

EDGE

NETWORK INTERFACE

TECHNICAL MANUAL

 *Wheatstone Corporation*

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Wheatstone Corporation
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Wheatstone EDGE Network Interface

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A Word About Nomenclature

Throughout this manual references are made to “BLADEs,” “sources,” “destinations,” and other terms whose meanings may not be instantly understood by everyone. Let’s take a moment to clarify some terms.

1. **BLADE.** In the WheatNet-IP system a “BLADE” is taken to mean an individual member of a WheatNet-IP system; any device that has a unique BLADE ID. It commonly refers to an individual input/output rackmount unit, but a more complete definition would include any network connected PC running a WheatNet-IP driver as well, including Automation servers and even the Program Director’s PC if they are running the WheatNet-IP driver to listen to audio streams. Conversely, any PC that is running the WheatNet-IP Navigator GUI program or using a browser for interfacing to the built in web servers on BLADEs is not a BLADE itself. Only those devices that can transmit and/or receive WheatNet-IP audio streams are “BLADEs.”
2. **Source.** A source is any audio signal in the WheatNet-IP system that is uniquely generated. Any WheatNet-IP signal that is created by accepting and packetizing an input is a source, as is any signal generated within the system. Source signals may be audio, logic, or both. A logic source might be a logic port triggered by an external switch. We generally avoid using the term “input” to describe WheatNet-IP signals because the term can be misleading. One would easily understand that an external audio input jack could be an “input” or “source,” but less obvious is the fact that an audio mix bus output is also a WheatNet-IP source because it is generating a unique signal (the mix) and making it available to stream throughout the system. Likewise, PCs streaming audio from a file via the WheatNet-IP driver can clearly be seen as a “source.”
3. **Destination.** A destination is the opposite of a source. It is a signal that can accept any WheatNet-IP stream. A destination can take the received WheatNet-IP stream and convert it to a physical analog or digital output, or, in the case of a PC, a virtual output that subsequent PC application programs can convert to an audio output at the PC’s speakers, or lay down as an audio track on the hard disc. Destinations can be audio, logic, or both. A logic destination might be a logic port wired to a lamp or relay. We avoid using the term “output” for WheatNet-IP signals. While it is clear that a WheatNet-IP destination wired to an output jack is an “output,” control surface fader channels would not normally be considered “outputs” but they *are* “destinations” in the WheatNet-IP system, because you can route a WheatNet-IP audio stream to them.
4. **LIO.** Shorthand for Logic Input or Output. In the WheatNet-IP system, an LIO signal is a signal that either generates or receives logic state information created either physically via a logic port or virtually via some state change within a mixing control surface. In the WheatNet-IP system logic information can be routed and cross connected just as audio can be.
5. **GUI.** Shorthand for Graphical User Interface. A method of providing for user interaction with the system using a special computer program that displays information in the form of images and text on the computer screen and accepts user input via typing and mouse clicking within the computer program. The WheatNet-IP Navigator is a computer program that provides a GUI.

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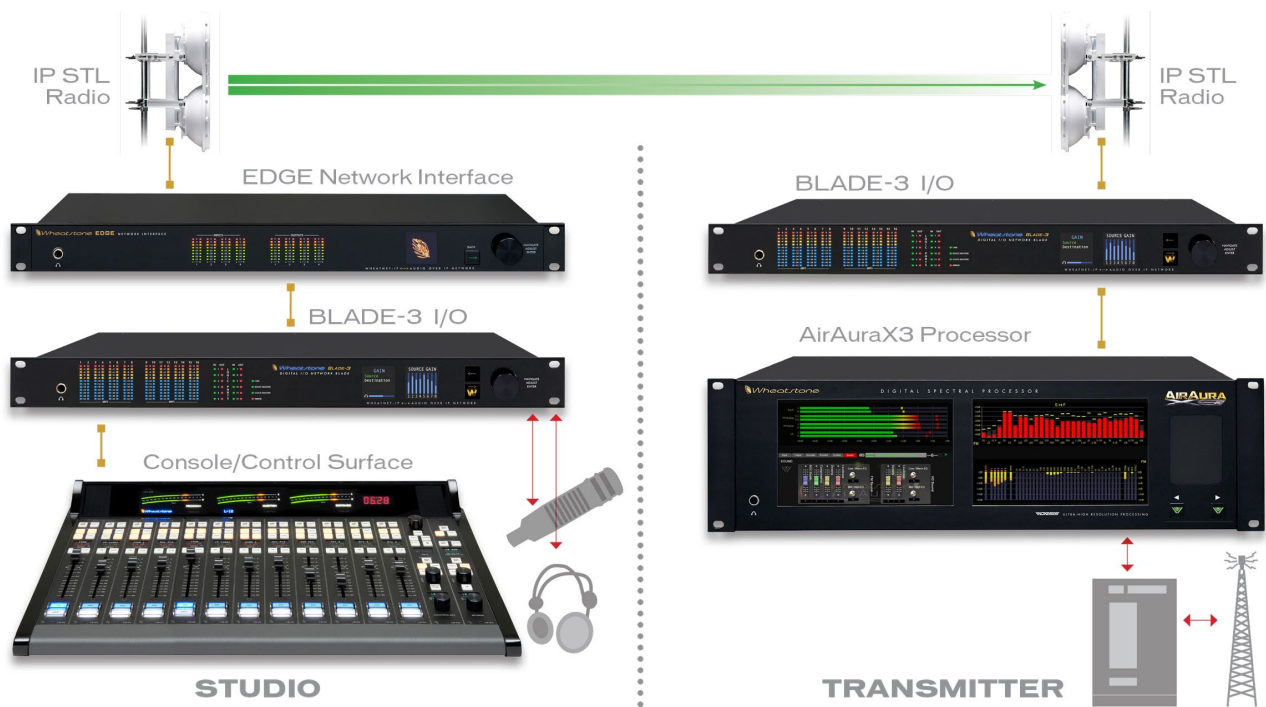
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General Information

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General Information

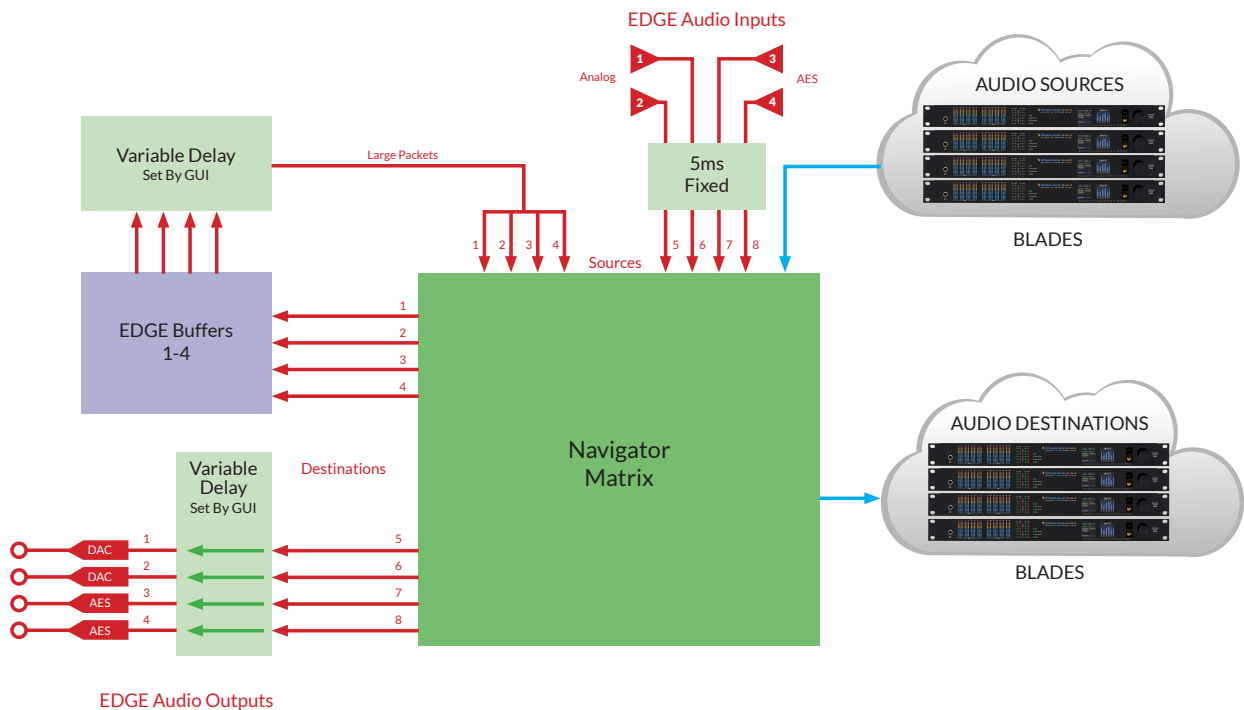
Introduction

The Network Edge was created to support use of low cost IP radios for WheatNet-IP audio links. So why are some IP radios cheap and others very expensive? A full duplex radio used historically for STL links has the ability to transmit data simultaneously in both directions. Doing so requires that the receive amplifier must have very significant rejection of the transmitter RF, and that adds cost. Half duplex IP radios which are significantly lower cost, handshake between the two ends to decide when each will burst transmit data while the other must be in receive mode. This half duplex mechanism requires more complex control, but significantly reduces the RF TX/RX front end cost.

The half duplex scheme however creates a problem for the WheatNet-IP system that is based on the use of high speed Ethernet switches for moving small Ethernet packets with minimal latency thru the network fabric. The BLADEs ingest the small .25msec packets and only buffer a few of them before playing out the audio thereby limiting latency to less than 1 msec. For real time production, the latency for mix-minus feeds is critical to keep at a minimum. The half duplexing rate of IP radios is on the order of several milliseconds. The control scheme of radios will ingest and store many packets during one phase of duplexing. Subsequently, this data is bursts across the link at a much higher rate and it buffered up on the RX side of link. That data is then spurt out as packets onto the Ethernet network on far side. The same operation is done from far side to near side but during opposite phase of duplexing. The point here is that the IP radio creates an unpredictable dynamic latency to packets flowing across the link.

The EDGE alleviates this random latency problem by adding a buffering mechanism between the radio and the network. The EDGE can be located at *either* end of the link, but the way it operates with WheatNet-IP depends which end it is located on. For both cases, the internal hardware of EDGE remains mostly the same. Small .25 msec packets are ingested, buffered and repackaged as 5 msec packets. There are 4 instances of this RX-TX mechanism which we have denoted as BIG for signal name defaults.

EDGE Function



EDGE Installation Options

The EDGE may be installed at either the Studio or Transmitter sides of the IP-STL link. Where you decide to install it depends on a few factors:

- IP Radio quality
- BLADE infrastructure
- Cost.

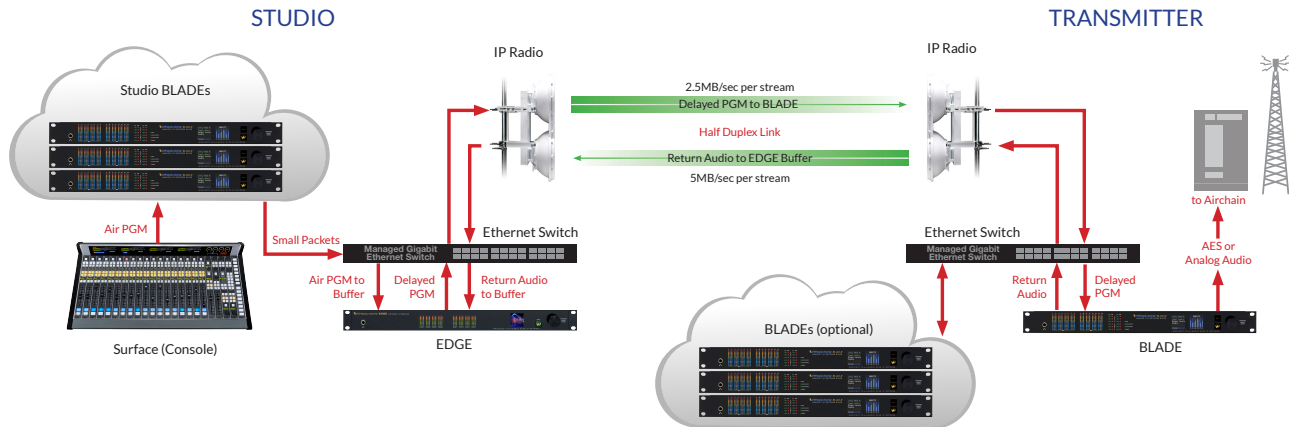
EDGE Installed on the Studio Side

For a “Studio-Edge” IP-STL application, the EDGE connects to the WheatNet-IP Ethernet network located at the studio end of link and a BLADE is then located at the transmitter (TX) end. The TX side BLADE connects to another Ethernet switch along with the IP Radio.

In this case, PGM audio from a control room needs to get through an IP radio to the transmitter site. In Navigator, the desired PGM mix *Source* is routed to one of the four EDGE Buffers. EDGE Buffer inputs automatically appear as *Destinations* in the Navigator matrix when the EDGE is first configured. Likewise, the EDGE’s post-delay, Buffered outputs automatically appear as *Sources* in the Navigator matrix.

Next, the corresponding Buffer *Source* is routed to a physical audio output *Destination* on the Transmitter end BLADE located at the far end of IP radio link. Individual DELAY controls for each of the four EDGE Buffer outputs allow the user to fine tune the playback buffer depth, thus compensating for latency in the IP radio's stream.

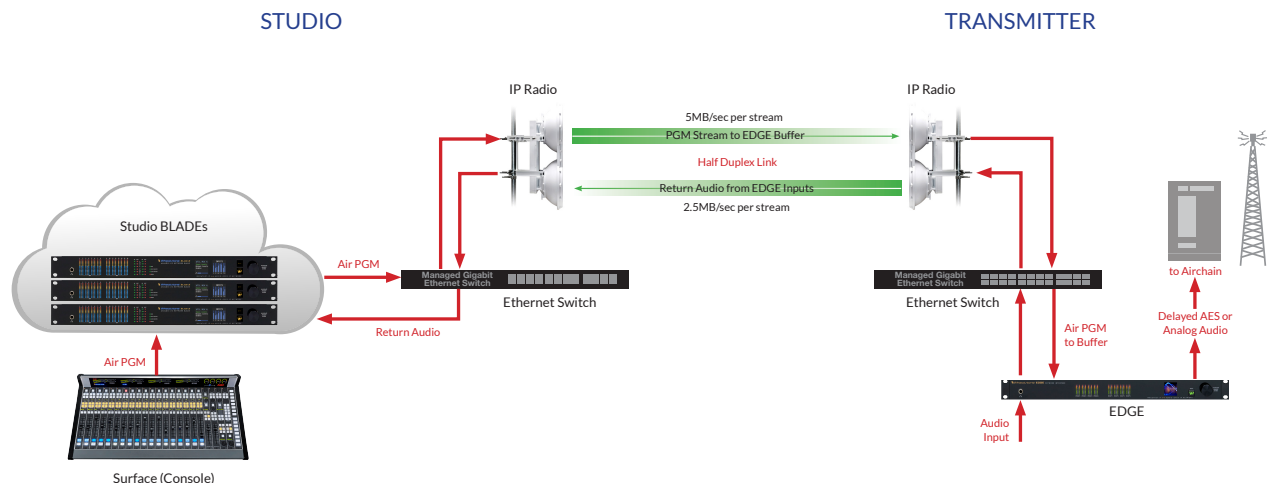
Because the small WheatNet-IP packets have been buffered by the EDGE prior to IP radio transmission, Ethernet overhead is reduced and the IP radio BW requirements are somewhat relaxed.



EDGE Installed at the Transmitter Side

For a “TX-Edge” IP-STL application, an IP radio is connected to the WheatNet-IP Ethernet network on the Studio side and the EDGE is then located at the transmitter (TX) end. The EDGE connects to another Ethernet switch along with the IP radio. A BLADE, co-located at the transmitter site is not required, but can provide valuable resources and functionality (silence detection, mixing, audio clip player, etc.).

In this case, PGM audio from a control room still needs to get through an IP radio to the transmitter site. In Navigator, the desired PGM mix *Source* would be routed to one of the EDGE's two analog or two AES *Destinations* feeding the rest of the air chain. Individual DELAY controls for each of the analog and AES outputs allow the user to fine tune the playback buffer depth, thus compensating for latency in the IP-radio stream.



EDGE Delay Controls

The EDGE DELAY interval is adjustable to accommodate various parameters of the IP radio link. A minimum number of samples is required to overcome the duplexing interval of the link. The control setting of upwards of one second is more for testing and confirmation that the appropriate connections and data paths have been chosen. All eight EDGE Destinations, four BUFFERS, plus two analog outputs, and two AES outputs feature a DELAY control that may be adjusted using the EDGE GUI.

Return Path Audio

In both cases, installation of an Edge at the Studio or Transmitter site, there are means to bring a return audio feed from the Transmitter back to the Studio.

In the “Studio EDGE” case where a BLADE exists at the Transmitter, the desired Return audio Source is wired to audio inputs of the TX site BLADE which appear in Navigator as a standard BLADE Source stream. This .25mS packet Source stream is then routed to an EDGE BUFFER destination. The BUFFER in turn feeds a variable DELAY whose output appears as a Source in Navigator. That buffered source can now be connected to any BLADE in the system where the audio will again be buffered and played out with additional delay. The latency of the audio in this return path will be 100 msec or more. The BLADE buffers 5 msec packets upwards of 100 msec, and then the DELAY setting of the EDGE would be in addition to that.

In the “TX EDGE” case, return audio would simply be connected into the EDGE inputs, Analog or AES, and those sources would be available to any BLADE back in the Studio with the corresponding latency. Note that these physical audio inputs are only available as 5msec packets.

Analog and Digital Audio I/O Connections

The EDGE provides two stereo analog inputs and two stereo analog outputs on XLR connectors. A pair of AES inputs and a pair of AES outputs are also available on RJ-45 connectors. These inputs are fed through a fixed 100mS buffer and available in Navigator as Sources.

In a Studio EDGE installation, the analog and AES I/O may not be required.

In a Transmitter EDGE installation, Analog or AES outputs would be utilized to feed an air chain, while the analog or AES inputs may be used for return path audio.

Synchronization – PLL Settings

The EDGE and BLADE both use Ethernet packets for sample rate clock synchronization. The IP radio inherently adds a substantial jitter to these timing reference packets. In order to overcome the jitter, the error integration interval and overall loop locking must be extended significantly. A PLL MODE selection is provided to accommodate for this.

Studio EDGE Model:

- The EDGE “PLL MODE” is set for LOCAL.
- The TX side BLADE set to SLOW PLL mode for that unit only.

- Transmitter EDGE Model
- EDGE PLL MODE is set to REMOTE.

Routing Rules

The EDGE was designed as a versatile buffer interface which leverages the core strengths of the WheatNet-IP and Navigator routing matrix. While all EDGE I/O buffers and hardware interfaces appear as signals in Navigator, not all available routing path combinations are valid. The following rules apply when routing EDGE signals in Navigator:

- Route any surface mix or physical Blade input to any EDGE Destination.
- Buffer Source signals may not be routed to other Buffer Destinations.
- EDGE physical inputs may not be directly routed to any Buffer Destination.
- WheatNet-IPPC Driver signals may not be directly routed to any Buffer Destination.
- Use Utility Mixers to create a low latency mix of buffered streams, and route the Utility Mixer output as required to any EDGE Destination.

Rack Mounting

The EDGE is designed to be mounted in an industry standard 19" equipment rack, and requires one rack unit (1.75 inches) of vertical space. The EDGE has a depth of 9-1/2" behind the rack rails (including chassis connectors). An additional five inches of space is required for wiring cables to pass through. The chassis has a width of 17-3/8". Space needed in front of the rack rails is 3/4".

The EDGE has vertical slots positioned in the side panels for venting. Make sure your installation does not obstruct these slots. There is no fan inside the EDGE because its power consumption is low enough to not require one.

The EDGE may be mounted between other devices in the equipment rack and in accordance with good engineering practice should not be mounted directly above devices that generate significant amounts of heat. If such a location is unavoidable then it is to utilize an extra 1RU blank rack panel between the WheatNet-IP and devices immediately above and/or below it.

WARNING! Under no circumstances should the EDGE unit be opened! The unit contains high voltage circuits that are hazardous and potentially harmful. The unit has no user-serviceable parts inside! If you have a problem the unit must be returned to Wheatstone Corporation for repair.

Installation Tips

- Place any surge protection circuits as close as possible to the EDGE or other device being protected.
- Establish a low impedance common ground in your facility and try to route all grounds to that point.
- Choose the best power conditioning / UPS units that you can afford and suitable for your equipment – focus on the features and options you need. The better UPS products can prevent thousands of dollars in equipment damage – some even come with an external equipment damage warranty.

Energizing

Once it has been installed in the rack, the EDGE may be energized by connecting the factory supplied power cord to a source of AC power. The AC line input voltage is permitted to be between 90 and 260VAC, 50 or 60Hz. Power consumption is under 100VA.

Aggressive AC input filtering is utilized at the AC input of the EDGE; however, it is always advisable to use external surge protection and/or an uninterruptible power supply (UPS), especially where AC power quality is questionable, such as at a remote transmitter site.

Power conditioning, surge suppression, and even power backup devices are wise investments when using sensitive modern electronic devices that use an internal computer.

Use of a UPS (uninterruptible power supply) is a good idea and will protect the EDGE from short duration power interruptions which may cause it to reboot.

EDGE Hardware Features



The front panel of the EDGE houses 8-segment, multi-color LEDs for metering four pairs of streaming audio and input or output signals. The front panel also sports an OLED display which can show various status messages relating to the EDGE's performance and configuration. The front panel display, button, and knob quickly and easily allow you to set up and configure each EDGE. Pressing the button takes you to the main menu, or backs out to the previous display. Rotation of the knob navigates up and down a menu when there is a list, or scrolls through options in a submenu once one has been selected. Pushing the knob "takes" an option. Use of the controls will become clearer as we go through some examples.

A headphone jack on left side complete the front panel.



The rear panel has four female XLR connectors for analog inputs and four male XLR connectors for analog outputs. It also has four RJ-45 (A1 IN, A2 IN, A1 OUT, and A2 OUT) connectors for analog input and output connections so you can choose your preferred connector type.

Four RJ-45 (D3 IN, D4 IN, D3 OUT, and D4 OUT) connectors are for digital input and output connections.

Two RJ-45 connectors provide 12 logic ports, which can be individually designated during set up as inputs or outputs. Use these ports to wire the various external switches, indicators, and control functions you need in your facility.

There is an RJ-45 connector for 100 Megabit Ethernet connection to the WheatNet-IP network.

Consult the wiring diagram on page 1-11 for detailed information.

At the far right of the rear panel is a standard IFC power connector. The EDGE has an internal power supply that will accept 100-240 Volts 50/60 Hertz AC power.

Network Switches

The next component of the WheatNet-IP system is your network switch(es). These are standard Ethernet devices that form the core of your LAN. You may already have a suitable one in place in your facility. There are literally hundreds of different models available in the market place which vary widely in size and capability, costing anywhere

from \$30 to \$30,000 and up. Obviously the \$30,000 switch has more features and capability than the \$30 switch. The important thing to remember is that most Gigabit switches will work with WheatNet-IP – up to a point. As the size of your system increases, it's easy to exceed the capability of inexpensive switches. Large systems need high capacity managed switches to avoid the bane of Ethernet audio systems, network overload. Simply put, if the WheatNet-IP devices are streaming packets faster than the Ethernet switch can distribute them, packets get dropped and the audio starts to break up. This is why your Ethernet switches must be sized appropriately, and your network traffic managed and controlled so that the sizing assumptions you made remain valid. Because 24 bit 48K sample rate audio streams represent a much larger packet rate than Ethernet networks were originally assumed to contain, they can represent the vast majority of data in the network. Consequently just about any switch or link can get overloaded if you are streaming lots of channels and don't attempt to manage your network and switch configuration. Conversely, because we use Gigabit ports for the WheatNet-IP to minimize link overload issues, a smaller system will run just fine on an inexpensive unmanaged switch, *as long as it is a Gigabit switch*. It's all in the numbers.

It is important that the Ethernet network be properly set up in order for the EDGE to successfully join in with the rest of the WheatNet-IP system.

CAT6 Wiring

The next component of your WheatNet-IP system is the CAT6 wiring itself. Each EDGE requires a single 100 Megabit network connection, which is typically a CAT6 cable. Due to the nature of Ethernet and CAT6 cabling, these connections must be at least 1 meter but less than 100 meters in length. If you must connect devices together that are more than 100 meters apart, use an interim Ethernet “edge” switch, or else use optical fiber and copper/fiber convertors to extend the range of the Ethernet LAN connections.

Software Tools

The next components of your WheatNet-IP system are the software tools used to administer it. While the WheatNet-IP system is completely functional (unlike some competitors) without running any software on a PC, you will find the Navigator GUI program very handy for administrating normal system functions like setting access passwords, controlling signal visibilities, naming sources and destinations, etc. The EDGE also employs the *Wheatnet Edge Setup* GUI for configuration which described later in this manual.

I/O Connections



Audio Inputs

The EDGE accepts three types of audio input sources:

- Balanced analog line level left/right audio;
- Digital AES3 compliant left/right audio with sample rate of 44.1kHz or 48kHz;
- WheatNet-IP via 100BaseT Ethernet connection to a WheatNet-IP audio network.

The EDGE is fed from a combination of analog inputs via four XLR or two RJ45 connectors and digital inputs via two RJ-45 connectors.

The digital inputs of the EDGE will be sample rate converted to the system's chosen sample rate of 44.1kHz or 48kHz, which is set via the WheatNet-IP Navigator GUI.

Analog – XLR

XLR 1L Pin 1 – SH] Input 1 Lt
XLR 1L Pin 2 – HI	
XLR 1L Pin 3 – LO	
XLR 1R Pin 1 – SH] Input 1 Rt
XLR 1R Pin 2 – HI	
XLR 1R Pin 3 – LO	
XLR 2L Pin 1 – SH] Input 2 Lt
XLR 2L Pin 2 – HI	
XLR 2L Pin 3 – LO	
XLR 2R Pin 1 – SH] Input 2 Rt
XLR 2R Pin 2 – HI	
XLR 2R Pin 3 – LO	

Analog – RJ-45

RJ-45 A1 Pin 1 – HI] Input 1 Lt
RJ-45 A1 Pin 2 – LO	
RJ-45 A1 Pin 3 – HI] Input 1 Rt
RJ-45 A1 Pin 6 – LO	
RJ-45 A2 Pin 1 – HI] Input 2 Lt
RJ-45 A2 Pin 2 – LO	
RJ-45 A2 Pin 3 – HI] Input 2 Rt
RJ-45 A2 Pin 6 – LO	

Digital – RJ-45

RJ-45 D3 Pin 1 – HI] Input (AES) 3
RJ-45 D3 Pin 2 – LO	
RJ-45 D4 Pin 1 – HI] Input (AES) 4
RJ-45 D4 Pin 2 – LO	

Audio Outputs

The output signals are available as analog line level (+4dBu, balanced) on the four XLR connectors, or on the two RJ-45 connectors and as digital on the two RJ-45 connectors.

Analog – XLR

XLR 1L Pin 1 – SH	}	Output 1 Lt
XLR 1L Pin 2 – HI		
XLR 1L Pin 3 – LO		
XLR 1R Pin 1 – SH	}	Output 1 Rt
XLR 1R Pin 2 – HI		
XLR 1R Pin 3 – LO		
XLR 2L Pin 1 – SH	}	Output 2 Lt
XLR 2L Pin 2 – HI		
XLR 2L Pin 3 – LO		
XLR 2R Pin 1 – SH	}	Output 2 Rt
XLR 2R Pin 2 – HI		
XLR 2R Pin 3 – LO		

Analog – RJ-45

RJ-45 A1 Pin 1 – HI	}	Output 1 Lt
RJ-45 A1 Pin 2 – LO		
RJ-45 A1 Pin 3 – HI	}	Output 1 Rt
RJ-45 A1 Pin 6 – LO		
RJ-45 A2 Pin 1 – HI	}	Output 2 Lt
RJ-45 A2 Pin 2 – LO		
RJ-45 A2 Pin 3 – HI	}	Output 2 Rt
RJ-45 A2 Pin 6 – LO		

Digital – RJ-45

RJ-45 D3 Pin 1 – HI	}	Output (AES) 3
RJ-45 D3 Pin 2 – LO		
RJ-45 D4 Pin 1 – HI	}	Output (AES) 4
RJ-45 D4 Pin 2 – LO		

Logic Ports

The EDGE has two LOGIC 1-6 and 7-12 RJ-45 connectors that provide 12 Universal logic ports.

LOGIC 1 - 6 - RJ-45

RJ-45 Pin 1 – Digital Ground
RJ-45 Pin 2 – Logic 1 In/Out
RJ-45 Pin 3 – Logic 2 In/Out
RJ-45 Pin 4 – Logic 3 In/Out
RJ-45 Pin 5 – Logic 4 In/Out
RJ-45 Pin 6 – Logic 5 In/Out
RJ-45 Pin 7 – Logic 6 In/Out
RJ-45 Pin 8 – +5V Digital

LOGIC 7 - 12 - RJ-45

RJ-45 Pin 1 – Digital Ground
 RJ-45 Pin 2 – Logic 7 In/Out
 RJ-45 Pin 3 – Logic 8 In/Out
 RJ-45 Pin 4 – Logic 9 In/Out
 RJ-45 Pin 5 – Logic 10 In/Out
 RJ-45 Pin 6 – Logic 11 In/Out
 RJ-45 Pin 7 – Logic 12 In/Out
 RJ-45 Pin 8 – +5V Digital

Network Connection

The EDGE can connect to a network or PC/laptop over Wired Ethernet via the 100Base-T Ethernet port on the rear panel. This port is completely independent and Auto-MDIX, allowing it to support straight-through and crossover cables in any combination. The wired Ethernet interface can support up to four simultaneous connections to remote GUIs.

For typical CAT6 cable pinouts see below. These connections are for communicating with the configuration computer via a network.

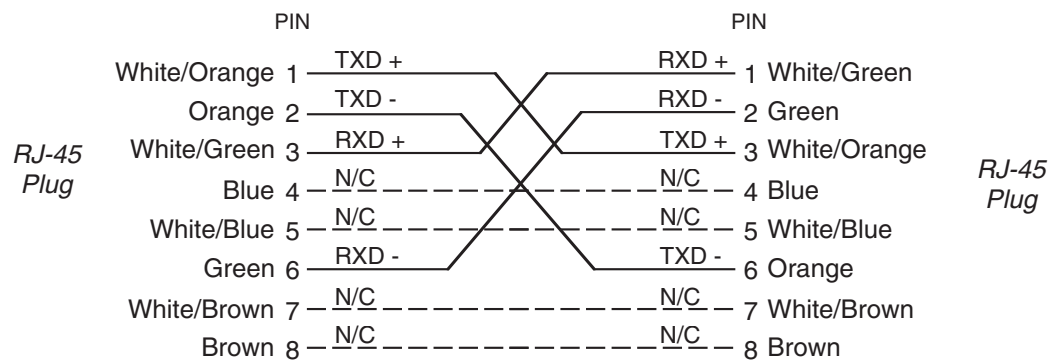
Ethernet – RJ-45

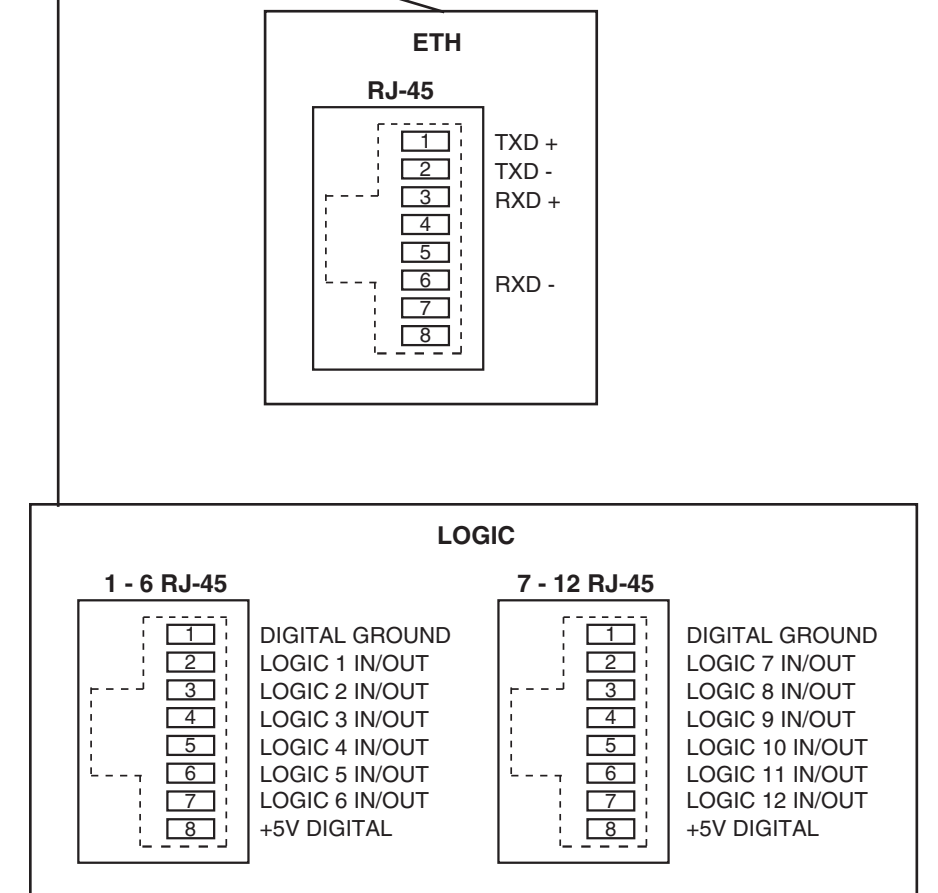
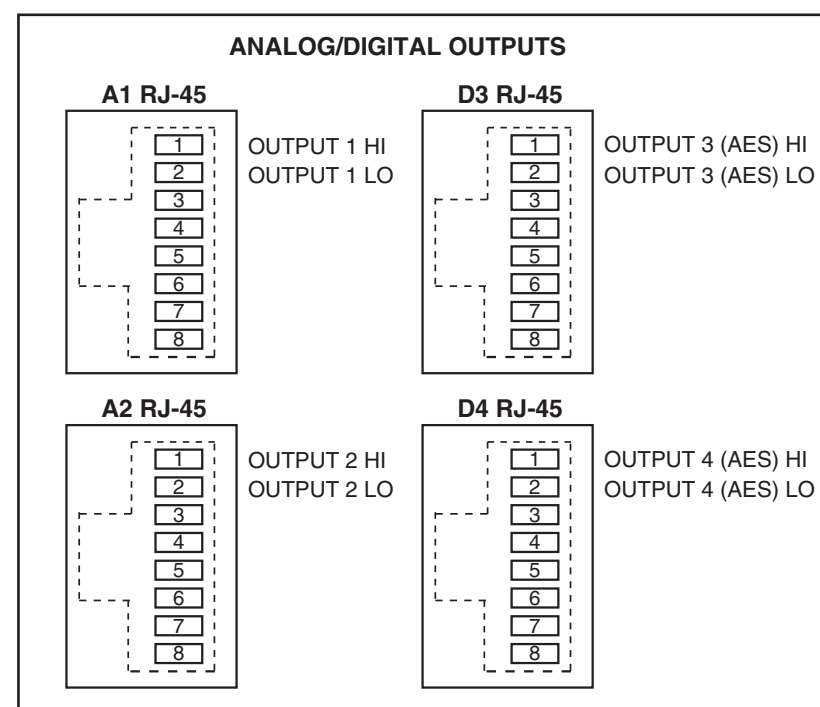
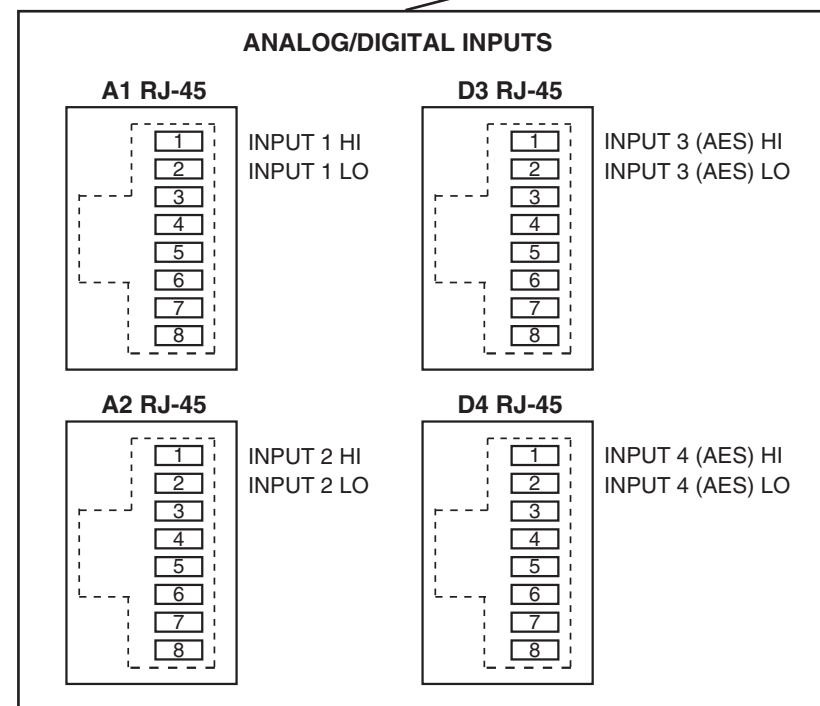
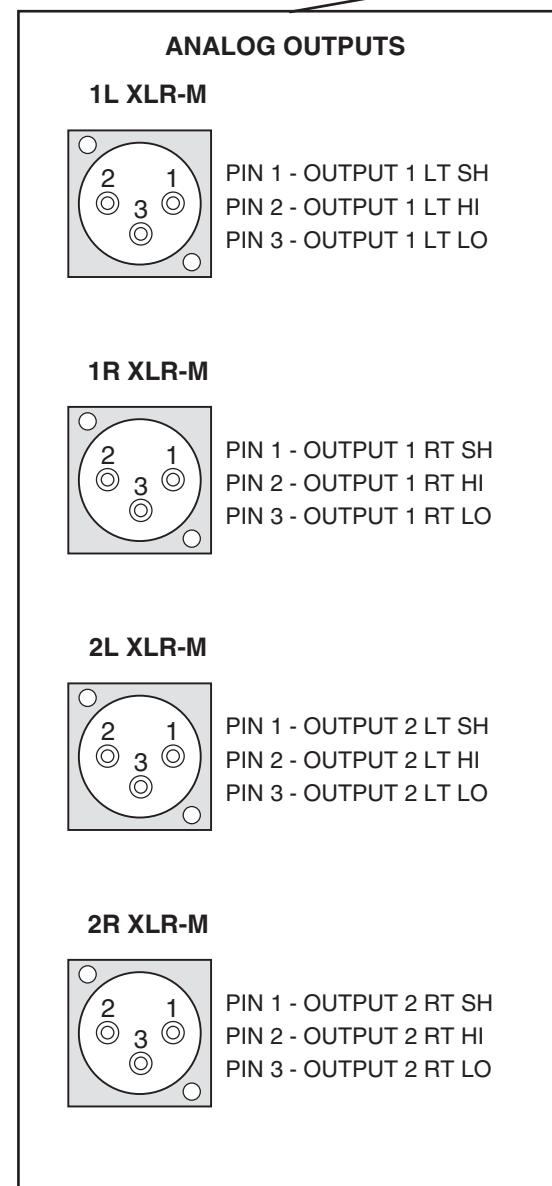
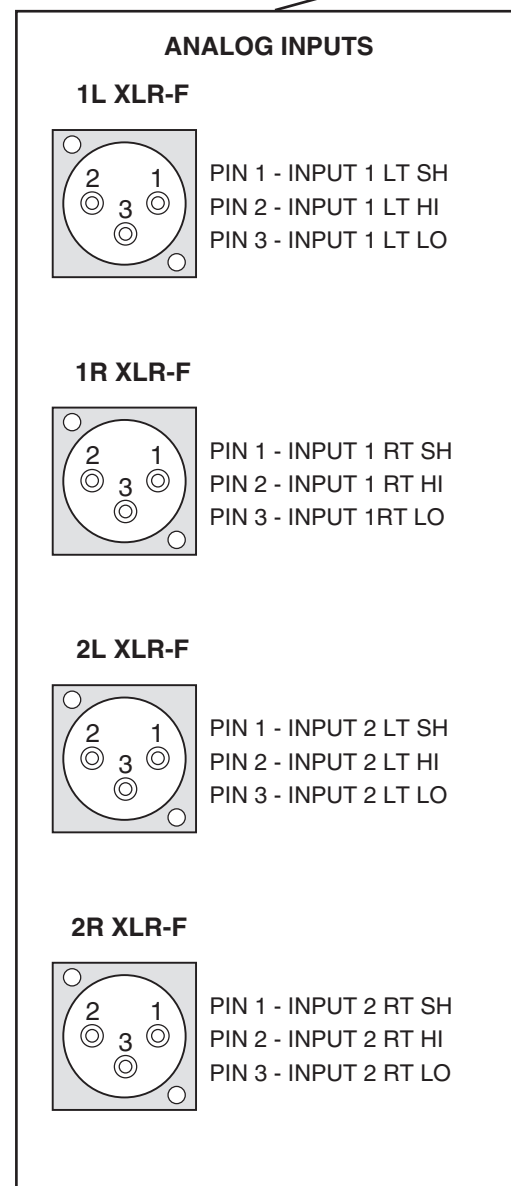
Pin 1 – TXD +
 Pin 2 – TXD -
 Pin 3 – RXD +
 Pin 4 – N/C
 Pin 5 – N/C
 Pin 6 – RXD -
 Pin 7 – N/C
 Pin 8 – N/C

Typical Straight-Through Cable

	PIN		PIN	
<i>RJ-45 Plug</i>	White/Orange 1	TXD +	1	White/Orange
	Orange 2	TXD -	2	Orange
	White/Green 3	RXD +	3	White/Green
	Blue 4	N/C	4	Blue
	White/Blue 5	N/C	5	White/Blue
	Green 6	RXD -	6	Green
	White/Brown 7	N/C	7	White/Brown
	Brown 8	N/C	8	Brown
				<i>RJ-45 Plug</i>

Typical Crossover Cable





EDGE Front Panel Operation

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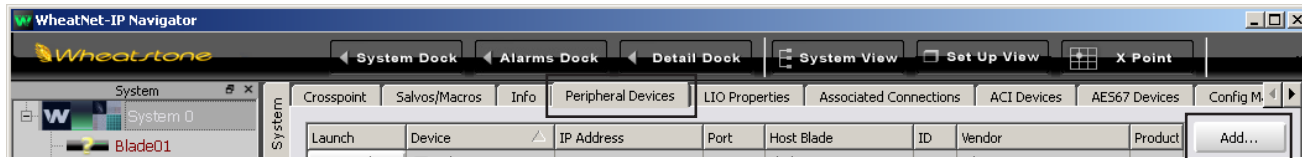
EDGE Front Panel Operation

Adding EDGE to the Peripheral Devices Tab

In order to utilize all the features of the EDGE in a WheatNet-IP system the device must be added to the *System 3rd Party Devices* tab in the Wheatstone WheatNet-IP Navigator program (aka the Navigator GUI). Below is the basics of that procedure. Refer to the *WheatNet-IP Audio Over IP Network Technical Manual* for additional details.

You will need to know the IP address of the EDGE being added, so you will want to find that out or set it as desired before you start. See the section below on the EDGE Menu for details on checking and setting the IP address.

Launch the Navigator GUI and make sure that System 0 is selected in the *System* pane.



Now, to the right of the *System* pane, select the *Peripheral Devices* tab.

Click the *Add* button on the far right to bring up the *Add Peripheral Device* dialog shown on right:

Type in a convenient *Name* and insert the *IP Address* of the EDGE being added. Leave the *TCP Port* at the default setting of 60021. From the *Host Blade* drop down select the BLADE that you want to associate the Peripheral device with. Click *Ok*.

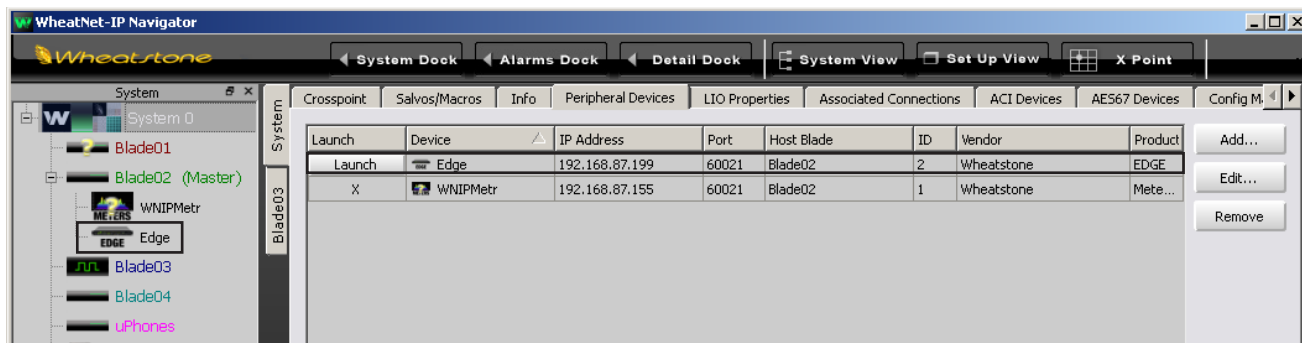
The 'Add Peripheral Device' dialog box is shown. It contains the following fields:

- Name: [Empty text box]
- IP Address: [Empty text box]
- TCP Port: 60021
- Host Blade: Blade02 (selected from a dropdown menu)

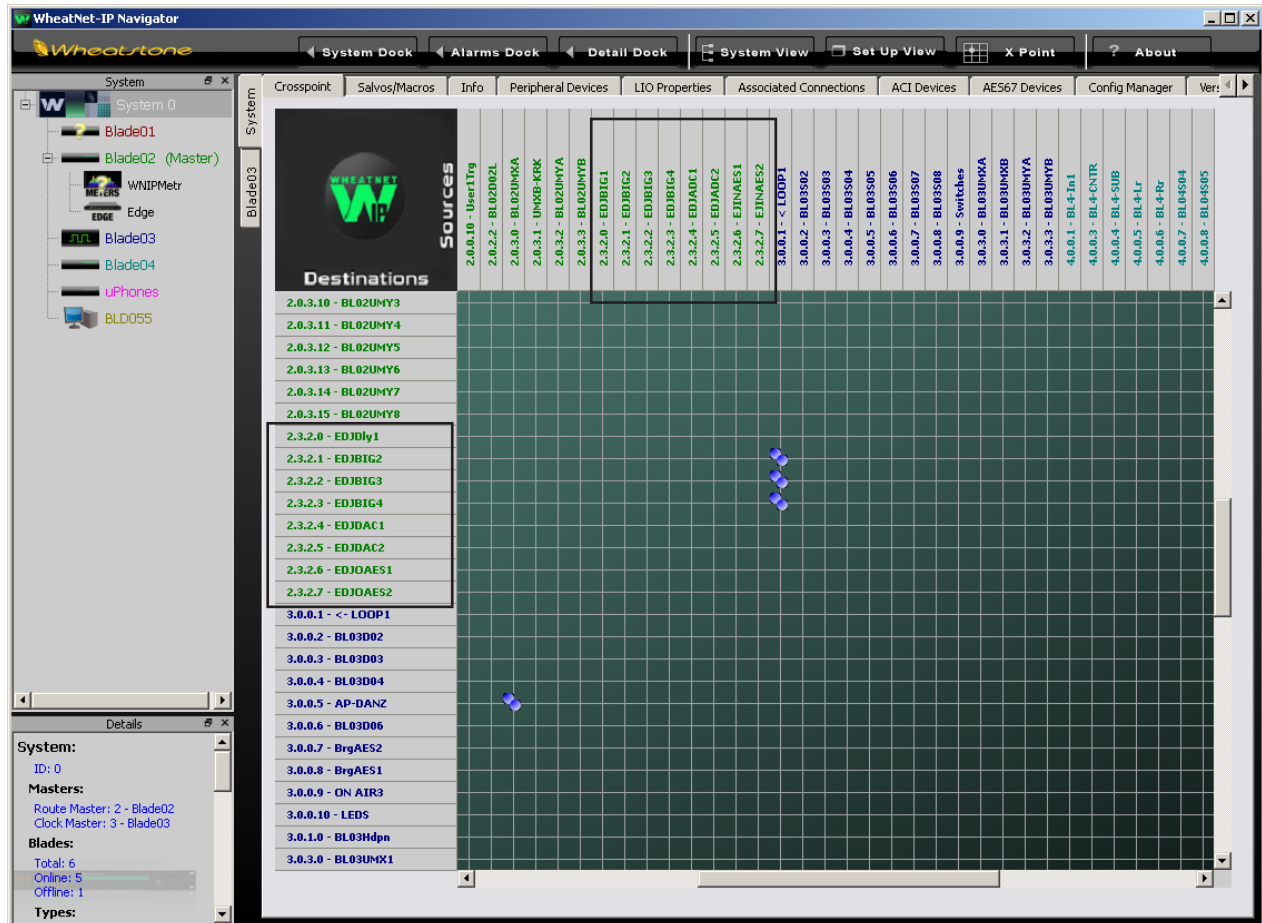
Buttons: Ok, Cancel

This completes the process of adding the device to the *Peripheral Devices* tab. The added device should show up in the *System* pane under the BLADE you added it to.

If it does not show up, or if it shows up but has a yellow question mark on it, then there is either a network issue that needs attention, or the device is not connected to the network at all, or one or more steps have been omitted or done incorrectly in the configuration process.



The System Crosspoint screen will now include the EDGE's connections.



Front Panel Controls



There are two front panel controls that you will use whenever you need to do any configuring or testing from the front panel.

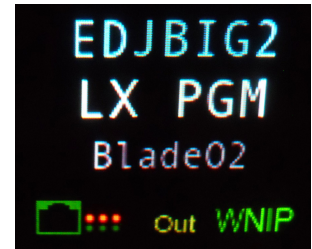
The knob serves a dual purpose. It is used to scroll through menu selections and parameter choices, by rotating the knob, and it is used to advance through parameter fields, by pressing and releasing the knob.

The other control is the square BACK button. You can't rotate this, so we will only tell you to press it. When we say this we also imply that, once pressed, you will release it.

OLED Display

Once EDGE has joined the system its front panel OLED display will show several pieces of information:

- **Source Name** – The topmost line shows the name of the current source.
- **Destination Name** – The location of the current source is shown below the source name.
- **BLADE Name** – The 3rd line displays the name of the current BLADE that the EDGE is associated with.
- On the left of the bottom line RJ-45 connector icon will show green and have moving dots next to it if the EDGE is connected to the network. If it is not connected the RJ-45 icon will show red and there will be no dots. In the center of the bottom line **In** or **Out** indicates whether the EDGE's signal meters are displaying input or output. The WNIP on the right side of the bottom line will show green if the EDGE is connected to the Wheatnet-IP system.



EDGE Front Panel Configuration



Activating any of the front panel controls will replace the screen saver display with the information screen.



Press the BACK button to open up the main menu screen:



Pressing the BACK button again will take you back to the information screen.

Rotation of the knob navigates up and down a menu when there is a list, or scrolls through options in a submenu once one has been selected. Pushing the knob “takes” an option.

To edit any parameter or name, press the knob to highlight the parameter. Turn the knob to find the desired value or character, then press the knob to take it. If the parameter has more than one field you can scroll the knob to cycle through the fields.

The BACK button backs out of a submenu to the main menu.

For example, when you select *Headphone...* by pressing the knob the *Headphone* display with Source and Gain shows in the window.



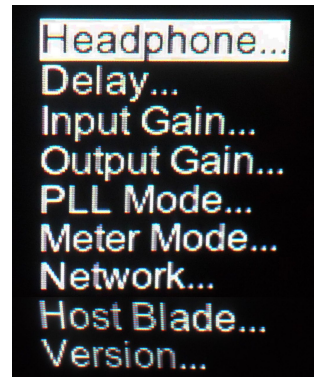
To choose a source, push the knob to highlight *Source* then scroll the knob to select source. Once desired source selected, push the knob to exit the adjustment mode.

Press the BACK button to get back to the main menu.

Try your hand at making some adjustments to help you get more familiar with the front panel controls.

The main menu of the BLADE 3 shows all of the options available from the front panel. These options are:

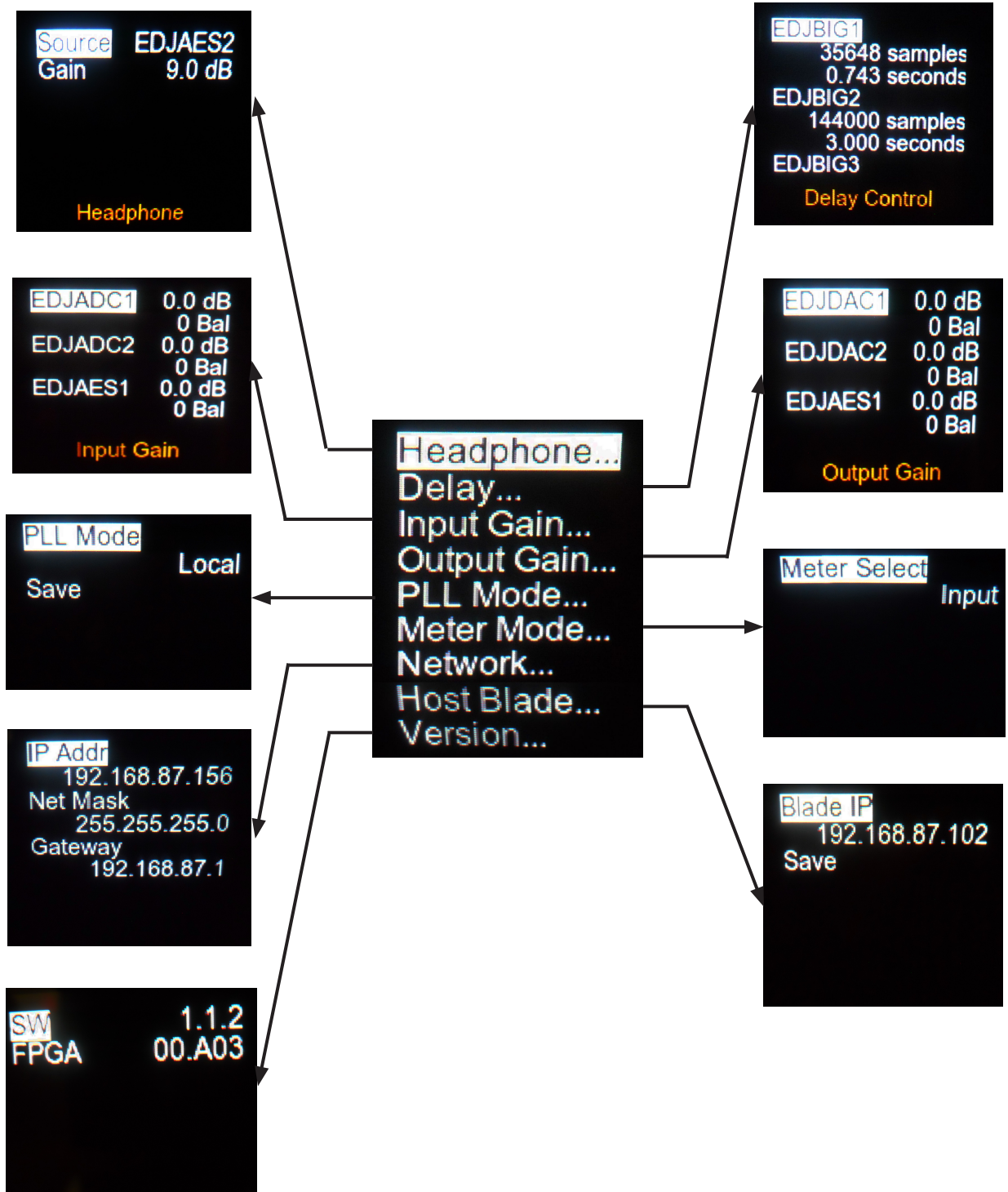
- **Headphone...** – Selects the headphone source and sets the gain.
- **Delay...** – Delay Control screen display delays in samples and seconds for each source.
- **Input Gain...** – Displays the gain levels for selected inputs and allows the user to set the gain level for each input.
- **Output Gain...** – Displays the gain levels for selected outputs and allows the user to set the gain level for each output.
- **PLL Mode...** – Selects mode as Local or Remote.
- **Meter Mode...** – Sets the front panel meter mode for EDGE to show input or output signal levels.
- **Network...** – Shows the current IP Address, Net Mask, and Gateway assigned to the EDGE. These settings can also be edited from this submenu. The EDGE is going to work in conjunction with WheatNet-IP system. The EDGE must have its IP address, Net Mask, and Gateway settings configured according to the rules of the system it is joining. Since all devices in WheatNet-IP system must be on the same subnet, you will need to configure the EDGE to be compatible with the existing system.
- **Host Blade...** – Allows you to display or change the Host Blade that the EDGE communicates with – setting is for the Host Blade IP address.
- **Version...** – Displays the current version of software running on the EDGE. If you need to call Wheatstone Technical Support with EDGE questions you may be asked to provide this information.



To exit menu press the BACK button once if you are in menu screen or twice if you in submenu screen.

See the Front Panel Menu Diagram on the next page.

Front Panel Menu Diagram



EDGE GUI

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EDGE GUI

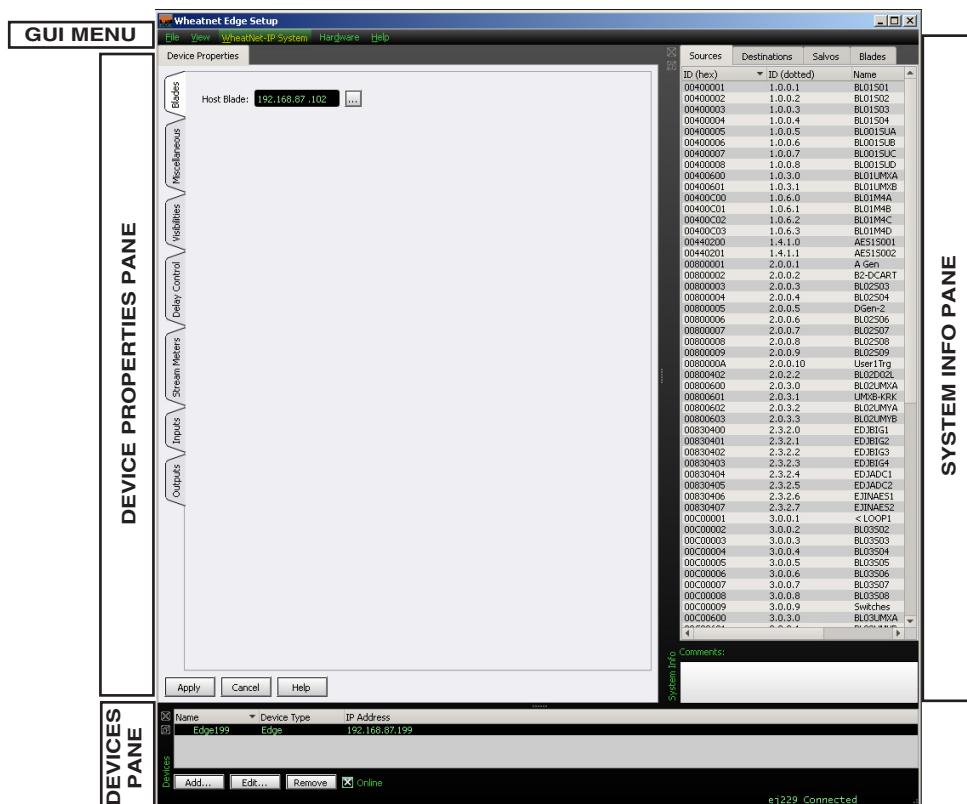
Installation and Overview

The EDGE comes with the *Wheatnet Edge Setup* Graphical User Interface (GUI) program, intended to be straightforward in setup connection between the EDGE and the WheatNet-IP system. On a user-supplied computer connected through an Ethernet switch to the EDGE install the GUI by running the installer file *wheatnetip_edge_GuiSetup_X_X_X.exe* (where *X_X_X* indicates the program version number). The installer creates a program with a file name of *WheatnetEdgeGui.exe*. Double-click the icon for this file, or its short-cut, to run the GUI.

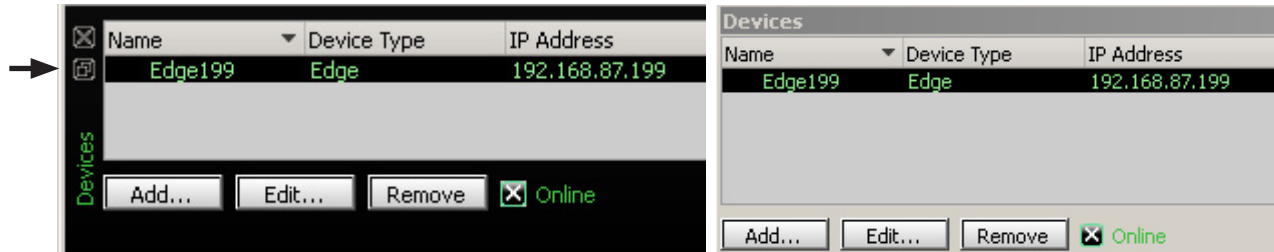
The EDGE GUI features a tabbed navigation architecture to easily access features with a minimum number of mouse clicks.

The EDGE GUI screen is vertically divided into two parts with a Device Properties Pane on the left side and a System Info Pane on the right side. Contents of the both Panes are change according to the tab selected. You may access any tabs of these Panes by simply clicking on them.

At the bottom of the screen is a Devices Pane that displays a list of EDGE devices that the GUI has been configured to communicate with. Click *Add...* to add a device to the list, *Edit...* to change the name of an EDGE or give the GUI a different IP address to talk to it on, or *Remove* to delete the device currently highlighted in the list. To the right of these buttons is the *Online* check box, which is used to toggle the GUI connection to the highlighted device between online (checked) and offline (not checked).

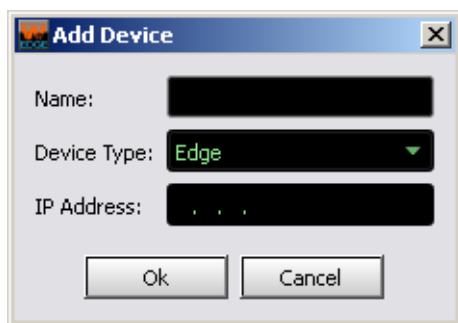


Both of the System Info and Devices Panes are relocatable within the GUI window by clicking on the Pane's button and dragging the Pane to the new location. You can even drag one or both of these Panes outside of the GUI window, a handy feature if you have two monitors. To bring a Pane back into the GUI, double-click its title bar.

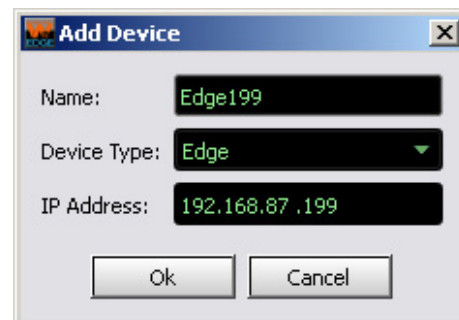


Adding EDGE To The Devices Panel

We need to add the EDGE as a device before we can work with *Wheatnet Edge Setup* GUI. Click the *Add...* button along the bottom of the *Devices* panel to bring up the *Add Device* dialog:



Give the device a convenient *Name*: (note that the system doesn't care what name you use; it will display it for you so you can recognize the device, but it will not otherwise make use of the name). Click on the down arrow at the right end of the *Device Type*: field and select *Edge*. Then fill in the *IP Address*: field with the IP address of the EDGE you are adding. Your *Add Device* dialog should look something like this:



Click *Ok*. The device now shows up on the *Devices* panel.

Click once on the device in the *Devices* panel list to highlight it. Make sure the *Online* check box has an X in it (click it once if it is empty), and then observe the lower right corner of the program window. If all is well and the EDGE and the computer running the *Wheatnet Edge Setup* GUI are both on the same network, you should see a message indicating you are connected to the EDGE.



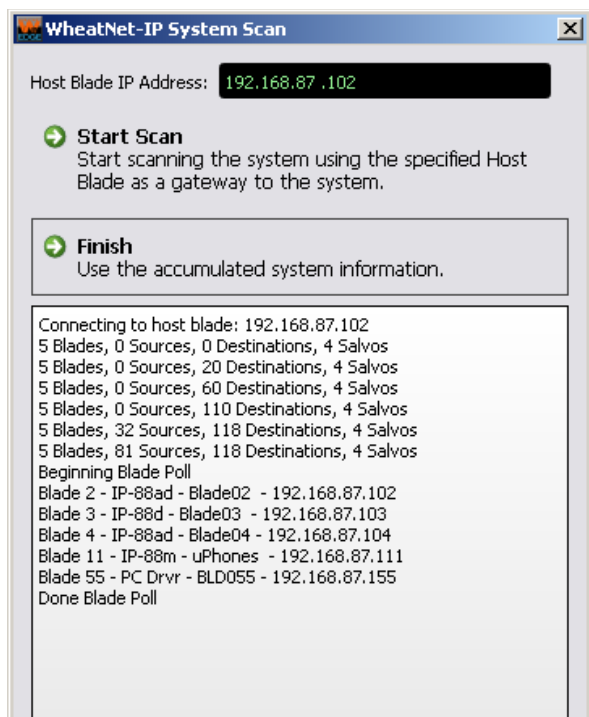
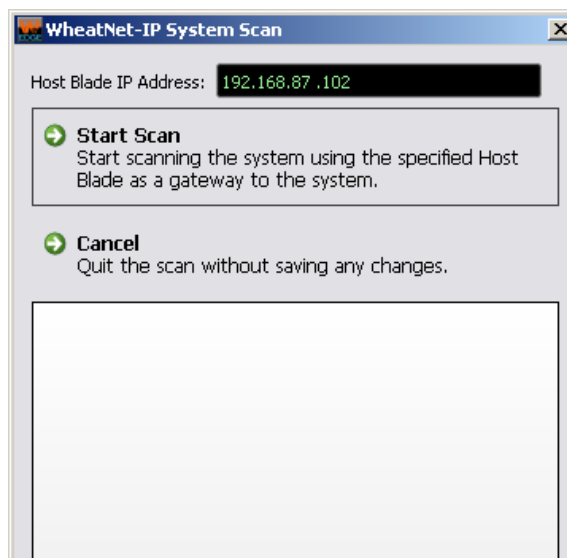
System Info Pane

Let's turn our attention now to the *System Info* pane. The first time you start up the *Wheatnet Edge Setup* GUI this area will be blank. So let's get it to fill in.

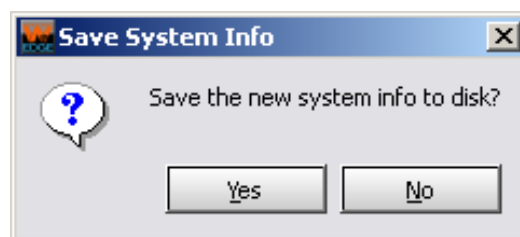
Select *WheatNet-IP System>System Scan...* from the *Wheatnet Edge Setup* GUI menu to see this dialog:

Start by specifying the *Host Blade IP Address*. This can be the IP address of any physical BLADE in the system. The *Wheatnet Edge Setup* GUI will query the chosen BLADE to get a map of the system resources. **DO NOT** use an EDGE IP Address for this operation; it will not provide the needed results. Once the BLADE IP address is entered, click *Start Scan*. The data area will start to fill in and after a period of time will indicate the scan is done.

When the scan is complete you will see a screen like this (the exact text is system-dependent):



Click the *Finish* button. You will be asked if you want to save the system information just gathered.



It is a good idea to save this information at some point in time. Otherwise, every time you start the *Wheatnet Edge Setup* GUI you'll need to do a scan to discover the available resources. On the flip side, any time you make a configuration change, you will need to do a fresh scan, and a save, to keep the program's knowledge of the system in sync with the changes. If you choose to save at this time, click *Yes*. You'll be prompted to add an (optional) comment to the

file, after which you'll be presented with the usual Windows file save dialog. Once the save is done you'll be able to continue. If you won't be saving right now, click *No* to continue.

You will notice that the System Info now has content. Here is an example of what you might see on the *Sources*, *Destinations*, *Salvos*, and *Blades* tabs:

Sources	Destinations	Salvos	Blades
ID (hex) ▼	ID (dotted)	Name	▲
00400001	1.0.0.1	BL01S01	
00400002	1.0.0.2	BL01S02	
00400003	1.0.0.3	BL01S03	
00400004	1.0.0.4	BL01S04	
00400005	1.0.0.5	BL001SUA	
00400006	1.0.0.6	BL001SUB	
00400007	1.0.0.7	BL001SUC	
00400008	1.0.0.8	BL001SUD	
00400600	1.0.3.0	BL01UMXA	
00400601	1.0.3.1	BL01UMXB	
00400C00	1.0.6.0	BL01M4A	
00400C01	1.0.6.1	BL01M4B	
00400C02	1.0.6.2	BL01M4C	
00400C03	1.0.6.3	BL01M4D	
00440200	1.4.1.0	AES1S001	
00440201	1.4.1.1	AES1S002	
00800001	2.0.0.1	A Gen	
00800002	2.0.0.2	B2-DCART	
00800003	2.0.0.3	BL02S03	
00800004	2.0.0.4	BL02S04	
00800005	2.0.0.5	DGen-2	

Sources	Destinations	Salvos	Blades
ID (hex) ▼	ID (dotted)	Name	▲
00400001	1.0.0.1	BL01D01	
00400002	1.0.0.2	BL01D02	
00400003	1.0.0.3	BL01D03	
00400004	1.0.0.4	BL01D04	
00400005	1.0.0.5	BL01D05	
00400006	1.0.0.6	BL01D06	
00400007	1.0.0.7	BL01D07	
00400008	1.0.0.8	BL01D08	
00400200	1.0.1.0	BL01Hdpn	
00400600	1.0.3.0	BL01UMX1	
00400601	1.0.3.1	BL01UMX2	
00400602	1.0.3.2	BL01UMX3	
00400603	1.0.3.3	BL01UMX4	
00400604	1.0.3.4	BL01UMX5	
00400605	1.0.3.5	BL01UMX6	
00400606	1.0.3.6	BL01UMX7	
00400607	1.0.3.7	BL01UMX8	
00440200	1.4.1.0	AES1D001	
00440201	1.4.1.1	AES1D002	
00800001	2.0.0.1	A Anlz	
00800002	2.0.0.2	BL02D02	
00800003	2.0.0.3	BL02D03	

Sources	Destinations	Salvos	Blades
ID ▼	Name		
1	UMXB>KRK		
2	D2CR>KRK		
3	DIMTest1		
4	DIMTest2		

Sources	Destinations	Salvos	Blades
Blade ID ▼	Mapped ID	Name	
2	Host Blade 1	Blade02	
3	---	Blade03	
4	---	Blade04	
11	---	uPhones	
55	---	BLD055	

It is important to note that Blade Picker function will use the last scan information you saved. If you have changed configuration in regard to Blades present since last saving the scan information you should rescan and resave.

Device Properties Pane

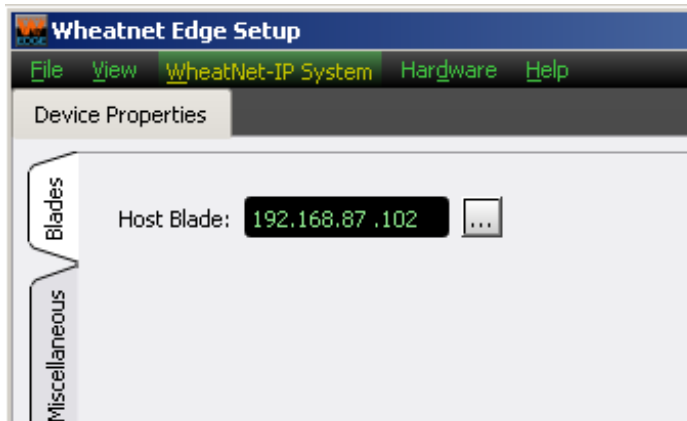
Blades Tab

In this section you will select the *Host Blade* that the EDGE communicates with.

Click the button with the three dots (ellipsis) to the right of the *Host Blade* field to bring up the *Blade Picker* dialog.

NOTE: If you have not done the system scan the *Blade Picker* dialog will not have any BLADE to show you. Also, if your system changed since the last scan and save the list available to the *Blade Picker* dialog may be incorrect.

Find the desired BLADE in the *Blade Picker* and double-click on it to select.



Blade ID	Mapped ID	Name	IP
2	Host Blade 1	Blade02	192.168.87.102
3	---	Blade03	192.168.87.103
4	---	Blade04	192.168.87.104
11	---	uPhones	192.168.87.111
55	---	BLD055	192.168.87.155

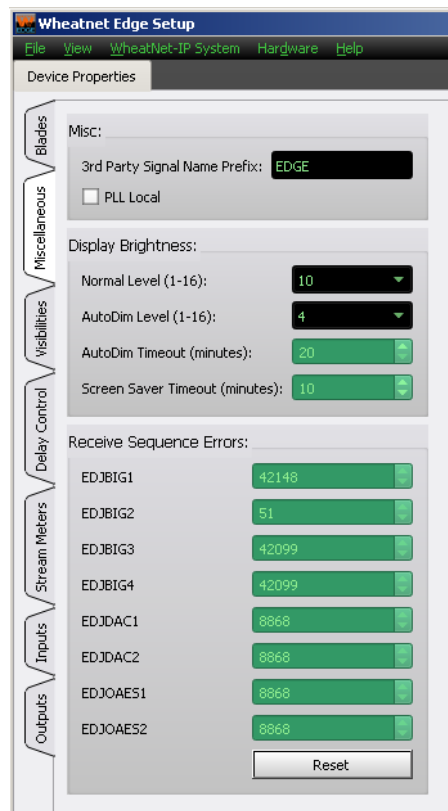
Miscellaneous Tab

3rd Party Signal Name Prefix

The EDGE has a four-character device name. The default name is *EDGE*. The EDGE uses the WheatNet-IP 3rd Party interface to define signals for handling audio between the EDGE and the WheatNet-IP system. The names of these signals use the four-character device name as the first four characters and then an appropriate description as the last characters. Changing the device name allows customization of the signal names that can make it easier to identify the signals in Navigator.

Note: When you change the device name, it is necessary to do the following. First, remove the 3rd Party device definition for the particular EDGE from Navigator. Second, reboot the EDGE. And third, add the 3rd Party device definition back into Navigator.

Note: In most places, the 3rd Party device name is displayed next to the signal name and can also be used to help distinguish signals when multiple EDGES are in use.



PLL

The EDGE and BLADEs both use ethernet packets for sample rate clock synchronization. The IP radio inherently adds a substantial jitter to these timing reference packets. In order to overcome the jitter, the error integration interval and overall loop locking must be extended significantly. A PLL MODE selection is provided to accommodate for this. In the Studio located EDGE case, the PLL MODE is set for local since the jitter only is occurring at the far end of the IP radio link. The BLADE at the far end will need to be set to SLOW PLL mode for that unit only. In the Transmitter located EDGE case, the EDGE PLL MODE is set to REMOTE.

The check box allows you to switch between the PLL modes:

- When the check box is unchecked the *PLL Local* text displays next to check box.
- When the check box is checked the *PLL Remote* text displays next to check box.

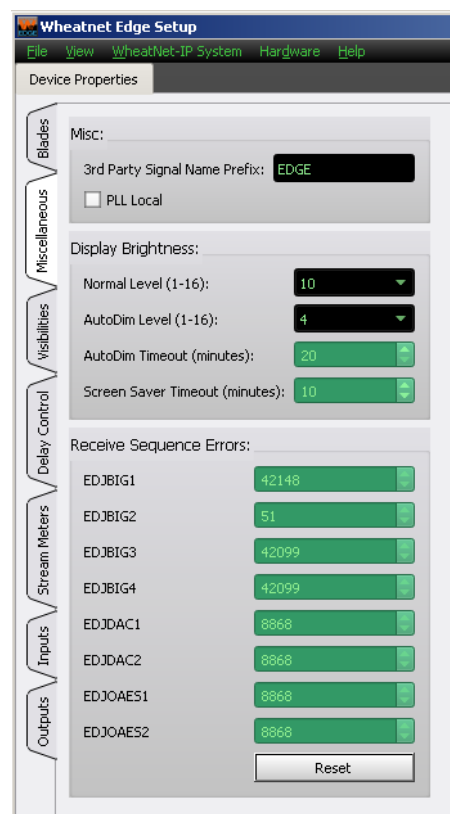
Display Brightness

The brightness of the displays can be controlled globally by the settings in this region. The displays brightness varies from a setting of 1 (which is off) to a maximum of 16. The displays also have a screen-saver mode. After a specified time, the display brightness will be automatically dimmed to an alternate brightness setting. When a button is pressed or an encoder is turned, the brightness returns to the normal level.

- Normal Level – This control specifies the normal brightness level of the display. The possible values vary from a low of 1 (off) to a high of 16.
- AutoDim Level – This control specifies the brightness level to be used when the displays are in screen-saver mode. The possible values vary from a low of 1 (off) to a high of 16.
- AutoDim Timeout – This control specifies how long (in minutes) to wait before display is automatically dimmed. The allowed values range from 20 to 59 minutes.
- Screen Saver Timeout – This control specifies how long (in minutes) to wait before entering screen-saver mode. The allowed values range from 0 to 45 minutes.

Receive Sequence Errors

The EDGE is monitoring the RTP sequence number field of the stream and incrementing counters for each stream when a sequence error is detected. When the IP radio is dropping packets these counters will respectively increment. These counters may assist in qualifying the IP radio settings and quality of RF link. Error rates of less than 10 increments per hour are probably satisfactory.



Visibilities Tab

Visibilities – Use the Visibility option setting to limit the sources the user sees when dialing up a source on the EDGE. This feature is helpful, especially in large systems with lots of signals. NOTE: If you have not done the system scan you will not see all the sources that are available to the EDGE.

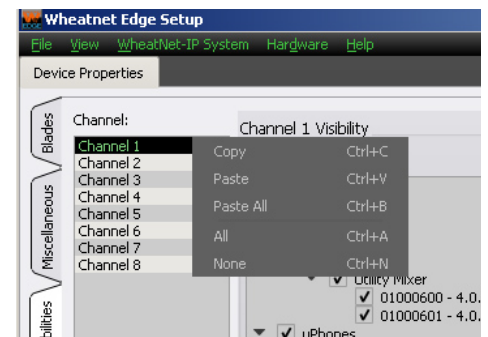
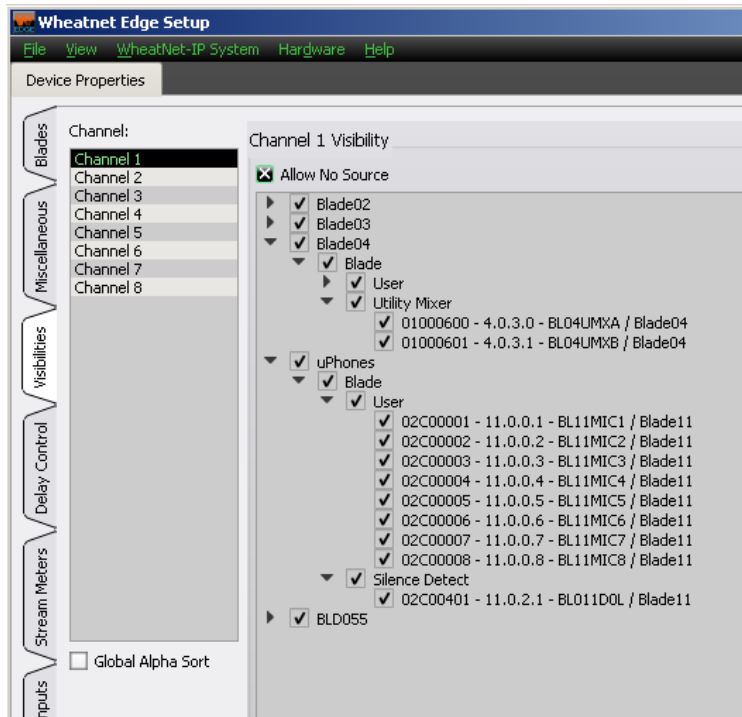
Scroll up and down the Channel list, check or uncheck signals as desired for that channel, and click the *Apply* button to save the visibility options. If you have made changes and then decided you don't want to put the changes into effect, click *Cancel*. This will cancel any changes you made since entering the screen or since clicking *Apply*, whichever happened most recently.

Check the *Global Alpha Sort* box to sort the list of channels in alphanumeric order when selecting sources on the EDGE.

Check *Allow No Source* if you want NoSource to be allowed for that channel. If *No Source* is not allowed then the channel must always have a source selected.

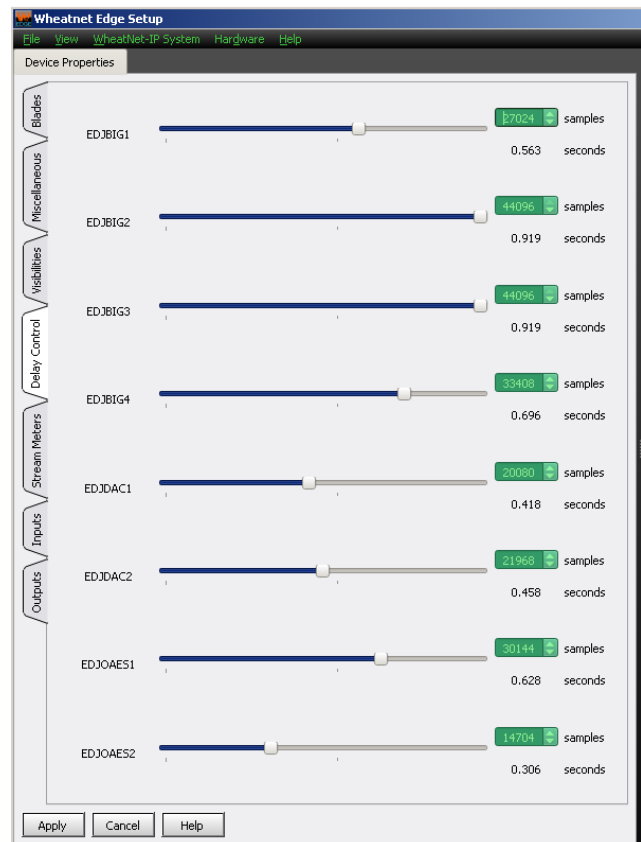
Right-clicking in the Channel area of the Visibilities tab pops up a menu with some useful shortcuts on it:

- **Copy** – Choose this item to copy the visibility settings of the currently selected channel.
- **Paste** – Choose this item to paste visibility settings that have been copied from one channel to the currently selected channel.
- **Paste All** – Choose this item to paste visibilities that have been copied from one channel to all channels.
- **All** – Choose this item to select all signals in the system to be visible to the currently selected channel. This also puts a check in the *Allow No Source* check box.
- **None** – Choose this item to deselect all signals for the currently selected channel. This also removes the check, if present, in the *Allow No Source* check box.



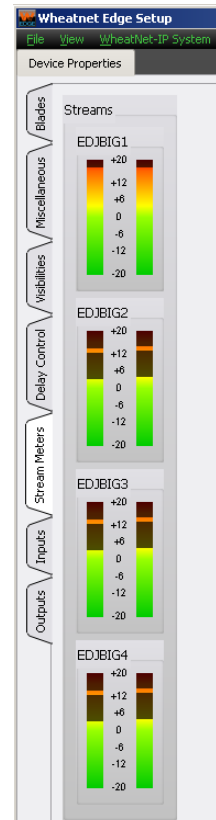
Delay Control Tab

The delay control allows for setting the buffer delay in audio samples. Typically the minimum delay might be 200 to 400 samples, i.e. something comparable to the half duplex period of the IP radio. Since this isn't necessarily a published spec of the radio, the method to set this would be to lower the delay until audio dropouts can be heard, and then backing away from this setting. The maximum delay of upwards of one second is provided for just confirming that the correct connections have been set up and it is then obvious with the large delay. Note that changing the delay setting does not immediately change the buffering delay. The buffer must first go empty in order to reset and then refill to new delay setting. This can be done by simply breaking and re-making the connection in Navigator.



Stream Meters Tab

Displays meters of the streaming audio.



Inputs and Outputs Tabs

Both Input and Output section have meters and controls that used to monitor the level and set gain and balance of the stereo EDGE's inputs/outputs signals.

The four pair bargraph meters show audio levels for the stereo channels color coded over a 40dB range, with the highest level being “+20” VU, corresponding to +24dBu, 0dBFS, and the onset of clipping. These meters show the actual signal level as modified by the gain setting. The bouncing bar at the top shows the peak audio level while the solid column shows the short term average audio level using VU time constants.

A slider control is for adjusting each channel's gain or loss over a range of +/-18dB. The slider handle moves to indicate a relative gain setting as you drag it with your mouse, and the text box below the slider updates with the specific gain value. If you prefer, you can drag your cursor over the number in the text box to highlight it and type in the gain value you want. The gain adjustment is made in real time and will reflect instantly on the bargraph meters. The system rounds off gain settings to the nearest 1/10th dB.

A balance control allows you to adjust the balance of the left and right stereo signal. The adjustments can be made by left clicking and holding the control while moving the cursor in a circular motion. If you prefer, the arrow keys can also be used to make this adjustment. Like the level control, you can highlight the number in the text box and set the balance level with “0” being center. The balance adjustments are also made in real time and will reflect instantly on the bargraph meters.

Please note that any gain modifications you make to a signal will affect the level of that signal everywhere in the system it appears.

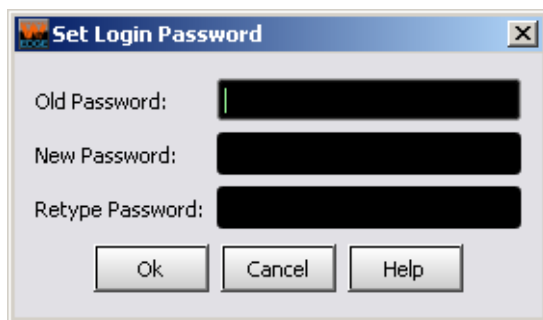


EDGE GUI Menu

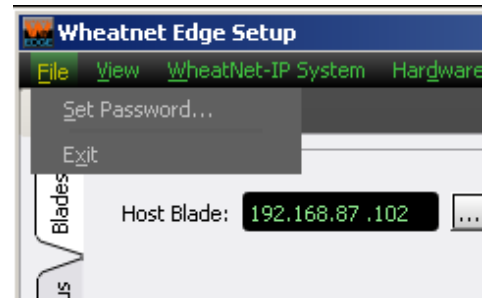
File

The *File* menu contains items for setting a password and for exiting the program:

- **Set Password...** – Used to set a password that will need to be entered to operate the *Wheatnet Edge Setup* GUI – when first installed the GUI requires no password – to set a password you must enter the current password and then enter the new password twice (the second to confirm the password).



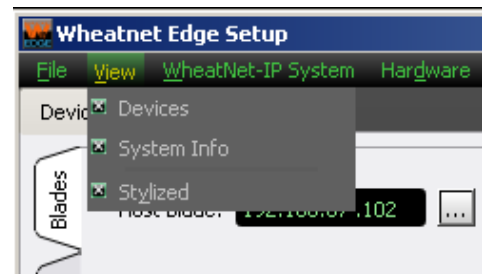
- **Exit** – Used to exit the EDGE GUI.



View

The *View* menu is used to show or hide certain sections of the *Wheatnet Edge Setup* GUI or to change the GUI appearance:

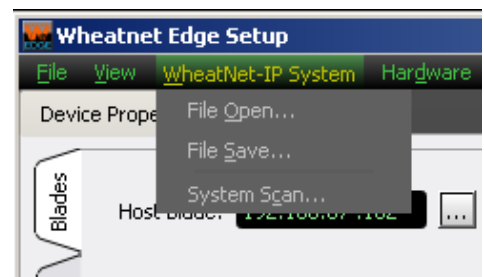
- **Devices** – Used to show or hide the Devices section.
- **System Info** – Used to show or hide the System Info section.
- **Stylized** – Used to toggle the *Wheatnet Edge Setup* GUI between a modern appearance and a more traditional one.



WheatNet-IP System

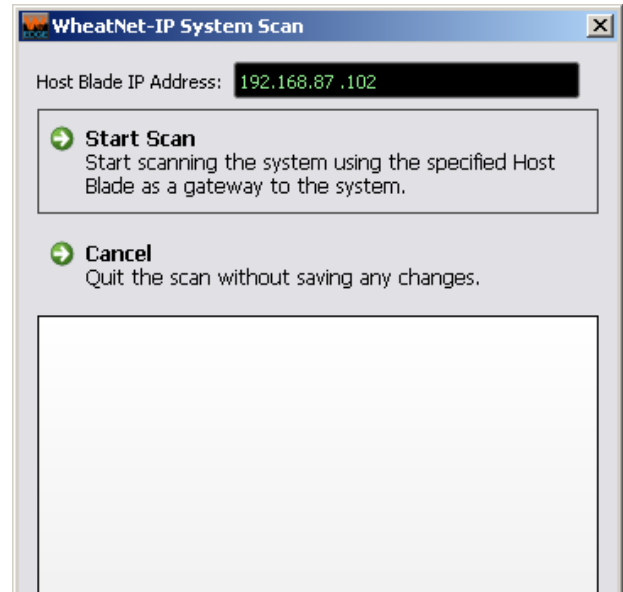
The *WheatNet-IP System* menu is used to manage signal sets within the EDGE GUI:

- **File Open...** – Used to open a saved signal set.
- **File Save...** – Used to save the current signal set.
- **System Scan...** – Used to scan the system to which the *Wheatnet Edge Setup* GUI is connected to get a list of all signals currently available in the system – this set can then be saved using *File Save...* and then later recalled using *File Open...* even if the EDGE is not connected to the system at that time.



When you first start the *Wheatnet Edge Setup* GUI there will be no information showing in the System Info section. Assuming that you are connected to a working system, you can get this section to fill by selecting *WheatNet-IP System>System Scan...* from the GUI menu. This will display the *WheatNet-IP System Scan* screen:

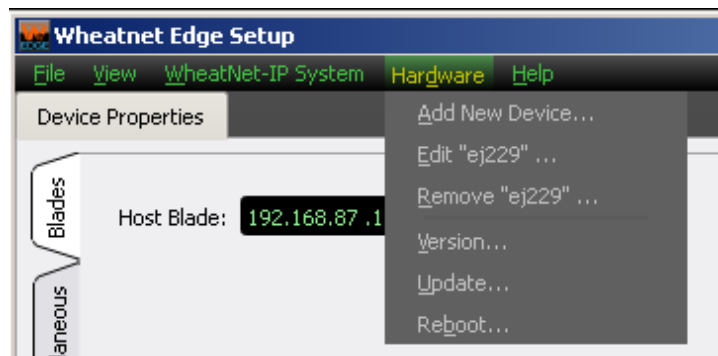
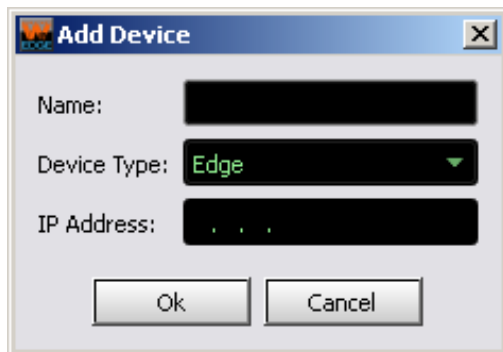
System Scan was described in details earlier in the *System Into Pane* section on page 2-5.



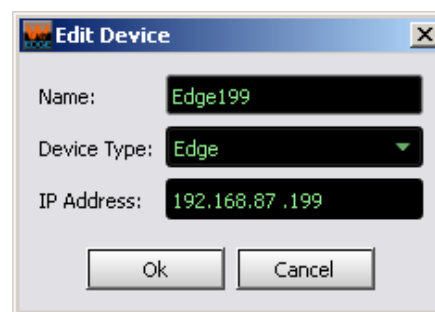
Hardware

The *Hardware* menu is used to set up devices in respect to connecting to them and managing their configuration and software:

- **Add New Device...** – Used to set up a new EDGE for the GUI to communicate with – brings up a dialog box to set a name, device type, and IP address:



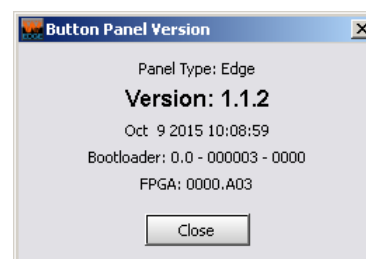
- **Edit “ej229”...** – Used to change the setup parameters for the highlighted EDGE using a similar dialog box:



- **Remove “ej229”...** – Used to delete the highlighted EDGE from the list after confirming the delete:



- **Version...** – Used to check the current version of software of the currently connected EDGE – this information may be needed in the event that Wheatstone Technical Support needs to be contacted about your unit.
- **Update...** – Used to change the software version of the currently connected EDGE.
- **Reboot...** – Used to reboot the currently connected EDGE – this is used primarily after doing a software update – a confirm dialog allows you to change your mind.



Help

The *Help* menu gives additional information about the *Wheatnet Edge Setup* GUI:

- **About...** – Used to show the version of the *Wheatnet Edge Setup* GUI.

