

User Guide

LQ 4.2 User Guide



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LQ Series 4.2

Part Number: 399G227 Rev E

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Important Safety Instructions

- Intended Audience: Professional, Technical and Qualified Personnel
- Read these instructions.
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water.
- Clean only with dry cloth.
- Install in accordance with the manufacturer's instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer.
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way such as; power-cord supply or plug is damaged, liquid has been spilled, objects have fallen into the apparatus, the apparatus has been exposed to heavy rain, the apparatus does not operate normally.
- Caution: Shielded Cable Requirement
- Shielded Cable is required for ALL LQ SERIES GPIO Port connectivity. Shielded Cable must be used to assure compliance with domestic and international emissions standards. Customers, Installers and or qualified Personnel failing to use shielded cables may cause radio interference in which case the user may be required to take adequate measures.

1 Overview

1.1 About LQ

LQ™ linking facilitates interfacing to any 2-wire partyline, 4-wire and 4-wire+GPIO endpoints either local or remote over any IP network.

The product line provides a unique combination of low latency with exceptional audio quality and an intuitive, easy to use design.

LQ 4.0 and above also offers connectivity to HelixNet systems, SIP lines and the Clear-Com mobile client, Agent-IC.

LQ is available in 8 models; the LQ-2W2, LQ-4W2 and LQ-4WG2 devices are small, robust 2-port throw-down boxes for fast and convenient installation.

The LQ-R devices (LQ-R4W8, LQ-R2W4-4W4, LQR-2W4, LQ-R4WG8, LQ-R2W4+4WG4) are single rack units providing 4 or 8 ports in a combination of 4-wire, 4-wire + GPIO and 2-wire options for more extensive installations.

1.2 The LQ product line offers:

- HelixNet linking. HelixNet to IVC connectivity via an LQ unit allows HelixNet to connect to a Clear-Com Eclipse matrix system.
- SIP connectivity. Up to 8 SIP clients can be connected to each LQ device.
- Agent-IC. Up to 8 Agent-IC clients can be connected to each LQ device.
- A mix of hardware and virtual ports of audio can be routed through the system using customizable Virtual Partylines. LQ Series 4.0 and above offers a mix of physical and 'virtual' ports.
- Each LQ-R unit allows up to 24 ports:
 - 8 hardware ports
 - 8 SIP ports
 - 8 virtual ports. IVC ports and Agent-IC ports are considered 'virtual' ports. Virtual ports can be used in any combination up to 8 in total.
- Up to six LQ units can be linked together providing a robust network for audio over IP
- Browser- based Core Configuration Manager (CCM)
- Adjustable audio quality settings to make the best use of available network resources

- Low latency OPUS codec
- LQ throw-down units: external power supply or Power over Ethernet (PoE)
- LQ 1-RU devices: dual redundant external power supply
- IVC-32 linking with Clear-Com Eclipse frames using G.722 codec (EHX 8.7 and above).

1.3 2-wire features

- 2-wire throw-down units can be powered locally by PoE or external PSU
- 2-wire line termination
- Auto nulling
- Clear-Com/RTS modes with both RMK/Call signaling pass-through (Clear-Com only).

1.4 4-wire features

- Port Function switching alleviates the need for crossover cables
- Panel data pass-through facilitates the connection of Clear-Com panels to matrix over any IP network
- Call signaling.

1.5 4-wire + GPIO features

- Network Control Events for flexible and scalable activation and passing of GPIO and controls
- Designed to work with low power 2-way radios (or any device that uses a relay trigger)
- Passes GPIO/control/data between LQ and Eclipse Matrix frame.

1.6 Clear-Com Cable Recommendations

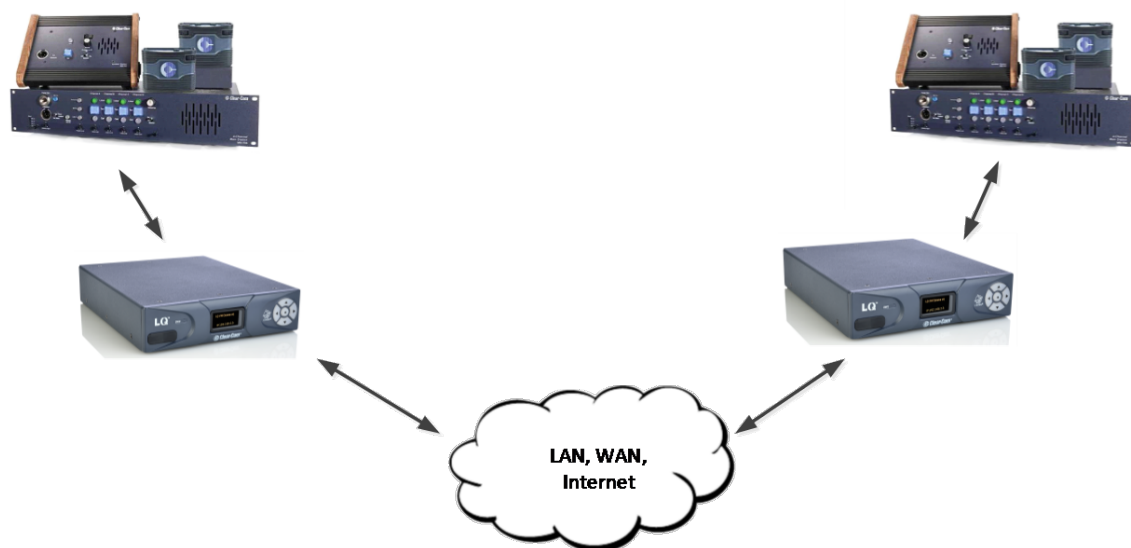
Use the following Category (Cat), American Wire Gauge (AWG) and shielded cable types:

1.6.1 Cable recommendations

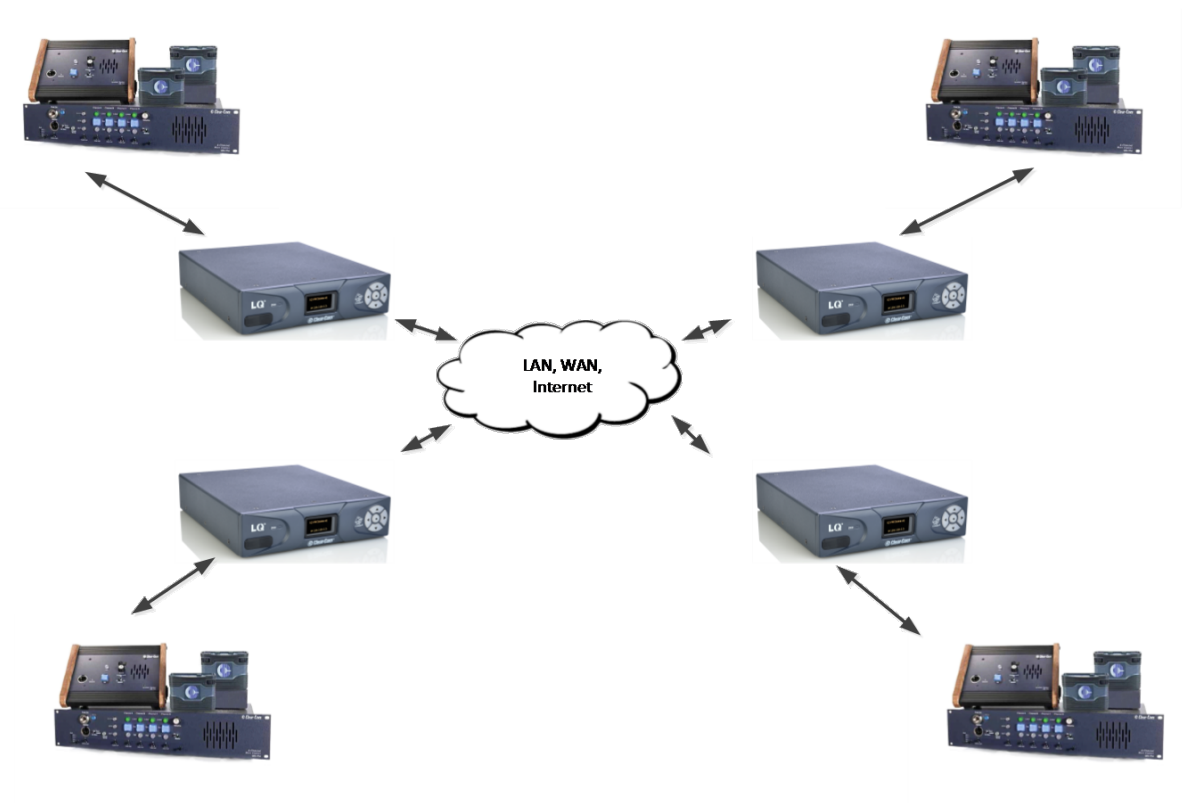
Category (Cat)	<ul style="list-style-type: none"> Higher Cat numbers will support a higher bandwidth. Therefore, by using a higher Cat number, you are future proofing your system to some extent. Example: Cat5; up to 1G. Cat6; up to 10G. Use CAT5e or higher.
American Wire Gauge (AWG)	<ul style="list-style-type: none"> The lower the AWG number, the less temperature rise there will be in the cable when using PoE. This is particularly important for bundles. Local building regulations may rule out the use of 26AWG or higher, depending on the installation. Check with your local building regulations. Use AWG 24 or lower.
Shielded Twisted Pair (STP) or Foiled Twisted Pair (FTP)	Using shielded cable means less problems with interference from other sources. This means that your network will be more robust if you use shielded cables.
Overall Recommendation	Use CAT6a 23 AWG STP cable.

1.7 Example Applications: 2-Wire Connections

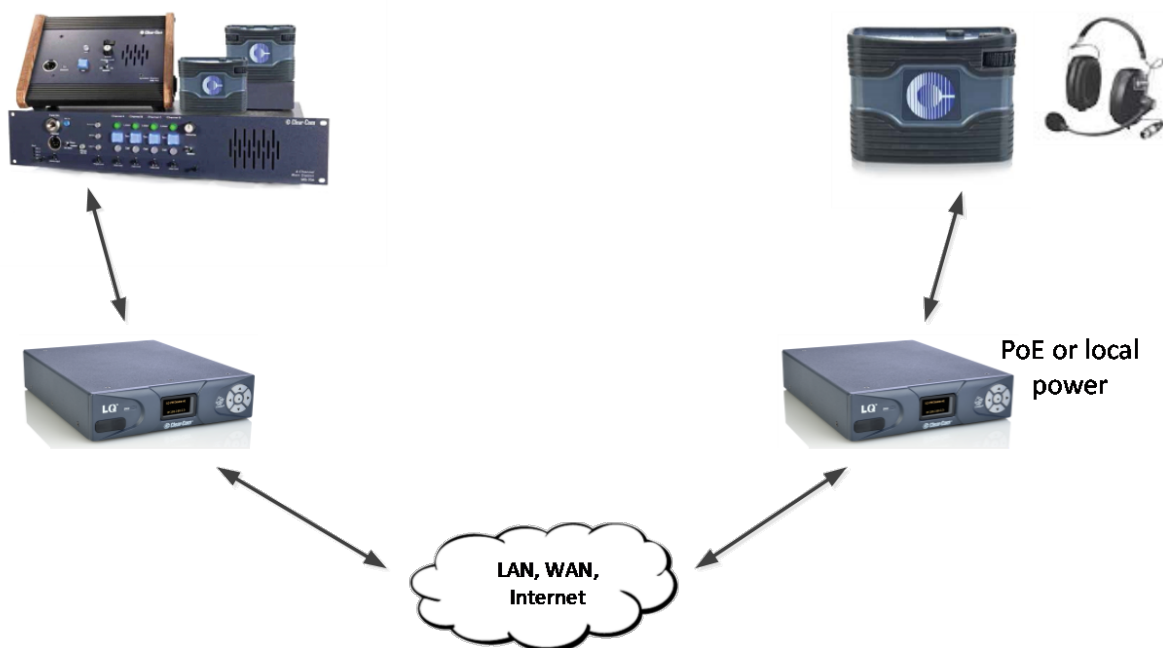
1.7.1 Partyline to partyline (2-wire connection)



1.7.2 Partyline to partyline (2-wire connection) #2.

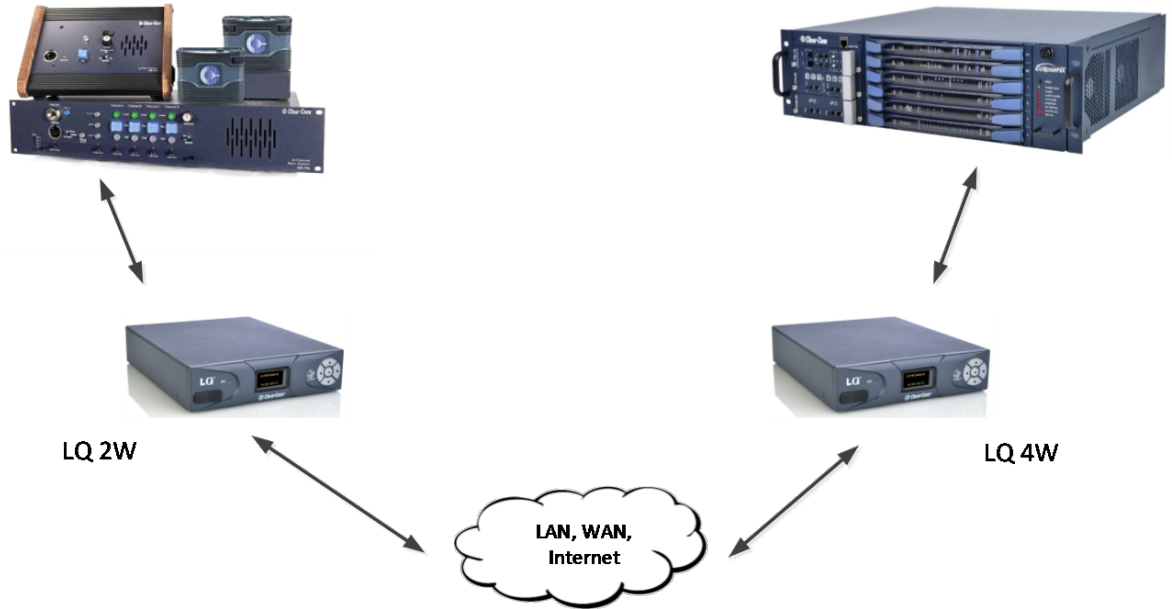


1.7.3 Partyline to beltpack

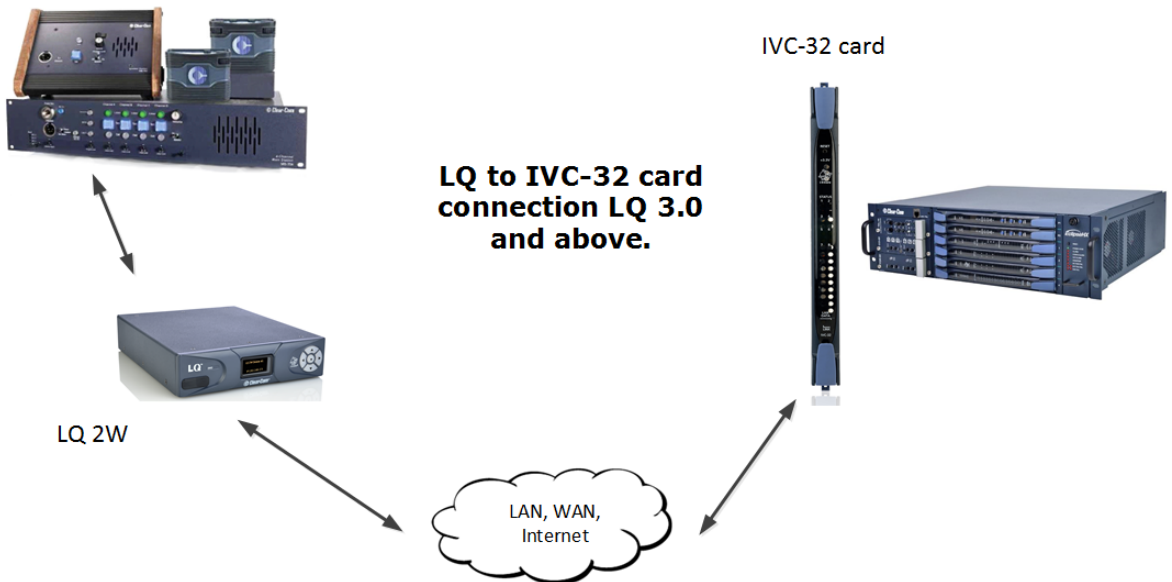


1.8 Example Applications: LQ to Matrix Connections

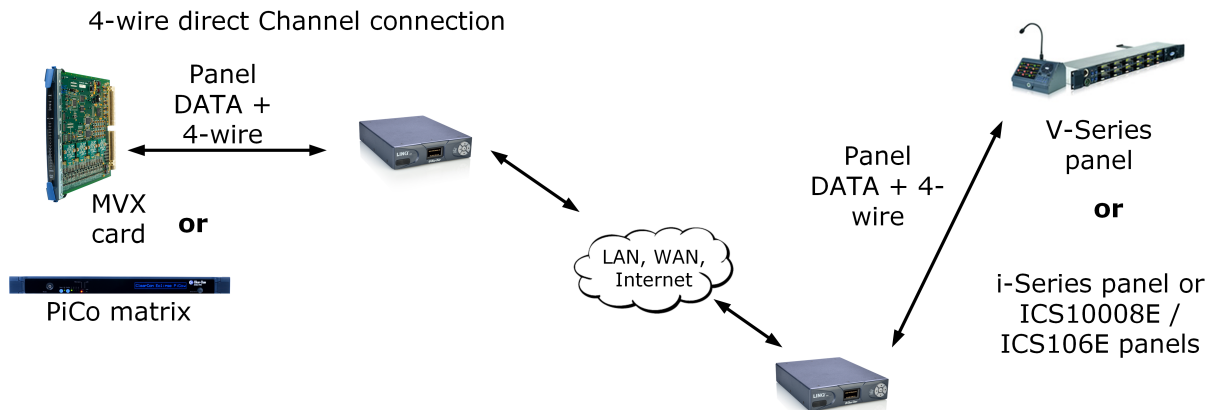
1.8.1 Partyline to matrix (2-wire to 4-wire)



1.8.2 LQ 3.0 to matrix using an IVC-32 port.

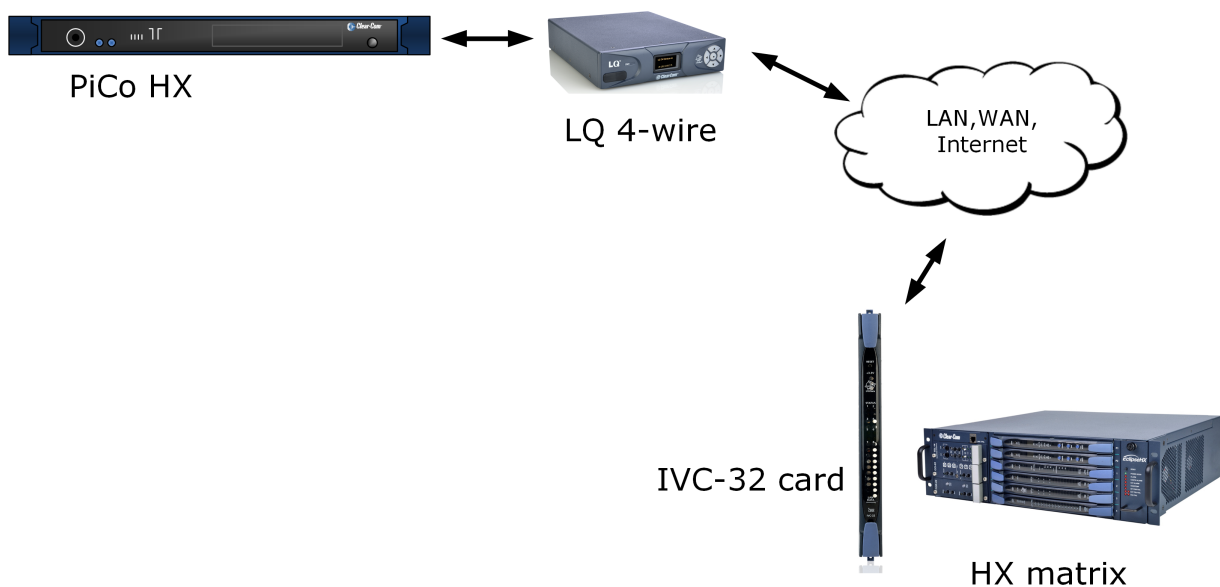


1.8.3 Remote panel to matrix connection



1.8.4 PiCo HX to Eclipse HX (8.7)

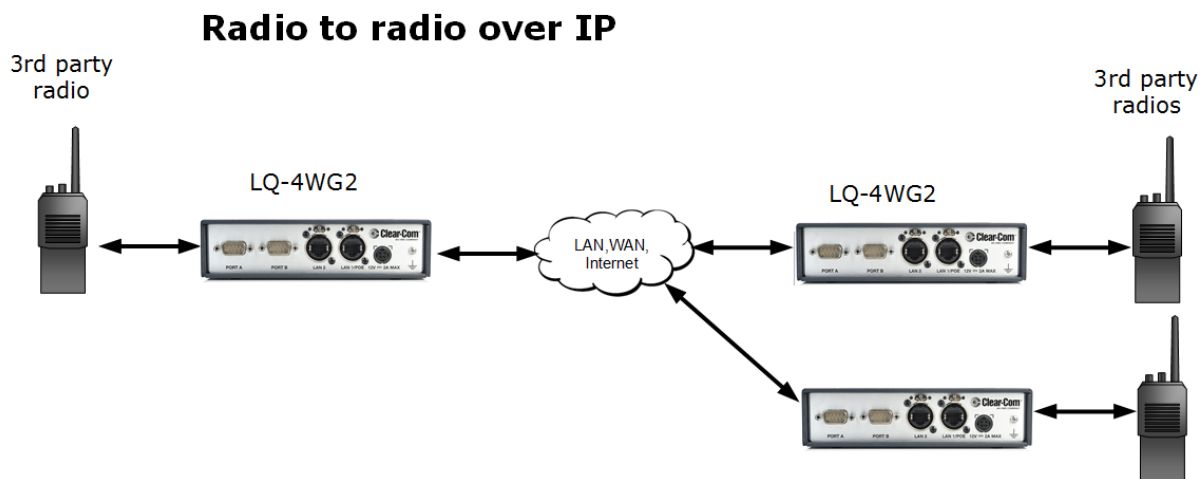
IP trunking: Eclipse HX to PiCo HX (EHX 8.7 and above)



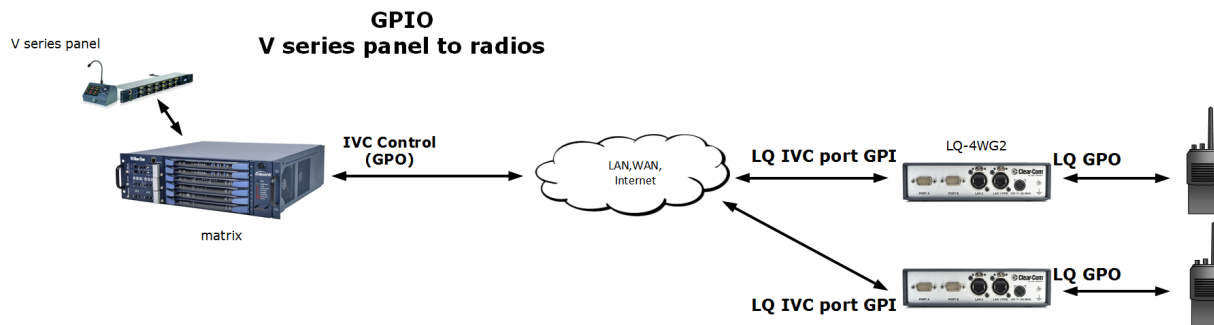
1.9 Example Applications: Radio connections (GPIO)

GPIO signals are converted to digital signals and then passed across the IP infrastructure (as with a 2-wire call signal).

1.9.1 Radio to radio

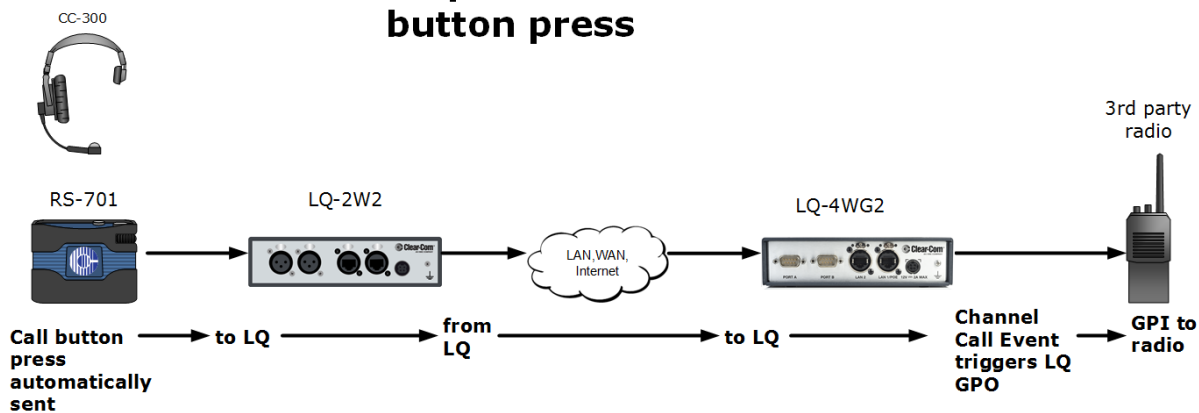


1.9.2 Panel to radio



1.9.3 Call button to radio

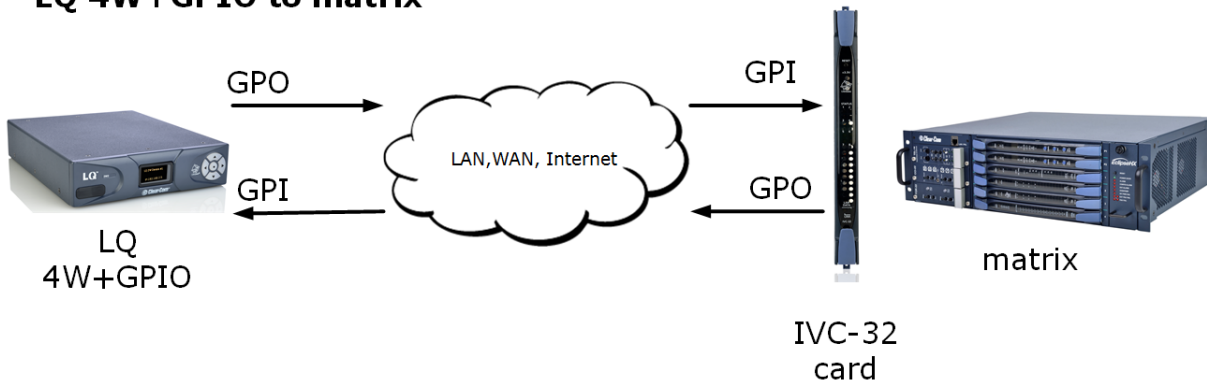
GPO from beltpack to radio on Call button press



For configuration details see [What are Channel Logic Events and how do I use them?](#) and [GPIO: Examples and step-by-step setup, Example 1.a.](#)

1.9.4 LQ 4W+GPIO to and from matrix

LQ 4W+GPIO to matrix



1.10 LQ and LQ-R Series Models

1.10.1 LQ-2W2 Throw-down unit



Two 2-wire Partyline connectors (XLR-3F)

1.10.2 LQ-4W2 Throw-down unit.



Two 4-wire connectors (etherCON RJ45)

1.10.3 LQ-4WG2 Throw-down unit.



Two 4-wire +GPIO connectors (DB-9M)

1.10.4 LQ-R2W4 1 RU unit.



Four 2-wire loop-through ports. (XLR-3M/XLR-3F)

Dual redundant power supply connectors

1.10.5 LQ-R4W8 1 RU unit.



Eight 4-wire connectors, (etherCON RJ45)

Dual redundant power supply connectors

1.10.6 LQ-R2W4-4W4 1 RU unit.



Four 2-wire connectors (XLR-3F)

Four 4-wire connectors (etherCON RJ45)

Dual redundant power supply connectors

1.10.7 LQ-R4WG8 1 RU unit.



Eight 4-wire +GPIO connectors (DB-9M)

Dual redundant power supply connectors

1.10.8 LQ-R2W4+4WG4.

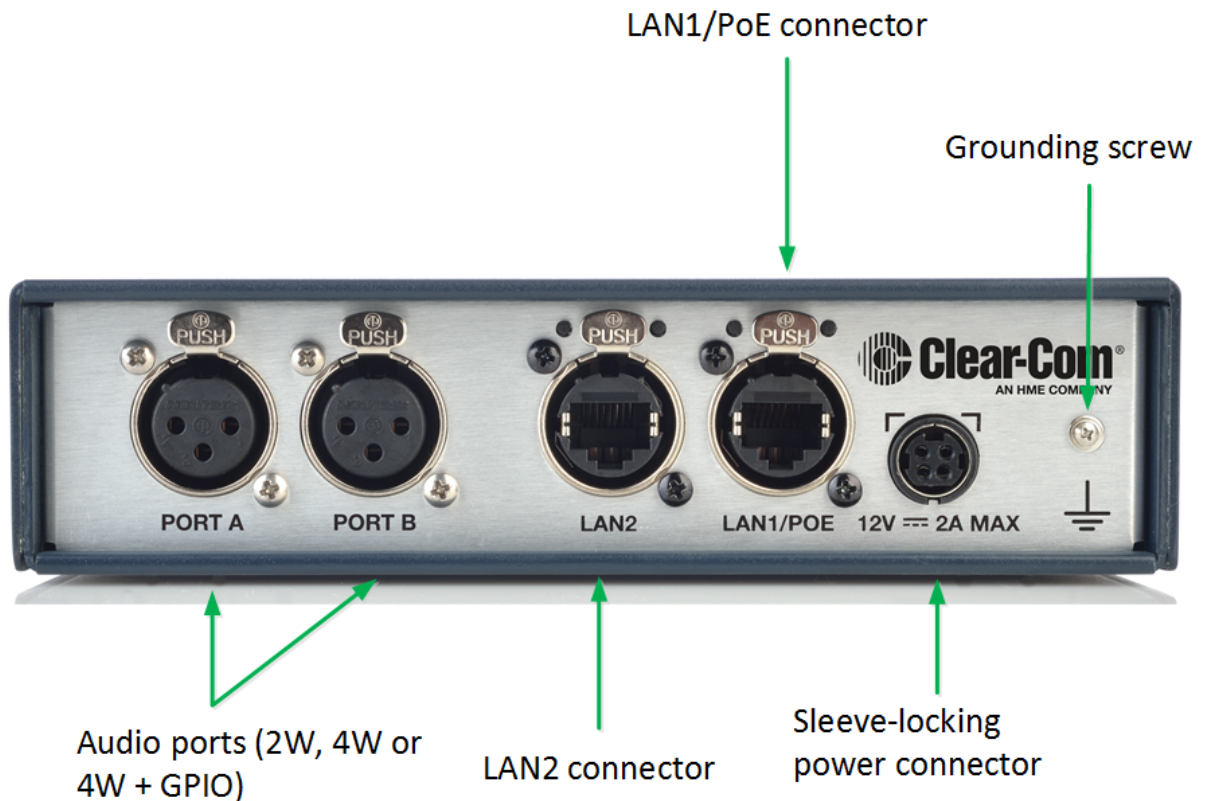


Four 2-wire connectors (XLR-3F)

Four 4-wire +GPIO connectors (DB-9M)

Dual redundant power supply connectors

2 Powering your LQ



Using the power supply unit (PSU)

- LQ units are supplied with a 24 watt sleeve-locking power connector.
- LQ-R 1RU units are supplied with two 60 watt sleeve-locking power connectors. Use either power connector, or both to guard against one power supply failing.

Note: *When connecting the sleeve-locking power cable, be sure to push until the connector locks into the device.*

Note: *The 60 watt PSU can be used with the throw-down units if necessary.*

Understanding power display icons

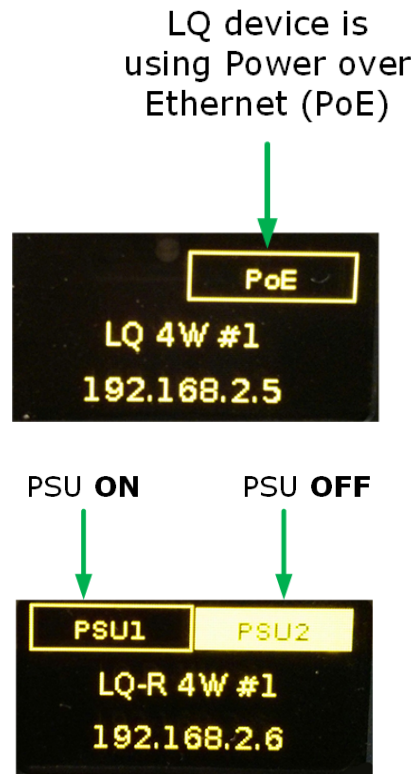
You will be able to see the power status of your device from:

- The front panel of the unit
- The device icon in the web based configuration tool (the CCM).

These indicators will show if the unit is using PoE or the PSU (LQ throw-down units), and which of the two power supplies (or both) are in use for the LQ-R units.

LQ throw-down units

If the device is using the PSU, this will be lit up instead of the PoE indicator.



LQ-R 1 RU units

2.1 Using Power over Ethernet (PoE) with 2-Port Units

The 2-port units will receive power from the LAN1/PoE connector if required (this is not the case for the larger LQ-R units).

When using PoE the LQ-2W2 supplies approximately 70 mA of power to drive the wired beltpacks (about two beltpacks).

The units draw up to 12 watts of power (depending on what is connected to them), so when using PoE you should have at least a Class 3 PoE switch.

If you exceed the power of your switch or network, the LQ device(s) will show a persistent flashing green light, and not move beyond the Clear-Com splash screen. This indicates that the device is continually booting and needs more power. Consider using the supplied sleeve-locking connector cable or a higher Class PoE switch.

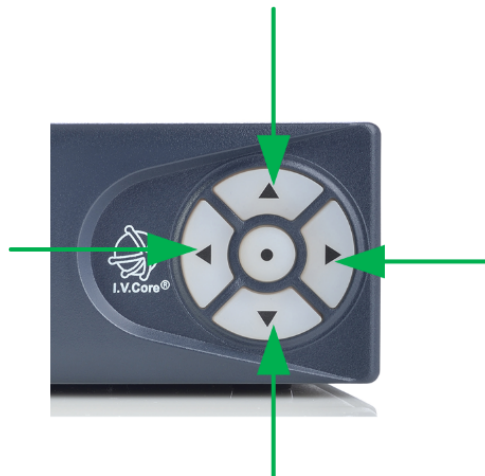
2.2 Power 2-Wire Beltpacks from the Partyline

2-wire beltpacks take power from the Partyline. The maximum numbers are shown in the table below.

LQ series unit	Power supply	Number of beltpacks powered by the Partyline
LQ	24 watts	150 mA (~5 beltpacks) per device
LQ	PoE (device draws up to 12 watts)	70 mA (~2 beltpacks) per device
LQ-R	60 watts	250 mA (~10 beltpacks per pair of ports, max 20 per device)

2.3 Reboot System

The system will start its boot sequence immediately when power is applied. If you need to reboot for any reason, either cycle the power or press all four direction keys on the control panel on the front of the LQ unit at the same time.



Press all four direction keys at the same time to reboot.

The system can also be rebooted using the front panel menu screens: **Menu > Administration > Reboot** and from the CCM: **Device > General > Maintenance > Reboot**.

3 Core Configuration Manager (CCM) walkthrough

This section gives you an overview of your configuration tool. Find context sensitive help in the user interface by clicking on the blue ? icon.

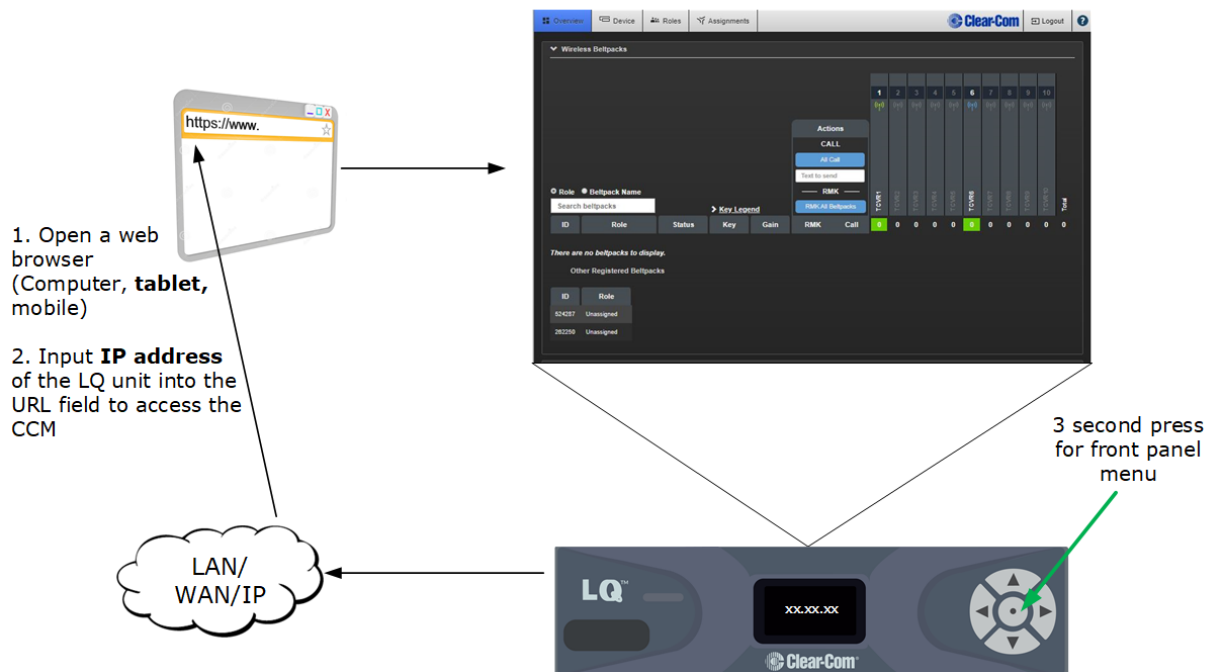
3.1 How to Access the Core Configuration Manager (CCM)

1. Make sure the LQ device is connected to a network (either LAN connector on back of device).
2. Open a browser (PC, tablet, mobile) on the same network as the LQ device and input the IP address of your LQ in the address field. Find the IP address in the front menu screens of your device.

Core Configuration Manager (CCM)

Username: **admin**

Find password: **Front panel menu>Networking>CCM password>[unique password]**



3.1.1 Minimum requirements for the CCM

Supported on the latest versions of all major web browsers (i.e. Google Chrome, Safari, Firefox, Internet Explorer, Opera).

3.2 The Core Configuration Manager (CCM) Password

The username for the CCM is: **admin**.

The default password is unique to each device.

To find the default password navigate to: **Front panel menu>Networking>CCM Password>[unique password]**.

The default unique password can only be viewed in the front panel menu of the device UNTIL you change it in the CCM. If you change the password it is no longer available in the front panel menus. If you lose your CCM password, you can reset it to the default from the front panel menu in order to gain access to the CCM.

3.2.1 Change the CCM password from the default setting

In the CCM, navigate to: **Device>General>Change password**.

3.2.2 Reset the CCM password from the front panel menus

Press and hold the **Menu** button for 3 seconds (the menu button is the center button on the circular control pad).

Using the navigation arrows, navigate to **Front panel menu>Administration>Reset CCM pass>Reset CCM pass**.

Push the menu button to select an option or commit changes.

Once you have reset the password, it is available for you to view under **Networking** in the front panel menu.

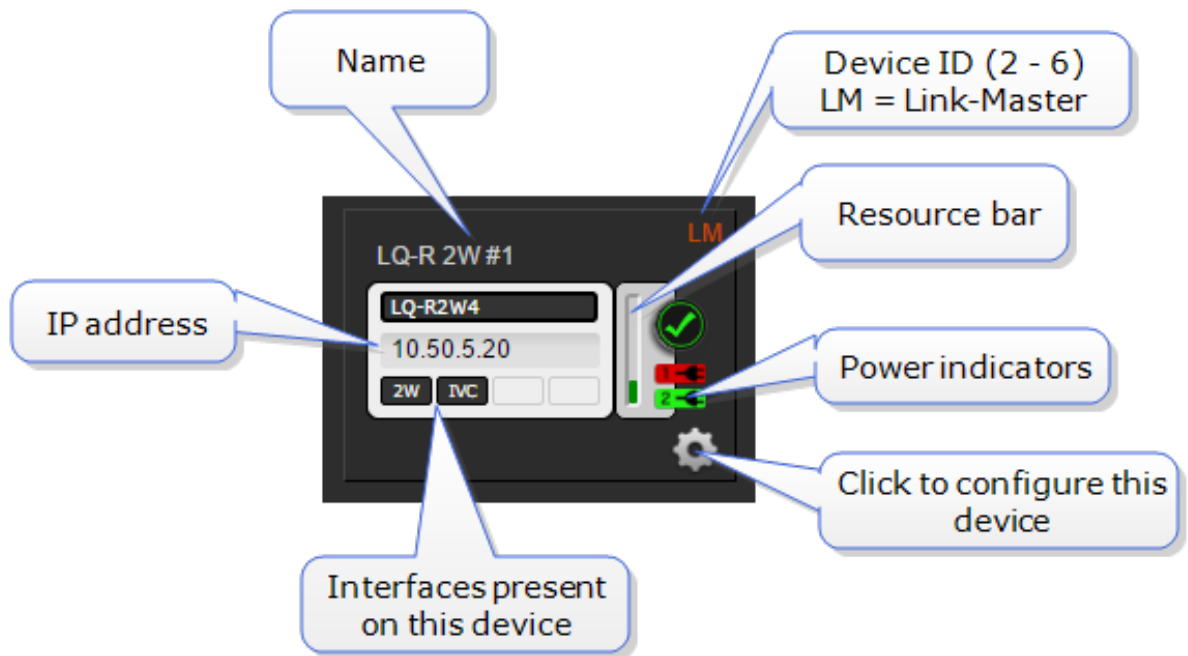
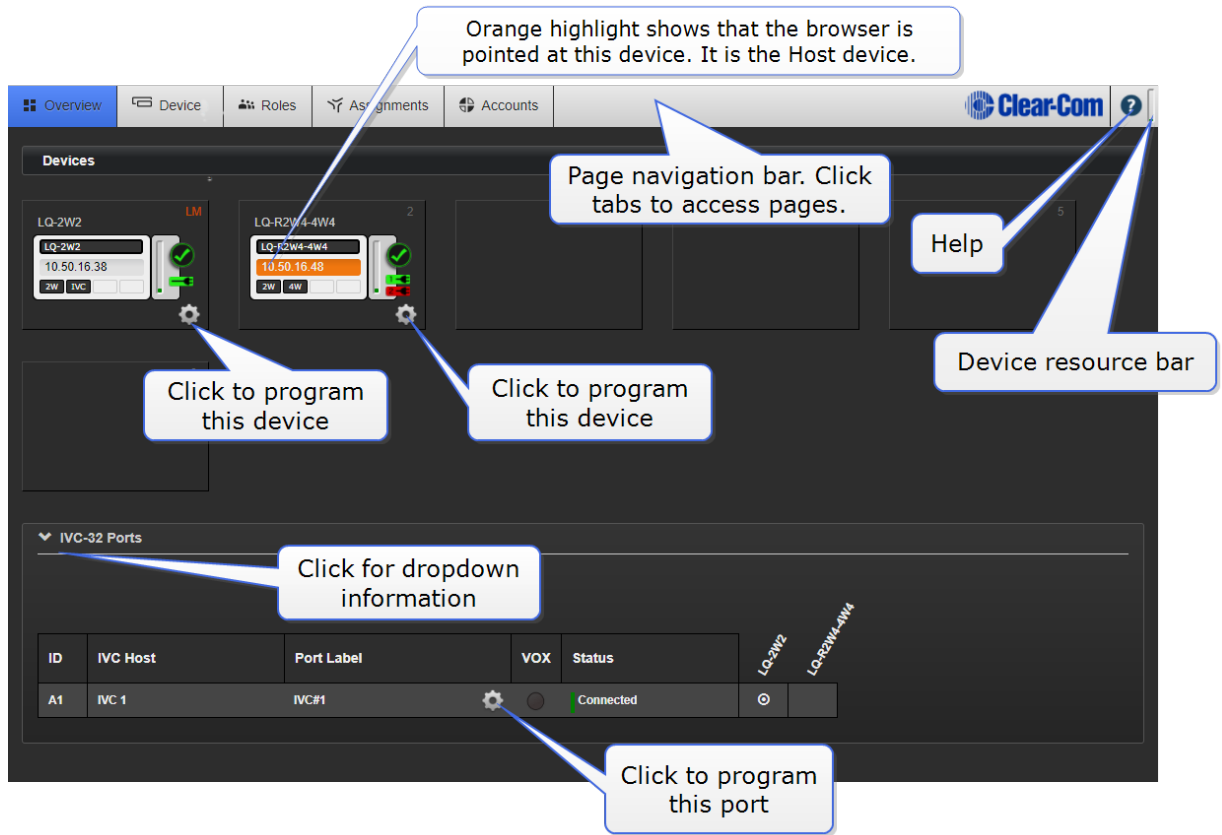
3.3 Overview

This page shows an overview of all the devices in your system. Devices in the upper part of the page are the units in a Link-Group. As LQs are added to the group, they appear in this screen. A HelixNet device can also be included in a Link-Group (LQ 4.0 and above).

On the lower part of the screen you can see the external systems that your LQ device is connected to. These can be:

- IVC (matrix) connections
- SIP (telephony interface) connections
- Agent-IC (mobile client) connections.

If you have a HelixNet in your Link-Group, you will see the remote units that are connected to the HelixNet Main Station in the lower half of the Overview screen.



3.3.1 Device Configuration

Devices in a Link-Group can be configured either directly or by proxy, meaning that the configuration operations for a unit are routed through the host device. The host device is the unit which the browser is currently pointed to (orange highlight).

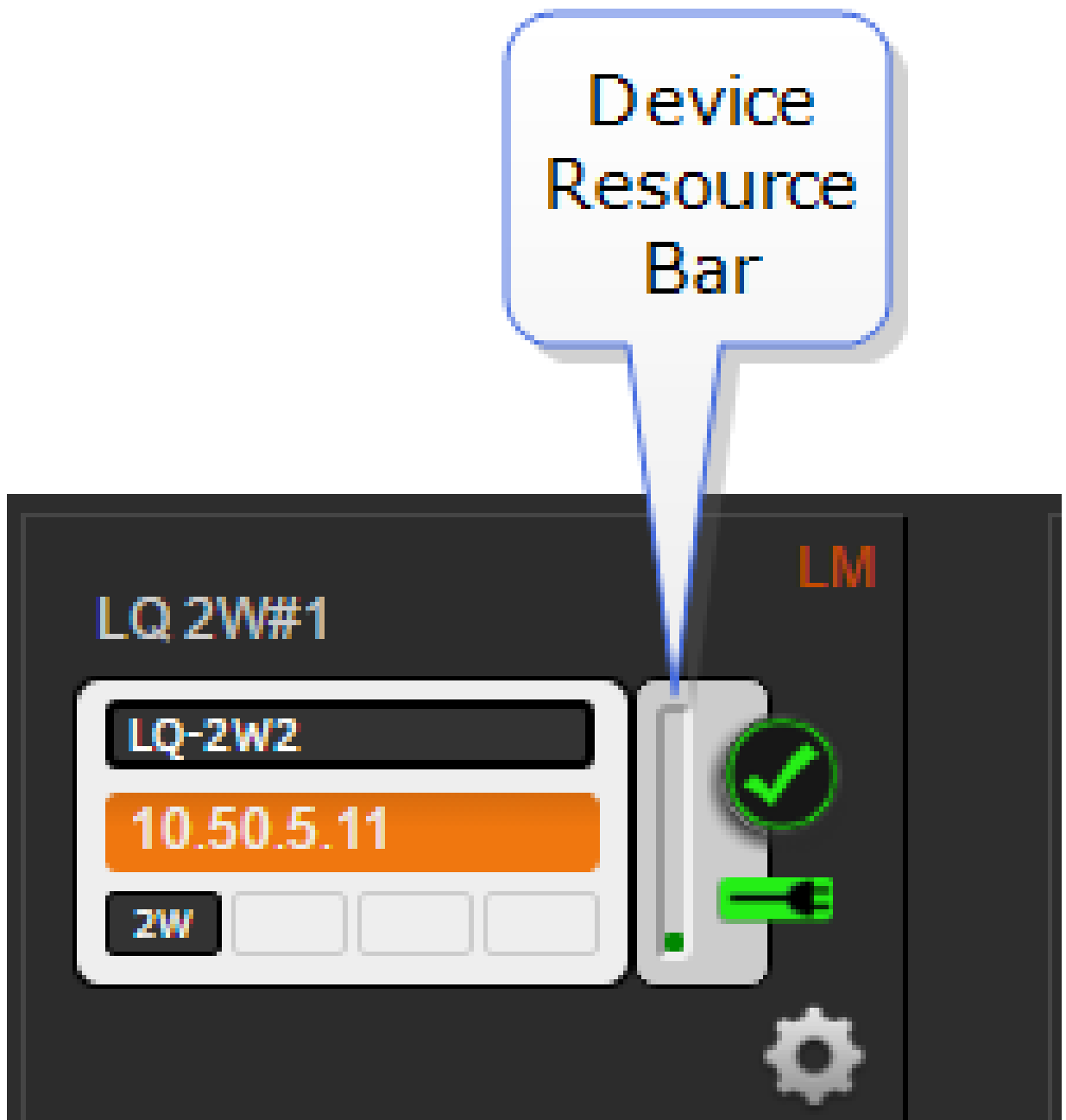
Click on the gear icon on any device.



You can use the Overview page to obtain diagnostic information for your all systems. Whenever you see a > symbol, click to see a drop-down section.

Clicking the gear icon in any part of the CCM always takes you to programming options.

3.3.2 Resource Bar



About the Resource Bar

The Resource Bar is a tool that indicates the amount of processor power currently allocated on that device.

- Bar orange = 70% of processing power reached
- Bar red = 80% of processing power reached

The device will work in the red zone, but the reliability of the audio response may decrease.

The CCM will start limiting demands on the unit (for example it will prevent a port being added to a Channel, or the addition of an IVC-32 or multi-Channel port) in order to maintain good audio quality and responsiveness.

To optimize resource usage

- Reduce the network quality in the local audio mixes. Higher network quality takes more resource.
- Reduce the number of ports that are in different Channels. Several ports in the same Channel do not take much resource. It is more demanding if the ports are spread over several Channels.
- Using a **LAN/WAN/Routed Network Optimization** mode will reduce the overall resource usage (set **Link-Group Optimization** mode in the **Linking** page of the CCM).

3.4 Device

The **Device** page takes you to the configuration options local to your LQ device. On the left you see configuration page buttons; **General**, **Network**, **Linking** and **Ports**. Switch between devices in a Link-Group using the dropdown menu just above the device icon.

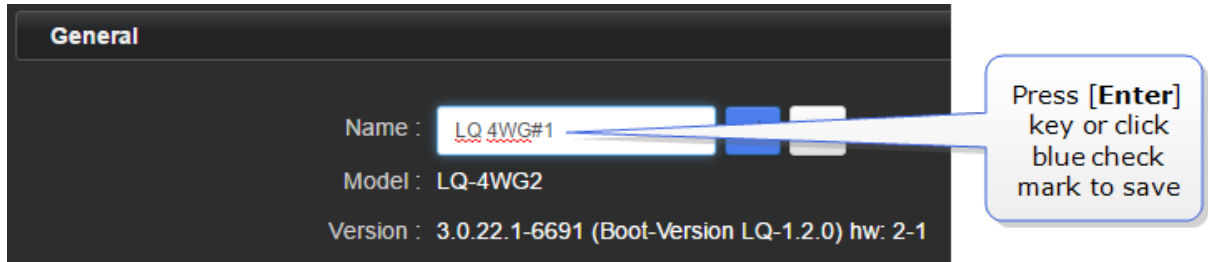
The screenshot shows the 'Device' configuration page for an LQ-2W2 device. The interface includes a top navigation bar with 'Overview', 'Device', 'Roles', 'Assignments', and 'Accounts'. The main content area is divided into a left sidebar with configuration buttons (General, Network, Linking, Ports) and a right pane for the selected configuration page (General). Callouts provide the following instructions:

- Click this dropdown to select different LQ devices. This allows access to devices and configuration by proxy.
- Orange highlight shows that the browser is pointed at this device. It is the Host device.
- Click a button to access configuration pages
- Click an arrow to toggle dropdown configuration options

3.4.1 General Settings

Configuration options local to your LQ Series 4.0 and above device.

3.4.2 Re-name your LQ.



3.4.3 Change Password

Change the password to the Core Configuration Manager local to that device. You can only change the password from the Host device, not by proxy.

3.4.4 License

Click here to activate licenses for SIP or Agent-IC clients.

For more information, see:

Licensing on page 151

3.4.5 Upgrade

Click **Select File** and navigate to where you have stored the upgrade file (.gz extension). Then click **Upgrade** when the Upgrade button turns blue. Wait while the device reboots itself.

An LQ unit must be upgraded from the host device (the device that the browser is currently addressing). The units cannot be upgraded by proxy.

To access a device directly as a host you must input that unit's IP address into a browser to access the CCM. The host device always has an orange highlight.

Note: *All devices in a Link-Group MUST be running the same version of the software; you must upgrade all devices in the group.*

After upgrades you are advised to check linking connections and auto null partyline ports.

3.4.6 Maintenance

Reset the unit to default settings.

Reboot the system.

Create a support archive. **Support Info** provides a 'snapshot' of the device's operational information for troubleshooting purposes.

3.5 Network

Dynamic host control protocol (DHCP) or Static IP address allocation?

Default setting: **DHCP**

It is recommended that the Link-Master in a Link-Group has a static IP address.

Most networks use DHCP to allocate IP addresses. Because of this, DHCP is recommended for fast set-up as the devices can be immediately connected to any network that provides DHCP. The addresses provided are dynamic and may change from time to time. Because DHCP IP addresses can change, the Link-Master should have a static IP address, or it may lose connectivity to the group. **Link-Local Environments on page 71**

3.5.1 External IP address and External Port setting

For efficient networking, these details should be set for any LQ device that connects over a firewall.

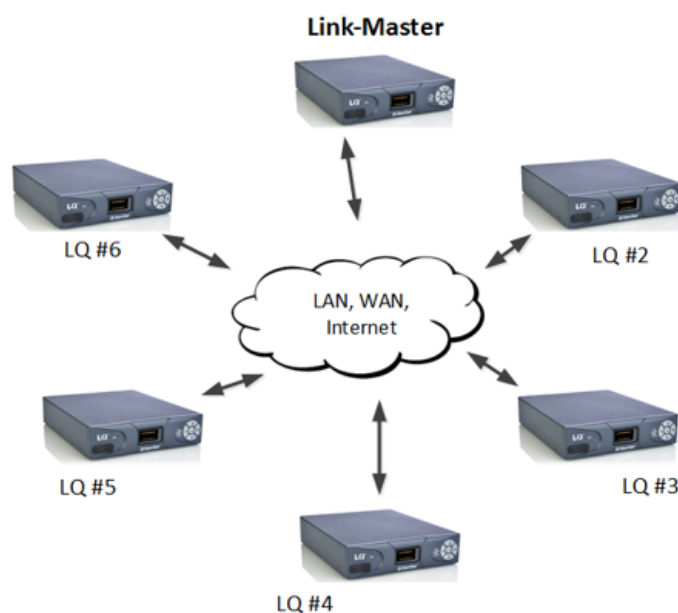
Note: *The Link-Master uses TCP port 80 for management, and TCP/UDP port 655 for audio. See **Linking over Internet or WAN** below for port addressing and port forwarding details.*

See your network administrator if you require network details.

3.6 Linking

In this page you can program a Link-Group. A Link-Group is a method for connecting LQ devices over LAN, WAN or internet so they share audio and data between them.

A Link-Group can contain both LQ devices and HelixNet Main Stations (LQ 4.0 and above).



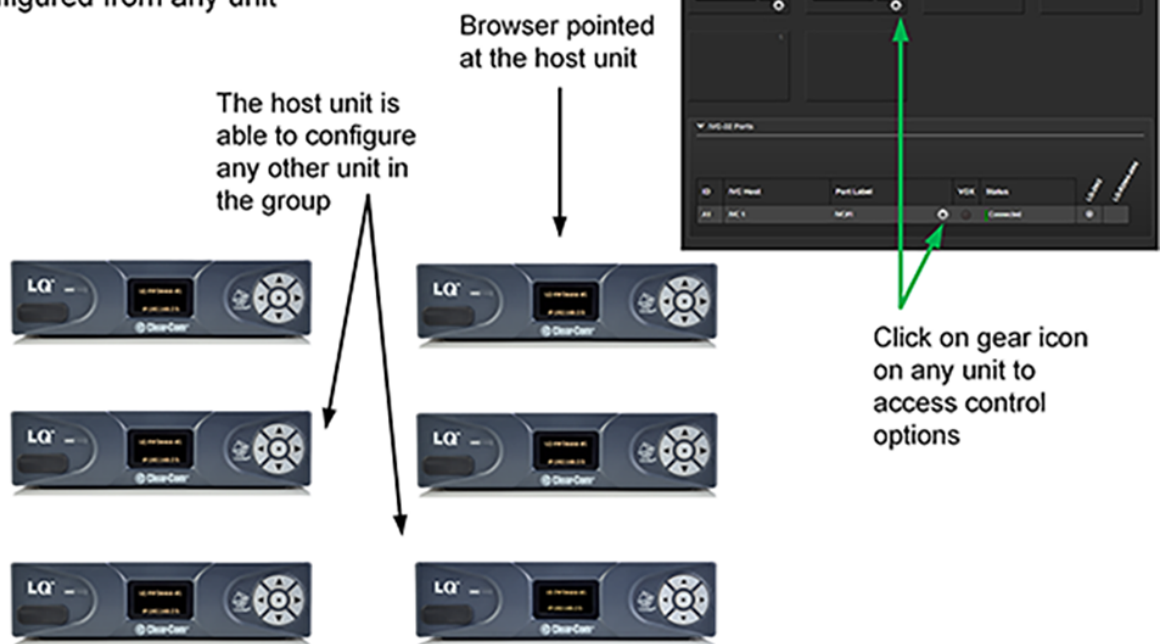
- 1 box is set to Link-Master
- Each LQ joins the group through the Link-Master
- Up to 6 LQs in a Link-Group

Channels

There are 24 channels within each Link-Group (channels can be added or taken away as required). Any port on any LQ can be assigned to any of the channels. To assign ports to channels navigate to **Assignments** in the Core Configuration Manager.

Devices can be seen and programmed from any device in the group.

Once connected, devices in a Link-Group can be configured from any unit

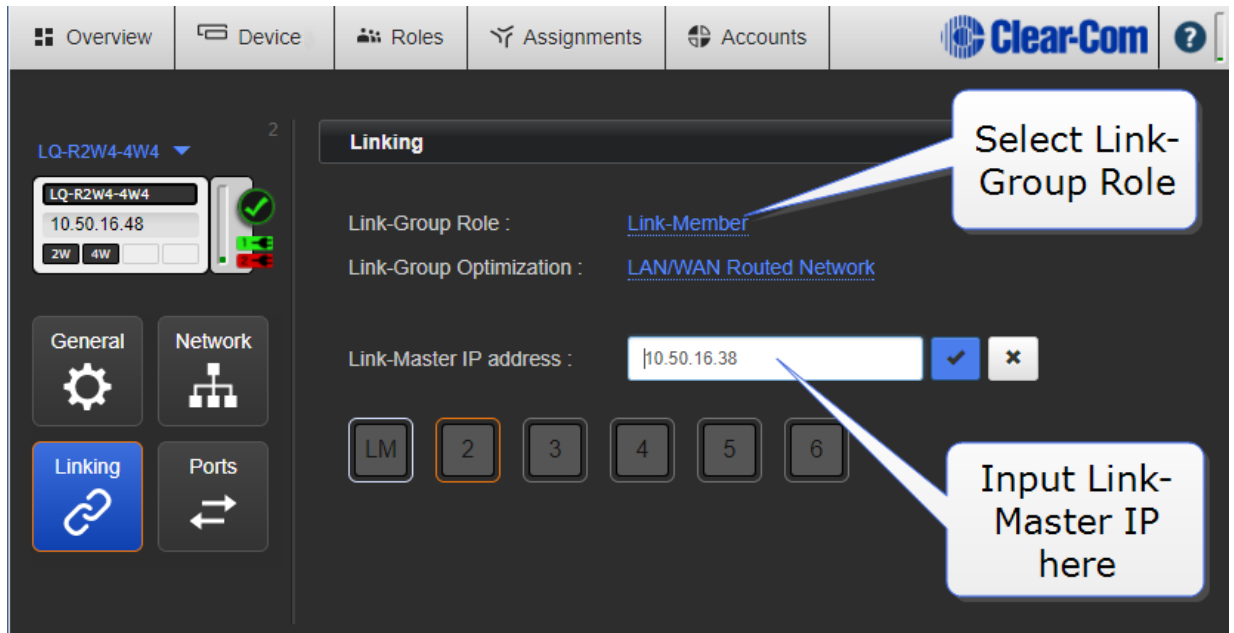


3.6.1 Link-Group Role

The Link-Master is responsible for synchronization and distribution of audio, Channel names and device availability throughout the Link-Group. Each group needs a Link-Master.

To create a group you must connect LQ member(s) to a Link-Master. Change this setting to **Link-Member** on the device to be connected to the master. When you change the role to Link-Member, you can then enter the Link-Master IP address here to link the devices. Find the device IP in the front menu screen of the device.

Note: *If linking with a HelixNet Main Station, the HelixNet device must always be designated the Link-Master.*



To take an LQ device out of a Link-Group, change it's role back to Link-Master here. This will disconnect the device from the group.

Related Links

About Linking on page 60

Creating a Link-Group on page 48

3.6.2 Link-Group Optimization

Internet/NATed network (Default mode)

Use this setting whenever the network you are using crosses firewalls. This is the default mode and will work with all networks. However, it requires more processing power of the LQ device and may affect latency.

LAN/WAN network

Use this mode when using LQ in a private network. It uses less network and CPU resources and gives better latency than the default.

3.6.3 Link-Master IP

Enter the Link-Master IP address to link a device to a group. You only see this field when the device is set to **Link-Member**.

See **Creating a Link-Group on page 48** for step by step details.

If connecting over firewalls, this will be the Link-Master's external (public) IP address and the port mapped to TCP port 80 at the firewall.

See **Linking over Internet or WAN on page 62** for port forwarding details.

Related links

Internet Connectivity on page 72

3.7 Ports

Settings vary according to port type.

LQ 4.0 and above allows five different port types: 2-wire, 4-wire, GPIO, IVC and SIP. You will see the port types available to your system in this page. Use the Port Selector to select ports for programming. Use the drop-down device selector for moving between different devices in a Link-Group.

In this page you can set port variables such as input gain (volume) and VOX detection. You can name the port here. More than one port can be selected for configuration at one time.

You can also program the GPIO triggers for your system, allowing relays to be sent to radios or other remote and third party equipment.

In LQ 3.0 and above, it is possible to put ports in more than one Channel.

VOX settings are available on all LQ port types.

If you have Link-Group, navigate between devices here

LQ. 4.0 allows 5 different port types: 2-wire, 4-wire, GPIO, IVC and SIP. You only see IVC and SIP ports if they have been previously configured.

Use the port selector section to select required port type. Selected port has an orange highlight.

Click ports button

Port configuration options are here

Overview | Device | Roles | Assignments | Accounts | Clear-Com

LQ 4W#1 LM

General | Network | Linking | **Ports**

Audio Ports

4-Wire

- A 1-4W-Port A
- B 1-4W-Port B

IVC

- A1 IVC SIP 49

SIP

- A1 2001
- A2 2002
- A3 3000
- A4 4000
- A5 2003
- A6 2004

Port Settings

Label : 1-4W-Port A

Multi Channel Support : Disabled

Input Gain : 0 dB

Output Gain : 0 dB

VOX

VOX Mode : Disabled

VOX Off Delay : Not set

VOX Threshold : Not set

VOX Action Triggers : Not set

4-Wire

Port Function : [to Matrix](#)

Baud Rate : [19200 \(Eclipse\)](#)

3.7.1 2-Wire specific settings

Enable Multi Channel Support if you want to put this port into more than one Channel.

Select action trigger. See Network Control Events.

You must perform an auto-null when any change in the connected 2-wire equipment occurs or there is a significant temperature change

Enable power as required. Enabling power automatically enables termination.

Enable VOX Mode if you want to use VOX to trigger an action.

Termination can be toggled on or off. Termination should not be enabled on more than one connected device.

Autonull: You must perform auto-null when any change in the connected 2-wire equipment occurs or there is a significant temperature change.

Termination: Termination is enabled automatically when power is enabled on a 2-wire partyline. Termination should only be enabled on one device within a 2-wire circuit. Termination can be toggled off and on in the configuration user interface.

3.7.2 4-Wire specific settings

Overview Device Roles Assignments Accounts Clear-Com

LQ 4W#1 LM

10.50.12.21

4W IVC SIP

General Network

Linking Ports

Audio Ports

4-Wire

A 1-4W-Port A

B 1-4W-Port B

IVC

A1 IVC SIP 49

SIP

A1 2001

A2 2002

A3 3000

A4 4000

A5 2003

A6 2004

Port Settings

Label : 1-4W-Port A

Multi Channel Support : Disabled

Input Gain : 0 dB

Output Gain : 0 dB

VOX

VOX Mode : Disabled

VOX Off Delay : Not set

VOX Threshold : Not set

VOX Action Triggers : Not set

4-Wire

Port Function : to Matrix

Baud Rate : 19200 (Eclipse)

Enable this option if you want to put this port into more than one Channel

Click to enable VOX mode. Enabling this option will activate VOX action triggers

See **Network Control Events** for more information

Setting this option correctly avoids the use of a cross-over cable. See **Port Function**.

This setting depends on which equipment you are connecting to. It determines the data rate. The default is to Clear-Com equipment.

3.7.3 4-Wire GPIO specific settings

Overview Devices Roles Assignments Accounts Clear-Com

LQ 4WG#1 LM

10.50.16.45

4WG

General Network

Linking Ports

Audio Ports

4-Wire + GPIO

A 1-4W-Port A

B 1-4W-Port B

Port Settings

Label : 1-4W-Port A

Input Gain : 0 dB

Output Gain : 0 dB

Output Level : Line Level (0dB)

Multi Channel Support : Disabled

VOX

VOX Mode : Disabled

VOX Off Delay : Not set

VOX Threshold : Not set

VOX Action Triggers : Not set

GPIO

GPIO Action Triggers : Disabled

GPO Triggered By : Disabled

GPO Off Delay : None

Mic level option supports connection to devices that normally have a microphone connected directly to their audio input (handheld radios). Overall gain = Output Gain + Output Level.

Enable Multi Channel Support if you want to put this port into more than one Channel.

Enable VOX Mode if you want to use VOX to trigger an action.

GPI and GPO triggers. See Network Control Events for more information.

Select action trigger. See Network Control Events.

Note: A 4-wire+GPIO port will not transmit call signals in the form of data. The **GPO Output Trigger** must be set to **Channel Call Event**, or a signal will not be sent.

3.7.4 IVC-32

You only see IVC32 ports in this screen if they have been previously created in the **Accounts** page.

Enable VOX Mode if you want to use VOX to trigger an action.

Select action trigger. See Network

GPI and GPO triggers. See Network Control Events.

Enable Multi Channel Support if you want to put this port into more than one Channel.

EHX Managed (default) will use whatever network quality is set in the EHX software. The other options will override what is set in EHX.

Click here for error

Enabling Silence Suppression will stop transmission when silence is detected on the line. This conserves network resources.

3.7.5 SIP specific settings

You only see SIP ports if they have been previously created in the **Accounts** page.

The screenshot displays the 'Audio Ports' configuration interface for device LQ 4W#1. The interface includes a navigation menu on the left with options for Overview, Device, Roles, Assignments, and Accounts. The main content area is titled 'Audio Ports' and is divided into three sections: 4-Wire, IVC, and SIP. The 4-Wire section shows two ports, A and B, each with a checkbox for '1-4W-Port A' and '1-4W-Port B'. The IVC section shows port A1 with a checkbox for 'IVC SIP 49'. The SIP section shows a list of SIP accounts (A1-A6) with checkboxes for '2001', '2002', '3000', '4000', '2003', and '2004'. The '2001' checkbox is selected. To the right of the SIP section, there are configuration options for 'Accounts' and 'Port Settings'. The 'Accounts' section shows 'SIP Server Label : SIP 1' and 'Registrar / Proxy : 10.50.12.83:5060'. The 'Port Settings' section shows 'SIP Account Label : 2001', 'Input Gain : 0 dB', and 'Output Gain : 0 dB'. Below these are 'VOX' settings: 'VOX Mode : Disabled', 'VOX Off Delay : Not set', 'VOX Threshold : Not set', and 'VOX Action Triggers : Not set'. Three callouts are present: one pointing to the 'Accounts' section header labeled 'Program SIP Accounts', one pointing to the 'Registrar / Proxy' IP address labeled 'SIP server IP address and port', and one pointing to the 'SIP Account Label : 2001' labeled 'Click for information'.

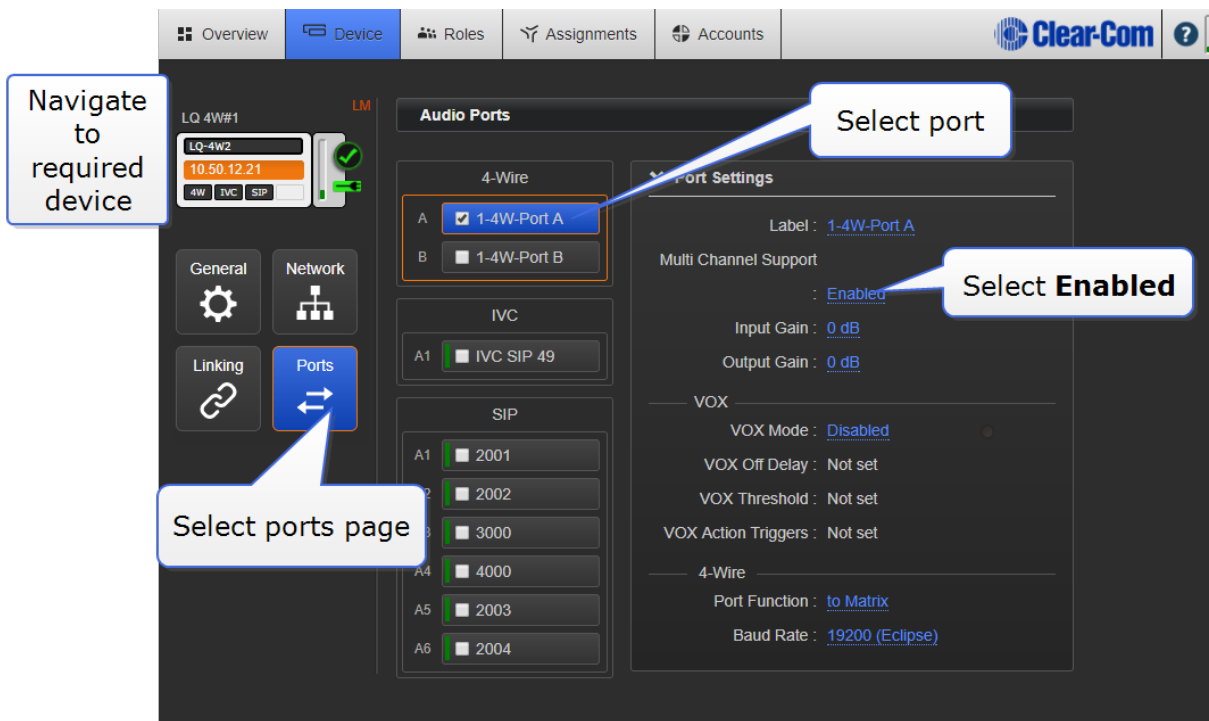
3.7.6 Multi-Channel Ports

It is possible to assign one port to many Channels. There is no limit on the amount of Channels a port can be put into, but the rules for device resource usage apply. When the unit is reaching the limits of its capacity, the user interface will stop you from assigning more ports.

When do I use multi-Channel ports?

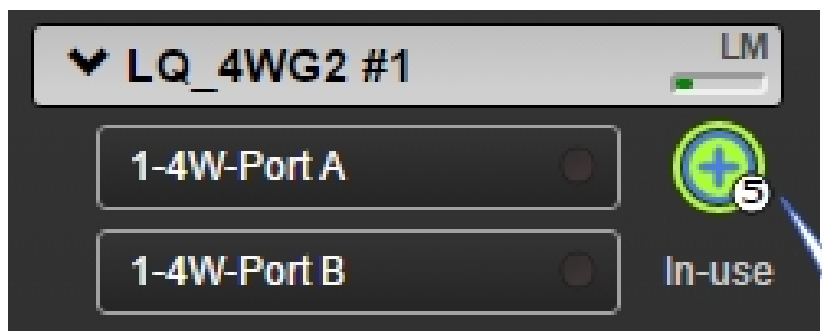
An example of when to use multi-Channel ports might be if you have a program feed or stage announce that should be heard by several teams or groups.

Enable multi-Channel port feature



Once enabled, multi-Channel ports are available in the Assignments page, ready to be assigned to more than one Channel.

Multi-Channel port icon.



Number of Channels the port is in

Note: *If the port has already been put into a Channel, it will be unassigned from the Channel when you enable multi-Channel support.*

For more information on how to put ports in Channels see **Assignments on page 41**.

Note: *Multi-Channel ports will not be placed in a local audio mix, they will be transported as a single audio stream. You can use the Resource Meter as a guideline for device capacity.*

3.8 Roles

When using LQ, some of the products you interconnect with use Roles for the purpose of intercom setup. Roles are preset configurations, used to simplify and control your intercom installation. You can work with default Roles which can be cloned or edited. You can also create your own Roles if required.

The products that use Roles when connecting to LQ devices are: HelixNet and Agent-IC.

When a HelixNet device is linked to LQ in a Link-Group set up, the Role configuration from the Master HelixNet device will override the LQ units.

For more information about HelixNet Role configuration, see the HelixNet User Guide, available from the Clear-Com website.

The screenshot shows the 'Roles' configuration page in the Clear-Com web interface. The page is divided into a left sidebar and a main content area. The sidebar contains a list of roles: 'Main Station (HMS)', 'HMS Default', 'Beltpack (HBP)', 'Remote Station (HRM)', 'Speaker Station (HKB)', and 'Agent-IC'. The 'HMS Default' role is selected and highlighted in orange. The main content area shows the configuration for the 'HMS Default' role, including a 'Keyset' section with four channels (Channel 1, Channel 2, Channel 3, Channel 4). Channel 1 is selected, and its key assignment is 'Channel 1' and 'Talk Latch: Latching'. Below the keyset are various output options: Station, Headset, Microphone, Program Input, Stage Announce Output, Hot Mic Output, Loudspeaker, GPI (Opto), and GPO (Relay). Callout boxes provide the following information:

- ADD:** Add a new Role. A new Role is always generated from an existing Role and then edited.
- CLONE:** Create a clone (copy) of this Role
- RESET:** This is the default Role for this device. Selected Role has an orange highlight.
- Channel 1:** Click here to assign this key to a different Channel. (Channel assignment toggles on and off)
- Main Station (HMS):** Click to configure HelixNet Main Station Roles
- Agent-IC:** Click to configure Agent-IC Roles

3.9 Assignments

Network transmission controls/transport settings are in this page (LQ only).

This is where you will assign ports to Channels. All devices, with their associated ports appear in the left margin of this page.

In the center are three tabs; chose from **All**, **Channels** and **Directs**.

Channels (up to 24 in total per Link-Group) are shown on the right.

To route audio:

1. Choose Channel type; Channel or Direct.
2. Click on an available Channel to select it or click '+' to create a new one.
3. With the Channel selected (orange highlight), click '+' next to the port you require to put into the Channel.
4. Repeat step 3 as often as required.

The screenshot shows the 'Assignments' page in the Clear-Com interface. The 'Channels' tab is selected, and 'Channel 1' is highlighted in orange. The interface includes a 'Ports' list on the left, a central 'Channel 1' configuration area, and a list of channels on the right. Callouts provide the following information:

- Add Channel:** Points to the green '+' icon in the top left of the main area.
- Channels tab:** Points to the 'Channels' tab in the top navigation bar.
- Assignments:** Points to the 'Assignments' page title in the top right.
- Click '+' to put port into selected Channel:** Points to the '+' icon next to the 'RS-701' port in the 'Ports' list.
- This symbol indicates that this port can be put in more than one Channel:** Points to the '2' in a circle next to the 'RS-701' port.
- Selected Channel has an orange highlight:** Points to the orange border around the 'Channel 1' configuration box.
- Local Audio Mix (submix):** Points to the 'LM' icon in the 'Channel 1' configuration area.

Note: *Network transmission controls (submix) are in this page.*

3.9.1 Channel or 4W Direct Channel?

An LQ Channel is made up of multiple audio sources which operate as a partyline. All sources in a Channel can hear and talk to each other. A 4-wire direct (panel) Channel, by contrast, is a connection between two ports only. A 4-wire direct (panel) connection cannot be included in a Channel and is configured separately.

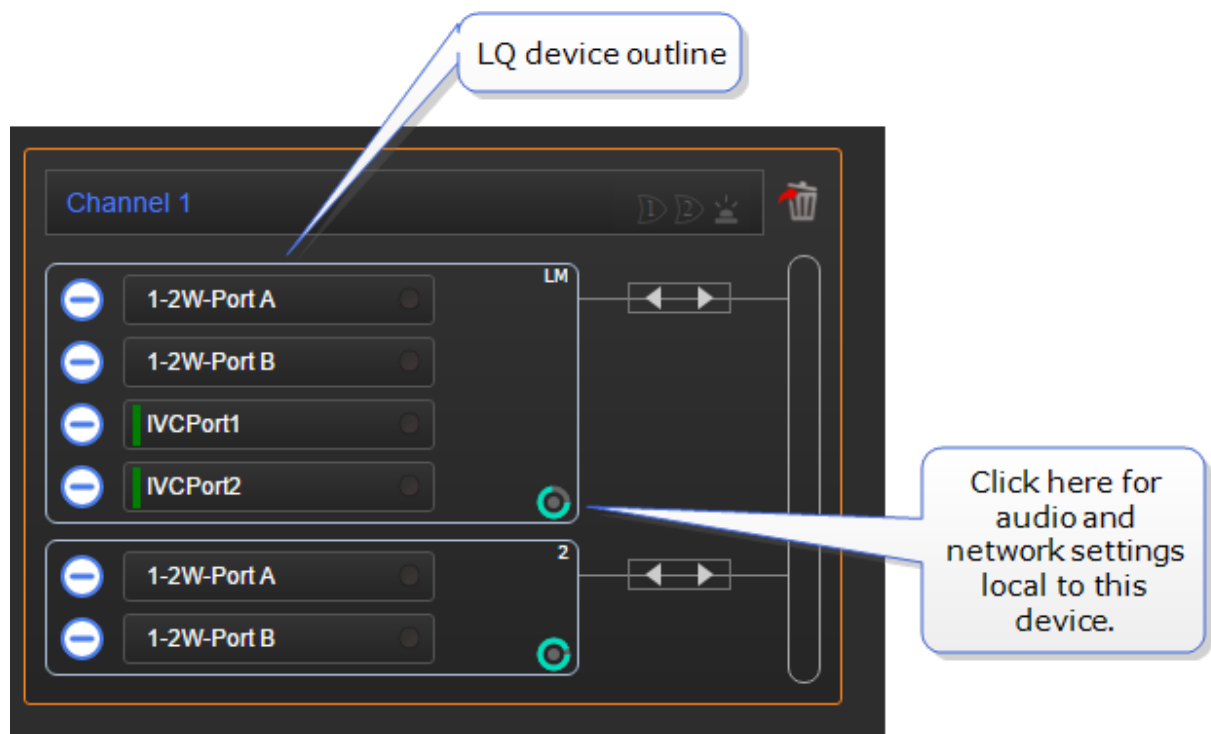
Note: *Direct Channels are not available in a HelixNet system.*

3.9.2 Local Audio Mix (LAM)

Each LQ device within a Channel performs its own local audio mix (submix). The LAM mixes audio at a very early stage of the audio transport which reduces the latency of the audio streams (below 4ms) and improves audio processing. LAM is a way of improving latency, increasing the capacity of an LQ device in certain user cases and reducing network usage.

The LAM is performed automatically when ports are added to a Channel.

Note: *The ports from each LQ appear within a box, with the local audio mix icon in the bottom right corner, where you can program network settings.*



Network settings within a Channel are set on a per-device basis. To set differing network quality for ports from the same device, put the ports in separate Channels.

Note: *LAM is not available if you are using a HelixNet/LQ Link-Group.*

3.9.3 Local Audio Mix/transport settings

Click/touch a blue label in the CCM to access settings.

Silence suppression. Default = **Disabled**

Enabling this option will stop transmission and implement comfort noise when silence is detected. This is done to conserve network resources.

3.9.4 Recommended network settings

- Internet - **very low** or **low**
- LAN/WAN - **balanced** or **high**
- LAN only - **very high**. This option enables 20 kHz bandwidth.

3.9.5 Custom setting

The Custom option allows adjustment of the jitter buffer setting independent of bit rate and packet size.

The jitter buffer setting is designed to buffer audio received to prevent loss if there is network jitter. Note that the jitter buffer selection will directly affect the latency. This is because the lower number in the jitter range represents the amount the LQ unit will buffer audio before delivering it to the port. A bigger jitter buffer setting will increase latency in milliseconds.

Note: *The network setting is the bandwidth from the LQ device into the IP network.*

Note: *Within the Custom setting, selecting an Audio Bitrate of 128 Kbps will automatically set Bandwidth to 20 kHz,*

Network Quality. Click on the slider to set.	Default setting shown in Bold
Transmit	
Audio bitrate	16, 32, 48, 64 , 128 Kbps
Audio bandwidth	12 , 20 kHz
Packet size	60, 40, 20, 10 , 5 ms
Receive	
Jitter (min-max)	60-200, 40-100, 20-60, 5-60 , 3-60 ms
Unit latency	80-220, 60-120, 40-80, 25-80 , 23-80 ms

3.10 Accounts

In this page you will generate and maintain accounts to external systems.

- Agent-IC client accounts
- PBX (SIP) accounts
- IVC (matrix) accounts

The screenshot shows the 'Agent-IC Users' management page. On the left sidebar, there are three buttons: 'Agent-IC' (selected), 'SIP', and 'IVC'. The main content area is titled 'Agent-IC Users' and contains a table labeled 'Agent-IC Users List'. The table has the following columns: #, Label, User ID, Password, Default Role, LQ Assignment, and Status. A single user is listed with the following details:

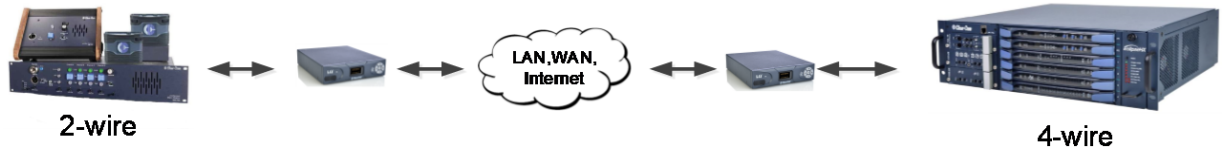
#	Label	User ID	Password	Default Role	LQ Assignment	Status
C1	Agent1	agent1	pass	AIC Default	LQ 4W#1	●

Callout boxes provide instructions: 'Click '+' to add a user account' points to the green '+' button in the table, and 'Click button to choose account type' points to the 'Agent-IC' button in the sidebar.

User log in credentials (**User ID** and **Password**) are stored in this page for each account.

Agent-IC and telephony (SIP) accounts need a license (see your Clear-Com representative for information).

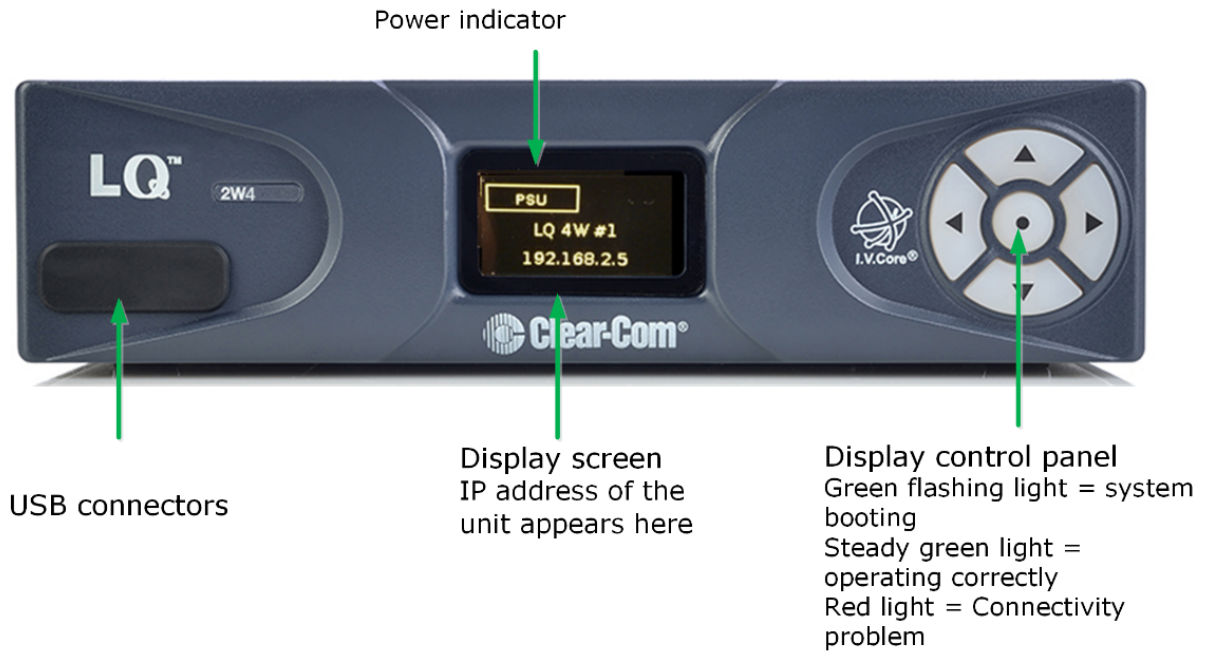
4 Basic set up (LAN)



4.1 Setting up your LQ environment within a LAN

Gather the following equipment:

- 2 x LQ units (LQ #1 and LQ #2)
 - 2 x provided Power Supply Units (PSUs)
 - 2 x Straight-through RJ45 Ethernet cables
 - 1 x Network connection with Dynamic Host Control Protocol (DHCP) server present (preferred method)
 - 2 x 2-wire, 4-wire and/or GPIO equipment to provide an audio connection to each LQ
 - 2 x 2 Network connections available for connecting each LQ to your network.
1. Connect either LAN port of LQ #1 to the local network equipment.
 2. Connect either LAN port of LQ #2 to the local network equipment.
 3. Connect the provided PSU to each LQ device. Once booted, each device will display an IP address on the front panel display.

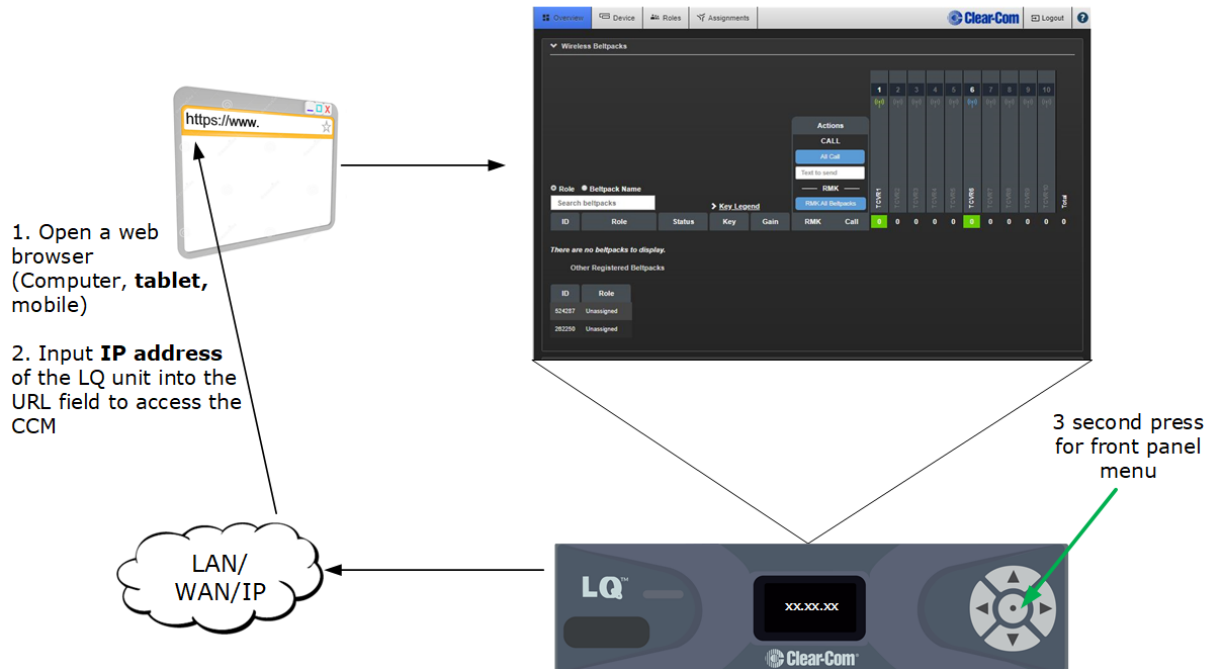


4. Once the devices are operational, you will program each device through the browser-based Core Configuration Manager (CCM).
5. Access the CCM. From a device connected to your network, open a Web browser. Enter the IP address as displayed on LQ #2 device in the address field of the Web browser (Chrome, Safari, Firefox, IE, Opera). This takes you to the CCM.
6. For details of the CCM username and password see **The Core Configuration Manager (CCM) Password on page 24**

Core Configuration Manager (CCM)

Username: **admin**

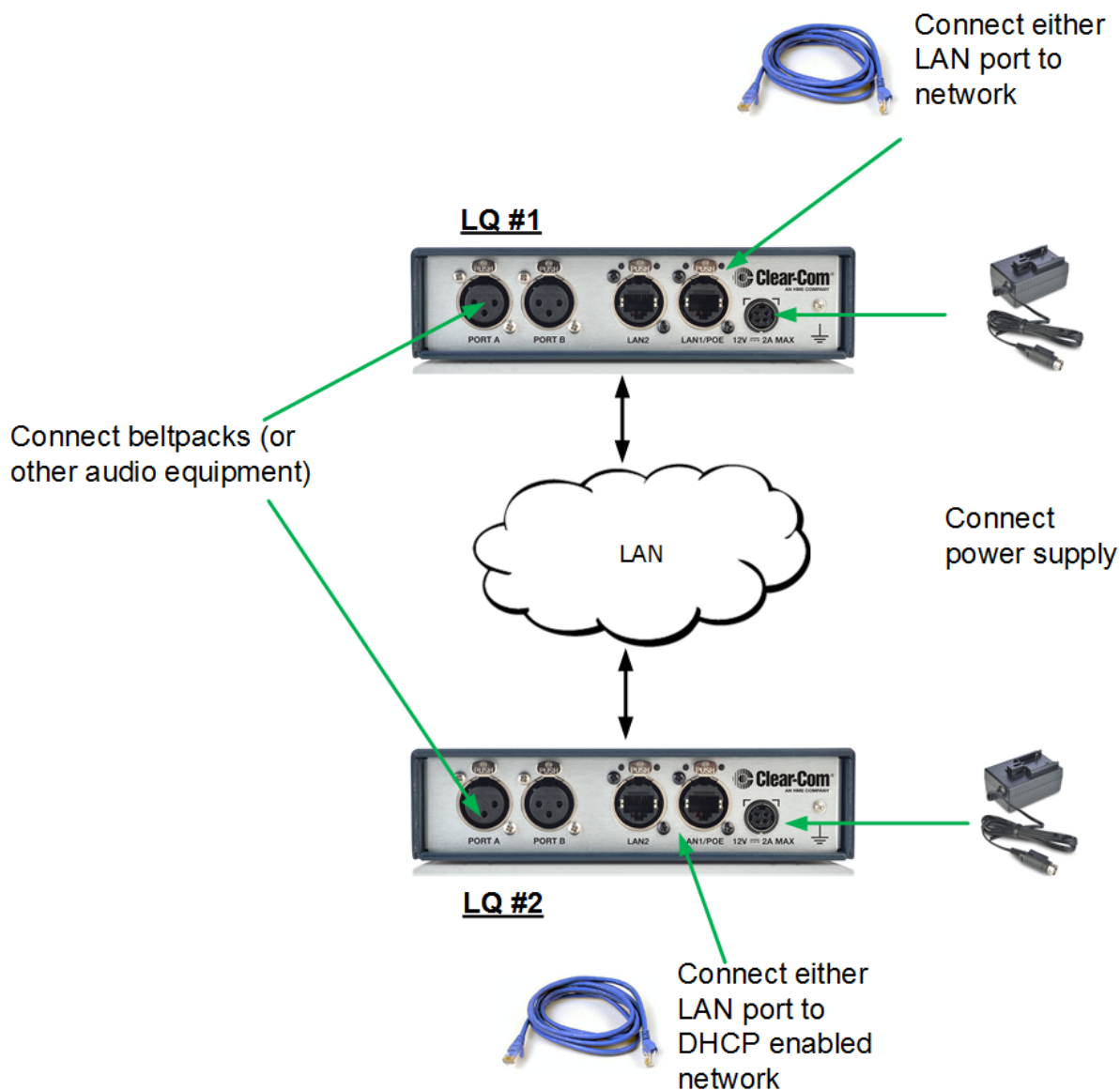
Find password: **Front panel menu>Networking>CCM password>[unique password]**



Note:

The IP address will be allocated by DHCP (default mode). In the event that the network does not serve DHCP or there is no network connection, the IP address will revert to a link-local address. If necessary IP addresses for the devices can be configured in the **Network** page of the CCM. See information links at the bottom of this page if you require more information.

7. Connect the audio equipment to Port A of each LQ device.
8. Once the LQ devices are set up, proceed to **Creating a Link-Group on page 48**.



For more information see:

Static IP configuration on page 69

4.2 Creating a Link-Group

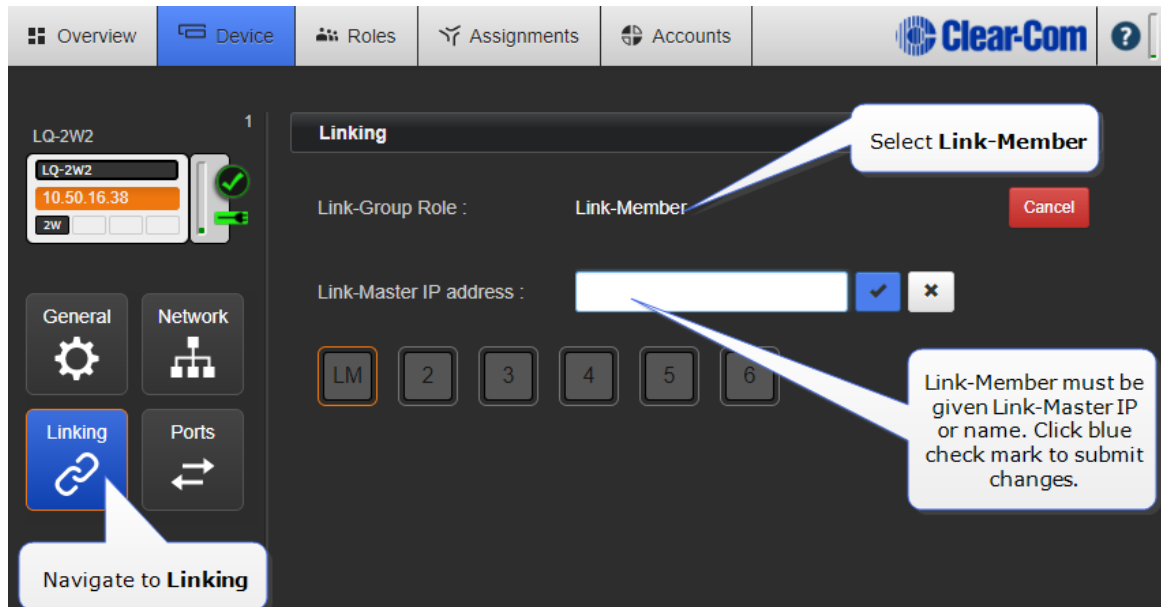
Before linking units together, one LQ device must first be designated as the Link-Master by setting that device's role to Link-Master. Every other LQ device within the Link-Group will then be set into a Link-Member role which allows the linking of those units directly to the Link-Master.

When creating a HelixNet/LQ Link-Group the HelixNet must always be designated the Link-Master.

In this example, LQ #1 will be left as Link-Master (default configuration) and LQ #2 will be linked to it.

4.2.1 How to create a Link-Group

1. Navigate to **Device > Linking** on the CCM of LQ #2.
2. Click **Change Role to Link-Member**.



3. Within the Link-Master IP address field, enter the IP address as displayed on the LQ #1 device. Click on blue check mark or press <ENTER> key to submit.
4. The next available Device ID will be selected by default (highlighted in blue) but can also be manually selected.

Overview Device Roles Assignments Accounts Clear-Com

LQ-2W2 1

Linking

Link-Group Role : Link-Member Cancel Apply Changes

Configuration for Roles, Assignments/Channels and Accounts will be replaced by the configuration of the new Link-Master.

Link-Master IP address : 10.50.16.129

Link-Group Member IDs :

LM 2 3 4 5 6

Slot #2 was automatically selected for this Device.

Select an available slot for registration of this Device within the Link-Group.

2. Apply changes

1. Select an available device ID if you do not wish to go with the default selection

Note that when linking a member to a master, the configuration from the master will over-ride the member

5. Click **Apply changes**.

LQ #1 and LQ #2 will now be linked (operation may take up to 30 seconds to complete). If there is existing configuration on the member LQ, this will be replaced by the configuration of the master.

6. Navigate to the **Overview** page (top navigation bar). Both LQ devices should be displayed on this page.

7. Before continuing, if either LQ device is a LQ-2W2 model, you may need to auto-null both ports (power must be present on the 2W circuit before auto-null is possible). For each device to be auto-nulled, navigate to **Device > Ports**.

8. Expand port sections and click on the **Auto-Nulling** button for each port.

The screenshot shows the Clear-Com web interface. At the top, there are navigation tabs: Overview, Device (selected), Roles, Assignments, and Accounts. The main content area is for device configuration. On the left, there are icons for General, Network, Linking, and Ports (selected). The 'Audio Ports' section is expanded, showing two ports: 'A' (RS-701) and 'B' (1-2W-Port B). Port 'A' is selected and highlighted in orange. Below the port list, there are settings for 'Interface Settings' (Power: Disabled, Mode: Clear-Com) and 'Port Settings' (Label: RS-701, Multi Channel Support: Disabled, Input Gain: 0 dB, Output Gain: 0 dB, VOX Mode: Adaptive Thresh, VOX Off Delay: 0.5 sec, VOX Threshold: Not set, VOX Action Triggers: Disabled, 2-Wire Termination: Disabled, and Auto-Nulling: Start Nulling). A callout box points to the 'Start Nulling' button.

Note: *The auto-nulling operation emits a loud hiss on the circuit. When auto-nulling, ensure that all talk buttons on external Partyline devices are turned off.*

For more information, see:

About Linking on page 60

In LQ 4.0 and above a HelixNet Main Station can also be included in a Link-Group.

LQ to HelixNet Connectivity on page 132

4.3 Using Channels to Route Audio

1. Click on the Assignments button within the navigation bar.
2. Select the Channels tab.
3. Select Channel 1 (or other Channel) from list on the right of Assignments page.

4. Add Port on each device to required Channel by clicking on the + symbol to the right of each port.

You should now be able to pass audio and call/RMK signaling to/from Port A on each device.

Channel 1 must be selected before audio can be assigned to it. This is shown by an orange highlight.

The screenshot displays the 'Assignments' tab in the Clear-Com software. On the left, under 'Ports', a list of ports is shown for device 'LQ-2W2'. The 'IVC#1' port is highlighted with an orange border and has a blue '+' icon to its right. A callout box with a blue border and white background points to this '+' icon, containing the text 'Click '+' to add port to Channel 1'. In the center, 'Channel 1' is selected and highlighted with an orange border. It shows two ports: '1-2W-Port B' and 'RS-701'. On the right, a 'Show All Connections' panel lists 'Channel 1' with a value of '2', and Channels 2 through 6 with values of '0'.

4.4 Clear-Com Cable Recommendations

Use the following Category (Cat), American Wire Gauge (AWG) and shielded cable types:

4.4.1 Cable recommendations

Category (Cat)	<ul style="list-style-type: none"> Higher Cat numbers will support a higher bandwidth. Therefore, by using a higher Cat number, you are future proofing your system to some extent. Example: Cat 5; up to 1G. Cat 6; up to 10G. Use Cat 5e or higher.
American Wire Gauge (AWG)	<ul style="list-style-type: none"> The lower the AWG number, the less temperature rise there will be in the cable when using PoE. This is particularly important for bundles. Local building regulations may rule out the use of 26AWG or higher, depending on the installation. Check with your local building regulations. Use AWG 24 or lower.
Shielded Twisted Pair (STP) or Foiled Twisted Pair (FTP)	Using shielded cable means less problems with interference from other sources. This means that your network will be more robust if you use shielded cables.
Overall Recommendation	Use Cat 6a 23 AWG STP cable.

4.5 Save and Restore

You can save the LQ device configuration to a file in order to keep a backup copy of your setup or to configure a stand-by LQ device.

Note: *When restoring settings, there is an option to restore IP settings.*

Save and restore is achieved from :

- The LQ unit front panel menus with a USB stick
 - In the front panel menu system, navigate to: **Administration>Settings>Save**
- The CCM
 - In the CCM, navigate to: **Device>General>Save/Restore System Settings**

When working with a Link-Group you must:

- Save and restore Link-Group settings on each device
- When restoring settings, you must restore Link-Master settings first (before restoring the Link-Members)

The table below shows which settings are restored (all are saved except CCM password and licenses):

	USB/Front panel menus	CCM no network	CCM with network
Static/DHCP Configuration	Yes	No	Yes
External Connectivity	Yes	No	Yes
HTTPS	Yes	No	Yes
Default Certificate	No	No	No
EasyDNS Certificate	No	No	No
Uploaded Certificate	Yes	No	Yes
Linking	Yes	Yes	Yes
Ports	Yes	Yes	Yes
Roles	Yes (on Link-Master)	Yes (on Link Master)	Yes (on Link Master)
Assignments (channels)	Yes	Yes	Yes
Accounts	Yes (on Link-Master)	Yes (on Link-Master)	Yes (on Link-Master)
Licenses	No	No	No
CCM password	No	No	No

5 Front Panel Interface

From the front panel of the LQ you can:

- Set audio configuration
 - input gain
 - output gain

- Set VOX configuration
 - VOX
 - Threshold
 - Delay

- Set 2-wire specific settings
 - Powering of the line
 - Clear-Com/RTS mode
 - Auto-nulling
 - Termination

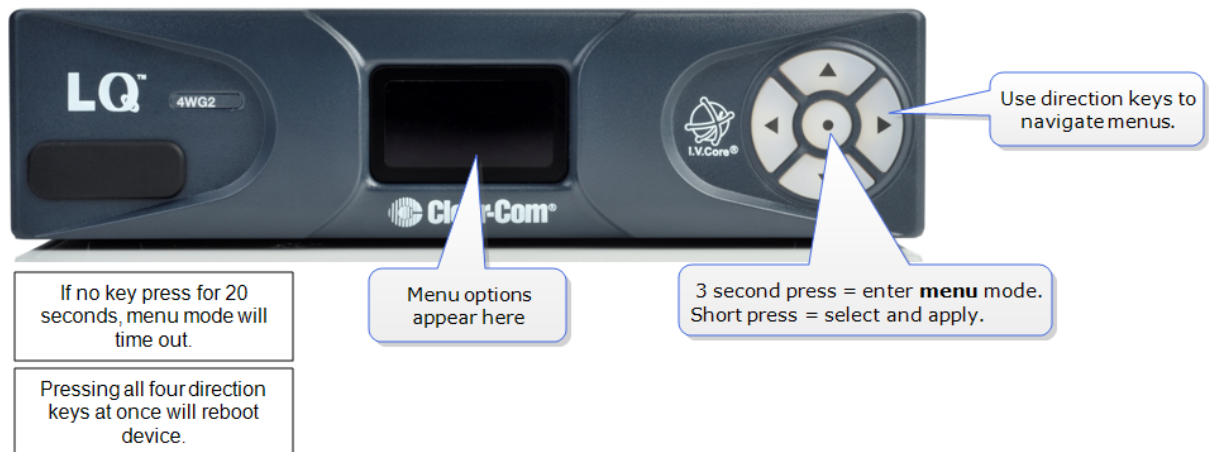
- Set 4-wire specific settings
 - Port Function: set port function of Ethernet cable 'to Matrix' or 'to Panel',
 - Vox levels
 - Baud rate

- Check licenses on the unit (SIP or mobile client)

- See GPIO settings
 - Test GPO hardware trigger
 - Set Mic level/line level (mic level for use when connecting directly to a radio)

- Set device settings
 - Brightness of OLED
 - Screensaver time-out
 - Reboot
 - Reset-to-default
-
- Networking
 - Edit network details
-
- Hang up SIP calls
-
- Collect diagnostic data for troubleshooting your device

5.1 How to access front panel menu options.



5.2 Programming Network Details from LQ Device Front Screen

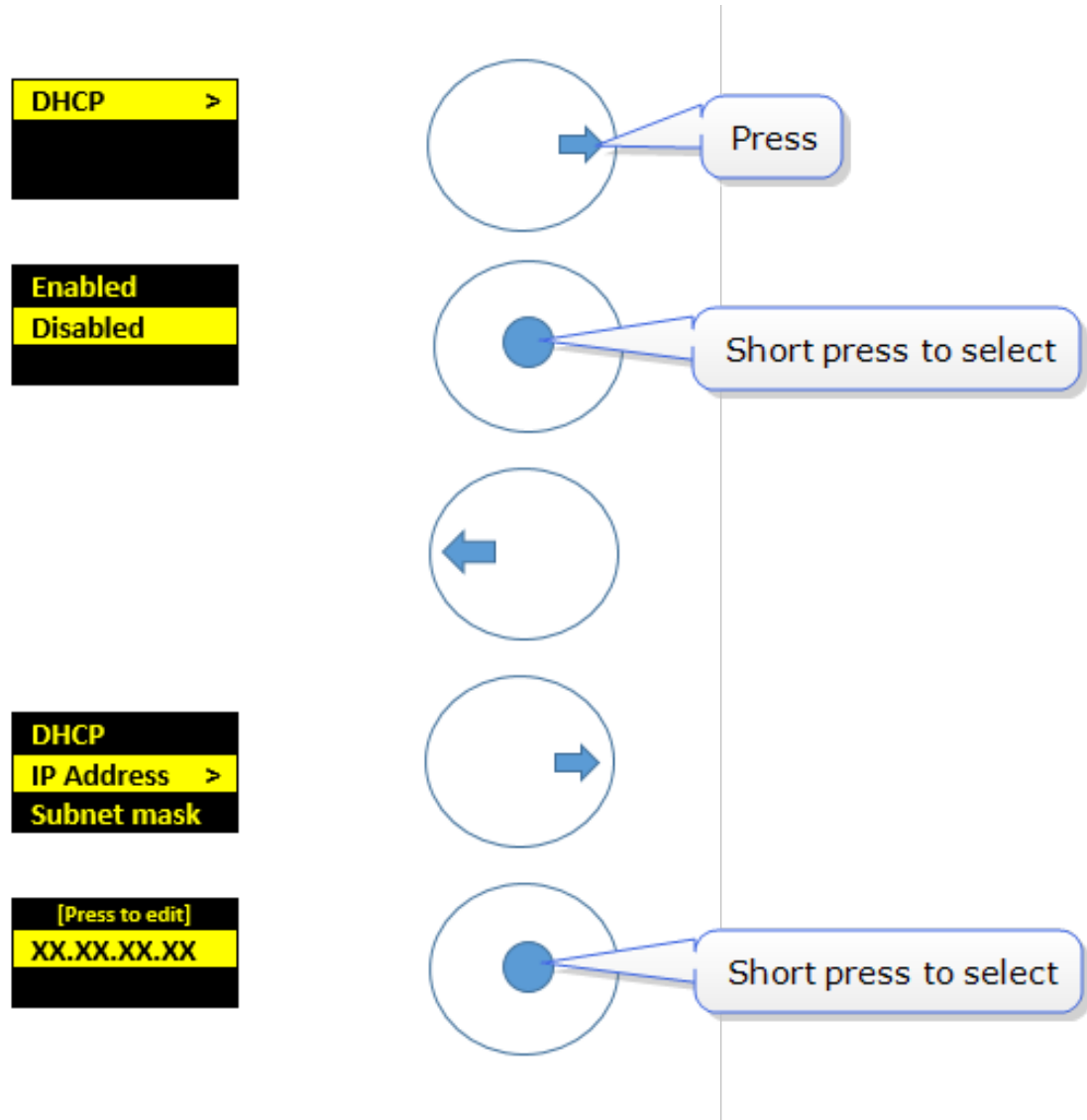
In LQ version 3.0 and above network details can be input and changed from the device front screen menu, as well as from the CCM.

Note: You can also test that the device GPOs are firing correctly from the front screen menus. Navigate to **Menu/ports/port** and scroll down.

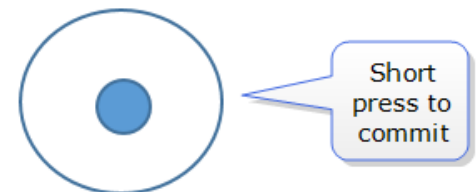
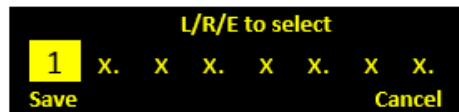
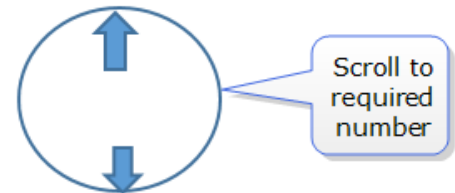
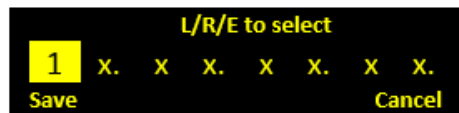
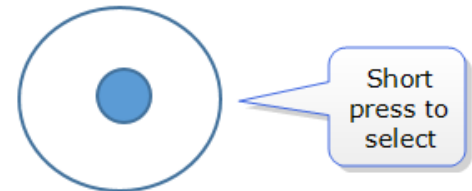
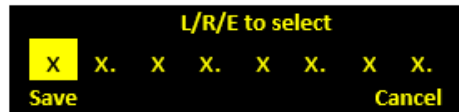
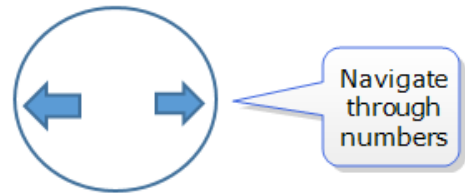
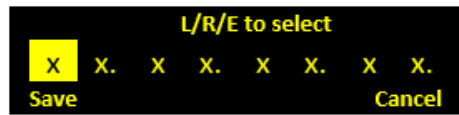
5.2.1 How to edit network details from the device menus

1. Navigate to **Menu > Networking > Edit**. **Edit** is at the bottom of the networking list. Use the arrow keys to navigate menus.
2. Disable the DHCP setting on your device. This allows you to access network details.

Disable DHCP and select IP for editing.



Edit and save IP address.



Repeat for each number. Then **Save**.

3. Repeat for Subnet mask, Gateway, and DNS as required.

5.3 The USB Logger

The USB logger can be used to capture comprehensive and detailed logs from your LQ unit (LQ 4.1 and above). These logs can be used to troubleshoot and diagnose problems.

Contact Clear-Com Global Support Services (GSS) for more information:

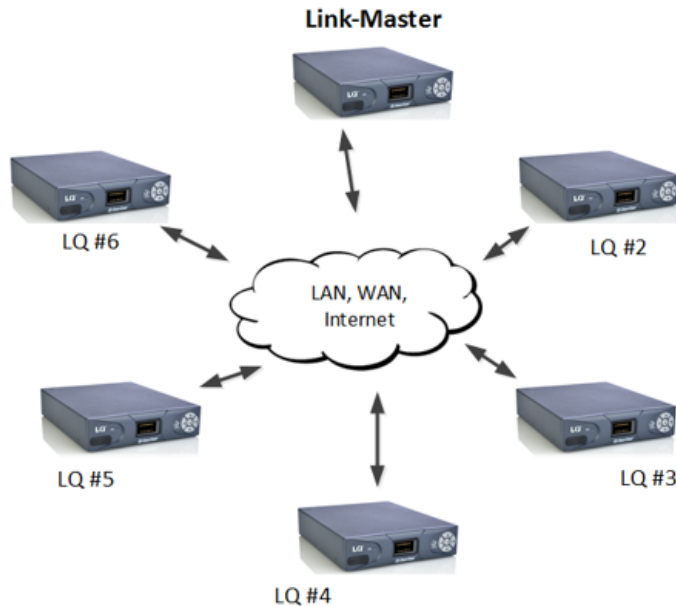
<https://www.clearcom.com/support/service-repair/>

6 Linking

6.1 What is a Link-Group?

A Link-Group is a set of LQ devices connected over IP so they share audio and data between them.

With LQ 4.0 and above a HelixNet device can also be included in a Link-Group. This increases the available ports and the range of a HelixNet system.

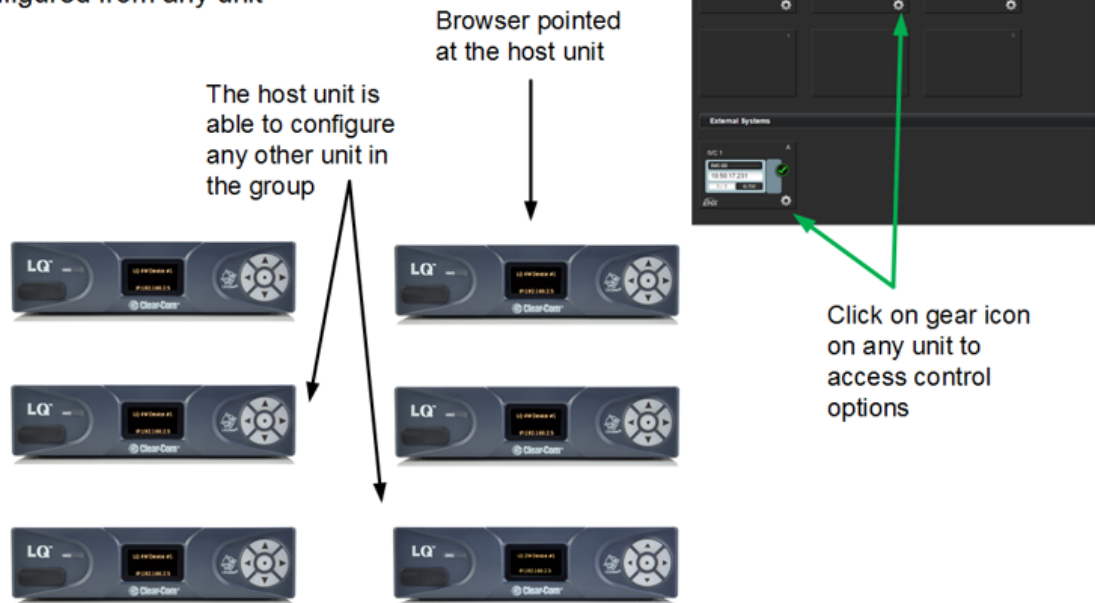


- 1 box is set to Link-Master
- Each LQ joins the group through the Link-Master
- Up to 6 LQs in a Link-Group

Channels

There are 24 channels within each Link-Group (channels can be added or taken away as required). Any port on any LQ can be assigned to any of the channels. To assign ports to channels navigate to **Assignments** in the Core Configuration Manager.

Once connected, devices in a Link-Group can be configured from any unit



The Core Configuration Manager (CCM) for any LQ host can be accessed by entering the IP address as displayed on the front panel display of the LQ host into a web browser's address field. All devices in the Link-Group can be viewed and configured through any single host in the Link-Group.

Note: *A HelixNet Main Station can also be linked in a Link-Group formation. The basic principles are the same for a HelixNet/LQ Link-Group, though there are a few differences in operation.*

For more information, see:

LQ to HelixNet Connectivity on page 132

6.2 About Linking

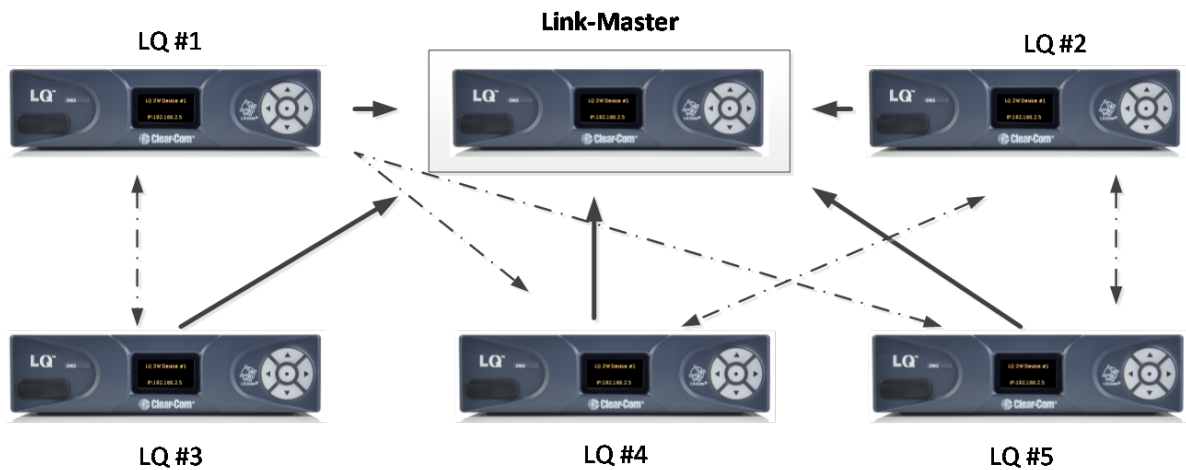
A Link-Group:

- Can contain up to 6 LQ devices or up to 6 of a combination of HelixNet Main Stations and LQ devices
- Must have one unit designated as Link-Master
- Performs a “best effort” approach to creating a mesh network between all the devices within the group.

A Mesh Network

Once joined to the Link-Group, all devices attempt to connect to all other devices within the group.

- Configuration and control of any device is possible through any other unit in the group
- Configuration information is both distributed and persisted within every node of the group
- Significantly reduces loss of service



6.3 The Link-Master role

The Link-Master role serves three main purposes:

1. It facilitates Link-Group membership.
2. It is the owner of Channel names, meaning that Channel names will only persist (be maintained consistently) if the Link-Master is operational.
3. It is responsible for the synchronization and distribution of both configuration and device availability status throughout the Link-Group.

Note: *The Link-Master must be reachable on TCP port 80 and TCP/UDP port 655 by all devices within the Link-Group. (Use TCP port 443 if you are using secure HTTPs.)*

Note: *It is recommended that the IP address of the Link-Master is allocated statically. When allocated by DHCP the IP address can change. If this happens the LQ devices will no longer be able to reach the Link-Master device.*

Note: *Any device can be set to Link-Master mode. Link-Master mode is the factory default setting.*

6.4 The Link-Member role

LQ devices that are not designated master will have the role of Link-Member. Joining a device to a Link-Group requires that device to be set to Link-Member role which will prompt the user to enter the address of the Link-Master.

If a Link-Member device loses connection to its Link-Master, the front panel LED of that device will turn red until the connection is restored.

6.4.1 Linking units

The only way to join devices to a Link-Group is through the Linking page of the CCM. Only the IP address of the Link-Master is required during this set up.

6.4.2 LQ restricted IP range

LQ units use the IP range 172.23.xx.xx for linking. Because of this, this IP range should not be used for any devices (including LQs) when working with the LQ Series system. Clear-Com cannot guarantee reliable behavior if this address range is used.

6.4.3 Linking over a LAN

This is the simplest way to link devices together. This type of environment enables the highest potential level of communication quality and the best availability of resources. When linking over a LAN, set Link-Group Optimization to **LAN/WAN routed network** in the **Linking** page of the Core Configuration Manager (CCM) for best latency performance and use of resources.

Note: *External linking is disabled when **Link-Group Optimization** is set to **LAN/WAN Routed Network**.*

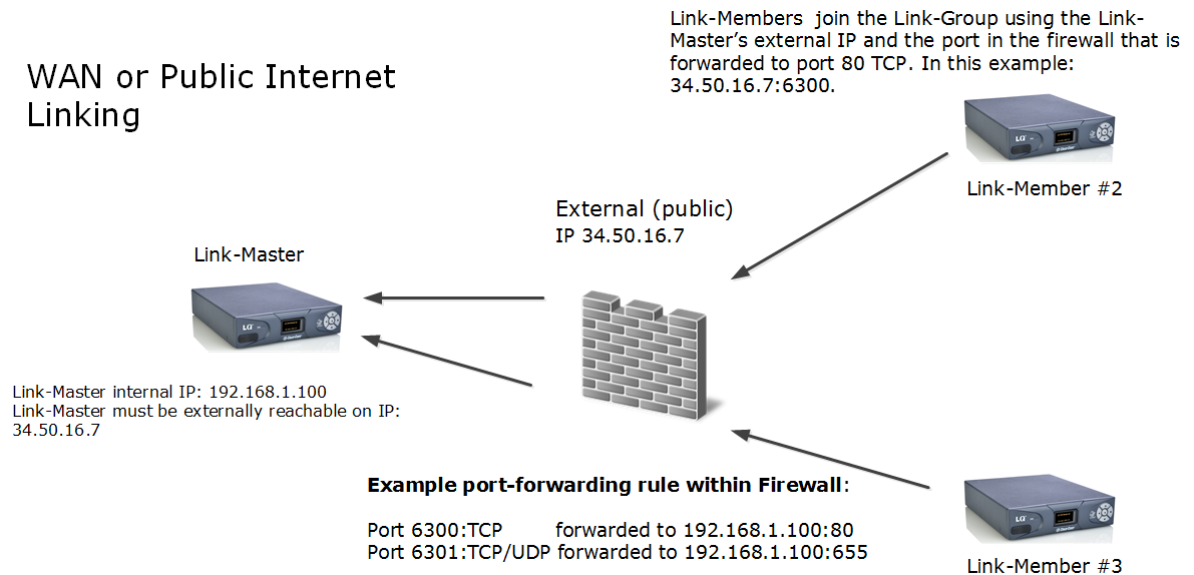
6.4.4 Linking over Internet or WAN

When linking over the public Internet, addressing of the Link-Master becomes more complicated as the Link-Master must be made externally reachable to all Link-Members. This is achieved by creating port forwarding rules within the firewall.

Note: *A HelixNet/LQ Link-Group does not operate over the Internet. This is because the codec that HelixNet uses (WavPack) is not optimised for the Internet. Internet connectivity when using HelixNet and LQ is achieved using a tie line.*

6.5 How to link LQ units over a firewall

WAN or Public Internet Linking



The Link-Master uses TCP port 80 for management and TCP/UDP port 655 for audio (port 443 for management if you are using HTTPs). You will need to create port-forwarding rules within your firewall to make these ports externally accessible to the Link-Master device.

When creating a Link-Group over the public internet, Link-Members need to be given the Link-Master's externally reachable IP address and the port that is forwarded to port 80. This information is entered in the **Linking** page of the CCM.

Note: *If no port forwarding rules have been applied the LQ devices will find the correct default ports automatically, so there is no need to specify a port.*

Once the devices are linked in a group, they will share network details with each other automatically. To facilitate this, the network details, including the port that is forwarded to TCP/UDP port 655 need to be configured in the Link-Master's **Network** page. If no port forwarding rules have been applied, it is not necessary to specify a port.

Overview | Device | Roles | Assignments | Accounts | Clear-Com

LQ-2W2

Linking

Link-Group Role : [Link-Member](#)

Link-Group Optimization : LAN/WAN Routed Network

Link-Master IP address : 134.50.16.7:6300

LM 2 3 4 5 6

General | Network | Linking | Ports

Set Link-Group Optimization to **Internet/NATed Network.**

If Linking behind a firewall

Link-Master IP address (given to the Link-Members) is the external IP and the port mapped to **TCP port 80** at the firewall.

If you are Linking units using **HTTPS** use the port mapped to **TCP port 433** at the firewall.

Overview | Device | Roles | Assignments | Accounts | Clear-Com

LQ-2W2

Network

LAN / WAN Connectivity

Mode : Static DHCP

IP Address : 10.50.16.38

Subnet Mask : 255.255.252.0

Gateway : 10.50.16.1

Primary DNS : 10.50.1.51

Secondary DNS : 10.50.1.151

External Connectivity

External IP Address : |

External Port : Not set

General | Network | Linking | Ports

External IP

External port (port that is mapped to TCP/UDP port 655)

Note: External Linking is not possible if **Link Group Optimization is set to **LAN/WAN Routed Network**.**

For more information on linking over the Internet, see **Internet Connectivity on page 72**.

6.6 How to Remove a Device from a Link-Group

6.6.1 Remove an on-line Link-Member from a group

1. Access the browser-based CCM for any device within the Link-Group.
2. In the Overview page, click on the device image of the unit that you want to remove from the group.
3. Navigate to Linking for that device.
4. Click Change Role to Link-Master.
5. Apply Changes.

The device will be reconfigured as a Link-Master and removed from the group.

6.6.2 Remove an off-line Link-Member from a group

1. Access the Core Configuration Manager for any device within the Link-Group.
2. In the Overview page, the off-line unit will show a red 'X'. Click on this device.
3. You will be asked if you want to remove this unreachable device. Click Delete.

The device will be removed from the Link-Group.

If this same device is powered on again, it will automatically seek the same Link-Master and ID slot. If the ID has been taken by another device, it will take the next available ID. If no ID is available (because there are already 6 devices in the group) it will not be able to join the group.

To re-use this device with a new Link-Master, it must be returned to the default role (Link-Master) and then re-linked.

7 Interface Port Configuration

7.1 Call signaling and Remote Mic Kill (RMK)

Call signaling is automatic on all audio routes so a call signal can be routed to any destination (2-wire or 4-wire).

Call signaling will be passed to some third party intercom equipment, but it may not be recognized.

RMK is supported and passed through to 2-wire participants only.

7.2 2-wire specific port options

Default option is shown in **bold**.

7.2.1 Device interface settings

Power: **Disabled**/Enabled. Enable power if you want to power partyline beltpacks from the line. See **Power 2-Wire Beltpacks from the Partyline on page 21** for more information.

Note: *Enabling power will enable termination by default.*

Mode: **Clear-Com**/RTS. For pinouts for each of these see **Pinouts on page 193**.

7.2.2 2-wire specific port settings

- Input/Output gain: -3 to +3 dB. Default = **0**.
- Termination: **Disabled**/Enabled. Termination is used to eliminate echo and distortion when 2 or more 2-wire devices are connected. This setting is automatically enabled when power is enabled on the line. It can be toggled on and off as power should only be terminated once within any series of connected devices.
- Autonull. Autonull should be started whenever 2-wire devices are connected or re-wired. Do not listen in on the headset while autonull is being performed.

7.3 4-wire specific port options

Note: *To minimize noise, use screened (shielded) cable when connecting 4-wire ports.*

- Input/Output gain: -12 to +12 dB. Default = **0**.
- Port function (sets pin polarity of cable) : **to Matrix**/to Panel. .

- Baud rate: 9600 (Drake 4000)/**19200 (Eclipse)**. Select baud rate according to which type of equipment you are connecting.

7.4 4-wire + GPIO specific settings

- Output level: Mic Level (-55db)/**Line Level (0 dB)**.

This setting is used when connecting to devices (like a hand-held radio) where audio connects directly to the mic. This setting works in conjunction with the Output Gain; overall gain = **Output Level + Output Gain**.

7.5 GPIO action triggers (4-wire + GPIO and IVC-32 ports)

Default option is shown in **bold**.

GPI action trigger: **Disabled**/Network Control Event 1/Network Control Event 2/Channel Call Event.

Assign a Network Control Event on detection of a GPI signal).

GPO action trigger: **Disabled**/Network Control Event 1/Network Control Event 2/Channel Call Event (assign which Network Control Event will trigger the GPO).

GPO Off Delay: **None** to 2 seconds. This sets a delay on the deactivation of the GPO after a Network Control Event has disappeared.

Test: use to check that the GPO is firing (hardware).

For detailed explanation and examples of how to use Network Control Events see **What are Networked Control Events and How Do I Use Them? on page 92**

7.6 IVC-32 specific port settings

Network Quality: **EHX Managed**/Very High (LAN)/High (WAN)/Low (internet). The default setting is **EHX Managed**.

Silence Supression: Enabled/**Disabled**. When enabled, Silence Supression will detect silence on the line, and will stop transmission and implement comfort noise when this occurs. This conserves network resources.

Settings available on all ports

7.7 Port settings

- Label: Clicking/touching the blue label header will allow you to change the name of the port. Enter the new name and click the blue check mark to apply changes.
- Multi-Channel support: Enabled/**Disabled**. Enable this option to use the audio source in more than one Channel or direct connection.

7.8 VOX (audio-gating)

The VOX setting has several functions:

- VOX can be used to maximise bandwidth efficiency by detecting when the line is silent and not transmitting at those times.
- VOX can be used to trigger a Network Control Event (used for sending and receiving GPIO signals) when audio is detected in the Channel.
- VOX can be used to eliminate unwanted noise, for instance, low level ambient or background noise.
- VOX mode: **Disabled**/Fixed Threshold/Adaptive.

If Disabled, VOX is not activated and Network Control Events cannot be configured. Audio is still detected in the Channel, so audio light will show.

Fixed Threshold: triggers VOX detection (audio gating) according to a fixed level . Enabling this option automatically enables **Threshold** and **VOX Delay**.

Adaptive: sets the audio trigger according to an automatically calculated 'noise floor'. This option implements comfort noise when silence is detected. Only the Off Delay option is activated with this setting. The Adaptive threshold is not suitable for transmitting music.

- VOX Off Delay: **0.5** to 4 seconds. Delays the deactivation of the noise gate to allow the signal to stabilize.
- VOX Threshold: 0 to -42 dB (default = **-22 dB**). Set the level at which audio is considered valid in the Channel.

8 Network Settings (IP)

8.1 Dynamic Host Configuration Protocol (DHCP)

The default method for LQ devices to obtain an IP address is DHCP.

Most networks allocate IP addresses using DHCP.

8.2 DHCP or Static IP addressing?

DHCP can be used for quick set-up and the units will work with DHCP IP addressing. However, the address provided by DHCP are dynamic and can change, so in some cases it is better to allocate static IP addresses to ensure a completely stable system.

A static IP address is generally recommended for the Link-Master, while the Link Members should use DHCP.

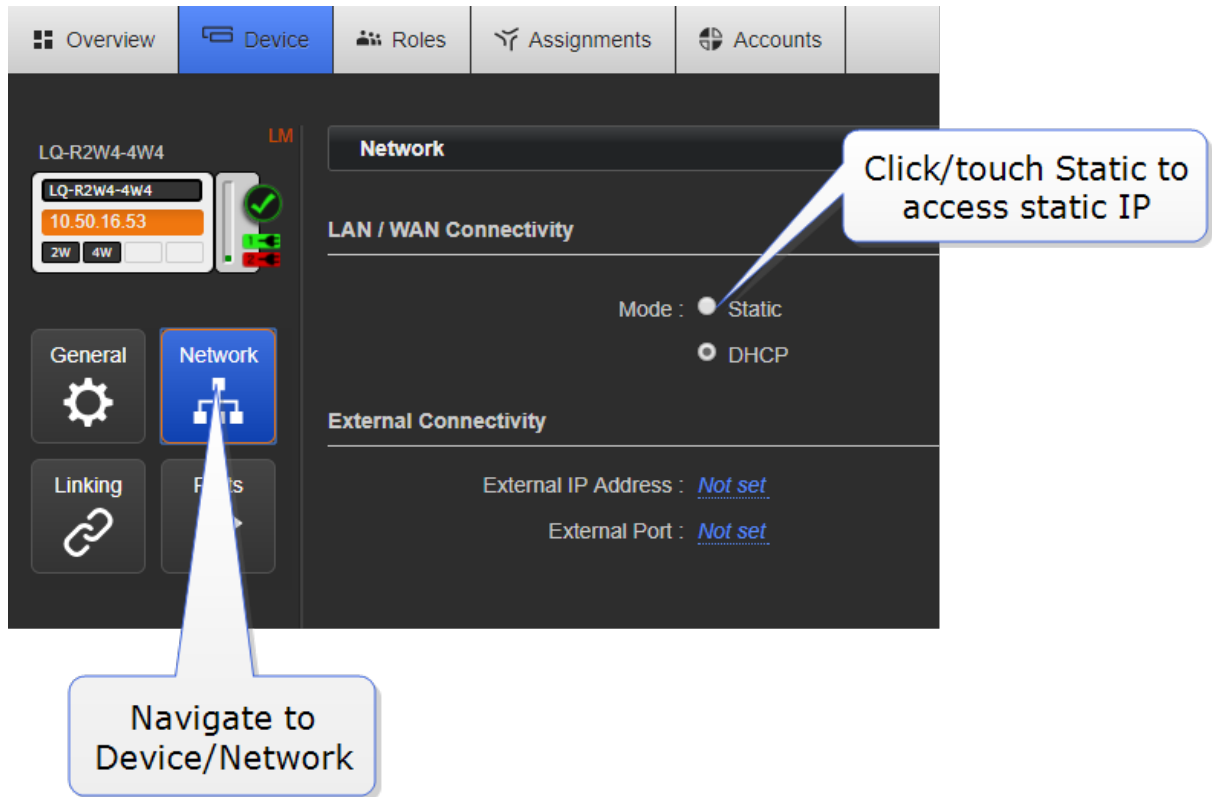
If there are additional Port Forwarding rules created in the firewalls that enable external connectivity to the Link-Members as well as the Link-Master the Link-Member units should also be given static IP addresses.

See [Linking over Internet or WAN on page 62](#)

8.3 Static IP configuration

DHCP is not recommended for the Link-Master and is not recommended for units linked to the master in some situations.

In these cases you will allocate the network settings statically. To do this, navigate to: **Device > Network** in the Core Configuration Manager (CCM).



8.3.1 Netmask or Subnet

The netmask or subnet divides the network into sectors for more efficient routing and is required when allocating a static IP address to an LQ device.

8.3.2 Gateway

This setting is required when traversing across internets.

For more information, see:

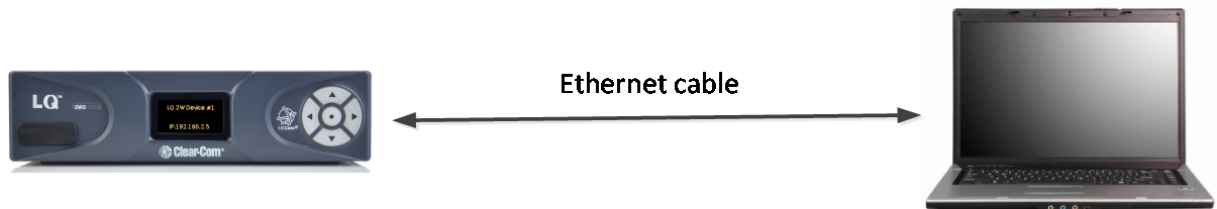
Linking over Internet or WAN on page 62

8.4 Link-Local Environments

- Any networked device will enter link-local mode if it is set to DHCP and no DHCP server is detected on the network.

Link-local mode

- If both the laptop and the LQ device are in DHCP mode, they will revert to link-local when connected. This means they can communicate with one another as they are both on the same subnet (169.254.xx.xx).



8.4.1 What is link-local?

A link-local address is an IP address within the local segment of any network. Routers do not pass information to these as link-local addresses are not guaranteed to be unique beyond a single network segment. When first connected to a network, your LQ device will attempt to get an IP address via Dynamic Host Configuration Protocol (DHCP). If no DHCP server is available the unit will automatically enter link-local IP mode. A link-local IP address will take the form: 169.254.xxx.xxx.

8.5 Accessing an LQ Unit when in Link-Local Mode

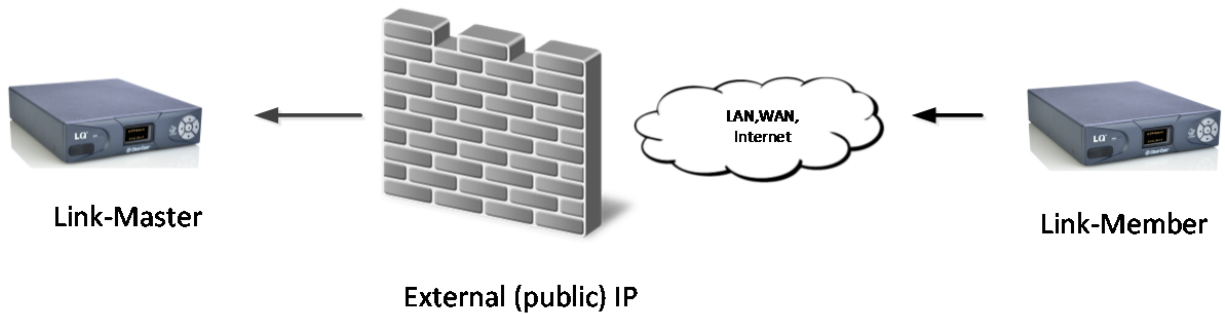
To access the CCM of an LQ unit in link-local, you must connect to it from a PC that is also in link-local mode.

Devices will revert to link-local mode if they are configured to DHCP and fail to find a DHCP address on the network or device they are attempting to connect to. A PC can be put into link-local mode by ensuring it is in DHCP mode and connecting it to the LQ unit that is in link-local with a standard Ethernet cable. The PC will look for a dynamically generated IP address (DHCP), and when it does not find one will enter link-local mode automatically.

Once the PC is connected to the LQ and in link-local mode, you can connect to your LQ unit by opening a browser window on the computer and inputting the unit's IP address (from the front panel display) into the address field. This takes you to the Core Configuration Manager where you can configure the device as usual.

Note: *The units will operate in link-local, but for optimum performance it is recommended that they are used with either static or DHCP network settings.*

9 Internet Connectivity



All devices within a Link-Group must have connectivity to the Link-Master on TCP port 80 (TCP port 443 if using the HTTPs protocol) and TCP/UDP port 655. When linking devices over the Internet, make sure that this connectivity is stable. Internet connection to an LQ device requires special configuration within your firewall (port-forwarding).

Note: *LQ devices cannot connect using the Internet if they have a HelixNet Main Station as link master.*

9.1 Getting an external IP address

When networking LQ devices over the Internet, an external IP address from which the Link-Master is reachable is required as a first step in making sure Link-Members can get to the Link-Master. The external (public) IP address must be static and non-changing. Normally an Internet Service Provider (ISP) will provide external addressing in Dynamic Host Configuration Protocol (DHCP) mode. This is not guaranteed to remain static but instead may change periodically. This will cause linking issues as the Link-Members will not be able to reach the master if the IP address changes. Therefore, it is suggested that you purchase a static address from your ISP. Failure to do this could result in a loss of service.

9.2 Port-forwarding

To connect to an LQ unit that is behind a firewall, certain ports must be mapped from your firewall to the LQ device. This mapping will forward traffic received on those ports from the Internet directly to the LQ unit.

- The Link-Group uses TCP port 80 (port 443 for HTTPs) for linking, data distribution and browser-based management.
- The Link-Group uses port 655 (TCP and UDP) for group connectivity and audio transmission.

For more information, see **Linking over Internet or WAN on page 62**

10 Secure HyperText Transfer Protocol (HTTPS)

10.1 What is HTTPS?

HTTPS is an adaptation of the HTTP protocol. It is commonly used for security when sending sensitive data over a network.

HTTPS protects against an intermediary being able to intercept data between devices. HTTPS uses data encryption and Public Key Cryptography to create a secured channel.

Using HTTPS with LQ Series 4.0 and above units involves:

- Installing a security certificate on the browser used to reach the Core Configuration Manager (CCM) of the LQ devices
- Redirecting IP traffic to the HTTPS port (443) using the **Force HTTPS** feature. This feature is found in the CCM of each device. The default setting for this feature is **Disabled**.

10.2 Why Use HTTPS with LQ Series Units?

When using the LQ Core Configuration Manager (CCM) to establish your intercom setup, you might wish to protect your login credentials and configuration details from unauthorized interference. In this case you will establish an encrypted connection between the CCM and the LQ devices using HTTPS.

The LQ units use port 80 (http) and port 443 (https) for management. Once a Link-Group is established, audio travels in an encrypted channel between units via port 655. However, the management ports will continue to exchange configuration information once the audio channel is established, and you might want to ensure that this information travels on a secured route.

For more information about a Link-Group and Linking see: **About Linking on page 60**

For more information about establishing a Link-Group using HTTPS see: **Setting up a Link-Group Using HTTPS on page 79**

10.3 How to Use HTTPS with LQ Series Units, Overview

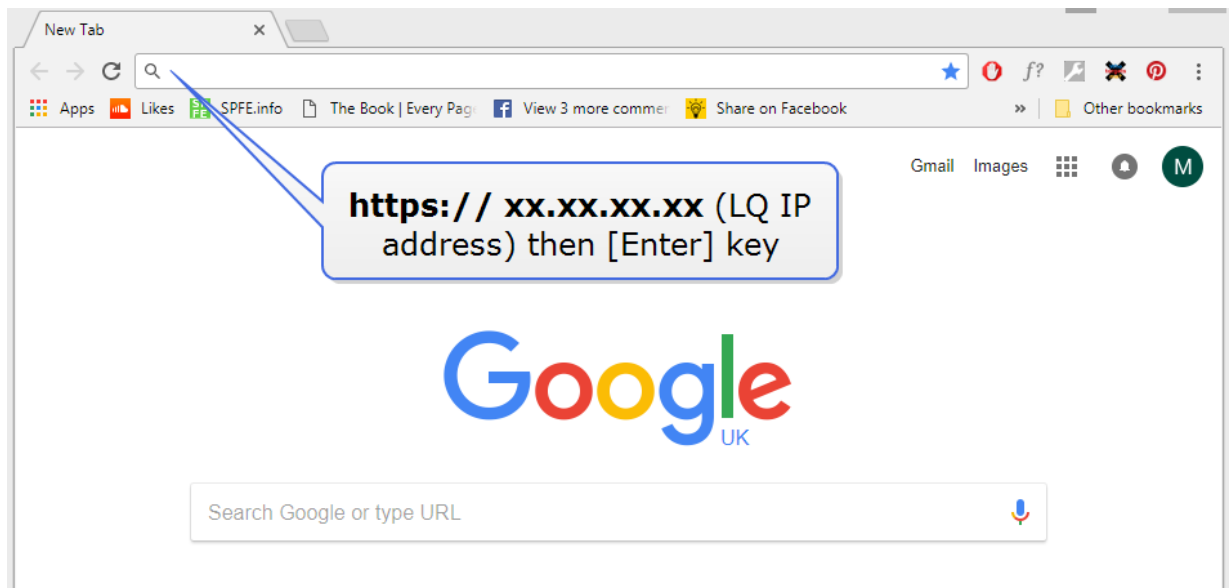
It is helpful to know how to set up an LQ device (Basic set up) and a Link-Group (Create a Link-Group) before establishing a secure connection. Please refer to the relevant sections in this manual if necessary.

There are two main steps to establishing an encrypted connection on the management ports of the LQ units.

1. Choose and install a suitable security certificate on the browser used to access the Core Configuration Manager (CCM) of the LQ units.
2. Enable the Force HTTPs feature on the LQ Series 4.0 and above unit. When you enable the Force HTTPs feature on an LQ unit, HTTP is turned off for that LQ unit and traffic is redirected to the HTTPs port. The Force HTTPs feature is found in the Network page of the CCM under the Security tab. The default setting for this feature is OFF.

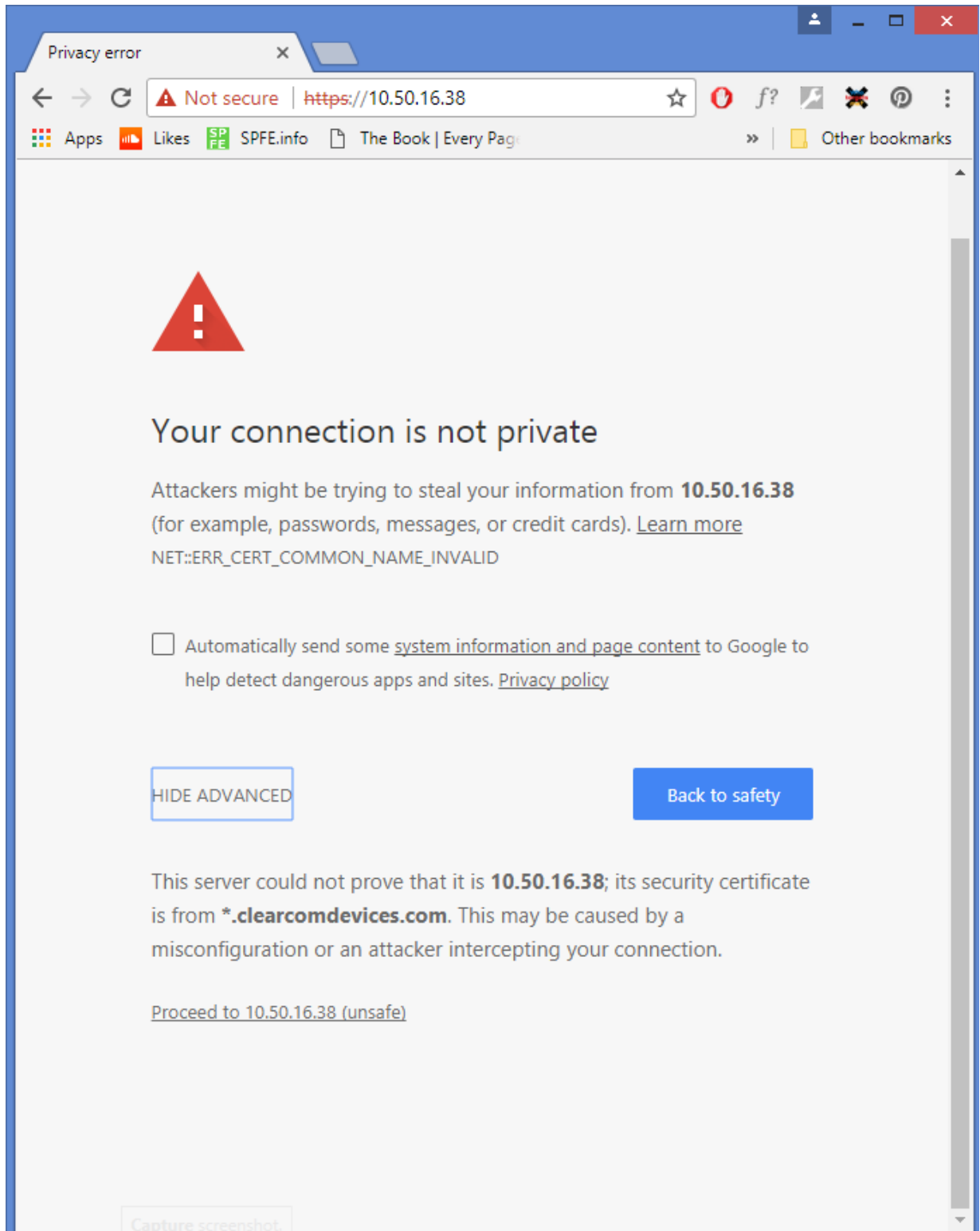
You must choose and install a security certificate and test it before enabling the Force HTTPs feature in the Core Configuration Manager (CCM).

Test the certificate by typing **https:// LQ IP address** in the browser URL field :



If the browser does not recognise the certificate as valid it will issue a warning:

Example browser exception:



When correctly installed, your browser will use the certificate to authenticate its HTTPs connection with LQ devices, giving an encrypted connection between the browser and the LQ unit and also between devices in a Link-Group.

Note: *The security certificate must be installed on every instance of a browser that is used to access the LQ unit. If you are working with a Link-Group, each browser used to access the devices must have a certificate installed.*

Relevant Information:

- LQ devices are designed to work with both HTTP and HTTPS. Enable the **Force HTTPS** feature to turn off the HTTP port and redirect traffic to the HTTPS port. This contributes to a secured connection between the devices.
- HTTP is routed through port 80
- HTTPS is routed through port 443
- There are 3 types of security certificate available for use with your LQ device:
 - A certificate of your own choosing (fullchain and private key)
 - An EasyDNS authorized certificate for *.clearcomdevices.com
 - The Clear-Com self-signed certificate.
- Depending on which certificate you use, you may have to register your LQ devices with a DNS server.
- If you try to Link to or access the CCM of a device that has been set to Force HTTPS using the HTTP protocol, you will get a **device not found** type message as the HTTP port has been turned off. If a device has been set to Force HTTPS in the CCM, you must use HTTPS to reach the device.

10.4 HTTPS Certification Browser Support

Each browser type (for example; Safari, Chrome, Edge, Firefox) uses its own method for HTTPS certificate management, and these methods can change with time. As this information is beyond the control of Clear-Com, please refer to the instructions supplied with your browser if you require more information about how the browser you are using works with certification support.

10.5 Certification Authority (CA) Options for Use with LQ Units

3 security authorization options are available. Choose the certification option that is best suited to your security requirements.

1. **A certificate of your own choosing.** This option gives you complete control over the security of your Link-Group. Choose this certificate if protecting the details of your intercom configuration is critical. This option requires some specialized knowledge. You will need to know how to obtain a fullchain certificate and a private key, and how to install them on your browser. When using your own certificate you might have to provide a DNS server address

and register the LQ device.

2. **The EasyDNS security certificate.**

This is a commercially certified certificate.

When using the EasyDNS certificate, you have to provide a DNS server address for LQ registration.

If you use this certificate, the browser needs Internet access to verify the certificate authenticity. This is because the browser will verify with AlphaSSL and GlobalSign that the certificate is valid.

3. **The Clear-Com self-signed (default) certificate.** This certificate can be downloaded and installed for use with an HTTPs connection. It is used to encrypt the audio channel that the LQ devices establish on port 655 (linking). It also verifies all Agent-IC connections to LQ. This certificate can be used in a private network. It does not require Internet access to confirm its authority.

Warning:

Browsers are not set up to recognize self-certification. Using the Clear-Com self -signed certificate (option 3) is likely to cause your browser to issue a warning.

This example shows a warning posted by the Chrome browser:

Privacy error

Not secure | <https://10.50.16.38>

Apps Likes SPFE.info The Book | Every Page Other bookmarks

Your connection is not private

Attackers might be trying to steal your information from **10.50.16.38** (for example, passwords, messages, or credit cards). [Learn more](#)

NET::ERR_CERT_COMMON_NAME_INVALID

Automatically send some [system information and page content](#) to Google to help detect dangerous apps and sites. [Privacy policy](#)

HIDE ADVANCED [Back to safety](#)

This server could not prove that it is **10.50.16.38**; its security certificate is from ***.clearcomdevices.com**. This may be caused by a misconfiguration or an attacker intercepting your connection.

[Proceed to 10.50.16.38 \(unsafe\)](#)

Click here to connect

Capture screenshot

To work with the Clear-Com self-signed certificate, you will need either to find a way of disabling the warning (for example, install the certificate in the trusted certificates root directory), or make a choice to ignore the warning and proceed to the insecure connection. This is not a conventional way of working with your browser's security features, but will provide a certain level of security if your Link-Group does not have Internet access.

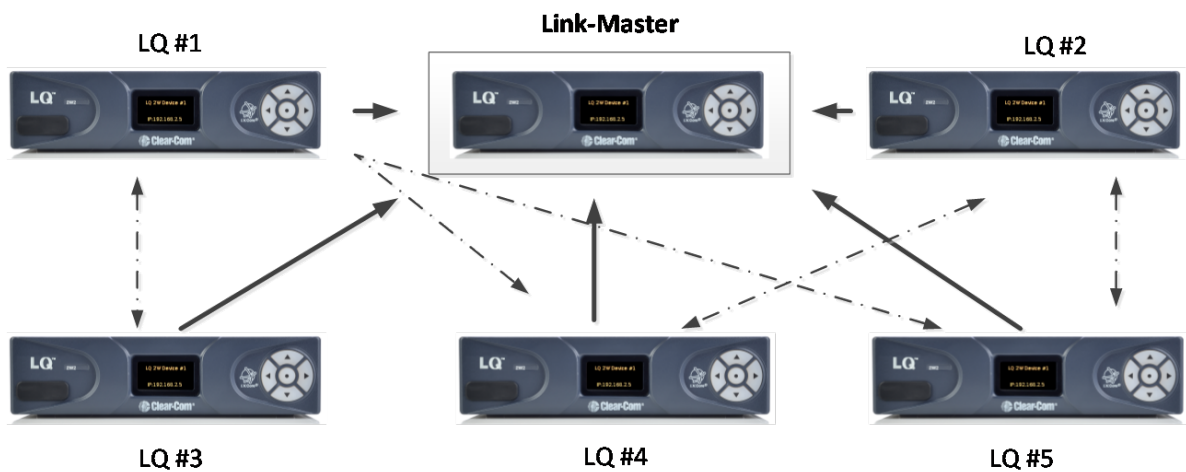
Note: *An iOS browser will only work with its own chosen certificates, so the Clear-Com self-signed certificate cannot be used in this context.*

10.6 Setting up a Link-Group Using HTTPs

Once joined to the Link-Group, all devices attempt to connect to all other devices within the group.

- Configuration and control of any device is possible through any other unit in the group
- Configuration information is both distributed and persisted within every node of the group
- Significantly reduces loss of service

A Mesh Network



LQ units establish a robust mesh network when transporting audio (see image above). The units use a series of IP ports to create this mesh:

Management (login credentials, setup details, IP addresses)

- TCP port 80 (HTTP)
- TCP port 443 (HTTPs)

Linking (audio)

- TCP/UDP port 655 (encrypted channel)

The devices will pass management details via either port 80 or port 443 (depending on which protocol is used). To ensure this information passes via an encrypted route, enable the Force HTTPs feature on every LQ device in the Link-Group. The devices will pass information on either management port, but the route will not be secure unless all the devices use HTTPs.

To create a Link-Group using the HTTPs protocol you will follow the same procedure as when using HTTP; you must give the member unit the IP address of the Link-Master unit. When linking units over the HTTPs protocol, you must specify HTTPs in the Linking page of the Link-Member.

For more information on the Linking procedure see: **Creating a Link-Group on page 48**

The port number does NOT need to be specified unless you are linking units over a firewall where port forwarding rules apply. In this case (units traversing a firewall to reach each other) you must specify the external IP address and the external port, so the units can cross the firewall.

Insert Link-Master IP in the form:
HTTPS://xx.xx.xx.xx

The correct port will be set by default.
Only change this setting if you are Linking over a firewall and port forwarding rules have been applied.

Note: *If you try to link to a device that has been set to Force HTTPs without specifying HTTPs, you will get a **device not found** message because the HTTP port is turned off.*

Note: *Before using the Force HTTPs feature, you must first install a security certificate on your browser. When using HTTPs with a Link-Group, every browser instance used to reach and configure the devices must have a security certificate installed.*

For more information see:

About Linking on page 60

Creating a Link-Group on page 48

Linking over Internet or WAN on page 62

Certification Authority (CA) Options for Use with LQ Units on page 76

10.7 Registering an LQ Unit with a DNS Server

When registering with a DNS server, the LQ unit will try and register two entries in the DNS it is connected to:

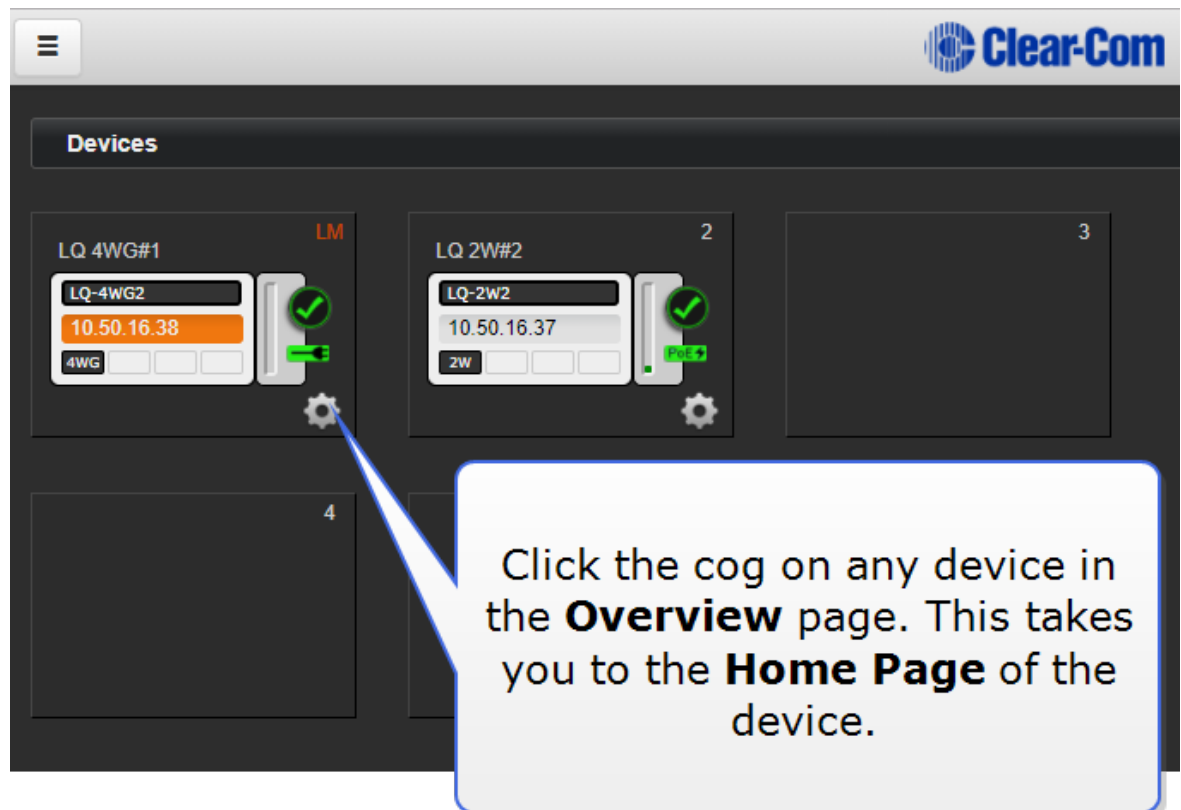
- `lq-[MACAddress].clearcomdevices.com` with its LAN IP address
- `lq-[MACAddress]x.clearcomdevices.com` with its external IP address.

This means that the LQ can usually be reached by typing the DNS hostname into a browser.

10.8 How to Set Up an HTTPs Connection between a Browser and an LQ Unit

10.8.1 Install a security certificate on your browser

1. Choose a security certificate. See **Certification Authority (CA) Options for Use with LQ Units on page 76** for more information.
2. Open the CCM of your LQ unit.



3. Navigate to **Device>Network>Security**.

4. Install the certificate. The three certificate options are covered below, choose a., b., or c.
 - a. **A certificate of your own choosing:**

Security

Force HTTPS : [Enabled](#)

*** HTTPS will only be active on connections to the CCM and between this and other devices in the Link-Group that also have HTTPS enabled. ***

Default Certificate

The default certificate is used by Agent-IC, when linking other LQs and for CCM traffic. Any other certificate loaded onto this unit will only be utilized by the CCM.

[Regenerate](#)

Certificate Status : **Valid**

Certificate Type : **Self-signed**

Certificate Authority : **ClearCom Tech Inc.**

Expiration Date : **Dec 9 2025 --- 2916 day(s) left.**

Active Certificate

CA Certificate : [Download](#)

Use Default Certificate : [Switch](#)

Use EasyDNS Certificate : [Switch](#)

Certificate Status : **Valid**

Certificate Type : **Self-signed**

Certificate Authority : **ClearCom Tech Inc.**

Expiration Date : **Dec 9 2025 --- 2916 day(s) left.**

Upload Certificate

User CA Fullchain : [Select File](#)

User CA Private Key : [Select File](#)

To install a certificate of your own choice, click here and navigate to where you have stored the file. You must install **User CA Fullchain** and **User CA Private Key**.

b. The EasyDNS certificate:

Security

Force HTTPS : [Enabled](#)

*** HTTPS will only be active on connections to the CCM and between this and other devices in the Link-Group that also have HTTPS enabled. ***

Default Certificate

The default certificate is used by Agent-IC, when linking other LQs and for CCM traffic. Any other certificate loaded onto this unit will only be utilized by the CCM.

[Regenerate](#)

Certificate Status : **Valid**

Certificate Type : **Self-signed**

Certificate Authority : **ClearCom Tech Inc.**

Expiration Date : **Dec 9 2025 --- 2916 day(s) left.**

Active Certificate

CA Certificate : [Download](#)

Use Default Certificate : [Switch](#)

Use EasyDNS Certificate : [Switch](#)

Certificate Status : **Valid**

Certificate Type : **Easydns**

Certificate Authority : **GlobalSign nv-sa**

Expiration Date : **Oct 19 2020 --- 1039 day(s) left.**

Upload Certificate

User CA Fullchain : [Select File](#)

User CA Private Key : [Select File](#)

To install the EasyDNS certificate, download the CA certificate from the LQ unit. Follow the instructions on your browser to install the certificate.

Click here to switch to the EasyDNS certificate.

Details of the certificate are shown here.

c. The Clear-Com self-signed (default) certificate:

The screenshot shows the 'Security' settings page. At the top, 'Force HTTPS' is 'Enabled'. A warning states: '*** HTTPS will only be active on connections to the CCM and between this and other devices in the Link Group that also have HTTPS enabled. ***'. Under 'Default Certificate', there is a 'Regenerate' button. The certificate status is 'Valid', type is 'Self-signed', authority is 'ClearCom Tech Inc.', and expiration date is 'Dec 9 2025 --- 2916 day(s) left.'. Below this is the 'Active Certificate' section with a 'Download' button. At the bottom is the 'Upload Certificate' section with 'Select File' buttons for 'User CA Fullchain' and 'User CA Private Key'.

The Clear-Com certificate verifies itself by date. You might need to regenerate the certificate to ensure it is in date.

This certificate is in date.

Click here to download the Clear-Com certificate and follow the instructions on your browser to install the certificate.

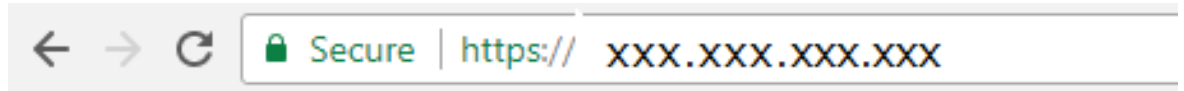
The certificate details are shown here.

5. Test the certificate by typing the HTTPs IP address into your browser URL field in the format: `HTTPs:// XX.XX.XX.XX :`

The screenshot shows a web browser with the Google search page. A callout box points to the address bar with the text: `https:// xx.xx.xx.xx (LQ IP address) then [Enter] key`. The browser shows a 'New Tab' with various bookmarks and a search bar at the bottom.

`https:// xx.xx.xx.xx (LQ IP address) then [Enter] key`

If you see the green 'secure' symbol and the browser does not issue an exception, the certificate is working.



Note: *When using your own certificate or the EasyDNS certificate, the LQ unit must first be registered with a DNS server. If required, your network administration department should provide advice on this. When using the Clear-Com default certificate, the device does not need to be registered with a DNS server. The Clear-Com default certificate can be used with a set up that does not have Internet access.*

Note: *Different browsers (for instance, Chrome, Firefox) have different methods for handling certification. This is beyond the control of Clear-Com. You may need to refer to the instructions that come with your browser for this.*

10.8.2 Enable the Force HTTPS feature on your LQ unit

1. Navigate to the **Security** section in the **Networking** page.
2. Enable the **Force HTTPS** feature. Click **Apply Changes**.

Security

Force HTTPS : *Not set*

Default Certificate

The default certificate is used by Agent-IC, while any other certificate loaded onto this unit will only be utilized by the CCM.

[Regenerate](#)

Certificate Status : **Valid**

Certificate Type : **Self-signed**

Certificate Authority : **Clear-Com**

Expiration Date : **Dec 9 2025 --- 2920 day(s) left.**

Active Certificate

CA Certificate : [Download](#)

Use Default Certificate : [Switch](#)

Use EasyDNS Certificate : [Switch](#)

Certificate Status : **Valid**

Certificate Type : **Self-signed**

Certificate Authority : **Clear-Com**

Expiration Date : **Dec 9 2025 --- 2920 day(s) left.**

Upload Certificate

User CA Fullchain : [Select File](#)

User CA Private Key : [Select File](#)

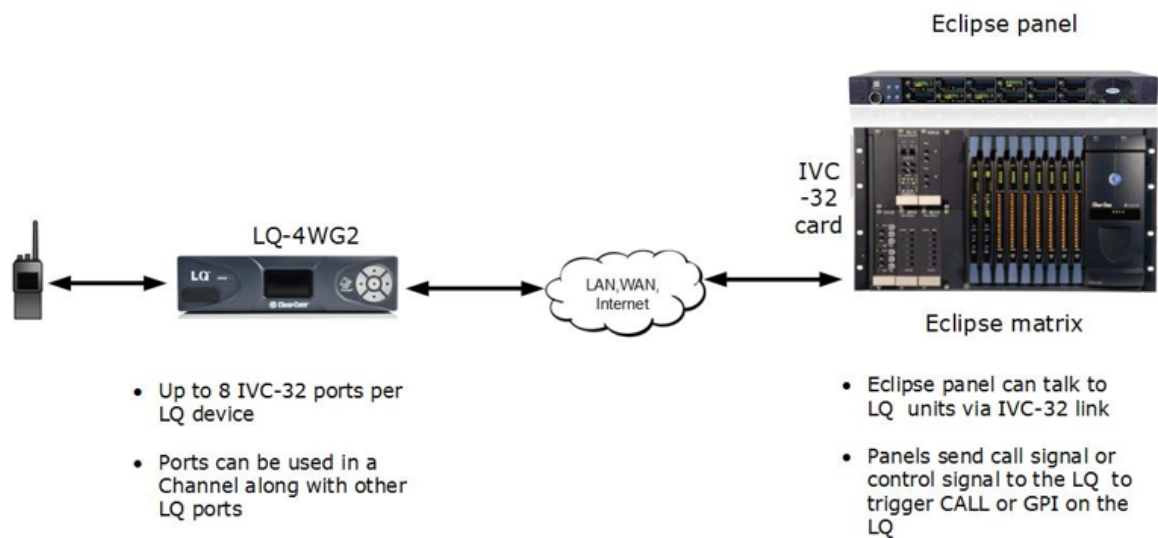
[Capture screenshot.](#)

3. If you are working with a Link-Group, enable the Force HTTPS feature on each device in the Link-Group.

11 Clear-Com Eclipse Matrix Connections

Each LQ unit (LQ 3.0 and above) can support up to 8 IVC-32 ports, as well as its own hardware ports.

- Up to 8 IVC-32 ports per LQ device
- Up to 32 IVC-32 ports per Link-Group
- IVC-32 ports are generated in the **External Systems** page in the CCM
- All ports, LQ hardware ports and IVC-32 ports can then be used in the LQ Channels to transmit audio, Call and GPIO signals.



Each LQ-R unit supports up to 24 ports: 8 hardware ports, 8 SIP ports and 8 virtual ports. Agent-IC and IVC ports are considered 'virtual' ports. Virtual ports can be used in any combination up to 8 in total.

11.1 How to create virtual ports and connect to a matrix

11.1.1 General outline

Both matrix and LQ must be connected to a network and able to reach each other across the network settings.

To set up this connection:

- Define port slots on the IVC-32 in the EHX configuration software
- Define IVC-32 virtual ports in the External Systems page of the Core Configuration Manager (CCM) and connect to the IVC-32
- Put required ports together in a Channel
- Program audio and GPIO relays if required.

11.2 Program the EHX software

In EHX, program the ports you want to connect to.

Program ports in EHX. Navigate to **EHX>Cards and Ports**.

1. Cards and Ports

2. Select IVC card from drop-down list

3. Double click here to find IVC card IP address

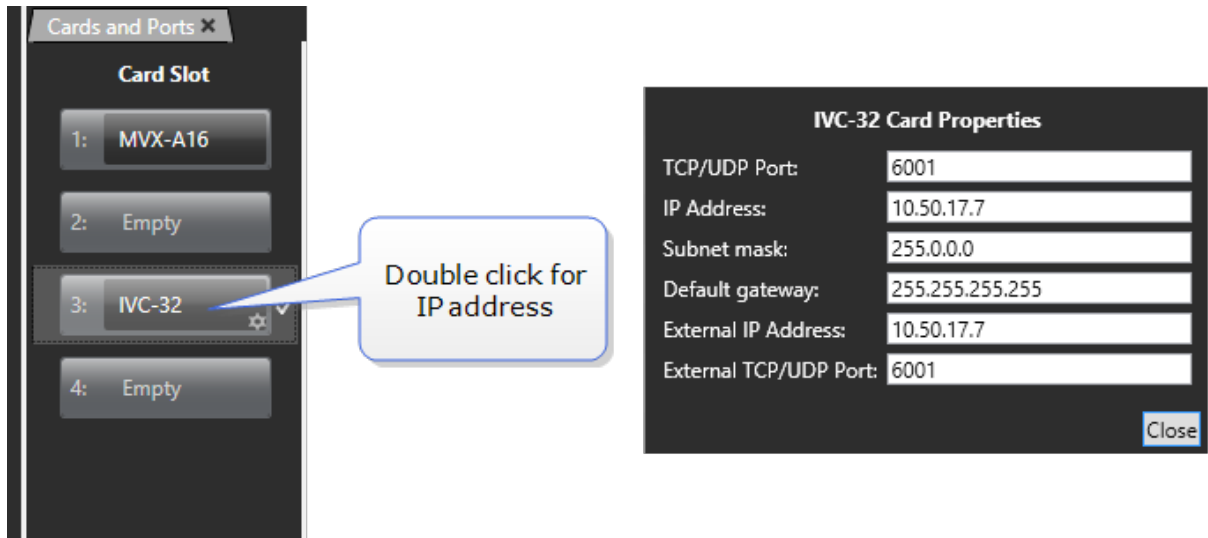
3. Select LQ from drop-down list, input label and description

4. Input User ID and Password

Port Number	Port Function	Label	Description
3.1 (17)	LQ		LQ Direct
3.2 (18)	LQ SIP	IVC_SIP#2	LQ SIP client
3.3 (19)	Empty		
3.4 (20)	Empty		
3.5 (21)	Empty		
3.6 (22)	Empty		
3.7 (23)	Empty		
3.8 (24)	Empty		
3.9 (25)	Empty		
3.10 (26)	Empty		
3.11 (27)	Empty		
3.12 (28)	Empty		
3.13 (29)	Empty		
3.14 (30)	Empty		
3.15 (31)	Empty		

When you have set up the new ports, you must **Apply changes to Matrix**.

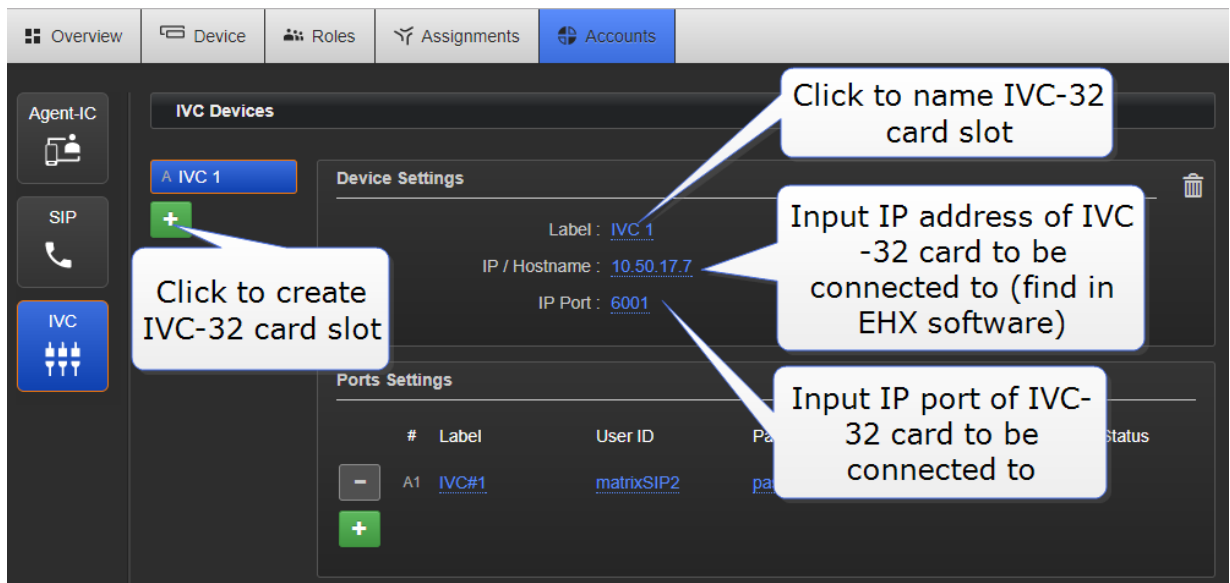
Find IVC32 card IP address.



11.3 Program the LQ CCM

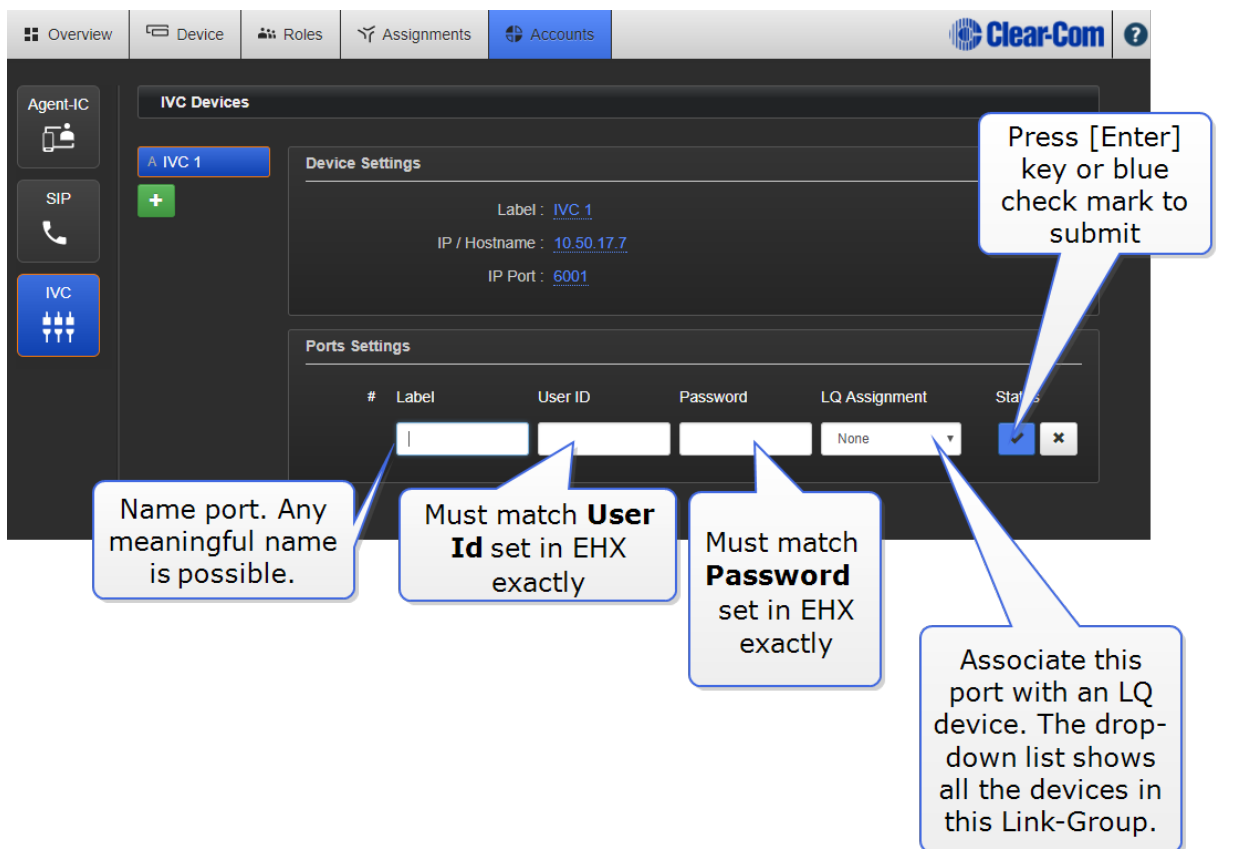
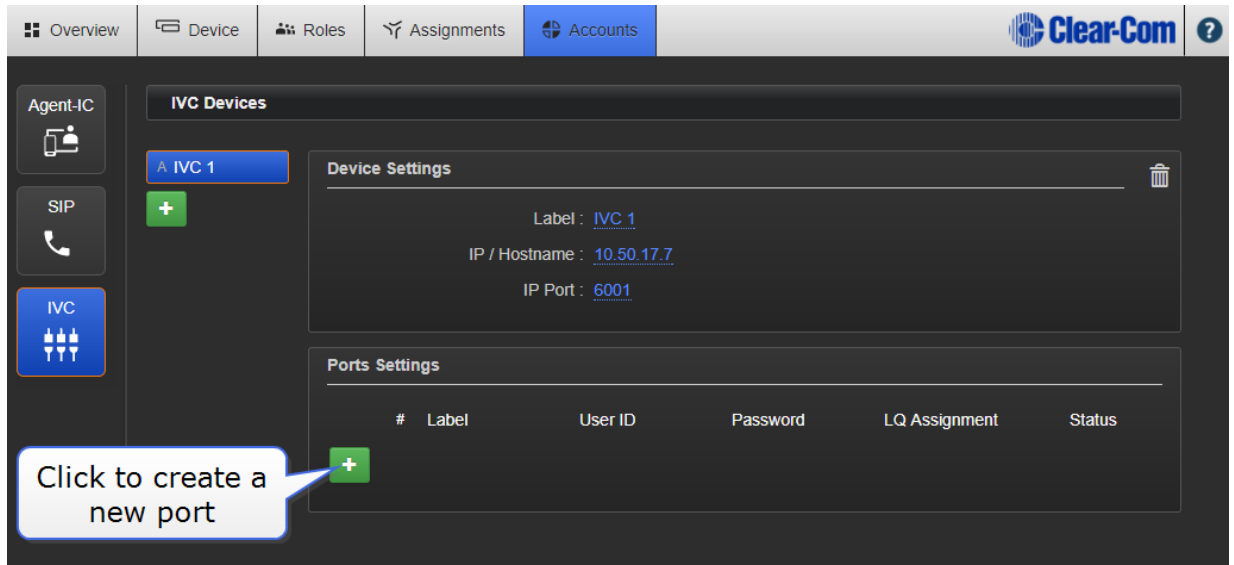
In the LQ Core Configuration Manager (CCM), create the IVC-32 card, and enter the TCP/IP address and port of the IVC-32 to be connected to.

How to create IVC-32 card slots in the CCM.



11.4 Create 'virtual' ports in the CCM

Next, you need to create a port, or ports for the card. You must have to hand **User ID** and **Password** that you entered into the EHX interface.



When the LQ is connected to the IVC-32 card, a green status LED shows. If the connection is not successful, a yellow warning displays. Click the yellow warning symbol for information.

11.5 Put new ports into a Channel

Once ports are created, they can be seen in the **Assignments** page and put into Channels.

Once a virtual port is associated to an LQ device you can adjust the port setting. Click the cog icon to go straight to **Ports** page.

If you want to pass GPIO controls over the network using LQ you must program Network Control Events. See **What are Networked Control Events and How Do I Use Them? on page 92**

12 What are Networked Control Events and How Do I Use Them?

12.1 About Networked Control Events

Networked Control Events are used to program input and output triggers (GPIO) in your intercom system. They are designed to allow maximum flexibility and scalability in your use of GPIO events.

For example, Networked Control Events can be used to enable radio communication over IP, or send a control signal from a panel, via a matrix to a radio. The GPO can also be used to turn on an 'on-air' light, or perform any other function you require.

A Networked Control Event occurs when the input trigger and the output trigger on ports in a Channel are set to the same value.

Active Networked Control Events can be viewed in the **Assignments** page in the CCM.

Networked Control Events

The screenshot shows the 'Assignments' page in the Clear-Com CCM. The 'Active Control Events' section is highlighted with a callout box. The configuration for Channel 1 is shown, with a green play button indicating an active event. The event is configured with '1-2W-Port B' as the input trigger and 'RS-701' as the output trigger. The 'Show All Connections' button is also visible.

12.2 How to set up Networked Control Events

1. Configure the input trigger on a port. This example shows audio entering a 4-wire port (VOX) on an LQ 4W2 device that triggers the output relay on an LQ GPIO device.

Overview Device Roles Assignments Accounts Clear-Com

LQ-R2W4-4W4 LM

Audio Ports

2-Wire

A RS-701

B 1-2W-Port B

C 1-2W-Port C

D 1-2W-Port D

4-Wire

E 1-4W-Port E

F 1-4W-Port F

G 1-4W-Port G

H 1-4W-Port H

Port Settings

Label: 1-4W-Port E

Multi Channel Support: Disabled

Input Gain: 0 dB

Output Gain: 0 dB

VOX

VOX Mode: Adaptive Threshold Status

VOX Off Delay: 0.5 sec

VOX Threshold: Not set

VOX Action Triggers: Control Event 1

4-Wire

Port Function: to Matrix

Baud Rate: 19200 (Eclipse)

VOX mode must be set to **Adaptive** (default) or **Fixed Threshold** before Control Events can be set

Set to Control Event 1

2. Configure the output (GPO) on a port.

Overview Device Roles Assignments Accounts Clear-Com

LQ-4WG#4 4

Audio Ports

4-Wire + GPIO

A 4-4W-Port A

B 4-4W-Port B

IVC

A1 Iqalex3

SIP

A1 AlexSIP

Port Settings

Label: 4-4W-Port A

Multi Channel Support: Disabled

Program Output Enabled: Mute

Input Gain: 0 dB

Output Gain: 0 dB

Output Level: Line Level (0 dB)

RX Call Signal: Disabled

VOX

VOX Mode: Adaptive Threshold Status

VOX Off Delay: 0.5 sec

VOX Threshold: Not set

VOX Action Triggers: Disabled

GPIO

GPI Action Triggers: Disabled Status

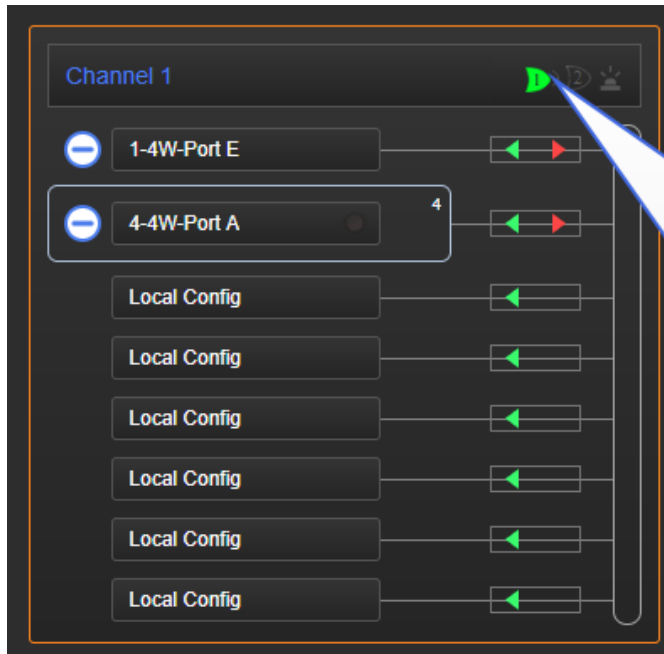
GPO Triggered By: Channel Event 1 Status Test

GPO Off Delay: None

VOX mode set to Adaptive Threshold

GPO set to Control Event 1

3. Put both ports together in a Channel . This activates a Networked Control Event when an input and an output Networked Control Event setting match. A GPO is then fired.



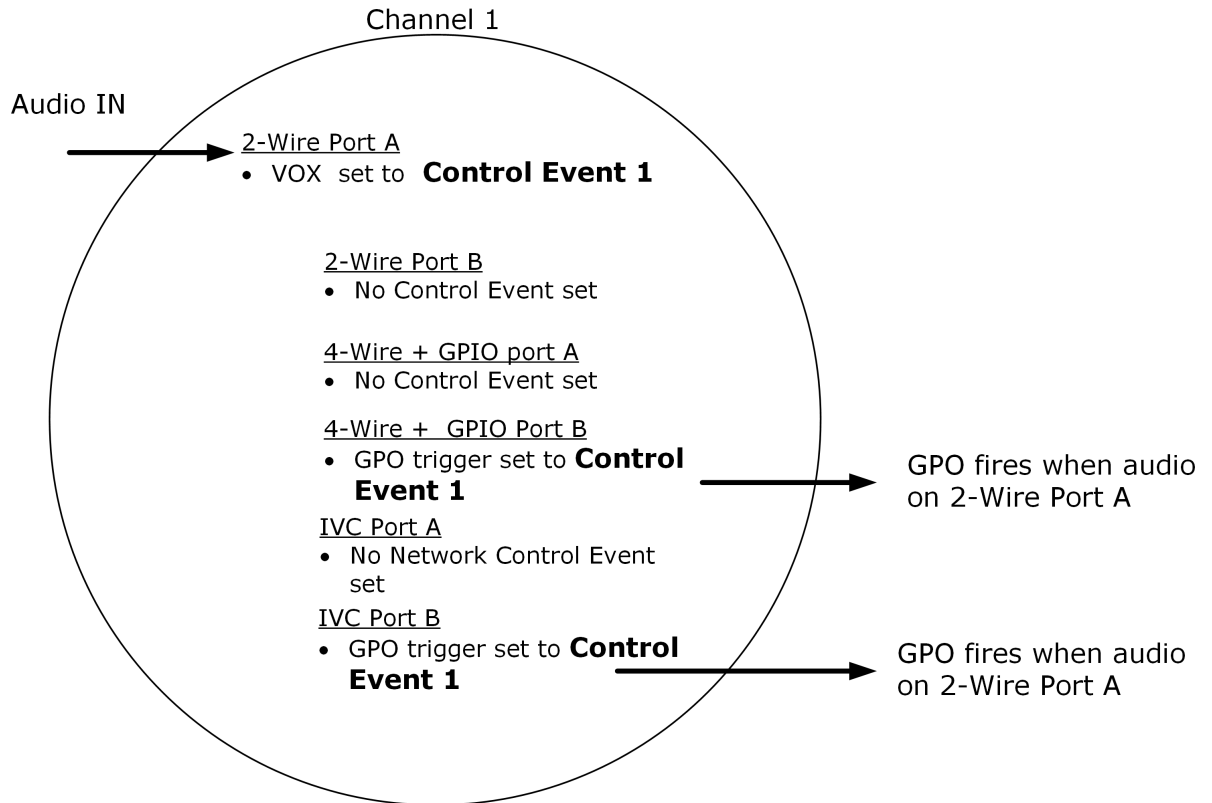
When audio triggers the VOX on Port E, Port A will fire a GPO. The **Network Control Event** icon lights when this happens.

12.3 Examples of when to use Networked Control Events

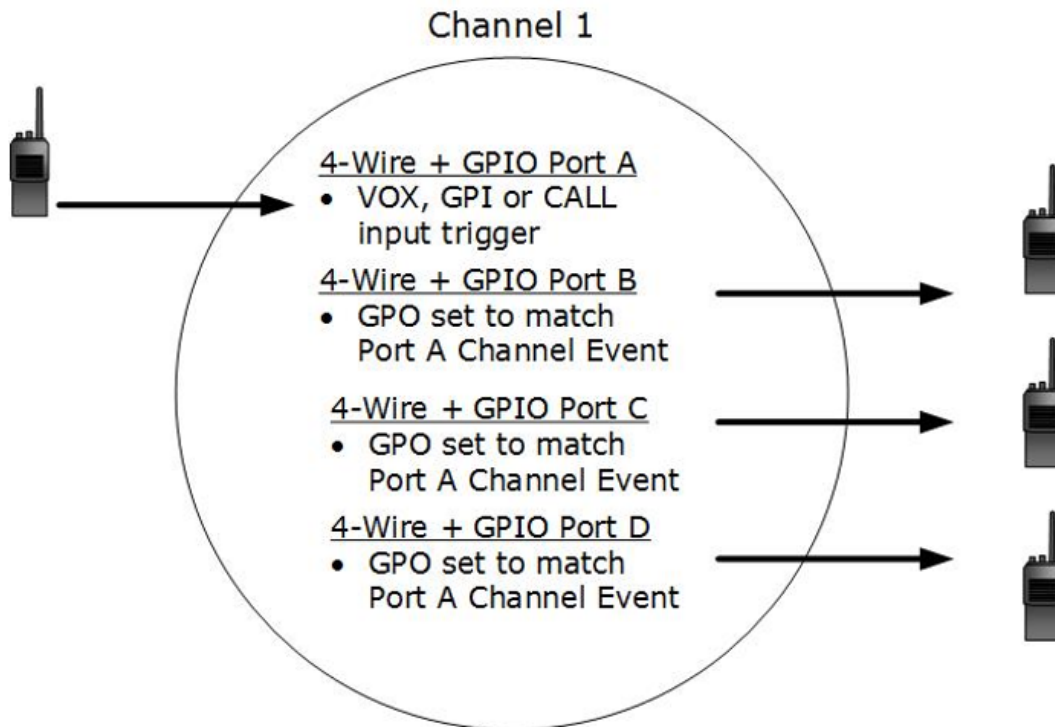
Example 1. VOX trigger

LQ Networked Control Event Example

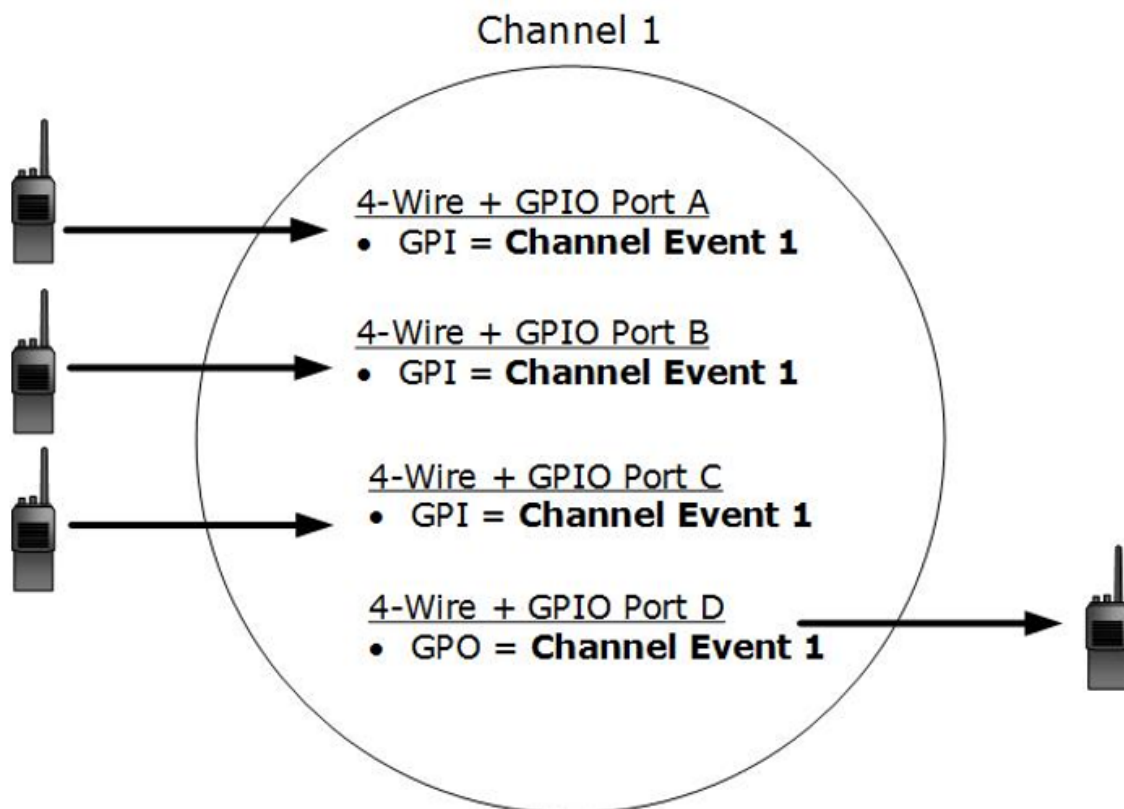
(VOX input trigger)



Example 2. One-to-many



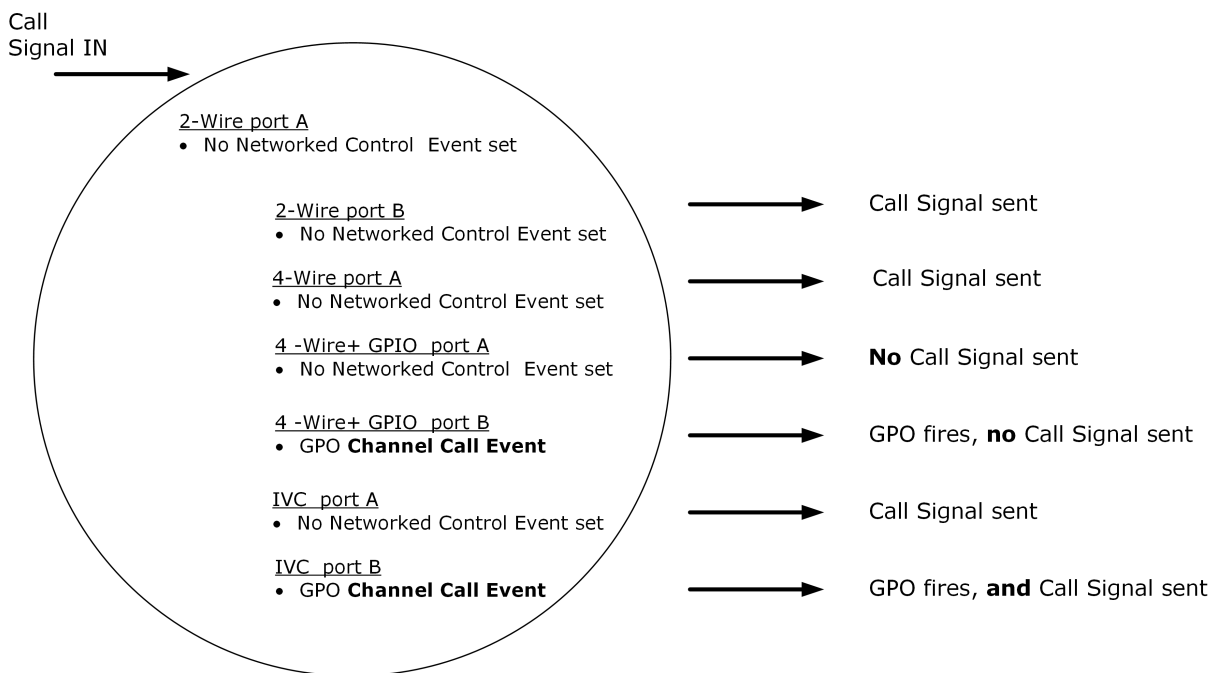
Example 3. Many-to-one



Example 4. Call Event trigger. Passing call signals using GPIO

LQ Networked Control Event Example

(Call signal input, automatic call propagation)

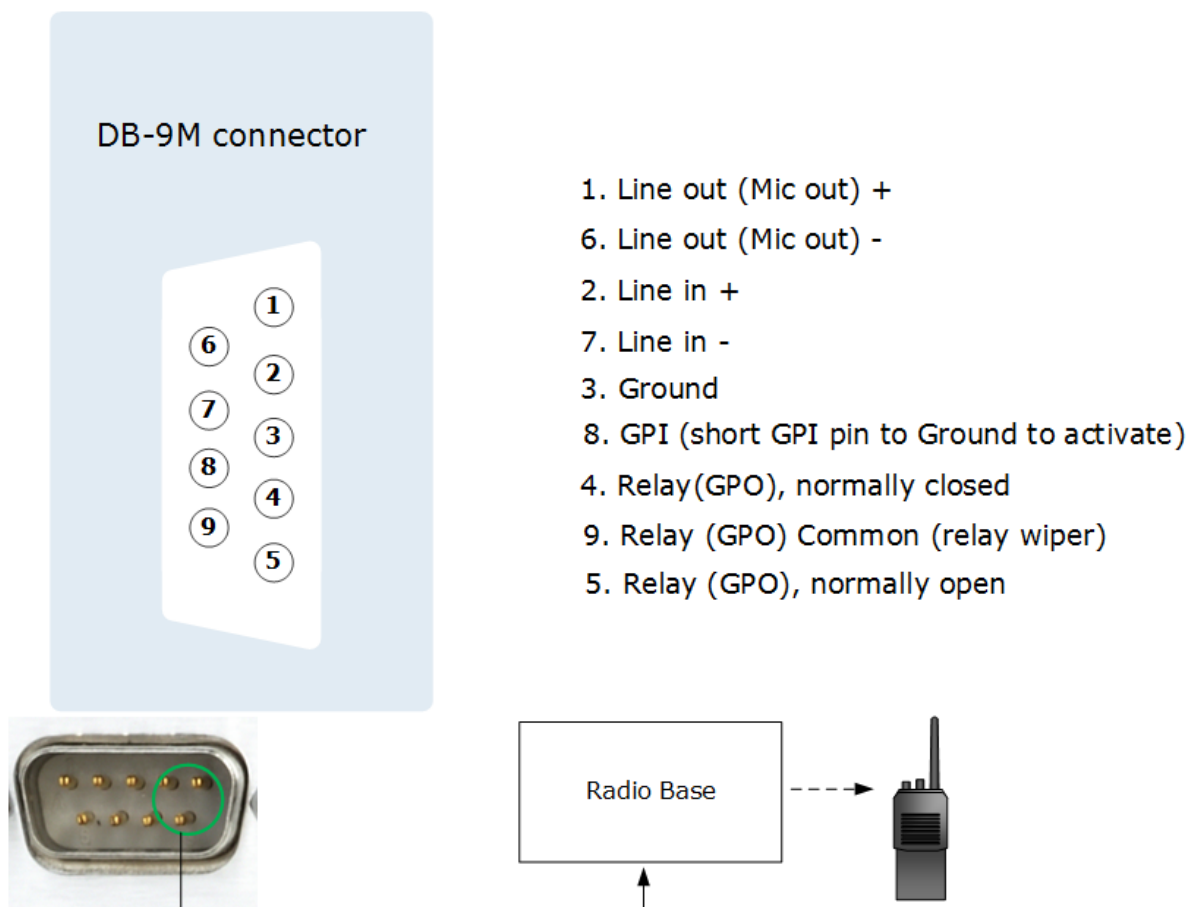


Note: Call signals are automatically propagated to all members of a Channel when using LQ so a GPI trigger is unnecessary. However, a GPIO interface will not send a call signal trigger unless a GPO Call Channel event is set on that port.

12.4 Types of GPI (input) trigger

4 LQ port types	Available GPI (input) trigger
LQ 2-Wire	1. Call 2. VOX
LQ 4-Wire	1. Call 2. VOX
LQ 4-Wire + GPIO	1. VOX 2. GPI
IVC-32	1. Call 2. VOX 3. GPI

12.5 GPIO port pinout

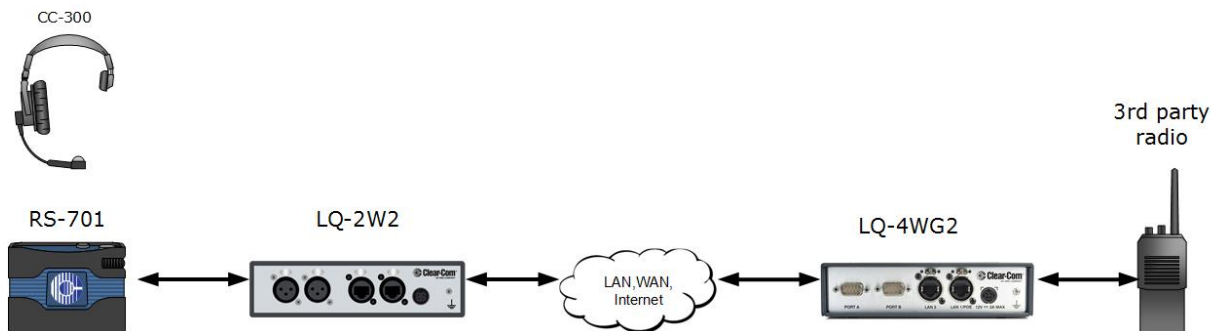


For more information, see:

GPIO: Examples and Step-By-Step Set Up on page 99

12.6 GPIO: Examples and Step-By-Step Set Up

12.6.1 Setting up a Partyline/2-Wire relay to a radio (VOX trigger).



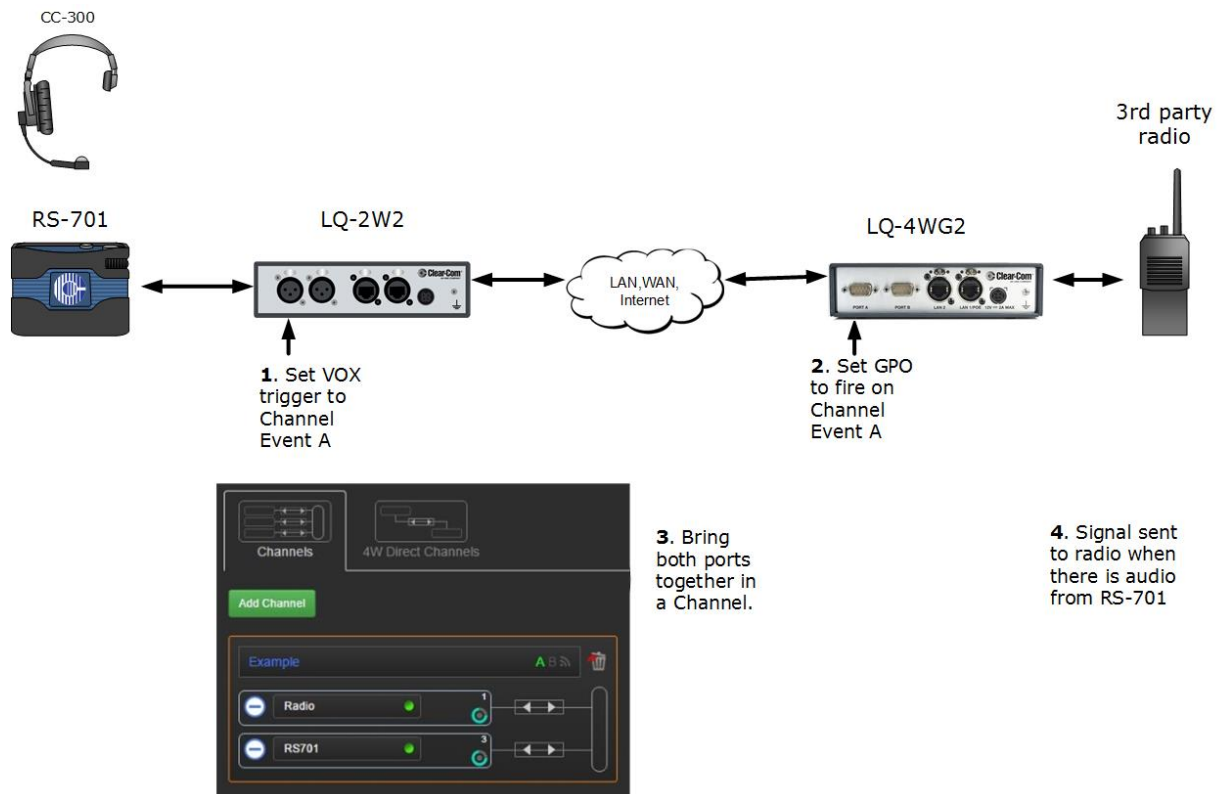
This example shows how to send a GPO (General Purpose Output) trigger to a third party radio when audio comes in from an Encore RS701 beltpack. This can be used to open audio transmission on the radio; equivalent to pressing the Push To Talk (PTT) button on the radio.

The GPO is triggered by LQ models that have a GPO port; LQ-4WG2, GQ-R2WG8 and LQ-R2W4+4WG4.

Note: For this configuration Link Group must already be established. See [Creating a Link-Group on page 48](#) for more information.

12.6.2 General set up outline

1. In port settings, on the device and port connected to the beltpack, set the VOX (audio detection) to trigger Network Control Event 1
2. On the device and port connected to the radio, set the GPO to trigger on Network Control Event 1
3. Bring both ports together into a Channel
4. When audio comes in from the beltpack, the GPO will fire. You can test this relay using the TEST button.



12.6.3 Beltpack to radio on VOX trigger

1. Connect the beltpack. For more information, see **Connecting 2-wire Equipment on page 159**
2. Set Network Control Events in the CCM (Core Configuration Manager)
 - a. Set beltpack port.

The screenshot shows the CCM interface for an LQ-R2W4-4W4 device. The 'Audio Ports' section is active, showing a list of ports under '2-Wire' and '4-Wire' categories. Port A, labeled 'RS-701', is selected and highlighted in orange. The 'Port Settings' section is expanded, showing 'Interface Settings' (Power: Enabled, Mode: Clear-Com) and 'Port Settings' (Label: RS-701, Multi Channel Support: Disabled, Input Gain: 0 dB, Output Gain: 0 dB). Under 'VOX' settings, the 'VOX Mode' is set to 'Adaptive Threshold' and the 'VOX Action Triggers' dropdown menu is open, showing 'Control Event 1' selected. A '2-Wire' section at the bottom shows 'Termination' and 'Auto-Nulling' options, both set to 'Control Event 1'.

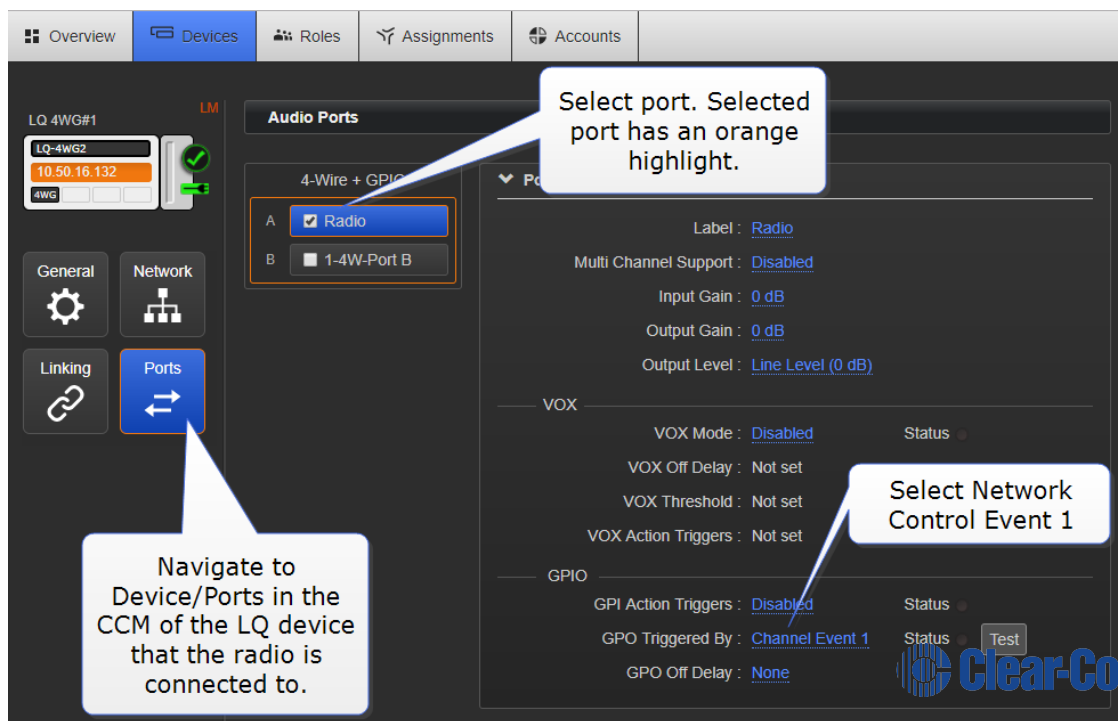
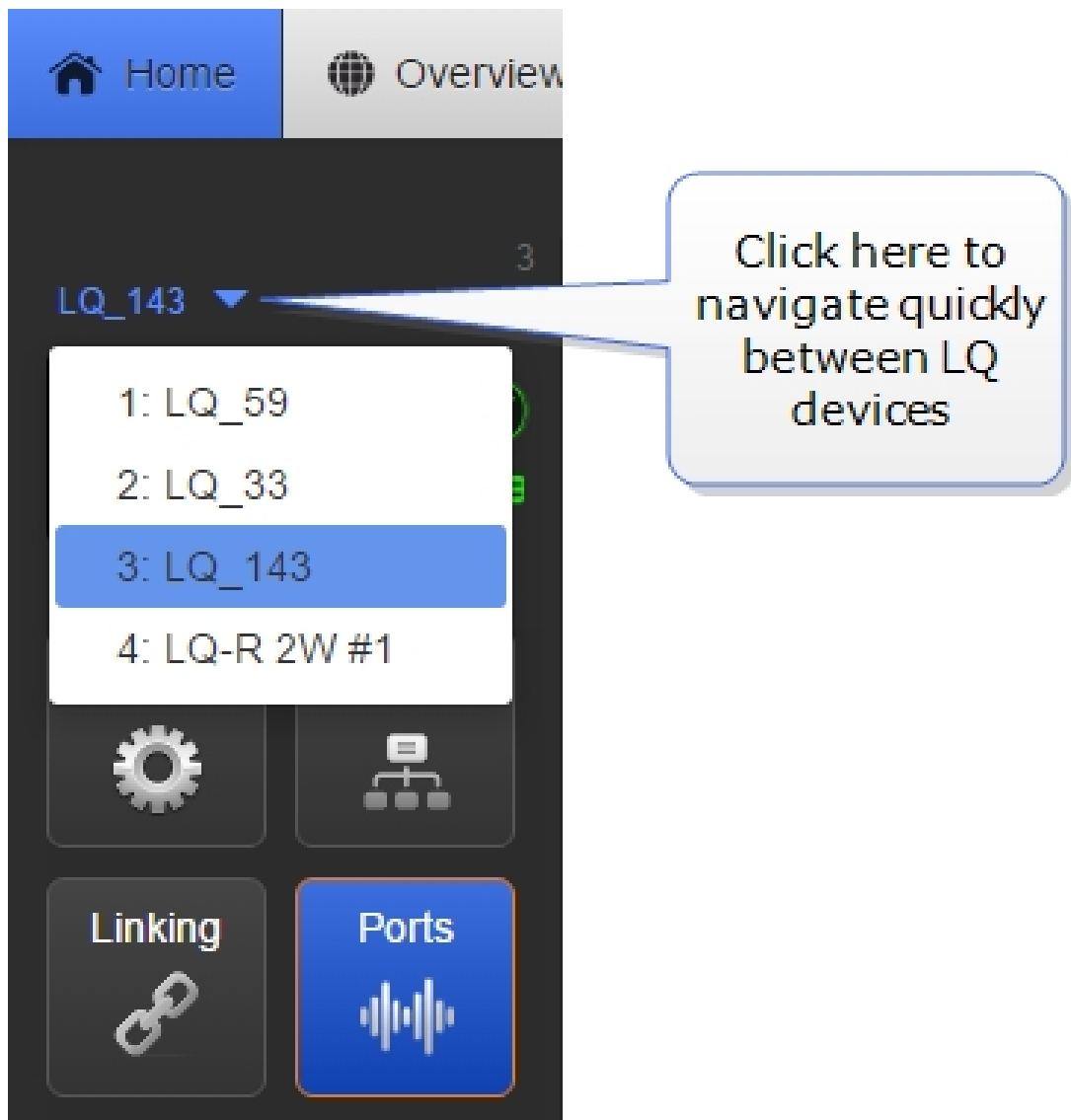
1. Navigate to **Device/Ports** in the CCM of the LQ device that the beltpack is connected to.

2. Select port. Selected port has an orange highlight.

3. Set VOX mode.

4. Select Network Control Event 1

b. Set radio port.



- Once you have set up the ports, navigate to Assignments in the CCM and put ports into a Channel.

The screenshot shows the 'Assignments' page in the CCM interface. It features a navigation bar with 'Home', 'Overview', and 'Assignments'. The main area is divided into 'Devices' and 'Channels'. Under 'Devices', there are three sections: 'LQ 4WG #1', 'LQ-R 2W+4WG#3', and 'LQ-R 4WG#4'. Each section lists various ports with '+' and '-' buttons. The 'Channels' section shows a list of channels (Channel 1 to Channel 12) and an 'Example' channel. A diagram in the center shows a 'Radio' and 'RS701' connected to a channel. Callouts provide instructions: '1. Navigate to Assignments', '2. Select Channel (or create a new one)', '3. Click '+' to put ports into Channel', '4. With both ports in the same Channel, Network Control Event 1 will trigger the output to the radio when audio comes in to the Channel from the headset.', and 'Click/touch '-' if you want to remove port from Channel'. A note states: 'Note: You will see Event 1 light at the top of the Channel box when the Event is triggered.'

Note: You will see audio and Network Control Event status LED light when audio comes into the Channel and triggers Network Control Event 1.

12.6.4 2-Wire beltpack to radio on Call button press

This example shows how to set up a Call button press on an Encore 701 beltpack to open communication with a third party radio.

Call signals are automatically passed when using 2-Wire equipment, so no configuration of the beltpack port is necessary when using a CALL to trigger a relay to a radio.

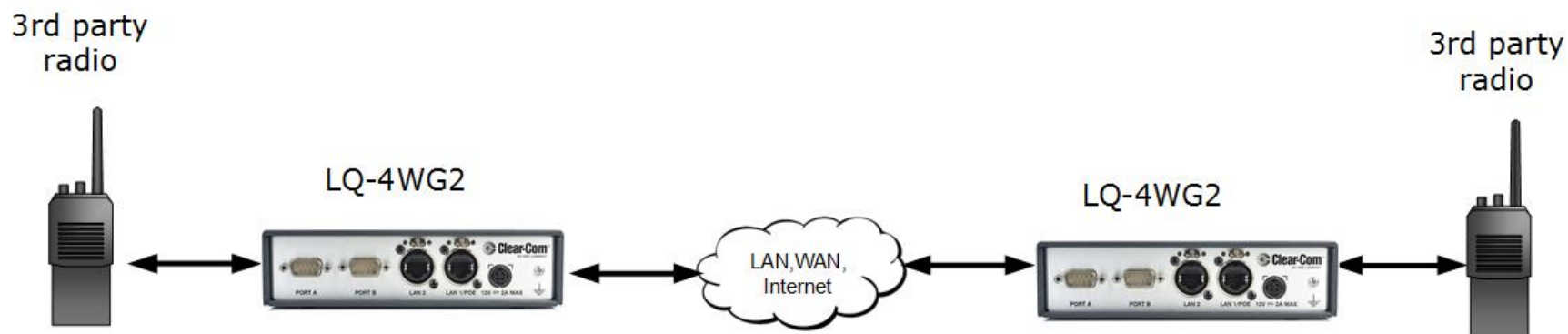
Beltpack to radio on Call button press

1. Connect beltpack as above.
2. In the CCM, navigate to the port where the radio is connected (see Step 2.b of Example #1 above). Select **Channel Call Event** on the **GPO trigger**.
3. The output will fire on any Call event in the Channel.

Note:

You can also set the beltpack to do 'call on talk' by setting dip switch 5 on the beltpack. See RS-701 datasheet available from the Clear-Com website, www.clearcom.com.

12.7 Setting Up a 4-Wire Radio GPIO over IP (LAN, WAN, Internet)



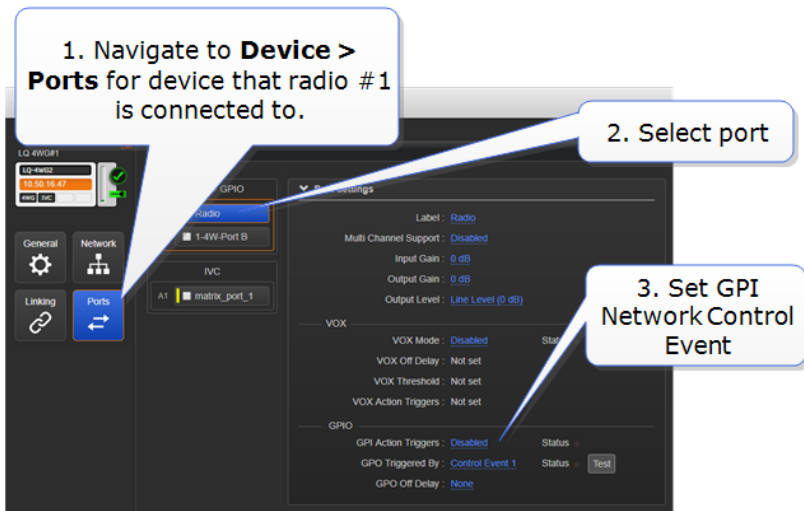
As with the examples above; to program this set up:

1. Configure the GPI and GPO triggers on the ports that the radios are connected to.
2. Bring both ports together into a Channel.

1. Navigate to **Device > Ports** for device that radio #1 is connected to.

2. Select port

3. Set GPI Network Control Event

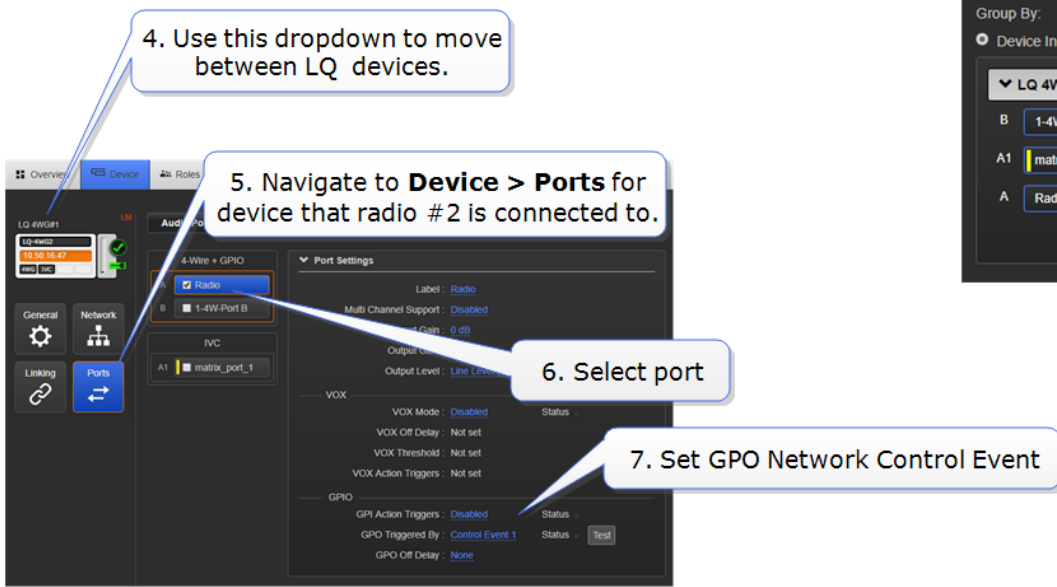


4. Use this dropdown to move between LQ devices.

5. Navigate to **Device > Ports** for device that radio #2 is connected to.

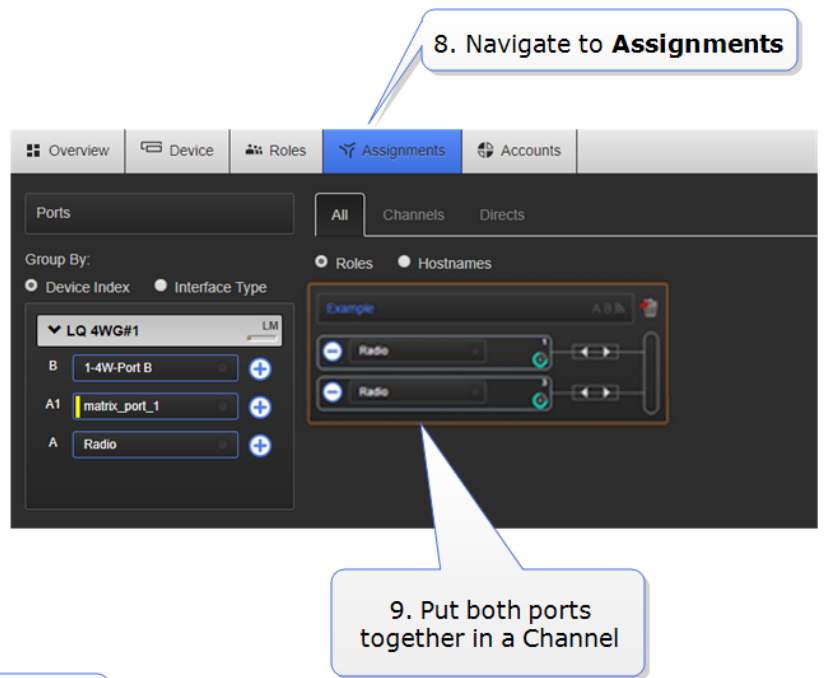
6. Select port

7. Set GPO Network Control Event



8. Navigate to **Assignments**

9. Put both ports together in a Channel



13 Session Initiation Protocol (SIP) Connectivity

LQ 4.0 and above.

With LQ-SIP you can connect external telephones lines into your intercom system, expanding the reach of your communications.

You must purchase a license to use SIP connectivity. Contact your Clear-Com dealer for more information.

13.1 What is SIP?

SIP is an application layer (signaling) protocol defined by the Internet Engineering Task Force (IETF) in 2002. It is used for creating, modifying and terminating sessions for voice, video and instant messaging (IM) for one or more participants.

SIP User Agents

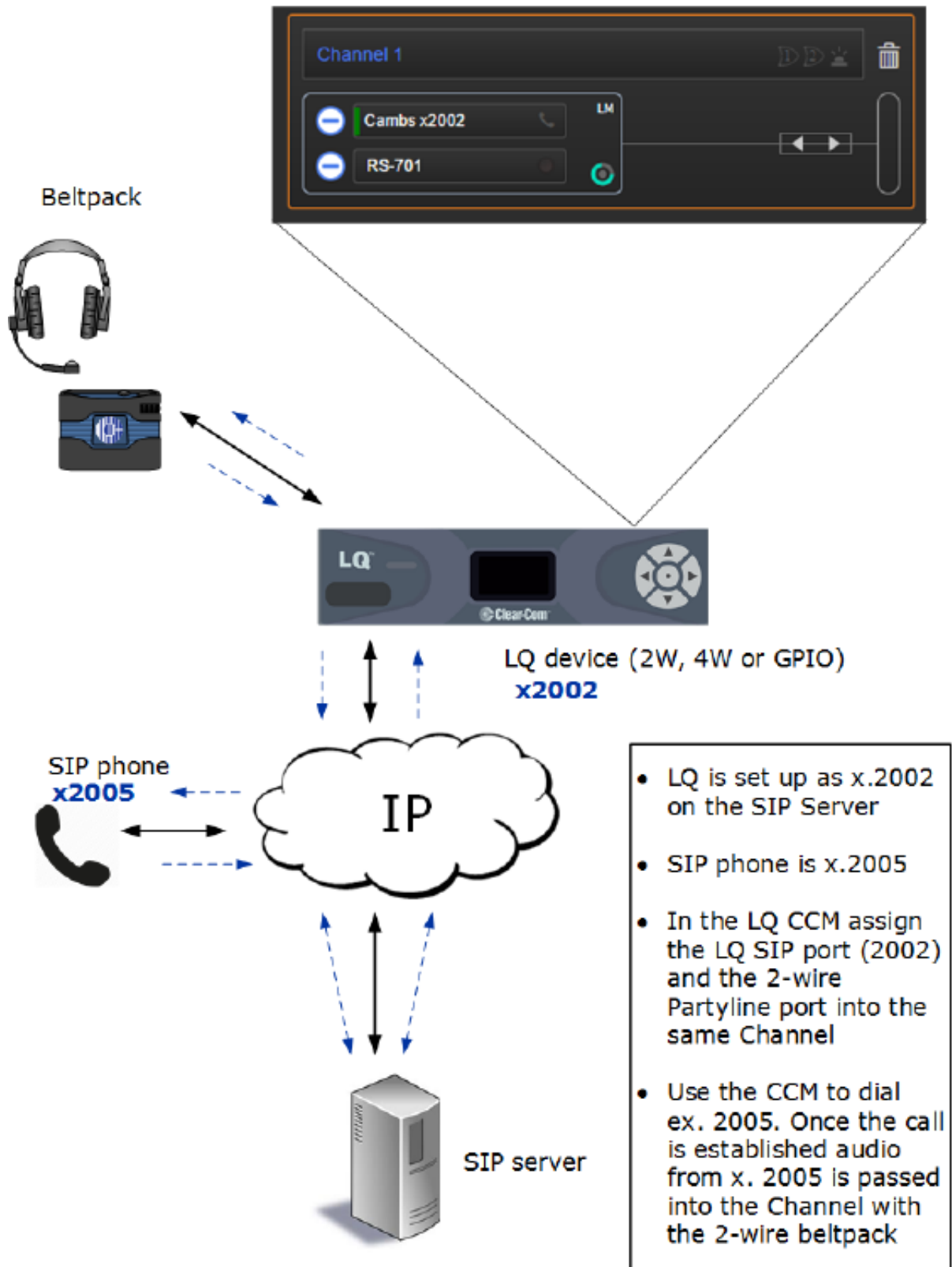
- SIP client: makes and terminates requests
- SIP server: accepts and administrates requests

13.2 Examples of LQ-SIP

13.2.1 LQ-SIP standalone

LQ-SIP can be used with 2-wire Partyline equipment to connect an external telephone to your LQ communications system. Use this set up to enable communication between a telephone user and a Partyline headset (or radio) user.

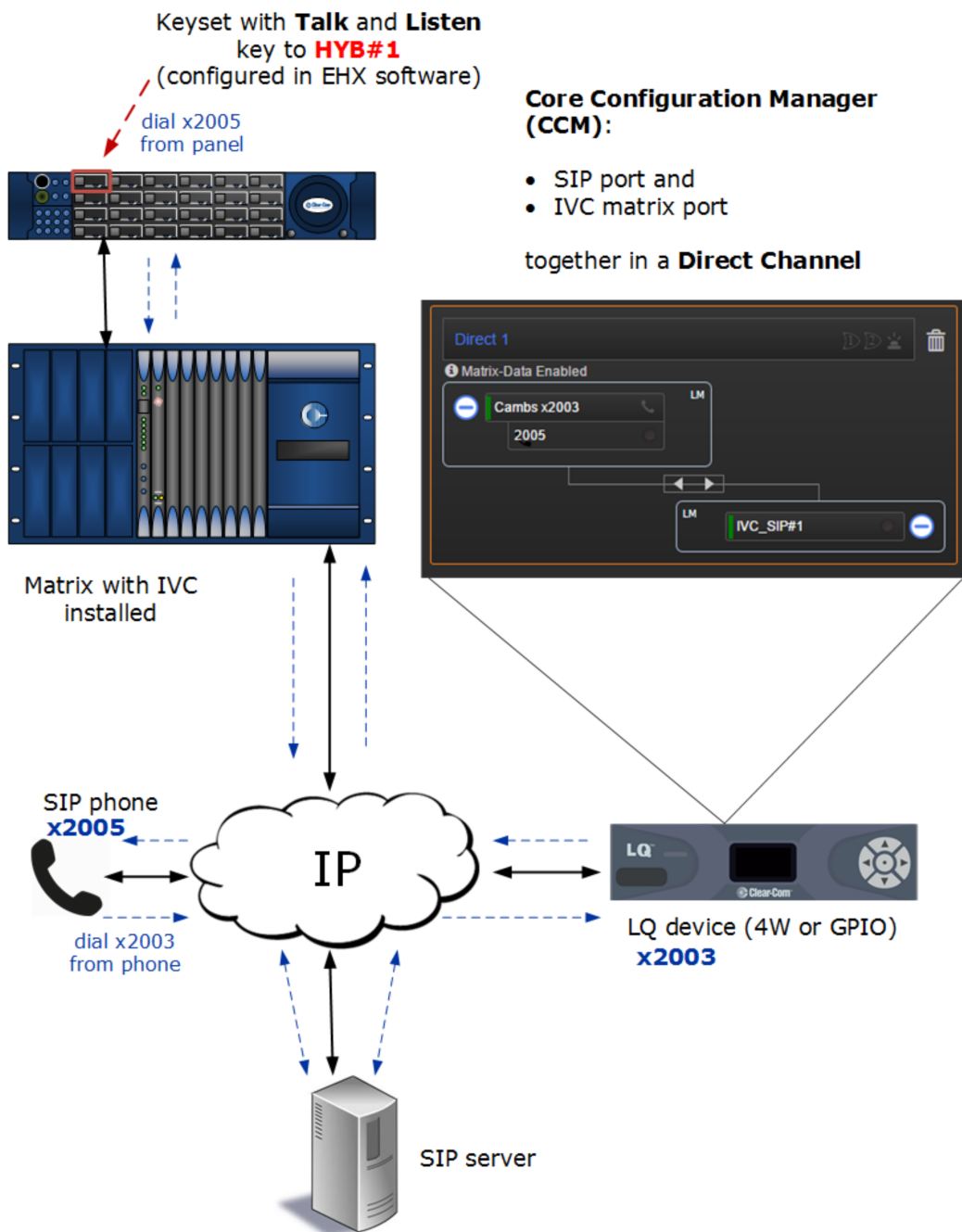
Assignments page in the Core Configuration Manager (CCM)



13.2.2 LQ-SIP and Clear-Com Eclipse matrix systems

LQ-SIP can be used to connect a telephone line to your matrix. This allows you to set up communication between a telephone user and a panel user.

Note: When connecting LQ-SIP to Eclipse use either a Clear-Com IVC card or a Clear-Com MVX card.



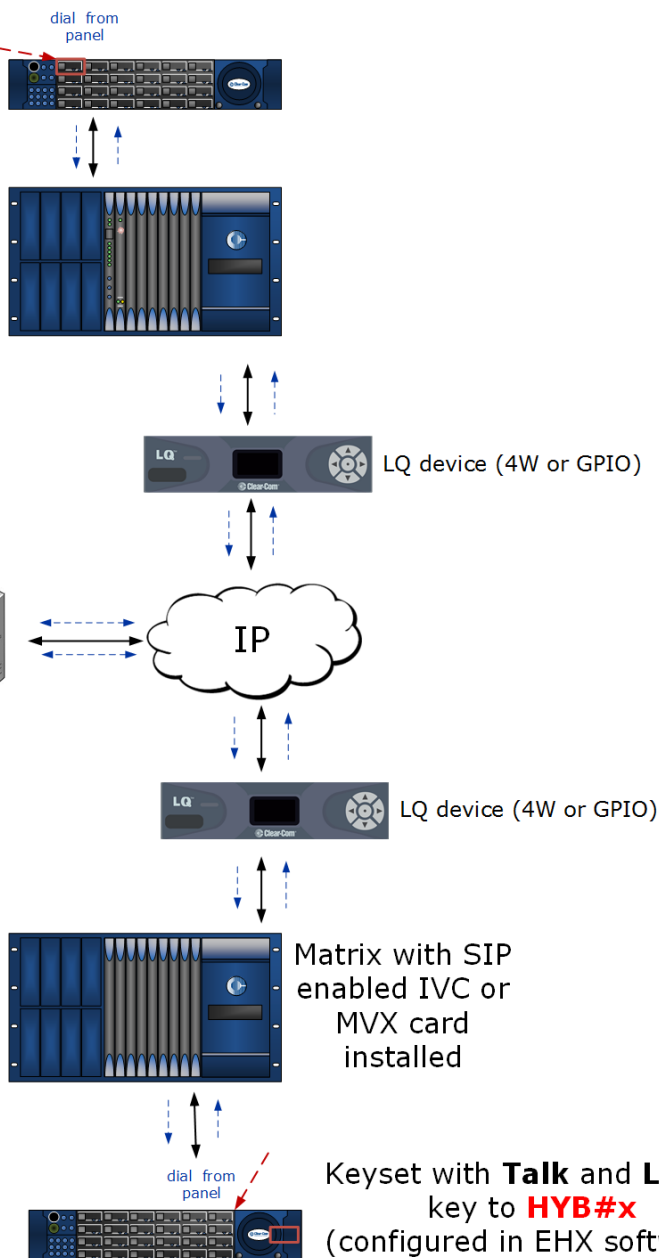
13.2.3 Connecting matrix systems using LQ-SIP (long range)

LQ-SIP can be used to link matrix systems, providing long range panel to panel communications between different systems.

Keyset with **Talk** and **Listen** key to **HYB#x** (configured in EHX software)

Matrix with SIP enabled IVC or MVX card installed

SIP server



Keyset with **Talk** and **Listen** key to **HYB#x** (configured in EHX software)

13.3 Codecs - LQ SIP

LQ devices are compatible with the following codecs:

- G.711 μ -law
- G.711 A-law
- G.722

13.4 Program LQ-SIP Standalone

- Required extension numbers must be set up on the SIP server before you begin. Refer to your SIP server documentation.
- Open the Core Configuration Manager (CCM): input the IP address of the LQ unit (found in the device front panel screen) into the address field of a browser that is on the same network as the LQ unit.
- For more detailed information on physically connecting devices, see *Chapter 4. Basic set up (LAN)* in the *LQ user manual*.
- If you don't have, or have not yet activated a license for SIP, you will not be able to generate SIP ports in the **Accounts** page of the CCM.
- For device username and password see **The Core Configuration Manager (CCM) Password on page 24**.

13.4.1 Set up: General outline

1. The LQ device must be connected to the same network as the SIP server. The LQ unit must be able to see (contact) the SIP server. See your network administrator you have any connectivity problems.
2. Connect the external 4-wire, 2-wire Partyline or radio to a port on the back of the LQ unit.
3. Open the CCM. Navigate to the **Accounts** page and register SIP client(s).
4. Navigate to the **Assignments** page in the CCM and put the SIP enabled port and the external port together in the same **Channel**.

Putting the two interfaces together in a Channel connects and routes audio in a Partyline (conference) setup.

Note: *Each LQ-R unit supports up to 24 ports: 8 hardware ports, 8 SIP ports and 8 virtual ports. Agent-IC and IVC ports are considered 'virtual' ports. Virtual ports can be used in any combination up to 8 in total.*

13.4.2 Demonstration: Program the CCM

1. Navigate to the Accounts page of the CCM and define the SIP server.

Note: You need to configure the **Domain** setting if your PBX is set up to work with more than one domain. Configuring the domain in the CCM is recommended as the PBX may have only one domain, but this can change. Please refer to your network and PBX administration if you need advice on this.

2. Register SIP clients. Give the LQ unit the **Username** and **Password** of an extension already set up in the SIP server. Assign this user extension to an LQ unit to register the client with the LQ. Register up to 8 SIP clients on each LQ device.

The screenshot displays the Clear-Com web interface for configuring SIP servers and accounts. The top navigation bar includes 'Overview', 'Device', 'Roles', 'Assignments', and 'Accounts'. The left sidebar shows 'AIC Users', 'SIP', and 'IVC-32'. The main content area is titled 'SIP Servers' and shows a list of servers, including 'Cambs SIP server'. Below this, the 'SIP Server Settings' for 'Cambs SIP server' are displayed, including fields for Label, Registrar/Proxy IP/Hostname (10.50.12.83), Registrar/Proxy Port (5060), and Domain (Not Set). The 'Advanced' section shows 'SIP Transport Protocol' set to 'UDP/TCP'. Below the settings is the 'Accounts' section, which contains a table with columns for #, Label, User, Password, LQ Assignment, and Status. A green '+' button is next to the 'Cambs SIP server' entry. A blue checkmark is in the Status column. Callout boxes provide instructions: 1. Click green '+', 2. User id and password exactly as in SIP server, 3. Choose LQ from dropdown list, 4. Click blue check mark to submit.

Note: If the registration process times out the LQ will re-register. The unit renews registration every 5 minutes.

Note: Some SIP providers require two levels of authorisation. In this case you will enter the username and user authorization ID into the **User** field in the format: `userID#userauthorizationID`. (No spaces).

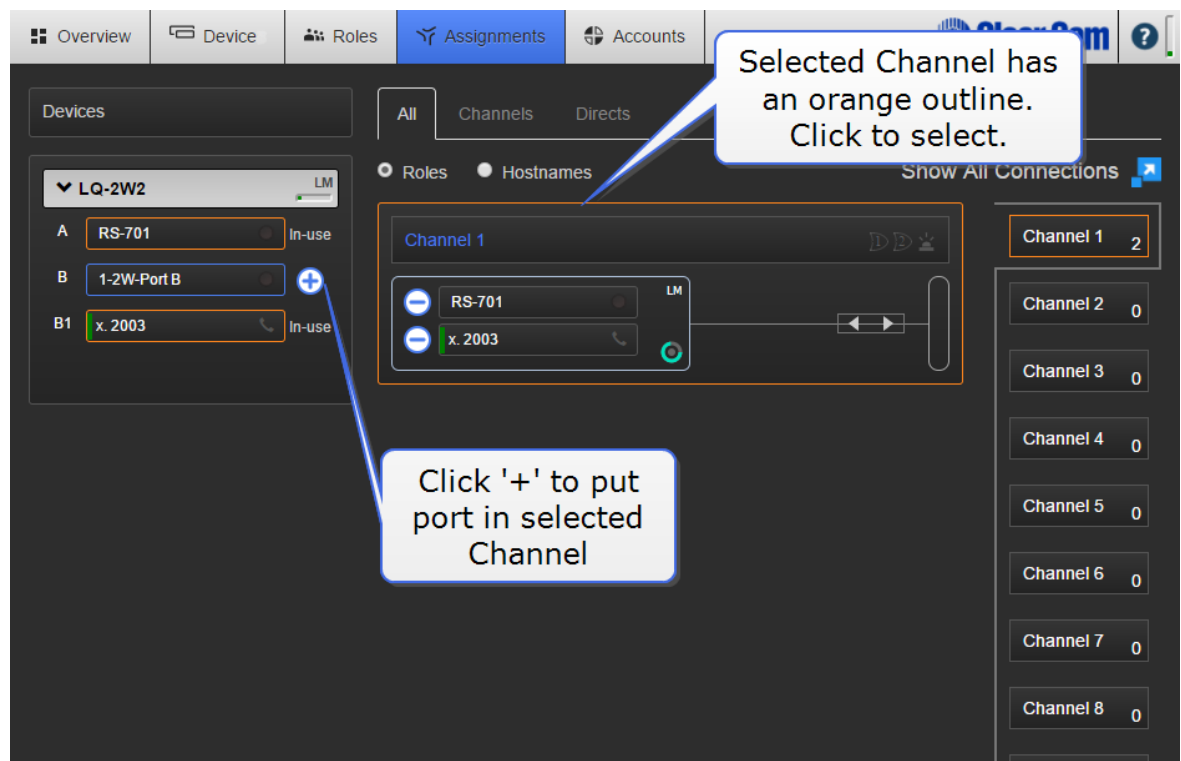
3. Successful registration is indicated. If registration is not successful, click the registration indicator for information.

- Once registered to an LQ unit, SIP telephone lines are seen under the device icon in the left side of the **Assignments** page.



The screenshot shows the 'Assignments' page in the Clear-Com interface. On the left, under 'Devices', the 'LQ-2W2' unit is expanded to show three ports: A (RS-701), B (1-2W-Port B), and A1 (x.2003). The A1 port has a green bar and a SIP icon. A callout box points to the A1 port with the text: "The SIP client is available on the LQ unit. The green bar indicates connection status." The main area shows 'Channel 1' with an orange outline and 'Empty' status. On the right, a list of channels (Channel 1 to Channel 7) shows zero connections.

- Go to the **Assignments** page of the CCM. Bring both the External port and the SIP port together in a **Channel**.



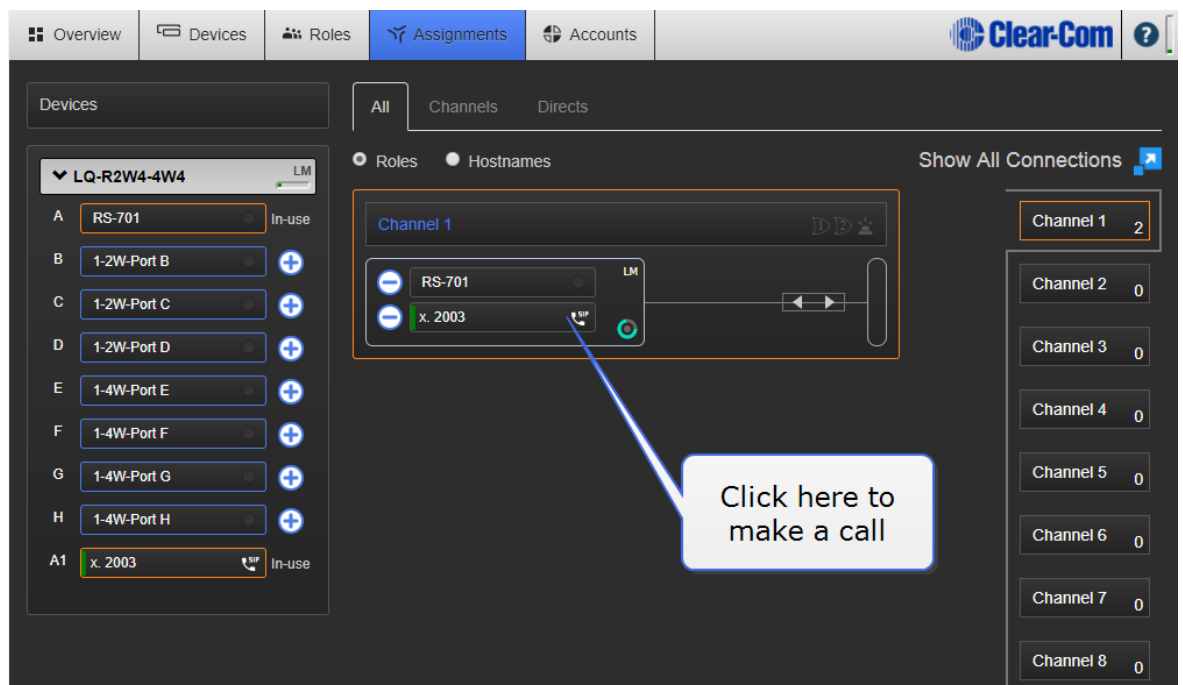
The screenshot shows the 'Assignments' page with the same device 'LQ-2W2'. The A1 port (x.2003) is now assigned to 'Channel 1'. A callout box points to the '+' icon next to the A1 port with the text: "Click '+' to put port in selected Channel". Another callout box points to the orange outline of 'Channel 1' with the text: "Selected Channel has an orange outline. Click to select." The main area shows 'Channel 1' with an orange outline and '2' connections. On the right, a list of channels (Channel 1 to Channel 8) shows zero connections.

Audio sources are now connected in a Partyline (conference) setup. You can dial into Channel 1 from an external phone and dial out from Channel 1 using the CCM.

13.4.3 Making and accepting calls: LQ SIP standalone

Note: *The SIP enabled port MUST be put in a Channel before you can make and accept calls.*

1. Accept incoming calls:
 - a. If an external user (for example x.2005) dials into the LQ-SIP line then the LQ unit will auto-answer and establish the call. Audio will then pass between all members of the Channel associated with the SIP line.
 - b. The CCM will show the incoming caller number.
 - c. The CCM user can hang up the call by selecting the phone icon and hanging up.
2. Use the CCM to dial out:



- a. Type in the dial-out window the phone number or address of the telephonenumber/extension you want to reach.
- b. Once the call is established, audio will pass between all members of the Channel associated with the SIP line.
- c. The CCM will show the dialed phone number.
- d. The CCM user can hang up the call by selecting the phone icon and hanging up.

Note: *SIP calls can also be hung up (ended) from the LQ device front panel menu.*

- Note:** You can define as many SIP clients as you need, but only 8 can be registered (connected to an LQ device) at any one time.
- Note:** SIP line connection status bars: green; connected, yellow; connecting, connections pending.
- Note:** You will see a VOX light in the **Assignments** page. This lights green when audio is coming from a port.

13.5 Program LQ-SIP and Clear-Com Eclipse

Connect a SIP telephone to your matrix.

When routing audio between LQ SIP and Eclipse, always use a **Direct Channel** in the LQ CCM setup.

- The Eclipse matrix must have EHX version 9.1 or later installed
- Connect via an MVX card: connect the MVX card and the LQ unit directly using a Cat5/6 cable
- Connect via an IVC (IP) card: LQ unit, matrix IVC card and SIP server must all be connected to the same IP network
- The LQ unit must be connected to the same network as the SIP server. The LQ unit must be able to see (contact) the SIP server, see your network administrator if you have any connectivity problems.

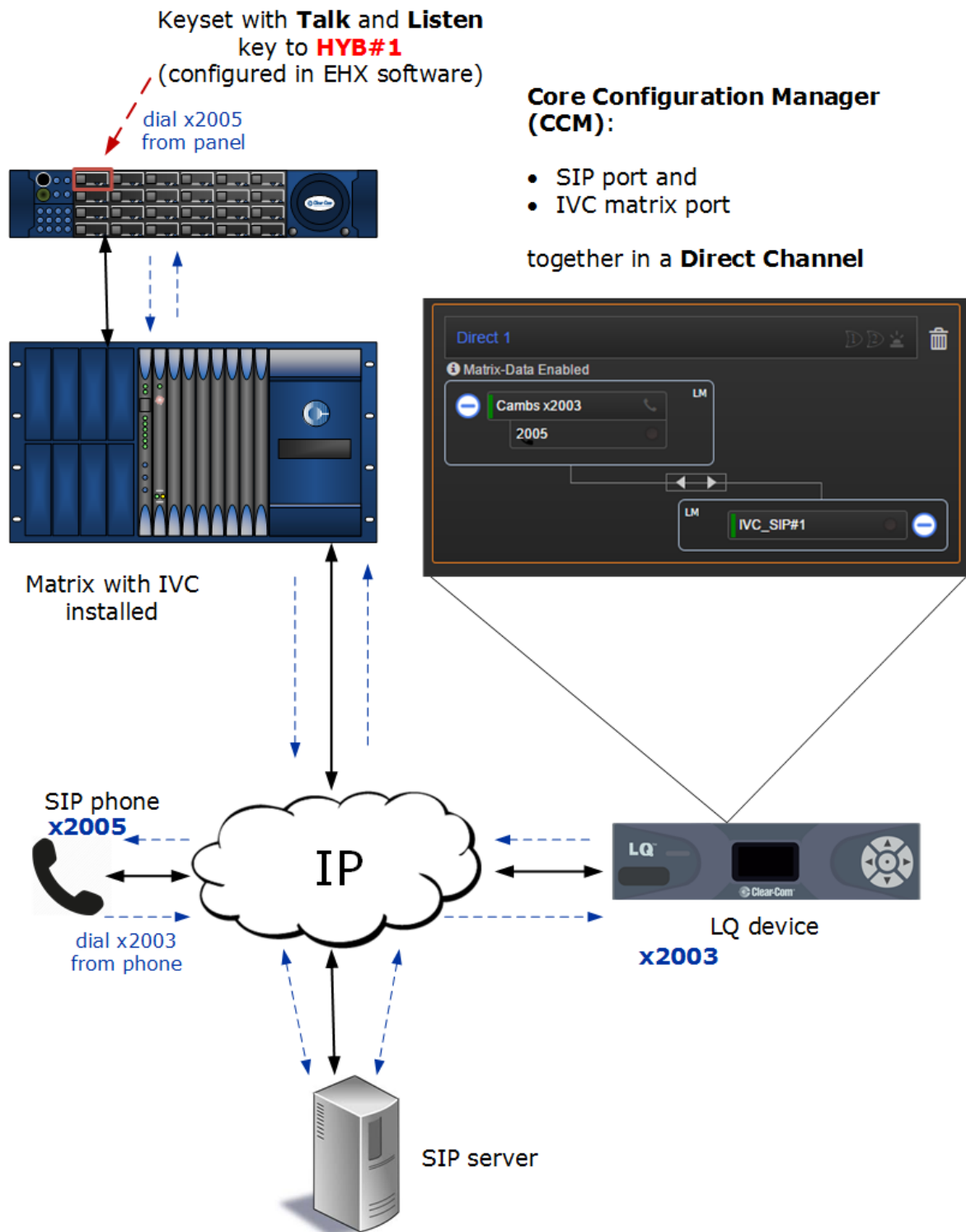
Note: Each LQ-R unit supports up to 24 ports: 8 hardware ports, 8 SIP ports and 8 virtual ports. Agent-IC and IVC ports are considered 'virtual' ports. Virtual ports can be used in any combination up to 8 in total.

Example setup:

General Outline

1. In the Eclipse Software, the matrix IVC port is setup as LQ SIP.
2. Create an IVC port in the LQ CCM to connect back to the Eclipse matrix IVC card.
3. The LQ unit is setup as x. 2003 on the SIP server.
4. A SIP phone is setup as x. 2005 on the SIP server.
5. In the LQ CCM assign the LQ SIP port (x.2003) and the LQ IVC port into a **Direct Channel**.
6. From the V-series panel select the HYB#1 key and dial '2005' (speed dial or keypad). The IVC card will send the dialed digits to the LQ unit which will dial x. 2005. Once the call is established

audio will pass from x. 2005 to the LQ to the IVC to the panel.



Configure the EHX software

1. Program **Card and Ports**.

- a. In the EHX software, navigate to Hardware>**Cards and Ports**.

1. Click to select card, IVC or MVX

2. Click to select **LQ SIP** port function from dropdown list

3. Set **User ID** and **Password**. Make a note of these for configuration of LQ device.

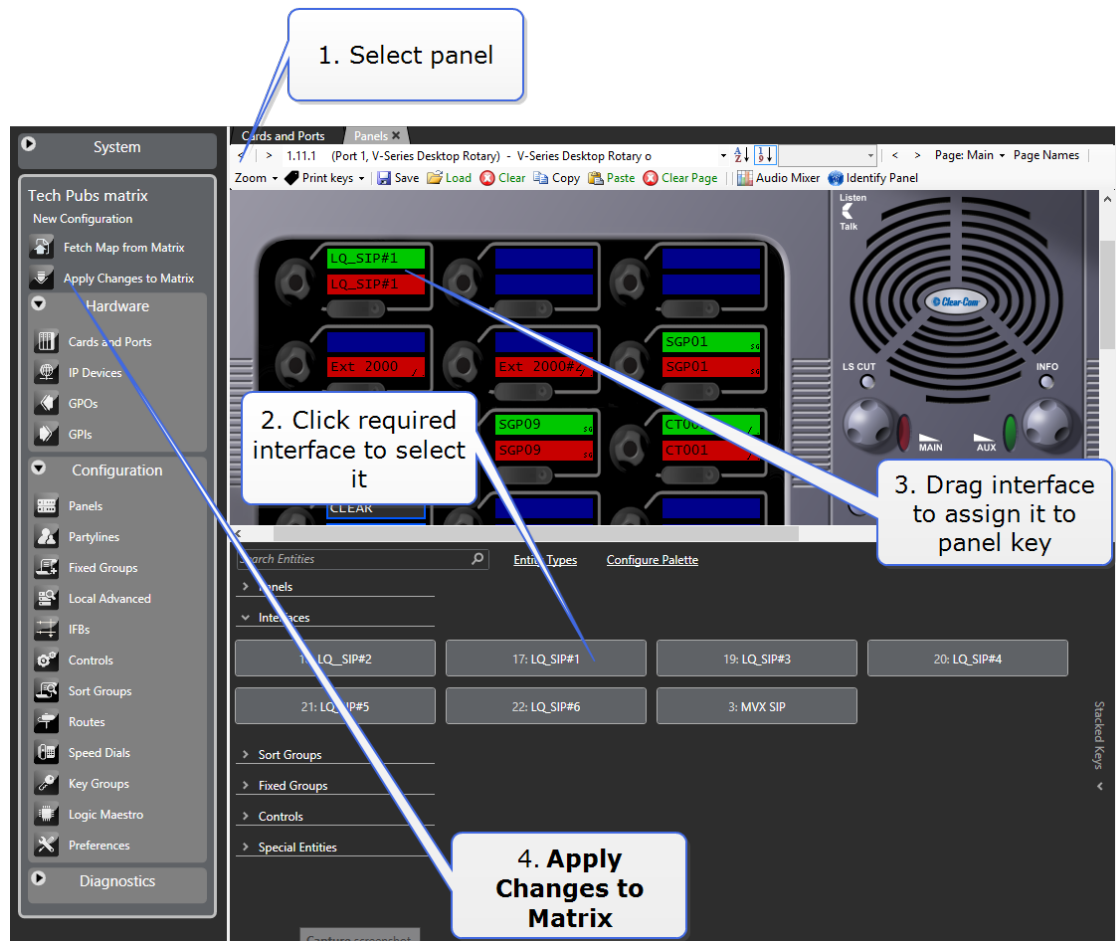
4. Click **Off Hook Tally**

Port Number	Port Function	Label	Description
3.1 (17)	LQ SIP	LQ_SIP#1	LQ SIP Client
3.2 (18)	LQ SIP	LQ_SIP#2	LQ SIP Client
3.3 (19)	LQ SIP	LQ_SIP#3	LQ SIP Client
3.4 (20)	LQ SIP	LQ_SIP#4	LQ SIP Client
3.5 (21)	LQ SIP	LQ_SIP#5	LQ SIP Client
3.6 (22)	LQ SIP	LQ_SIP#6	LQ SIP Client
3.7 (23)	Empty		
3.8 (24)	Empty		
3.9 (25)	Empty		
3.10 (26)	Empty		
3.11 (27)	Empty		
3.12 (28)	Empty		
3.13 (29)	Empty		
3.14 (30)	Empty		
3.15 (31)	Empty		
3.16 (32)	Empty		
3.17 (33)	Empty		
3.18 (34)	Empty		
3.19 (35)	Empty		

- b. Make a note of the User ID and Password for each port (exactly as in the EHX software). You will need it to enable the connection between the LQ unit and the matrix card.
- c. Set preferences. Select the **Off Hook Tally** (click checkbox) under **Telephone Options** if required.

2. Program Panels.

- a. In the EHX software, navigate to **Configuration>Panels**.



Normally for a telephone conversation you will assign a Talk and Listen to the panel key.

- b. Click **Apply Changes to Matrix** when done.

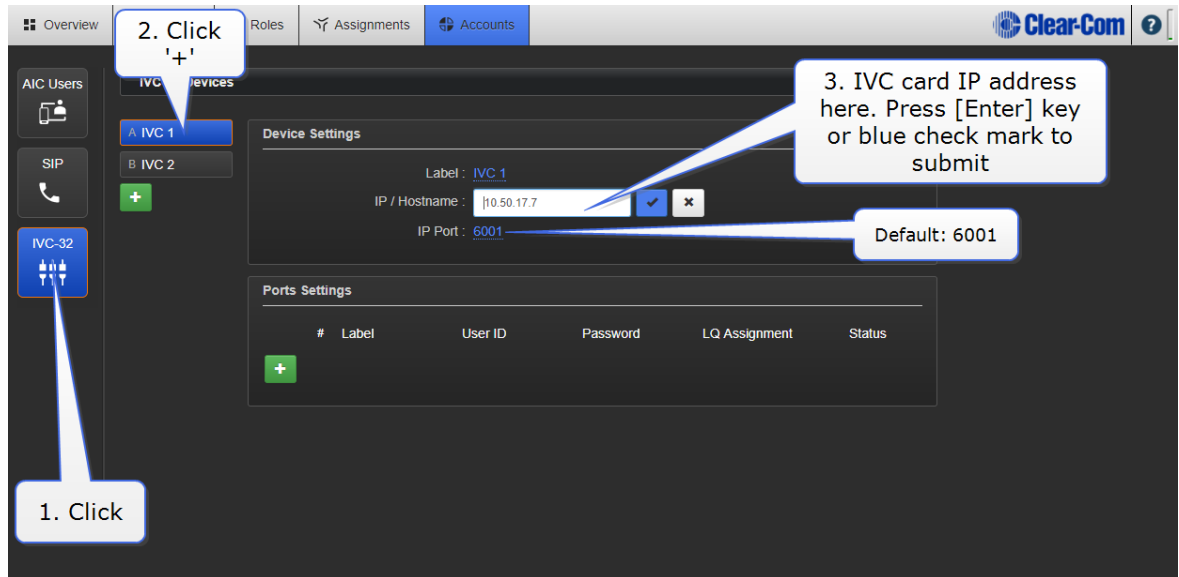
Note:

You can dial an external number using the panel keypad. For convenience, you can program a speed dial. See Chapter 17, *Configuring audio and conference routing in the EHX Software User Guide* for more information on setting up a speed dial.

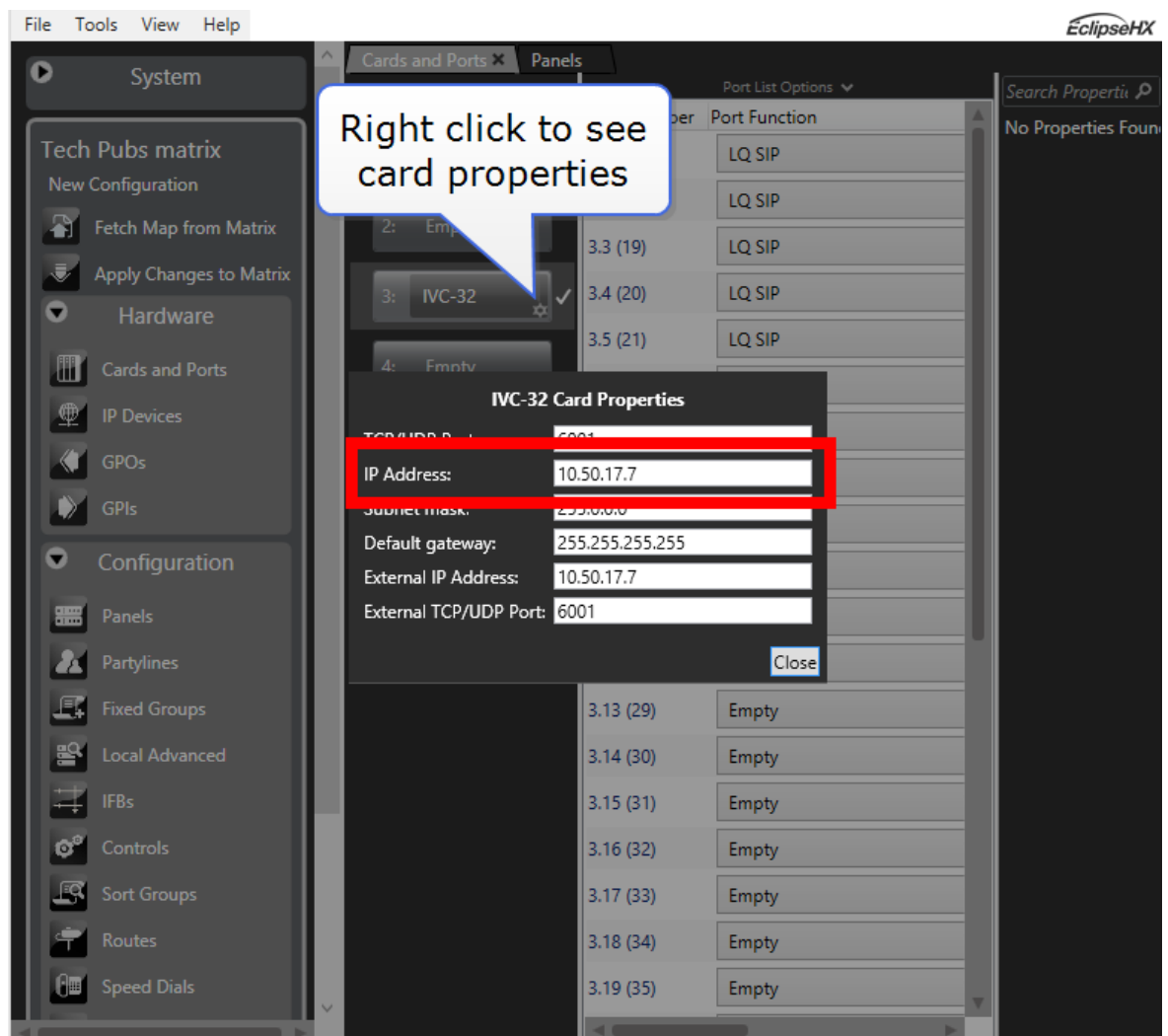
Program the CCM

1. Register the LQ unit to the SIP server. To do this, follow steps 1 - 4 in **Program LQ-SIP Standalone on page 111**(LQ-SIP standalone section)

2. Generate IVC matrix ports in the CCM. Navigate to the **Accounts** page of the CCM and define the IVC matrix card. Give the LQ unit the IP address of the Eclipse IVC matrix card.



3. How to find the Eclipse IVC card IP address in the EHX software.



4. Generate IVC ports. Give the LQ unit the Username and Password already set up in the EHX software. Assign port to an LQ unit to connect.

1. Click '+'

2. User ID and password exactly as in EHX

3. Choose LQ unit

4. Press [Enter] key or blue check mark to submit

#	Label	User ID	Password	LQ Assignment	Status
				None	<input checked="" type="checkbox"/>

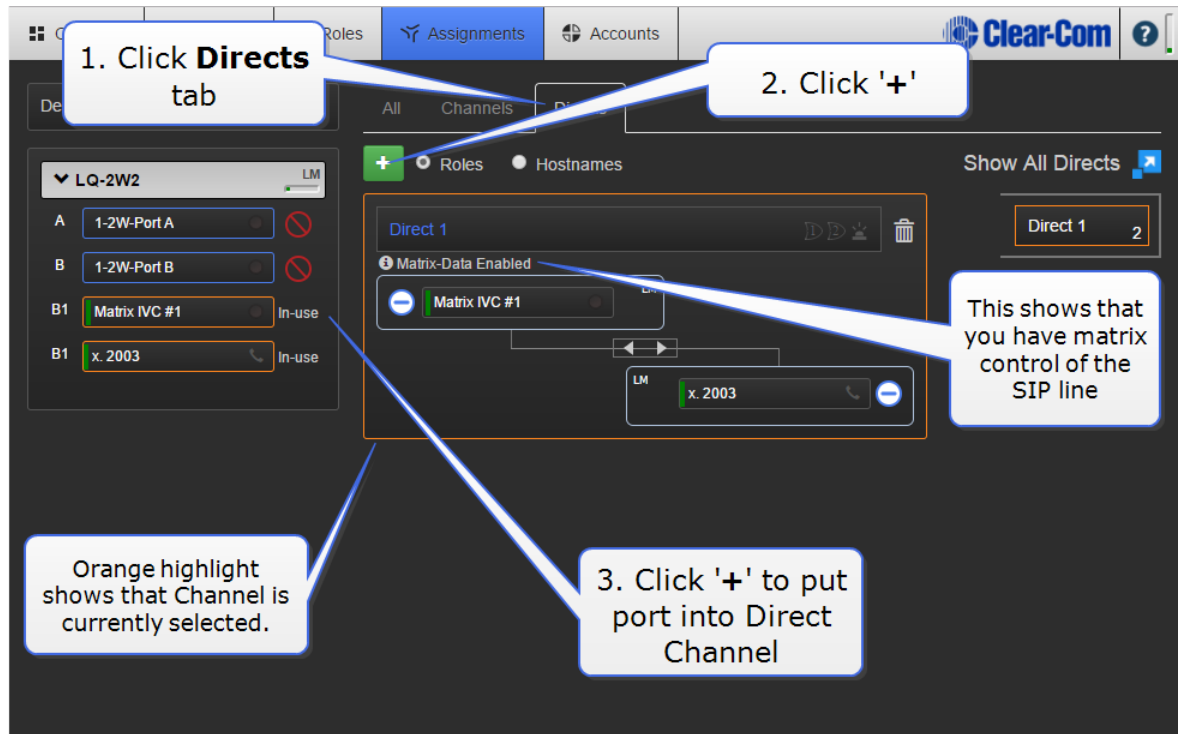
5. When connection is successful you see a green connection light. If you see a yellow triangle, click this for information.
6. Once assigned to an LQ unit, these ports are seen under the device icon on the left side of the Assignments page.

SIP port and matrix port available.
Green bar indicates connection status

Show All Connections

Channel 1	0
Channel 2	0
Channel 3	0
Channel 4	0
Channel 5	0
Channel 6	0
Channel 7	0
Channel 8	0

7. Bring both ports together in a **Direct Channel** to connect and route audio sources.



8. Once you have followed these steps you will be able to dial any external line that is available to your SIP server. you can dial in to your intercom system from an outside telephone, and dial out from your system using either a panel or the LQ CCM.

IVC ports are 'virtual' ports, in contrast to the physical ports on the LQ unit. You can have up to 8 virtual ports assigned to an LQ unit. Virtual ports can be either IVC connections or up to eight Agent-IC connections.

VOX light (green). This indicates audio coming from a port.

If you are using an MVX port to connect to the LQ for dialing in/out via the LQ-SIP, place the LQ 4-wire port into a Direct Channel with the SIP line.

SIP and IVC/MVX connection status bars: green; connected, yellow; connecting, connection pending.

SIP calls can also be ended either from the CCM or the LQ device front panel menu.

For how to use SIP calls on a panel see [How to Use SIP Calls on page 122](#)

13.6 How to Use SIP Calls

When a SIP call comes into a Channel (SIP-enabled ports must be placed in a Channel before they can be used) the LQ device answers the call automatically. How the call is monitored and responded to depends on which device you are working from how the client device is configured.

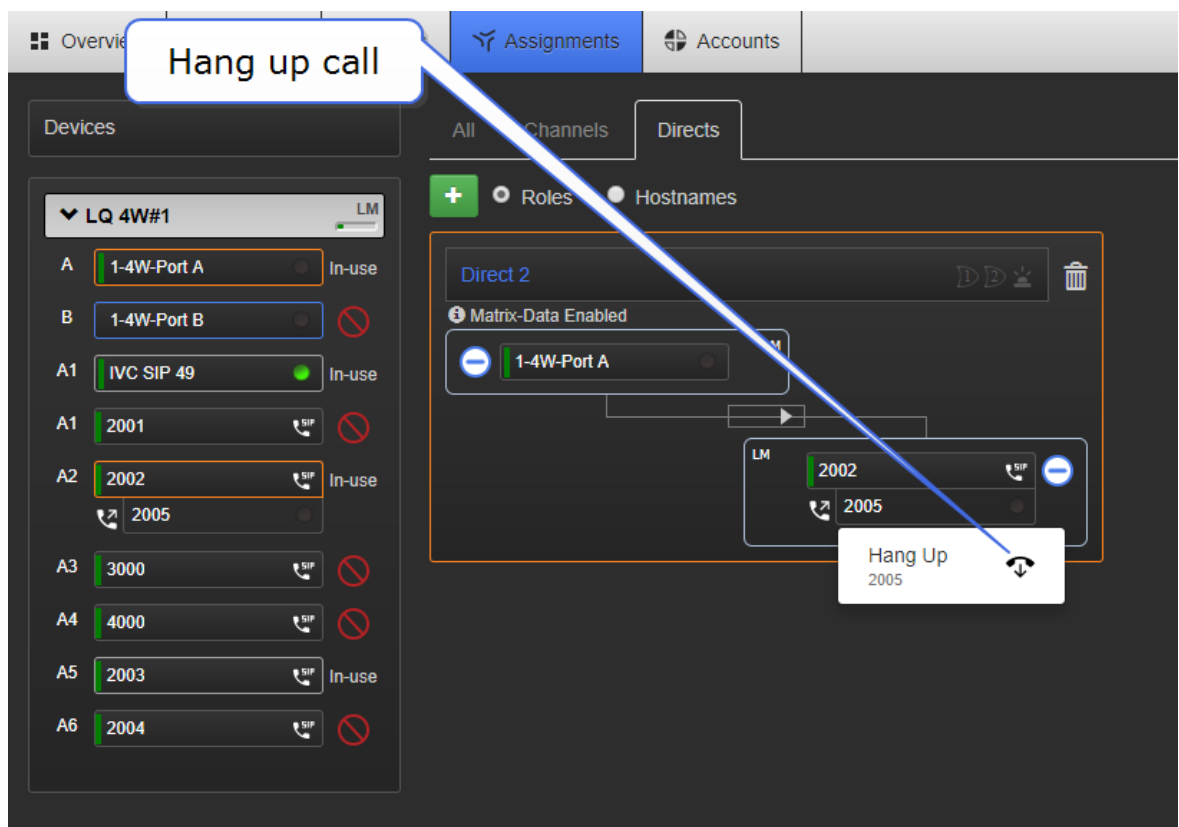
13.6.1 How to establish and end calls using the LQ unit Core Configuration Manager (CCM)

SIP calls can be managed from the **Assignments** page of the CCM. You can:

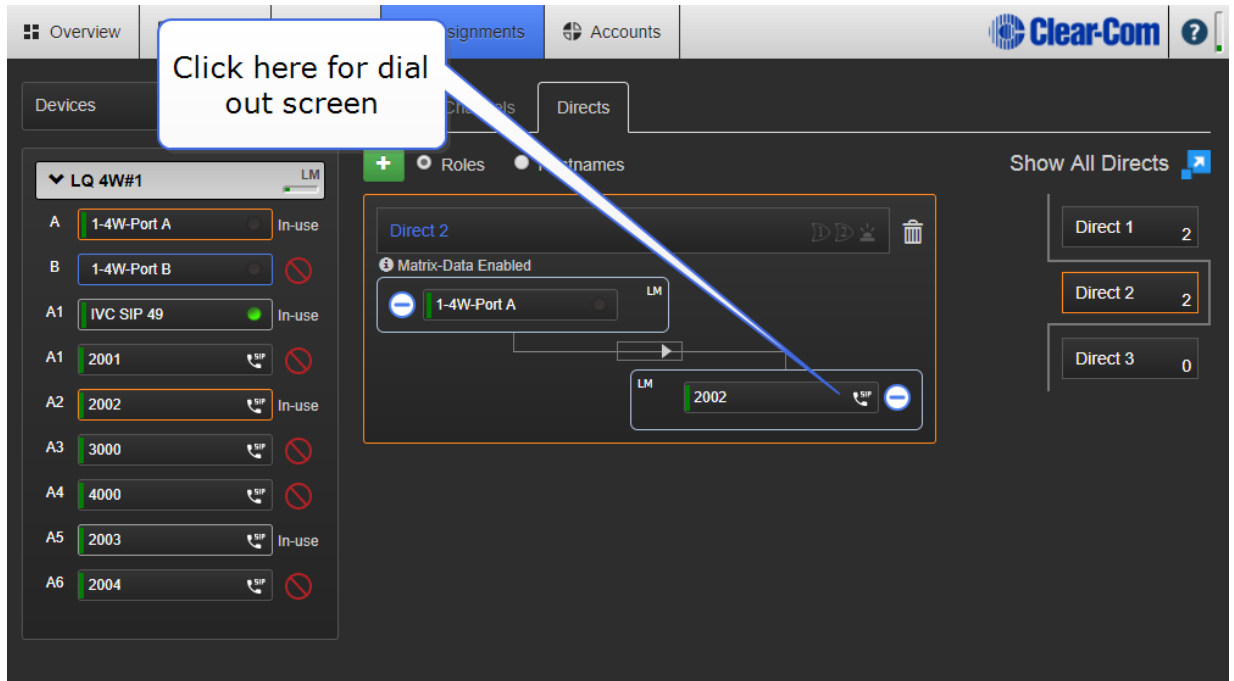
- Dial out
- View numbers
- End calls.

1. Incoming calls:

- If an external user (for example x.2005) dials into the LQ-SIP line then the LQ unit will auto-answer and establish the call. Audio will then pass between all members of the Channel associated with the SIP line.
- The CCM will show the incoming caller number.
- The CCM user can hang up the call by selecting the phone icon and hanging up.



2. Use the CCM to dial out:



- Type in the dial-out window the phone number or address of the telephonenumber/extension you want to reach.
- Once the call is established, audio will pass between all members of the Channel associated with the SIP line.
- The CCM will show the dialed phone number.
- The CCM user can hang up the call by selecting the phone icon and hanging up.

13.6.2 Control calls from the LQ unit front menu screen

SIP calls can be ended (hung up) from the device front menu screens.

13.6.3 Using SIP lines with a panel (Eclipse and LQ-SIP)

SIP enabled ports are programmed in the EHX software. Of importance are **Line Release** and **Off-Hook Tally** options. Setting these options will control how telephone calls behave in your Eclipse system. The **Off-Hook Tally** is set to **ON** by default when you declare and LQ SIP interface in the EHX software.

If the Off-Hook Tally is set to On, an incoming call configured to a panel will flash on the interface key. Use the panel keyset to monitor and talk back to the calling party. An incoming call can be ended by the caller (or from the CCM and device front screen menu). If the Line Release option is set in EHX then the call can also be released by the panel.

Line Release option (MVX card)

The screenshot displays the EclipseHX configuration interface. The left sidebar shows the navigation menu with 'Cards and Ports' selected. The central area shows a table of port configurations. The right sidebar shows the 'Panel Options' section, where the 'Line Release' checkbox is checked.

Port Number	Port Function	Label	Description
1.1 (1)	V Desktop Rotary	1.1 1.1	V-Series Desktop Rotary o
1.2 (2)	V 2RU Lever (24 Keys)	1.2 1.2	V-Series 2RU Lever - 24 K
1.3 (3)	LQ SIP	MVX SIP	LQ SIP Client
1.4 (4)	Empty		
1.5 (5)	Empty		
1.6 (6)	Empty		
1.7 (7)	Empty		
1.8 (8)	Empty		
1.9 (9)	Empty		
1.10 (10)	Empty		
1.11 (11)	Empty		
1.12 (12)	Empty		
1.13 (13)	Empty		
1.14 (14)	Empty		
1.15 (15)	Empty		
1.16 (16)	Empty		

1. Cards and Ports

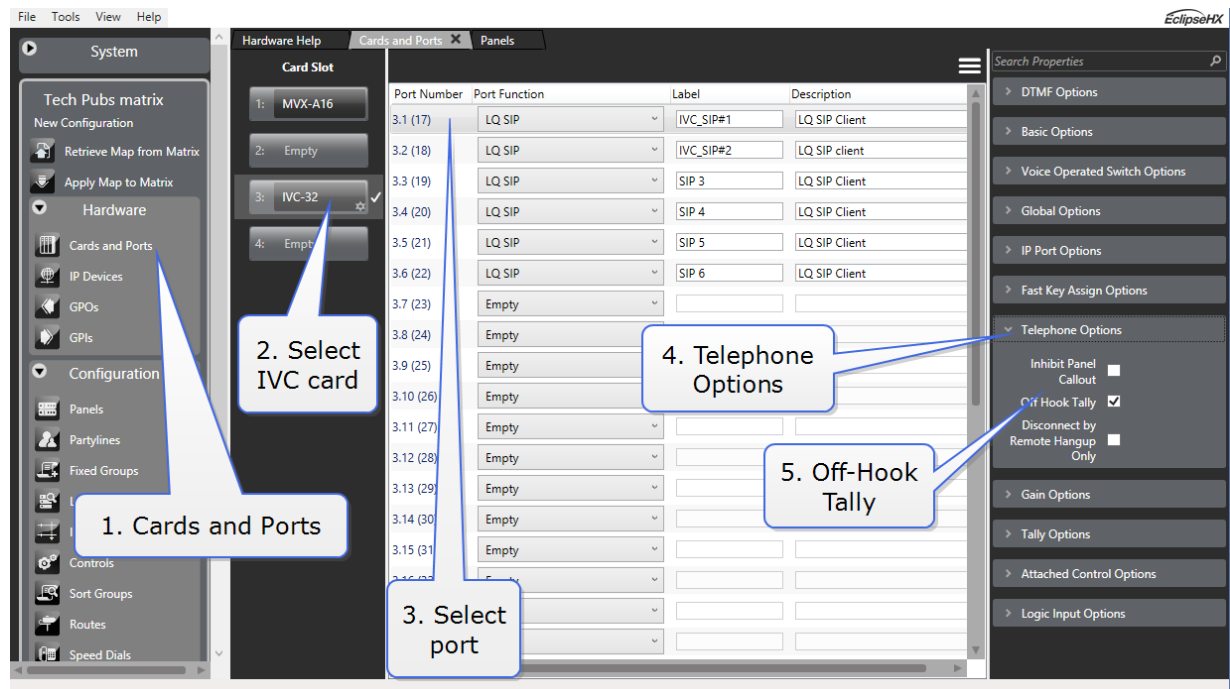
2. Select MVX card

3. Select port

4. Panel options

5. Line Release

Off-Hook Tally (IVC card)



Making outgoing SIP calls from the panel

The following methods are possible:

- Speed dials
- Prepared dialing

Speed dials

Speed dials can be set up in the EHX software to work with a specific interface and number. A speed dial is created and attached to a control in the EHX software, the control is put on a key and then this key is put on a panel. To use a speed dial once it is configured, latch the interface key and press the speed dial key (in any order).

When configuring a speed dial, the interface and the control (the number to dial) can be stacked on the same key to reduce the number of keys used to dial a set number. See **Speed Dial** and **Stacked Key** in the *EHX User Guide*.

Prepared dialing

When using prepared dialing, the number is dialed first (use the panel keypad or dial menu) and the interface (panel key) is selected second. This method of dialing is more flexible when it comes to possible numbers to dial and the dial route.

Note: *Piecemeal dialing is only supported on the Tel-14 telephony interface.*

13.7 SIP and the Internet

13.7.1 Generic SIP ports

- Port 5060 (UDP or TCP) for SIP
- Port 5061 (TCP) for TLS communications –if using secure SIP
- Port 4000-32767 (UDP) (send & receive) for RTP/RTCP communications (2 ports per call)

LQ 4.0 and above will only use ports 4000 - 4015 locally but will still be able to connect to any other RTP/RTCP ports.

Secure SIP and TCP is not supported..

13.7.2 Network Address Translation (NAT) and Firewall

NAT and many firewalls “hide” private networks behind a public IP address. This normally means that SIP calls can be initiated from a private network to the Internet but not the other way around. Also, firewalls commonly deny access to port numbers associated with Voice Over IP (VoIP) applications.

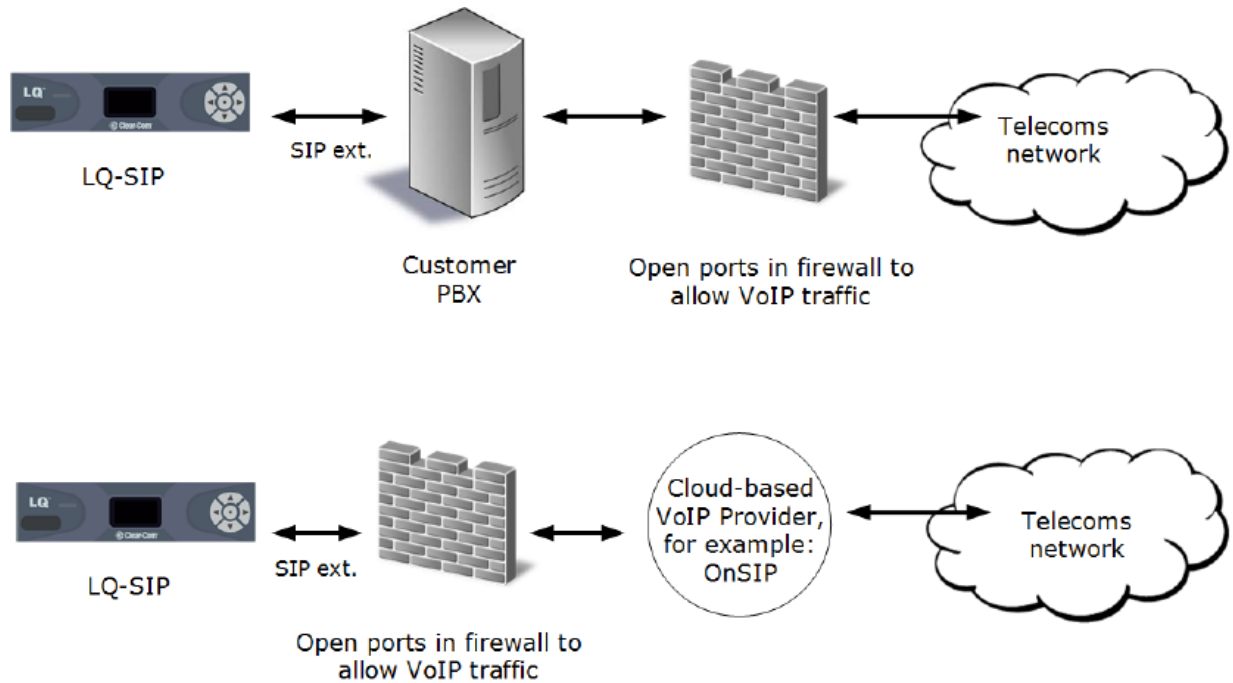
This aspect of SIP can be handled by technologies designed to traverse firewalls such as STUN, TURN and ICE. Some VoIP service providers use proprietary server side solutions that do not require STUN/TURN/ICE servers.

13.7.3 Using SIP with LQ

When using SIP with LQ Series units, you need an IP - Private Branch Exchange (IP - PBX) to act as a SIP server. This PBX can be a physical unit, or you can use a cloud-based IP-PBX service.

Note: *LQ SIP does not currently work with STUN/TURN/ICE.*

More information on firewall/NAT:https://www.ingate.com/files/Solving_Firewall-NAT_Traversal.pdf



13.7.4 Hardware and cloud based PBXs

LQ has been extensively tested with a number of hardware and cloud-based PBXs, including:

- Grand Stream - a small budget hardware PBX
- Cisco PBX - a larger hardware PBX
- Mitel PBX - a larger hardware PBX
- ONSIP - a US cloud-based PBX (www.onsip.com)
- YAY - a European cloud-based PBX (www.yay.com)

Configuring a cloud-based PBX in the CCM

If a hardware PBX is not available, both ONSIP and YAY offer low cost monthly subscription that will provide lines that can be assigned to LQ devices.

The screenshot shows the 'Accounts' tab in the Clear-Com web interface. On the left sidebar, there are buttons for 'Agent-IC', 'SIP', and 'IVC'. The main content area is titled 'SIP Servers' and contains a list of servers: 'A CambsPBX', 'B ONSIP', and a green '+' button. The 'B ONSIP' server is selected, and its settings are displayed in the 'SIP Server Settings' panel. The settings are as follows:

- Label: [ONSIP](#)
- Registrar/Proxy IP/Hostname: [sip.onsip.com](#)
- Registrar/Proxy Port: [5060](#)
- Domain: [xxxxxx.onsip.com](#)

Under the 'Advanced' section, the SIP Transport Protocol is set to [UDP/TCP](#). Below the settings is an 'Accounts' table with the following columns: #, Label, User, Password, LQ Assignment, and Status. A green '+' button is located at the bottom left of the table.

User and Password as defined by the ONSIP account.

The screenshot shows the 'Accounts' tab in the Clear-Com web interface. On the left sidebar, there are buttons for 'Agent-IC', 'SIP', and 'IVC'. The main content area is titled 'SIP Servers' and contains a list of servers: 'A CambsPBX', 'B ONSIP', 'C YAY', and a green '+' button. The 'C YAY' server is selected, and its settings are displayed in the 'SIP Server Settings' panel. The settings are as follows:

- Label: [YAY](#)
- Registrar/Proxy IP/Hostname: [talk.yay.com](#)
- Registrar/Proxy Port: [5060](#)
- Domain: [default](#)

Under the 'Advanced' section, the SIP Transport Protocol is set to [UDP/TCP](#). Below the settings is an 'Accounts' table with the following columns: #, Label, User, Password, LQ Assignment, and Status. A green '+' button is located at the bottom left of the table.

User and Password as defined by the YAY account.

For more information, see:

How Do I Link An LQ Device to a Public Branch Exchange (PBX)? You must first create extensions within your PBX. Refer to your PBX documentation for this. Make a note of the PBX IP address and the User ID and Password of the extensions you require to connect to the LQ device. The PBX and the LQ unit must be connected to the same network and be able to see each other across the network. The PBX and the LQ must not be configured to the IP range 172.23.xx.xx .Open the LQ CCM in a browser. Navigate to the **Accounts** page and select the **SIP** button from the left side of the page. Click '+' to begin to define the PBX. Follow the steps illustrated below. The Registrar/Proxy Port and the Domain are controlled by the PBX admin. The Proxy Port usually defaults to 5060. on page 1

13.8 SIP Server Connection Loss

On occasion you might lose connection between an LQ device and your SIP server.

The LQ software is designed to maintain a call in this event but occasionally you can experience haphazard call behavior. In this case you can chose to disconnect the call if the connection to the server is lost.

If connection to the SIP server is lost, you will see the SIP port status bar change from green to yellow (connection lost or pending) in the **Assignments** page.

13.8.1 How to set a call to disconnect on server loss

In the CCM navigate to **Accounts>SIP>SIP server** and click to check the **SIP Disconnect on server loss** check box.

When this box is checked, any active call will be disconnected on loss of server connection of ≥ 30 seconds.

The screenshot displays the 'SIP Servers' configuration interface. On the left, there is a sidebar with 'Agent-IC', 'SIP', and 'IVC' options. The main area is titled 'SIP Servers' and contains a list of servers, with 'SIP 1' selected. Below the list is the 'SIP Server Settings' section, which includes fields for Label, Registrar/Proxy IP/Hostname, Registrar/Proxy Port, and Domain. The 'Advanced' section contains 'SIP Transport Protocol' (UDP/TCP), 'SIP Transport Port' (5060), and 'SIP Disconnect on server loss' (unchecked). A callout box with a blue border and white background points to the checkbox with the text 'Click to enable'. Below the settings is an 'Accounts' table with columns for #, Label, User, Password, LQ Assignment, and Status, and a green plus icon for adding new accounts.

#	Label	User	Password	LQ Assignment	Status
+					

14 LQ to HelixNet Connectivity

LQ 4.0 and above.

HelixNet 4.0 and above.

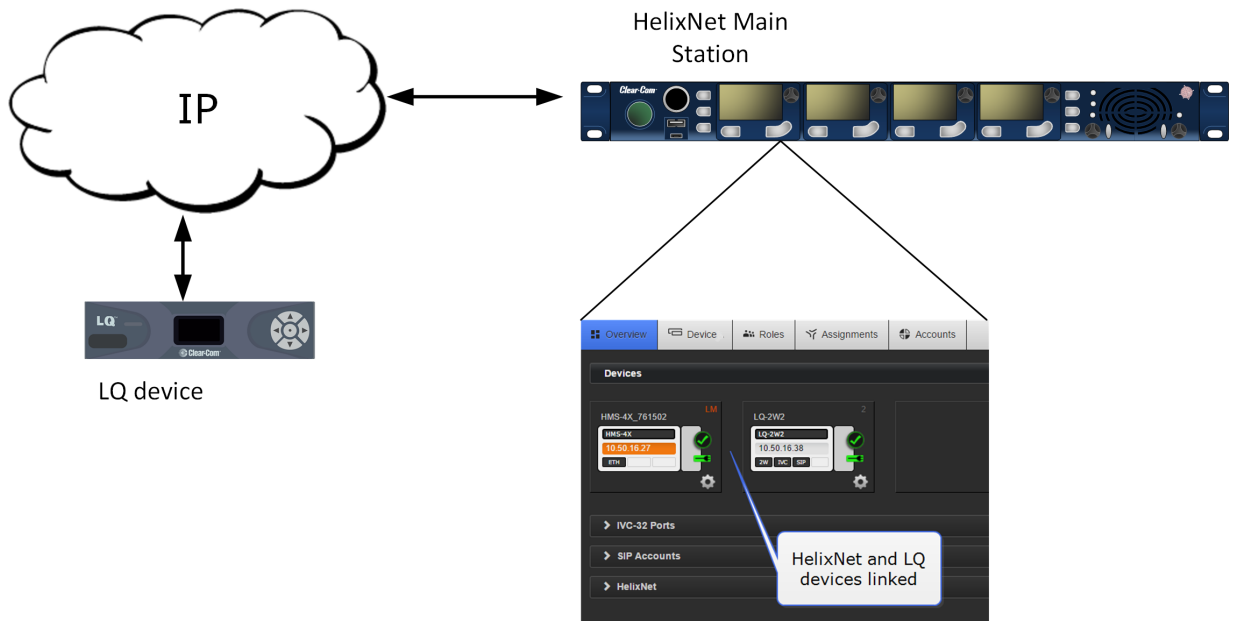
Linking one or more LQ units to a HelixNet Main Station (HMS) in a Link-Group is a way of greatly increasing the number of I/O interfaces available in your HelixNet intercom system.

The HelixNet Main Station must be the Link Master in any Link-Group.

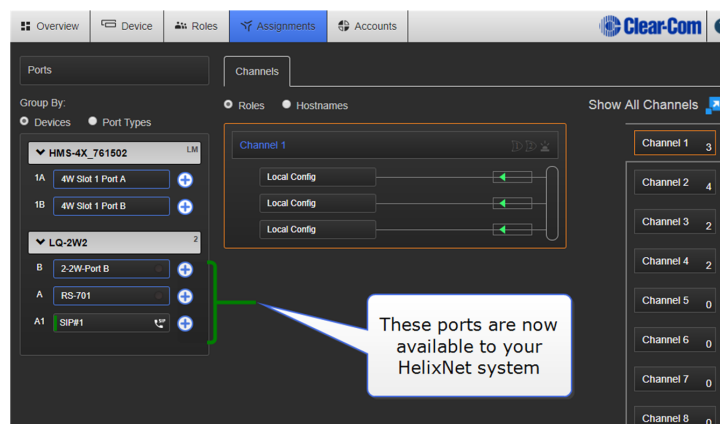
Linking HelixNet and LQ also brings Agent-IC, SIP and Eclipse (IVC) connectivity into your HelixNet system.

14.1 HelixNet/LQ Link-Group

Once an LQ unit is linked to an HMS in a Link-Group, all ports on the LQ unit are visible in the CCM and available to be placed in a HelixNet Channel. Once a port is in a Channel, audio from that port can be routed anywhere within the system.



Core Configuration Manager (CCM): Overview page



CCM: Assignments page

Connecting an HMS and an LQ unit also brings the possibility of Agent-IC, SIP and IVC connectivity into your HelixNet intercom system (according to license for Agent-IC and SIP).

Note: A HelixNet/LQ Link-Group supports up to 3 linked Main Stations and up to 3 linked LQ units (to a maximum of 6 devices in total).

Note: The HMS must always be the Link-Master in a HelixNet/LQ Link-Group.

The following limitations are imposed when LQ devices are linked to a HelixNet Link-Group:

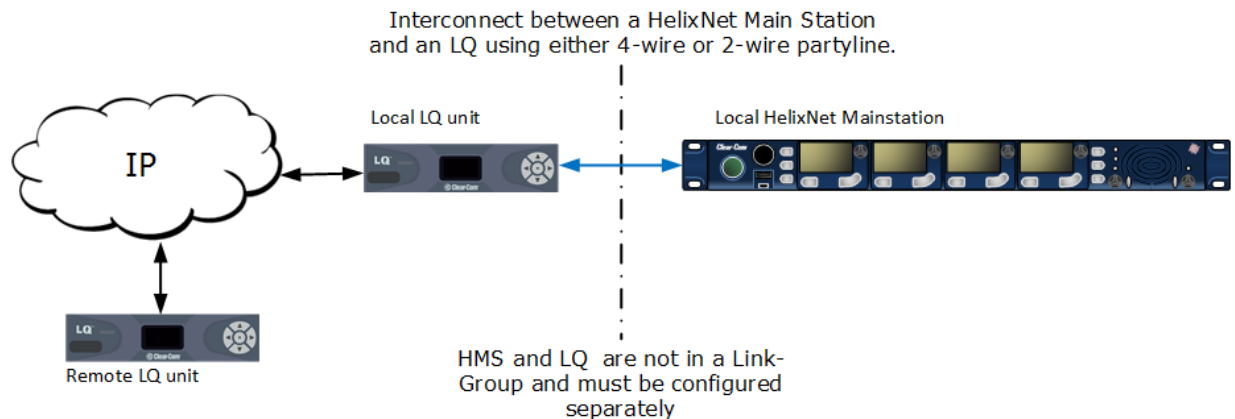
- No creation or use of Direct Connections
- No interconnection of Clear-Com panels over 4-wire

- **No SIP hangup capability through the HMS Front panel**
- **No Internet connection between LQ units.**

Note: *If you upgrade your HelixNet system when you have a Link-Group set up, the linking status will be reset and you will need to re-establish the Link-Group.*

14.2 Connecting HelixNet and LQ with analog connection

Interconnecting HelixNet and LQ equipment using either 4-wire or 2-wire interfaces is possible and only serves as a means of transporting one channel of audio along with call signaling per connection.



For more information, see:

Programming a HelixNet LQ Link-Group on page 134

14.3 Programming a HelixNet LQ Link-Group

- The HelixNet Main Station that has been designated as the Link-Master must be reachable on an IP network by all other Link-Members.

The HLI-ET2 module must be fitted to the HelixNet Main Station for IP connectivity.

- To access the Core configuration manager (CCM), input the IP address of each device into the address field of a browser.
- Once LQ and HelixNet devices have been joined to a Link-Group, they can be monitored and configured from any device within that group.
- An LQ/HelixNet Link-Group supports up to three linked HelixNet Main Stations and up to three linked LQ units (a maximum of 6 devices in total).

HelixNet/LQ Link-Group Core Configuration Manager (CCM)

HelixNet Mainstation: Link-Master #1

HLI-ET2 Ethernet module

All devices in Link-Group connected to network with Cat5/6 cable

LAN/WAN

LQ #2: Link-Member

LQ-R #3: Link-Member

Audio can be routed to/from any port on any device within the Link-Group

Find details of the CCM username and password here: [The Core Configuration Manager \(CCM\) Password on page 24](#)

14.3.1 General outline: create a HelixNet/LQ Link-Group

1. Access the CCM of the HMS. Make sure the device Link-Group Role is set to Link-Master. Default setting: **Disabled**.
2. Access the CCM of the LQ unit. Make sure the device Link-Group Role is set to Link-Member. Default setting: **Link-Master**.
3. Give the LQ Link-Member device the IP address of the HelixNet Link Master. Repeat this step for each device to be linked to the Link-Master.
4. Once you have linked the members to the master, all devices in the Link-Group will be visible in the Overview page of the CCM.
5. Navigate to the Assignments page of any device in the Link-Group to view and configure available ports.

14.3.2 Demonstration: create a HelixNet/LQ Link-Group

1. a. Ensure the HelixNet device is set to Link-Master in the CCM of the Main Station. Navigate to **Device > Linking > Link-Group Role**.

Overview Device Roles Assignments Accounts Clear-Com

HMS-4X LM
HMS-4X
10.50.16.27
4W ETH

General Network
Linking Ports

Linking

Link-Group Role : [Link-Master](#)

Link-Group Optimization : LAN/WAN Routed Network

LM 2 3 4 5 6

Click to set Link-Group Role to Link-Master

Orange highlight indicates host device

Note:
The default Link-Group Role of an HMS is **Disabled**.
The **Host** device is the device CCM your browser is currently pointing to.

2. a. Set Link-Group Role of LQ unit to **Link-Member**. Navigate to **Device > Linking > Link-Group Role**.
- b. Input Link-Master IP address.

Overview Device Roles Assignments Accounts Clear-Com

LQ-2W2 1
LQ-2W2
10.50.16.38
2W

General Network
Linking Ports

Linking

Link-Group Role : [Link-Member](#) Cancel Apply Changes

Configuration for Roles, Assignments/Channels and Accounts will be replaced by the configuration of the new Link-Master.

Link-Master IP address : [10.50.16.27](#)

Link-Group Member IDs :

LM 2 3 4 5 6

Slot #2 was automatically selected for this Device.

Select an available slot for registration of this Device within the Link-Group.

1. Click to set to Link-Member

2. Click to input IP address of HelixNet Link-Master. Blue check mark or [enter] key to submit

3. Link-Member slot is automatically selected

4. Apply Changes to link devices

- c. For each device to be added to the Link-Group, input the device IP into the browser's address field to access the CCM, designate the device as **Link-Member** and give it the **Link-Master** IP address (this links the device to the group).
- d. Linked devices can be seen in the **Overview** page.

The screenshot displays the 'Overview' page in the Clear-Com interface. At the top, there are navigation tabs: Overview (selected), Device, Roles, Assignments, and Accounts. The main content area is titled 'Devices' and contains three device configuration cards:

- HMS-4X_761502** (LM): Shows HMS-4X, IP 10.50.16.27, and ports 4W and ETH.
- LQ-2W2** (2): Shows LQ-2W2, IP 10.50.16.38, and port 2W.
- LQ-R2W4-4W4** (3): Shows LQ-R2W4-4W4, IP 10.50.16.53, and ports 2W and 4W.

Each card has a green checkmark and a gear icon for configuration. Below the device cards is a sidebar menu with expandable sections: HelixNet, Agent-IC, and SIP Accounts. A green bracket highlights these sections.

Callout boxes provide additional information:

- Link-Members are displayed in their assigned positions within the Link Group (pointing to the LQ-2W2 card).
- Click on the cog icon for device configuration (pointing to the gear icon on the LQ-R2W4-4W4 card).
- Expand sections to view status and state information about each component type (pointing to the HelixNet, Agent-IC, and SIP Accounts sections).

- e. Navigate to the **Assignments** page to create, configure and view how audio is routed throughout the system. All ports on the LQ units will now be visible and available for

assignment into one or more channels.

Overview Device Roles **Assignments** Accounts

Ports Channels

Group By: Roles Hostnames Show All Channels

Devices Port Types

HMS-4X_761502 LM

1A 4W Slot 1 Port A

1B 4W Slot 1 Port B

LQ-2W2 2

B 2-2W-Port B

A RS-701

A1 SIP#1

LQ-R2W4-4W4 3

B 3-2W-Port B

C 3-2W-Port C

D 3-2W-Port D

E 3-4W-Port E

F 3-4W-Port F

G 3-4W-Port G

H 3-4W-Port H

A RS-701

Channel 1

Local Config

Local Config

Local Config

Channel 1 3

Channel 2 4

Channel 3 2

Channel 4 2

Channel 5 0

Channel 6 0

Channel 7 0

Channel 8 0

Channel 9 0

Channel 10 1

Channel 11 0

Channel 12 0

These LQ ports are now available to HelixNet

Click to add port to selected Channel

15 Agent-IC and LQ

Use Agent-IC (version 2.0 or later) to connect a mobile user to your intercom system. Agent-IC connects directly to an LQ unit. Once connected to LQ, Agent-IC is also available to the HelixNet system or any other ports on the LQ device.

Each LQ-R unit supports up to 24 ports: 8 hardware ports, 8 SIP ports and 8 virtual ports. Agent-IC and IVC ports are considered 'virtual' ports. Virtual ports can be used in any combination up to 8 in total.

15.1 Agent-IC Profiles

The Agent-IC client device (phone or tablet) connects to one of two possible a host systems using a profile. Connect to either:

- An LQ unit or
- An Eclipse matrix.

Each mobile client allows two user accounts per host system: EHX1 and EHX2, LQ1 and LQ2.

Profile credentials are set up in the host system before use.

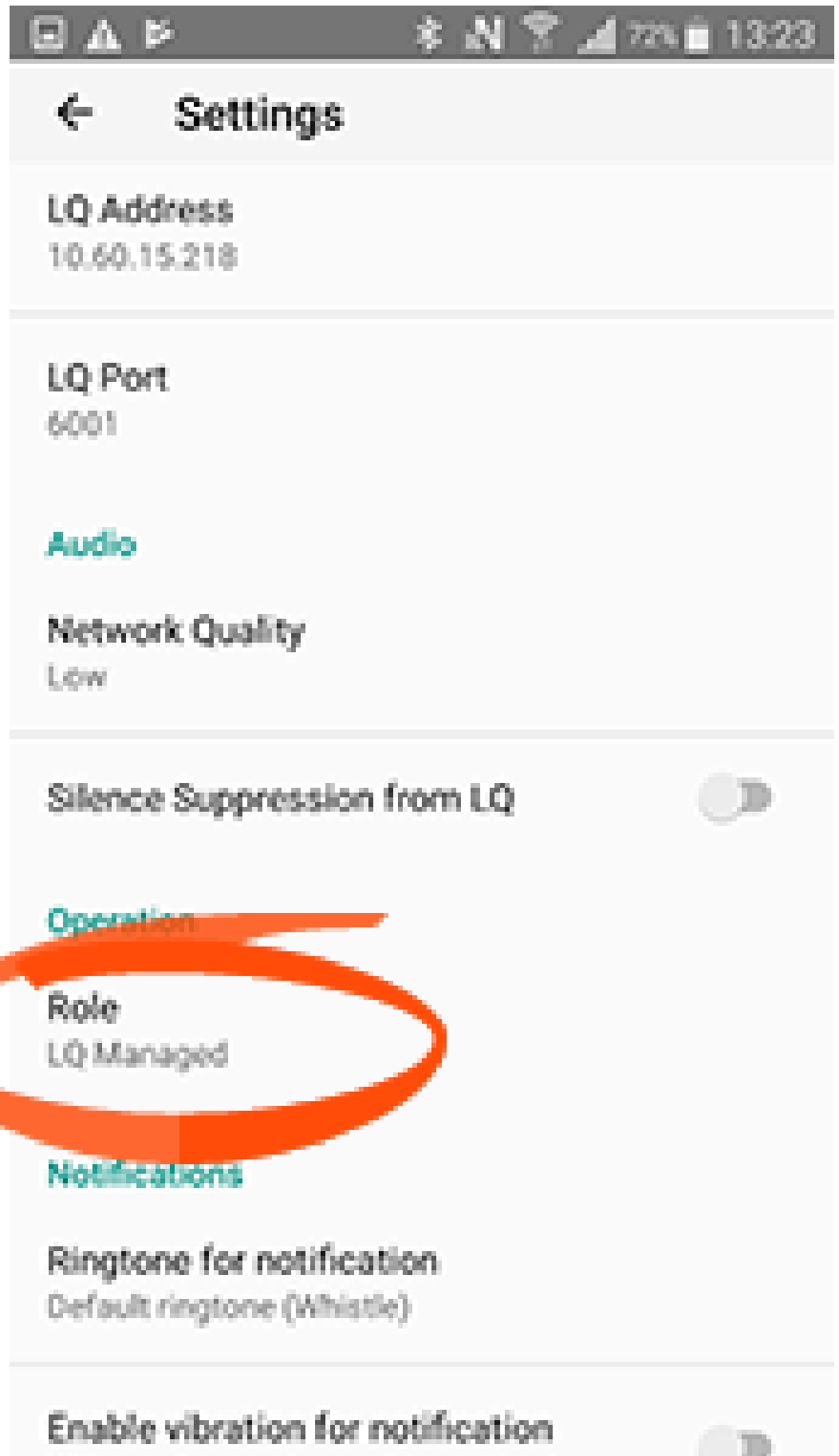
When you connect with a profile for the first time you need to input your user credentials (**User ID** and **Password**) in **Settings**. You also need the IP address of the host unit you want to connect to.



15.2 Agent-IC Roles

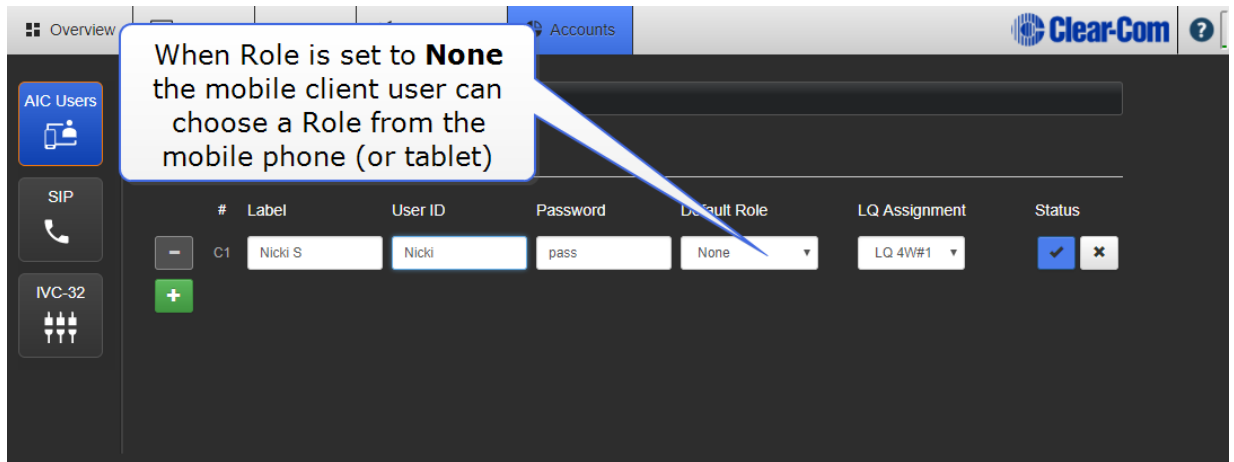
Agent-IC uses Roles. A Role is a logical setup that a client (end) device selects from a set of pre-defined configurations. Roles are used to control setup and reduce installation time. Each Role can be given a name or label that corresponds to a common user workflow, for example; Director, Sound, A1. The Role or Roles are defined in the **Roles** page of the Core Configuration Manager (CCM).

The Role associated with a User ID can be seen in **Settings**.



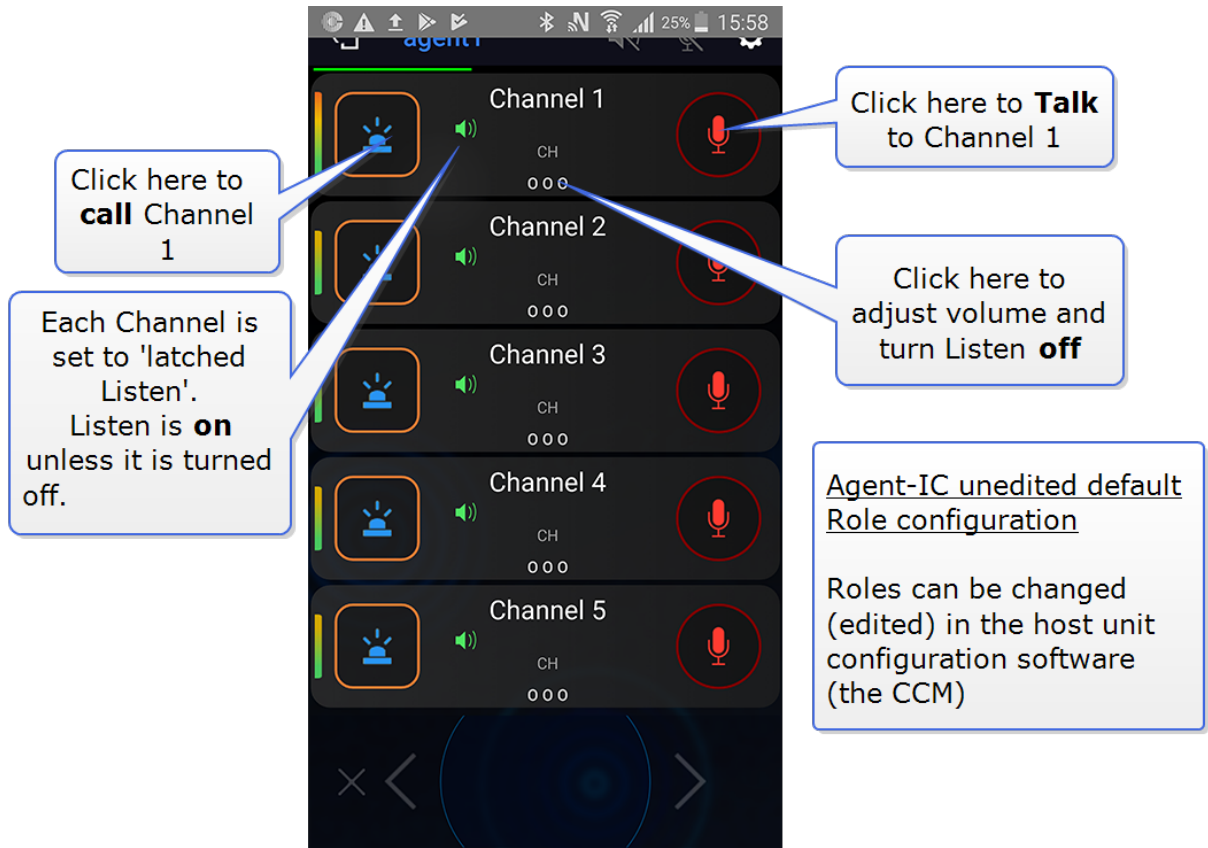
When using Agent-IC, the Role can be fixed for fast and easy deployment of the mobile client. When a Role is fixed, it is allocated in the CCM and another Role cannot be selected from the mobile client. This is known as an 'LQ managed' Role.

To allow the mobile user to select from a choice of Roles, the **Role** setting in the CCM is set to **None**.



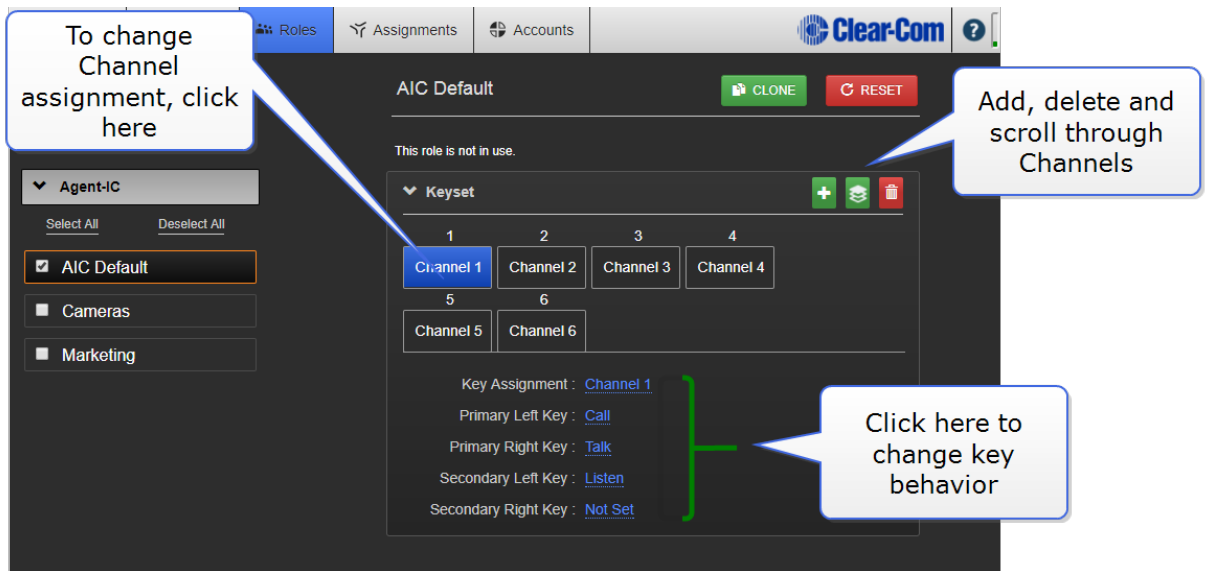
15.3 Agent-IC default Role

Agent-IC arrives with a default Role that you can use 'as is' or edit to suit your particular requirements. The default Role has 6 Channels. Keyset configuration is the same for each Channel when using the default Role; the keys all operate in the same way.



15.4 Change Agent-IC default Role configuration

Role configuration is changed in the **Roles** page of the Core Configuration Manager (CCM).



Click required Channel.
To remove assignment,
click again.

Assignments Accounts Clear-Com

Keyset: #1

Select item to assign to Keyset: #1

Channels

Channel 1 Channel 7

Channel 1 Channel 2 Channel 3 Channel 4

5 6

Channel 5 Channel 6

Key Assignment : [Channel 1](#)

Primary Left Key : [Call](#)

Primary Right Key : [Talk](#)

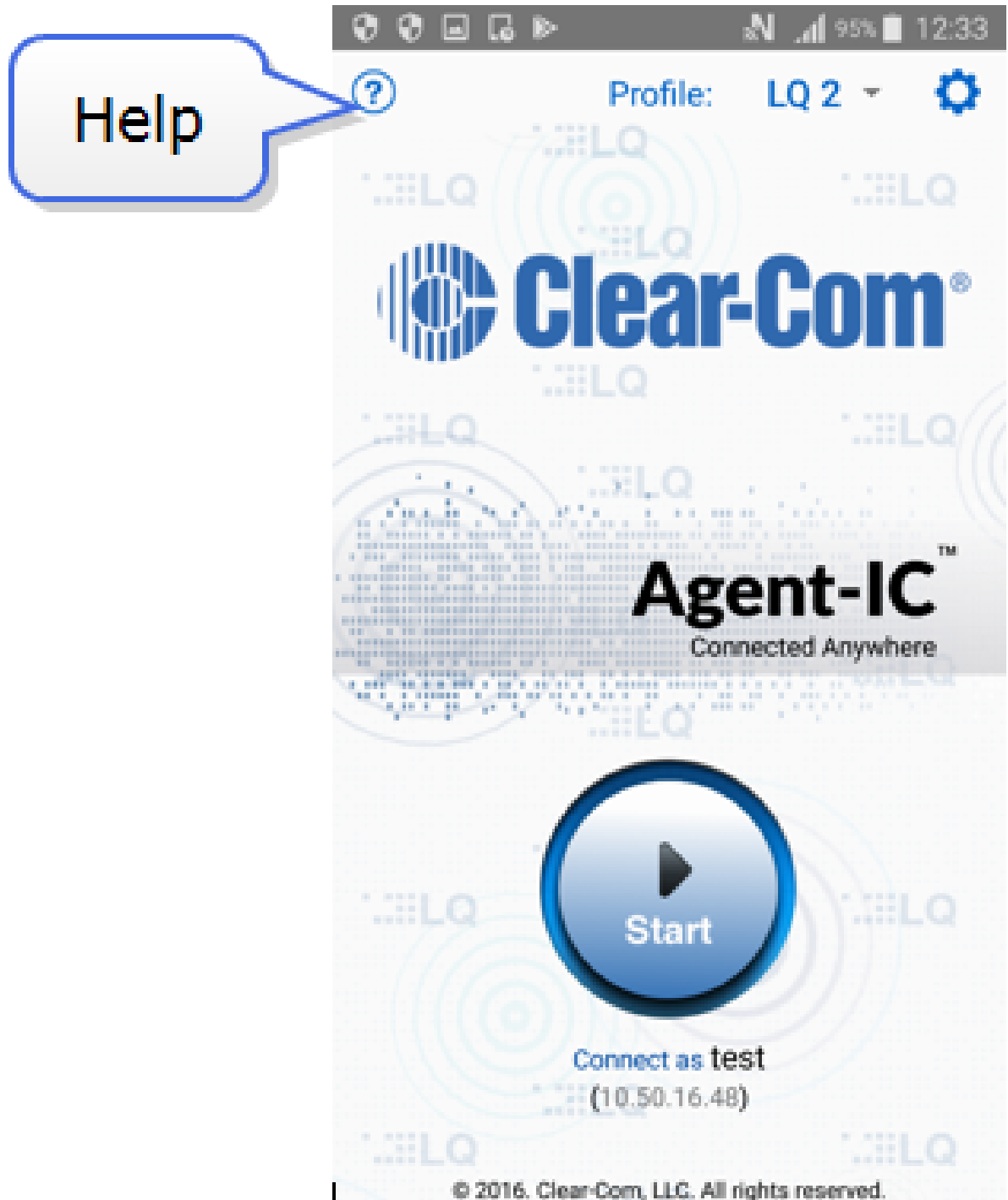
Secondary Left Key : [Listen](#)

Secondary Right Key : [Not Set](#)

For more information, see:

Program Agent-IC to LQ connectivity on page 145

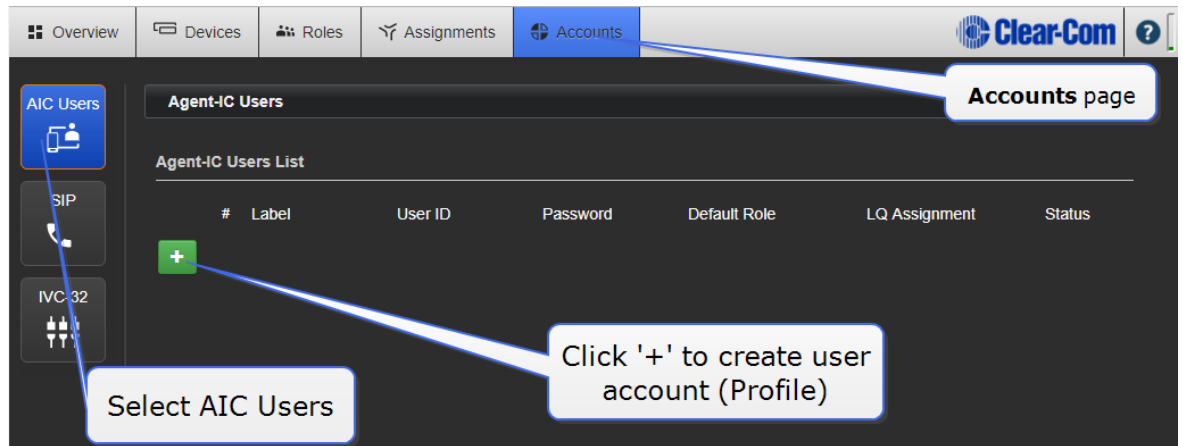
More information on how to use Agent-IC can be found in the embedded help.



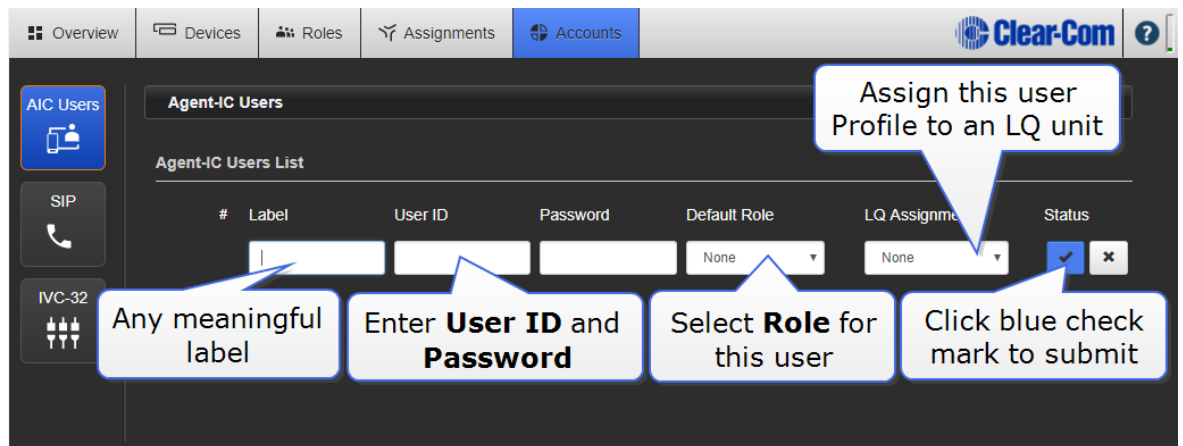
15.5 Program Agent-IC to LQ connectivity

From the CCM, use the following steps:

1. Set up Agent-IC users in the Accounts page of the CCM. Navigate to the Accounts page.
2. Create user account # 1.



3. Create user account #2.



Your Agent-IC user profiles are now setup and the client device can chose a Profile and connect to the system.

15.5.1 Connect Agent-IC to LQ

1. From your phone or tablet, select an Agent-IC user profile from the 4 available. In this case you need to select an LQ profile, as LQ is the host device.
2. Click the **Settings** button.

3. Enter login credentials (**User ID** and **Password**).



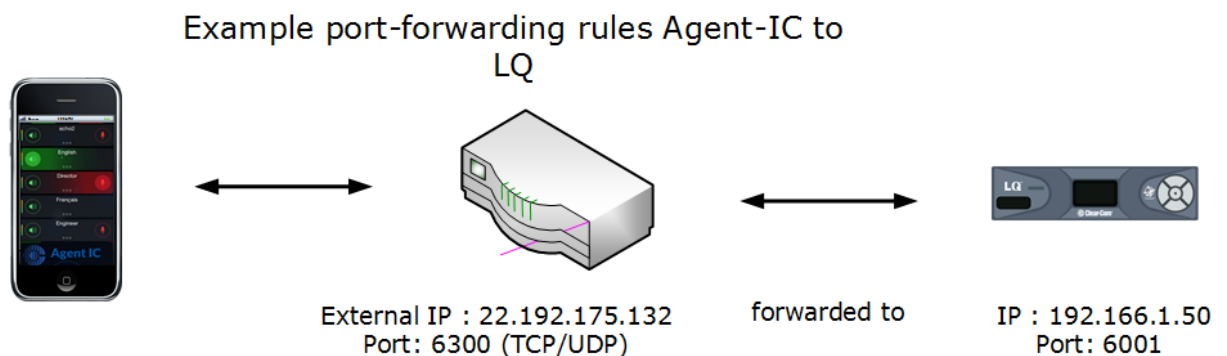
4. Enter the LQ IP address.
5. Press the round **Start** button to connect.

For more information, see:

[How to Access the Core Configuration Manager \(CCM\) on page 23](#)

15.6 Connecting Agent-IC to LQ Over a Firewall

Agent-IC traffic must be able to reach the LQ behind the firewall. Port forwarding rules must be created in your firewall and the LQ device must be given the external facing IP address and port. The LQ uses port 6001 (TCP/UDP) for Agent-IC traffic.



1. Create a port forwarding rule within the firewall that forwards all Agent-IC TCP/UDP traffic to the LQ behind the firewall.

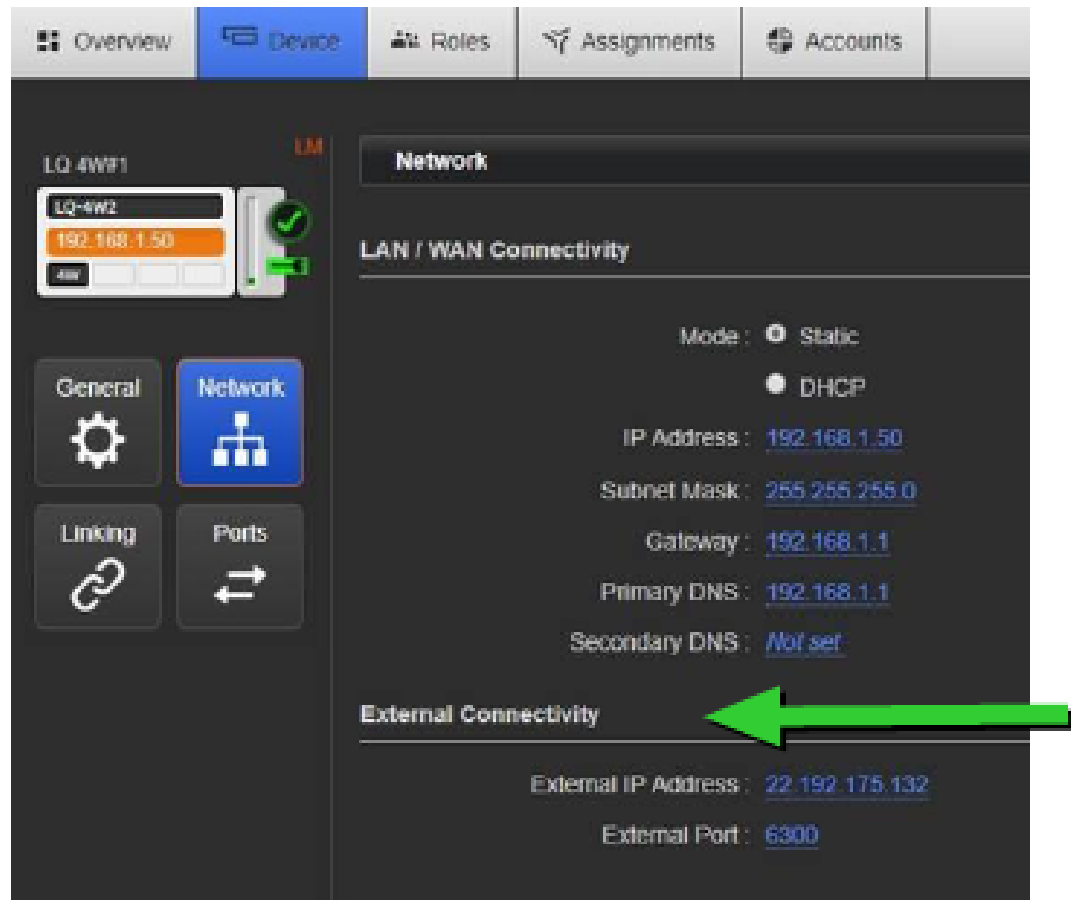
Example

Service Name	LQ-Agent-IC			
Service Type	TCP/UDP ▼			
External Starting Port	6300	(1~65535)		
External Ending Port	6300	(1~65535)		
<input type="checkbox"/> Use the same port range for Internal port				
Internal Starting Port	6001	(1~65535)		
Internal Ending Port	6001			
Internal IP address	192	168	1	50

2. Open the CCM (the browser-based management interface hosted by the LQ). Navigate to **Device>Network**.

3. In the **External Connectivity** section, enter the external IP address and port as configured in your router/firewall.

Example



4. In the CCM, create an Agent-IC user account. Navigate to **Accounts>Agent-IC>** and create new account.
5. Open the Agent-IC client application on your mobile device. Navigate to **Settings** and enter the following connection information:
 - a. Username (as entered in Step 4 above)
 - b. Password (as entered in Step 4 above)
 - c. LQ Server (the firewall external address as entered in Step 3 above: in this example

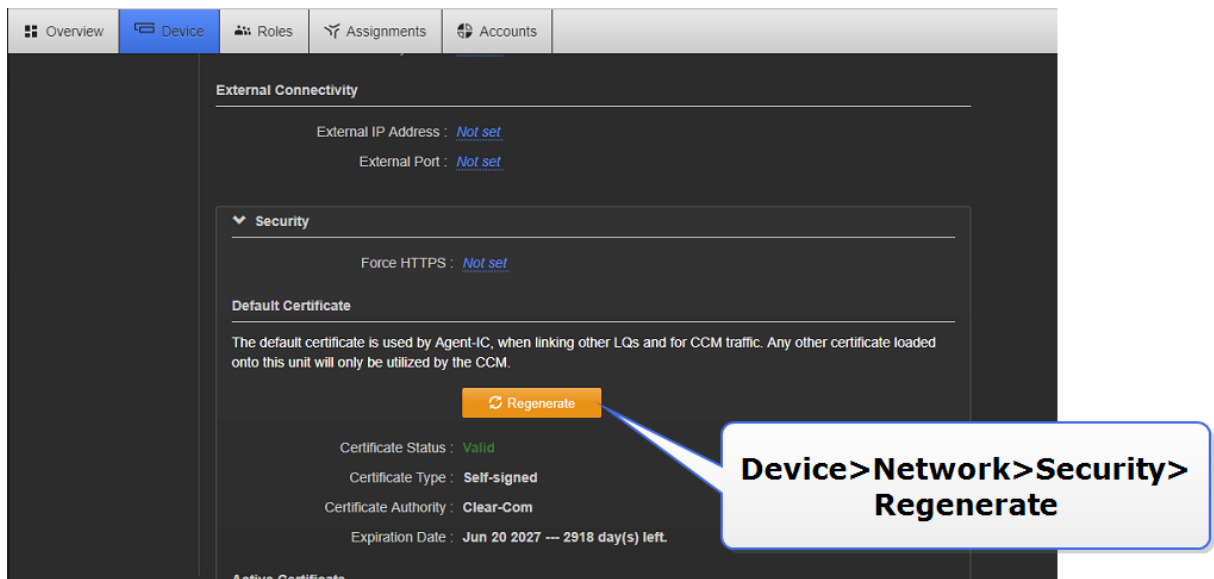
22.192.175.132)

d. LQ port (your external facing port as configured in Step 3: in this example 6300).

Your Agent-IC client should now have connectivity to the LQ host from inside and outside the facility.

Using HTTPs

If you are using HTTPs, it is advisable to recreate the security certificate after Step 3. To do this, in the CCM navigate to **Device>Network>Security** and click the yellow **Regenerate** button (LQ 4.0 and above).



Note: *If you are using LQ 4.0 and above you must reboot the device and re-enter the IP address to force the certificate to renew.*

16 Licensing

When creating SIP or Agent-IC accounts in LQ, you must first buy a license from your Clear-Com representative. Three license types are available:

- **Agent-IC-LQ.** This is a single Agent-IC client license.
- **Agent-IC8-LQ.** This is a bundle of 8 Agent-IC licenses. The bundle must be assigned to one LQ device, it cannot be broken down into individual licenses.
- **SIP8-LQ.** This is a bundle of 8 SIP client licenses. The bundle must be assigned to one LQ device, it cannot be broken down into individual licenses.

Licenses are shipped with the LQ device and activated by the user.

When you have purchased your licenses, Clear-Com will email or send you a **Ticket ID**.

The ticket ID can contain multiple licenses for more than one LQ unit. Each unit will accept 8 SIP and up to 8 Agent-IC client licenses (the software restricts licenses to the capacity of the unit).

Dear Customer,

Thank you for purchasing the Clear-Com License. Please find your license details below.

License Type: **AGENT-IC-LQ**

SO Number : 1234567

Agent-IC-LQ: 3

Agent-IC8-LQ : 0

SIP8-LQ: 0

Ticket ID: XXXX-XXXX-XXXX-XXXX-XXXX

Note: Please keep your Ticket ID as it is used to activate the licensing process.

16.1 How to activate your LQ licenses

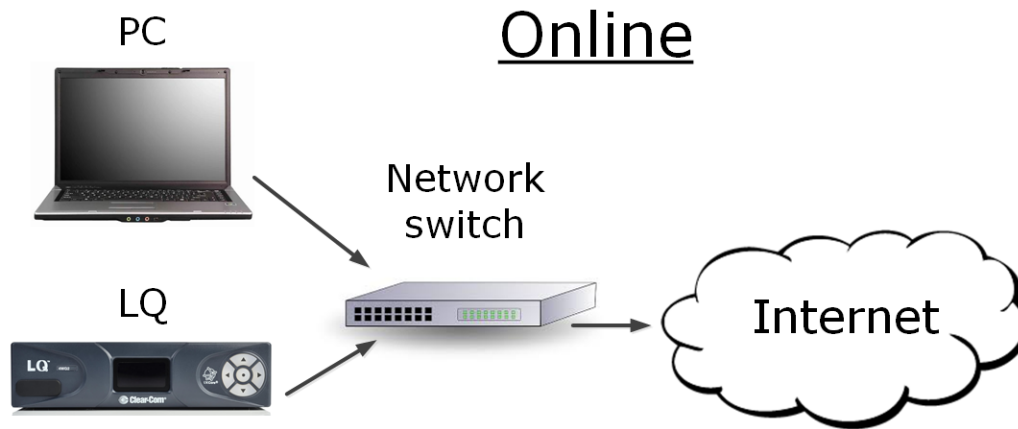
Licenses can be given to any LQ unit. However, once you have activated a license on a unit, you CANNOT move it to another unit.

Licenses can be activated:

- **Online** or
- **Offline**

Online activation is where the LQ unit has access to the Internet. Offline activation is necessary if the LQ units do not have access to the Internet.

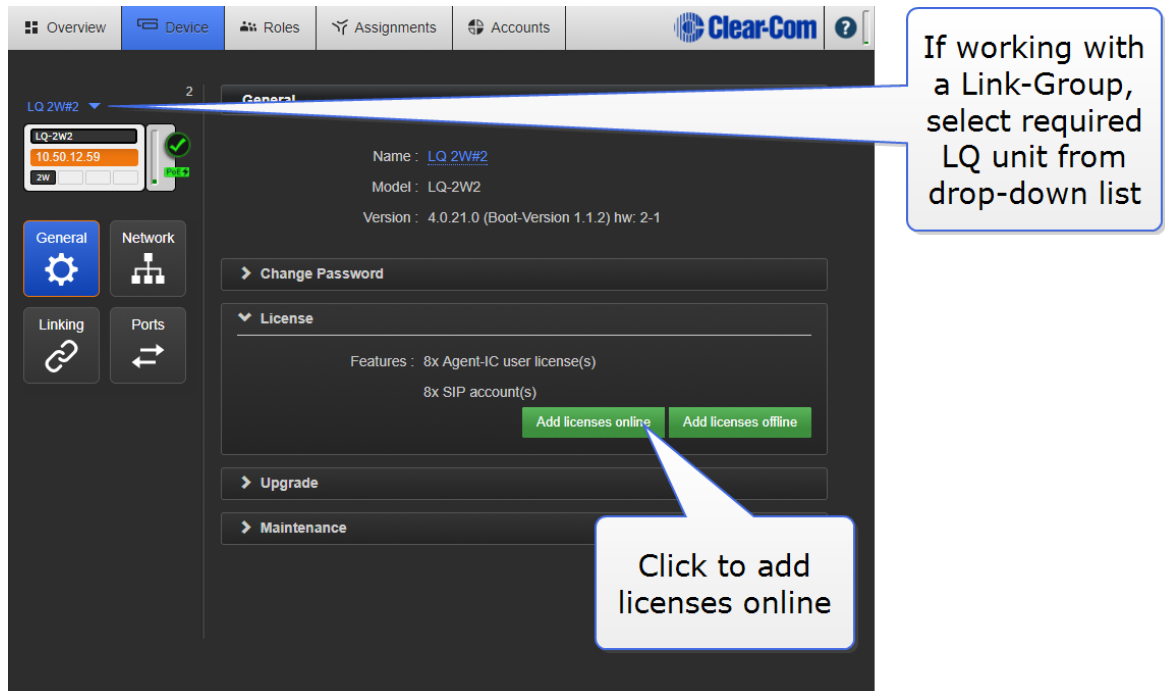
Note: Clear-Com recommends activating licenses online where possible.



16.1.1 Online license activation

1. Open the CCM by inputting the IP address of your device into a browser URL field. If your LQ units are set up in a Link-Group formation you can point the browser at any device in the Link-Group.
2. Find details of the CCM username and password here: **The Core Configuration Manager (CCM) Password on page 24.**
3. Navigate to **Device>General>License.**

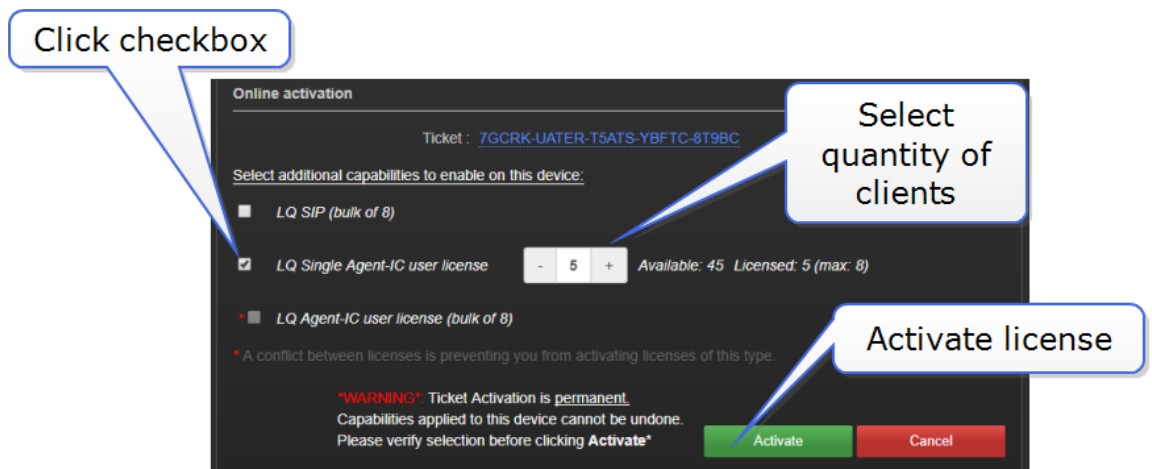
- If working with a Link-Group, select the required LQ unit, and then click Add licenses online.



- In the Ticket field, enter the Ticket ID, and then click the blue check mark. The licensing page will show information about the quantity of licenses that are available for activation on this unit.



- Select the required checkboxes, and the quantity of clients needed, and then click Activate.



16.1.2 Offline license activation

When you activate licenses without internet access, you must download a Context File from the LQ device. The context file acts as a 'holder' for the licenses. The file is then sent to Clear-Com where it is loaded with the license. Clear-Com returns the loaded context file, which you then upload to the LQ unit.

To order your license for offline activation you must send the following to Clear-Com:

- The context file
- The ticket ID
- Details of exactly which licenses from the ticket you wish to activate on this unit.

1. In the CCM, navigate to **Device>General>License**.
2. If working with a Link-Group, select the required LQ unit, and then click **Add licenses offline**.

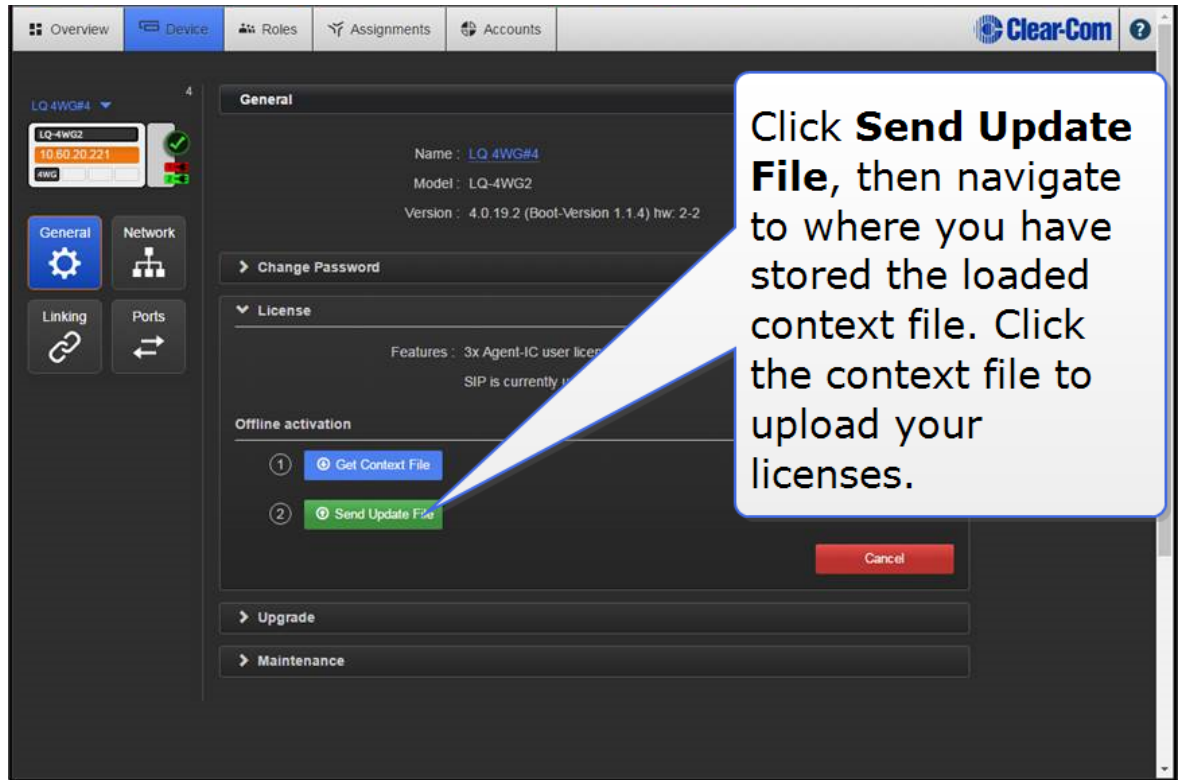
The screenshot displays the Clear-Com CCM interface for device management. The top navigation bar includes 'Overview', 'Device', 'Roles', 'Assignments', and 'Accounts'. The main content area is titled 'General' and shows details for device 'LQ-2W#2'. The 'License' section is expanded, showing 'Features: 8x Agent-IC user license(s)' and '8x SIP account(s)'. Two buttons are present: 'Add licenses online' and 'Add licenses offline'. A callout box points to the 'Add licenses offline' button with the text 'Click to add licenses offline'. Another callout box points to the 'LQ-2W#2' dropdown menu with the text 'If working with a Link-Group, select required LQ unit from drop-down list'.

3. Click **Get Context File**.

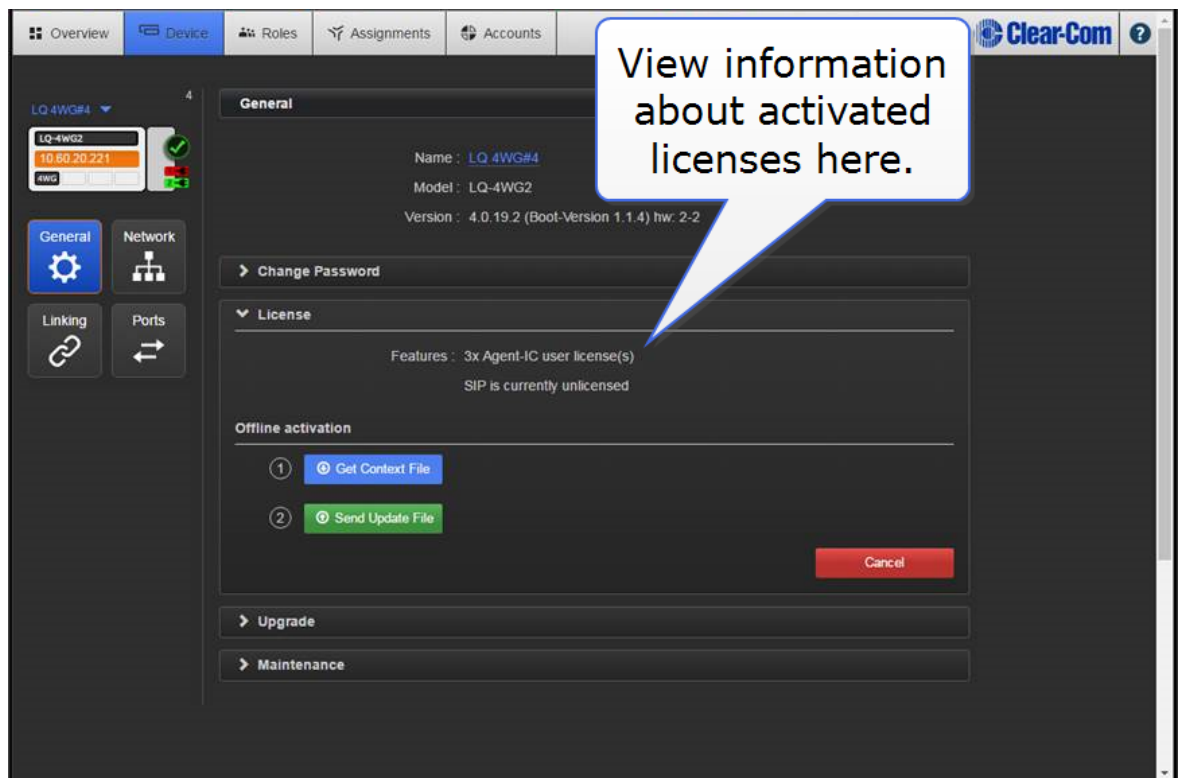
The screenshot shows the Clear-Com web interface for a device named 'LQ 2W#1'. The interface includes a navigation bar with 'Overview', 'Device', 'Roles', 'Assignments', and 'Accounts'. The 'Device' tab is active, showing a sidebar with 'General', 'Network', 'Linking', and 'Ports' options. The main content area is titled 'General' and displays device information: Name: LQ 2W#1, Model: LQ-2W2, and Version: 4.0.21.0 (Boot-Version 1.0.8) hw: 1-1. Below this, there are sections for 'Change Password', 'License' (with features: 8x Agent-IC user license(s) and 8x SIP account(s)), and 'Offline activation'. In the 'Offline activation' section, the 'Get Context File' button is highlighted with a blue border and a callout box. The callout box contains the text: 'Click **Get Context File** (.WibuCmRac extension)'. Other buttons in the 'Offline activation' section include 'Send Update File' and 'Cancel'.

4. Save the context file to an appropriate location (a folder or USB stick).
5. Send the context file, ticket ID and details of which license you require on the unit to this address: licenses@clearcom.com The context file will be returned to you by email, loaded with your licenses. When you receive the loaded context file go on to the next step (6, below).

- In the **Licenses** tab in the CCM, click **Send Update File** and navigate to where you have stored the loaded file. Click the context file to begin activating licenses.



- When the update file is loaded, the licenses are activated. The activated features appear in the upper part of the License section.



17

Using LQ to Interconnect Equipment

When connecting LQ units to other Clear-Com products and third party intercom systems, use the following guidelines:

Device type	Which LQ unit?	To Panel/To Matrix (configure pinout in software)	Supports call signaling?	Panel data?
HelixNet HLI-4W2	LQ-4W2LQ-R4W8LQ-R2W4-4W4	To panel	Yes	No
HelixNet HLI-2W2 (Note: this connection is not preferred for optimum audio quality)	LQ-2W2LQ-R2W4LQ-R2W4-4W4LQ-R2W4-4WG4	N/A	Yes	No
MXV-A16/Eclipse PiCo	LQ-4W2LQ-R4W8LQ-R2W4-4W4	To matrix (Identified as a CCI-22)	Yes	Yes
IVC-32 IP card/Clear-Com matrix	LQ-2W2LQ-R2W4LQ-R2W4-4W4LQ-R2W4-4WG4		Yes	Yes
Other matrices (third party)	LQ-4W2LQ-R4W8LQ-R2W4-4W4	Depends on third-party pinout	No	No
Encore MS-702/4	LQ-2W2LQ-R2W4LQ-R2W4-4W4LQ-R2W4-4WG4	N/A	Yes	No
Encore RS Beltpack 1/2/3	LQ-2W2LQ-R2W4LQ-R2W4-4W4LQ-R2W4-4WG4	N/A	Yes	No
RTS 2-wire equipment	LQ-2W2LQ-	N/A	Yes, but does	No

Device type	Which LQ unit?	To Panel/To Matrix (configure pinout in software)	Supports call signaling?	Panel data?
	R2W4LQ-R2W4-4W4LQ-R2W4-4WG4		not pass call signaling to 4-wire audio routes.	
HME DX210/DX410	LQ-4W2 LQ-R4W8LQ-R2W4-4W4 LQ-2W2*LQ-R2W4*	To panel	Yes	No
FreeSpeak/FreeSpeak II Base	LQ-4W2LQ-R4W8LQ-R2W4-4W4 LQ-2W2*LQ-R2W4*	To panel	Yes**	No
V-Series panel i-Series panel	LQ-4W2LQ-R4W8LQ-R2W4-4W4	To panel	Yes	Yes
2-way radio or 4-wire device with relay activation	LQ-4WG2LQ-R2W4-4WG4LQ-R4WG8	N/A	Yes (call signal can fire relay)	No

*This connection is not preferred for optimum audio quality. LQ-4W2 is recommended.

** On a FreeSpeak Base station, only ports 3 and 4 pass call signaling.

Table 1 Interconnection guidelines

17.1 Connecting 2-wire Equipment

When connecting 2-wire equipment the following functions should be taken into consideration:

- Auto-null

Every time equipment is changed on a 2-wire port you should auto-null.

- Enable/Disable the partyline power
- Line Termination.

These functions can be found in the 2-wire port settings page of the CCM. Navigate to Device > **Ports** on any unit in the Link-Group.

Example:

Equipment	Port settings
Encore RS beltpack 701/2/3	Power: Enabled Termination: Enabled Auto-nulling: Start auto-nulling
Encore MS-702/4 Encore PK-7 Encore PS-702/4	Power: Disabled Termination: Disabled Auto-nulling: Start auto-nulling

17.2 Connecting to 4-Wire Equipment

To minimize noise, use screened (shielded) cable when connecting 4-wire ports.

17.2.1 Pin-out configuration

Pin-out configuration can be set on LQ Series 4-wire interfaces (not 4W + GPIO). This is a software switch that switches the configuration of the pins on the RJ45 etherCON connectors, according to the device you are connecting to. See **Interconnection Guidelines**.

Pin-out configuration is set 'to Matrix' by default. To set the pin configuration of a device:

1. Access the CCM for any unit in the Link-Group.
2. Navigate to Device > **Ports**.
3. Select either 'to Matrix' or 'to Panel'.

The screenshot displays the configuration interface for an LQ-R2W4-4W4 device. The 'Audio Ports' section is active, showing '2-Wire' and '4-Wire' options. Under '4-Wire', '1-4W-Port E' is selected. The 'Port Settings' section shows 'Port Function' set to 'to Matrix'. Callouts provide instructions: 'Navigate to Device/Ports' points to the 'Ports' button, and 'Select Port Function (pinout configuration): To Matrix/To Panel (Not 4W+GPIO)' points to the 'Port Function' dropdown. Another callout 'Select equipment type. (Not 4W+GPIO)' points to the 'Label' field.

17.2.2 Port Function: To Matrix (Default) or To Panel

Check this function whenever you are connecting 4-Wire devices (not GPIO DB-9M connectors).

About Port Function

Clear-Com products are designed so matrices can connect directly to panels/Base Station/main station using a straight-through CAT 5/6 (Ethernet) cable. The pin assignments (inputs and outputs) on these devices are complementary. Previously, a crossover cable was necessary when connecting Bases to other Bases (RJ45 connector). It is no longer necessary to use a crossover cable as there is now a Port Function toggle which changes pinouts as required. This function is found in port options and can be set from the CCM or the Base Station front panel menus.

Port Function Pin Assignments

Port Function pin assignments		
Pin	To Panel/Base Station	To Matrix
1	Data in +	Data out +
2	Data in -	Data out -
3	Audio in +	Audio out +
4	Audio out +	Audio in +
5	Audio out -	Audio in -
6	Audio in -	Audio out -
7	Data out +	Data in +
8	Data out -	Data in -

How do I set Port Function (pin polarity)?

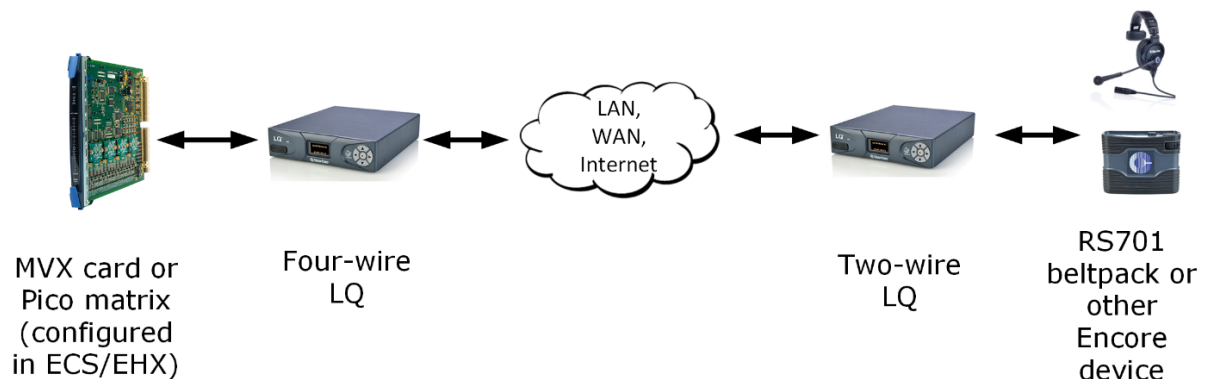
To Matrix: if connecting the LQ to a matrix port. Use a 1:1 CAT5 cable from LQ to Matrix.

To Panel: if connecting the LQ to a panel or basestation (for instance, Helixnet, FSII Base). Use a 1:1 CAT5 cable from LQ to Panel/basestation.

Set Port Function in the CCM. Click/touch image to enlarge/minimize.

The screenshot shows the CCM interface for configuring audio ports. The 'Ports' menu item is highlighted with a callout: "Navigate to Home/Ports". Under the '4-Wire' section, '1-4W-Port A' is selected. In the 'Port Settings' section, the 'Port Function' dropdown is set to 'to Matrix', with a callout: "Select To Matrix or To Panel." Other settings include Label: 1-4W-Port A, Input Gain: 0 dB, Output Gain: 0 dB, Multi Channel Support: Disabled, and Baud Rate: 19200 (Eclipse).

17.3 Connecting an Eclipse PiCo (or MVX Card) to an Encore Device Using LQ



When setting up this connection, care must be taken to configure the port in the EHX software correctly. This is because, in this case, the port must be declared as a CCI-22 device as the port detection device on the LQ will recognise it as such.

1. From the EHX software, navigate to **EHX > System > Cards and Ports**.
2. Select the MVX card port.
3. Select a CCI-22 device from the list.
4. It is advisable to label the port as an LQ 4-wire device to avoid confusion.

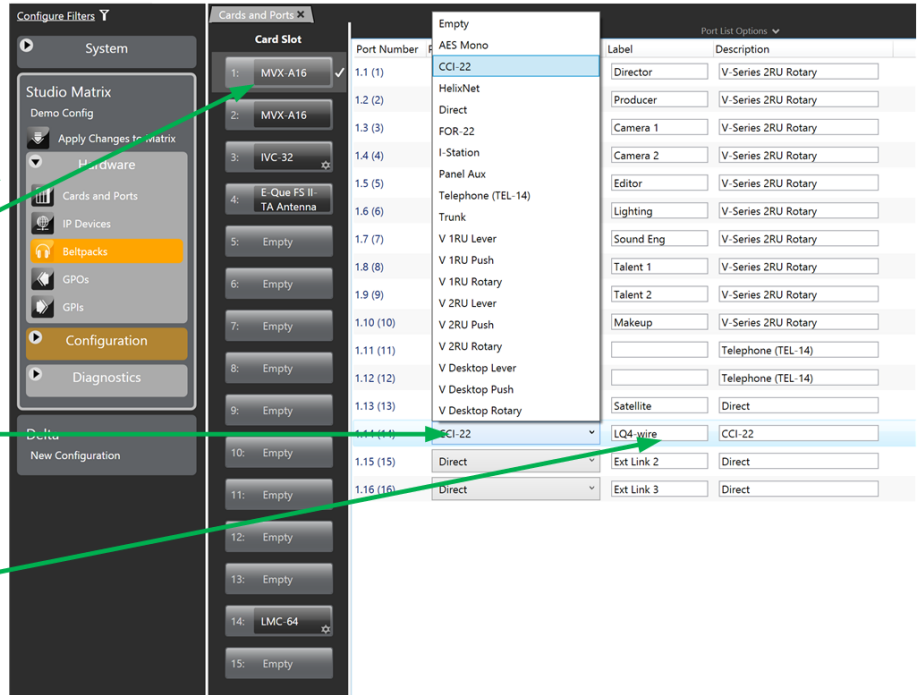
Show me:

1. Navigate to EHX/Hardware/ Cards and Ports

2. Select MVX card

3. Set port as CCI-22

4. Label port as LQ 4-wire

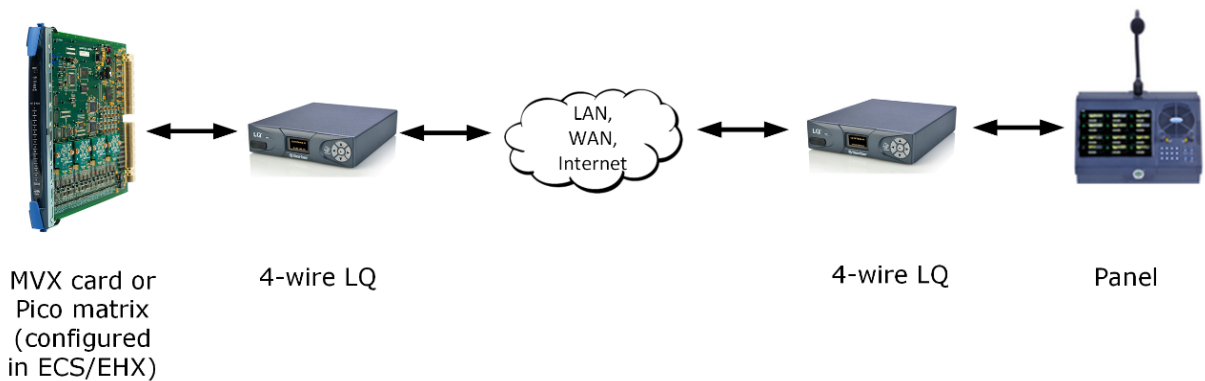


Note:

The connection between the MVX or PiCo and the LQ device is a 4-wire connection, even though it is declared as a 2-wire connection.

For more information on port function, see 5.16 Port Function in the EHX Software User Guide .

17.4 Connecting an Eclipse PiCo (or MVX Card) to a Panel Using LQ

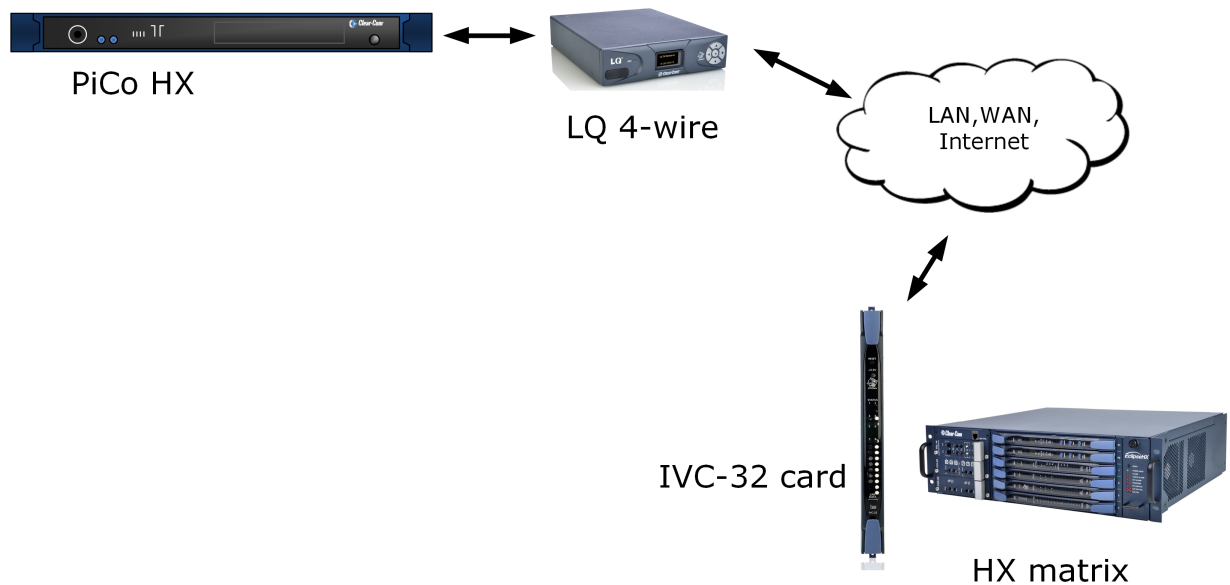


When setting up this connection, the MVX port to the LQ should be declared as a panel in the EHX software.

For more information on port function, see the Eclipse EHX Software User Guide.

17.5 PiCo HX Trunk to HX Matrix (Eclipse HX 8.7 and Above)

IP trunking: Eclipse HX to PiCo HX (EHX 8.7 and above)



For this set up it is necessary to configure both EHX and the Core Configuration Manager (CCM).

1. In the EHX software, declare the PiCo port that connects to the LQ as a trunk.
2. In the EHX software, declare the IVC-32 card port on the HX matrix as an '**LQ trunk**'.
3. Generate an IVC-32 port in the Core Configuration Manager (CCM) of the LQ device.
4. Connect 1:1 CAT5 cables between the PiCo and the LQ unit.
5. Navigate to **Assignments** in the CCM, select and allocate a Channel. It is advisable to name this Channel 'Trunking'. Put both the LQ IVC port and the LQ 4-wire port into the Trunking Channel together. This generates a connection between the two ports

Note: *Don't assign other ports to this Trunking Channel as this will cause confusing transmission.*

18 Upgrading Your Device

Upgrades for your device will be available from the Clear-Com website.

<https://www.clearcom.com/support/download-center/>

To upgrade your device, you must import the upgrade file provided by Clear-Com into the device via the unit's CCM (Core Configuration Manager). An LQ unit must be upgraded from the host device (the device that the browser is currently addressing). The units cannot be upgraded by proxy.

All devices in a Link-Group MUST be running the same version of the software.

18.1 Import the upgrade file

1. Open a browser window and input the IP address of the device into the address field to access the CCM. The device IP can be found on the front display of the unit when it is powered and booted.
2. Navigate to **Device > General** in the CCM.
3. Expand the Upgrade option (click on '+').
4. Click Select File and navigate to the upgrade file (.gz extension). Select the upgrade file to upload it.
5. When the upgrade file is loaded, Upgrade will light up. When this happens, click on it to upgrade. When the upgrade is finished, the unit will reboot by itself.

The screenshot shows the CCM interface for a device named 'LQ-R2W4-4W4' with IP address '10.50.16.53'. The 'General' tab is active, showing fields for Name, Model, and Version. The 'Upgrade' section is expanded, showing a 'Select File' button (labeled 1) and an 'Upgrade' button (labeled 2). Callout boxes provide instructions: 'Click/touch to expand Upgrade option.' points to the '+' icon; 'Click/touch and navigate to upgrade file (.gz extension)' points to the 'Select File' button; and 'When upgrade file is loaded, Upgrade will light up. When this happens, click on it to upgrade. Wait while unit reboots.' points to the 'Upgrade' button.

Note: *If you downgrade an LQ unit from Version 2 to Version 1, you will see a red light flashing on the front panel after the first reboot. Power cycle the unit one more time to reset the status.*

19 FAQs

The FAQs are divided into the following categories:

Device Queries on page 168

2-Wire and 4-Wire Specific Queries on page 169

Interconnection Queries on page 170

IP and Network Queries on page 177

Audio Quality Queries on page 183

Telephony Queries on page 187

19.1 Device Queries

19.1.1 How Can I Find the IP Address of my LQ Unit?

The IP address of an LQ device can be found on the front panel display of the units and also in the Web GUI. The IP address of a unit can be changed via the CCM (**Device > Network**) or from the device front menu screens (**Programming Network Details from LQ Device Front Screen on page 56**).

19.1.2 What Does a Solid Red Light on the Front Panel Keypad Indicate?

A solid red light on the keypad shows that the unit has lost its IP connection to the Link-Master.

Make sure that the Link-Master's IP address is reachable from the network point where the Link-Member is connected.

19.1.3 What Does a Flashing Red Light on the Front Panel Keypad Indicate?

A flashing red light shows that there is an ID conflict within the LQ-Group, meaning that two LQ units are trying to connect to a Link-Group using the same link ID.

To resolve this you will need to undo the unit's link to the Link-Master and then re-apply the linking process to an available ID:

1. Within a Web browser, enter the IP address of the LQ device which is showing the flashing red LED. This takes you to the Core Configuration Manager (CCM) for that unit.
2. Navigate to the device's Linking page (**Device > Linking**).
3. Click the Change Role to Link-Master button and click Apply Changes.
4. Now reconfigure the link and the link ID. To do this, click the Change Role to Link-Member button, and enter the Link-Master IP. Click the blue check mark or <Enter>.
5. Select an available ID slot (available IDs will be highlighted in blue) and click Apply Changes.

19.1.4 What Does a Persistent Flashing Green Light (More than Two Minutes) on the Front Panel Keypad Indicate?

The devices boot automatically when power is supplied and show a flashing green light on the front panel keypad while the system is booting.

If the device is booting (the flashing green light does not turn into a solid green light) for more than 2 minutes, and the display screen does not move beyond the Clear-Com splash screen, the most likely explanation is that the unit does not have enough power. This can happen if too many LQ devices are drawing power from the same PoE switch or network.

Check the power supply provided by PoE to see if this is the case and consider using the supplied power connector cable to power the devices.

19.1.5 How are LQ Series Devices Powered?

- LQ throw-down units use local power (24 watt sleeve-locking PSU) or Power over Ethernet (PoE).
- LQ-R 1RU rack units use local power only (2 x 60 watt sleeve-locking PSUs).

19.2 2-Wire and 4-Wire Specific Queries

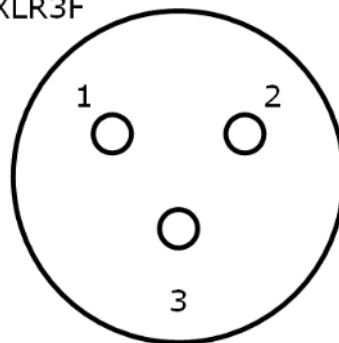
19.2.1 What Types of 2-Wire Intercom Do LQ Series Units Support?

- Clear-Com

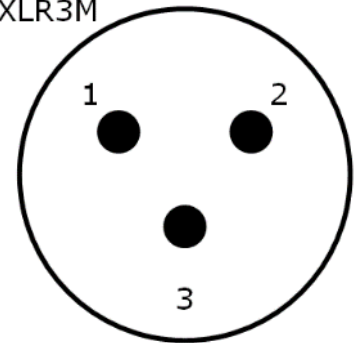
Clear-Com 2-wire XLR pin-out

1. Ground
2. DC power (30V)
3. Duplex audio

XLR3F



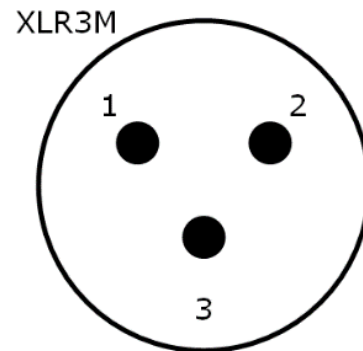
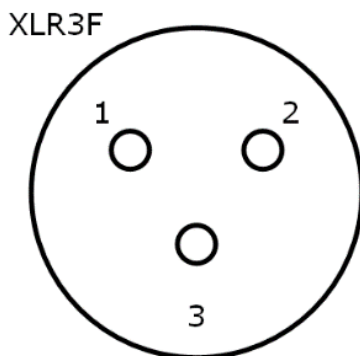
XLR3M



- RTS TW

RTS TW 2-wire
XLR pin-out

1. Ground
2. DC power (30V)
Duplex audio 1
3. Duplex audio 2



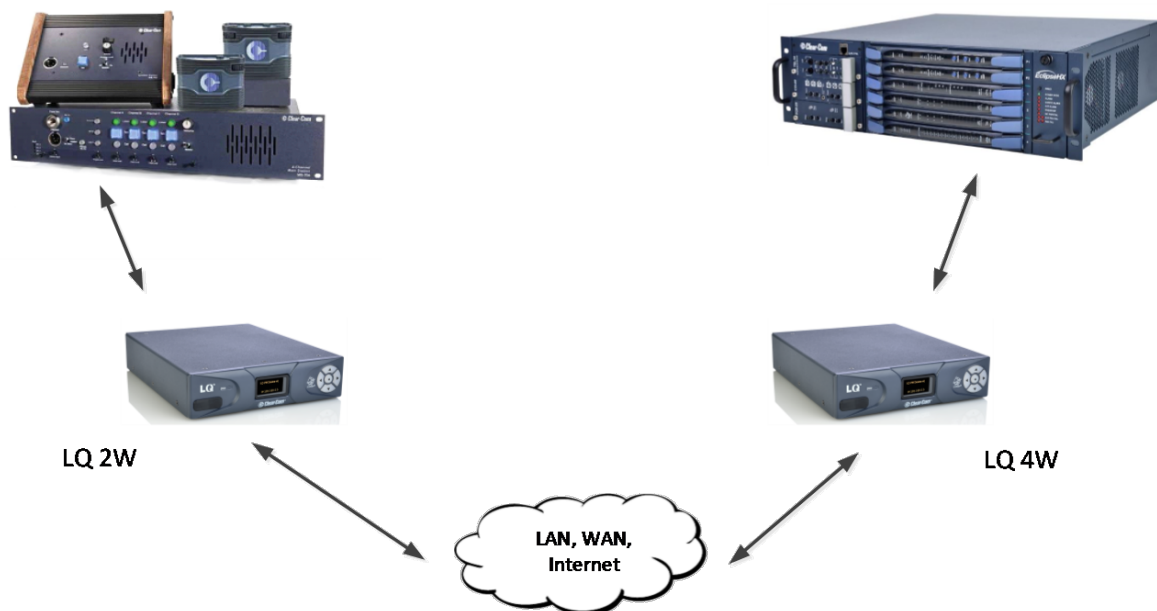
19.2.2 Does the LQ-4W2 Pass Call Signaling?

Yes, but only call signaling originating from Clear-Com equipment. Call signaling to RTS equipment will be limited.

19.3 Interconnection Queries

19.3.1 Can I Link LQ-2W to an LQ-4W?

Yes, a 2-wire device can be linked to a 4-wire device.



19.3.2 Can I Connect Clear-Com Intercom Panels to LQ 4-Wire Devices?

Yes, Version 2 firmware and later supports Clear-Com Eclipse ECS/EHX matrix to panel connections.

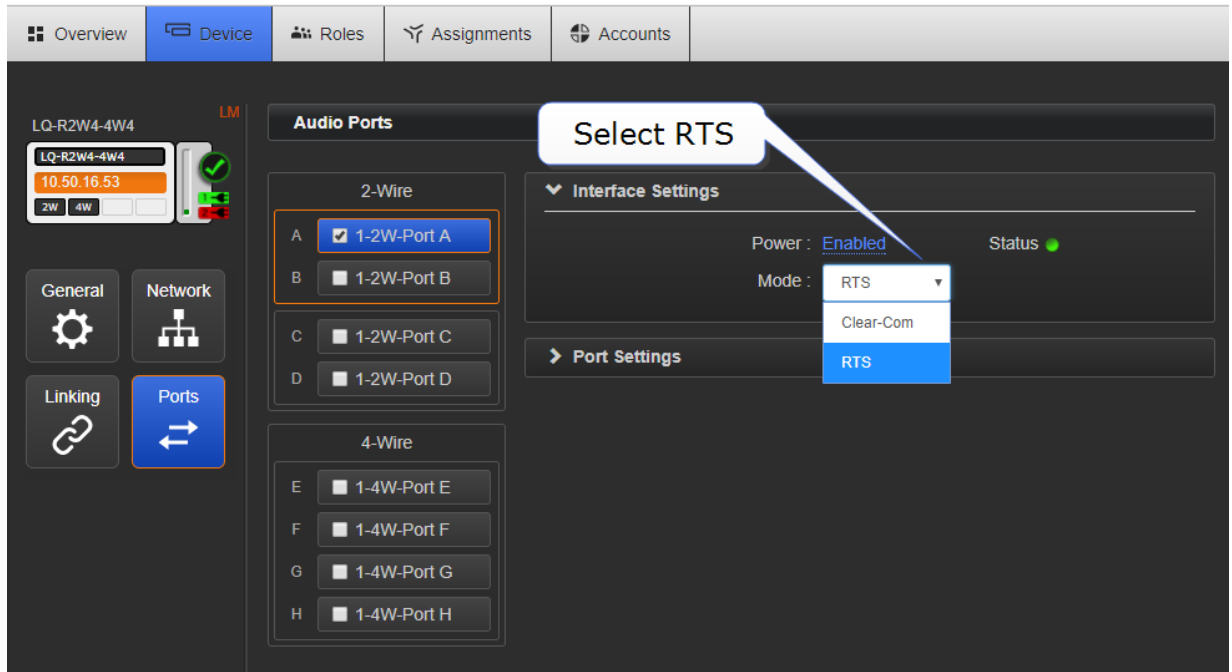
Matrix+3 connections are not supported.

Drake 4000 panels are supported (baud rate 9600)

19.3.3 How Do I Set Up LQ to Work with RTS Equipment?

To use RTS equipment you must set the **Mode** setting to **RTS** in the CCM:

1. Navigate to **Device>Ports>Interface Settings>Mode** for the required device.
2. Select RTS.



Port A will be channel 1 of the RTS

Port B will be channel 2 of the RTS

The two XLRs (pair) work in parallel, and the RTS device can be connected to either XLR.

19.3.4 How do I link an LQ device to HelixNet Main Station (HMS)?

Linking an LQ to an HMS follows the same procedure as linking LQ units in a Link-Group. The LQ manual, available from the Clear-com website gives an overview of linking.

Devices must be connected to the same network and able to see each other across the network.

To link devices:

1. In a browser, open the Core Configuration Manager (CCM) of the HMS. Navigate to **Device>Linking**.
2. Designate the **Link Group Role** of the HMS as **Link-Master**
3. Open the CCM of the LQ unit. Navigate to **Device>Linking**.

4. Designate the **Link Group Role** of the LQ unit as **Link-Member**
5. To link units, give the Link-Member the IP address of the Link-Master and click the blue check mark.

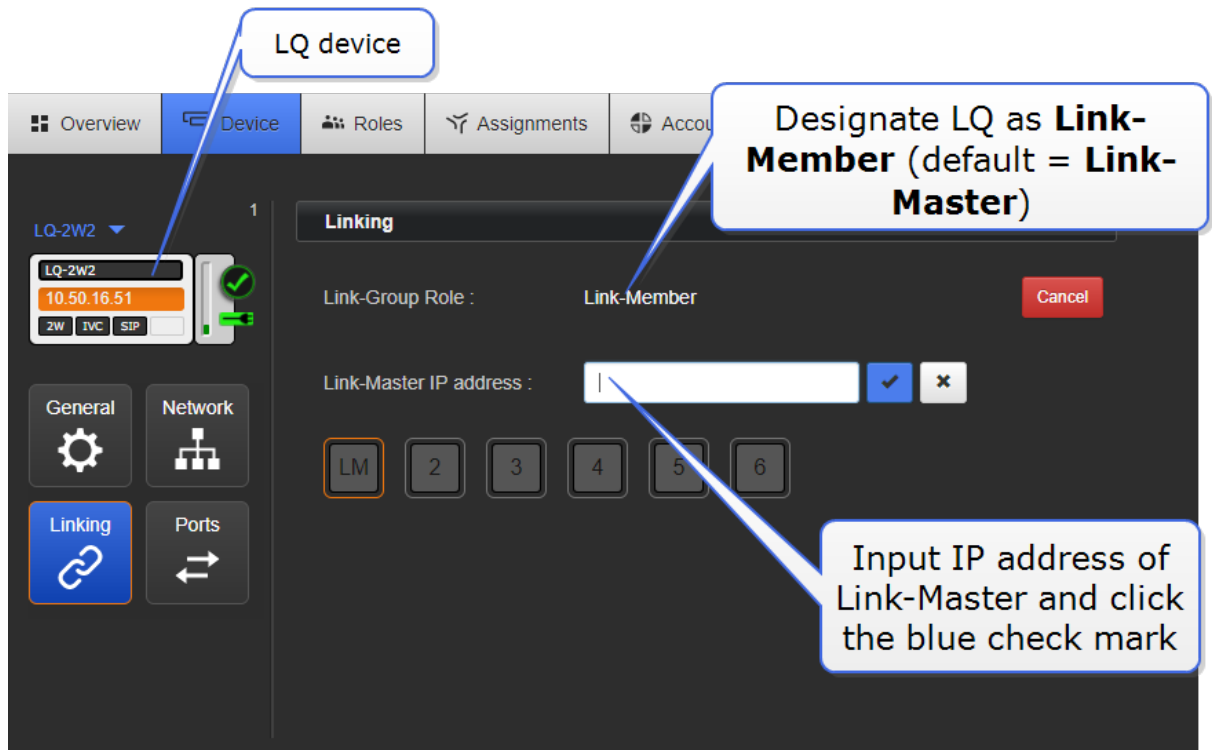
The screenshot displays the Clear-Com web interface for configuring an HMS device. The top navigation bar includes 'Overview', 'Device', 'Roles', and 'Assignments', with the 'Device' tab selected. The main content area is titled 'Linking' and shows the following configuration:

- Link-Group Role : [Link-Master](#)
- Link-Group Optimization : LAN/WAN Routed Network

Below the configuration, there are six buttons labeled 'LM', '2', '3', '4', '5', and '6'. The 'LM' button is highlighted with a blue border. A callout box points to the 'Link-Master' role, stating: "Set Link Group Role of HMS as **Link-Master** (default = **Disabled**)".

On the left side, there is a sidebar with navigation options: 'General', 'Network', 'Linking', and 'Ports'. The 'Linking' option is highlighted with a blue border. A callout box points to this option, stating: "Navigate to **Device>Linking**".

At the top left, a callout box points to the device name 'HMS-4X_Mary' and the IP address '10.50.16.54', stating: "HMS device".



Note: The HMS must occupy slot 1 in the Link-Group. This is the default setting.

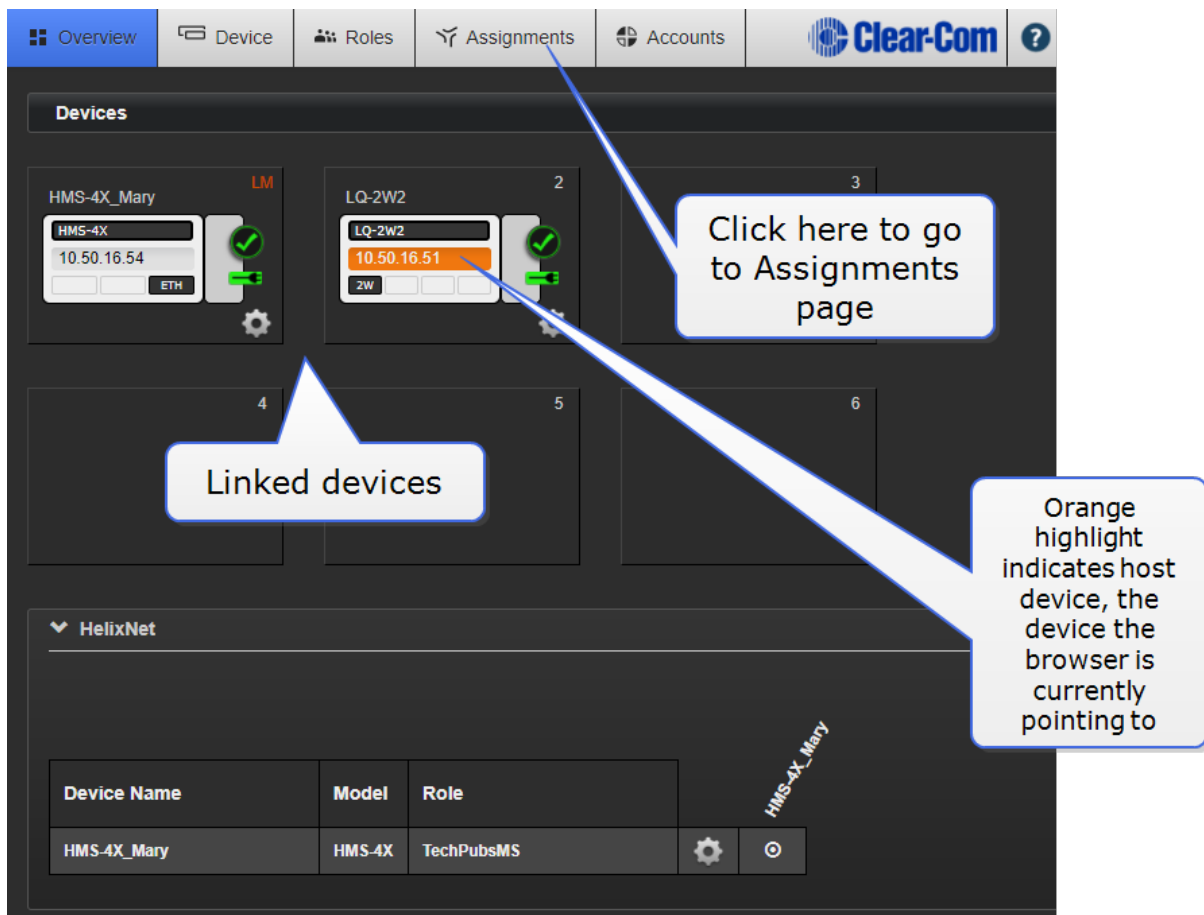
Note: The **Role** settings of the LQ unit is over-ridden by that of the HelixNet master when devices are linked.

Note: The Link Group Role status of the HMS is set to **Disabled** by default. This stops the device from broadcasting its DNS to the network. The device is not visible to other devices on the network while Link Group Role is disabled.

19.3.5 How Do I Add an LQ Port to a HelixNet Channel?

LQ ports are available to a HelixNet Main Station (HMS) when the devices are linked in a Link-Group configuration.

1. Open the Core Configuration Manager (CCM) of any device in the HMS/LQ Link-Group.



2. Navigate to the Assignments page.

Note: *Direct Channels are not available to HelixNet. This means that panel control of audio sources is not available.*

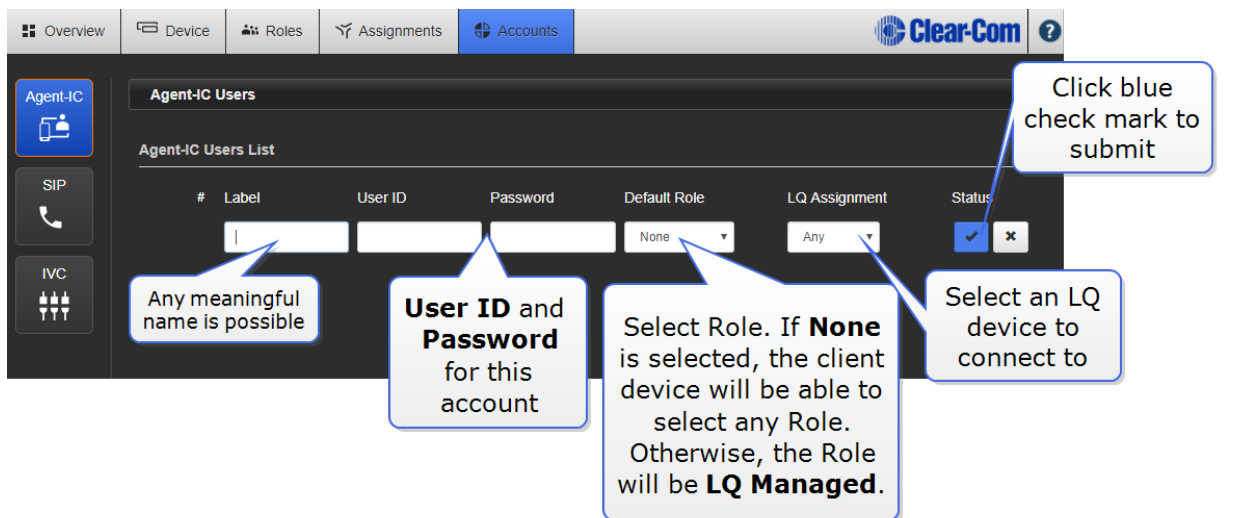
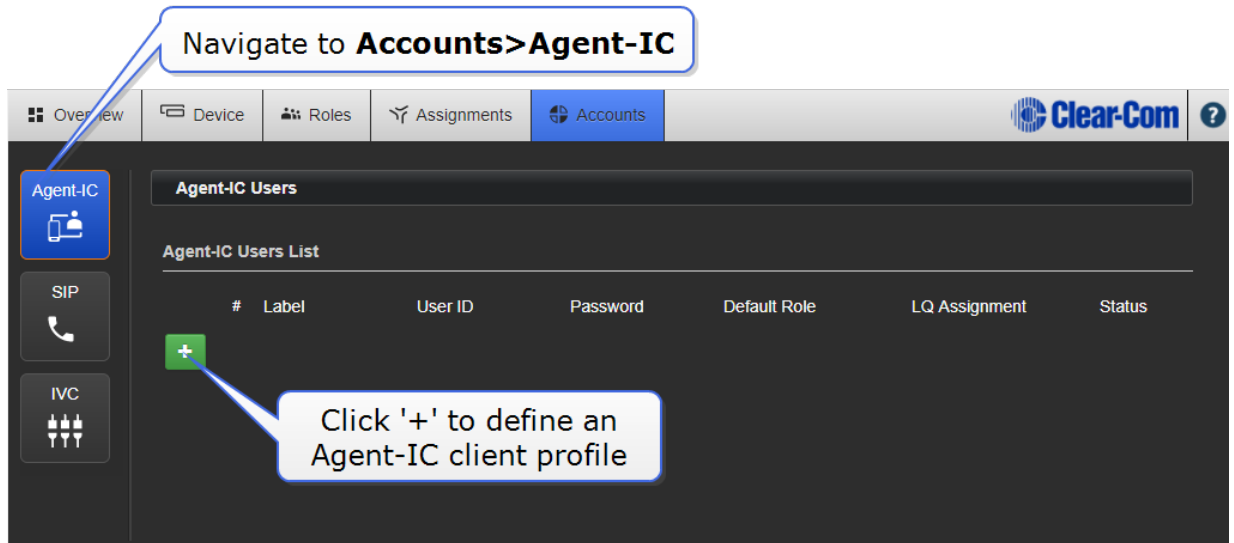
Note: *Local Audio Mix (submix) is not available in HelixNet.*

19.3.6 How Do I Get an Agent-IC Client to Connect to an LQ Device Via 3G/LTE/4G/Wifi?

There is one connection method for an Agent-IC client to an LQ unit, regardless of the connection medium.

Note: *The device must have Agent-IC license or licenses installed. See **Licensing** on page 151 for more information.*

Agent-IC accounts must be set up in the **Accounts** page of the LQ CCM.

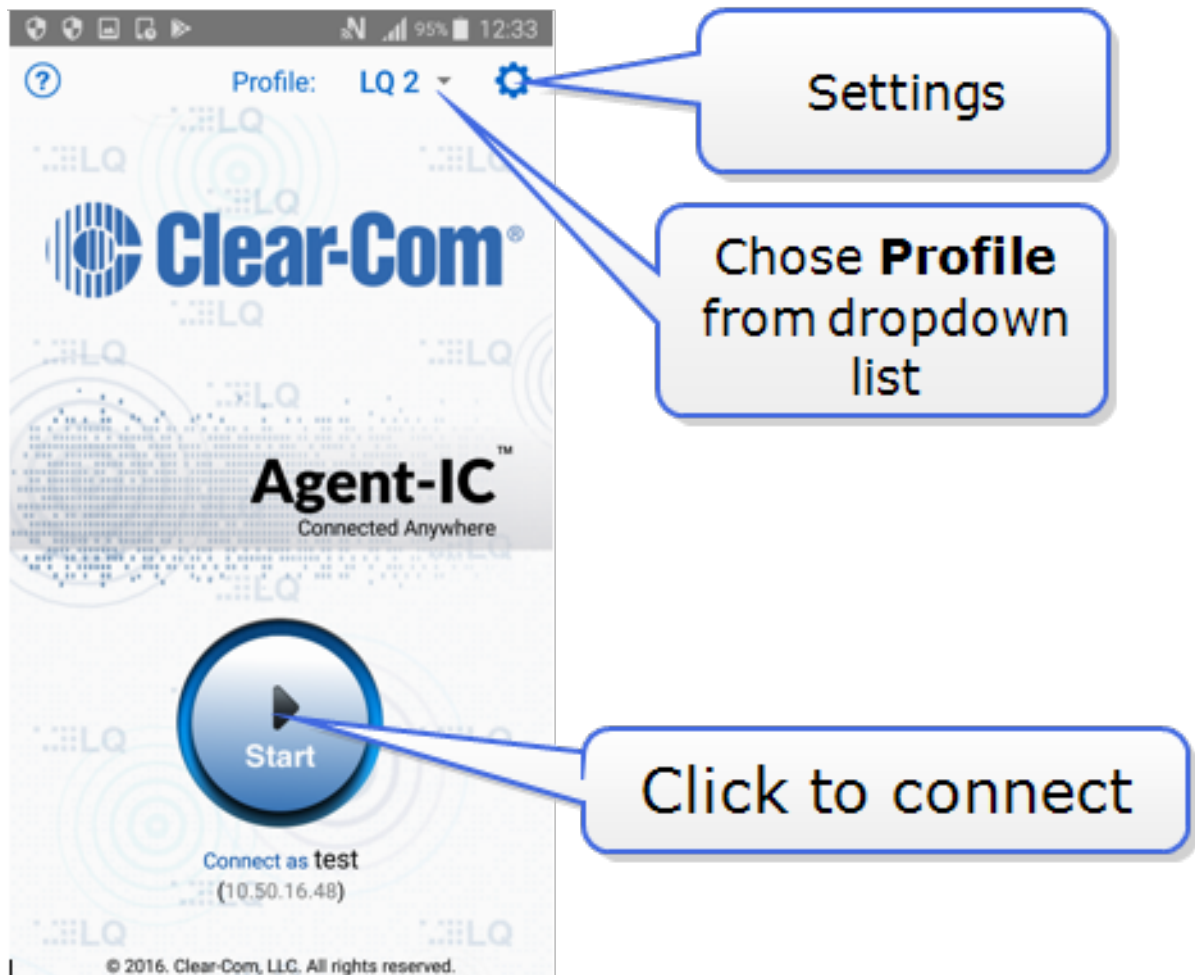


From the mobile client, input:

- LQ device IP address
- Login credentials (User ID and Password) in **Settings**.

Chose an LQ **Profile** (an EHX profile connects to an EHX system).

Press **Start** to connect the client to the LQ.



Note: When connecting Agent-IC to HelixNet via LQ, due to a heavier codec (WavPack), the data rate will increase. This may cause problems with the Agent-IC client in HelixNet Channels, particularly when using the slower 3G bandwidth connections.

19.4 IP and Network Queries

19.4.1 How Do I Set the System Up if I Have to Cross One or More Firewalls?

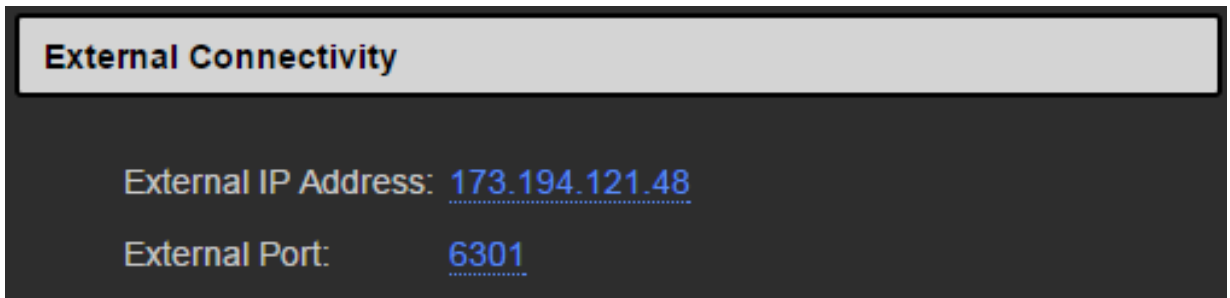
As a minimum requirement for connectivity, the Link-Master must be reachable by all other Link-Members in the Link-Group. To achieve this, port-forwarding rules need to be created within the firewall which the Link-Master is behind. The ports that need to be forwarded are as follows:

1. 80:TCP. This is used for both link initiation and Web management.
2. 655:TCP/UDP. This is used for the transmission of all audio and data (call signaling) between Link-Group members.

To set up a Link-Group with devices behind one or more firewalls, observe the following example configuration:

Assume the following IP addresses and port-forwarding rules:

- 173.194.121.48 (external IP address)
 - 192.168.1.100 (Link-Master network address)
 - 6300 (arbitrary port chosen for port 80, the management port-forward rule)
 - 6301 (arbitrary port chosen for port 655, the audio/data port-forwarding rule)
1. Within the firewall, create a port-forward rule that forwards any TCP requests received on 173.194.121.48:6300 to 192.168.1.100:80.
 2. Within the firewall, create a port-forward rule that forwards any TCP/UDP requests received on 173.194.121.48:6301 to 192.168.1.100:655.
 3. Within the Link-Master's Network configuration page, configure the external IP and audio/data port:



4. Within the remote unit's Linking configuration page, configure the Link-Master's external IP and management port:



5. Repeat step 4 for each LQ unit to be part of the group.
6. For every Link-Member within the Link-Group that can be made externally reachable, navigate to the device's Network configuration page and configure the external IP and audio/data port as in step 3 (optional).

These configuration steps will ensure basic connectivity within the Link-Group. For more detailed information see **Internet Connectivity on page 72**.

19.4.2 Why Must the Link-Master Have a Static IP Address?

The Link-Master must be statically addressed to prevent its IP address from changing. A changed IP address will result in loss of connectivity with the rest of the Link-Group.

Note: *Another alternative is to maintain DHCP addressing but use the Address Reservation feature available in most managed routers. This will instruct the router to allocate a specific DHCP address to an LQ device identified by its MAC address. The unit's MAC address can be retrieved through the LQ's front panel menu.*

19.4.3 Connectivity, Including Web Access to My LQ Unit is Intermittent, Even Though I Am Accessing It from Within The Same LAN.

The most probable cause for this is that an IP conflict exists. In this case, the IP address used by the LQ unit is already in use by another device within your LAN. The quickest and easiest way to check if this is the problem is to change the LQ unit's IP address to an address that is known to be available and observe if connectivity to the unit is once again consistent.

19.4.4 What Happens If Connection to the Link-Master Is Lost?

The Link-Master must be statically addressed to prevent its IP address from changing. A changed IP address will result in loss of connectivity with the rest of the Link-Group.

A). Connection to the Link-Master is lost when a Link-Group is on a LAN

In this case, existing audio routes will be maintained, but system-wide data, such as Channel names will not be updated. New data routes will not be possible.

B). Connection to the Link-Master is lost when a Link-Group is on the Internet

In this situation there is likely to be loss of audio. When connecting over the Internet, it is usually the case that the Link-Master is the only device that is reachable by the other units in the group. If this is the case, all audio will be routed through the Link-Master, creating the possibility of a single point of failure. To prevent this, be sure to facilitate connectivity between the LQ units in the group through port-forwarding, described in **Internet Connectivity on page 72**.

In both cases, on a LAN or the Internet, loss of connection to the Link-Master will have the following effects:

- Prevents the ability of the LQ units to modify any of the Channel names.
- Prevents the distribution of device configuration changes throughout the Link-Group resulting in the possibility of inconsistent routing information.

19.4.5 How Do I Connect an IVC Card to a HelixNet Main Station (HMS) Over IP Infrastructure?

To link an HMS to an IVC card over IP, the HMS must first be connected to an LQ unit in a Link-Group configuration. Once connected to an LQ in this way, the IVC 'virtual ports' are available to the HMS.

The Link-Group devices must be connected to the network and able to reach the IVC card over the IP infrastructure.

1. Open the Core Configuration Manager (CCM) of any device in the Link-Group

The screenshot displays the Clear-Com CCM interface. At the top, there is a navigation bar with tabs for Overview, Device, Roles, Assignments, and Accounts. The Accounts tab is currently selected. Below the navigation bar, the main content area is divided into several sections:

- Devices:** A grid of device cards. Two cards are visible: 'HMS-4X_Mary' (Model: HMS-4X, IP: 10.50.16.54) and 'LQ-2W2' (Model: LQ-2W2, IP: 10.50.16.51). Both cards have a green checkmark and a gear icon. A callout box labeled 'Linked devices' points to these two cards.
- Accounts:** A section titled 'HelixNet' containing a table of accounts. The table has columns for Device Name, Model, and Role. One account is listed: HMS-4X_Mary, Model HMS-4X, Role TechPubsMS. A callout box points to the Accounts tab in the navigation bar, stating: 'In a Link-Group, the Accounts page becomes available to HelixNet'.
- IVC Ports:** A section titled 'IVC Ports' with the message: 'There are no IVC Accounts configured.'

2. Navigate to the **Accounts>IVC**

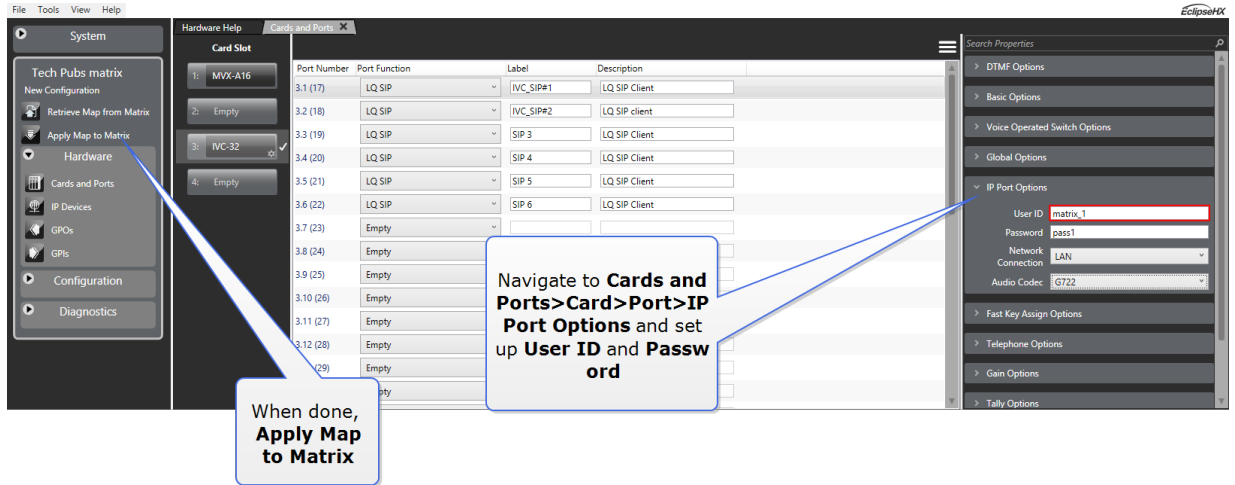
The screenshot shows the 'Accounts' tab in the Clear-Com interface. On the left sidebar, there are buttons for 'Agent-IC', 'SIP', and 'IVC'. The 'IVC' button is highlighted with a blue callout box that says 'Navigate to **Accounts** and select **IVC** button'. The main content area shows 'IVC Devices' with a list containing 'A IVC 1'. Below this, there are two sections: 'Device Settings' and 'Ports Settings'. The 'Device Settings' section shows: Label: IVC 1, IP / Hostname: Not Set, and IP Port: 6001. The 'Ports Settings' section is a table with columns: #, Label, User ID, Password, LQ Assignment, and Status. A green plus sign is visible in the bottom left of the ports table.

3. Open the EHX software and find the IP address of the IVC card.

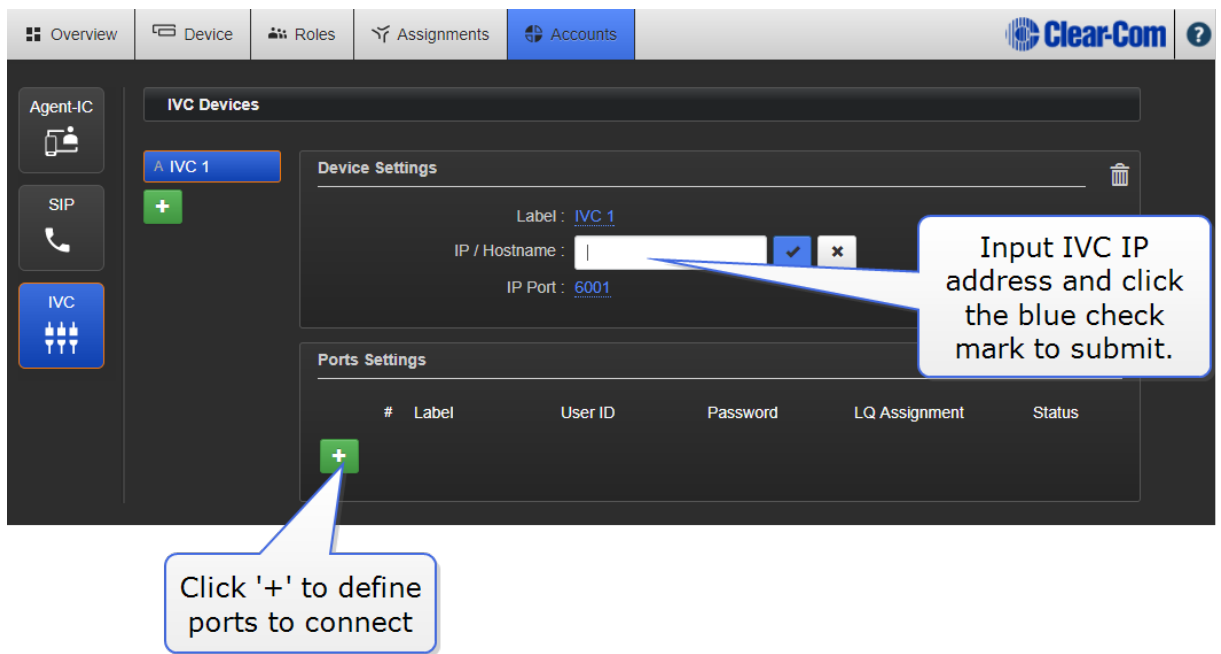
The screenshot shows the 'EclipseHX' configuration system window titled 'SIP_testing on localhost (Administrator) - EHX Configuration System'. The left sidebar has a 'System' menu with options like 'Tech Pubs matrix', 'Hardware', 'Cards and Ports', 'IP Devices', 'GPOs', 'GPIs', 'Configuration', and 'Diagnostics'. The 'Cards and Ports' window is open, showing a 'Card Slot' list with '1: MVX-A16', '2: Empty', '3: IVC-32', and '4: Empty'. A blue callout box points to the 'IVC-32' card with the text: 'Navigate to Cards and Ports. Select IVC card and right click to see IP address'. A 'IVC-32 Card Properties' dialog box is open, displaying the following information:

Property	Value
TCP/UDP Port:	6001
IP Address:	10.50.17.7
Subnet mask:	255.0.0.0
Default gateway:	255.255.255.255
External IP Address:	10.50.17.7
External TCP/UDP Port:	6001

4. Define the port login credentials in EHX



5. Give the LQ Group the IP address of the IVC card, input login credentials and connect ports.



User ID and Password must match that set up in EHX exactly

Select an LQ unit to connect to

Click blue check mark to connect port to the LQ

Successful connection is indicated by the connection status button. Click on this icon for information.

Note: *The expected latency of HelixNet to LQ to IVC is 100ms plus. This connection may not be suitable for a live environment.*

19.5 Audio Quality Queries

19.5.1 How Do I Eliminate Choppy Audio Being Received By an LQ Unit?

Choppy audio is usually the result of a port that has a network quality setting that is too high for the IP network. Choppy audio can usually be resolved by adjusting network quality on either the transmitting or receiving devices.

For example, if the choppy audio is only on one receiving device, then the problem will probably be solved on that device. However, if the problem is on all devices except one, then the issue can probably be solved by adjusting network quality on the transmitting device.

Note: *If you want to resolve poor audio quality when using the 20 kHz audio feature, you may need to use the Custom network quality settings to keep the bitrate high at the same time as adjusting the jitter buffer. Do this on the device that is receiving choppy audio.*

19.5.2 Adjust network quality setting

Network quality problems should be resolved on a per Channel basis.

1. Within a web browser, input the IP address of the required LQ device, or any device within a Link-Group into the address field in order to open the Core Configuration Manager (CCM).
2. Select the **Assignments** page from the top navigation bar.
3. Select the Channel with audio problems from the Channel selector on the right side of the page.
4. Click/touch the Local Audio Mix button within the Channel.
5. Click/touch the Network Settings.
6. Adjust the network quality slider bar.
7. Repeat step 6 until the choppy audio is minimized.

Note:

The jitter buffer setting is designed to buffer audio received to prevent loss if there is network jitter. Be aware that the jitter buffer selection will directly affect the latency. This is because the lower number in the jitter range represents the amount of time the LQ unit will buffer audio before delivering it to the port. A bigger jitter buffer setting will increase latency in milliseconds.

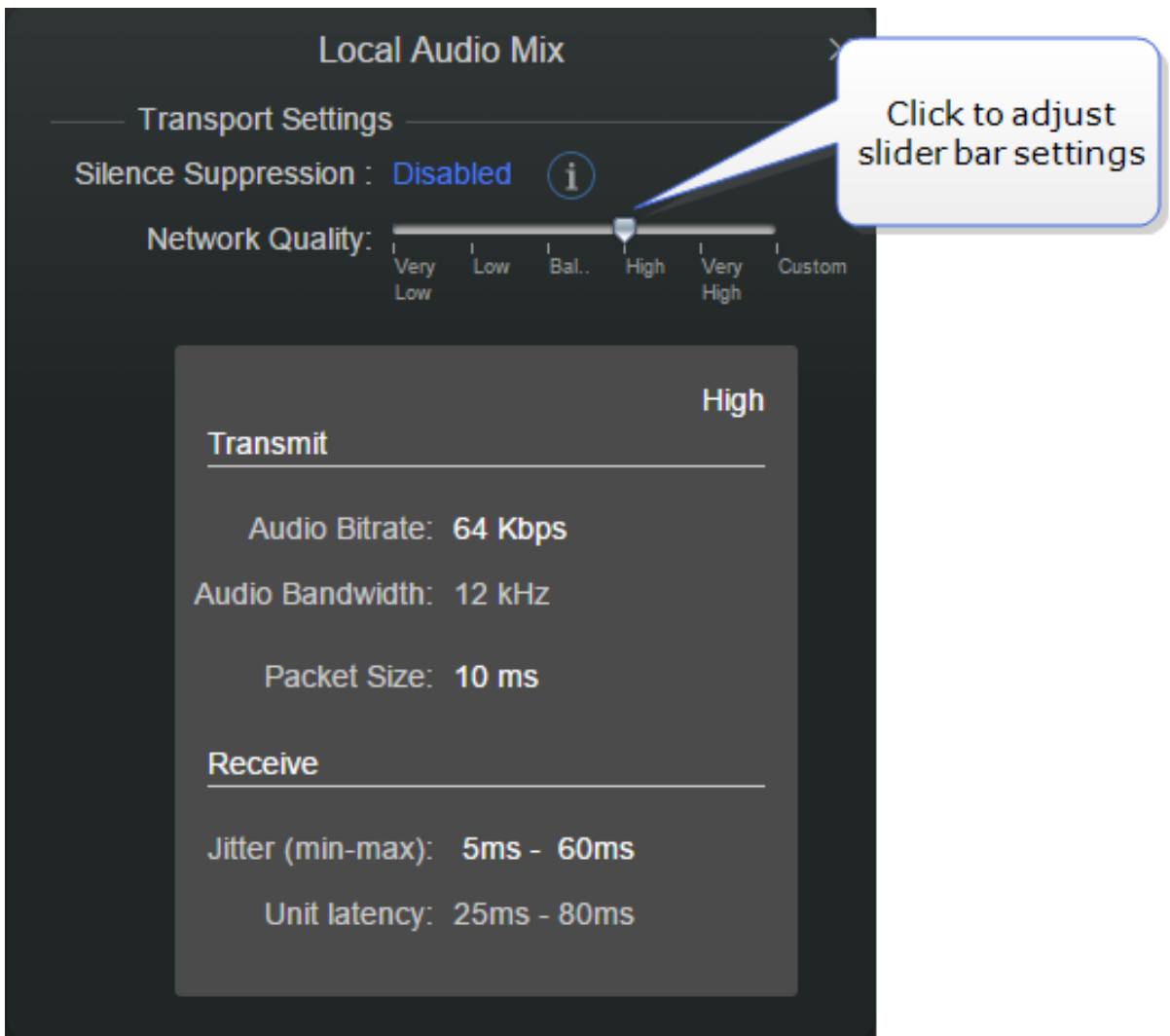
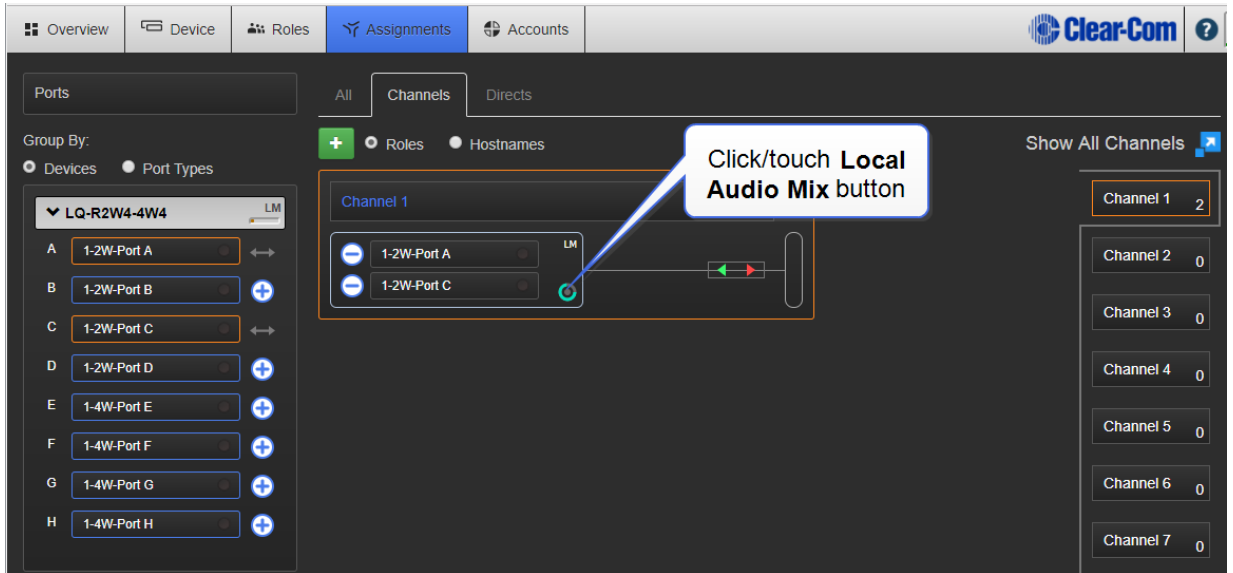
The Custom option within the Network Quality setting allows adjustment of the jitter buffer independent of other settings.

19.5.3 How Do I Use 20 kHz Audio?

To use 20 kHz audio, the bitrate must be set to 128 Kbps in the Local Audio Mix (LAM).

Local Audio Mix is adjusted on a per Channel basis.

1. Within a browser, enter the IP address of the LQ device (or any member of the Link-Group if that configuration is being used) in the address field. This opens the Core Configuration Manager.
2. Navigate to **Assignments** using the top navigation bar.
3. Select the required Channel from the right side of the page.
4. Click the LAM button, then network settings and use the slider bar to adjust settings. 128 Kbps is available on **High** or **Custom** settings.



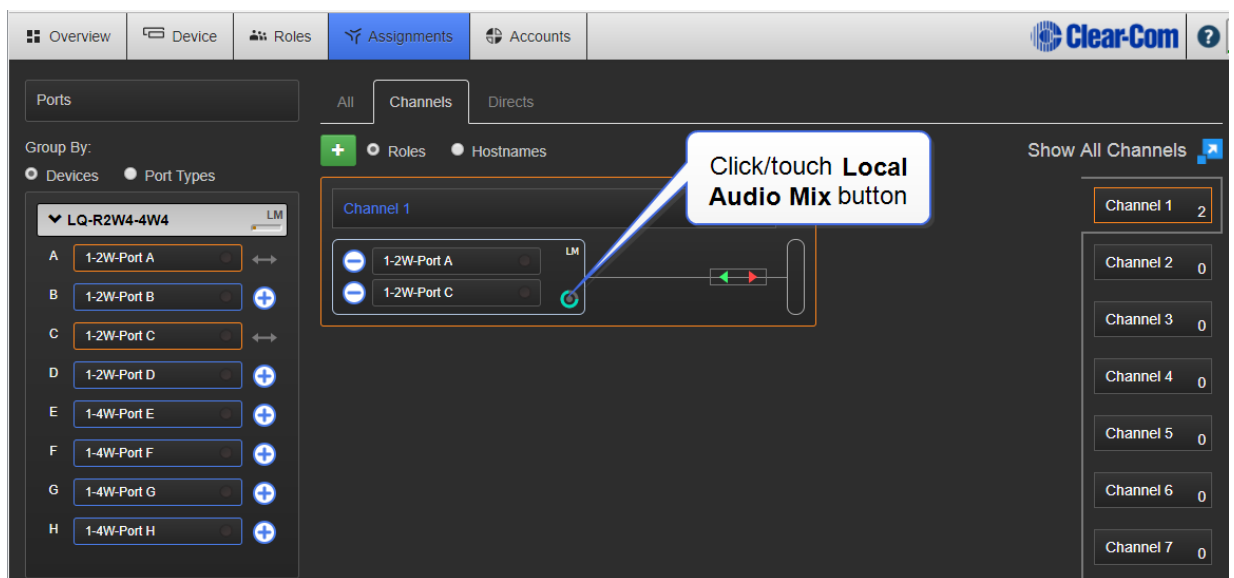
19.5.4 How Do I Change Network Quality Settings?

Network quality settings (the rate at which the LQ device transmits data to the network it is connected to) are set in the **Assignments** page of the Core Configuration Manager (CCM).

1. Go to the Assignments page of the LQ device (or any LQ device in a Link-Group, if you are using a Link-Group configuration).
2. Click on the Local Audio Mix (LAM) button within the currently selected Channel.
3. Click on the Network Quality setting.
4. Use the slider bar to adjust the setting (very low to very high, or Custom).

Suggested network settings:

- Low: Internet
- Balanced or High: WAN
- Very High: LAN



Local Audio Mix

Transport Settings

Silence Suppression : Disabled ⓘ

Network Quality:

Very Low Low Bal.. High Very High Custom

High

Transmit

Audio Bitrate: 64 Kbps

Audio Bandwidth: 12 kHz

Packet Size: 10 ms

Receive

Jitter (min-max): 5ms - 60ms

Unit latency: 25ms - 80ms

Click to adjust slider bar settings

19.6 Telephony Queries

19.6.1 How Do I Link An LQ Device to a Public Branch Exchange (PBX)?

You must first create extensions within your PBX. Refer to your PBX documentation for this. Make a note of the PBX **IP address** and the **User ID** and **Password** of the extensions you require to connect to the LQ device.

The PBX and the LQ unit must be connected to the same network and be able to see each other across the network.

Note: *The PBX and the LQ must not be configured to the IP range 172.23.xx.xx.*

1. Open the LQ CCM in a browser.
2. Navigate to the **Accounts** page and select the **SIP** button from the left side of the page.
3. Click '+' to begin to define the PBX. Follow the steps illustrated below.

The screenshot shows the 'Accounts' tab in the Clear-Com interface. The 'SIP Servers' section is active, showing settings for 'A CambsPBX'. The 'SIP Server Settings' form includes fields for Label, Registrar/Proxy IP/Hostname, Registrar/Proxy Port, and Domain. Below this is an 'Advanced' section with a SIP Transport Protocol dropdown. The 'Accounts' table below shows a list of accounts with columns for #, Label, User, Password, LQ Assignment, and Status. Callouts provide instructions: 1. Click '+' to add extension; 2. Click here to input the IP address of the PBX; 3. Click '+' to add extension; User must match an extension set up in the PBX exactly; Password must match an extension set up in the PBX exactly; Select LQ unit; Click blue check mark to connect; For labels, any meaningful name is possible; This indicates connection status. If connection is unsuccessful, click icon for information.

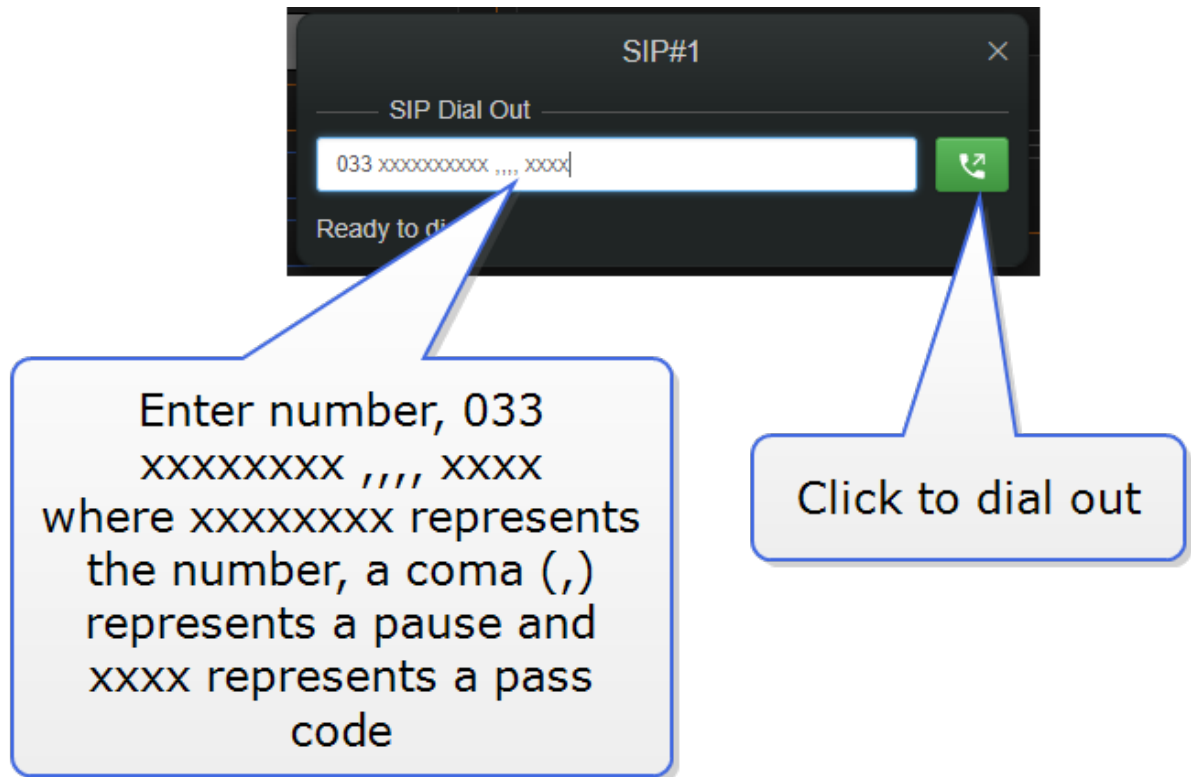
Note: The **Registrar/Proxy Port** and the **Domain** are controlled by the PBX admin. The Proxy Port usually defaults to 5060.

19.6.2 Can I Use DTMF Tones when Connecting to a Telephone Conference?

You can use DTMF dial tones when connecting to a telephone conference. The LQ SIP client can generate SIP information packets which a PBX can convert to DTMF tones. For example, a coma (,) represents a pause.

Navigate to **Assignments**

The screenshot displays the 'Assignments' page in the Clear-Com interface. The top navigation bar includes 'Overview', 'Device', 'Roles', 'Assignments', and 'Accounts'. The 'Assignments' tab is active. Below the navigation bar, there are tabs for 'All', 'Channels', and 'Directs'. The 'All' tab is selected. On the left, there is a 'Ports' section with a 'Group By' dropdown set to 'Device Index'. Two device groups are visible: 'LQ-2W2' and 'LQ-R2W4-4W4'. The 'LQ-2W2' group contains ports B (1-2W-Port B), A1 (IVC#1), A (RS-701), and A1 (SIP#1). The 'LQ-R2W4-4W4' group contains ports A (2-2W-Port A), B (2-2W-Port B), C (2-2W-Port C), D (2-2W-Port D), E (2-4W-Port E), and F (2-4W-Port F). In the center, a diagram for 'Channel 1' shows a connection between '1-2W-Port B' and 'SIP#1'. A callout box points to the 'SIP#1' port with the text 'Click here to make an outgoing call'. On the right, there is a list of channels from 'Channel 1' to 'Channel 8', with 'Channel 1' having a value of 2 and others having 0. A 'Show All Connections' button is located at the top right of the main area.



19.6.3 SIP Accounts - Log in to Your LQ System

Some third party SIP service providers (for example, RingCentral and Broadcom Inc.) require a User Authorization field when logging into an account in addition to the User and Password fields:

In this case, when you log into the account in the CCM, you will be required to input both User and User Authorization credentials into the **User** field separated by a # (no spaces):

Username#authorizationID

SIP Server Settings

Label : [SIP 1](#)

Registrar/Proxy IP/Hostname : [sip10.ringcentral.com](#)

Registrar/Proxy Port : [5090](#)

Domain : [sip.ringcentral.com](#)





Advanced


SIP Transport Protocol : UDP/TCP

SIP Transport Port : [5060](#) (requires reboot to take effect)

SIP Disconnect on server loss :

Accounts

#	Label	User	Password	LQ Assignment	Status	
	A1	330	XXXXX#XXXXX	xxxxxxx	LQ 4W#1 	 



20 Technical Specifications

20.1 System Limits and Capacities

The following system limits and capacities apply.

Entity	Maximum number that can be created in the CCM
Roles	100
Channels	24
Directs	24
Accounts (Agent-IC, SIP and IVC)	No limit

Entity	Maximum number that can be created in the Accounts page for a single LQ device
Agent-IC	No limit <i>Note:</i> Any number over eight will result in the user being logged into demo mode of the Agent-IC client.
SIP	8
IVC	8

20.2 Audio

2-wire LQ		4-wire LQ	
Frequency response	50 Hz - 10 kHz	Frequency response	100 Hz -20 kHz
Codec	OPUS	Codec	OPUS
Input/output gain	-3 to +3 dB	Input/output gain	-12 to +12 dB
Maximum input Clear-Com	0dBu (nominal -18dBu)	Input impedance	100K transformer isolated
Maximum input RTS	+6dBu (nominal -12 dBu)	Output impedance	120R transformer isolated

2-wire LQ		4-wire LQ	
Termination	200R selectable	Maximum output	+18dBu (nominal 0dBu)
On-Noise	<-70dBu	Noise	<-75dBu
Off-Noise	<-85dBu		
Call drive voltage Call sense voltage Clear-Com	>11V<4V	Call drive and sense	Clear-Com
Call drive voltage Call sense voltage RTS	-7dBu 20kHz-32dBu 20kHz		
RMK (Remote microphone kill)	Clear-Com and RTS		

20.3 Pinouts

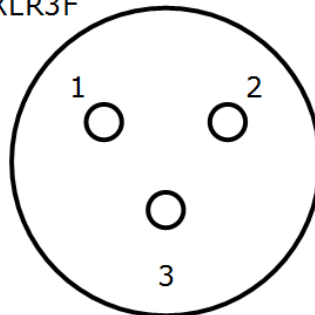
2-wire pinouts.

- Clear-Com

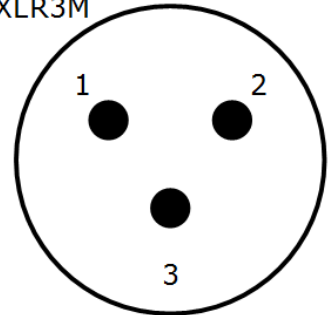
Clear-Com 2-wire XLR pin-out

1. Ground
2. DC power (30V)
3. Duplex audio

XLR3F



XLR3M

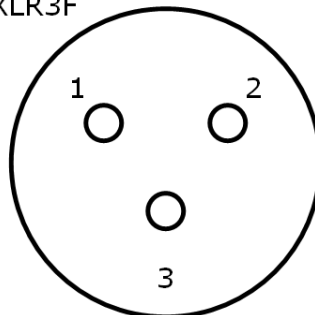


- RTS

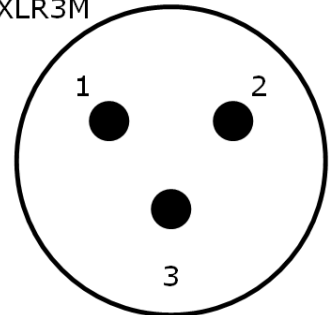
RTS TW 2-wire XLR pin-out

1. Ground
2. DC power (30V)
Duplex audio 1
3. Duplex audio 2

XLR3F



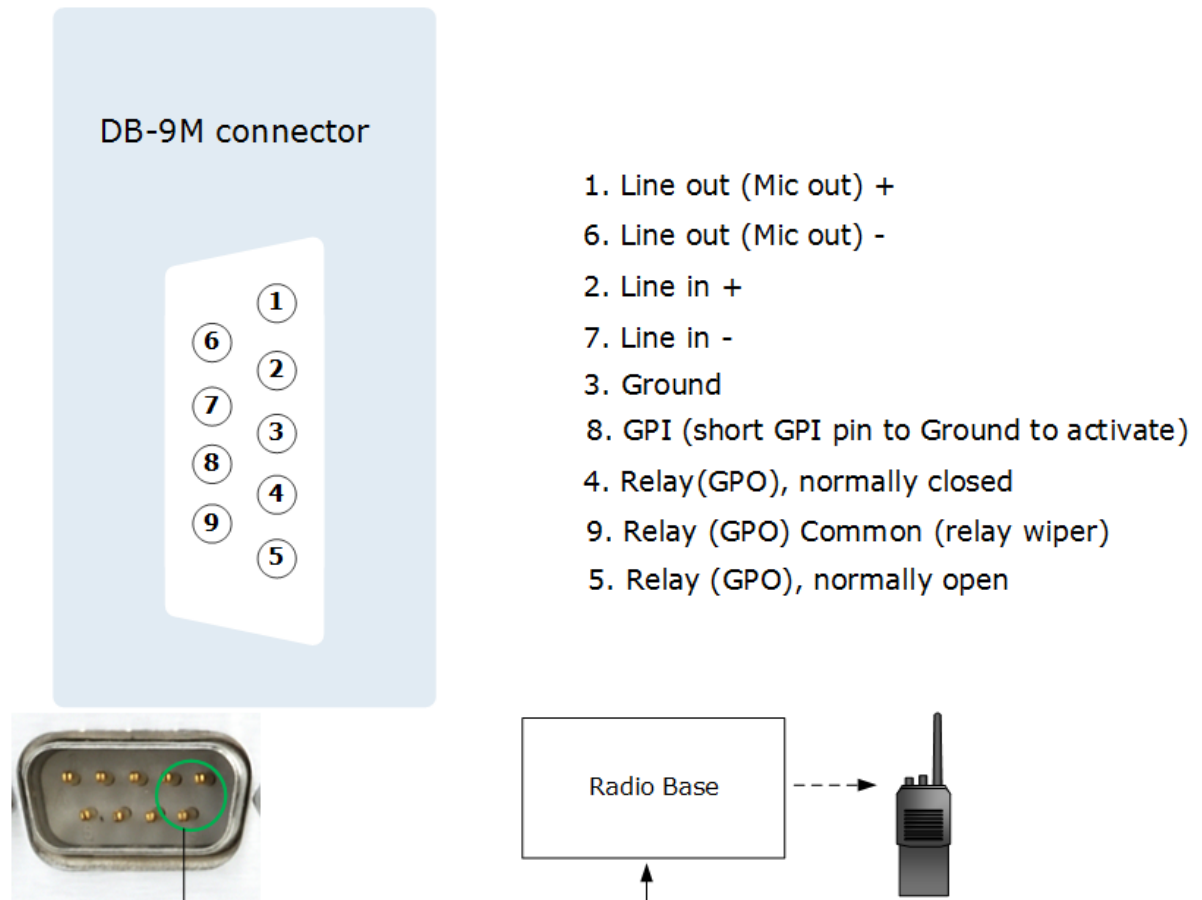
XLR3M



20.4 4-wire pinouts

Pin	To panel	To matrix
Pin 1	RS-422 input + (into matrix)	RS-422 output + (from panel)
Pin 2	RS-422 input - (into matrix)	RS-422 output - (from panel)
Pin 3	Audio input + (into matrix)	Audio output + (from panel)
Pin 4	Audio output + (from matrix)	Audio input + (into panel)
Pin 5	Audio output - (from matrix)	Audio input - (into panel)
Pin 6	Audio input - (into matrix)	Audio output - (from panel)
Pin 7	RS-422 output + (from matrix)	RS-422 input + (into panel)
Pin 8	RS-422 output - (from matrix)	RS-422 input - (into panel)

4-wire GPIO pinouts



4-wire GPIO specifications	
Relay contact type	SPDT
Relay contact voltage rating	60V
Relay contact current rating	2V
Input type	Close contact to ground
Input voltage range	0-12V
Input current	1mA
Input DC isolation	No isolation due to contact to ground

Caution: Shielded Cable Requirement

Shielded Cable is required for ALL LQ SERIES GPIO Port connectivity. Shielded Cable must be used to assure compliance with domestic and international emissions standards. Customers, Installers and or qualified Personnel failing to use shielded cables may cause radio interference in which case the user may be required to take adequate measures.

20.5 Partyline Output Current (2-Wire)

Line voltage (selectable)	
LQ: PoE	26V 70mA max
LQ: DC power connector (12V PSU)	26V 150mA max
LQ-R: DC power connector (12V PSU)	26V 250mA max

Note: LQ units will draw up to 12 watts for a Partyline (depending on how many devices are connected to the line).

20.6 Network Quality Settings

Default option is in **bold**

Bitrates	16, 32, 48, 64 , 128 kbps
Packet size	5, 10 , 20, 40ms, 60ms
Jitter buffer	200 – 1000ms, 100 – 500ms, 60 – 200ms, 40 - 100ms, 20 – 60ms, 5 – 60ms , 0 –

	60ms

20.7 Connectors

LQ Throw Down Units		
2-wire (LQ-2W2)	4-wire (LQ-4W2)	4-wire + GPIO (LQ-4WG2)
2 x etherCON (F) : network 2 x 3 pin XLR-F: audio	4 x etherCON (F): 2 for network, 2 for audio	2 x etherCON (F) : network 2 x DB-9M + GPIO

LQ Rack Units				
2-wire (LQ-R2W4)	4-wire (LQ-R4W8)	Combined (LQ-R2W4-4W4)	4-wire + GPIO (LQ-R4WG8)	Combined GPIO (LQ-R2W4+4WG4)
2 x etherCON (F) : network 4 x 3 pin XLR-F4 x 3 pin XLR-M	2 x etherCON (F) : network 8 x etherCON RJ45 F	2 x etherCON (F) : network 4 x etherCON RJ45 F4 x 3-pin XLR-F	2 x etherCON (F) : network 8 x DB-9M + GPIO	2 x etherCON (F) : network 4 x 3-pin XLR-F4 x DB-9M + GPIO

20.8 Power Supply

LQ-R Rack Units	LQ Throw Down Unit
Input: 100-240V, 47-63Hz, 0.58A max Output: DC 12V, 2A, 60W max	Input: 100-240V, 47-63Hz, 0.58A max Output: DC 12V, 2A, 24W max
2 x Plug-in adapter with sleeve locking connector US, UK, Europe, AUS and China sockets included	1 x Plug-in adapter with sleeve locking connector US, UK, Europe, AUS and China sockets included

20.9 Environmental

Environmental variable	Measurement
Operating temperature	32 - 104°F (0 - 40°C)
Storage temperature	-67 - 158°F (-55 - 70°C)
Humidity	90% non-condensing

20.10 Dimensions and Weight

	LQ Throw Down Unit	LQ-R Rack Unit
Dimensions	6.8w x 1.79h x 8.45d inches (173 x 46 x 215 mm)	19w x 1.79h x 8.8d inches (484 x 46 x 224 mm)
Weight	1.83lbs (.83kg)	4.29lbs (1.95kg)

Terminology/Glossary

4-wire direct	A 4-wire connection is characterized by two pairs of twisted copper wire which transmit in opposite directions. A 4-wire circuit gives a full-duplex interface which is often used to connect to third party devices. When used with the LQ Series, a 4-wire direct connection (as opposed to a channel) provides point-to-point and panel connections over IP. The 4-wire direct interface will pass panel data as well as audio. 2-wire connections are inactive in the 4-wire direct tab of the Assignments page in the CCM and cannot be used in this context.
CCM	Core Configuration Manager. This is the browser-based configuration tool that each LQ device is supplied with. It can be accessed by entering the IP address of your device (shown on the device front panel) into the address field of a Web browser.
Channel	In the context of the LQ product, a Channel represents a conduit or holder for routing audio and data (including GPIO triggers) through your intercom system. As well as routing audio, a Channel also connects audio and data sources. To use Channels, connect audio to the port connectors on the device, and assign the port or ports to one or more Channels. LQ uses two different types of Channel; a regular Channel and a 4-wire direct Channel. A regular Channel operates like virtual party or conference line. It comprises audio from multiple audio interfaces on the devices (ports A-F) that have been assigned to it. Within a regular Channel, all parties can hear and speak to each other. A 4-wire direct Channel is made up of only two audio sources in a one-to-one connection.
Networked Control Events	Network Control Events are settings on a port that allow GPIO signals and controls to be passed through your intercom system. GPIO signals are converted to digital signals and then passed across the IP infrastructure (as with a 2-wire call signal). There are three Network Control Events to choose from: 1, 2 and Call. See What are Networked Control Events and How Do I Use Them? on page 92 for more information.
Host device	The LQ device whose browser-based configuration tool (CCM) your browser is currently directed to.
Linking	The act of joining multiple LQ devices together in one group.
Link-Group	A set of devices linked together forming their own isolated network.

Link-Master	Role of a device within a Link-Group that provides central reachability within the group as well as ownership of both configuration and distribution of information.
Link-Member	Role of a device within a Link-Group that shares client privileges within the group.
Partyline	In a Partyline, all the participants on the line are involved in the same conversation, and they can hear and talk to all members. In some contexts a Partyline is known as a conference line. Partylines can be 2-wire or 4-wire.
Proxy device	A device within a Link-Group that can be configured via the browser-based configuration tool (CCM) of another unit in the group.
Virtual Partyline	A virtual Partyline is a digital audio channel that is made up of several different audio sources. In terms of audio, a virtual Partyline behaves in the same way as a Partyline; all participants can hear and talk to each other.

22 Compliance

Regulatory Models: LQC and LQ-R

Manufacturer: Clear-Com LLC, 1301 Marina Village Parkway, Suite 105, Alameda Ca., 94501

Brand: Clear-Com

Product name: LQ Series

Country of Origin: USA

FCC notice

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

Note: *This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communication. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.*

Warning:

Changes or modifications not expressly approved by Clear-Com, LLC, an HM Electronics, Inc. company could void the user's authority to operate this equipment.

Note: *This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.*

Industry Canada Compliance Statement

This Class[A] digital device complies with Canadian ICES-003.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la class[A] est conforme à la norme NMB-003 du Canada.

Korean KC EMC Registration

For Class A Equipment

이 기기는 업무용(A급) 전자파 적합기기로서 판매자 또는 사용자는 이 점을 주의하시길 바라며, 가정 외의 지역에서 사용하는 것을 목적으로

Australia and New Zealand

This product has been tested and found compliant with applicable AS/NZS Standards Australia
RCM Marking:

New Zealand R-NZ Marking if applicable: R-NZ

European Union

Directives:

EMC Directive 2014/30/EU

Low Voltage Directive 2014/35/EU

RoHS Directive 2011/65/EU

Standards:

EN55022

EN55024

EN55032

EN/IEC60950-1

Waste Electrical and Electronic Equipment (WEEE)

The European Union (EU) WEEE Directive (2012/19/EU) places an obligation on producers (manufacturers, distributors and/or retailers) to take-back electronic products at the end of their useful life. The WEEE Directive covers most Clear-Com products being sold into the EU as of August 13, 2005. Manufacturers, distributors and retailers are obliged to finance the costs of recovery from municipal collection points, reuse, and recycling of specified percentages per the WEEE requirements.

Instructions for Disposal of WEEE by Users in the European Union

The symbol shown below is on the product or on its packaging which indicates that this product was put on the market after August 13, 2005 and must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of the user's waste equipment by handing it over to a designated collection point for the recycling of WEEE. The separate collection and recycling of waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local authority, your household waste disposal service or the seller from whom you purchased the product.

