User Guide

FreeSpeak Edge™ User Guide

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Clear-Com
AN HME COMPANY

Document reference

FreeSpeak Edge™ User Guide

399G304 Rev A

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1 Important Safety instructions

The following safety instructions apply:

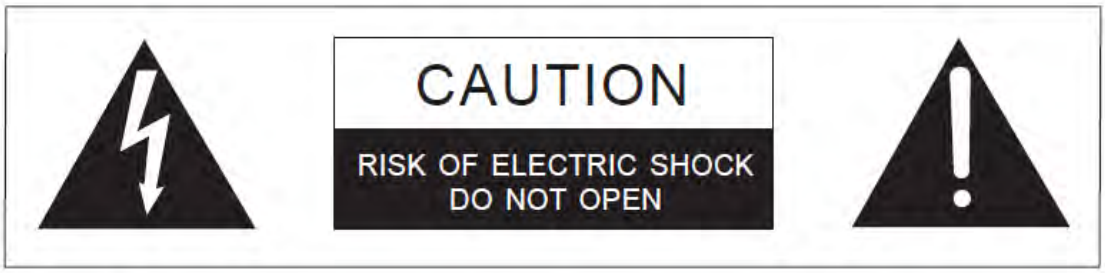
- Read these instructions.
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water.
- Clean only with dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
- Do not install near any heat 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.
- Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
- 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 or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
- Use only chargers provided by HME/Clear-Com to charge the battery packs or beltpacks:
    - BAT80 Battery pack and beltpack charger manufactured by HME/Clear-Com
    - The beltpack can also be charged using a USB cable; USB C, 2.5A, 5V

- This product uses Lithium Ion Batteries which can be a fire hazard, if used improperly. Use only HME/Clear-Com supplied BAT80 or equivalent battery packs to ensure safe operation of the beltpack.
- When using AA Batteries follow all safety instructions from manufacturer. Do not mix different battery chemistries. When depleted, replace all batteries.
- The in-beltpack USB charging feature has only been tested utilizing USB2.0 port.

Warning: To reduce the risk of fire or electric shock, do not expose this product to rain or moisture.

1.1 Safety symbols

Familiarize yourself with the safety symbols. These symbols are displayed on the apparatus and warn you of the potential danger of electric shock if the system is used improperly.



This symbol alerts you to the presence of uninsulated dangerous voltage within the product's enclosure that might be of sufficient magnitude to constitute a risk of electric shock. Do not open the product's case.

This symbol informs you that important operating and maintenance instructions are included in the literature accompanying this product.

Note: *For compliance notices, see* ***Regulatory compliance****.*

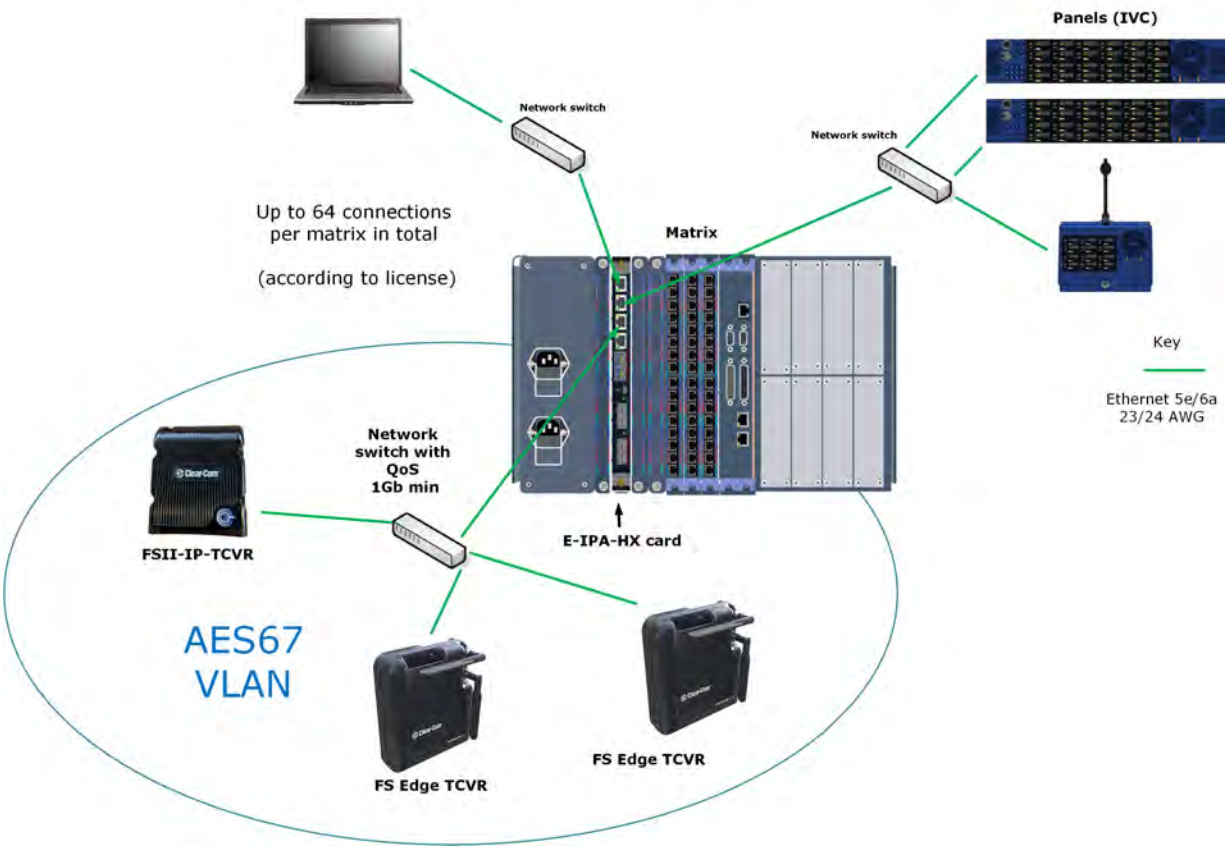
2 Introduction to FreeSpeak Edge™

FreeSpeak Edge™ is a member of Clear-Com's FreeSpeak™ family of digital wireless intercom solutions. It uses the 5 GHz radio frequency range.

The FreeSpeak Edge system includes full duplex multi-channel wireless beltpacks and transceivers for use in a matrix with Clear-Com's SMPTE 2110-30/AES67 compatible IP audio card, the E-IPA-HX.

FreeSpeak Edge uses encryption (AES256) between beltpack and transceiver for security.

Example set up: FreeSpeak Edge to E-IPA-HX card



2.1 FreeSpeak Edge 5 GHz

The 5 Ghz radio frequency range offers a number of advantages to intercom users:

- A clear, full audio quality with a very low noise floor and latency (Opus codec @ 12 Khz)
- Behaves well in venues or stadiums where RF multipath is an issue
- A wide range of channels, providing lots of room for users to exist without interfering with each other

2.2 System capacity

FreeSpeak Edge supports up to a maximum 64 beltpacks and 64 transceivers per E-IPA card.

Each FreeSpeak Edge transceiver supports 10 beltpacks within one coverage zone.

The technology within FreeSpeak permits the beltpack user to go between coverage zones created by different transceivers, and for the system to hand over the communication from one transceiver to the next. Thus, a larger, customizable communications area may be designed.

3 Installing FreeSpeak Edge

To install the FreeSpeak Edge system use the following general guidelines (overview). In the first instance you will need:

- An RF scan of the local area. You can scan the local area using the beltpack Channel Scanning mode. Use this to find out which channels have the least existing RF traffic and will therefore provide the best environment for reliable audio transmission.
- For a substantial installation, you need a site survey to determine the best placing of your transceivers (see *FreeSpeak Edge RF Configuration Guide* for detailed information). You will use the transceivers in Standalone mode for an initial assessment of radio coverage in any given area.
- A network infrastructure that can support an AES67 network (See *Clear-Com AES67 Network Recommendations* for detailed information).

Then you will need to:

- Install transceivers according to the site survey findings
- Configure the E-IPA card
- Create beltpack roles. A role is an audio configuration for your beltpack, defined in the configuration software. Then go to Panels in the EHX software and populate the keysets.
- Cable transceivers to your network
- Discover transceivers on the network and connect them to the matrix. Discover the transceivers using the **Transceivers** page in EHX and click on the blue **Detect IP TCVR** button . After you tick the check box on the selected transceiver(s), then click the up-arrow to bring the newly discovered transceivers into the upper box in that window. When all the new transceivers are in the upper window, click on the DONE button on the bottom of that window. Then **Apply Map to Matrix**.
- Register the beltpacks to a matrix
- Connect the beltpacks to your matrix. You will select a role from the EHX software on connection

Once you have completed these steps you will be ready to start using your beltpacks.

Note: *EHX v. 12 or above.*

3.1 Installing the FreeSpeak Edge transceiver

The Edge transceiver can be mounted on a wall or on a microphone stand. It also has a lanyard hole for convenient hanging. The transceiver will transmit audio in any position but it must be

fixed in an upright position in order for the cooling mechanism to work properly.

Note: *This unit MUST have a 4-inch clearance above and below to allow for safe operating conditions.*

Note: *This unit MUST NOT be installed above other heat sources because this will reduce the performance.*

Wall Mounting

The transceiver can be attached to the wall mounting plate with a simple push and downward press movement (lift and pull to remove).

The wall mounting plate has a variety of fixing options. Chose the method that is most suited to the surface you are fixing the device to. The wall mounting plate contains four mounting holes for size # 6 wood screws.

Microphone/camera stand mounting

The transceiver has two possible microphone stand connectors on the bottom of the device (3/8 and 5/8 inch). It also has a spigot socket (5/8 inch).

Orientation and height of the Edge transceiver

The Edge transceiver will transmit audio at any orientation. However, in order to achieve optimum environmental performance (temperature and water resistance) it must be fixed in an upright position. Please refer to the chart below for details.

Orientation of unit	Environmental performance
Upright	• Up to 50°c (with 4 inch clearance above and below plus no heat sources below) • IP rating 55 (to be confirmed)
Upside down	• Up to 50°c (with 4 inch clearance above and below plus no heat sources below) • IP rating not guaranteed
On its side	• Up to 32°c • No IP rating

Note: *For best performance the transceiver should be positioned 6 - 8 feet (1.8 - 2.4 m) above the floor and 2 feet (0.6 m) below the ceiling.*

3.2 Clear-Com cable recommendations

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

Specification	Description
Category (Cat)	• 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 1GB. Cat 6; up to 10GB. • Use Cat 5e or higher.
American Wire Gauge (AWG)	• 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.

3.3 Daisy-chain transceivers

IP transceivers can be daisy-chained (connected together using Ethernet or Fiber cable). This extends the distance your transceivers can be from a network switch. Up to 3 devices can be connected. The first can run on Power over Ethernet (PoE), the second two must have local power.

There is only one Ethernet and one Fiber connector on each transceiver, so daisy-chaining will always involve mixing cable types.

3.4 Installing and removing an E-IPA-HX card

To install an E-IPA-HX card:

1. Carefully place the card in the appropriate slot. Make sure the card is aligned with the top and bottom precision guides.
2. Push the card toward the backplane connectors.
3. When the card has almost reached the backplane connectors, open the two ejector tabs, allowing them to clear the edges of the matrix. Gently insert the card further until it touches the backplane connector guides.
4. Gently close both ejector tabs at the same time, to propel the card into the backplane connectors.

3.4.1 To remove an E-IPA-HX card from the matrix

1. Hold the card in place in the matrix.
2. The two card ejector tabs are located at the top and bottom of the card. To remove a card, open the two ejector tabs at the same time until the card unseats from its backplane connectors.
3. Pull the card out of the matrix.

Note: *As with all Eclipse Cards, the front card is hot-swappable, but the backplane card connector is not. When putting the cards back onto a matrix, as well as when you remove it, the frame's power must be turned off.*

3.5 Adding an E-IPA-HX card to the software

To add and E-IPA-HX card to the software:

1. In the EHX configuration software go to: **Hardware > Cards and Ports**, and then navigate to an available slot number (marked **Empty**). Do either of the following:
   a. Double click the slot.
   b. Right click the slot and select Set Card Type.
2. Select a card type from the drop-down menu listing the available card types.

Note: *You cannot have both E-IPA-HX cards and E-Que card on the same matrix.*

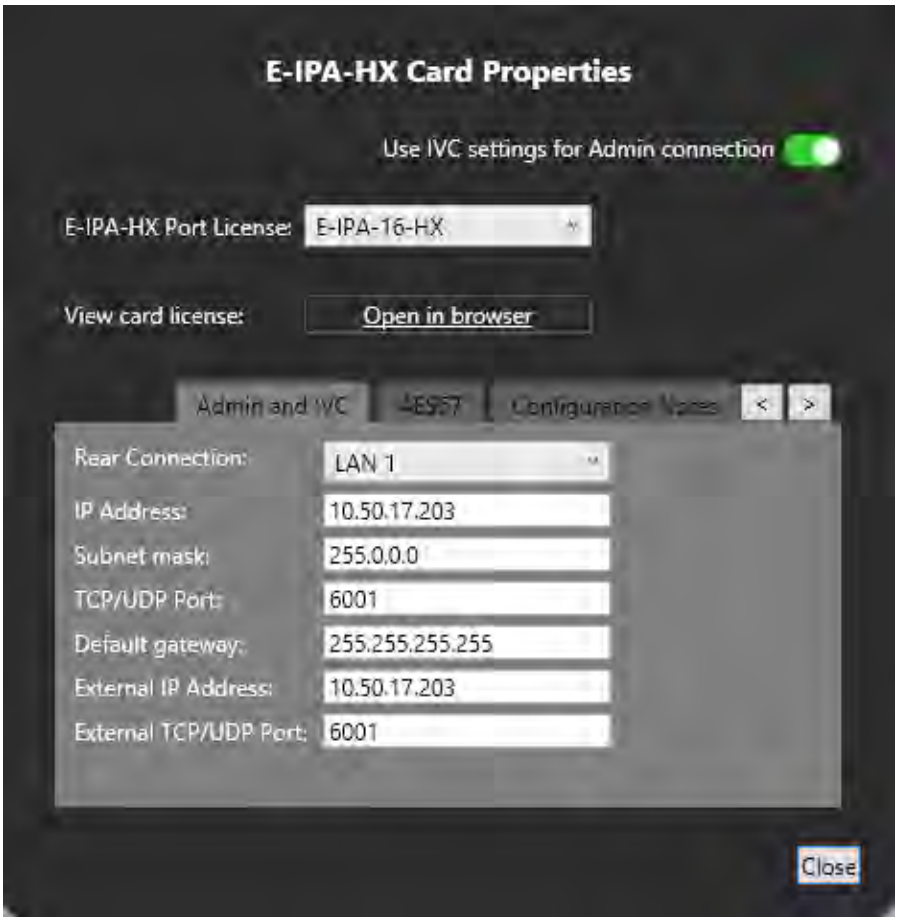
3.6 Configuring the E-IPA-HX card for FreeSpeak Edge

Note: *For use with FreeSpeak Edge you must have EHX v. 12 or above.*

Note: *For more information about using the EHX configuration software to setup and configure the IP transceiver, see the EHX Configuration Software User Guide.*

3.6.1 Set card properties

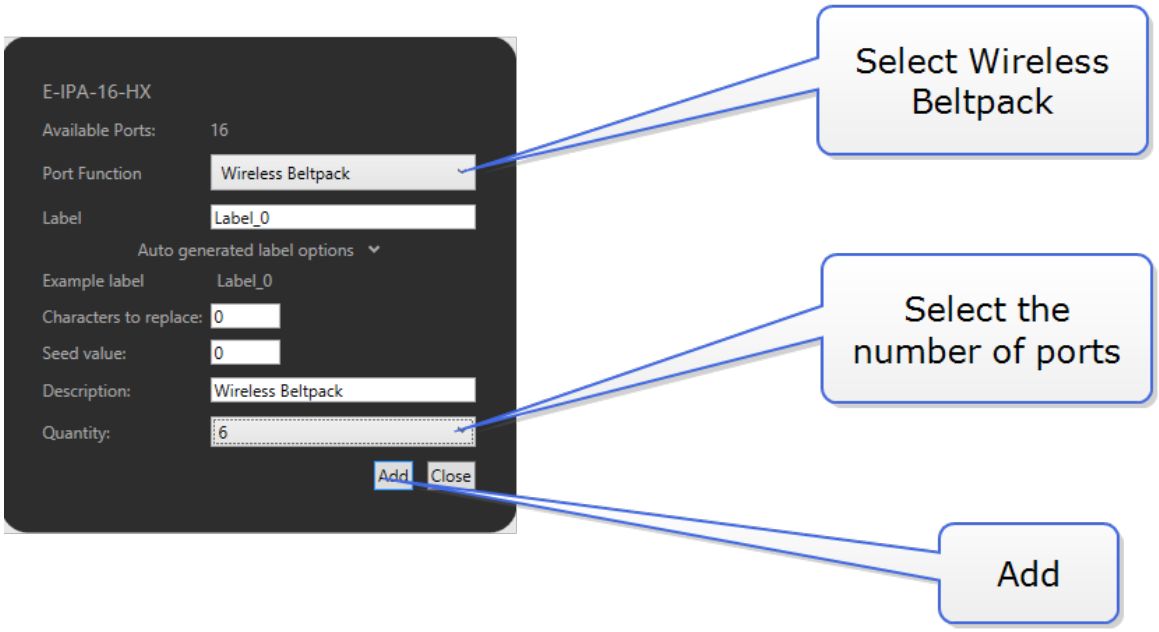
Configure the network settings in Card Properties. Navigate to **EHX>Matrix>Configuration>Hardware>Cards and Ports**. Select the E-IPA card by clicking on it then right click to access **Card Properties**.



3.6.2 Add beltpacks

When using FreeSpeak Edge on E-IPA-HX , each beltpack takes up a matrix port. Select the number of beltpacks you require.

1. Navigate to Cards and Ports and select the E-IPA-HX Card slot.
2. Click **+Port**. The following screen appears.



Note: *If you are adding more than one port, you can enter values in the **Characters to Replace** and **Seed value** fields to automatically generate labels. For example if you enter **Label 0** in the **Label** field, and then enter **0** in the **Characters to replace** and **Seed value** fields, this will automatically generate labels called Label 1, Label 2, Label 3 up to the specified number of labels.*

3. Click **Add** to add the ports, and then **Close** to exit the screen.

Note: *The ports that are allocated to beltpacks can be thought of as a pool of ports that can be used by any FreeSpeak beltpack. You only need to allocate for the number of beltpacks you intend to have connected to the system at any one time. No allocation for spare beltpacks is needed.*

When at least one beltpack has been allocated to the card, you will see a **Beltpacks** button appears under **Hardware**. Click this button to configure beltpacks in the usual way. (Registration and Roles).

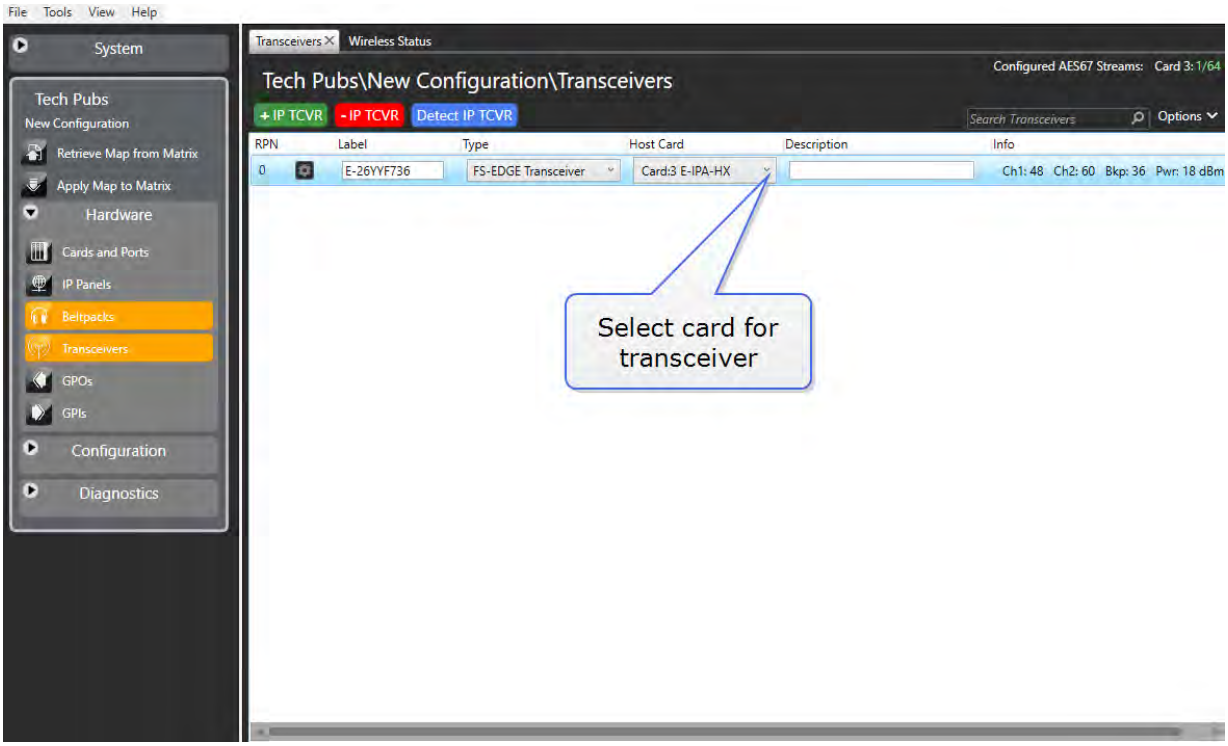
3.7 Beltpack roaming between E-IPA-HX cards

FreeSpeak beltpacks (FS II and FS Edge) cannot roam reliably between E-IPA cards. If they do you will lose audio. Therefore, if you have more than one E-IPA card, you must configure IP

transceivers of the same type on one card. This eliminates the possibility of beltpacks roaming between cards.

When using a single E-IPA card, FS II and FS Edge transceivers can co-exist on the same card (up to 64 transceivers on one card).

Transceivers can be allocated to particular E-IPA cards in the EHX software. See image below.



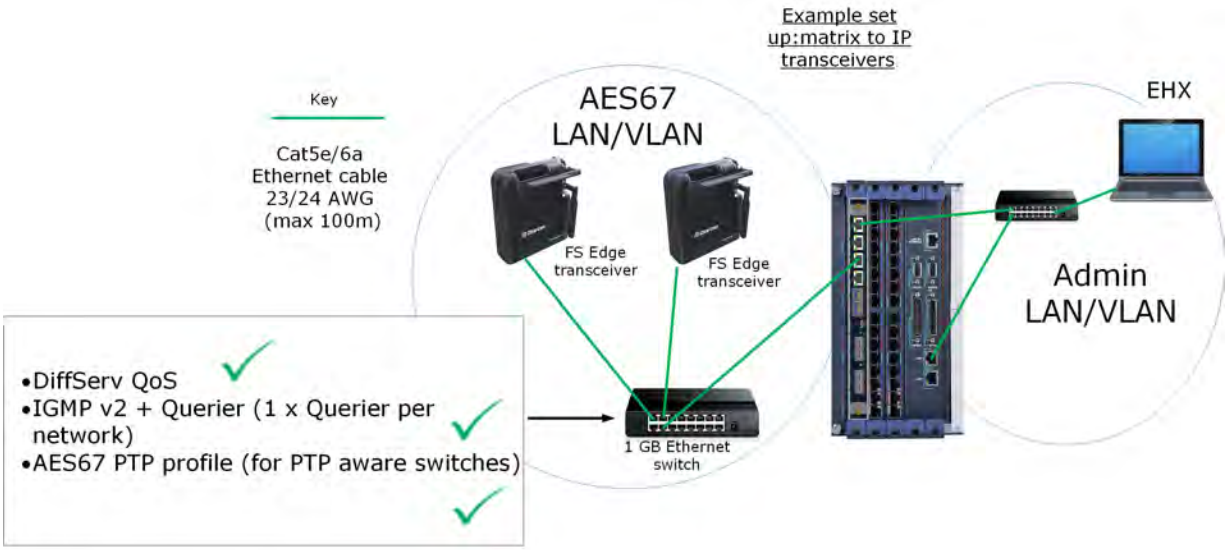
3.8 Connecting the FreeSpeak Edge transceivers to a matrix

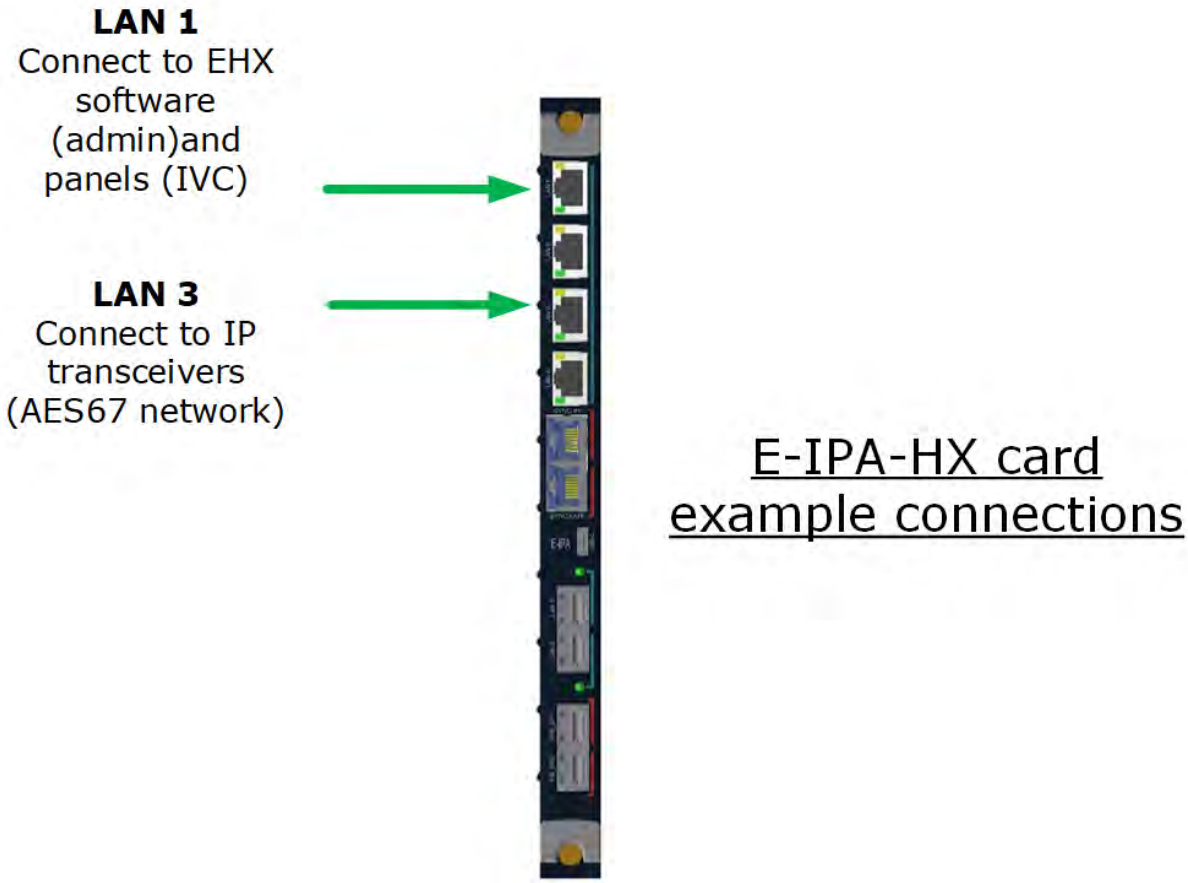
The FS Edge transceiver connects to an E-IPA-HX card in an Eclipse HX Digital Matrix.

You can connect transceivers to one of the LAN ports (LAN 1 - 6) on the E-IPA card. The default connection for an AES67 network (IP transceivers) is LAN 3. For a fiber connection, connect the IPT to LAN 5 or 6.

Warning: Do not connect more than one cable from the E-IPA card to the same LAN/VLAN. This may lead to a broadcast storm and could seriously degrade the performance of your network.

- Transceivers cannot be added to the matrix until at least one beltpack is configured in the EHX software.
- Each E-IPA-HX card can connect to up to 64 IP transceivers (FreeSpeak II or FreeSpeak Edge). Each transceiver can connect up to 10 beltpacks.
- The total number of beltpacks depends on your E-IPA-HX card license.





Recommendation:

- The IP transceivers have a higher than average requirement for network timing accuracy. For this reason it is advisable to use different VLANs to route Admin/IVC traffic and AES67 IPT traffic.

Rule:

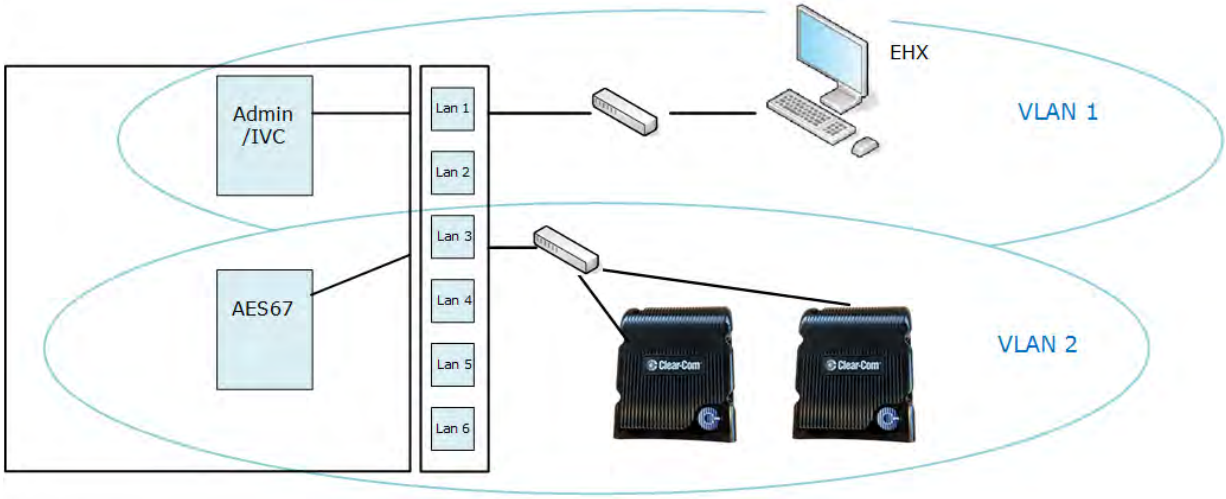
- If you separate Admin and IVC traffic then they must be on different VLANs.

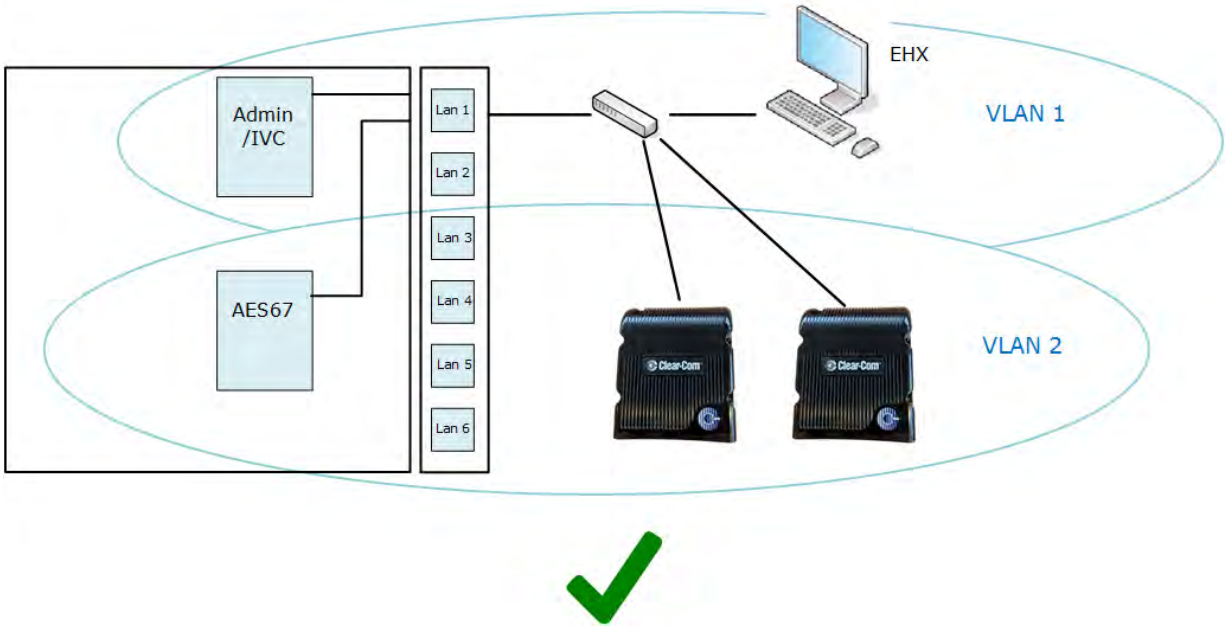
Note: *The bandwidth usage per Edge transceiver is ~9.6 Mbps.*

Warning: If you change the IP address of the AES67 ports (transceiver or E-IPA matrix card), the devices will reset automatically. Reset can take up to five minutes..

When connecting the E-IPA-HX card to the Edge transceiver over your network certain scenarios will work while others do not. This is down to the way the E-IPA card routes audio and data between ports and processors.

Example set ups:





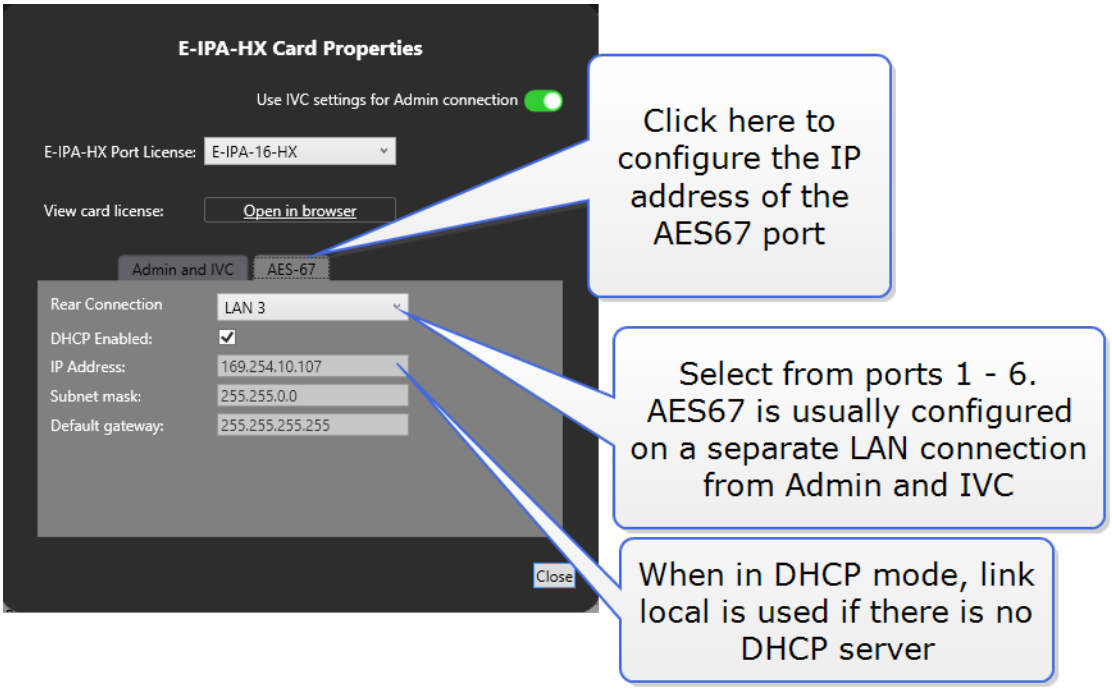
3.8.1 Network setup for the FreeSpeak II and FreeSpeak Edge transceivers

Bear in mind the following network considerations. For more information, refer to the Clear-Com network recommendations document.

- Clear-Com recommends that AES67 traffic has its own dedicated network or VLAN.
- If there is no DHCP server, AES67 connections will use the link-local range of IP addresses (169.254.XXX.XXX).
- When configuring an AES67 network, the network switch needs to have DiffServ Quality of Service (QoS) switched on.
- Internet Group Management Protocol (IGMP) snooping needs to be switched on, with at least one IGMP querier.
- The network must be 1Gbps. A 100Mbps network will not support the amount traffic the card can generate, and will not deliver the required PTP accuracy.
- The Multicast enabled switch must be ON.
- Try to keep the number of layer 2 hops between PTP master and slave (for example, IP Transceiver) as low as possible (no more than three). If there are more than three, you require switches that support PTP. You may also have to use transparent or boundary clocks.
- Use DHCP (the default setting) for fast and easy setup of the devices. If no DHCP server is present, IPTs will self-assign an IP address in the link-local IP range.

The screen below shows the E-IPA-HX card properties screen.

Note: *If you need to use static IP addressing for your transceivers, see Static configuration in this document.*



3.8.2 Cabling the FreeSpeak Edge TCVR

Run Ethernet cable from one of the LAN connectors on the E-IPA card (default AES67 connector = LAN 3) to the FS Edge TCVR via a properly configured IP network port.

3.9 Adding transceivers to the matrix

When at least one beltpack has been allocated to the card, you will see a **Transceivers** button appear under **Hardware**. Click this button to add and remove IP transceivers.

Two methods can be used for adding transceivers;

1. Online configuration (the Discovery method)
2. Offline configuration

Once connected, you can allocate static IP addresses to the transceiver if you wish.

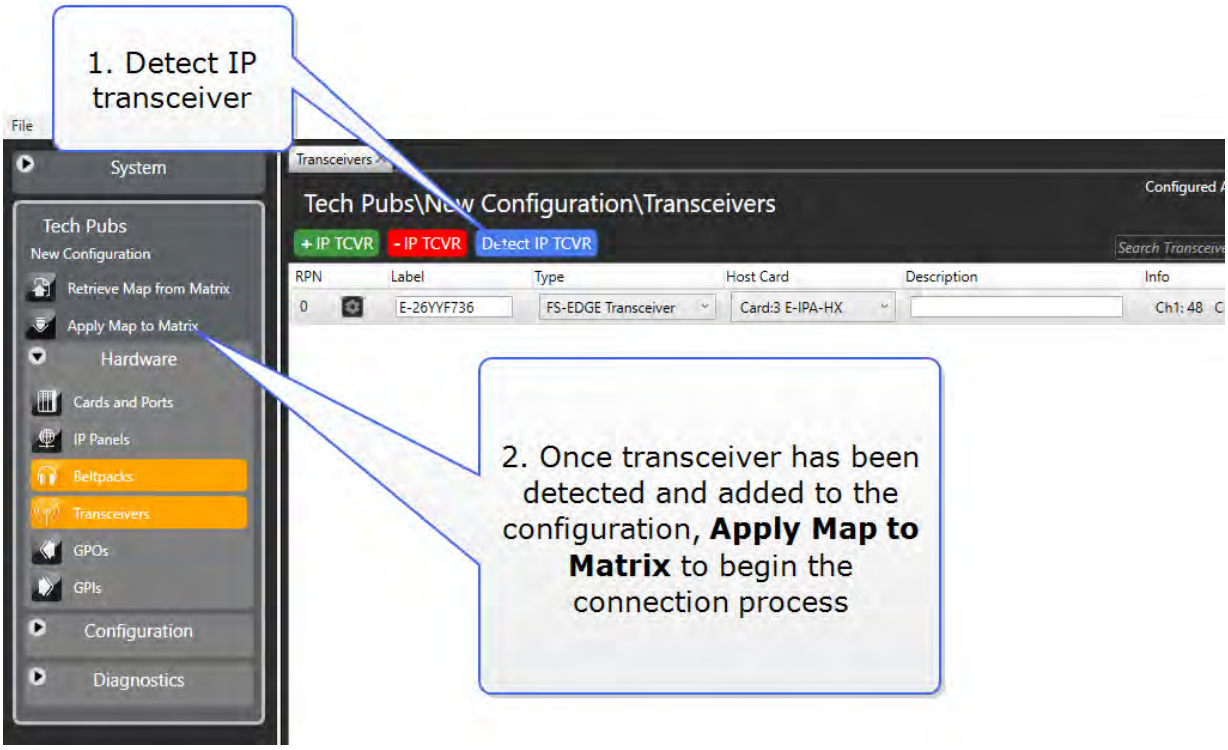
3.9.1 Online configuration (the Discovery method)

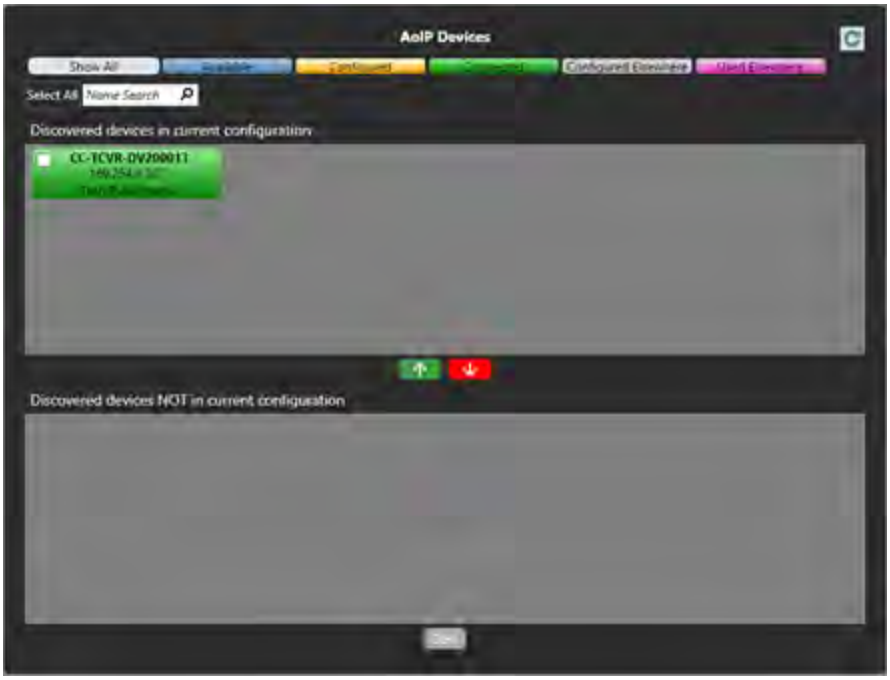
Use **Detect IP TCVR** to find the transceivers on the network. The AES67 interface of the E-IPA-HX card and the transceivers must be on the same network. The EHX software must be on the same network as the E-IPA Admin port.

By default, the E-IPA-HX and the Edge transceiver are in DHCP mode.

Note: *The Detect IP TCVR feature works if the matrix and the transceivers are not on the same subnet. However, for audio connection between the transceiver and the card, the devices must be on the same subnet.*

Note: *If you reset a transceiver to default settings, the device reverts to DHCP. To reset the transceiver, press and hold the* ***Mode*** *button on the transceiver base until the status light turns red (approximately 12 seconds).*





The color of the detected transceiver indicates	
Blue	Transceiver is available and ready for use
Amber	Transceiver is configured, but not connected to the matrix. A download is required
Green	Transceiver is connected to the matrix
Gray	Transceiver is connected to another matrix, but it is not online
Purple	Transceiver is already connected to another matrix

From the AoIP Devices screen, use the up and down arrows to add or remove matrices from your current configuration. **Apply Map to Matrix** when you are done. This begins the connection process of the transceiver to the matrix.

Note: *The connection process will take up to 5 minutes.*

The status LEDs on the transceiver indicate stages of the connection process:

Status Indicator 1	
White flashing	No IP connection to the matrix (30 secs)
Purple flashing	IPT connected, no PTP lock (up to 3 min)
Amber flashing	PTP locked, no RF sync (1 minute)
Solid amber	Transceiver is online and ready for beltpack connection

3.9.2 Offline configuration

In most cases, you will configure your transceivers by using the 'Detect IP TCVR' function, which is the preferred method of operation. There is, however, an offline method that allows you to add the transceivers before connecting to the network (offline configuration).

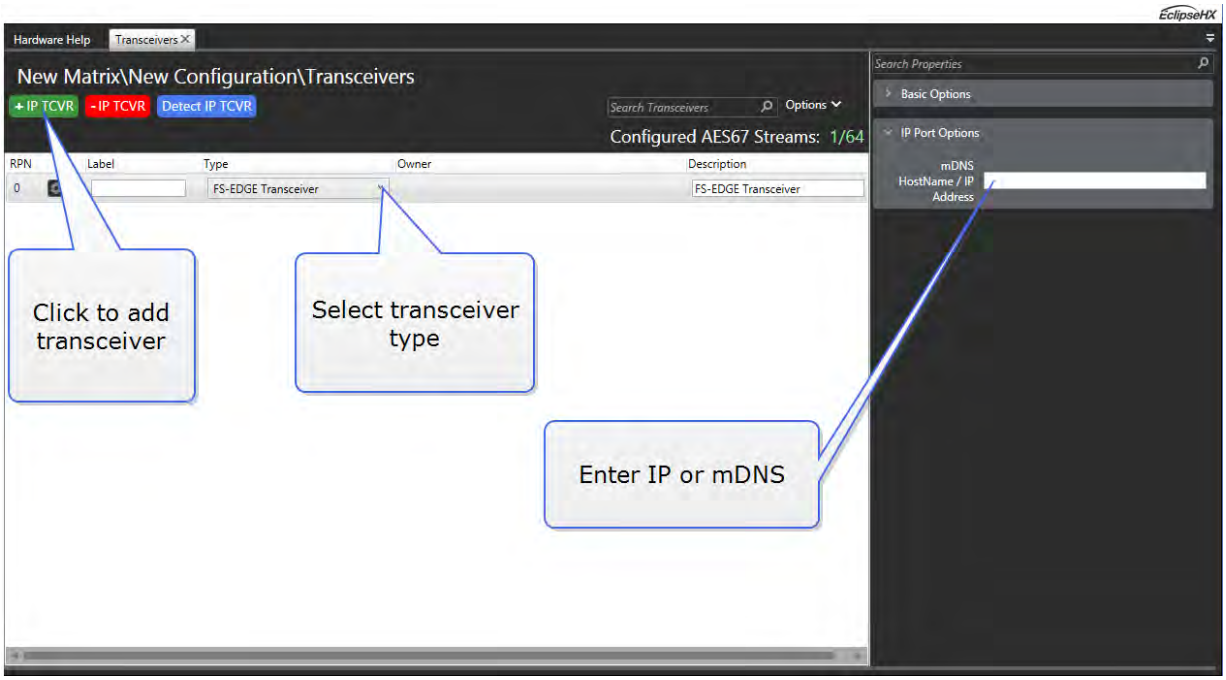
Use the **+ IP TCVR** button to add transceivers to your configuration offline. For an Edge transceiver you must select **FS-Edge Transceiver** from the **Type** dropdown list.

To connect the matrix and the transceiver, input the transceiver mDNS Hostname or IP address into transceiver **Properties** and click **Apply Map to Matrix**.

Note: *The mDNS Hostname is on the label on the back of the Transceiver.*

Note: *Using mDNS hostname means that even if the IP Address is changed, the matrix will automatically re-connect with the new IP without an Apply Changes being required.*

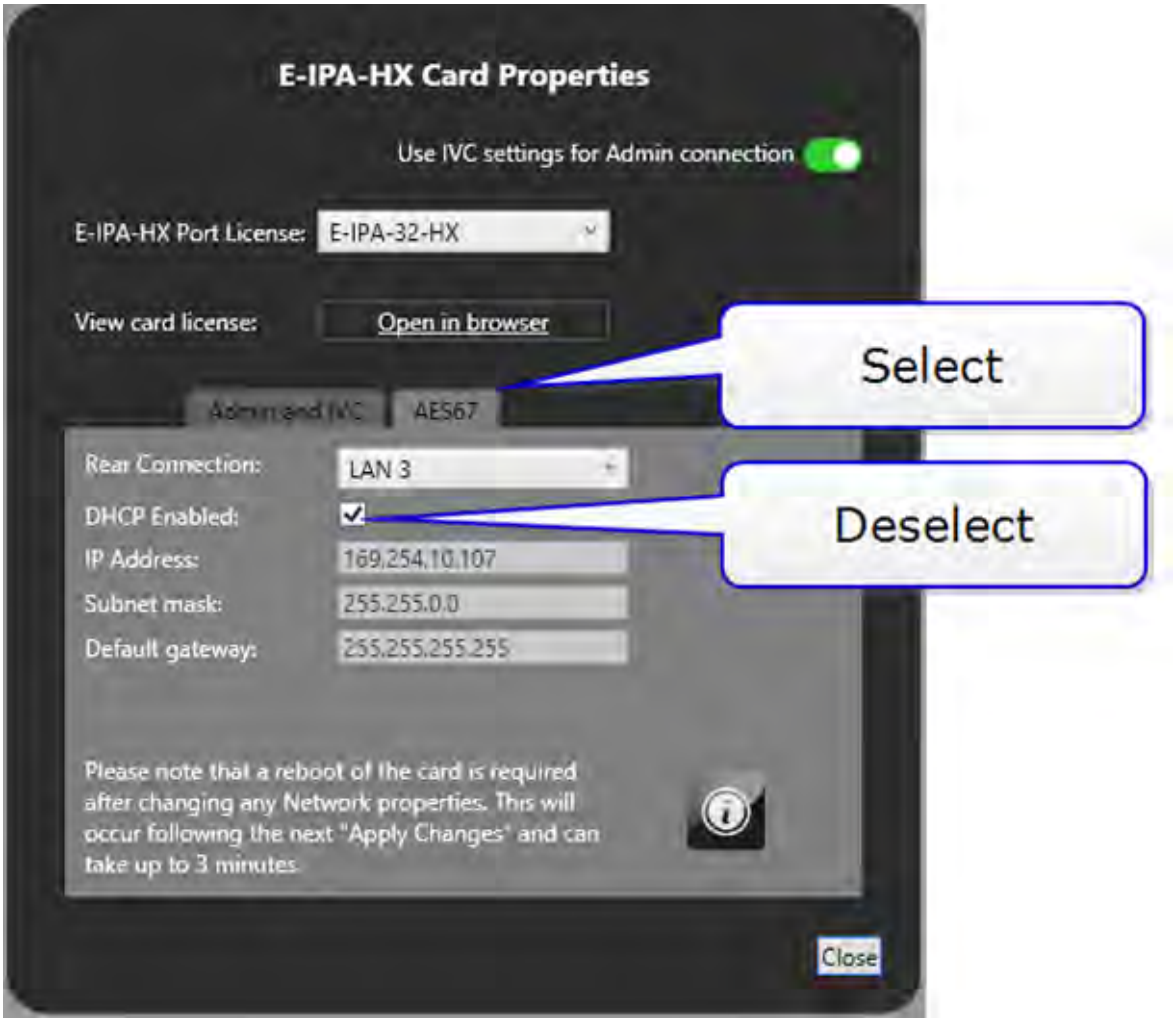
To remove a transceiver from your matrix configuration, use the **- IP TCVR** button (**Apply Map to Matrix**).



3.9.3 Static configuration

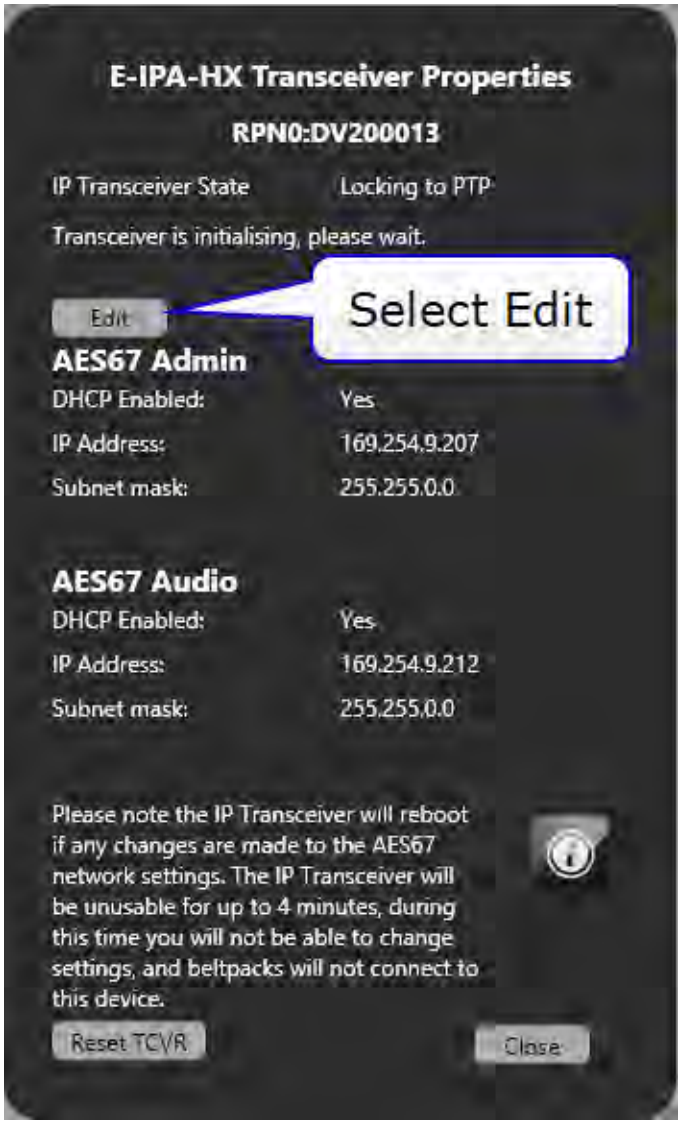
By default, the E-IPA-HX card is DHCP enabled, and any IPTs are in DHCP mode. However, you can allocate static IP addresses for an IPT. If the IP AES67 Admin and AES67 Audio IP addresses are in DHCP mode, you must set them to static mode.

1. Navigate to **Hardware > Cards and Ports**, and then double-click the card slot containing the E-IPA-HX card. The Card Properties screen appears.



2. Select the **AES67** tab, and then deselect **DHCP Enabled**.
3. Enter the required static IP address, and then **Apply Changes**.
4. Click **Close**.
5. Navigate to **Hardware > Transceivers**.
6. Click the cog icon for the required transceiver. The Transceiver Properties screen appears.
7. Select **Edit**, and then deselect **DHCP Enabled** for both AES67 Admin and AES67 Audio.

   Note: *You cannot mix DHCP and static IP addressing on the IPT.*

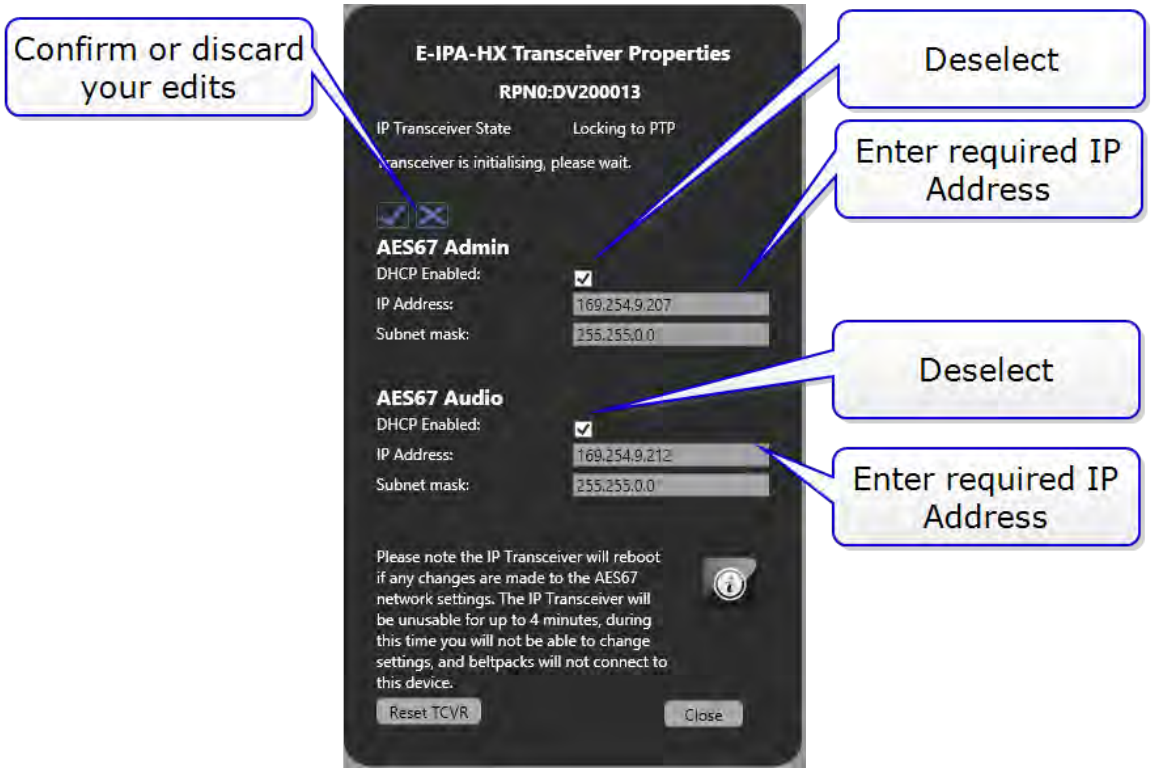


Note: *The IP Transceiver must be connected.*

8. Enter the required static IP addresses for AES67 Admin and AES67 Audio.

   Note: *You cannot set static IP addresses that are within the Link Local range (169.254.0.0 to 169.254.255.255)*

   Note: *You must set both the AES Admin and AES Audio addresses on the same subnet with the same mask*



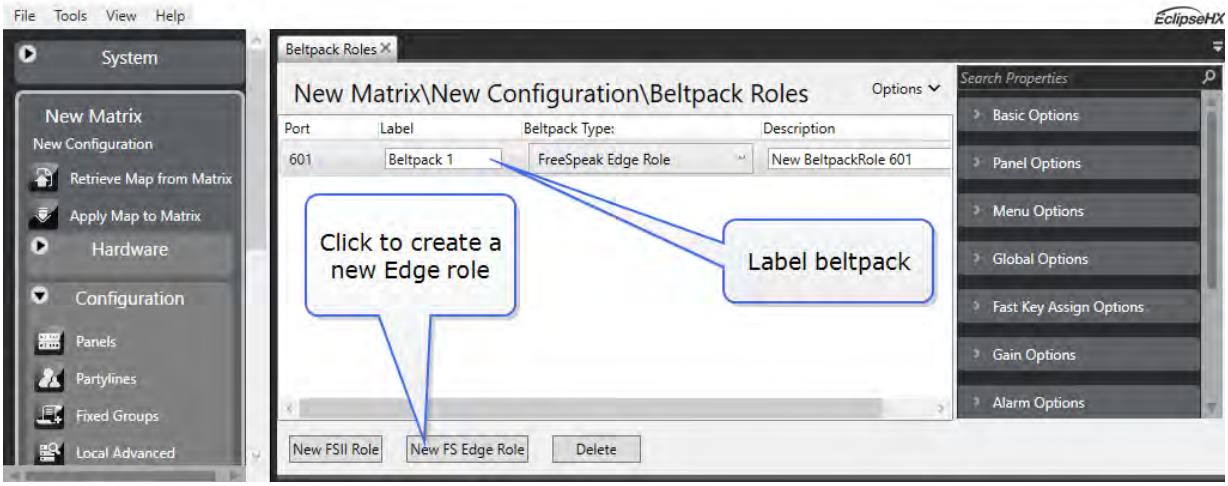
9. Click the tick or cross icon to accept or discard changes.
10. Click **Close**.
11. Click **Apply Map to Matrix**.

3.10 Beltpack roles

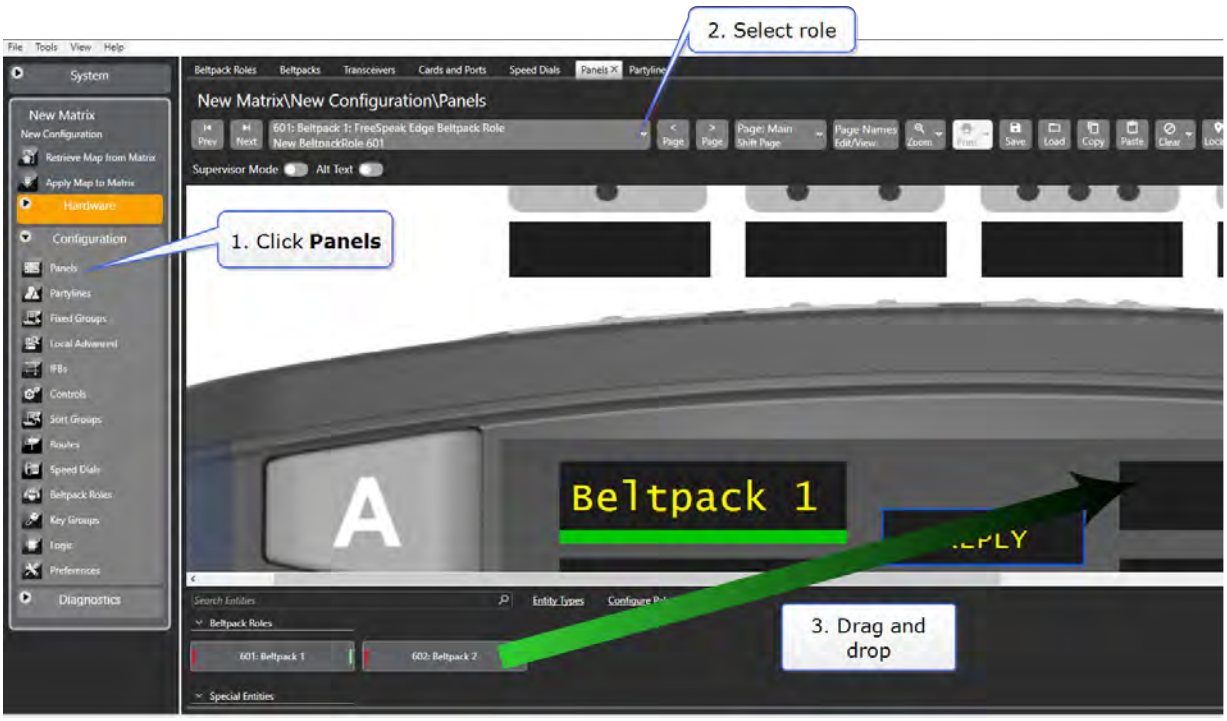
Beltpack roles are used to define your Edge beltpack properties and audio configuration. Roles should be created in your configuration software before you connect your beltpacks to the system.

Once a role has been generated in EHX, audio and keys can be configured in panel programming. This role is then fixed to the beltpack so it persists over power cycles, or you can allow a role to be selected by the beltpack user.

To create a role, navigate to **EHX>Matrix>Configuration>Beltpack Roles**. Click **New FS Edge Role**.



The beltpack role is treated like a panel in the EHX software. Beltpack keys and other audio entities can be dragged and dropped onto the keys. To configure audio for your beltpack navigate to: **EHX>Matrix>Configuration>Panels**. Then select the beltpack you wish to configure from the dropdown list.



3.10.1 More information on programming roles

To configure your audio entities see **Chapter 17. Panel Programming** in the *EHX Configuration Software User Guide.*

For more information on configuring beltpack roles see **20.1.2 Adding and deleting beltpack roles** and **20.1.3 Beltpack programming** in the *EHX Configuration Software User Guide.*

3.11 Registering the beltpack to a matrix

Before registering a beltpack to your system you must have:

- At least one transceiver connected
- As many beltpack roles as you have beltpacks (1:1)

There are two methods for registering beltpacks to your FreeSpeak Edge system:

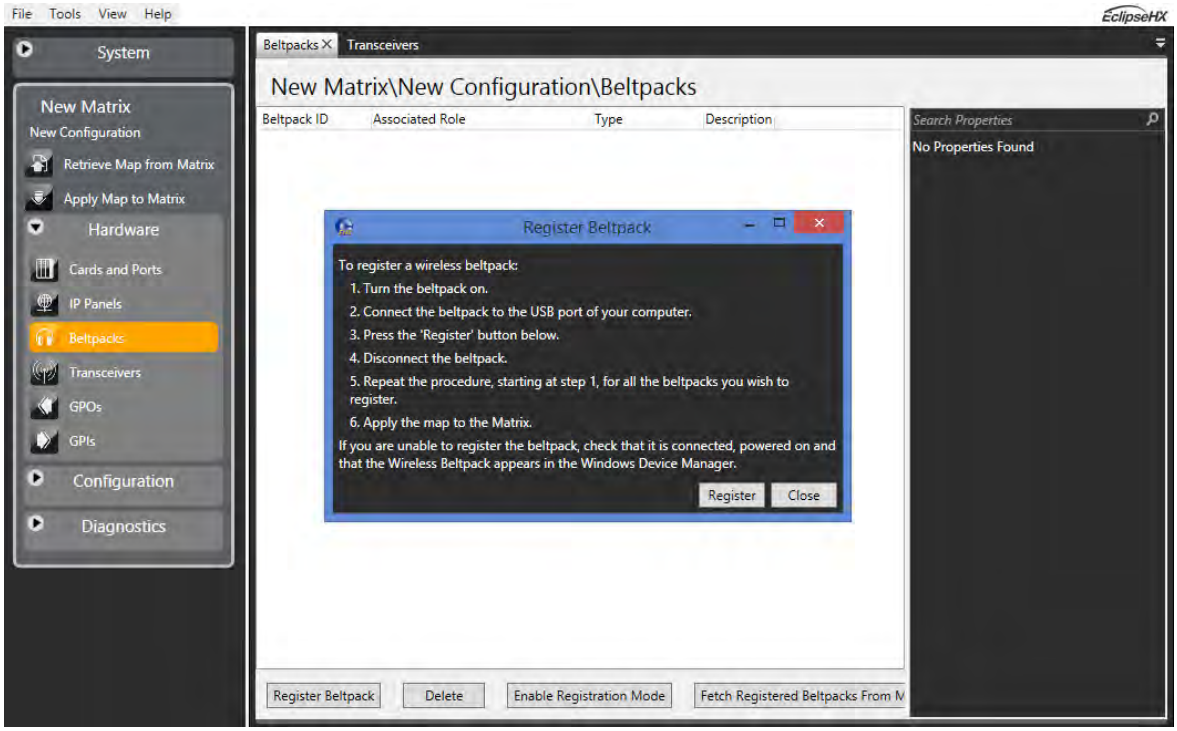
1. Using a USB cable
2. Over The Air (OTA) wireless registration

3.11.1 USB registration

To register a beltpack with a USB, connect the beltpack (USB C) to the PC hosting the EHX software. Make sure the beltpack is powered ON.

In the EHX software:

1. Navigate to **Hardware>Beltpacks** (you must add at least one transceiver before doing this).
2. Click **Register Beltpack** at the bottom of the screen.
3. Follow the instructions, then click **Register**.



3.11.2 Over The Air (OTA) wireless registration (EHX)

If your beltpacks are not within easy reach of the PC hosting the EHX software, you can register them remotely as long as they are within range of an active and registered transceiver. To do this you must:

1. Enable registration mode in EHX (10 minute window).
2. From the beltpack, use the menu to connect to the system and then register.

Note: *The beltpack menu must be in advanced mode to use OTA registration. If your beltpack's role has been menu-restricted, you must enter an Admin Pin to gain menu access to register the BP. To enable this on your beltpack navigate to:* ***Menu>Administration>Enable Advanced Menu****. You need the four digit system code, found in EHX System preferences to enable this (default: 4632). If your beltpack is already in advanced mode you will not see this menu option.*

In the EHX software

1. Navigate to **Hardware>Beltpacks** (you must add at least one transceiver to an E-IPA port before doing this).
2. Click **Enable registration mode** at the bottom of the screen.

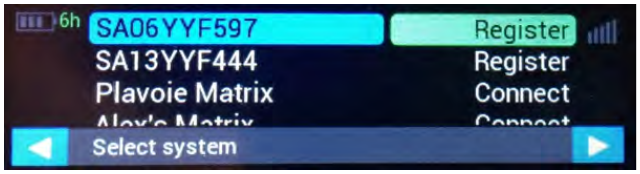
   Note: *This will start a 10 minute timer to allow OTA registration through the connected transceivers. OTA registration can be disabled at any time by clicking the* ***Disable Registration Mode*** *button at the bottom of the screen.*

Register the beltpack to the system

1. On the beltpack, press and hold the + and - button on either side of the front of the beltpack to enter the menu system.
2. Using either the rotary keys or the + and - buttons navigate to: **Menu>System>System Connect**.
3. Press the menu select key (**D**).

   Note: *If your beltpack is already registered to a system, you will be asked to confirm a disconnect.*

4. Navigate to the system you want to register to and press **D** to start the registration process.



Press **D** to start registration process

5. Use key **C** to cancel a selection or move back up the menu tree.

Once registered, the beltpack system will proceed to connection.

Note: *When you have registered your beltpacks in this way you need to* ***Fetch Registered Beltpacks*** *from the matrix before applying the map to the matrix.*

3.12 Connect the beltpacks

Once the beltpacks have been registered to a matrix system they can be connected to the transceiver network.

You will see **Searching...** in the main beltpack menu screen.

When the required matrix appears in the menu screen, select it using the rotary controllers (left or right) and press **D** to connect.

You will see a list of pre-configured roles in the menu screen. Navigate to a role using the rotary controllers and press the **D** button. This selects a role for your beltpack and connects it to the system.

You will now be able to use your beltpack for communication.

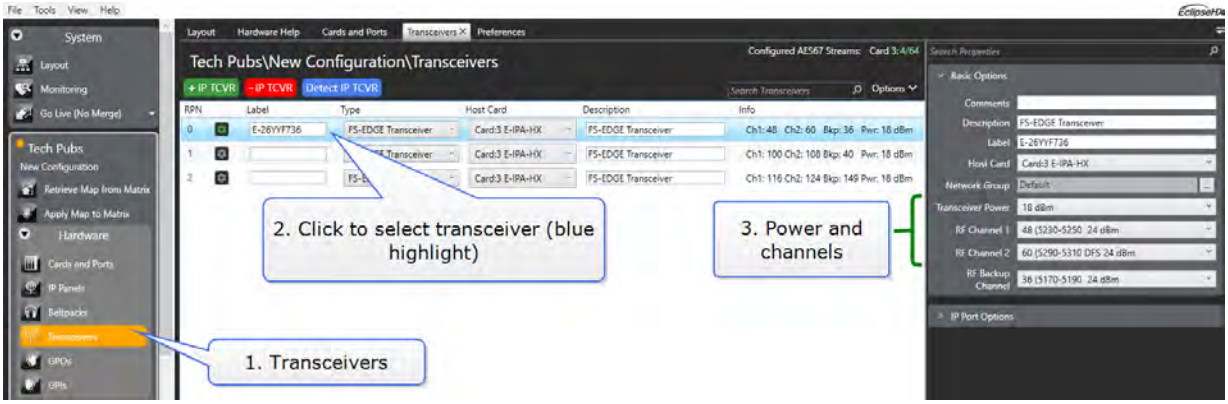
Note: *If a role has been fixed to your beltpack, that role will be automatically selected.*

3.13 Radio Frequency (RF) channel selection and power settings

In the first case, channels and transceiver power settings are automatically selected according to your region's requirements for 5 GHz RF. The transceiver uses two channels and these must not be adjacent to each other in the coverage zone, so adjacent channels cannot be selected on the transceiver). For example, you might use channels 36 (Channel 1) and 40 (Channel 2). These channels are separated by 20 MHz and so are not adjacent.

Channel power defaults to the highest available value (according to regulatory region). When one channel has a lower power setting than the other, the transceiver will take the lowest power setting.

View these settings in transceiver properties. Navigate to:
Matrix>Transceiver>Properties>Basic Options.



Transceiver channels can also be viewed from the beltpack. On the beltpack, navigate to: **Menu>Diagnostics>Connection status**.

A transceiver with DFS channels performs a 1 minute radar scanning process before channels become operational. If you are using two DFS channels, they are scanned at the same time, so 1 minute total scanning time.

In Europe, DFS channels 120, 124 and 128 are allowed. However, these channels perform a 10 minute radar scanning before becoming an operating channel. For this reason, channels 120, 124 and 128 have been removed from the selection algorithms. These channels must be selected manually if you wish to use them.

Note: *For a small system (4 transceivers or less), you may be able to work with the default settings. However, for a larger system you must undertake a site survey and modify channels and power rating accordingly.*

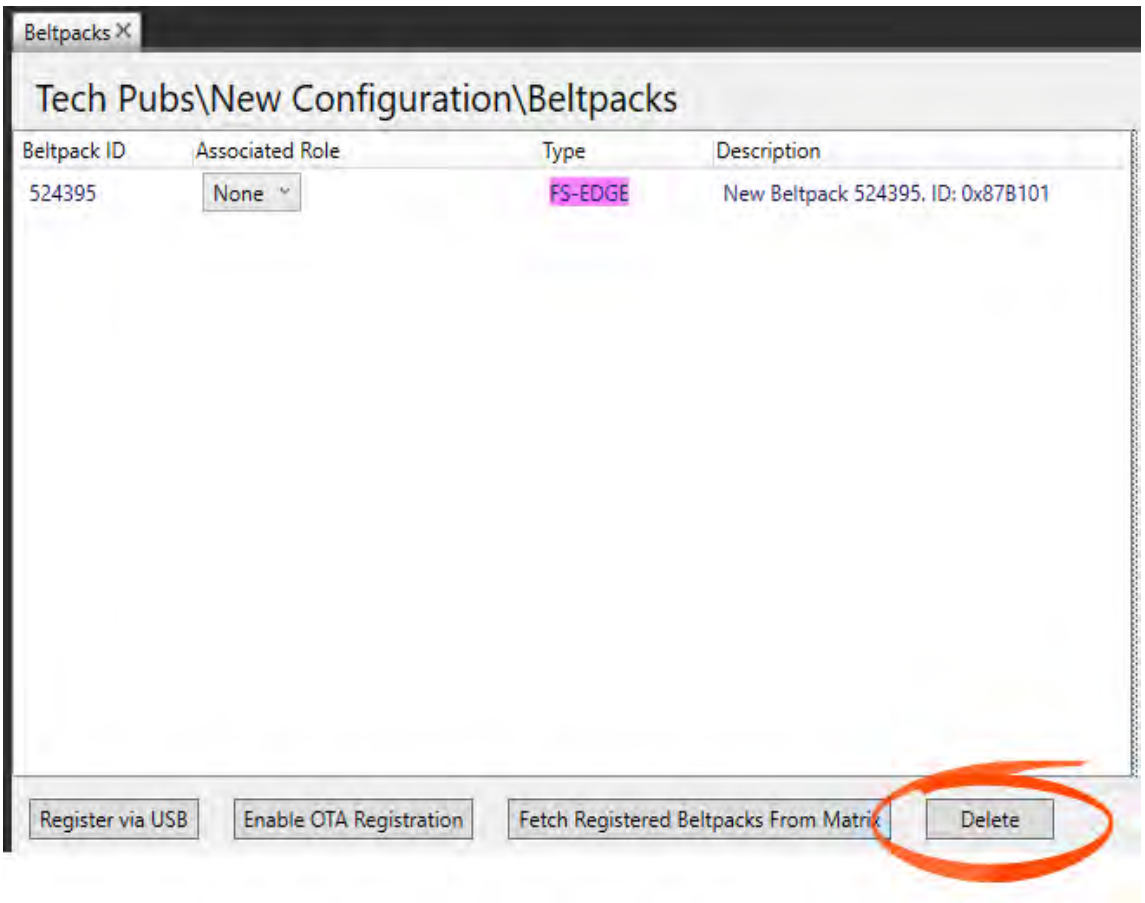
3.14 De-register beltpacks from a system

Beltpacks should be de-registered at the beltpack and from the EHX configuration software.

- Beltpack: Press the **+** and **-** key to enter the menu system (3 second press). **D** to select. **C** to cancel or go back. Using the rotary controllers navigate to: **Menu>System>System Delete**. Use the **D** key to select system delete.

- EHX: in the EHX user interface navigate to **Matrix>Hardware>Beltpacks>Delete**

  When you have deleted the beltpacks, you must **Apply Map to Matrix**



If you do not de-register at the beltpack and in EHX (you only do one) the beltpacks are not able to connect but they are still listed. This has the potential to cause confusion.

4 Site survey features

The FreeSpeak Edge system provides tools to facilitate your site survey:

- Standalone mode, transceiver
- Local RF scan mode, beltpack

4.1 Transceiver standalone mode

You can use standalone mode to connect the Edge transceiver to two beltpacks with full duplex audio. This is useful for performing an initial survey to find out how the transceiver performs in the local RF environment before the device is connected to a matrix. In standalone mode, for convenience, you can use a USB battery pack (5V, 3A) to power the transceiver.

To enable standalone mode:

1. Press and hold the Mode button while simultaneously powering the Edge transceiver.

   Both LEDs will turn solid yellow when standalone mode is enabled. At this point you can release the Mode button.

   Note: *While the IPT is in standalone mode, LED 1 is yellow and LED 2 flashes yellow at 2 Hz.*

Once standalone mode is enabled on the transceiver you can register and connect the beltpacks to it using the Over the Air (OTA) registration method.

Note: *If the beltpack has been previously connected to a system, you will have to delete that system before connecting to the transceiver in standalone mode. Delete an old system by navigating to* ***System*** *in the beltpack menu.*

To register and connect the beltpacks to the standalone transceiver:

1. Power on the beltpack.
2. Enter menu mode by pressing **+** and **-** keys at the same time for one second.
3. Navigate to **System** using the rotary controllers.
4. Select **System** using the **D** key.
5. You will see the transceiver to register to in the menu screen.
6. Select the transceiver and register to it using the **D** key.

Use the **C** key to go back or cancel.

Once the beltpack is registered to the transceiver you will be able to use the beltpack to test the coverage zone.

To take a transceiver out of standalone mode, power cycle the device.

4.2 Local RF scan using a beltpack

Your Edge beltpack has the capacity to conduct an RF scan of the local environment, in order to find out which 5GHz channels on your site are available and do not contain RF traffic. When you put a beltpack in Channel Scan mode, it reboots in a mode that can see the local RF environment. Audio and BLE are not available.

4.2.1 Put the beltpack into Channel Scan mode

1. Power on the beltpack.
2. Enter menu mode by pressing the **+** and **-** keys at the same time for one second.
3. Navigate to **Diagnostics** using the rotary controllers.
4. Select **Diagnostics** using the **D** key.
5. Navigate to **Channel Scan** using the rotary controllers.
6. Select **Channel Scan** using the **D** key.
7. You will be asked to confirm that you want to reboot the beltpack in Channel Scan mode.
8. Press the **D** key to enter Channel Scan mode.
9. The beltpack will reboot in Channel Scan mode.

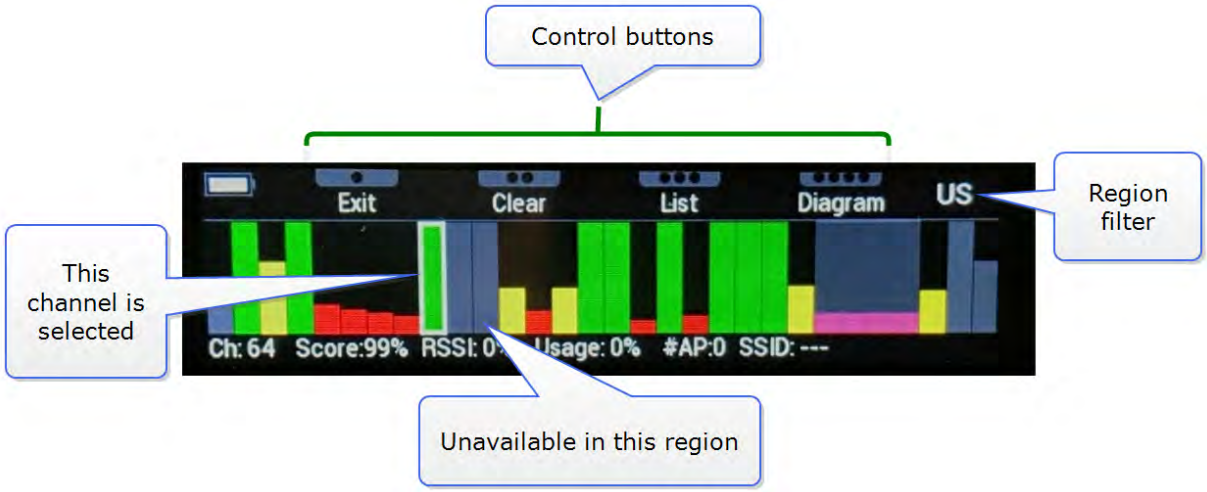
   Note: *Use the **C** key to go back or cancel.*

4.2.2 Using Channel Scan mode

A semi-opaque rectangle moving across the screen shows channels being scanned.

Use the **+** and **-** keys to move through the region filters (All, EU, CA, US).

Note: *It is important that you select the correct region.*



Bar color	Percentage score
Green	over 66%
Yellow	between 33 and 66 %
Red	below 33%

The percentage score is calculated by an algorithm using Received Signal Strength Indicator (RSSI), RF activity and the presence of access points.

List view

The following variables can be seen in list view:

- RF channel number (the channel at the top of the list has the best rating)
- % score (0 - 99%)
- RSSI (signal strength 0 - 99%)
- Usage: the amount of RF activity that is detected in this channel
- #AP: the number of access points that use this channel
- SSID (service set identifier (WiFi name) of one of the access points)

5 RF channel selection 5 GHz

The 5 Ghz band has many more RF channels than the 1.9 or 2.4 GHz bands (20 - 30 depending on region). This channel density can allow a high data through put (up to 10 beltpacks in an RF zone) and combined with the Edge system technology gives low latency, high quality (12 KHz) audio transmission.

The Edge transceivers make use of antenna diversity. This involves two or more antennas used together to improve the quality and reliability of a wireless link. This, along with Orthogonal Frequency Division Multiplexing (OFDM) makes the FreeSpeak Edge system particularly suitable for a multipath environment and as long as channel selection is conducted carefully when this is necessary, gives very robust and reliable coverage.

5 GHz signals have different transmission qualities to the 1.9 or 2.4 GHz bands. Signals do not propagate as freely through walls in a building, but they will 'bounce' or reflect off hard surfaces. This makes them well suited for use in stadiums with a reflective ceiling. In general, for the same power level, the outdoor range of 5 Ghz system is much smaller than the equivalent DECT system. This is because direct line-of-sight is required, as signals do not propagate through obstacles easily.

The 5 GHz RF band has a number of regional regulatory variations that need to be taken into account;

- Which channels are available in a particular region
- Power regulations (for that region)
- Availability of channels for outdoor or indoor use
- Availability of channels for universal use (wi-fi and other 5 GHz devices such as cameras). These are the Industrial, Scientific and Medical (ISM) channels.
- Channels used for radar (weather and emergency services) communication. These are the Dynamic Frequency Selection (DFS) channels.

The regulations are automatically enforced by the system software.

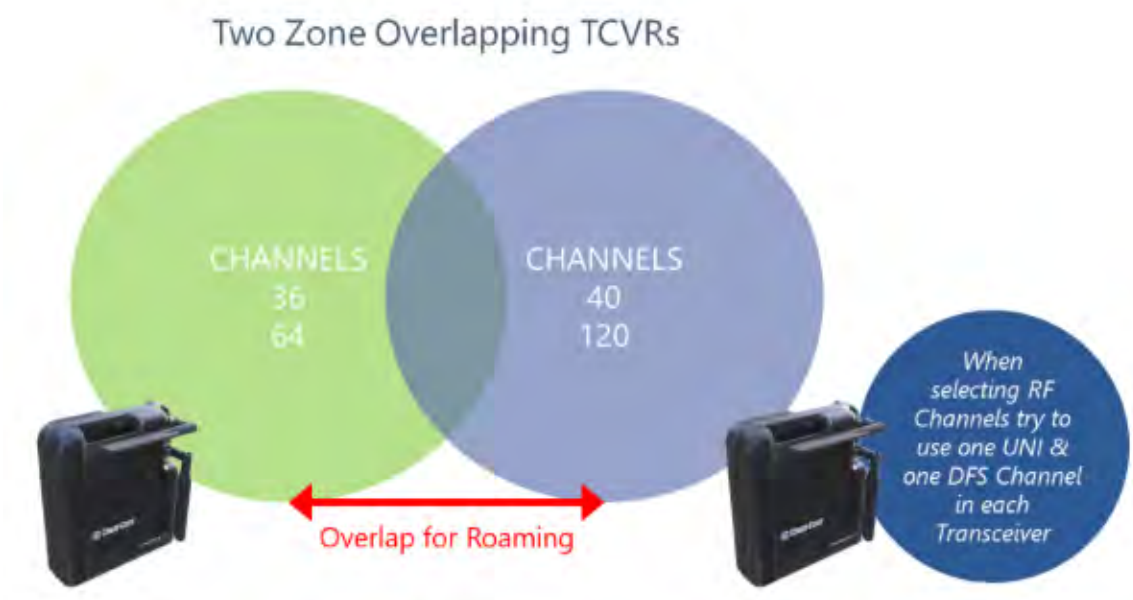
Transceivers use DFS channels as these are less likely to be hosting other traffic. In this case, the transceiver will also need a reserve or backup channel. The backup channel is used if radar or other activity is detected in a channel; the Edge signal will automatically be moved to the backup channel. You will see a double red flash on the transceiver status LEDs when the backup channel is in use.

Each Edge transceiver uses 2 RF channels at any one time.

Given that each transceiver makes use of two channels, a system consisting of 4 transceivers can make use of up to 8 channels. If you are using DFS channels you will also need to take account of backup channels. If this number of channels is not available, channels can be re-used

on the location. When re-using channels, you must be careful that transceivers using the same channels are not located next to each other as this causes interference. A beltpack must not be able to see a particular channel more than once at any time.

Two transceivers, 4 channels:



Eight transceivers, 6 channels:

The transceivers have selectable power settings, and these can be used to customize the size of an RF cell to suit your environment and avoid the possibility of channels being placed next to each other in the overall coverage zone.

When using FreeSpeak Edge, the channels are selected automatically by the EHX software in the first instance.

For rapid set up you can use the default channels, but in any case you are advised to seek information about existing 5 GHz traffic in your location. This information can be obtained from:

- A site frequency coordinator or IT administrator (if there is one)
- A scan of channels in the location using the beltpack

Typically, the default channel setup will work for a small system (4 transceivers or less) in an environment that has limited equipment competing for the band usage. For a larger system, or one where there is more 5 GHz traffic, you are advised to take control of transceiver channel selection yourself. RF channel selection can be changed in the EHX software.

In most countries, 5Ghz channels fall into the following categories:

Channel type	Restrictions
ISM (Industrial, scientific and medical)	These are the channels with the least restrictions and highest allowance for transmission power. However, they may be crowded with interference since ISM channels are equally the first choice for other wireless equipment. Also, generic ISM channels don't exist in some countries (for example. Japan).
TPC (transmit power control)	Transmission power is restricted in these channels. The maximum power setting for the FreeSpeak Edge system is below the TPC values.
Indoor Channels	If these channels are used, the equipment may only operate in an indoor setting. Different countries have different definitions and requirements for indoor settings.
DFS (dynamic frequency selection)	Devices operating in this channel are required to implement a radar detection mechanism and move to a different channel when radar pulses are detected.

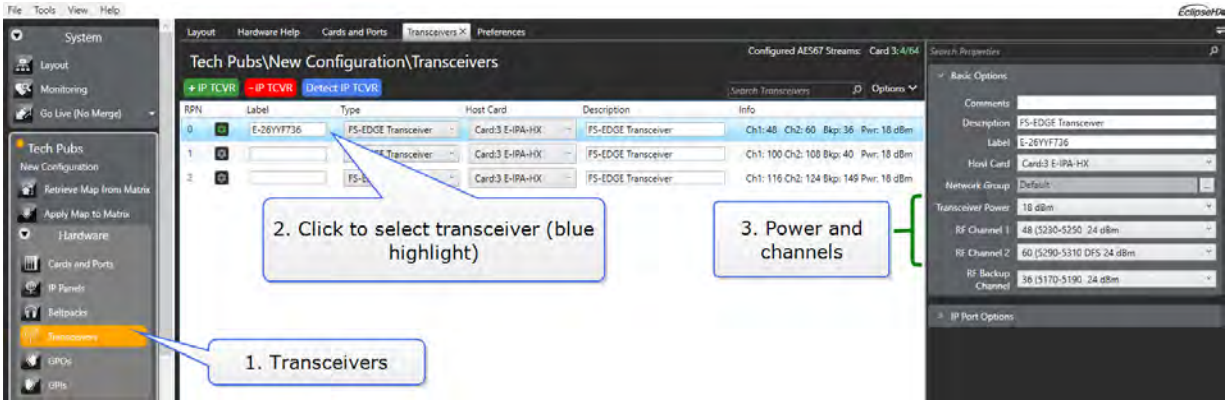
For detailed information refer to: *FreeSpeak Edge RF Configuration Guide*, available from the Clear-Com website.

5.1 Radio Frequency (RF) channel selection and power settings

In the first case, channels and transceiver power settings are automatically selected according to your region's requirements for 5 GHz RF. The transceiver uses two channels and these must not be adjacent to each other in the coverage zone, so adjacent channels cannot be selected on the transceiver). For example, you might use channels 36 (Channel 1) and 40 (Channel 2). These channels are separated by 20 MHz and so are not adjacent.

Channel power defaults to the highest available value (according to regulatory region). When one channel has a lower power setting than the other, the transceiver will take the lowest power setting.

View these settings in transceiver properties. Navigate to: **Matrix>Transceiver>Properties>Basic Options**.



Transceiver channels can also be viewed from the beltpack. On the beltpack, navigate to: **Menu>Diagnostics>Connection status**.

A transceiver with DFS channels performs a 1 minute radar scanning process before channels become operational. If you are using two DFS channels, they are scanned at the same time, so 1 minute total scanning time.

In Europe, DFS channels 120, 124 and 128 are allowed. However, these channels perform a 10 minute radar scanning before becoming an operating channel. For this reason, channels 120, 124 and 128 have been removed from the selection algorithms. These channels must be selected manually if you wish to use them.

Note: *For a small system (4 transceivers or less), you may be able to work with the default settings. However, for a larger system you must undertake a site survey and modify channels and power rating accordingly.*

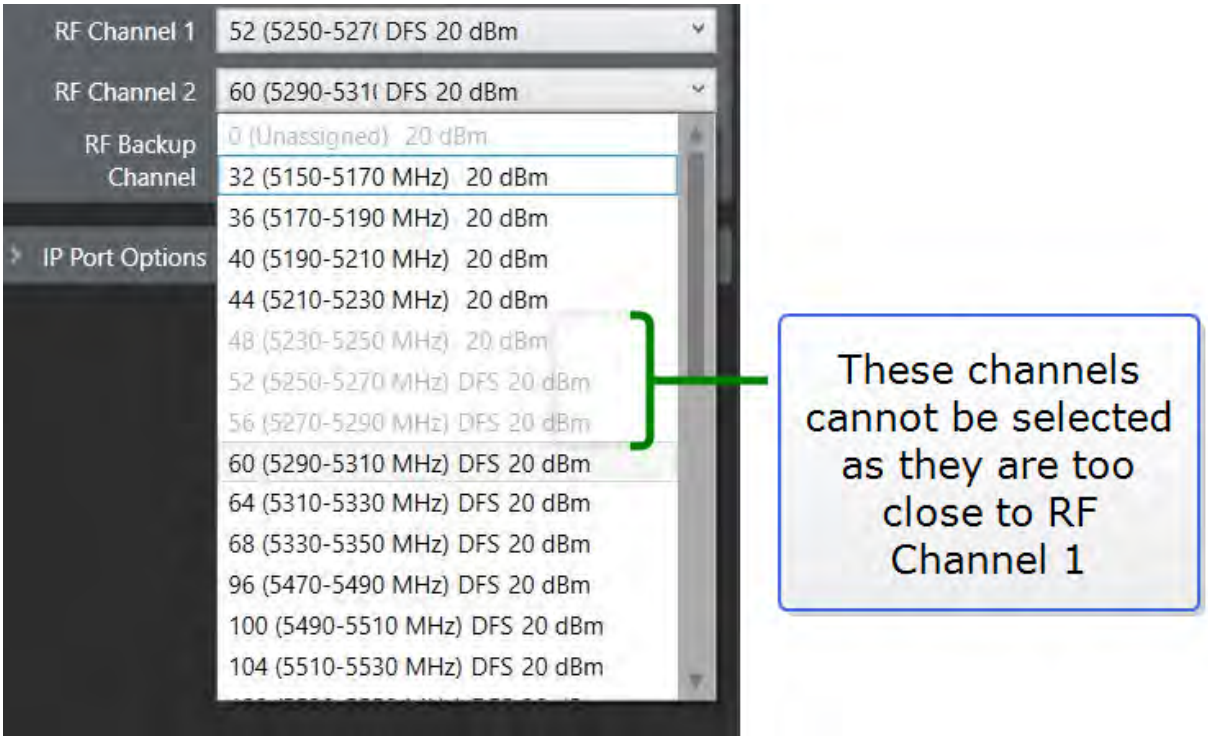
5.2 Channel selection

In the first case, the system software will allocate channels automatically. However, you may wish to allocate channels manually, for instance if you are using more than 4 transceivers or are working in a crowded RF environment.

Each transceiver uses two channels unless DFS channels are selected in which case the transceiver uses 3 channels. When DFS channels are used the device needs a backup channel in the event that the signal needs to be moved due to the detection of radar.

Channels on a transceiver must not be next to each other in the RF spectrum in order to avoid interference in the audio signals. They cannot be adjacent. This channel spacing is enforced by

the EHX software. For a definition of 'adjacent' see Radio Frequency (RF) channel selection and power settings on page 39.



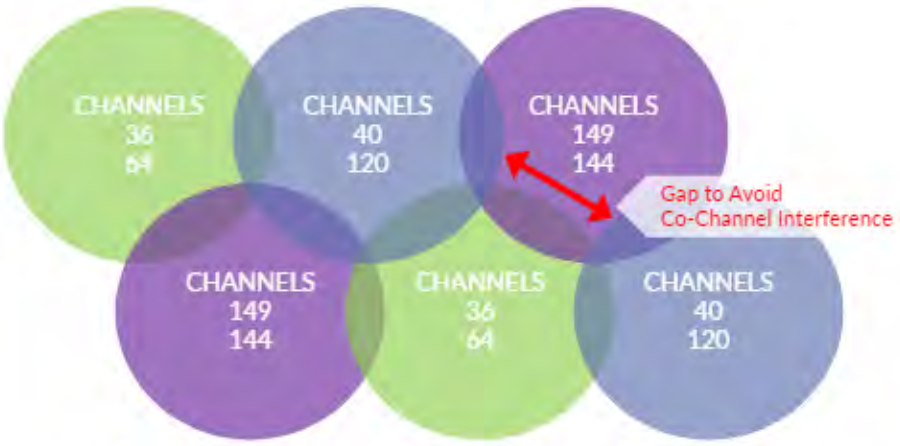
For more information see the *Freespeak Edge RF Configuration Guide* available from the Clear-Com website.

5.3 Channel re-use

Channel re-use is a way of making the best use of the available 5 GHz RF channels in your location. Employ channel re-use if you are:

- Using more than 4 transceivers
- And/or the channel availability on your site is limited by other RF traffic

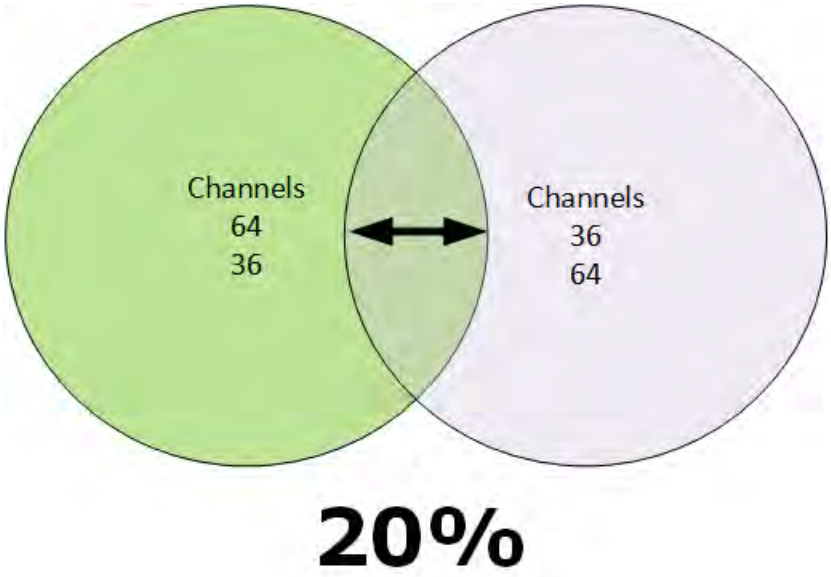
Example of channel re-use



Use of 3 Zones for Overlapping Coverage to build a roaming system

5.3.1 Guidelines

- Transceiver RF coverage zones ideally overlap by 20% of the coverage cell



- If transceivers are 3m (10 feet) or less apart, for best performance, Clear-Com recommends that adjacent transceivers do not use adjacent channels. Without this gap between channels and transceivers, there is some possibility of interference.
- Adjacent transceivers can use the same channels if the channel order is reversed. For example; transceiver A, Channel 1 = 36, Channel 2 = 64. Transceiver B, Channel 1 = 64, Channel 2 = 36.

Rule

- The beltpacks must not be able to see more than one transceiver with the same channel at any one time.

5.4 Using Dynamic Frequency Selection (DFS) channels

DFS channels are selected by default by the system software as they are less crowded with wireless traffic than other channels. When DFS channels are used, the FS Edge system makes use of a channel scanning mechanism that switches the signal to a backup channel if radar is detected. In most cases, radar detection happens rarely, but the system conducts a regular channel scan as required by regulations. You will see this happening when DFS channels are selected on start up or reboot of the device. During a channel scan, the transceiver status LEDs will flash blue. Channel scan takes one minute per channel (with one exception, see note below).

The DFS channels can be configured without a backup channel but this is not recommended.

Backup channels are limited to non-DFS channels. This reduces the potential risk of non-transmission.

Note: *In Europe, DFS channels 120, 124 and 128 are allowed. However, these channels perform a 10 minute radar scanning before becoming an operating channel. For this reason, channels 120, 124 and 128 have been removed from the selection algorithms. These channels must be selected manually if you wish to use them.*

If radar is detected and the backup channel is in use you will see a double red flash on the transceiver status LEDs. You will also see a red B displayed on the transceiver icon in the wireless status diagnostics page of the configuration software (**Matrix>Diagnostics>Wireless Status**),

5.4.1 Important notes, DFS

If there is no backup channel selected when radar is detected the transceiver will stop working.

Once the signal has dropped into the backup channel, it does not automatically move back to its original channel. This is required by the regulations.

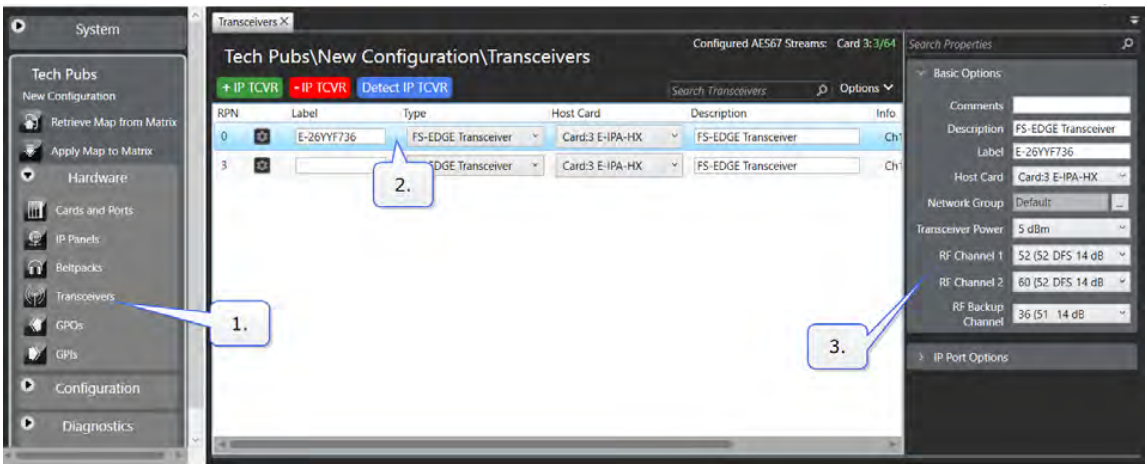
If radar is detected in the second channel and the backup channel is already in use, the signal cannot move and the transceiver will stop working.

Once the signal has moved to the backup channel, you cannot use the channel where radar was detected for 30 minutes.

5.4.2 How to clear the RF signal from the backup channel

The signal can be moved from the backup channel in a number of ways:

- Reset the channels in the EHX software. Navigate to: **Matrix>Hardware>Transceivers>Transceiver>Basic Options**, change channel and **Apply Map to Matrix**.



- Power cycle the transceiver (this can take up to 5 minutes)
- Reset the transceiver in the EHX software. Navigate to:

  Matrix>Hardware>Transceivers>Transceiver and click the cog icon for transceiver properties.
- Click the **Reset** button.

5.4.3 Fail-safe DFS channel set up

Radar in both channels is unlikely to happen in normal scenarios. However, if you want a fail-safe set up on your transceiver you should use one DFS channel and one non-DFS channel.

5.5 Radar scanning in DFS channels

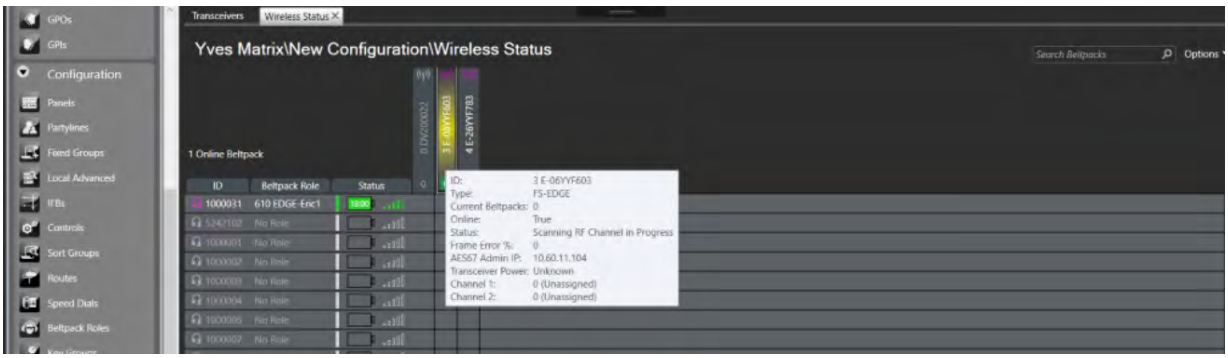
The Edge system selects DFS channels by default, as these channels are less likely to contain traffic than the universal channels. When a DFS channel is selected, the system must carry out a channel scan to make sure that it is clear of radar. A scan occurs whenever the transceiver is going through it's connection sequence and also periodically while it is in use.

Radar scanning usually takes one minute per channel. You will see the status lights on the transceiver flash blue when a channel scan is occurring. The LEDs will flash blue/purple or blue/yellow if the device is starting up and acquiring PTP and sync lock at the same time. If radar is detected in a channel while the transceiver is connected to the system, transmission will drop into the backup channel. You will see a double red flash on the transceiver status light when radar is detected in a channel.

Note: ***If you have not selected a backup channel, the transceiver will not transmit when radar is detected.***

Backup channels are restricted to non-DFS channels to reduce the risk of non-transmission.

The EHX software will report scanning for radar activity with explicit messaging.



If the transceiver is in standalone mode and radar is detected, the device will stop transmitting.

Note: ***Non DFS channels do not require a channel scan or a backup channel.***

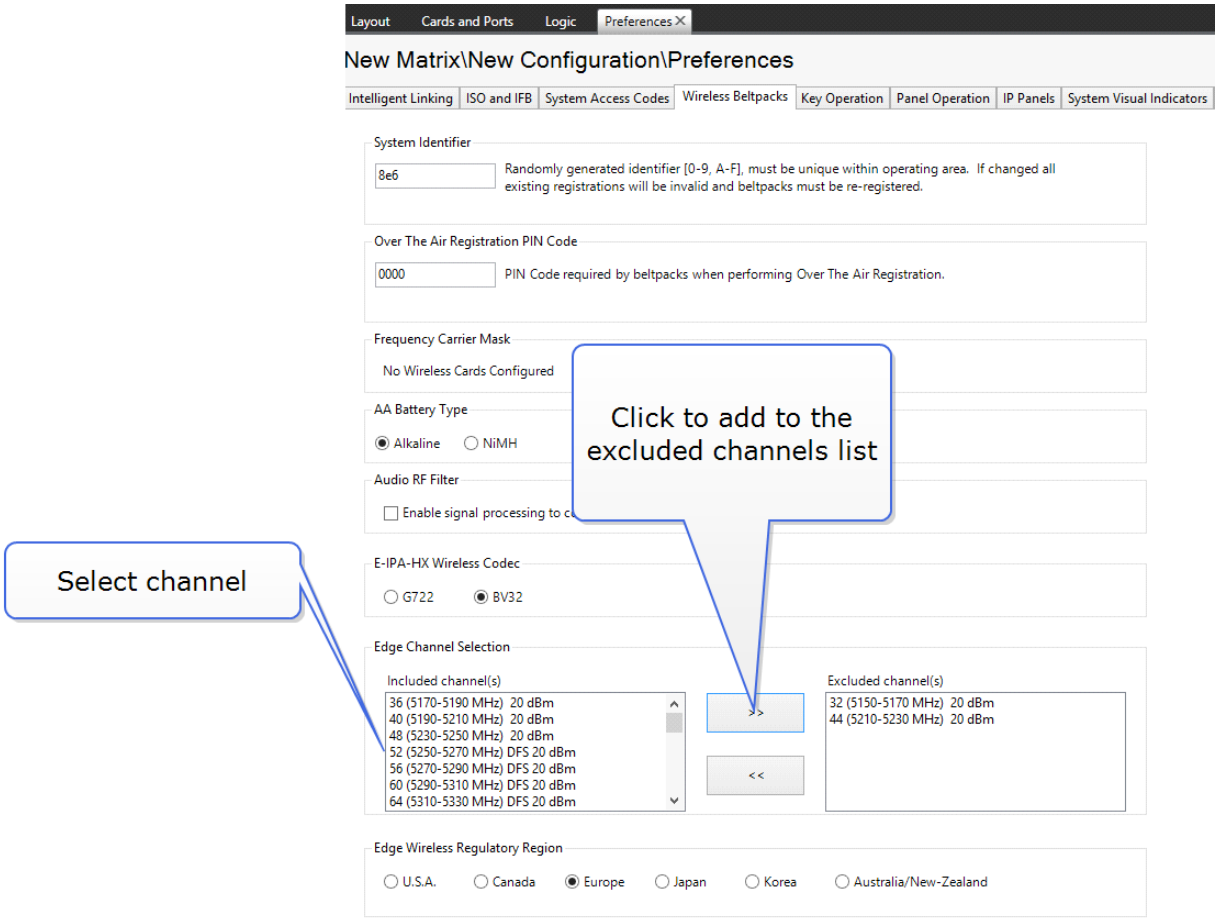
For more information about transceiver status LEDs, see **Edge transceiver status LEDs on page 72**

5.6 Transceiver - excluded channels

When setting up FS Edge transceivers, on some sites, you may be warned that certain RF channels are already in use. These channels are unsuitable for use on a transceiver. In this case you can exclude channels from the device selection processes in the system preferences.

5.6.1 EHX

Navigate to: **Matrix>Configuration>Preferences>Wireless Beltpacks>Edge Channel Selection**



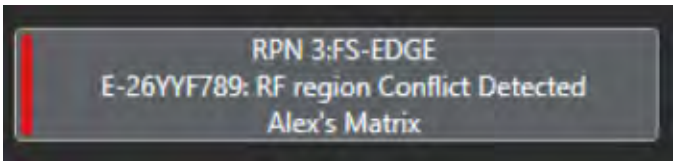
5.7 Wireless Regulatory Region (WRR)

The WRR defines the allowed channels, DFS functionality and RF power limits that are available to the FreeSpeak Edge system according to its regional regulatory requirements.

5 GHz channel use must comply with regional regulations. Each transceiver has a fixed WRR setting and cannot be changed by the user or any third-party. WRR settings must also be configured in the EHX software by system preferences.

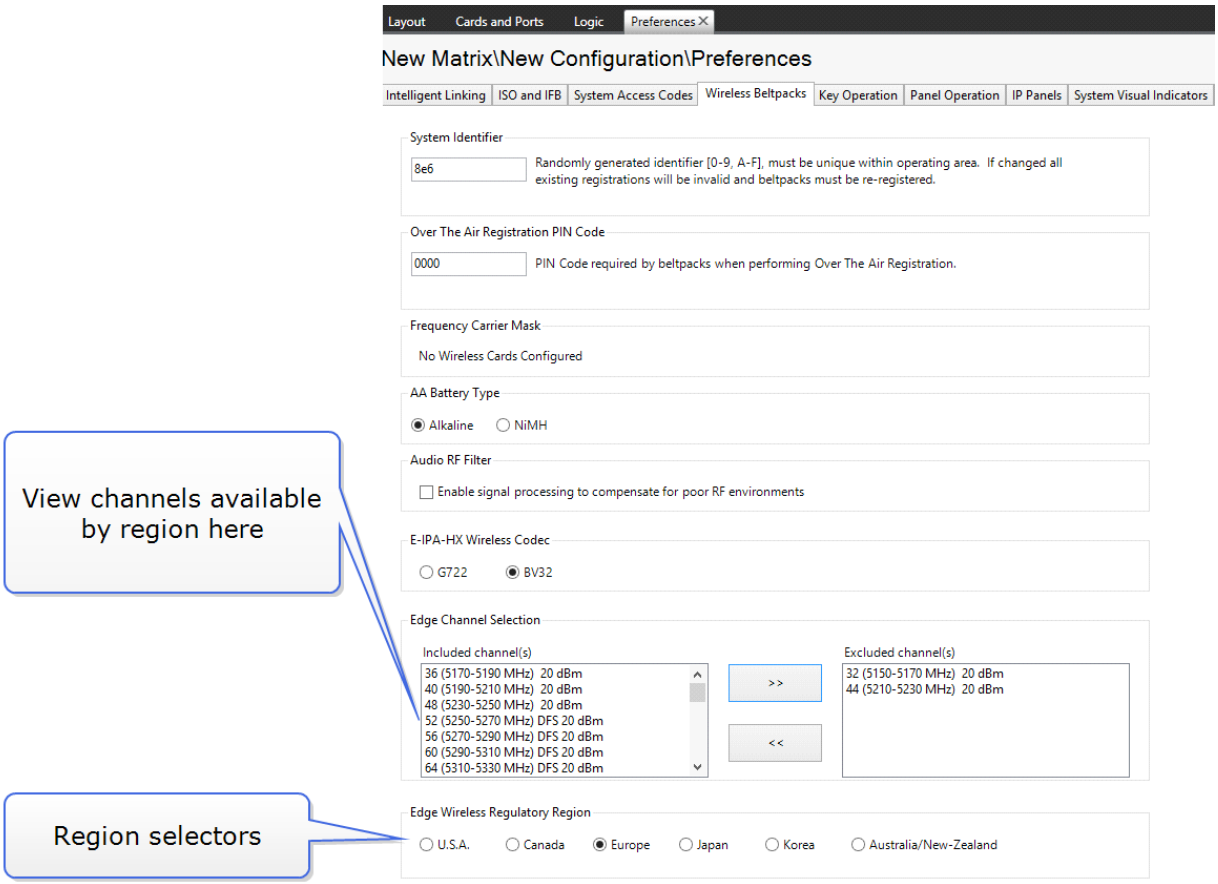
If the configurable WRR setting in the EHX software does not match the fixed WRR of the transceiver, the system will not work and audio cannot be transmitted. The transceiver will show a red or amber status LED and the EHX system will flag the error.

To see the error message navigate to the monitoring screen in EHX. This message is also available in transceiver properties.



To view the WRR setting, navigate to **Matrix>configuration>preferences>wireless beltpacks**

You can also see the channels and power ratings available in each region in this screen.



Note: *The Edge transceiver is the master device with a fixed WRR (Wireless Regulatory Region) that ensures regulatory conformity with respect to allowed channels, DFS functionality and RF power settings. The Edge beltpacks are slave/client devices that follow the WRR settings of the transceiver that they are registered to.*

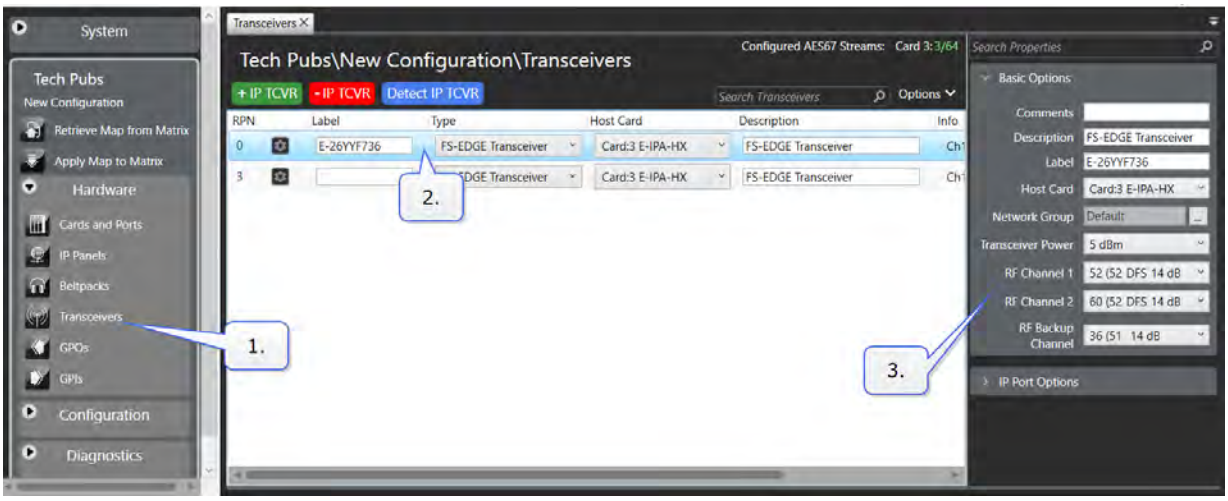
Link

Transceiver models (regional variations) on page 84

5.8 Change RF channels on the Edge transceiver

To change RF channels on the Edge transceiver navigate to:

EHX>Matrix>Hardware>Transceivers>Properties>Basic Options>RF Channel and select required channels from the dropdown lists.



When done **Apply Map to Matrix**

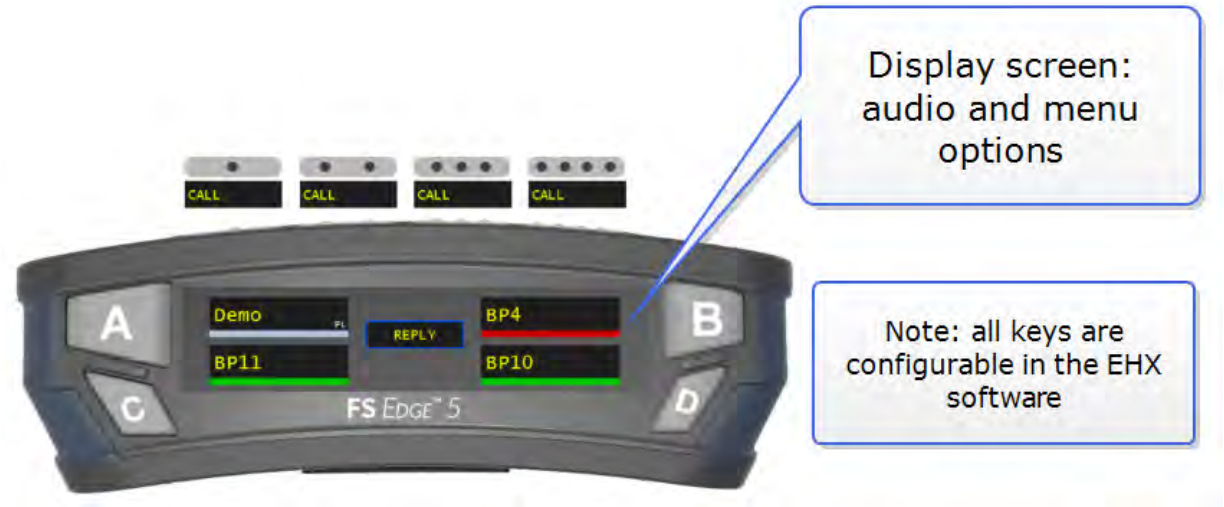
6 Operating the Edge beltpack

The FreeSpeak Edge beltpack has the following features:

- Operates in the 5Gz radio frequency range giving high quality audio with very low latency (<50 ms)
- Up to 9 audio channels (with reply key re-assigned)
- Can be used without a headset (half-duplex, like a walkie-talkie)
- Easy USB and over-the-air (OTA) registration of beltpack to system
- Build-in flashlight
- Touch sensitive reply key with haptic feedback (vibrate)
- Intuitive setup of channels using a 'drag and drop' interface
- 9 keys are fully user configurable so the beltpack is very flexible in use
- Beltpack menu system for control of audio preferences (for instance, volume, display, dark mode) and system connect.

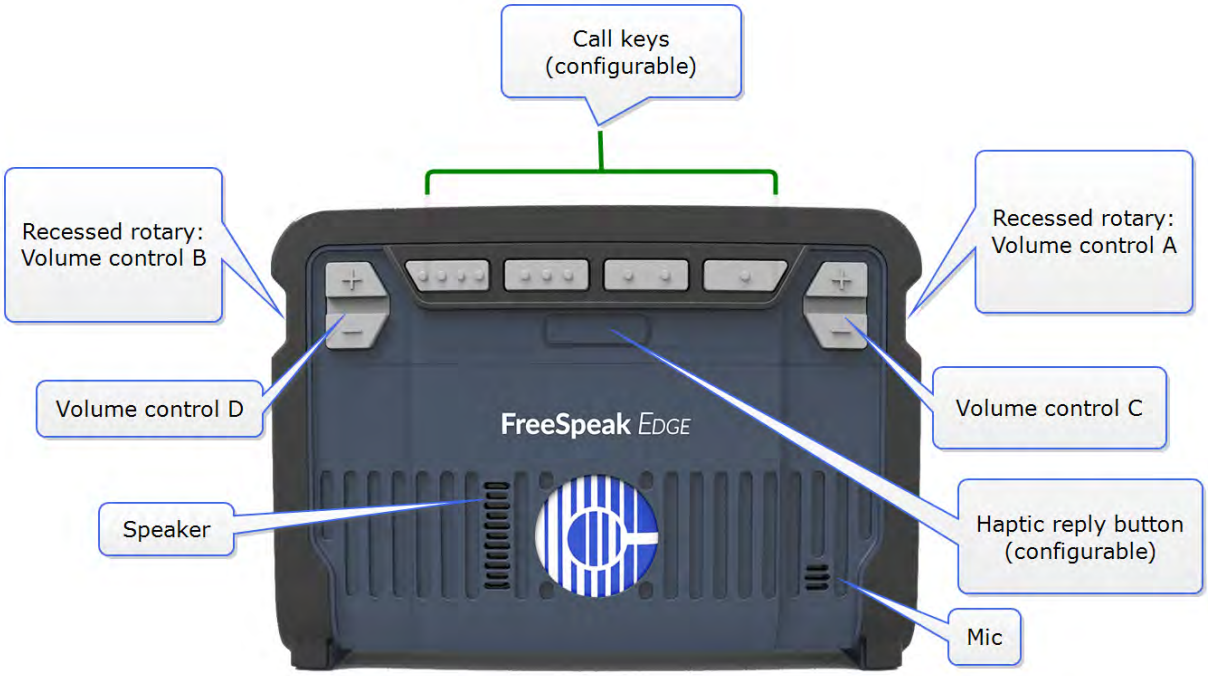
6.1 Top controls and display

A configured Edge beltpack is shown below, with 4 channels (A,B,C,D) and 4 call keys.

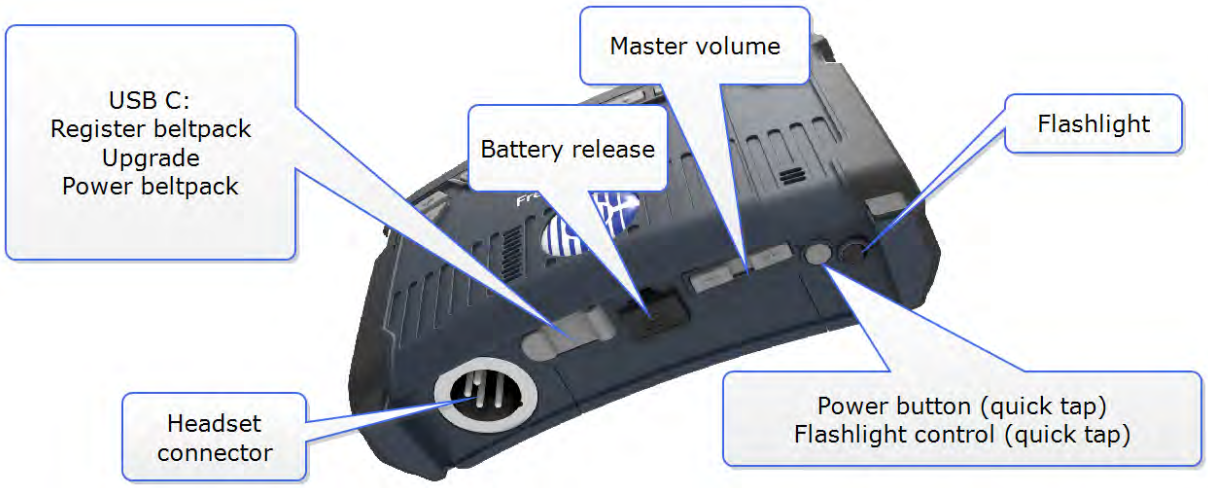


The function of keys A,B,C,D are defined by a role in the EHX software. See Beltpack roles on page 27 for more information.

6.2 Front controls



6.3 Beltpack bottom connectors



6.4 Beltpack batteries and power

The beltpack can be powered by:

- Li-ion batteries (supplied with the beltpack)
- USB cable (the beltpack battery can also be charged this way)

You can charge the beltpack by using the beltpack charger. Place up to four beltpacks in the charger bay. It takes about five hours to charge beltpack.

Note: *You can also remove a battery from a beltpack and charge the battery in the charger. It takes about three hours to charge a battery.*

6.4.1 Beltpack batteries

The following specifications apply to the BAT80 batteries.

- Capacity (mA) - 4400mAh
- How long in beltpack - 12 hours

  Note: *If the beltpack loudspeaker is used, this figure is lower.*
- Charge time:
  - Cradle - 3.5 to 4 hours @ 25°C
  - USB - 3.5 to 4 hours @ 25°C
- Battery life: how many cycles - 500 cycles

6.4.2 Powering on/off

The beltpack powers on and off using a long press on the power button.

Automatic power up

The beltpack powers up automatically with or without the battery when the USB is connected or when the beltpack is inserted into the cradle. To power up the beltpack using the power button, the USB and the cradle must be disconnected and a properly charged battery must be inserted.

Shut down

As well as using the power button, beltpack can also be shut down using the 'shutdown' option in the Administration menu.

Note: *The beltpack will only shut down if the USB and the cradle are disconnected, otherwise it will reboot.*

6.5 Menu mode

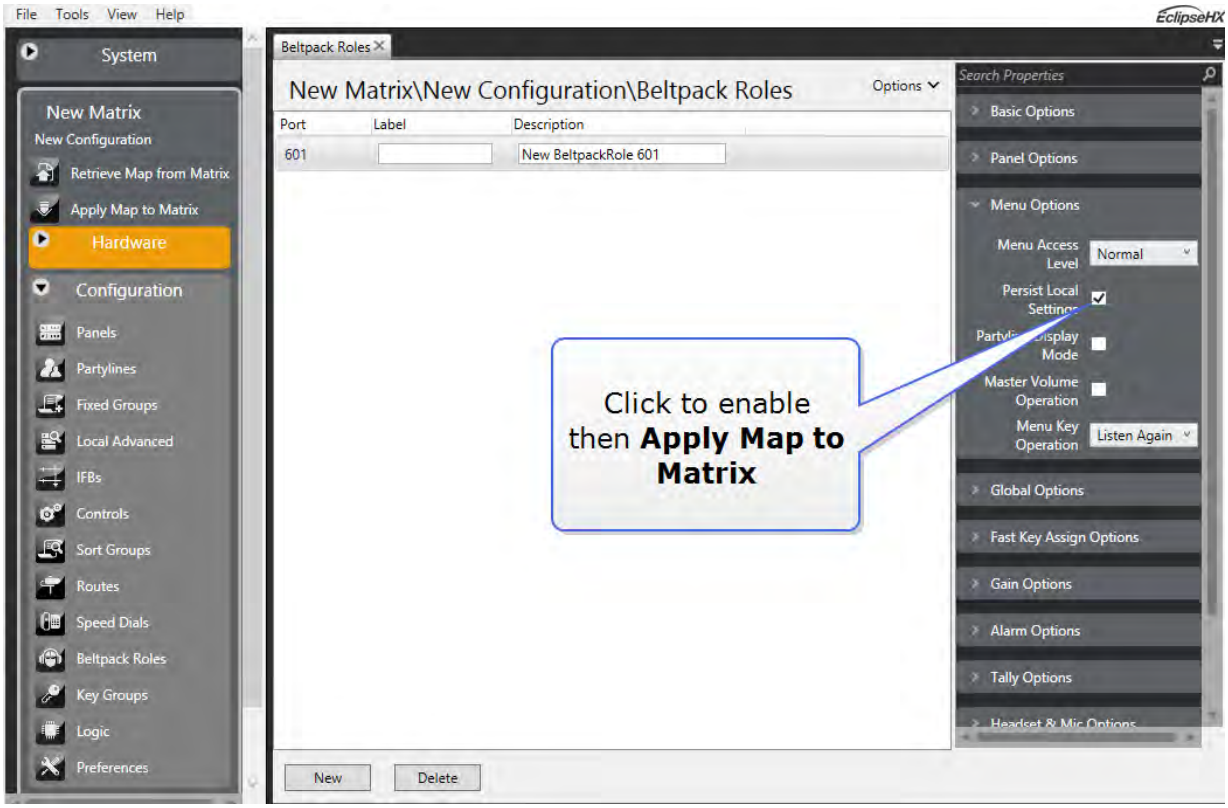
Although the beltpack is controlled from the EHX configuration software by default, it also has a menu system available in the beltpack display screen.

6.6 Use/persist local settings (beltpacks)

Beltpack preferences, for example; volume, sidetone, alert behavior and display brightness, are centrally controlled by the configuration software. These variables can be changed on the beltpack using the beltpack menu system, but they will not persist over power cycles. To save your beltpack preferences through power cycles use the **Use/Persist Local Settings** feature.

6.6.1 Enable **Use/Persist Local Settings** (EHX)

1. In the EHX software navigate to: **Matrix>Configuration>Beltpack Roles>Beltpack>Preferences>Menu Options>Persist Local Settings**.
2. Click to check **Persist Local Settings**.

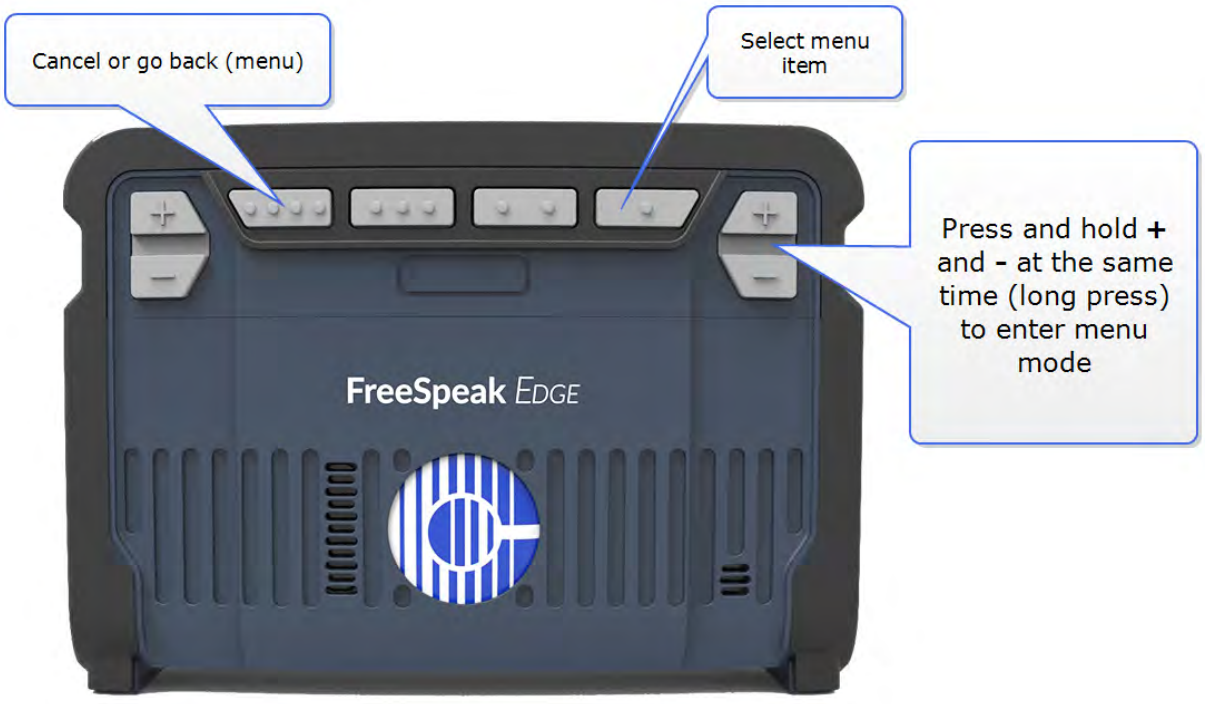


6.6.2 Enable Use/Persist Local Settings (beltpack menu)

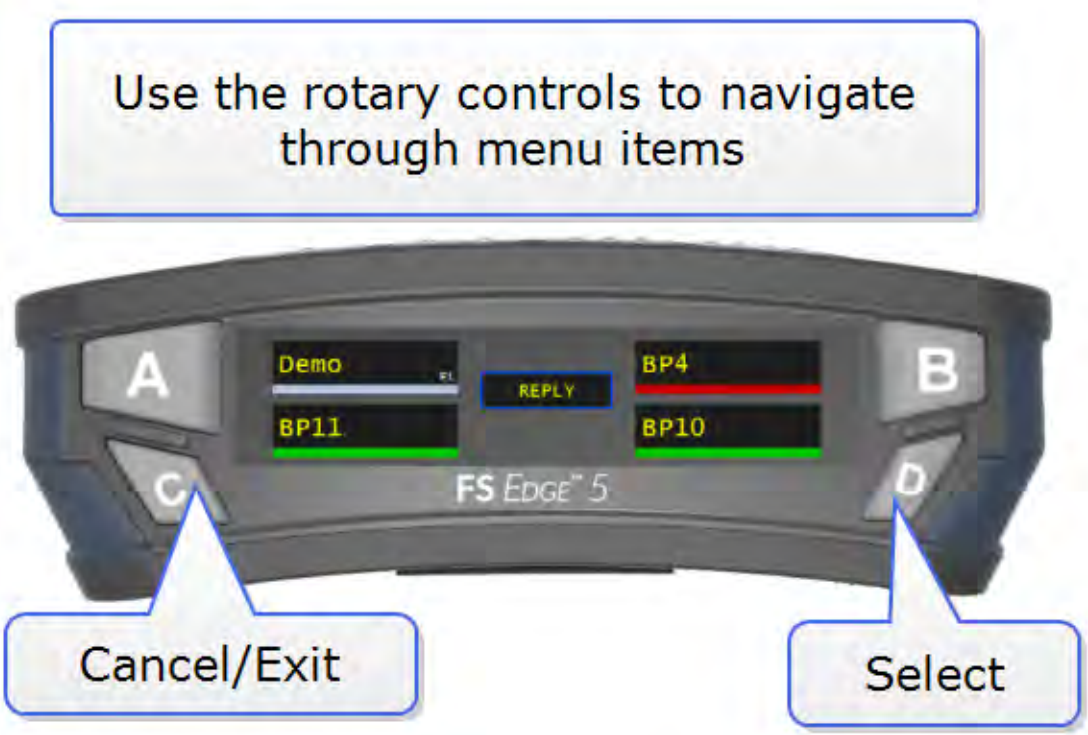
1. In the beltpack menu, navigate to **Roles>Role Default Set**.
2. To disable this feature and return beltpack control to the configuration software, uncheck this setting in the configuration software.

6.7 Edge beltpack menu access

To enter menu mode on an Edge beltpack, press and hold the **+** and **-** keys at the same time (2 second press).



Once in the menu, use, the rotary keys to scroll through the list. Use the **D** key to select a menu item. Use the **C** key to go back.



Use the **C** key to exit menu mode, or allow it to time out.

Note: *When in menu mode you can also use the "." and "...." keys to select and cancel menu options.*

Note: *The beltpack has four menu levels that are defined by the beltpack role: advanced, normal, basic and none . To change the menu level access from your beltpack you must input the menu access pin code. By default this is 4632. To find the menu access code in the configuration software navigate to:* ***Matrix>Configuration>Preferences>Menu Access Code****. If you change the menu access code in the configuration software, you must* ***Apply Map to Matrix*** *for the change to take effect.*

6.8 FreeSpeak Edge beltpack menus

FreeSpeak Edge beltpacks can be configured from the device menu system. The variables you can program from the beltpack are shown below.

Note: *Menu options can be set to 4 different levels: advanced, normal, basic and none.*

Note: *Menu access levels can be changed from the beltpack menu (under Administration) or from the configuration tool (EHX). To change menu level access from the beltpack you need your system administration code (default: 4632). To find the system administration code navigate to:* ***EHX>Matrix>Configuration>Preferences>System Access Codes****.*

6.8.1 Advanced menu options

The following tables list the Advanced menu options.

Speaker

Menu item	Description
On/off	Speaker **On** allows the beltpack to be used without the headset with simplex (one way) audio. The beltpack is used like a walkie-talkie. Speaker **Off** returns audio to the headset (usually duplex, depending on configuration).

Audio

Menu item	Description
Volume Level Control	• Master volume: -70 to 0 dB • Keys A,B,C,D, 1,2,3,4: -80 to 12.1 dB
Headset Options	• Sidetone control: tracking, non tracking, disabled • Sidetone level: -70 dB to 0 dB • Headphone gain: 0, 3, 6 dB • Limiter: -12 to 8 dB/Off. The limiter prevents audio getting too loud (potential ear damage). • Low level limit: Off/ -21, -12, -6 dB. The low level limit prevents audio being so low that it cannot be heard and seems to be broken. • Mic Type: Electret, dynamic, auto detection*
Eavesdropping	**On**/**Off**. When Eavesdropping is **On**, you don't need to have a talk route open (a key pressed) for your beltpack to transmit audio. Eavesdropping is separate from mic on/off. When the mic is off audio cannot be transmitted.
Contour filter	**On**/**Off.**

*If automatic headset detection is **On**:

- Dynamic headset is detected if microphone impedance is between 90 – 320 Ohms
- Electret headset is detected if microphone impedance is between 1.3 – 6.5 kOhms.

Beltpack settings

Menu item	Description
Flashlight	The power button is the default control for the flashlight but it can also be turned on and off from the menu
Call alert mode	Off, audio, vibrate, both
Low battery alert mode	Off, audio vibrate, both
Alarm battery threshold	0 - 100% (5% increments)
Out/zone alert mode	Off/audio, vibrate, both.
Haptic feedback	• Enable • Disable • Use this setting to disable the vibrate mechanism on the reply button. Touching the reply key will still send a call signal when haptic feedback is disabled.

Brightness settings

Menu item	Description
Dark mode	• Off • On • Dark mode turns the beltpack screen display off completely. For use in environments that need a blackout.
Display brightness	Very low, low, medium, high, very high
Display dim timeout	Off/5 to 120 seconds (5 second increments)
Display off timeout	5 to 120 seconds (5 second increments)

System

Menu item	Description

System	• System connect. Use this to register and connect the beltpack. The beltpack must be registered to a system before it can connect.
	• System delete. Unregister the beltpack from a previous system.
	• Standalone mode (visible only in standalone mode)
	  • Name (read only)
	  • IP address (read only)
	  • RF channel 1 (select available channel)
	  • RF channel 2 (select available channel)
	  • Tx power applied (select the transceiver power in dBm).

Note: Only RF channels and RF power options that are compliant with Edge system WRR (wireless regulatory region) are available on the beltpack's menu. The Edge system's WRR is defined by the transceiver, which is the master device and contains a fixed WRR setting.	

Administration

Menu item	Description
Software info	Software version information
Reset settings	This clears all preferences (audio, beltpack, display) and roles to default settings (no role)
Reset to default	This clears all preferences and roles to default AND clears all system registrations
Reboot	Power cycle the beltpack
Shutdown	Switch the beltpack off
Menu Access Level	Select access level (pin protected)

Diagnostics

Menu item	Description
Site Survey	• RPN (transceiver) • Channels • Signal strength • Packet loss • # beltpack • Overall score
Connection status	RF channel 1 and 2: • Signal strength • Packet loss • Skipped (?) • Channel number
Channel scan	The beltpack reboots before it enters channel scan mode.
Battery status	% charge, battery power in V and mA, temperature, lifetime in charge cycles, time-to-empty.
Hardware	Beltpack ID, serial number

6.8.2 Normal menu options

The following tables list the Normal menu options.

Speaker

Menu item	Description
On/off	Speaker **On** allows the beltpack to be used without the headset with simplex (one way) audio. The beltpack is used like a walkie-talkie. Speaker **Off** returns audio to the headset (usually duplex, depending on configuration).

Audio settings

Menu item	Description
Volume control	• Master volume: -70 to 0 dB • Sidetone: -70 to 0 dB
Headset options	• Sidetone control: tracking, non tracking, disabled • Sidetone level • Headphone gain: 0, 3, 6 dB • Limiter: -12 to 8 dB/Off • Low level limit: Off/ -21, -12, -6 dB • Mic Type: Electret, dynamic, auto detection
Contour filter	On/Off

Beltpack settings

Menu item	Description
Flashlight	The power button is the default control for the flashlight
Call alert	Off, audio, vibrate, both
Alarm battery alert	Off, audio, vibrate, both
Low battery threshold	0 - 100% (5% increments)
Out/zone alert	Audio, vibrate, both
Haptic feedback	• Enable • Disable • Use this setting to disable the vibrate mechanism on the reply button. Touching the reply key will still send a call signal when haptic feedback is disabled.

Brightness settings

Menu item	Description
Dark mode	• Off • On • Dark mode turns the beltpack screen display off completely. For use in environments that need a blackout.
Display brightness	Very low, low, medium, high, very high
Display dim timeout	Off/5 to 120 seconds (5 second increments)
Display off timeout	5 to 120 seconds (5 second increments)

System

Menu item	Description

System	• System connect. Use this to register and connect the beltpack. The beltpack must be registered to a system before it can connect.
	• System delete. Unregister the beltpack from a previous system.
	• Standalone mode (visible only in standalone mode)
	  • Name (read only)
	  • IP address (read only)
	  • RF channel 1 (select available channel)
	  • RF channel 2 (select available channel)
	  • Tx power applied (select the transceiver power in dBm).

Note: Only RF channels and RF power options that are compliant with Edge system WRR (wireless regulatory region) are available on the beltpack's menu. The Edge system's WRR is defined by the transceiver, which is the master device and contains a fixed WRR setting.	

Administration

Menu item	Description
Software info	Software version informatiion
Reboot	Power cycle the beltpack
Shutdown	Switch the beltpack off
Menu access level	Select access level (pin protected)

Diagnostics

Menu item	Description
Site survey	• RPN (transceiver) • Channels • Signal strength • Packet loss • # beltpack • Overall score
Connection status	RF channel 1 and 2: • Signal strength • Packet loss • Skipped (?) • Channel number
Channel scan	The beltpack reboots before it enters channel scan mode.
Battery status	% charge, battery power in V and mA, temperature, lifetime in charge cycles, time-to-empty.
Hardware	Beltpack ID, serial number

6.8.3 Basic menu options

The following tables list the Basic menu options.

Speaker

Menu item	Description
On/off	Speaker **On** allows the beltpack to be used without the headset with simplex (one way) audio. The beltpack is used like a walkie-talkie. Speaker **Off** returns audio to the headset (usually duplex, depending on configuration).

Audio settings

Menu item	Description
Volume level control	• Master volume gain • Keysets A, B, C, D and 1, 2, 3, 4 • 4/8 channels
Contour filter	On/Off

Beltpack settings

Menu item	Description
Haptic feedback	• Enable • Disable • Use this setting to disable the vibrate mechanism on the reply button. Touching the reply key will still send a call signal when haptic feedback is disabled.

Brightness settings

Menu item	Description
Dark mode	• Off • On • Dark mode turns the beltpack screen display off completely. For use in environments that need a blackout.

System

Menu item	Description

System	• System connect. Use this to register and connect the beltpack. The beltpack must be registered to a system before it can connect.
	• System delete. Unregister the beltpack from a previous system.
	• Standalone mode (visible only in standalone mode)
	  • Name (read only)
	  • IP address (read only)
	  • RF channel 1 (select available channel)
	  • RF channel 2 (select available channel)
	  • Tx power applied (select the transceiver power in dBm).

Note: Only RF channels and RF power options that are compliant with Edge system WRR (wireless regulatory region) are available on the beltpack's menu. The Edge system's WRR is defined by the transceiver, which is the master device and contains a fixed WRR setting.	

Administration

Menu item	Description
Software info	Software version informatiion
Reboot	Power cycle the beltpack
Shutdown	Switch the beltpack off
Menu access level	Select access level (pin protected)

Diagnostics

Menu item	Description
Site survey	• RPN (transceiver) • Channels • Signal strength • Packet loss • # beltpack • Overall score
Connection status	RF channel 1 and 2: • Signal strength • Packet loss • Skipped (?) • Channel number
Channel scan	The beltpack reboots before it enters channel scan mode.
Battery status	% charge, battery power in V and mA, temperature, lifetime in charge cycles, time-to-empty.
Hardware	Beltpack ID, serial number

6.8.4 Menu option for 'None'

The following tables list the menu options for 'None'.

Speaker

Menu item	Description
On/off	Speaker **On** allows the beltpack to be used without the headset with simplex (one way) audio. The beltpack is used like a walkie-talkie. Speaker **Off** returns audio to the headset (usually duplex, depending on configuration).

System

Menu item	Description
System	• System connect. Use this to register and connect the beltpack. The beltpack must be registered to a system before it can connect. • System delete. Unregister the beltpack from a previous system.
Note: Only RF channels and RF power options that are compliant with Edge system WRR (wireless regulatory region) are available on the beltpack's menu. The Edge system's WRR is defined by the transceiver, which is the master device and contains a fixed WRR setting.	

Administration

Menu item	Description
Software info	Software version informatiion
Reboot	Power cycle the beltpack
Shutdown	Switch the beltpack off
Menu access level	Select access level (pin protected)

Diagnostics

Menu item	Description
Site survey	• RPN (transceiver) • Channels • Signal strength • Packet loss • # beltpack • Overall score
Connection status	RF channel 1 and 2: • Signal strength • Packet loss • Skipped (?) • Channel number
Channel scan	The beltpack reboots before it enters channel scan mode.
Battery status	% charge, battery power in V and mA, temperature, lifetime in charge cycles, time-to-empty.
Hardware	Beltpack ID, serial number

6.8.5 Offline menu options

The following tables list the Offline menu options. These menu options apply when the beltpack is not connected to a FreeSpeak Edge system.

System

Menu item	Description
System	• System connect. Use this to register and connect the beltpack. The beltpack must be registered to a system before it can connect. • System delete. Unregister the beltpack from a previous system.
Note: Only RF channels and RF power options that are compliant with Edge system WRR (wireless regulatory region) are available on the beltpack's menu. The Edge system's WRR is defined by the transceiver, which is the master device and contains a fixed WRR setting.	

Administration

Menu item	Description
Software info	Software version informatiion
Reboot	Power cycle the beltpack
Shutdown	Switch the beltpack off

Diagnostics

Menu item	Description
Site survey	• RPN (transceiver) • Channels • Signal strength • Packet loss • # beltpack • Overall score
Connection status	RF channel 1 and 2: • Signal strength • Packet loss • Skipped (?) • Channel number
Channel scan	The beltpack reboots before it enters channel scan mode.
Battery status	% charge, battery power in V and mA, temperature, lifetime in charge cycles, time-to-empty.
Hardware	Beltpack ID, serial number

7 Operating the Edge transceiver

The FreeSpeak Edge transceiver has multiple radios and antennas (antenna diversity). The device receives and transmits over 2 radio channels and the radios are in continuous use in order to make the best use of whatever signal paths are available between the transceiver and the beltpacks. The two swivel blade antennas provided with the device can be angled for optimum coverage of your intercom environment. These antennas provide a doughnut-shaped (toroidal) coverage zone and are designed to work together to provide complete coverage of the RF zone.

The transceiver uses natural convection for cooling purposes, there are no moving parts (fans).

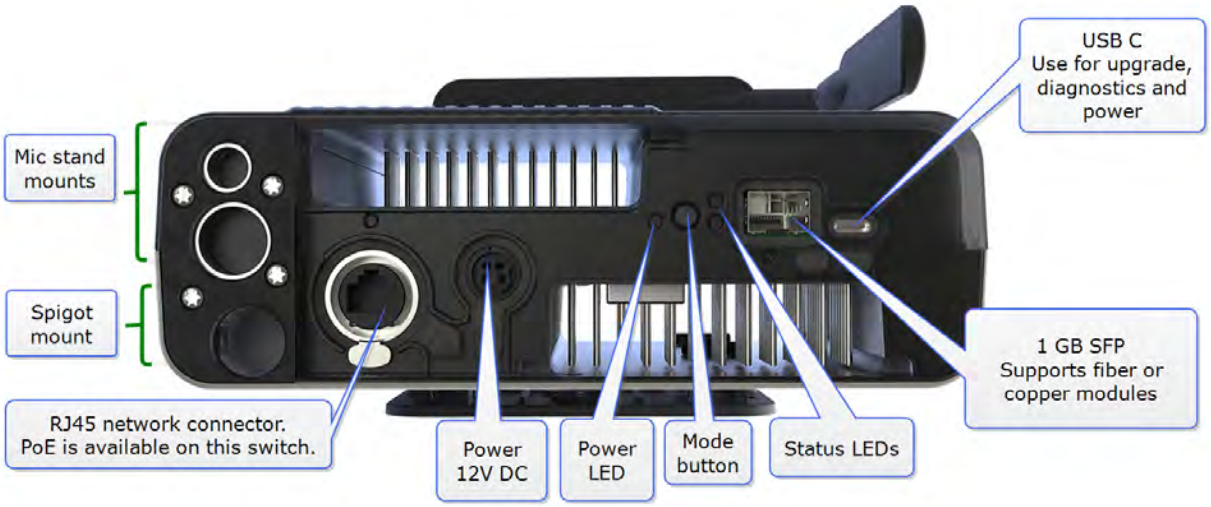
7.1 IP rating (Protection Marking)

The Edge transceiver has a rating of IP 53. It can be mounted outside and will be resistant to weather conditions and also water spray.

To ensure that the device cooling mechanism works optimally, and to achieve the IP rating, the FreeSpeak Edge transceiver must be fixed in an upright position.

See **Installing the FreeSpeak Edge transceiver on page 10** for details.

7.2 FreeSpeak Edge transceiver connector panel



7.3 Powering the transceiver

The transceivers can use:

- Power over Ethernet (PoE). Connect to LAN 1 RJ45.

  Note: *The transceiver is a Class 3 PoE device.*

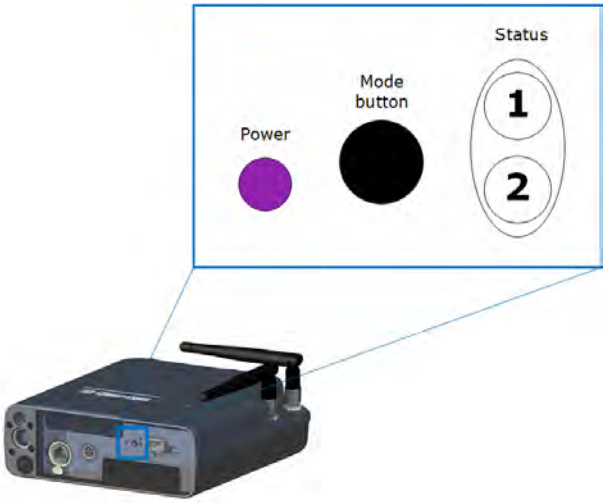
- Local power. Use the supplied power supply (12V DC 5 amp).
- USB power from a USB battery pack. For standalone mode, this is 3 A, 5V.

7.3.1 Power redundancy

You can simultaneously power the FreeSpeak Edge transceiver using a local power supply and PoE. In this case, the following applies:

- If the transceiver is using a local power supply, adding a PoE connection causes no power interruption.
- If the transceiver is using a PoE connection, adding a local power supply interrupts the power supply for 1 to 2 seconds.
- If the transceiver is using both local and PoE, if you remove the local power supply connection, the power supply is interrupted for 1 to 2 seconds and then continues using the PoE supply.
- If the transceiver is using both local and PoE, if you remove the PoE connection, the transceiver continues to operate without interruption using the local power supply.

7.4 Edge transceiver status LEDs



The status LEDs are also visible from the top of the transceiver.

Transceiver start up sequence

Transceiver state	Status LEDs	LED flash rate and color
Transceiver booting	1 2	1 and 2 steady blue (up to 3 mins)
No connection with the Eclipse matrix frame	1 2	1 and 2 flash white (up to 2 mins)
Acquiring PTP	1 2	1 and 2 flash purple (up to 2 mins)
PTP locked	1 2	1 and 2 steady purple
DFS channel availability check (1 minute per channel). DFS radio channels are scanned to check for radar activity before they are selected for use. Scanning occurs during the PTP and Radio sync processes. If no DFS channels are selected you will not see this stage.	1 2 1 2	1 and 2 flash blue/purple (1 min) or blue/yellow (1 min)
Acquiring radio sync	1 2	1 and 2 flash yellow (up to 2 mins)
Transceiver online and ready for beltpack connection	1 2	1 and 2 steady yellow

Standalone mode

To enter standalone mode, press and hold the mode button while simultaneously powering the device.

Transceiver state	Status LEDs	Flash rate color
Transceiver has entered standalone mode Release the mode button	1 2	1 and 2 steady yellow
Transceiver is in standalone mode and is ready for beltpack connection.	1 2	1 is steady yellow. LED 2 flashes yellow (double flash).
For PTP and radio sync indicators see the transceiver start up sequence table above.		

Radar detected in channel

Transceiver state	LED Flash rate and color
Radar detected in a channel	2 double red flash

Other Indicators

Transceiver state	LED Flash rate and color
Read/write activity	1 and 2 flash light blue
Software upgrade in process	1 and 2 flash blue
Software upgrade fail	1 and 2 flash red
Software upgrade succeeded	1 and 2 flash green
Transceiver too cold	1 flashes light blue fast
Transceiver too hot	1 flashes red fast
Hardware failures	2 flashes red fast

Mode indicators

To activate modes, press and hold the mode button for a certain number of seconds.

Press and hold the mode button	Mode	Feature
Status LED 2 shows mode selection.		
< 3 seconds	1	Clear mode selection
> 3 < 6 seconds	2	Identify me feature. LED 2 white for 1 second then color mix flashing
> 6 < 9 seconds	3	LED 2 green. No feature.
> 9 < 12 seconds	4	LED 2 yellow. No feature.
> 12 seconds	5	LED 2 red. Reset the transceiver to default settings. The device will also reboot.

7.5 Reset the transceiver to default

To reset the IP Transceiver to default:

1. Press and hold the Mode button for at least 12 seconds. When the transceiver status light turns red the device will have entered reset mode and you can release the mode button.

This will reset the IP Transceiver and remove any stored diagnostics.

Note: *Reset can take up to 5 minutes.*

- The Admin and the audio (AES67) IP addresses are reset to DHCP
- Channel selection will be reset to the default
- You will need to reconnect the transceiver to the matrix as it will be removed from the EHX configuration

7.6 Port security settings

The following port security settings apply for the IP Transceiver.

Note: *All ports are closed by default, and the firewall is enabled.*

Port	Setting
AES67 Admin	DHCP (67, 68) mDNS (5553) HTTP (80, 8080, 443) rsync (873) IVP port is configurable
AES67 Audio	DHCP (67, 68) PTP (319, 320) mDNS (5353) IVP (6001) HTTP (8080)

7.7 Network and synchronization

The following network and synchronization information applies:

- The transceiver is shipped with DHCP enabled (default). The transceiver supports static IP addressing, but if you use a static IP you will need to enter two static IP addresses.
- When the transceiver is reset to default it will revert to DHCP mode, and the AES67 Admin interface is set to DHCP.
- When budgeting for network bandwidth be aware that the transceiver will take a bandwidth of approximately 10 Mbps.
- Be aware that in order to achieve reliable radio sync, your AES67 network has a lower tolerance of jitter and delay than other AoIP networks.
- If the AES67 IP address on the transceiver changes, the device will reboot. This may take up to 5 minutes.

7.8 General network and switching rules

The following table lists general system and switch requirements for small, medium and large configurations.

System size	Configuration	Switch requirements
Small	Up to 10 IPTs Up to three layer-2 hops between the PTP master and IPTs Clear-Com AES67 traffic only	DiffServ QoS
Medium	10 to 30 IPTs Up to three layer-2 hops between PTP master and IPTs Clear-Com AES67 traffic only	DiffServ QoS IGMP Snooping IGMP Querier
Large	More than 30 IPTs More than four layer-2 hops between PTP master and IPTs Mixed network traffic	DiffServ QoS IGMP Snooping IGMP Querier PTP Transparent and/or Boundary clocks

7.9 Spare parts

The IP Transceiver has the following spare parts.

- SFP-MMFO-2G-SX 2GBPS MM SX FIBER SFP
- SFP-SMFO-2G-LX 2GBPS SM LX FIBER SFP
- 453G032-2 Power Supply Unit 12VDC 60W LVL 6 SWITCHING

8 Upgrading FreeSpeak Edge

This section tells you how to upgrade your transceiver and beltpacks.

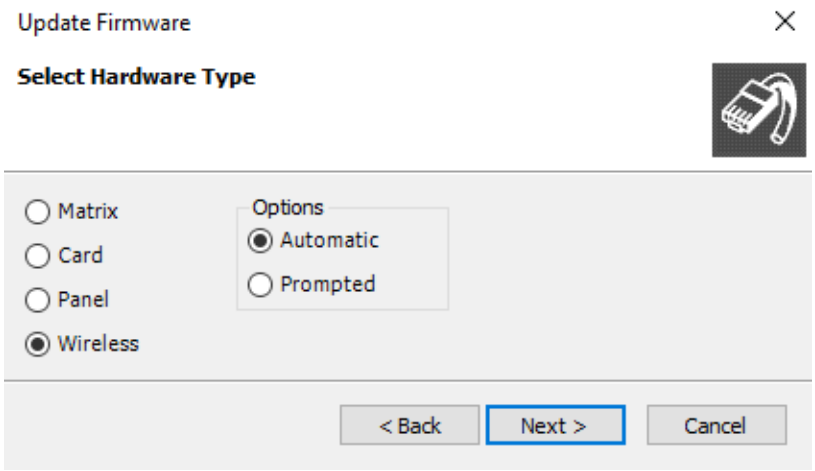
8.1 Upgrading FreeSpeak Edge transceivers

You can upgrade the transceiver firmware by:

- Upgrading from the matrix (the file extension for the upgrade firmware is .ccf)
- Using a USB connection (the file extension for the upgrade firmware is .ccf)

8.1.1 Upgrading from the matrix

1. Right-click on the Frame in the Layout window, and then select **Firmware > Update Firmware**. The Update Firmware Wizard appears.
2. Select **Next**. The following screen appears:



Note: For the Edge transceivers, the Auto/Promoted radio button is always set to Auto.

3. Select the **Wireless radio** button.
4. Select **Next**, and then browse to the upgrade file (.ccf) and select **Open**. The upgrade file is loaded to the transceiver, and the transceiver restarts.

You can track the status of the download in the EHX Event Log.

8.1.2 Upgrading by USB connection

Place the *.ccf upgrade image onto a USB stick in a folder named *firmware_upgrade* located in the root of the USB FAT32 file system.

Note: *Make sure that there is only one upgrade image in the folder. If not, the incorrect image might be upgraded.*

The upgrade will begin automatically when you insert the USB stick.

Note: *Both status LEDs will flash light blue once per second for 5 seconds on successful detection of the upgrade file. Both status LEDs will light solid red if there is an error during the upgrade. When upgrade is complete, both status LEDs will flash green.*

8.2 Upgrading FreeSpeak Edge beltpacks

You can upgrade the FreeSpeak II beltpack firmware by:

- Using a USB connection (the upgrade file for USB has a .ccu extension).
- Using an Over The Air upgrade.

8.2.1 Upgrading by USB connection

1. Connect the beltpack to a USB port on the computer running the EHX software.
2. Select **Tools > Apply Wireless Firmware Via USB**.
3. Browse to the location of the upgrade file, and then select Update Firmware. The upgrade file for USB has a .ccu extension.

The upgrade file is downloaded to the beltpack or transceiver.

Note: *FreeSpeak Edge beltpacks must be upgraded individually.*

8.2.2 Upgrading beltpack firmware by Over The Air Upgrade

Note: *You must first upgrade the transceivers before upgrading the beltpacks.*

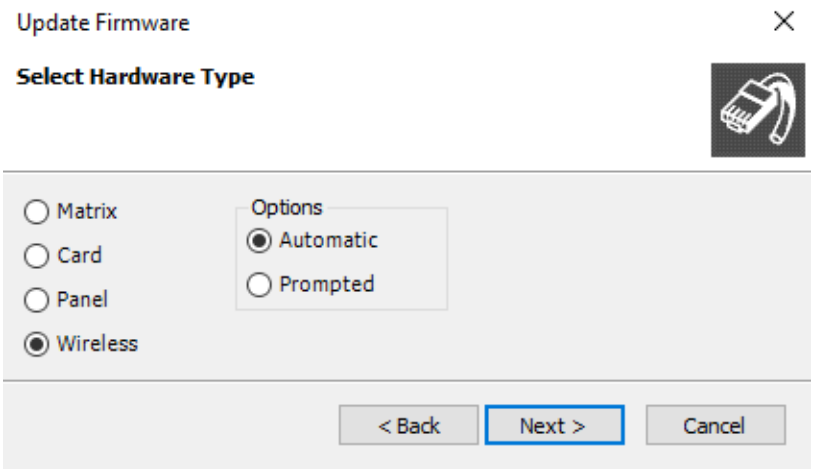
Note: *When enable OTA registration on the beltpack is on, upgrade is disabled. Upgrade is re-enabled when registration is finished.*

Note: *FreeSpeak Edge beltpacks must be upgraded one by one.*

Note: *For OTA upgrade, the beltpack must be within 15- 20 meters (50 to 66 feet) of the transceiver.*

1. Right-click on the Frame in the Layout window, and then select **Firmware > Update Firmware**. The Update Firmware Wizard appears.

2. Select Next. The following screen appears:



3. Select the **Wireless radio** button. Select the **Automatic** option.

4. Select **Next**, and then browse to the upgrade file (.ccu) and select **Open**. The upgrade file is downloaded to the connected beltpack.

Upgrade status is shown on the beltpack display and also in the EHX Event Log..

9 Specifications

9.1 FreeSpeak Edge beltpack

Specification	Value
Audio bandwidth	200 to 12 kHz
Mode of operations	Full duplex on all routes
Beltpack frequency response	100 Hz to 12 kHz
Beltpack assignment-select buttons	2, used to edit beltpack menu options
Number of simultaneous full-duplex audio paths	Up to 9
Level/talk controls	9 push buttons, 5 level controls (2 rotary and 2 button level controls, with 1 master level control)
Frequency spectrum	5170 to 5875 MHz (20 MHz channels set by country)
Output power	Adjustable from 1 to 24 dBm (maximum output power is determined by selected channel and country)
Modulation	Orthogonal Frequency-Division Modulation (OFDM)
Headset connector	4-pin male, Clear-Com standard, options for 5-pin female and 7-pin male with PTT
Headphone impedance	≥32 ohm
Microphone type	Dynamic or electret, selectable in beltpack menu
Headset limiter	Selectable from beltpack menu
Battery	4400 mAh
Power	16 Wh
Typical voltage	3.6 V

Specification	Value
Battery life	12 hours
Input Level	70 to -40 dBu
Electret headphone voltage	2.3V
Microphone and Headset Limiters	Selectable
Powering	Li-Ion Battery. 4400 mAh, 16Wh
Latency for AES67	less than 50 ms
Battery Charging	In unit, using 4-way AC80 charger. Can be charged using USB C.
Battery Life	Approximately 12 hours
Range from Single Edge Transceiver	• Outdoors 60 - 90 ft (m) at maximum output • Indoors 250 - 450 ft (m) at maximum output • Range is influenced by environment • Reflective surfaces will increase the range • Adjustable power settings change range • Some 5 GHz channels in certain countries limit the transmit output (this limits the range)
Environmental	IP-54 water and dust resistance Operating: 0 to 45 degrees Celsius Storage: -30 to 70 degrees Celsius Humidity: 20 to 90% non-condensing
Dimensions	5.3 x 4.0 x 1.9 inches (134.9 x 103.3 x 48.8 mm) whd
Weight	Without battery: 0.71 lb (0.37 kg) With battery: 0.96 lb (0.44 kg)

9.2 FreeSpeak Edge transceiver

Specification	Value
Beltpacks supported per transceiver	10 in one cellular zone
Frequency spectrum	5170 to 5875 (20MHz channels set by country)
Transceiver transmission range	Up to 450 m (ft.), line of sight indoors
Local powering	12VDC power supply or 5V (USB) or 48V PoE
Modulation	Orthogonal Frequency-Division Modulation (OFDM)
Output power	Adjustable from 1 to 24 dBm (maximum output power is determined by selected channel and country).
SFP module	1GB (1000Base), <250mA maximum current draw
Connection to matrix	RJ45
Mounting	Separate wall plate with various mounting options Mic stand mounts, Camera spigot mounting hole Hole for lanyard mounting
Environmental	IP54 water and dust resistance. Operating: 0 to 45 degrees Celsius Storage: -30 to 70 degrees Celsius Humidity: 20 to 90% non-condensing
Dimensions	60 x 180 x 220 mm (dwh) (2.4 x 7.0 x 8.7 inches)
Weight	Approx. 460g (16.1 oz)

9.3 FreeSpeak Edge battery charger and battery

Specification	Value
Power Supply	Input voltage: 100 to 240 Vac (50 to 60Hz) Output voltage: 12 V at 5 A (60 W) MTBF (min.) 300,000 hours (calculated hours at 25 degrees Celsius, by Telcordia SR-332)
Temperature	Operating: 0 to 45 degrees Celsius Storage: -30 to 70 degrees Celsius Humidity: 20 to 90%, non-condensing
Charger dimensions	11 x 2.8 x 7.2 inches, 279.4 x 71.1 x 182.9 mm (whd)
Charger weight	Charger alone: 1.94 lb, 0.88 kg Power supply and cord: 1.12 lb, 0.51 kg Total: 3.06 lb, 1.39 kg
Battery dimensions	2.3 x 3.3 x 0.7 inches (58.4 x 82.6 x 17.5 mm)
Battery weight	0.24 lb (0.11 kg)
Battery capacity	4400 mAh
Typical battery voltage	3.6 V
Battery power	16 Wh

9.4 Transceiver models (regional variations)

Part number	Region
FS-EDGE-TCVR-50-IP-US	United States
FS-EDGE-TCVR-50-IP-CN	Canada
FS-EDGE-TCVR-50-IP-EU	Europe
FS-EDGE-TCVR-50-IP-J	Japan
FS-EDGE-TCVR-50-IP-AU	Australia and New Zealand
FS-EDGE-TCVR-50-IP-SK	South Korea

9.5 Transmission method

Specification	Value
RF modulation	Orthogonal frequency-division multiplexing (OFDM)
Frequencies of operation and maximum RF output	Edge supports 20 MHz, ieee 5GHz channels
Theory of Operation	Dynamic allocation of frequencies and handoff of beltpacks among the transceivers up to their individual limit of up to 10 connected beltpacks at a time; each beltpack is assigned a virtual port within the matrix.

9.6 Notice about specifications

While Clear-Com makes every attempt to maintain the accuracy of the information contained in its product manuals, that information is subject to change without notice. Performance specifications included in this manual are design-center specifications and are included for customer guidance and to facilitate system installation. Actual operating performance may vary.

10 Regulatory compliance

Applicant Name: Clear-Com LLC

Applicant Address: 1301 Marina Village Pkwy, Suite 105, Alameda CA 94501, United States

Manufacturer Name: Clear-Com LLC

Manufacturer Address: 1301 Marina Village Pkwy, Suite 105, Alameda CA 94501, United States

Country of Origin: USA

Brand: Clear-Com

Caution: All products are compliant with regulatory requirements detailed in this document when the user follows all installation instructions and operating conditions per Clear-Com specifications

Caution: Use of accessories and peripherals other than those recommended by Clear-Com may void the product's compliance as well as the user's authority to operate the equipment.

Caution: All products are designed for use with the standard, integral or dedicated (external) antenna(s) that are shipped together with the equipment. Any product changes or modifications will invalidate all applicable regulatory certifications and approvals.

Caution: The use of software or firmware not supported/provided by Clear-Com products may result that the equipment is no longer compliant with the regulatory requirements.

Warning: The power adaptor is the equipment´s disconnection device. The power outlet must be located nearby the equipment and its access must be easy.

10.1 Part numbers and regulatory models

Part number	Region	Regulatory Model
AC80	-	AC80
BAT80	-	BAT80
FSE-BP50-X4	-	1409
FSE-BP50-X5	-	1409
FSE-BP50-X7	-	1409
FS-EDGE-TCVR-50-IP-US	United States	1408-US
FS-EDGE-TCVR-50-IP-CN	Canada	1408-CA
FS-EDGE-TCVR-50-IP-EU	Europe	1408-EU
FS-EDGE-TCVR-50-IP-J	Japan	1408-J
FS-EDGE-TCVR-50-IP-AU	Australia and New Zealand	1408-AZ
FS-EDGE-TCVR-50-IP-SK	South Korea	1408-KR

10.2 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.*

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.

User Restriction in the 5Ghz band: The device for the band 5150-5250MHz is only for indoor usage to reduce potential for harmful interference to cochannel mobile satellite systems.

10.3 FCC/IC/EC RF exposure warning

This product complies with FCC/IC/EC radiation exposure limits set forth for an uncontrolled environment.

Produits Clear-Com sont conformes aux limites IC d'exposition aux rayonnements définies pour un environnement non contrôlé.

This product may not be co-located or operated in conjunction with any other antenna or transmitter.

Cet appareil et son antenne (s) ne doit pas être co-localisés ou fonctionnement en association avec une autre antenne ou transmetteur.

The beltpack has been tested to comply with FCC/IC/EC RF Exposure requirements in body-worn position. Use of third-party clips or holsters with the beltpack may not ensure compliance with FCC/IC/EC RF exposure requirements and should be avoided.

To comply with FCC/IC/EC RF exposure requirements, the base transceiver unit must be installed and operated at least 20 cm (8 inches) from any person.

Produits Clear-Com doivent être installés et utilisés avec distance minimum de 20cm entre le radiateur et votre corps.

10.4 Industry canada compliance statement

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est soumise aux deux conditions suivantes:

(1) cet appareil ne doit pas provoquer d'interféence, et

(2) cet appareil doit accepter toute interféence radioéectrique subie, mêe si l'interféence est susceptible d'en compromettre le fonctionnement.

Cet éetteur exempt de licence est éuipéd'une antenne intéré. Cet éetteur exempt de licence n'est pas autoriséàfonctionner avec une autre antenne.

Cet appareil et son antenne (s) ne doit pas être co-localisés ou fonctionnement en association avec une autre antenne ou transmetteur.

Cet appareil numérique de la class[A] est conforme à la norme NMB-003 du Canada.

This Class[A] digital device complies with Canadian ICES-003.

Restrictions d'utilisation dans la bande 5 GHz: L'appareil pour la bande de 5150 a 5250MHz est concupour usage a l'interieur seulement afin de reduire le potentiel d interferences pour les systemes mobiles par satellite qui utilisent le meme canal.

User Restriction in the 5Ghz band: The device for the band 5150-5250MHz is only for indoor usage to reduce potential for harmful interference to co-channel mobile satellite systems.

Jusqu'a nouvel ordre, les appareils faisant l'objet de la presente section ne doivent pas transmettre dans la bande 5600-5650 MHz, afin que les radars meteorologiques d'Environnement Canada fonctionnant dans cette bande soient proteges.

Until further notice, devices subject to this Section shall not be capable of transmitting in the band 5600-5650MHz, so that environmental weather radars operating in this band are protected.

10.5 Korean notice

A급 기기 (업무용 방송통신기자재)

이 기기는 업무용(A급)으로 전자파적합기기로

서 판매자 또는 사용자는 이 점을 주의하시기

바라며, 가정외의 지역에서 사용하는 것을 목

적으로 합니다.

KCC 2.4Ghz and 5725-5850MHz warning: Life-related safety services cannot be provided because the radio equipment may have radio interference.

해당 무선설비는 전파혼신 가능성이 있으므로 인명안전과 관련된 서비스는 할 수 없음

10.6 Japan notice

電波法の規定により5GHz帯(W52、W53) は屋内使用に限ります。

User Restriction in the 5Ghz band: The 5Ghz bands (W52 and W53), which corresponds to 5150-5350Mhz, are restricted to indoor use only according to the provisions of the Radio Law

Warning: Under the Japanese Radio Equipment Category of Low Power Data Communications System in the 5Ghz, the usage of U-NII-3 band (5745-5825Mhz) is not allowed.

10.7 Australia compliance statement

User Restriction in the 5Ghz band: This device is restricted to indoor use only when operating in 5150-5350MHz.

Until further notice, devices subject to this Section shall not be capable of transmitting in the band 5600-5650MHz, so that environmental weather radars operating in this band are protected.

10.8 New Zealand compliance statement

User Restriction in the 5Ghz band: This device is restricted to indoor use only when operating in 5150-5250MHz.

10.9 European Union (CE mark)

The CE marking indicates compliance with the following directives and standards, whenever applicable to the product in question.

10.9.1 Directives:

Radio Equipment Directive 2014/53/EU

Electromagnetic Compatibility Directive 2014/30/EU

Low Voltage Directive 2014/35/EU

RoHS Directive 2011/65/EU and 2015/863/EU

10.9.2 Standards

EN55022/EN55032

EN55024/ EN55035

IEC/EN62368-1

EN300328

EN301893

EN301489

EN50581

Warning: 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.

User Restriction in the 5Ghz band: This device is restricted to indoor use only when operating in 5150-5350MHz for below EU member states.

AT	BE	BG	CZ	DK
EE	FR	DE	IS	IE
IT	EL	ES	CY	LV
LI	LT	LU	HU	MT
NL	NO	PL	PT	RO
SI	SK	TR	FI	SE
CH	UK	HR		

Caution: Although Europe allows 5600-5650Mhz band, these DFS channels 120, 124 and

128 must perform a 10 minutes radar scanning (also known as CAC - Channel Availability Check) before becoming an operating channel.

10.10 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.

10.10.1 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.

10.11 General Battery Safety Instructions for Battery Models: BAT41, BAT50, BAT60, BAT70, BAT80

BAT80 batteries are specifically designed only for use with product(s) offered by: HM Electronics Inc. (HME) Clear-Com LLC, an HME Company

SAFETY PRECAUTIONS: To ensure the safety and reliability of your Battery, follow the guidelines in this section.

10.11.1 Using the Battery

⚠ **WARNING!** Do Not Abuse/Modify Battery Packs

Lithium-ion cells and battery packs may get hot, explode or ignite and cause serious injury if modified or abused.

10.11.2 Follow the safety instructions below

- Do not place the battery in fire or heat the battery.
- Do not connect the battery backward, so the polarity is reversed.
- Do not connect the positive terminal and negative terminal of the battery to each other with any metal object (such as a wire).
- Do not carry or store the battery together with necklaces, hairpins or other metal objects.
- Do not pierce the battery with nails, strike the battery with a hammer, step on the battery or otherwise subject it to strong impacts to shocks.
- Do not solder directly onto the battery.
- Do not expose the battery to water or salt water, or allow the battery to get wet.
- Do not disassemble or modify the battery. The battery contains safety and protection devices which, if damaged, may cause the battery to generate heat, explode or ignite.
- The protection circuit module provided with battery packs is not to be used as a substitute for a shut off switch.
- Do not place the battery in or near fire, on stoves or in other high temperature locations.
- Do not place the battery in direct sunlight, or use or store the battery in cars in hot weather. Doing so may cause the battery to generate heat, explode or ignite. Using the battery in this manner may also result in a loss of performance or shortened life expectancy.
- When the battery is worn out, insulate the terminals with adhesive tape or a similar non-conducting material before disposal.
- Immediately discontinue use of the battery if, while using, charging, or storing the battery, the battery emits an unusual smell, feels hot, changes color or shape or appears abnormal in any other way.
- Do not place the battery in microwave ovens, high-pressure containers or on induction cookware.

⚠ In the event the battery leaks and the fluid gets into one's eye, do not rub the eye. Rinse well with water and immediately seek medical care. If left untreated, the battery fluid could cause damage to the eye.

⚠ If the device causes abnormal current to flow, it may cause the battery to become hot, explode, or ignite causing serious injury.

10.11.3 Charger types

Your battery must only be charged with an HME/Clear-Com recommended charger ONLY. Any attempt to use other types of chargers may cause an explosive reaction, fire or chemical burns.

10.11.4 Battery charger models

BAT41 Charger Model: AC40 and AC40A

BAT50 Charger Model: AC50

BAT60 Charger Model: AC60

BAT70 Charger Model: AC70

BAT80 Charger Model: AC80

10.11.5 Charging the battery

Be sure to follow the warnings listed below while charging the battery. Failure to do so may cause the battery to become hot, explode or ignite and cause serious injury.

- Do not continue charging the battery if it does not recharge as specified in the HME/Clear-Com User Guide, under charging instructions.
- Do not attach the battery to an external charger, power supply plug or directly to a car's cigarette lighter.

10.11.6 Recycling the battery

If your business or household does not have a battery recycling program, go to the following URL or copy and paste the following URL into your browser, then enter your zip code for a list of recycling centers: http://earth911.com

10.12 배터리 모델에 대한 일반 배터리 안전 지침 : BAT41, BAT50, BAT60, BAT70, BAT80

BAT80 배터리는 다음이 제공하는 제품과 함께 사용하도록 특별히

설계되었습니다. HM Company, HME Company, Clear-Com LLC

안전주의 사항 배터리의 안전과 신뢰성을 보장하려면이 섹션의 지침을

따르십시오.

배터리 사용

⚠ 경고! 배터리 팩을 남용하거나 수정하지 마십시오

리튬 이온 전지 및 배터리 팩은 변형되거나 남용 될 경우 뜨겁거나 폭발하거나 발화하여 심각한 부상을 입을 수 있습니다.

아래 안전 지침을 따르십시오.

- 배터리를 불 속에 넣거나 배터리를 가열하지 마십시오.
- 배터리를 뒤로 연결하지 마십시오. 극성이 바뀝니다.
- 금속 물체 (예 : 전선)로 배터리의 양극 단자와 음극 단자를 서로 연결하지 마십시오.
- 목걸이, 머리핀 또는 기타 금속 물체와 함께 배터리를 운반하거나 보관하지 마십시오.
- 손톱으로 배터리를 찌르거나 망치로 배터리를 치거나 배터리를 밟거나 충격에 강한 충격을 가하지 마십시오.
- 배터리에 직접 납땜하지 마십시오.
- 배터리를 물이나 바닷물에 노출 시키거나 배터리가 젖지 않도록하십시오.
- 배터리를 분해하거나 개조하지 마십시오. 배터리에는 안전 및 보호 장치가 포함되어 있으며, 손상되면 배터리가 발열, 폭발 또는 발화 될 수 있습니다.
- 배터리 팩과 함께 제공된 보호 회로 모듈은 차단 스위치 대신 사용해서는 안됩니다.
- 배터리를 불이나 불 근처, 스토브 또는 다른 고온 장소에 두지 마십시오.
- 직사광선에 배터리를 두거나 더운 날씨에 자동차에 배터리를 사용하거나 보관하지 마십시오. 배터리가 열을 일으키거나 폭발하거나 발화 할 수 있습니다. 이러한 방식으로 배터리를 사용하면 성능이 저하되거나 수명이 단축 될 수 있습니다.
- 배터리가 마모 된 경우 폐기하기 전에 접착 테이프 또는 유사한 비전 도성 재료로 단자를 절연하십시오.
- 배터리를 사용, 충전 또는 보관하는 동안 배터리에서 이상한 냄새가 나거나 뜨거워 지거나 색이 변하거나 다른 방식으로 비정상적으로 나타나면 배터리 사용을 즉시 중단하십시오.

• 배터리를 전자 레인지, 고압 용기 또는 유도 조리기구에 넣지 마십시오.

⚠ 배터리가 누출되어 액체가 눈에 들어가면 눈을 비비지 마십시오. 물로 잘 씻고 즉시 치료를 받으십시오. 치료하지 않으면 배터리 액이 눈에 손상을 줄 수 있습니다.

⚠ 장치에 비정상적인 전류가 흐르면 배터리가 뜨거워 지거나 폭발 또는 발화하여 심각한 부상을 입을 수 있습니다.

충전기 유형

또는 화학적 화상이 발생할 수

있습니다.

배터리 충전기 모델

BAT41 충전기 모델 : AC40 및 AC40A

BAT50 충전기 모델 : AC50

BAT60 충전기 모델 : AC60

BAT70 충전기 모델 : AC70

BAT80 충전기 모델 : AC80

배터리 충전

배터리를 충전하는 동안 아래 나열된 경고를 따르십시오. 그렇지 않으면 배터리가 뜨거워 지거나 폭발 또는 발화하여 중상을 입을 수 있습니다.

- HME / Clear-Com 사용 설명서의 충전 지침에 따라 배터리가 충전되지 않으면 충전을 계속하지 마십시오.
- 배터리를 외부 충전기, 전원 플러그 또는 자동차 담배 라이터에 직접 연결하지 마십시오.

배터리 재활용 비즈니스 또는 가정에 배터리 재활용 프로그램이없는 경우 다음 URL로 이동하거나 다음 URL을 복사하여 브라우저에 붙여 넣은 다음 재활용 센터 목록을위한 우편 번호를 입력하십시오. http://earth911.com

Общие инструкции по технике безопасности для аккумуляторных моделей:

10.13 BAT41, BAT50, BAT60, BAT70, BAT80

Аккумуляторы BATXX специально предназначены для использования только с продуктами предлагаемыми: HM Electronics Inc. (HME) Clear- Com LLC, компания HME

МЕРЫ БЕЗОПАСНОСТИ

Для обеспечения безопасности и надежности вашей батареи следуйте инструкциям в этом разделе. Использование батареи

ПРЕДУПРЕЖДЕНИЕ!

⚠ Не злоупотребляйте / не изменяйте Аккумуляторы Литиево-ионные элементы и аккумуляторы могут нагреваться, взрываться или воспламеняться, что может привести к серьезным травмам модификации или неправильном использовании.

Следуйте инструкциям по безопасности ниже:

• Не подвергайте аккумулятор воздействию огня и не нагревайте его.

• Не подключайте батарею назад, так что полярность меняется.

• Не соединяйте положительную клемму и отрицательную клемму батареи друг с другом какими-либо металлическими предметами (например, проводом).

• Не переносите и не храните батарею вместе с шейками, шпильками или другими металлическими предметами.

• Не прокалывайте батарею гвоздями, не ударяйте батарею молотком, не наступайте на батарею и не подвергайте ее сильным ударам.

• Не паяйте непосредственно на батарею.

• Не подвергайте батарею воздействию воды или соленой воды и не допускайте ее намокания.

• Не разбирайте и не модифицируйте батарею. Батарея содержит защитные и защитные устройства, которые в случае повреждения могут вызвать нагрев, взрыв или возгорание батареи.

• Модуль защитной схемы, поставляемый с батарейными блоками, не должен использоваться вместо выключателя.

• Не ставьте батарею в огонь или рядом с ним, на печи или в других местах с высокой температурой.

• Не подвергайте аккумулятор воздействию прямых солнечных лучей и не храните аккумулятор в автомобилях в жаркую погоду. Это может привести к нагреву аккумулятора, взрыву

или возгоранию. Использование батареи таким образом может также привести к потере производительности или сокращению срока службы.

• Если батарея изношена, перед утилизацией изолируйте клеммы липкой лентой или аналогичным непроводящим материалом.

• Немедленно прекратите использование батареи, если во время использования, зарядки или хранения батареи она издает необычный запах, нагревается, меняет цвет или форму или выглядит ненормальной любым другим способом.

• Не кладите батарею в микроволновые печи, баллоны с высоким давлением или на индукционную посуду.

⚠ В случае протечки батареи и попадания жидкости в глаза не тереть глаза. Хорошо промыть водой и немедленно обратиться за медицинской помощью. Если не обработать, жидкость из батареи может привести к повреждению глаз.

⚠ Если устройство вызывает аномальный ток, это может привести к нагреву батареи, ее взрыву или возгоранию, что может привести к серьезным травмам.

Типы зарядных устройств

Ваша батарея должна заряжаться только с помощью зарядного устройства, рекомендованного HME / Clear-Com. Любая попытка использовать другие типы зарядных устройств может привести к взрывной реакции, пожару или химическим ожогам.

Модели зарядных устройств

Модель зарядного устройства BAT41: AC40 и AC40A

Зарядное устройство BAT50 Модель: AC50

Зарядное устройство BAT60 Модель: AC60

Зарядное устройство BAT70 Модель: AC70

Зарядное устройство BAT80 Модель: AC80

Зарядка аккумулятора

При зарядке батареи обязательно следуйте приведенным ниже предупреждениям. этого требования может привести к нагреву, взрыву или возгоранию аккумулятора, а также ксерьезным травмам.

- Не продолжайте зарядку батареи, если она не заряжается, как указано в Руководстве пользователя HME / Clear-Com, в соответствии с инструкциями по зарядке.
- Не подключайте аккумулятор к внешнему зарядному устройству, вилкеэлектропитания или непосредственно к автомобильному прикуривателю

Переработка аккумулятора

Если в вашей компании или семье нет программы утилизации аккумуляторов, перейдите по следующему URL-адресу или скопируйте и вставьте следующий URL-адрес в браузер, а затем введите свой почтовый индекс, чтобы получить список центров утилизации: http://earth911.com