Raven Electronics Corporation
Specialized Communication Solutions 1968

M4x Manual

Chapter 1 – Introduction

Contact Raven Electronics

Thank you for purchasing an M4x Product from Raven Electronics Corporation. Please contact us if you have any questions, concerns, ideas, or suggestions on how to improve this manual. We can be contacted at:

Raven Electronics Corporation
4655 Longley Lane, Suite 106
Reno, Nevada 89502
(775) 858-2400 Phone
(775) 858-2400 FAX
info@ravencomm.com
sales@ravencomm.com

Please contact us when installing your M4x Product for the first time or if you ever have any questions, comments, or concerns. We would love to hear from you.

We are the "Idea Shop" committed to solving engineering problems and exceeding expectations.

Note: Throughout this manual we reference various screens in the program. Depending on the revision of the software received with the shipment, there may be slight variations. This product is always evolving as is the documentation.

Raven Electronics' Warranty and Safety Information

Please be ESD protected before starting any procedures contained in this manual.

This warranty expressly precludes any liability by Raven Electronics Corporation for consequential damages however arising after delivery to the purchaser of the affected equipment, and is limited to the expressed warranty, excluding all implied warranties including merchantability. All equipment manufactured by Raven Electronics Corporation is warranted against defective materials and workmanship for a period of two (2) years from the date of delivery to the original purchaser or end-user. Liability under this warranty is limited to servicing, adjusting, repairing or replacing, as necessary, any equipment returned to the factory, transportation prepaid for that purpose. Factory examination must disclose a manufacturing defect. Repaired or replaced items will be returned to the purchaser surface freight prepaid within the continental USA. This warranty does not extend to any equipment which has been subjected to transportation damage, misuse, neglect, accident, improper installation, or any other circumstances reasonably beyond the control of Raven Electronics Corporation.

Beyond the warranty period, repairs will be billed to the purchaser at cost. In such cases, an estimate will be submitted for approval before repair is initiated. Repaired equipment will be returned to the purchaser with transportation charges collect, unless agreed to between the purchaser and Raven Electronics Corporation.

M4x Blade Quick Start Guide

Thank you for purchasing the M4x Blade.

When updating your M4x Blade, confirm the following items were received with your shipment.

- Software CD
  This CD also includes the User Manual
- AC Power Supply Adapter
  120/240 VAC, 12 VDC 1.5 Amp regulated
  (Note: on units powered from a DC source, this item will not be included)
- Power Cord
  (Note: on units power from a DC source, this item will not be included)
- USB Cable

If any of these items are missing, please contact Sales at 775-858-2400.

Installing the M4x Software

Note: Install this software before plugging in the M4x Blade.

1. ***Uninstall old M4x Software before installing a new version.***
2. Install the software by inserting the CD into the computer's CD Drive.
3. We recommend selecting "Easy Install" when prompted.
4. Follow the on-screen prompts to complete the installation.
5. Refer to the M4x User Manual included on the software disk for more detailed installation instructions, (especially if this version of software will be installed over a prior version of software).

Power Up the M4x Blade

1. Connect the Power Cable into the AC Power Adapter.
2. Connect the AC Power Adapter to your AC power source (e.g. 3-pronged grounded wall outlet). The AC Power Adapter can be connected to a 100 to 240 VAC, 50-60 Hz, 0.5A source.
3. Connect the DC plug from the AC Power Adapter into the DC jack on the rear of the M4x Blade as shown in Figure 1.

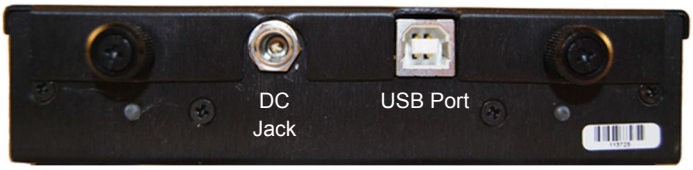


Figure 1

There are seventeen LED indicators on the front panel of the M4x Blade as shown in Figure 2.

There are two LEDs per Port. The first LED is Red (default is XMT (Output)). The second LED is Green (default is RCV (Input)).

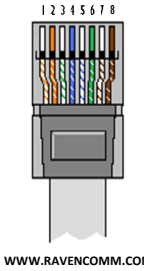
There is a Power On LED which is also Green (and sometimes blue) to let the user know the M4x Blade is powered on.

Figure 2

For more details regarding how the LEDs can be set to indicate COR (E-Lead) or PTT (M-Lead), please refer to the M4x User Manual.

M4x Port Pin Outs

On top of each M4x Blade, there are labels with pin out information for each port installed in the M4x Blade. Please note, the pin order is grouped for clarity.



Note: E-Lead is COR, M-Lead is PTT

MODULE 476-150	4-WIRE INTERFACE
PIN 1, PIN 2	RCV
PIN 3, PIN 6	M-LEAD
PIN 4, PIN 5	XMT
PIN 7, PIN 8	E-LEAD

MODULE 476-151	4-WIRE INTERFACE
PIN 1, PIN 2	RCV
PIN 3, PIN 6	M-LEAD
PIN 4, PIN 5	XMT
PIN 7, PIN 8	E-LEAD

MODULE 476-152	2-WIRE INTERFACE
PIN 1, PIN 2	2WIRE
PIN 3, PIN 6	M-LEAD
PIN 4	NC
PIN 5	NC
PIN 7, PIN 8	E-LEAD

MODULE 476-175	SNI
PIN 1	NC
PIN 2	NC
PIN 3	NC
PIN 4, PIN 5	PSTN
PIN 6	NC
PIN 7	NC
PIN 8	NC

MODULE 476-178	RELAY
PIN 1	RLY 1 NC
PIN 2	RLY 1 COM
PIN 3	RLY 1 NO
PIN 4	RLY 2 NC
PIN 5	RLY 2 COM
PIN 6	RLY 2 NO
PIN 7	NC
PIN 8	NC

MODULE 476-178	RELAY OPT – 02
PIN 1	RLY 1 COM
PIN 2	RLY 1 NO
PIN 3	RLY 2 COM
PIN 4	RLY 2 NO
PIN 5	RLY 3 COM
PIN 6	RLY 3 NO
PIN 7	RLY 4 COM
PIN 8	RLY 4 NO

MODULE 476-180	I/O
PIN 1	I/O 1
PIN 2	I/O 2
PIN 3	I/O 3
PIN 4	I/O 4
PIN 5	I/O 5
PIN 6	I/O 6
PIN 7	I/O 7
PIN 8	I/O 8

MODULE 476-777	VOIP
PIN 1, PIN 2	ETH XMT
PIN 3, PIN 6	ETH RCV
PIN 4, PIN 5	ETH SHLD
PIN 7, PIN 8	ETH SHLD

MODULE 476-777	VOIP
PIN 1, PIN 2	4W RCV
PIN 3, PIN 6	M-LEAD
PIN 4, PIN 5	4W XMT/2W
PIN 7, PIN 8	E-LEAD

Starting the M4x Blade Software

1. Verify the M4x Blade is powered on.
2. Connect the USB Cable to the M4x Blade as well as to the computer.
3. Located on the Computer Desktop, select "M4x Setting" shortcut.
4. Once the program is open, select "Actions" menu in the upper left area of the screen.
5. Select "Connect"
6. Select "Local/USB"
7. On the right-hand side of the screen, a new box will appear.
8. Press the "+" next to Communication System
9. Click on "Blade" and the factory settings will appear
   This screen will show the following:
   - The M4x Blade Firmware Revision
   - The Modules Installed/Firmware Revision
   - Any enabled features
10. Click on the "+" next to Blade (and its Node Address)

    The items that appear will allow access to the port settings
11. Click on the "+" next to System Voting to create a Vote Group or Groups (an optional feature) and follow the Wizard.
12. Click on the "+" next to System Bridging to create a Bridge Group or Groups.

Please refer to this M4x User Manual for more detailed settings.

Configuring the M4x Analog 4-Wire Module

1. Click on the "+" just to the left of the Blade, if you have not already from prior instructions. All ports populated will show a generic name until the user changes it.
2. Click on the port that you want to analyze or configure. The Port Status, along with the Transmit and Settings control buttons appear.
3. Press the Setting button in order to expand the settings screen.
4. Click through the tabs to see various settings.
5. When all changes have been made, click "Actions" menu and then "Save Settings to Firmware". This will save the settings to the M4x Blade. Please note: the "Save" button, only saves the changes on the computer and will not save the settings onto the M4x Blade.
6. After any changes have been made, please power cycle the M4x Blade by unplugging the unit and plugging it back in.

Configuring a Bridge

1. Configure the M4x Analog 4-Wire Module(s) before configuring a Bridge.
2. The M4x Blade allows multiple bridge configurations to be created on one blade.
3. Click "System Bridging" on the right side of the screen.
4. Drag various ports from the system components panel and drop them onto the Port Name boxes in the Bridge Configuration pop up box.
   - If Broadcast is NOT checked, the associated bridge group will be full conference.
   - If DTMF Bridge Group is enabled, the members of the bridge are now able to be cross-patched dynamically as remote users dial using DTMF-enabled devices.
5. Click the check box "Enabled" to enable the bridge.

Configuring SNR Voting (Advanced Feature)

1. Configure the M4x Analog 4-Wire Daughter Board(s) before configuring a Vote Group.
2. Click "System Voting" on the right side of the screen.
3. Follow the wizard that appears.
4. Click the "Add" button to enable the Voting group.

Performing an M4x Loop Back Test for a 4-Wire Analog Module

The M4x Loop Back Test enables users to perform basic tests for PTT and COR, XMT and RCV tones, as well as DTMF.

1. Click "Actions" on the Menu (upper left corner of the screen)
2. Select "Loop-back Test"
3. Place the loopback cable firmly into a M4x Blade port to test.
4. Select the port to test (be sure the cable is in the same port)
5. Select the Loopback Tab
6. Select to Test All or the Specific Test and click Test
7. Testing status and Pass/Fail notifications will populate as the M4x Blade goes through the specified tests.

Thank you for choosing a Raven Electronics Corporation M4x Blade for your communication needs, where we are the 'idea shop' committed to solving engineering problems and exceeding expectations.

Chapter 2 – M4x Product Description

The M4x products provide a complete interoperability solution for existing voice and data networks. The flexibility of the M4x products is demonstrated by the firmware and software integration, allowing for full customization of features. Truly, there are hundreds of ways the M4x platform can and has been used.

What is M4x? M4x is an acronym for "Multi-Market, Mixed-Media"; x = next generation. M4x is a flexible technology that allows engineers the ability to quickly design communication solutions.

The basis of Raven's M4x technology is the ability to mix different media types within a single communication system. Several types of Raven M4x digital-signal-processor-powered modules exist to support a number of media types. M4x hardware and software tools facilitate the design of simple to complex communications solutions that might otherwise require multiple products from multiple vendors. Out of the box most features are enabled to allow a number of media interoperability options. Some features such as the SNR comparator/voter and Motorola Custom Configurations require a special hardware license. Inquire with Raven Electronics Corporation for pricing for these advanced features.

Standard Features

- VOX (Voice-Activated Switch)
- VAD (Voice Activity Detection)
- Tone detection and generation
- Audio Bridge
- DTMF Bridging
- COR Bridging
- Notch Filtering
- Wireline
- Tone-remote control
- Voice-frequency switching
- Audio delay

Note: M4x is an ever-evolving product with active, on-going development. Please contact us for more information on the current status of roadmap items.

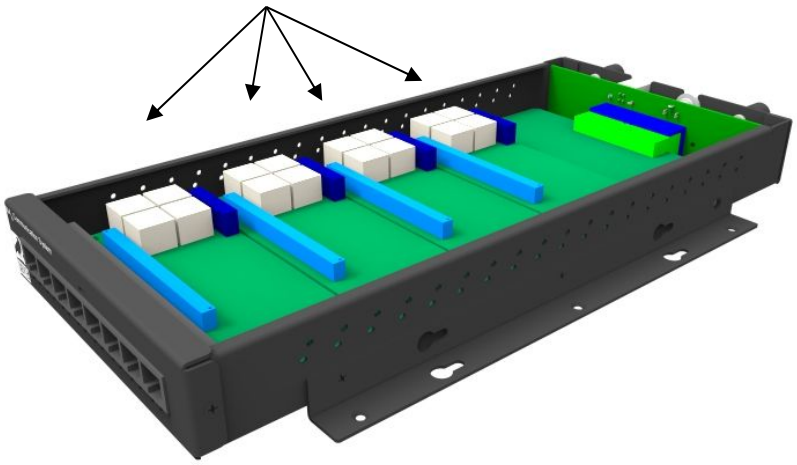
Advanced Features

- Signal-to-Noise Voter/Comparator
- Motorola 800 MHz Rebanding and other Custom Configurations

Applications

- VoIP/RoIP
- 800 MHz Rebanding
- Conventional Radio Simulcast
- Repeater Intertie
- Incident Response
- Radio Interoperability
- Multi-User Crosspatch
- DTMF Crosspatch
- Communications System Troubleshooting
- SNR Voting
- Multi-Channel Dispatch

Raven Modules



M4x Blade General Information

The Raven M4x Blade is a compact, software-driven, communication device. This product offers the perfect combination of versatility, mobility, and economy; a simple USB connection to a laptop or desktop computer unleashes a powerful communication system that can serve an unlimited number of uses.

At the heart of the M4x Blade Communication System are DSP (Digital Signal Processor) -powered "modules". These modules, manufactured by Raven Electronics, provide "access points" for several different types of communication equipment including radios, telephones, the public telephone network, orderwire, and even alarm and control equipment.

The M4x Blade Communication can accommodate up to 8 such access points, and under software control, can bridge or conference them in any combination.

And that is just the beginning of the M4x Blade Communication System's versatility the M4x Blade offers. Easily set it up for SNR voting, radio interoperability, conventional radio simulcast, dispatch center call matrix, dispatch console, call conferencing system, repeater intertie, incident response, a small office telephone system, and system troubleshooting.

Choose up to four different modules for up to eight individually configured ports depending on your needs.

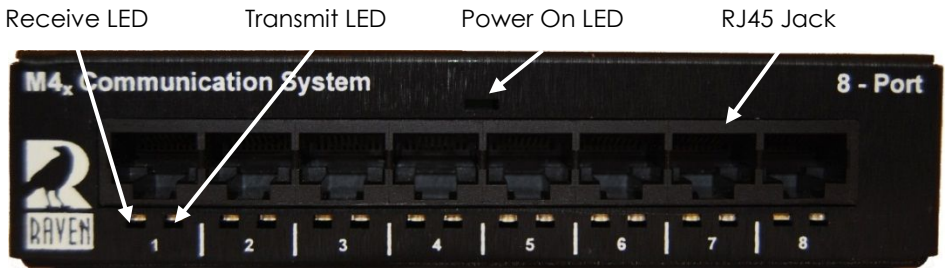


Figure 1: M4x Blade Front Panel

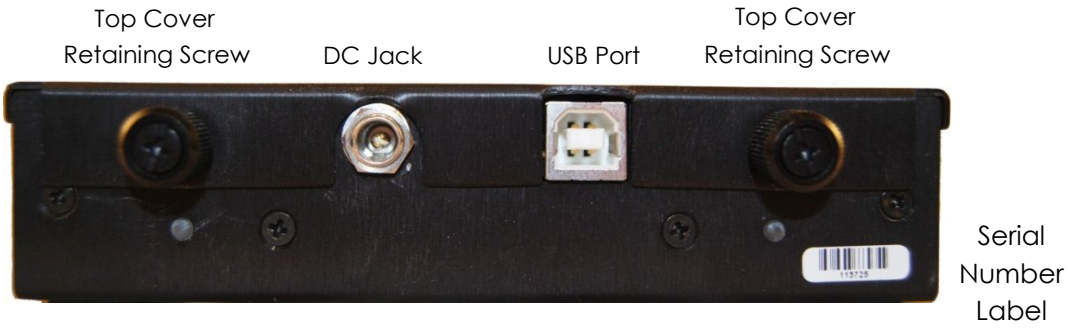
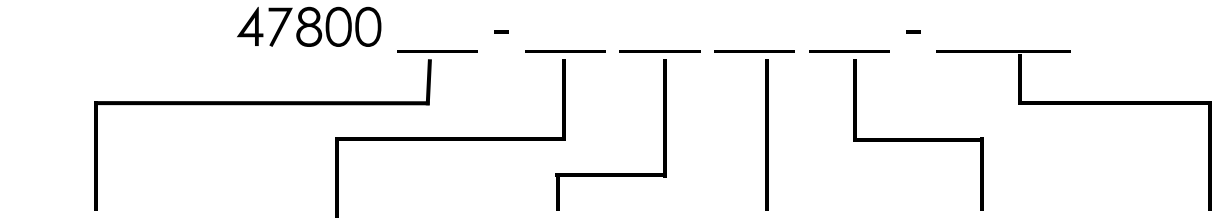


Figure 2: M4x Blade Rear Panel

M4x Blade Model Number

The basic M4x Blade model, 47800, will be followed by an A or D for power designation, a dash, and then four numbers to indicate what modules (daughter boards) are supplied. The model number will have this format: 47800A-__ __ __ __ where each blank will be filled with a character that corresponds to the module installed. If a position will not have a module, the blank position will be filled with a "0".

Example: 47800A-260V
(A Blade with one Z476-151 modules, one Z476-175 module, no module in this location, and a VOIP module — only in the last slot) (with SNR: 47800A-260V-W500)



Power Options:	Module 1:	Module 2:	Module 3:	Module 4:	Configurations:
AC Power = A	Z476-124 = B	Z476-124 = B	Z476-124 = B	Z476-124 = B	SNR = W500
DC Power = D	Z476-150 = 1	Z476-150 = 1	Z476-150 = 1	Z476-150 = 1	If SNR is not chosen, please leave blank
	Z476-151 = 2	Z476-151 = 2	Z476-151 = 2	Z476-151 = 2	
	Z476-152 = 4	Z476-152 = 4	Z476-152 = 4	Z476-152 = 4	
	Z476-153 = D	Z476-153 = D	Z476-153 = D	Z476-153 = D	
	Z476-155 = 5	Z476-155 = 5	Z476-155 = 5	Z476-155 = 5	
	Z476-170 = 3	Z476-170 = 3	Z476-170 = 3	Z476-170 = 3	
	Z476-175 = 6	Z476-175 = 6	Z476-175 = 6	Z476-175 = 6	
	Z476-178 = 7	Z476-178 = 7	Z476-178 = 7	Z476-178 = 7	
	Z476-180 = C	Z476-180 = C	Z476-180 = C	Z476-180 = C	
	Z476-184 = 8	Z476-184 = 8	Z476-184 = 8	Z476-184 = 8	
	Z476-189 = 9	Z476-189 = 9	Z476-189 = 9	Z476-189 = 9	
	Z476-232 = A	Z476-232 = A	Z476-232 = A	Z476-232 = A	
	Blank = 0	Blank = 0	Blank = 0	Z476-777 = V	
				Blank = 0	

Notes:

The VOIP Module, Z476-777, can only be located in the last slot of the blade.

Please note, the Z476-189 module is a double-wide module, so a "0" will need to be in the next position after the A is placed. Example: 47800A-290V

Available Modules

Z476-150	Basic 4-wire analog module with two channels in and out, DTMF detection, VOX detection with relay output, voice delay up to 1 second on each channel, PTT (M-Lead) relay outputs and COR (E-Lead) inputs. (This module is interchangeable with the Z476-151.)
Z476-151	Same as the Z476-150, however, this module can work with very low frequency signals
Z476-152	Two channel 2-wire analog line interface (hybrid) without battery voltage applied, detects open or disconnected line
Z476-153	Same as the Z476-150 and Z476-151, however this module can work with 2-wire or 4-wire.
Z476-155	Conference Bridge
Z476-170	Telephone Interface — two channels for 2-wire and 4-wire telephones, restricted to two modules per single blade
Z476-175	Switched Network Interface (SNI) — two channels for connecting to 2-wire circuits (PSTN) with telephone battery voltage applied
Z476-178	Relay module — six DPDT relays or eight SPDT relays
Z476-180	Input/Output (I/O) Module — 16 channel AUX input/output
Z476-184	Alarm Input module — 16 alarm inputs which can sense ground or open circuit for alarm
Z476-189	Four channel 64 kbps RS-422 (V.11) digital service channels — the voice signals can be routed to any other port in the blade (this is a double-wide module. Use "0" for the second position.)
Z476-232	Two channel RS-232 Interface — inputs and outputs can be routed to the host computer or to other RS-232 ports
Z476-777	VoIP Module (can only be located in the last slot of the M4x Blade)

Optional Configurations

W500	Voting Configuration
W560	Digital Voting Configuration

M4x Blade Specifications

POWER REQUIREMENTS

+5 VDC @ 300 mA maximum

+12 VDC @ 60 mA maximum

-12 VDC @ 60 mA maximum

ENVIRONMENTAL

Operating Temperature	0 to 50°C
Storage Temperature	-40 to 80°C
Relative Humidity	0 to 95% non-condensing
Maximum Altitude	15,000 ft (4572 meters)

PHYSICAL

PC Board Dimensions	1.95" W x 4.50" L x 0.80" H (4.95 cm x 11.40 cm x 2.03 cm)
Weight	3 oz (85 g)

47698 Line Interface

The Raven 47698 Line Interface provides a switched multi-path interface between several external ports and the TDM bus. A variety of modules can be plugged onto the 47698 Line Interface card to provide the desired interface. The available interfaces include 4-Wire E&M, 2-Wire to 4-Wire Telephone, 2-Wire PSTN, 64 Kbps RS-422, Telephone Interface, Conference Bridge, RS-232 Data, Dry Circuit Hybrid, Relays, Alarm Inputs, VoIP.

The 47698 Line Interface card connects to the computer via USB to control handshaking and configuration. The switched traffic is digitized by the modules and the Interface card reformats the digital signal to route it through the TDM bus. A micro-controller on the Interface card provides the intelligence to route the switched traffic and perform communications between the computer and the module.

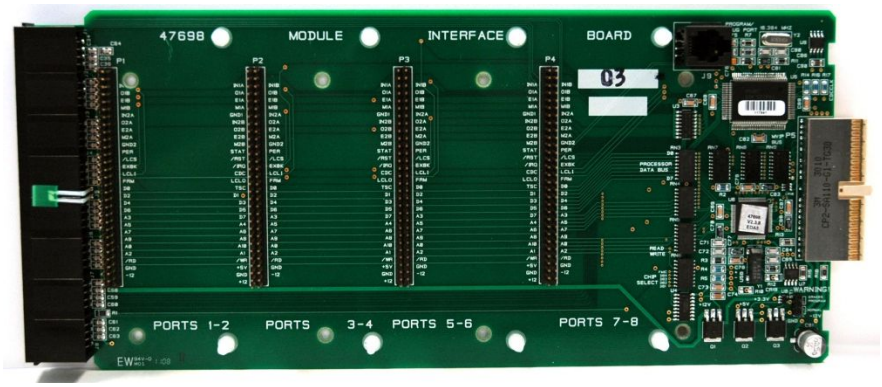


Figure 3: M4x 47698 8-Channel Line Interface

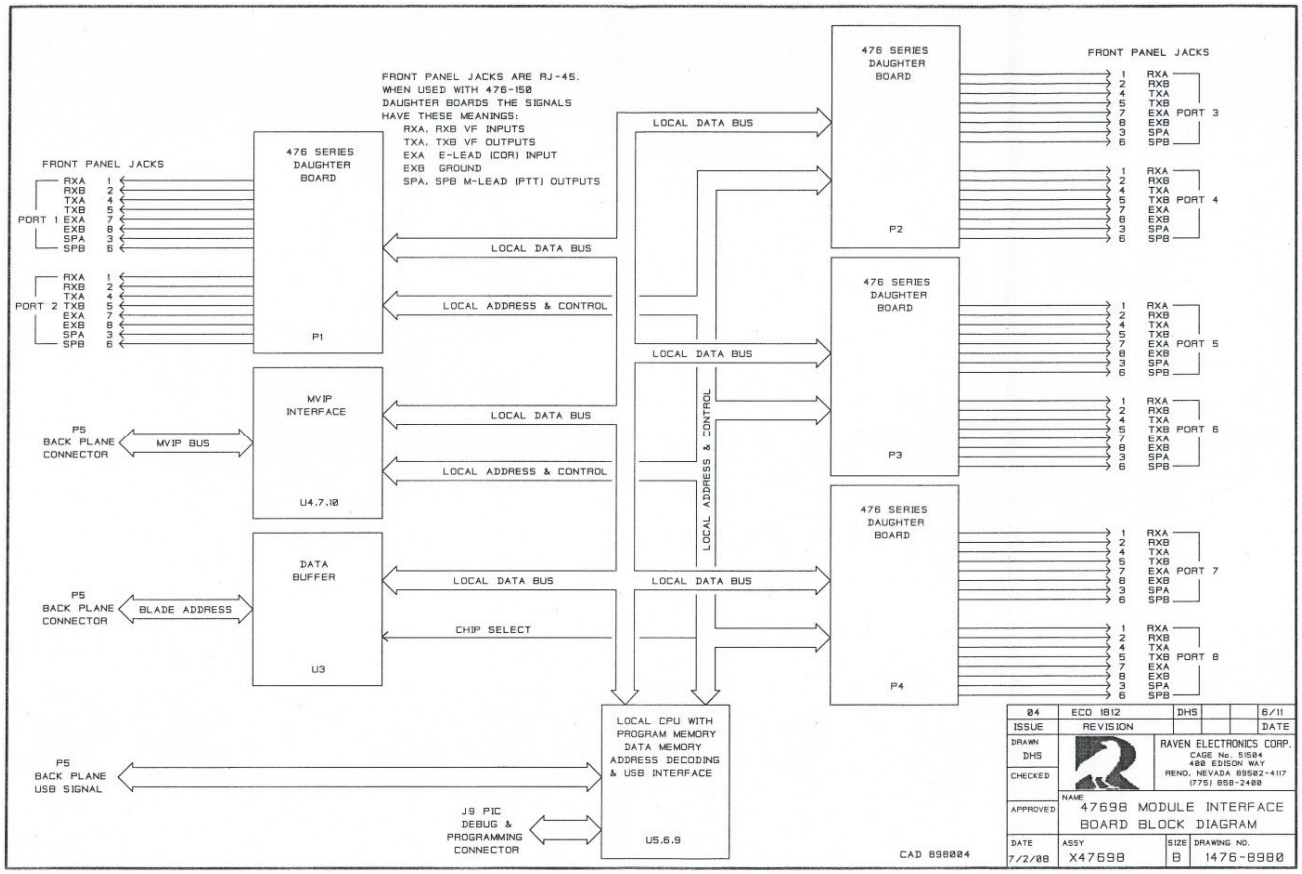
The 47698 8-Channel Line Interface utilizes a micro-controller, TDM bus technology, and 16-bit data buffers to interconnect eight switched ports to the TDM bus digital switching matrix. The micro-controller communicates with the computer via USB to control the routing, connecting, and disconnecting of the switched ports.

The micro-controller acts as a buffer and translator between the individual modules and the TDM bus. The computer communicates with the micro-controller via a device driver program. The micro-controller interfaces the different speeds of the device driver and the TDM bus interface and translates the device driver command set to the TDM bus instruction set. The micro controller also transfers data to the digital signal processing (DSP) circuitry on the modules. As with the TDM bus circuitry, the micro-controller interfaces the different speeds of the circuits and translates the device driver command set to the DSP instruction set.

The TDM bus is comprised of sixteen 2.048 Mbps serial data streams with thirty-two time slots each. The sixteen data streams are divided equally between transmit and receive ports, resulting in a maximum capacity of 256 full duplex simultaneous connections. The TDM bus circuitry on the Line Interface card routes the signal via the TDM bus if the connection is between itself and a port on another Line Interface card. If the connection is to a module on the same Line Interface, the signal is handled internally and is not routed through the bus.

47698 SPECIFICATIONS

POWER REQUIREMENTS	+5 VDC @ 50 mA maximum
	+3 VDC @ 30 mA maximum
TDM BUS STREAM	
Format	16 serial data streams, 32 time slots per stream
Data Rate	2.048 Mbps
Input/Output Voltage	0.4 VDC low / +4.6 VDC high
MODULE INTERFACE	
Format	8-bit parallel data
Data Rate	100 Mbps
Input/Output Voltage	0.8 VDC low maximum / 2.0 VDC high minimum
ENVIRONMENTAL	
Operating Temperature	0 to 50°C
Storage Temperature	-40 to 80°C
Relative Humidity	0 to 95% , non-condensing
Maximum Altitude	15,000 ft (4572 meters)
PHYSICAL	
PC Board Dimensions	4.95" W x 11.00" L x 0.85" H (12.573 cm x 27.940 cm x 2.160 cm)
Weight	0.70 lbs (0.32 kg)



Chapter 3 – M4x Blade Setup

M4x Installation and Connection

System Requirements:

- Microsoft Windows XP, Vista, Windows 7
- NET framework version 3.5
- One available USB 2.0 Port (Single Blade M4x)
- One standard USB A to USB cable (included)

Power Requirements:

- 9—18V, nominal 12V
- Average power consumption: 3—6 Watts

Operating Conditions:

- Temperature: 0—50°C

Figure 4 illustrates the optional mounting bracket for the M4x Blade.

Figure 4: M4x Mounting Bracket

M4x Communication Setup Software Installation

Note: M4x is continually changing as is this document. Although the screenshots may differ a bit depending on the software revision with the M4x Blade, the information is still in here.

In order to connect to the M4x Blade, first install the necessary software. All the software necessary to get started is located on the CD provided.

Note: If an older version of the software has already been installed, it must be uninstalled before the new software is installed.

Figure 5: AutoPlay Screen

After inserting the provided disk, an AutoPlay screen will appear, similar to the one shown in Figure 5. Select Run setup.exe. An installation splash screen shown in Figure 6 will launch.

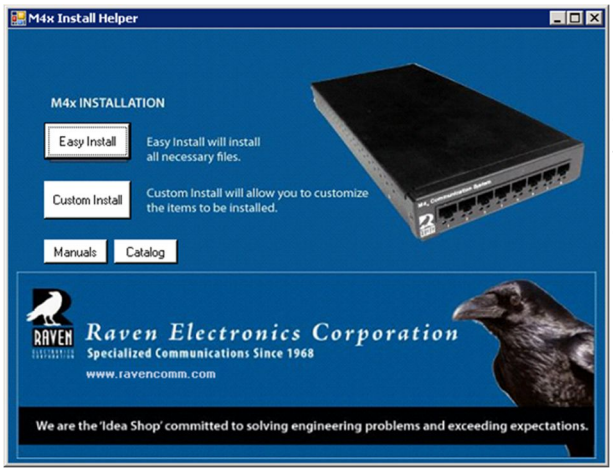


Figure 6: Installation Splash Screen

If this is the first software installation, the quickest way to get up and running is by simply clicking on the "Easy Install" button on the startup screen. This will run all the proper setup applications needed to get started. By accepting all the default options during the setup process, everything should be up and running in less than five minutes.

The next screen to appear is the "Welcome to the M4x Installer!" screen shown in Figure 7. Click Next, accept the EULA, and continue to follow the prompts and clicking Next.

Figure 7: Welcome to the M4x Installer Screen

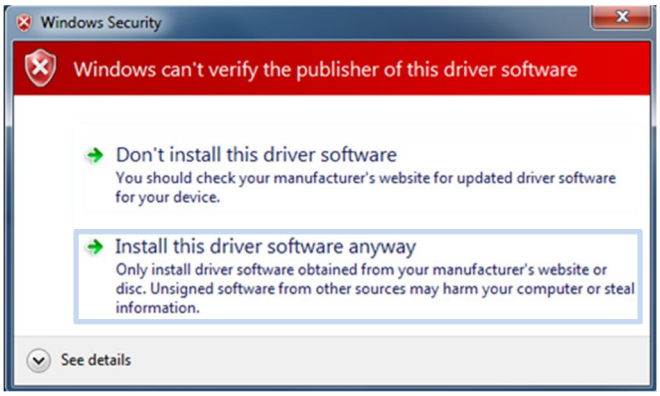


Figure 8: Install Drivers Screen

In the case that the computer using does not currently have .Net 2.0 or later installed, a prompt will appear to download and install the latest .Net revision directly from Microsoft. Please see .Net 3.0 Install on how to download the newest revision of .Net.

If additional control of the set up process is needed, please see the Troubleshooting section which identifies the folders located on the setup disk.

When the installation is complete and successful, the following screen, as shown in Figure 9, will appear. Click Finish to complete the process.

Figure 9: Successful Install Screen

M4x User Application Install

Note: Because the program will occasionally search for installation files when initialized after modifications have been made, it is highly recommended that a copy of the folder "M4x User App" be saved to the hard drive on the computer first before executing the installation. It should remain in that same location after installation for as long as the M4x software is installed. Moving the installer files may cause the program to hang and have to be re-installed.

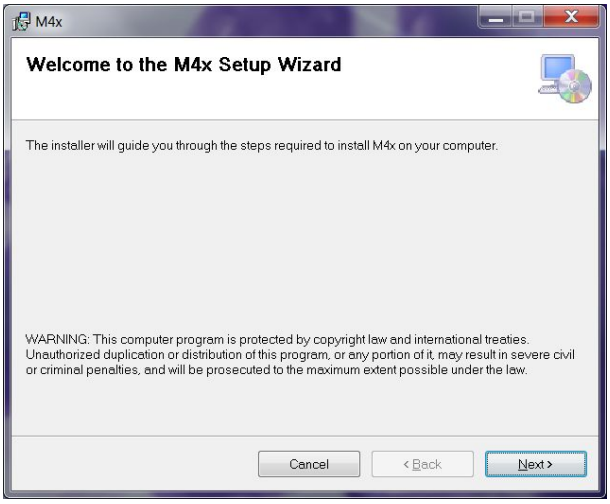


Figure 10: Setup Wizard

During the installation process, the Welcome to the M4x Setup Wizard screen as shown in Figure 10.

The next screen will allow the destination folder to be selected for the installation. It is highly recommended not to change these settings unless there is a compelling reason to do so.

In Figure 11, this screen allows the installer to select whether the program will be available to everyone or just the user profile used to install the program.

When satisfied with these settings, click on the Next button in the bottom right to continue. Follow the prompts on the following screens.

Note: It is highly recommended that Windows update is run after the installation in order to check for critical updates to the .Net framework software before using the M4x Software.

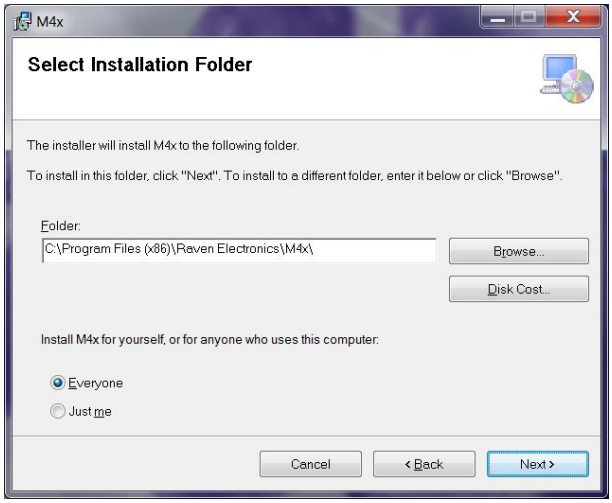


Figure 11: Installation Selection

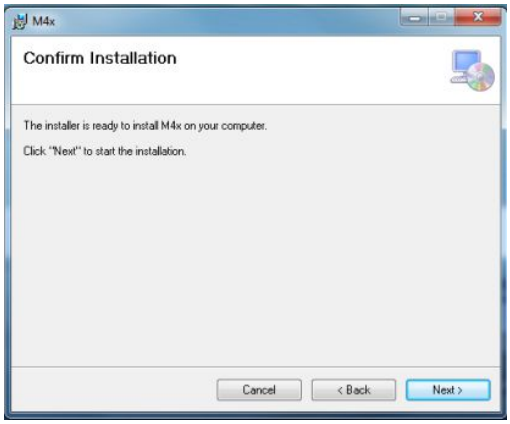


Figure 12: Installation Confirmation Screen

When Figure 12 appears, this confirms installation.

After the installation is complete, the icon, shown in Figure 13, will appear on the desktop.

Now launch the M4x Settings by double-clicking on the desktop icon, M4x Settings. This will begin the M4x Software to configure the M4x Blade.

Figure 13: M4x Software Icon

Connecting to the Local M4x Blade

Ensure that the M4x Blade is connected to the computer via USB and the M4x Blade is powered on by connecting it with the supplied 12V power supply (AC powered M4x Blades).

To connect to a local M4x Blade (connected via USB) as per Figure 14:

1. Open the M4x Configuration Setup
2. From the Actions menu bar, mouse over Connect and click on Local/USB. After Local/USB has been selected, a green progress bar will appear on the page indicating the M4x Software is connected to a local blade.

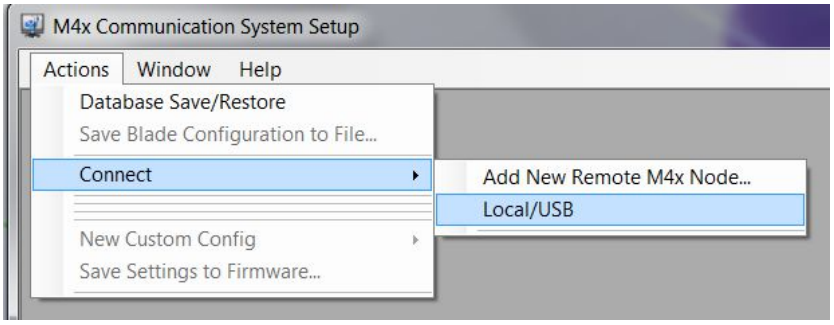


Figure 14: Connecting to Local M4x Blade

3. Once the M4x Blade is connected to the computer, System Components will appear on the right-hand side of the screen.
4. Connecting a second blade will allow both blades to appear in the System Components section. Attach the second blade and follow the above directions, #2 and 3.

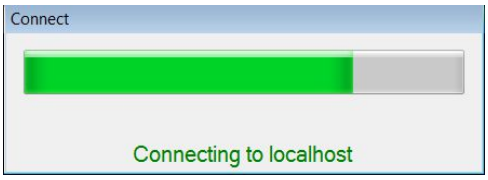


Figure 15: Connecting Status Screen

Connecting to Remote M4x Blade

To connect to a Remote M4x Blade as per Figure 16:

1. Open the M4x Configuration Setup
2. From the Actions menu bar, mouse over Connect, then click on "Add New Remote M4x Node…"
3. A prompt will appear asking for Node Information: Name and IP Address (Host) of the remotely connected M4x Blade as shown in Figure 17.

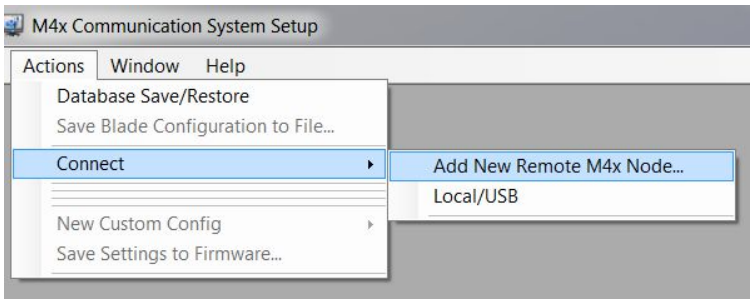


Figure 16: Connecting to Remote M4x Blade

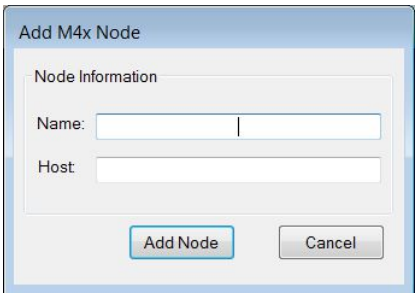


Figure 17: Adding an M4x Node

Note: In order to communicate between M4x Blades for remote configuration, the host machine connected with a single M4x Blade requires that the M4x Blade hosting service is running (included on setup disk).

M4x Configuration Software

The M4x employs software to configure many communication settings including various combinations of PTT & COR, DTMF length and digit pause, VOX thresholds, levels and function tone macros. Each individual port or is configurable on a per port basis. Thus, a system can have any number of ports uniquely configured according to the mission requirements.

The M4x comes configured with the software to support your mission requirements. The M4x configuration software environment has been optimized for Windows and is capable of running indefinitely and without interruption.

To access various menus of the M4x Software, click on the plus icon immediately to the left of "Communications Systems" to expand the list as shown in Figure 18.

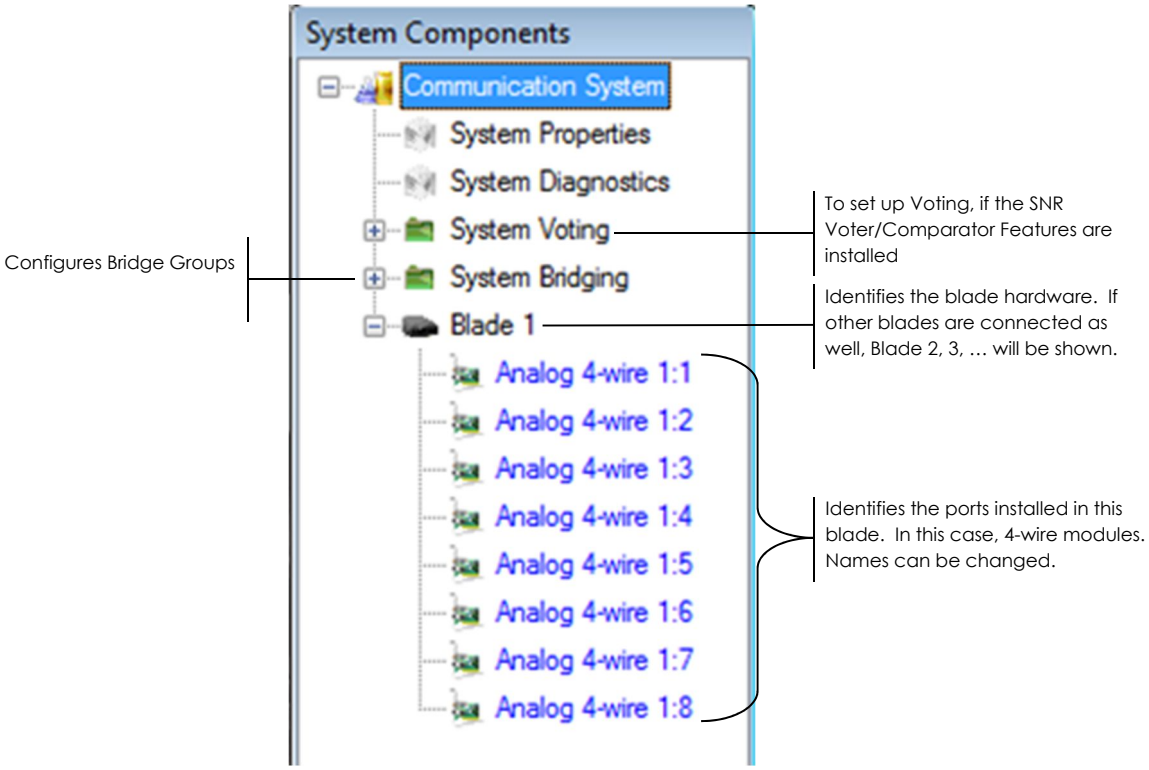


Figure 18: System Components

M4x Blade System Properties

Clicking on System Properties, of the System Components Panel, displays this screen which tells basic information regarding what is installed on the current M4x Blade, as shown in Figure 19.

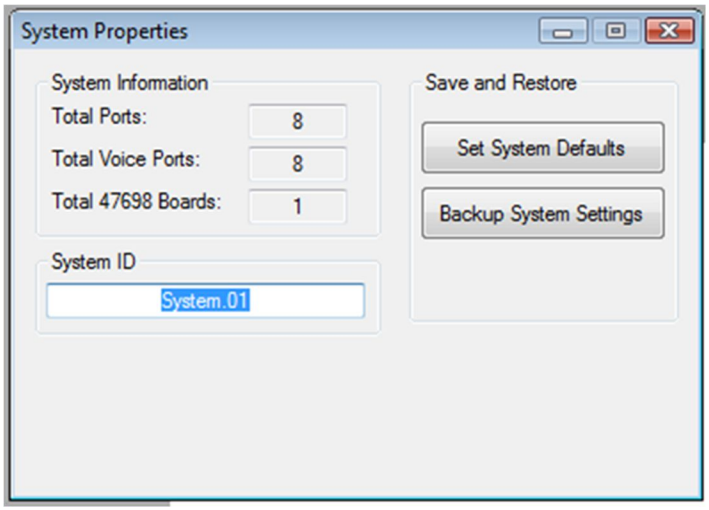


Figure 19: System Properties

Total Ports: The number of useable ports currently installed on this M4x Blade.

Total Voice Ports: The number of ports installed that allow for voice communications.

Total 47698 Boards: The number of Blades currently connected to this system.

Set System Defaults: Resets all configuration settings to their default. This will only take effect once the application has been closed and restarted.

Backup System Settings: This will save the system settings to a folder of your choice.

Restore System Settings: This will allow for you to load the previously saved settings.

Viewing M4x Blade Details

Click on Blade 1 in the System Components Panel, as shown in Figure 20. This screen shows firmware revision, the modules installed and their firmware revision, and enable features, if any.

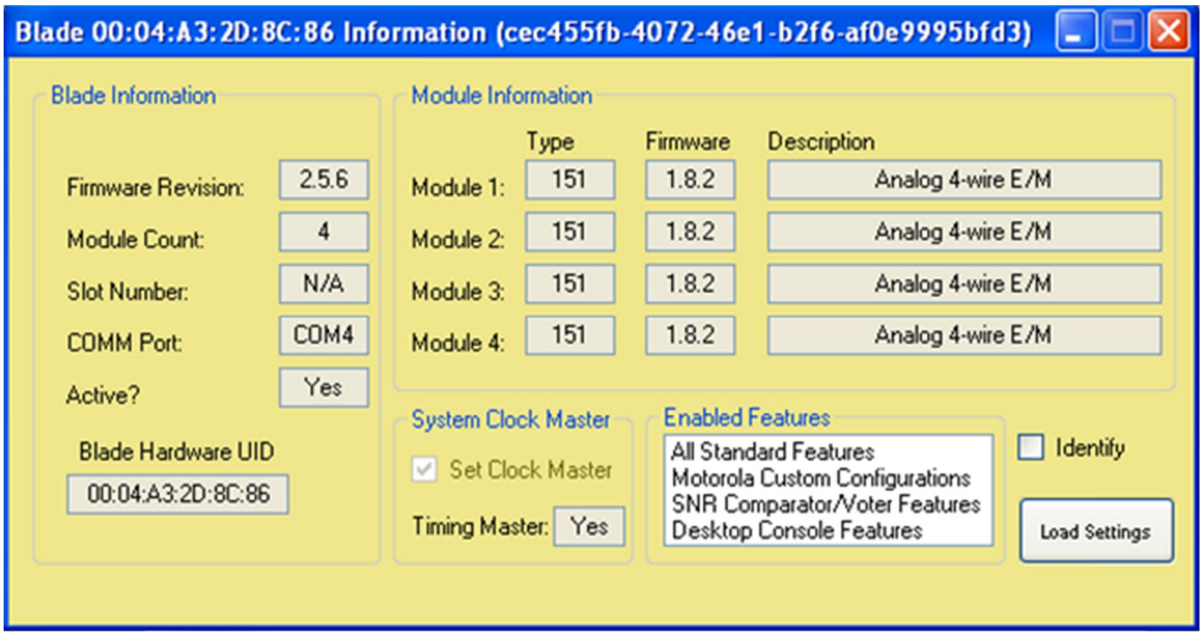


Figure 20: M4x Blade Details

Note: Depending on Software Revision, this screen may appear different.

M4x Blade Information

Just as shown in Figure 20, Figure 21 shows M4x Blade specific information. Again, depending on the software revision, screens may appear slightly different.

Firmware Revision: Indicates the number of the firmware revision currently installed on this M4x Blade.

COMM Port: The COMM port the M4x Blade is using to communicate to the software through the USB.

Blade Hardware UID: States the unique identification number of this M4x Blade. Each M4x Blade will have a different UID.

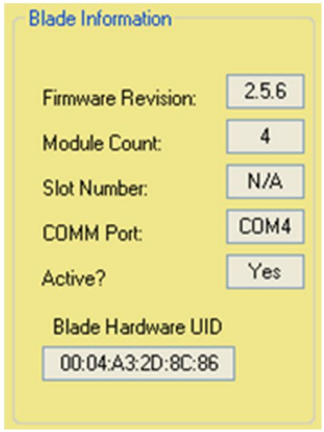


Figure 21: M4x Blade Information

Module Count: The number of modules currently installed on this M4x Blade.

Active?: Indicates whether or not this M4x Blade is installed properly and is working.

Slot Number: Not Applicable (used in M4x Systems and M4x Expansion Chassis)

Module Information

Again, just as shown in Figure 20, Figure 22 shows M4x Module specific information within the M4x Blade. Again, depending on the software revision, screens may appear slightly different.

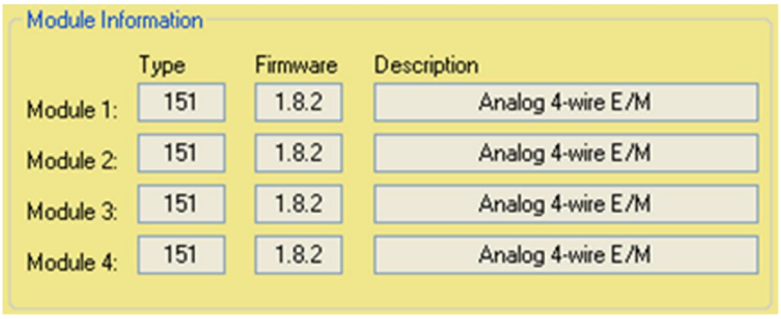


Figure 22: M4x Module Information

Type: Indicates the type of module installed.

Firmware: Indicates the firmware revision for this module.

Description: Provides a brief description of the module installed

Note: Only those modules installed will have information listed. The above example shows four 476-151s, however, the actual installed modules may vary.

System Clock Master

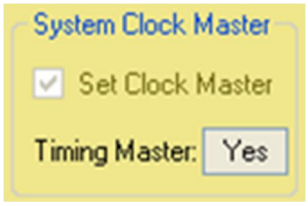


Figure 23: System Clock Master

When there are multiple M4x Blades in a system, when checked, this M4x Blade becomes the clock master. Please refer to Figure 23.

Timing Master: Indicates whether or not the FMIC chip from this M4x Blade is used to time all M4x Blades in this system.

- Single M4x Blade - Timing Master will be "Yes"
- Multi-Blade - Only one can be the Timing Master.

Enabled Features

The enabled features section, Figure 24, identifies all installed hardware features. All M4x Blades are equipped to utilize various features and require an "unlock" application for them to be enabled. Some features may require additional licensing fees, so please check with Raven Electronics for pricing.

Figure 24: Enabled Features

Motorola Custom Configurations, SNR Comparator/Voter Features, and Desktop Console Features are optional features. If interested in these features, please contact us at Raven Electronics, 775-858-2400, Press 2 for Sales

Identify and Load Settings Button

As shown in Figure 25, the M4x Blade can be identified by checking this box. When several M4x Blades are connected at the same time, it makes it easy to identify which M4x Blade is 1, 2, 3, … by checking the box and looking at which LEDs are lit up. The Load Settings button allows the user to load preconfigured settings onto the M4x Blade.

Identify: If multiple blades are connected at the same time, checking this box turns on all the LEDs on the front of the M4x Blade to visually identify the M4x Blade.

Figure 25: Identify and Load Settings

Load Settings: If any settings have been preconfigured, press this button and follow the prompts

Chapter 4 – M4x 476-150/151 Module

476-150 / 476-151 2-Port 4-Wire Analog VF/VOX Module

The Raven 476-150 Dual 4-Wire Interface is one of the module interface boards that attach to a 47698 Interface card. The 476-150 / 476-151 Dual Interface provides two 4-Wire audio ports. Transformer coupled inputs and outputs provide DC isolation as well as excellent common-mode rejection. The input and output levels can range from –16 to +7 dBm @ 600 ohms, with 0.1 dB resolution. The two ports can be configured E&M Lead operation (or PTT/COR) when required.

The Dual 4-Wire Interface can be provisioned to detect DTMF signaling, SF seize/release, SF dial pulse signaling, CCITT teletype FSK. The signaling information is passed to the computer for decoding. The interface can also provide VOX functionality with numerous options; including setting VOX delay (125ms—1 second), relay hold-on (500ms—4 seconds), VOX thresholds (-5 dB— -40 dB), and several customized tone and wire line options as well.

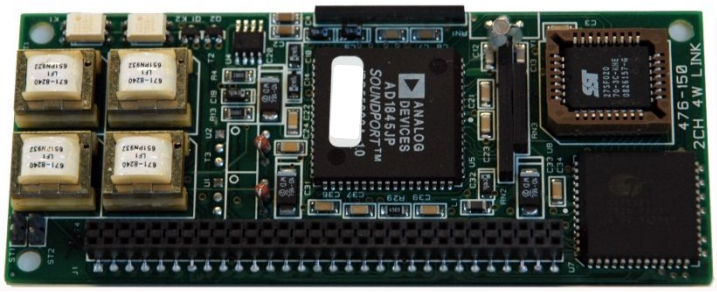


Figure 26: 476-150 4-Wire Analog 2-Port Module

The 476-150 / 476-151 Dual 4-Wire Interface utilizes a codec and digital signal processor (DSP) circuitry to interface two 4-Wire audio ports to the 8-bit parallel port of the 47698 Line Interface. The DSP acts as a buffer and translator between the codec and the 47698 Line Interface 8-bit parallel bus. The E&M Leads, DTMF, SF, and voice with teletype (speech plus) can be selected by the provisioning routine. The DSP decodes and encodes the signaling tones and teletype FSK digitally, resulting in stable and reliable tone generation and detection.

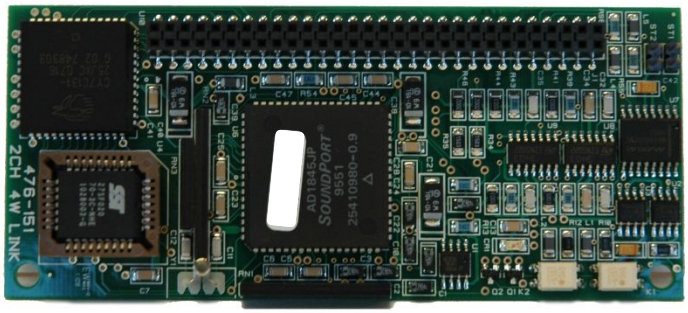


Figure 27: 476-151 4-Wire Analog 2-Port Module

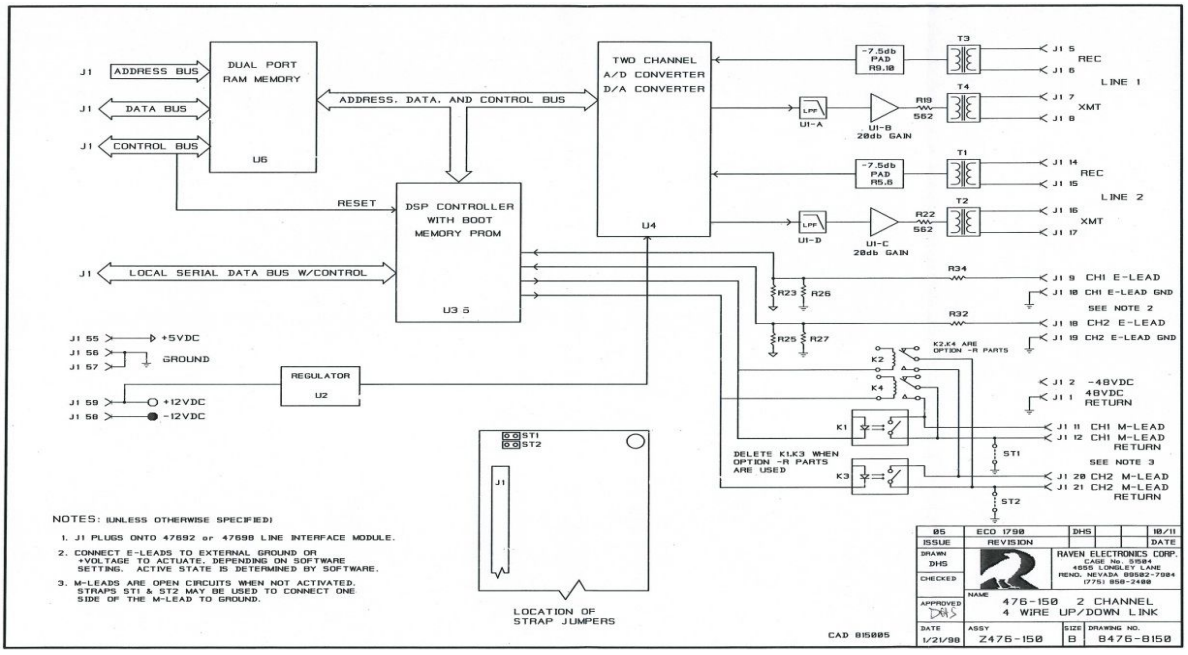
The operating mode selected can vary between the two audio ports on the 4-Wire Interface, making it possible to mix operating modes on one 476-150 / 476-151 module. The following modes of operation can be selected in the provisioning routine:

- DTMF Signaling on or off
- PTT / COR (E&M Lead) Signaling on or of
- SF Signaling on or off and signaling frequency
- SF Seize / Release Signaling
- Voice low-pass filter on or off (for speech plus application), and cut-off frequency
- Teletype on or off, baud rate and FSK frequencies
- VOX with customer specified voice delay
- Tone Remote Control
- Notch Filter
- SNR / Voter/Comparator

With a little imagination M4x can become what you want it to be. If you have ideas call us and we can help you realize your idea!

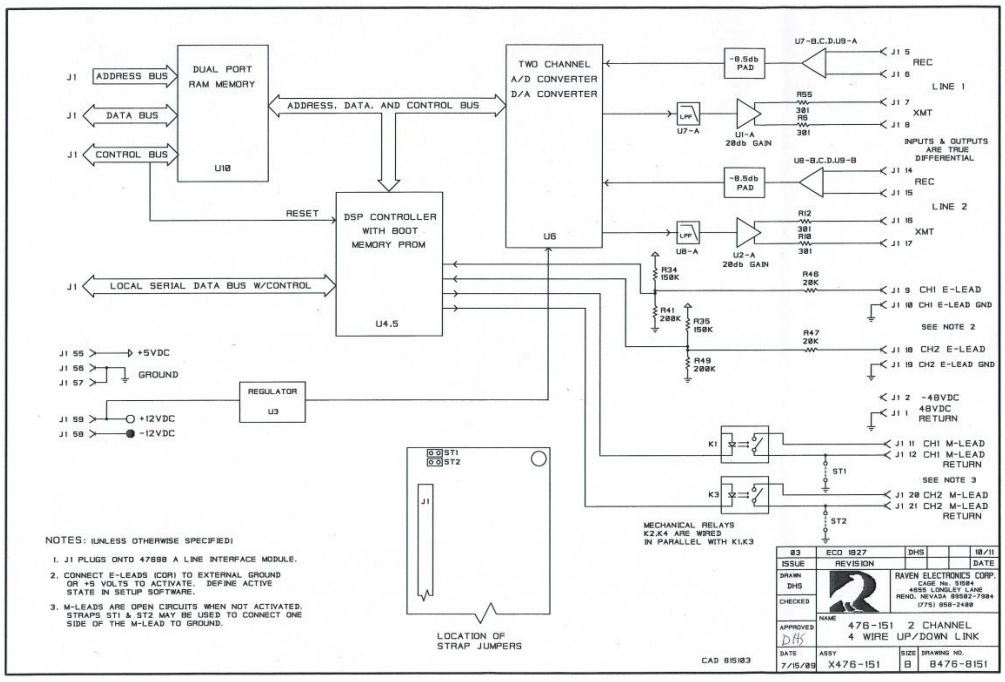
476-150 SPECIFICATIONS

POWER REQUIREMENTS	+5 VDC @ 300 mA maximum
	±12 VDC @ 60 mA maximum
4-WIRE AUDIO PORTS	
Input & Output Levels	-16 to +7 dBm @ 600Ω, adjustable in 0.1 dB steps
Frequency Response	300 to 3400 Hz ±0.5 dBm ref. to 1 KHz
Isolation	>60 dB
Idle Noise	<20 dbrnC0
MODULE INTERFACE	
Format	8-bit parallel data
Data Rate	100 Mbps
Input/Output Voltage	0.8 VDC low maximum / 2.0 VDC high minimum
M-LEAD RELAY	
Maximum contact voltage	60 VDC, 20 VAC
Maximum current	100 mA
E-LEAD INPUT	
High Input	Open circuit or ≥ +5 VDC
Low Input	ground or negative voltage
True Sense	User determined by software
ENVIRONMENTAL	
Operating Temperature	0 to 50°C
Storage Temperature	-40 to 80°C
Relative Humidity	0 to 95% , non-condensing
Maximum Altitude	15,000 ft (4572 meters)
PHYSICAL	
PC Board Dimensions	1.95" W x 4.50" L x 0.8" H (4.95 cm x 11.40 cm x 2.03 cm)
Weight	3 oz (85 g)



476-151 SPECIFICATIONS

POWER REQUIREMENTS	+5 VDC @ 300 mA maximum
	±12 VDC @ 60 mA maximum
4-WIRE AUDIO PORTS	
Input & Output Levels	-20 to +7 dBm, adjustable in 0.1 dB steps
Frequency Response	5 to 3400 Hz +/-0.5 dBm, ref. to 1 KHz
Input Impedance	600Ω or higher impedance, user selectable
Output Impedance	600Ω
Isolation	>60 dB
Idle Noise	<20 dbrnC0
MODULE INTERFACE	
Format	8-bit parallel data
Data Rate	100 Mbps
Input/Output Voltage	0.8 VDC low maximum / 2.0 VDC high minimum
M-LEAD RELAY	
Maximum contact voltage	60 VDC, 20 VAC
Maximum current	100 mA
E-LEAD INPUT	
High Input	Open circuit or ≥ +5 VDC
Low Input	ground or negative voltage
True Sense	User determined by software
ENVIRONMENTAL	
Operating Temperature	0 to 50°C
Storage Temperature	-40 to 80°C
Relative Humidity	0 to 95% , non-condensing
Maximum Altitude	15,000 ft (4572 meters)
PHYSICAL	
PC Board Dimensions	1.95" W x 4.50" L x 0.8" H (4.95 cm x 11.40 cm x 2.03 cm)
Weight	3 oz (85 g)



Configuring the M4x Analog 4-Wire Module

Basic Configuration

1. Click on the "+" just to the left of the Blade in the System Components area. All ports are populated to show a generic name until it is changed. Refer to Figure 28.

Figure 28: System Components

2. Click on one of the ports to analyze or configure. The Port Status, along with Transmit and Settings control buttons appear. Refer to Figure 29.

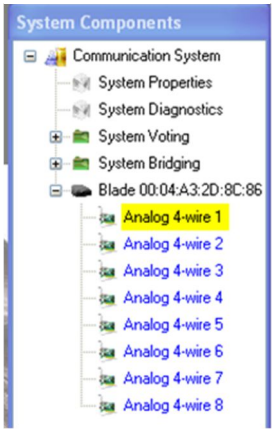


Figure 29: System Components Tree

3. Press the Settings button to expand the settings screen as shown in Figure 30.

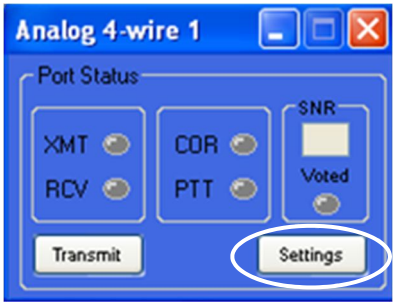


Figure 30: Analog Port

4. The following screen will appear allow the user to make configuration changes with every tab. Refer to Figure 31.

The following pages will describe what is found on all of the tabs.

Note: *Please note that the M4x Blade is ever evolving, so the pictures shown may not be the same revision as on the software received with the Raven M4x Blade. Although the diagrams may differ, the options are still available to configure.*

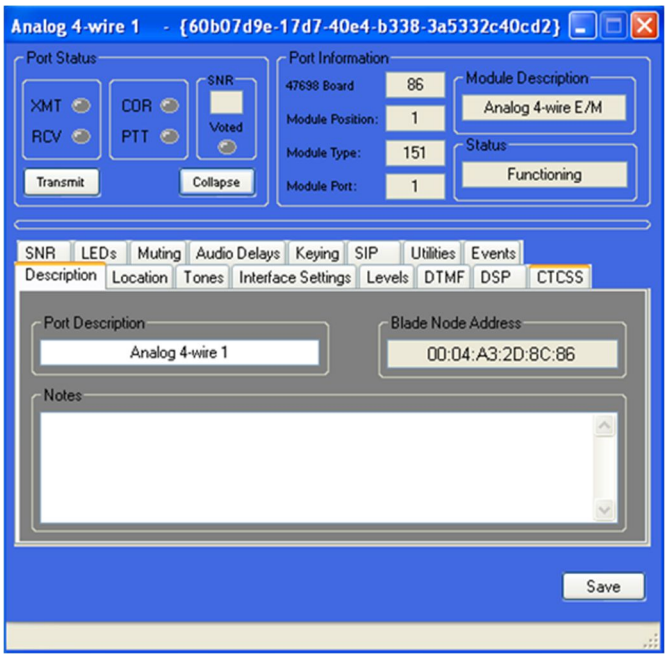


Figure 31: Main Setup Screen

Port Status

This screen, shown in Figure 32, gives the user a quick glance at the status of the various ports. Transmit (XMT) is when the signal is transmitting out of the M4x Blade to another piece of equipment. Receive (RCV) is when the signal is being received into the M4x Blade from another piece of equipment.

XMT: Turns red when this port on the M4x Blade is transmitting. This corresponds to the red LED on the M4x Blade chassis.

RCV: Turns green when this port on the M4x Blade is receiving. This corresponds to the green LED on the M4x Blade chassis. This LED will be labeled "STS" when 2175 Hz status tone is being received.

Transmit: Will either assert PTT if the enable PTT box in Audio Options is checked, or transmit the Tone Macro if enable keying tones is checked.

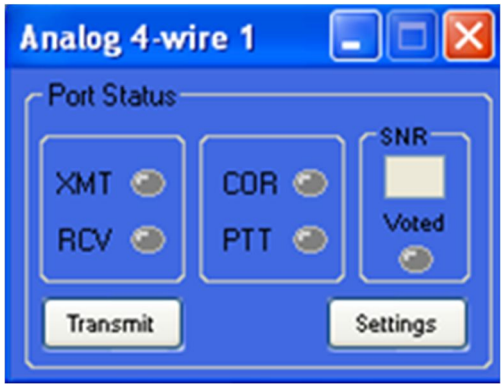


Figure 32: Port Status Screen

COR: Turns green when COR has been asserted on this port. COR is normally associated with received signals.

SNR: Displays the current signal to noise ratio on this port. The higher the number, the better quality the audio.

Voted: If this is configured as a voter / receiver port and is currently voted the LED will be green.

Settings / Collapse: Opens or closes full setup menu.

PTT: Turns red when PTT has been asserted on this port. PTT is normally associated with transmitted signals.

Port Information

This describes the M4x Blade on which the port resides, the slot on which the port's module is located (slots 1-4), the M4x module type, and the port number itself (port 1 or 2). Please refer to Figure 33.

47698 Board: The last byte of the MAC Address

Module Position: Position 1-4 on the 47698 Board

Module Type: The M4x Module Type

Module Port: The port of the module (1 or 2)

Figure 33: Port Information

Module Description: Description of the Module Type

Status: If module is working.

Saving a Port Configuration

When a configuration is complete, press the Save button, as shown in Figure 34. This will save the configuration for that particular M4x Blade on the computer used to configure the M4x Blade. If the application is closed and reopened, the settings will remain active.

***Note**: This button does **not** save settings to the actual M4x Blade; only to the computer, and is associated with the M4x Blade that is currently being configured.*

Figure 34: Saving a Configuration

In order to use the same configuration for multiple M4x Blades, please reference Chapter 8: Saving a Configuration for Multiple M4x Blades.

Description Tab

This tab, as shown in Figure 35, allows the default Port Description to be changed to easily identify the port when configuring. The Port Name will also change in the System Components tree.

Port Description: Change the Port's Name to easily identify when configuring. Example: "Plumb Firehouse" or "Site 2"

Notes: can be used for any type of notes.

Blade Node Address: MAC Address to identify M4x Blade. This is an unique identifier automatically assigned and cannot be changed.

Figure 35: Description Tab

Location Tab

This tab is used to identify the location for this port. Please refer to Figure 36. When using Raven's custom map-based software, it will allow the location to appear on a map and show location status.

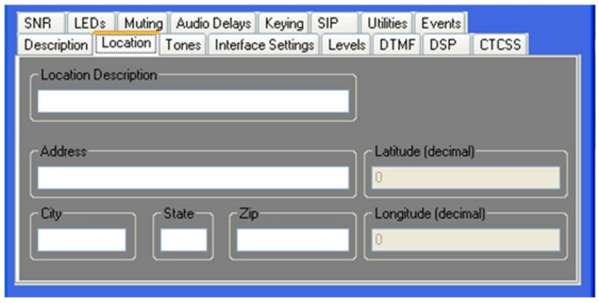


Figure 36: Location Tab

Tones Tab

The Tones Tab, as shown in Figure 37, is used to send and receive Test Tones. Click "Send" and the button turns red and transmits the selected tone type. When "Send" is clicked again, it turns back to gray and the test tone stops transmitting. During this process the Transmit and Receive lights in the Port Status window will blink while the test is running.

Test Tone: This drop-down list has multiple test tone types to choose from. Some tones in the drop-down list can be used to simulate inbound audio (removes the need for external TMS equipment).

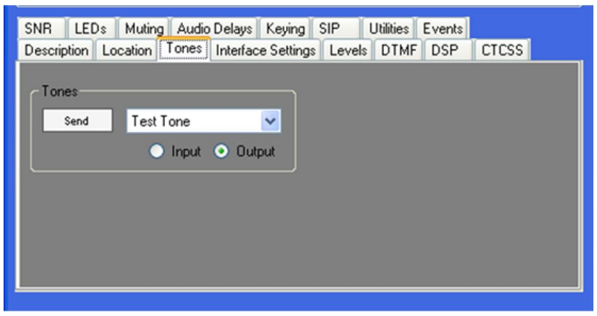


Figure 37: Tones Tab

Input / Output: Default is Output. This simulates a Test Tone being transmitted. This may be changed to simulate a received Test Tone by pressing Input.

Interface Settings Tab

The Interface Settings Tab can set Impedance on the 476-151 Module and PTT and COR Settings on both 476-150 and 476-151 Modules. Please refer to Figure 38.

4-wire Input Impedance: When 476-150 Module is installed, 600 ohm is automatically selected. When 476-151 Module is installed, there is a choice between a 600 ohm Impedance or high Impedance.

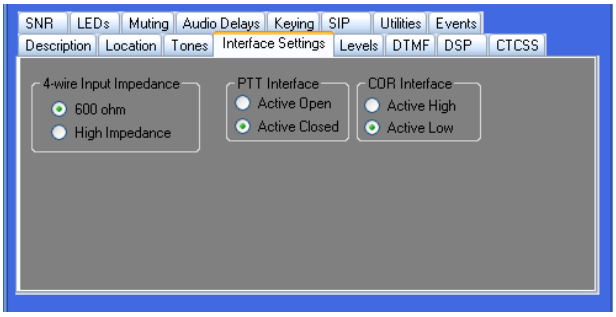


Figure 38: Interface Settings Tab

PTT Interface: Active Closed is the default. Active Closed means the relay is normally open until PTT is asserted and then there is a relay closure. If Active Open is checked, the normal state of the relay is closed until PTT is asserted and then the relay would go to open.

COR Interface: Active Low is the default.

Levels Tab

The Levels Tab, as shown in Figure 39, allows the user to adjust any gain necessary To (Receive) or From (Transmit) the M4x Blade. The defaults are 0 dB Transmit and 0 dB Receive with –6.0 for the DTMF gain. Typically this satisfies a majority of installations.

Transmit Level: Adjusting the number in this box either increases or decreases the volume of outbound audio by that amount in decibels.

Receive Level: Adjusting the number in this box either increases or decreases the volume of inbound audio by that amount in decibels.

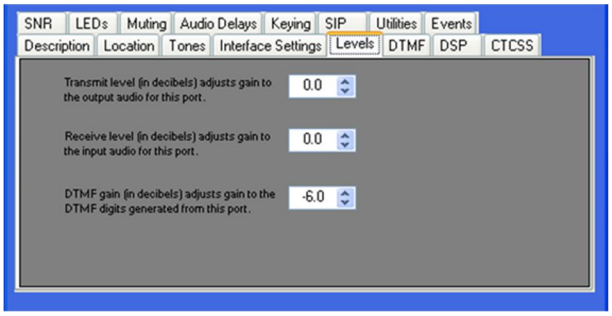


Figure 39: Levels Tab

***Note**: When transmit or receive levels or gain are set to zero, then there is no change made to signal volume. All levels within the Levels Setup are measured in decibels.*

***DTMF Gain**: Sets the dB level at which the generated DTMF will be transmitted.*

DTMF Tab

The DTMF enables an installer at time of installation to send DTMF tones across the network. It can also be set up to be used with DTMF switching schemes. Please refer to Figure 40.

DTMF address for this port: This is used with DTMF switching schemes. It shows what combination of digits is used to access this port. The default first number represents the M4x Blade number. The second number represents the port on that Blade.

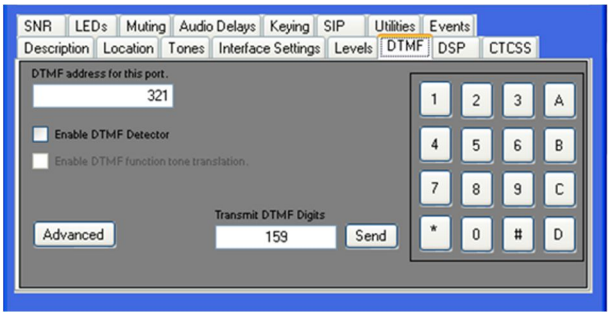


Figure 40: DTMF Tab

Transmit DTMF: Generates and transmits DTMF numbers in the box.

Enable DTMF Detector: Enables/Disables DTMF tone detectors on this port.

DSP Tab

The DSP (Digital Signal Processing) Settings Tab enables Notch Filtering, Other Filters, Tone Detection, and Inverting a Signal. Please refer to Figure 41.

Notch Filter: When Enable Notch is checked, all frequencies will be transmitted except for the one selected in the box. The notch is 100 Hz wide and 50 dB deep. The default is 2175 Hz. In certain configurations, the Notch Filter selection will be un-selectable.

Other Filters: As with the Notch Filter, when selected 300 Hz HPF would be the only frequency not transmitted.

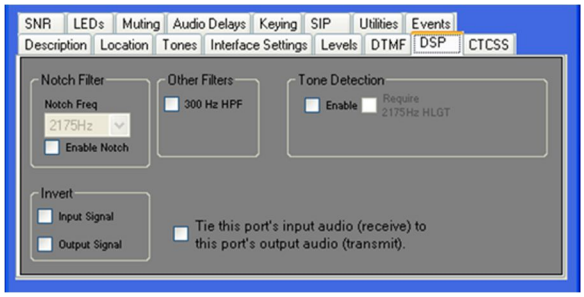


Figure 41: DSP Tab

Invert: This option is not used as part of a configuration. It is for troubleshooting/testing purposes. When an O-scope is connected, it will invert the input (receive) or output (transmit) signal.

Tone Detection: *This will enable detection of function tones F1 through F15 at the 4-wire Receive.*

Tie XMT and RCV: *When checked, any audio that is received on this port will also be transmitted from this port.*

CTCSS Tab

The CTCSS (PL) Tab, as shown in Figure 42, enables sub-audible tones to command and control radios. This is currently a custom option. Please contact Raven Sales for more information at 775-858-2400.

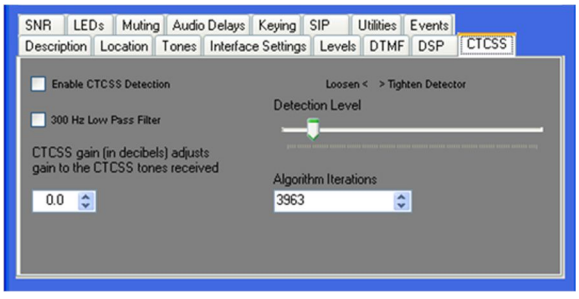


Figure 42: CTCSS Tab

SNR Tab

The SNR Tab, as shown in Figure 43, is used to configure Signal to Noise Ratio (SNR) settings for Voting applications. This is an optional feature. If interested in acquiring this feature, please contact Raven Sales at 775-858-2400. If SNR has been purchased, most of the options on this screen will be greyed out until an SNR Vote Group Receiver is configured. The note in yellow shows this port is set up as a Voter Receiver.

Report SNR: When this option is checked, the SNR box in the port status area will be enabled and the signal-to noise ratio of this port will be displayed in the Port Status Screen.

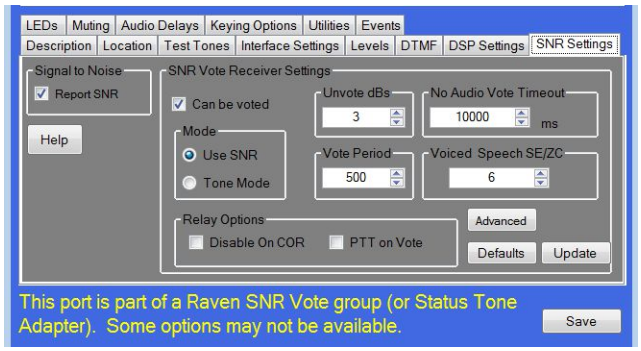


Figure 43: SNR Tab

LEDs Tab

This tab gives the option to change the Green and Red LEDs in the software and on the M4x Blade as shown in Figure 44.

Green LED Options: Default is Receive Audio, however any of the options listed can be set to make the Green LED light up on the screen as well as on the M4x Blade.

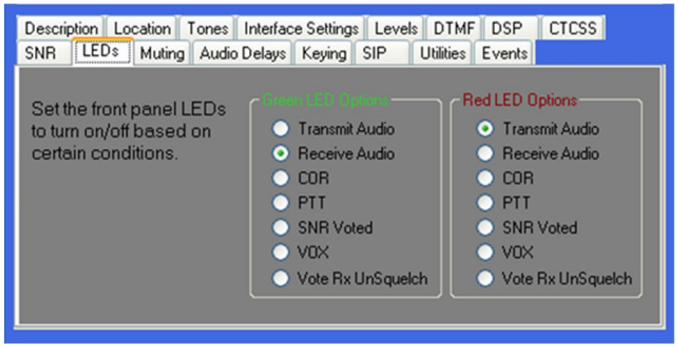


Figure 44: LEDs Tab

Red LED Options: Default is Transmit Audio, however any of the options listed can be set to make the Red LED light up on the screen as well as on the M4x Blade.

Muting Tab

The muting tab gives muting options for the 4-wire Transmit and Receive. Please refer to Figure 45.

Mute Options for the 4-wire Transmit

Always mute output audio on this port. When this option is checked, no audio will be transmitted from this port.

Mute transmit audio when COR is detected on this port. When this option is checked, no audio will be transmitted when COR is detected.

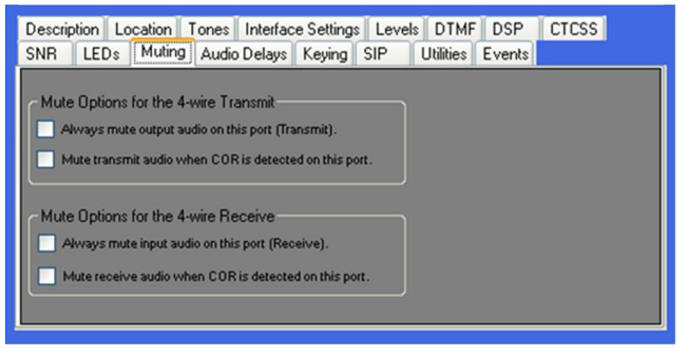


Figure 45: Muting Tab

Mute Options for the 4-wire Receive

Always mute input audio on this port. When this option is checked, no audio will be received on this port.

Mute receive audio when COR is detected on this port. When this option is checked, no audio will be received when COR is detected.

Audio Delays Tab

This tab allows Audio to be delayed before transmitting or receiving. These options can be adjusted, however the audio hold off cannot exceed 1 second between both receive and transmit. Please refer to Figure 46.

Transmit Audio Hold Off

The amount of time to delay the signal from the output of the M4x Blade

Adjustable from 0 to 1 second, in 125 microsecond steps.

Figure 46: Audio Delays Tab

Receive Audio Hold Off

The amount of time to delay the signal from coming into the M4x Blade

Keying Tab

The keying tab, as shown in Figure 47, is used when various Triggers or Keying Tones are necessary.

PTT is asserted when the trigger is reached.
Be sure to check this box when PTT needs to be asserted when the trigger is reached.

PTT Key-up Delay (ms)
When PTT is asserted, this allows for a delay before keying up.

Function Tone Macro
This is set to state what tones to send and for how long when triggered. Check **Use Keying Tones** box to select.

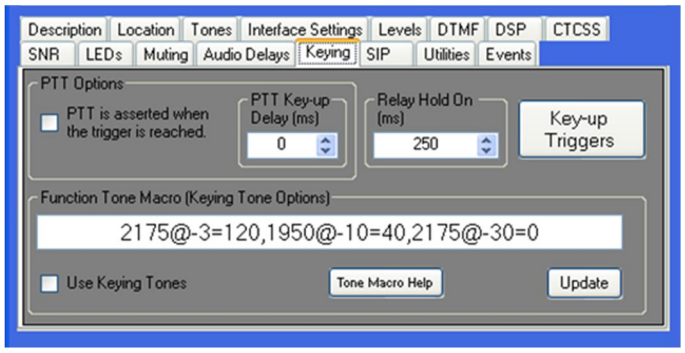


Figure 47: Keying Tab

Use Keying Tones
When selected, the tone macro defined will initiate when the trigger condition is met. This is used for tone remote control in applications where there is no direct connection from the PTT on this port to a radio

Relay Hold On (ms)
Is how long the audio trigger and keying option is held after the trigger condition terminates.

Key-Up Triggers
Do not change to "No Trigger (Custom)". This may render your configuration inoperable. Default is Always Trigger. If custom software is being used, the custom box is checked. Do not ever uncheck this box if it is already checked.

Update
Tells the software there is a new tone macro to use.

Tone Macro Help Clicking on this option will display the following:

[Frequency (Hz)] @ [Level (dB)] = [Time (ms)]
Frequency can range from 300 Hz to 3 kHz
Level can range between –60 dB to 7 dB
Time of 0 indicates tone will stay on until transmission ends
Tone sequences are separated by commas
Up to five tone sequences are allowed

Example: 2175@-3=120,1950@-10=40,2175@-30=0

The above example will generate a 2175 Hz tone at –3 dBm for 120 ms when the VOX call initiates. It is followed by a 1950 Hz tone at –10 dBm for 40 ms. Finally a 2175 Hz tone at –40 dBm will remain on for the duration of the call. This macro in inputed on a per port basis, so every port can have independent function tones as necessary.

SIP Tab

The SIP Tab is used to set up a SIP Account for this particular port/channel as shown in Figure 48. SIP (Session Initiation Protocol) is a VoIP technology that we use to connect SIP devices to our analog channels (and more) on an MN4x Blade.

Description
Describe the Soft Phone

Username or Number
A username or phone number used with this endpoint

Display Name
The name to display for Caller ID

Domain
The SIP Server Domain

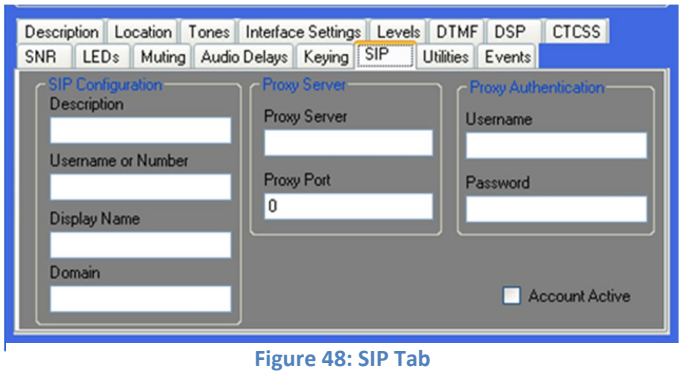


Figure 48: SIP Tab

Proxy Server
IP Address of Proxy Server

Proxy Port
The port number of the Proxy Server

Username
The username for the Proxy Server

Password
The password for the Proxy Server

Utilities Tab

The Utilities Tab, shown below in Figure 49, is used to Save and Restore settings as well as perform Loop Back Tests. When performing Loop Back Tests, be sure to have a loop back cable plugged into the port being tested. ***Note**: Only plug in the cable for the port being tested.*

Save / Restore Settings This is the location to Save the settings to a File for later use or use on another M4x Blade, Restoring a saved File, Restoring setting Defaults, and Print the current Settings.

Instructions This gives a diagram of the pinouts as well as the pinouts for a loopback cable.

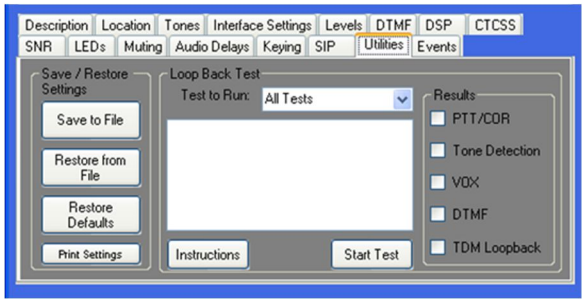


Figure 49: Utilities Tab

Loop Back Test A loopback cable is required to test the various functions. ***Note:*** Only one port can be tested at a time, otherwise the tests will fail. Be sure the window shows "Testing has completed"

Events Tab

This is an Event Viewer to see what errors and communication occurs between the various pieces of software and hardware within the M4x Blade. A sample of Event Log after setting up a Voter Receiver and sending a Transmit (Output) Test Tone is shown below in Figure 50.

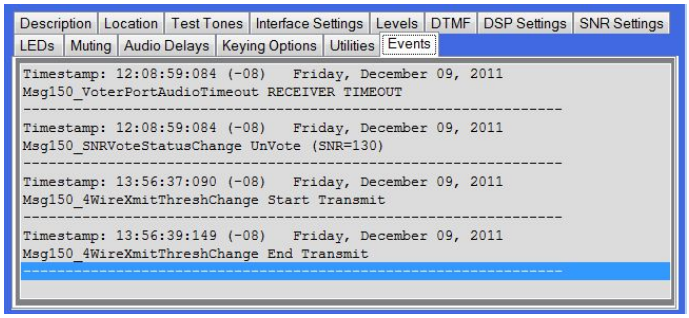


Figure 50: Events Tab

LED Status Descriptions

The following LEDs can indicate the following (may require Synergy):

- RED LED that stays on, indicates a bad module
- RED LED that blinks, indicates a loss of status tone
- GREEN LED that stays off, indicates no circuit audio
- GREEN LED that stays on, indicates port is idle or active but not voted
- GREEN LED that blinks, indicates port is voted

Chapter 5 – M4x 476-175 Module

476-175 Dual Switched Network Interface (FXO)

The Raven 476-175 Dual Switched Network Interface module provides bi-directional access between a public switched network and the Raven M4x equipment network. A ring voltage detector allows the 476-175 module to answer calls from the public switched network. M-Lead outputs can be provided via another optional relay module in the M4x Blade.

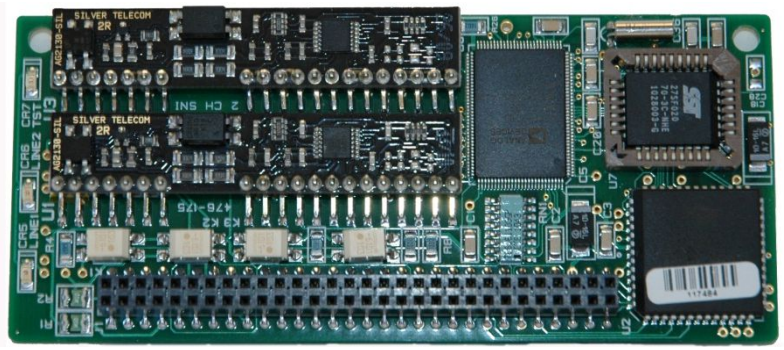
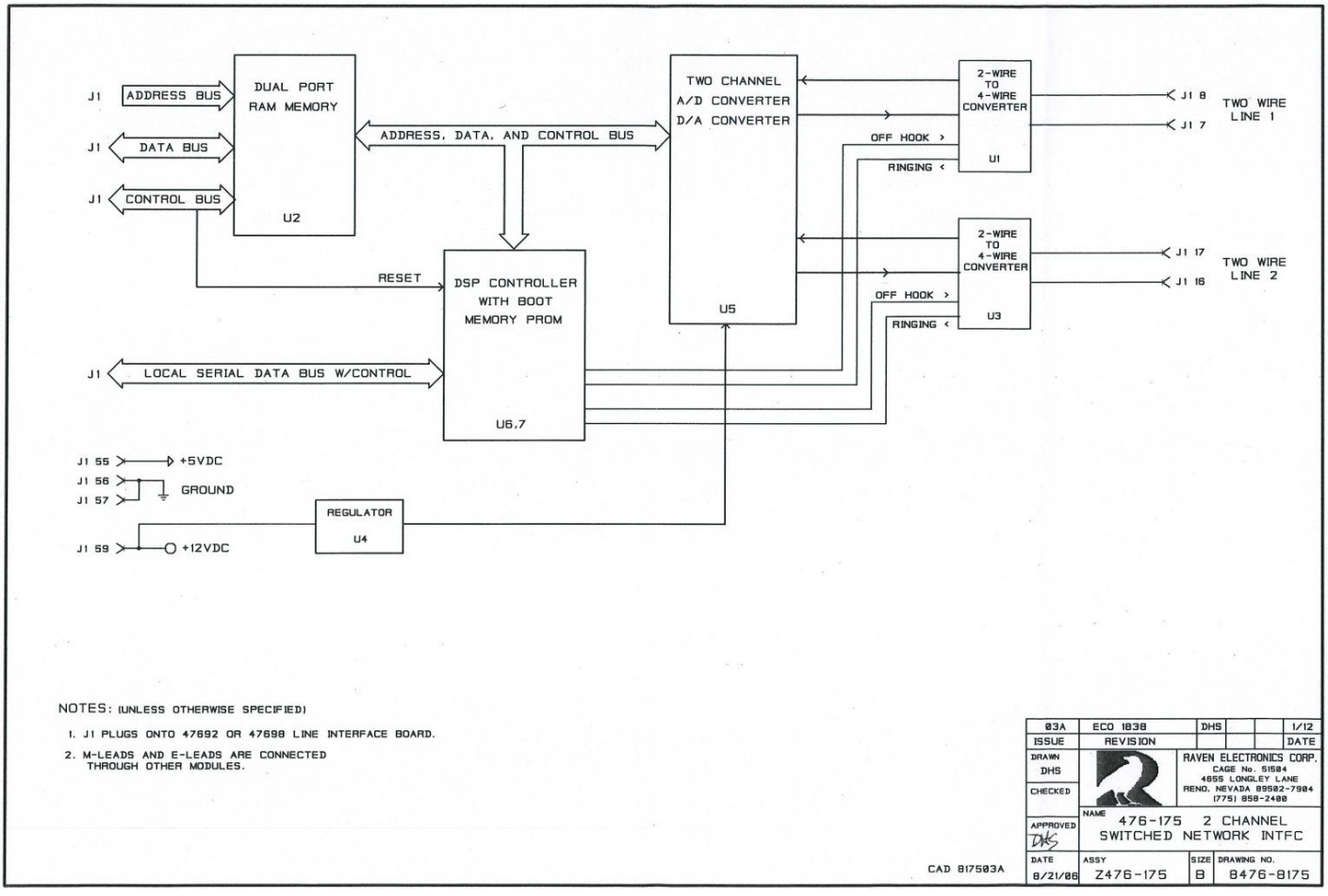


Figure 51: 476-175 Switched Network Interface, 2-Port

476-175 SPECIFICATIONS

POWER REQUIREMENTS	+5 VDC @ 300 mA maximum
	+12 VDC @ 60 mA maximum
VOICE PATHS	
2-Wire Line Levels	0 dBm (nominal) @ 600Ω
Frequency Response	±0.5 dB 300 Hz to 3400 Hz ref 1000 Hz
Idle Noise Off Hook	<12 dBrnCO
HYBRID	
Transhybrid Loss	≥30 dB
Longitudinal Balance	>60 dB
ENVIRONMENTAL	
Operating Temperature	0 to 50°C
Storage Temperature	-40 to 80°C
Relative Humidity	0 to 95% , non-condensing
Maximum Altitude	15,000 ft (4572 meters)
PHYSICAL	
PC Board Dimensions	1.95" W x 4.50" L x 0.50" H (4.95 cm x 11.40 cm x 1.3 cm)
Weight	3 oz (85 g)



Configuring the M4x Switched Network Interface (SNI) Module

Basic Configuration

Figure 52: System Components

1. Click on the "+" just to the left of the Blade in the System Components area. All ports are populated to show a generic name until it is changed. Refer to Figure 52.
2. Click on one of the ports to analyze or configure (Analog Loop-Start #). The Port Status, along with Transmit and Settings control buttons appear. Refer to Figure 53.
3. Press the Settings button to expand the settings screen. Refer to Figure 54.

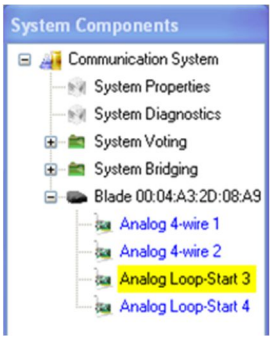


Figure 53: System Configuration

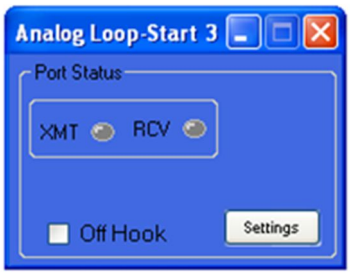


Figure 54: SNI Port Screen

4. The following screen will appear allow the user to make configuration changes with every tab. Refer to Figure 55.

Description Tab Ability to name the port

Test Tones Ability to send and receive test tones

Interface Settings Sets the number of rings before answering

Levels Ability to adjust gain for Transmit and Receive

DTMF Enables an installer at the time of installation to send DTMF tones across the network. It is also where the DTMF code is programmed

DSP Settings Enables Notch Filtering, other various filters, Tone Detection, and an option to Invert a Signal.

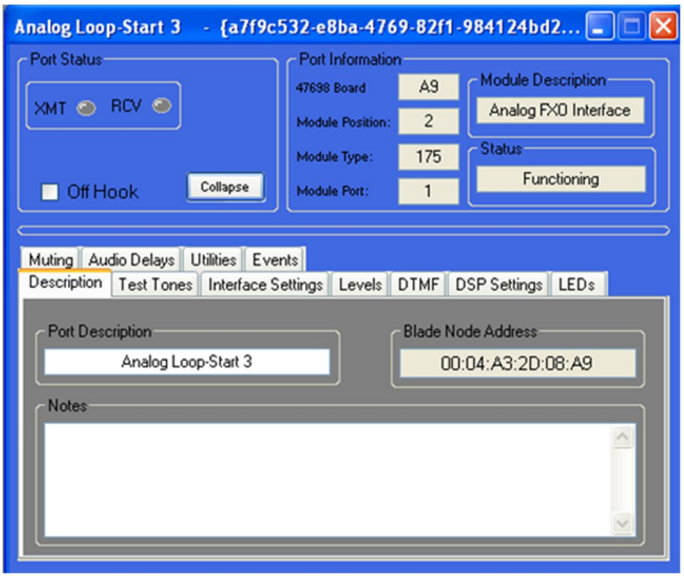


Figure 55: SNI Main Setup Screen

LEDs Option to change the Red and Green LEDs in the software and on the M4x Blade.

Muting Ability to mute the 2-wire Transmit and/or 2-wire Receive

Audio Delays Allows audio to be delayed before Transmitting or Receiving

Utilities Used to Save and Restore Settings as well as perform loop back tests

Events Event log to show what has occurred during set up as well as use

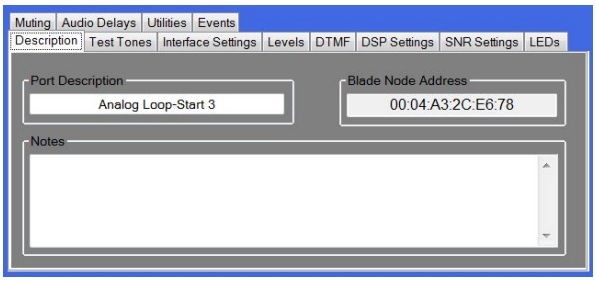
Note: *Please note that the M4x Blade is ever evolving, so the pictures shown may not be the same revision as on the software received with the Raven M4x Blade. Although the diagrams may differ, the options are still available to configure.*

Description Tab

This tab, Figure 56, allows the default Port Description to be changed to easily identify the port when configuring. The Port Name will also change in the System Components tree.

Port Description: Change the Port's Name to easily identify when configuring. Example: "Plumb Firehouse" or "Site 2"

Notes: can be used for any type of notes.



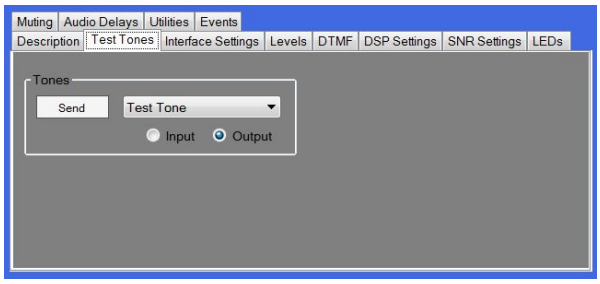
Blade Node Address: MAC Address to identify M4x Blade. This is an unique identifier automatically assigned and cannot be changed.

Figure 56: SNI Port Description Tab

Tones Tab

Figure 57, the Tones Tab is used to send and receive Test Tones. Click "Send" and the button turns red and transmits the selected tone type. When "Send" is clicked again, it turns back to gray and the test tone stops transmitting. During this process the Transmit and Receive lights in the Port Status window will blink while the test is running.

Test Tone: This drop-down list has multiple test tone types to choose from. Some tones in the drop-down list can be used to simulate inbound audio (removes the need for external TMS equipment).



Input / Output: Default is Output. This simulates a Test Tone being transmitted. This may be changed to simulate a received Test Tone by pressing Input.

Figure 57: SNI Tones Tab

Answer Options Tab

This tab is used to select how many rings before the M4x Blade answers. The default is set to 6 Rings. Please see Figure 58.

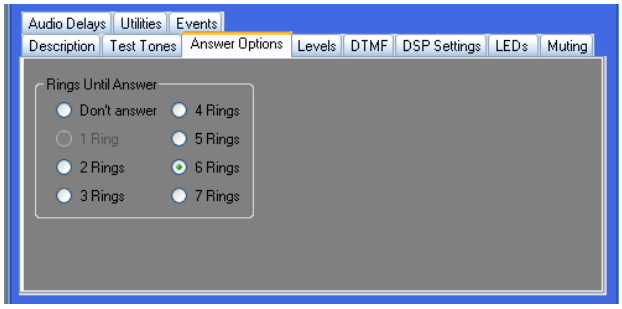


Figure 58: SNI Answer Options Tab

Levels Tab

The Levels Tab allows the user to adjust any gain necessary To (Receive) or From (Transmit) the M4x Blade. Refer to Figure 59. The defaults are 0 dB Transmit and 0 dB Receive with –6.0 for the DTMF gain. Typically this satisfies a majority of installations.

Transmit Level: Adjusting the number in this box either increases or decreases the volume of outbound audio by that amount in decibels.

Receive Level: Adjusting the number in this box either increases or decreases the volume of inbound audio by that amount in decibels.

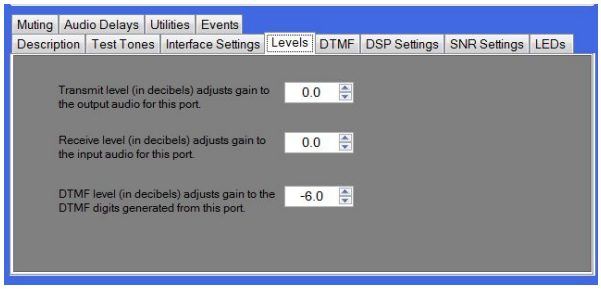


Figure 59: SNI Levels Tab

***Note**: When transmit or receive levels or gain are set to zero, then there is no change made to signal volume. All levels within the Levels Setup are measured in decibels.*

DTMF Gain: Sets the dB level at which the generated DTMF will be transmitted.

DTMF Tab

The DTMF Tab, Figure 60, enables an installer at time of installation to send DTMF tones across the network. It can also be set up to be used with DTMF switching schemes.

DTMF address for this port: This is used with DTMF switching schemes. It shows what combination of digits is used to access this port. The default first number represents the M4x Blade number. The second number represents the port on that Blade.

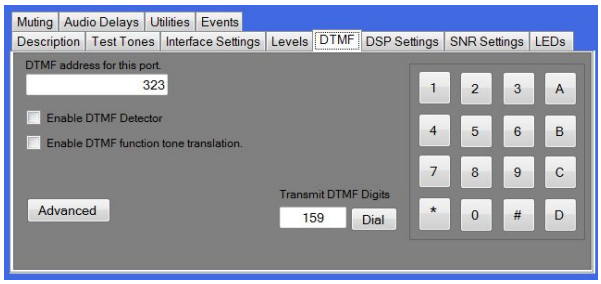


Figure 60: SNI DTMF Tab

Transmit DTMF: Generates and transmits DTMF numbers in the box.

Enable DTFM Detector: Enables/Disables DTMF tone detectors on this port.

DSP Tab

The DSP (Digital Signal Processing) Settings Tab enables Notch Filtering, Other Filters, Tone Detection, and Inverting a Signal, shown in Figure 61.

Notch Filter: When Enable Notch is checked, all frequencies will be transmitted except for the one selected in the box. The notch is 100 Hz wide and 50 dB deep. The default is 2175 Hz. In certain configurations, the Notch Filter selection will be un-selectable.

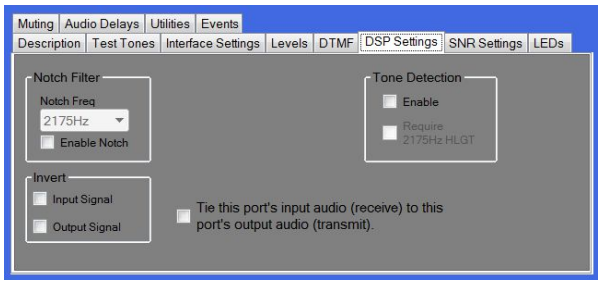


Figure 61: SNI DSP Settings Tab

Tone Detection: This will enable detection of function tones F1 through F15 at the 4-wire Receive.

Tie XMT and RCV: When checked, any audio that is received on this port will also be transmitted from this port.

Invert: This option is not used as part of a configuration. It is for troubleshooting/testing purposes. When an O-scope is connected, it will invert the input (receive) or output (transmit) signal.

SNR Tab

The SNR Tab is used to configure Signal to Noise Ratio (SNR) settings for Voting applications as shown in Figure 62. This is an optional feature. If interested in acquiring this feature, please contact Raven Sales at 775-858-2400, press 2 for Sales. If SNR has been purchased, most of the options on this screen will be greyed out until an SNR Vote Group Receiver is configured.

Report SNR: When this option is checked, the SNR box in the port status area will be enabled and the signal-to noise ratio of this port will be displayed in the Port Status Screen. Refer to Figure 60.

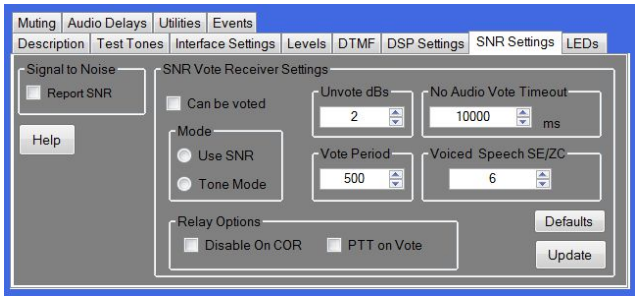


Figure 62: SNI SNR Settings Tab

LEDs Tab

This tab gives the option to change the Green and Red LEDs in the software and on the M4x Blade. Please refer to Figure 63.

Green LED Options: Default is Receive Audio, however any of the options listed can be set to make the Green LED light up on the screen as well as on the M4x Blade.

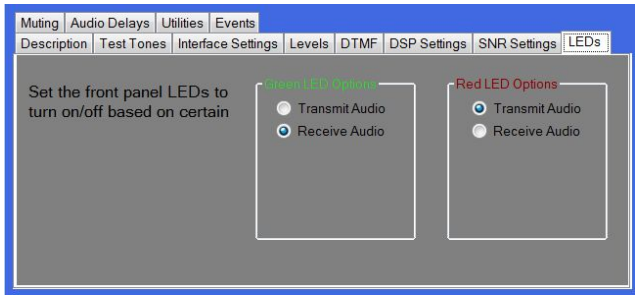


Figure 63: SNI LEDs Tab

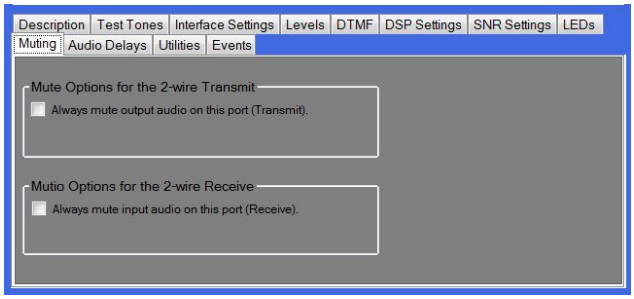
Red LED Options: Default is Transmit Audio, however any of the options listed can be set to make the Red LED light up on the screen as well as on the M4x Blade.

Muting Tab

The muting tab, Figure 64, gives muting options for the 2-wire Transmit and Receive.

Mute Options for the 2-wire Transmit

Always mute output audio on this port. When this option is checked, no audio will be transmitted from this port.



Mute Options for the 2-wire Receive

Always mute input audio on this port. When this option is checked, no audio will be received on this port.

Figure 64: SNI Muting Tab

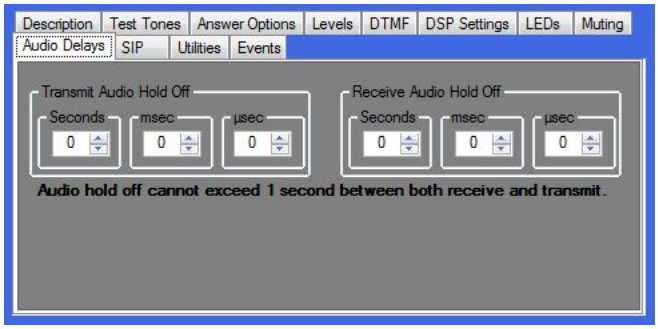
Audio Delays Tab

This tab allows Audio to be delayed before transmitting or receiving as shown in Figure 65. These options can be adjusted, however the audio hold off cannot exceed 1 second between both receive and transmit.

Transmit Audio Hold Off

The amount of time to delay the signal from the output of the M4x Blade

Adjustable from 0 to 1 second, in 125 microsecond steps.



Receive Audio Hold Off

The amount of time to delay the signal from coming into the M4x Blade

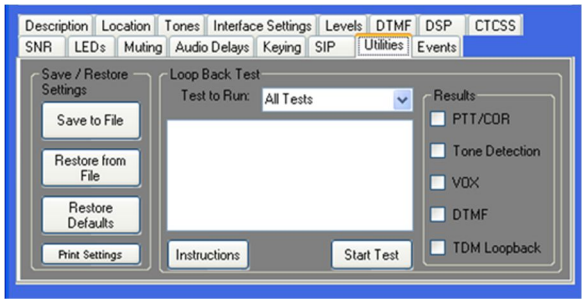
Figure 65: SNI Audio Delays Tab

Utilities Tab

The Utilities Tab, shown below in Figure 66, is used to Save and Restore settings as well as perform Loop Back Tests. When performing Loop Back Tests, be sure to have a loop back cable plugged into the port being tested. ***Note**: Only plug in the cable for the port being tested.*

Save / Restore Settings This is the location to Save the settings to a File for later use or use on another M4x Blade, Restoring a saved File, Restoring setting Defaults, and Print the current Settings.

Instructions This gives a diagram of the pinouts as well as the pinouts for a loopback cable.



Loop Back Test A loopback cable is required to test the various functions. ***Note:*** Only one port can be tested at a time, otherwise the tests will fail. Be sure the window shows "Testing has completed"

Figure 66: SNI Utilities Tab

Events Tab

This is an Event Viewer to see what errors and communication occurs between the various pieces of software and hardware within the M4x Blade. A sample of Event Log after setting up a Voter Receiver and sending a Transmit (Output) Test Tone is shown below in Figure 67.

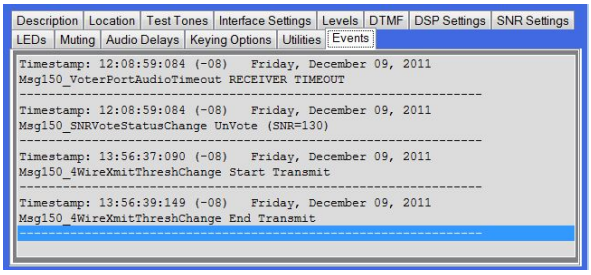
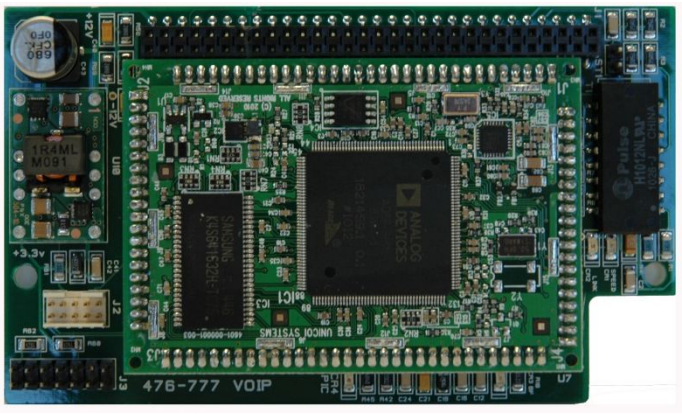


Figure 67: SNI Events Tab

Chapter 6 – 476-777 VoIP Module



The Raven 476-777 VoIP Module provides an Ethernet connection on one port and a complete 4-wire or 2-wire VF Interface on the second port. The VF input and output gain can range from –16 to +7 dBm @ 600Ω, with 0.1 dB resolution. The VF input can be switched to high impedance. The VF port can be configured for E&M Lead operation when required via the M4x Configuration Software.

The VoIP Port of the 476-777 module utilizes a codec and digital signal processor with an on-board memory to communicate via VoIP. The digital signal processor acts as a buffer and translator between the VoIP signal and the codec or Line Interface buses. All the functions of the module can be selected through the M4x Configuration Software. Included in this portion of the module is a complete physical layer driver / receiver chip for communication via VoIP. The VoIP decoded data can be routed to the companion VF port on the module and/or to the TDM serial data bus on the 47692 or 4698 Line Interface board.

A hardware/software combination, the 476-777 module is a solution designed to be dropped into an existing M4x Blade (See figure 1) or used as the foundation of a new M4x-based application. Based on a dedicated and powerful Analog Devices Blackfin processor, the 476-777 module includes existing M4x module interoperability, Ethernet connectivity, and a 48 kHz-capable stereo audio codec. The efficient embedded operating system, network stack and control software are pre-integrated; out-of –the-box the 476-777 module is immediately capable of creating digital conference calls or IP backhaul from disparate analog or digital sources through M4x modules.

The intuitive Raven M4x Communications System Software was designed with ease-of-use and a short learning-curve of paramount concern. Users have the option of physically connecting directly via USB cable or remotely across Ethernet to a secure configuration web page. There are no POTs and no DIP switches. Using the system software all configuration options are controlled in a Windows-familiar interface with simple drag-and-drop features.

Features Overview

The Raven 476-777 module includes a core set of included features and optional features that enable further ease of integration into disparate complex systems.

Core VoIP Networking Protocols

- SIP, SDP, RTP, STUN
- ***Optional:*** SIPS, SRTP

Call Management

- *Supported Workflows*: SoftPhone, Desktop Phone, POTS FXS , POTS FXO
- *Actions*: place, answer, transfer, and disconnect calls; conference bridge/call; generate DTMF, attended and unattended call hold; caller ID/message waiting/call waiting.
- *Events*: incoming call, peer on/off hold, peer disconnect, being transferred, detect DTMF, registered/unregistered, etc.
- Call management control via web page for remote control or M4xCSS for local control.

Voice Engine

- *Codecs*: G.711 (fully compatible), G.726 (16/24/33/40 kbps), G.722, DVI4 (narrow/HD/Ultra HD), Linear PCM, and iLBC supported with some limitations.
- *Algorithms*: Gain, Automatic Gain Control (AGC), DC Blocker, High-Pass Filter, Voice Activity Detector (VAD), Acoustic Echo Suppressor, Sample Rate Conversion, DTMF (Generator/Detector), Call Progress Tone Generator, Custom Ring Tone Generator, Comfort Noise Generator, Packet Loss Compensation
- ***Optional Algorithms***: Acoustic Echo Canceller , Line Echo Canceller, Noise Reduction , Frequency Equalizer

Information Subsystem

- Configuration Information Management
  - File-based by default
  - Can integrate with platform's configuration style
- Runtime Information Management (e.g. call status)
- Local (M4x) or remote (web service) access configuration and status monitoring

Web-Based Configuration UI

- HTTPS for secure access
- Expandable to include specific user-application configurations

Module Only

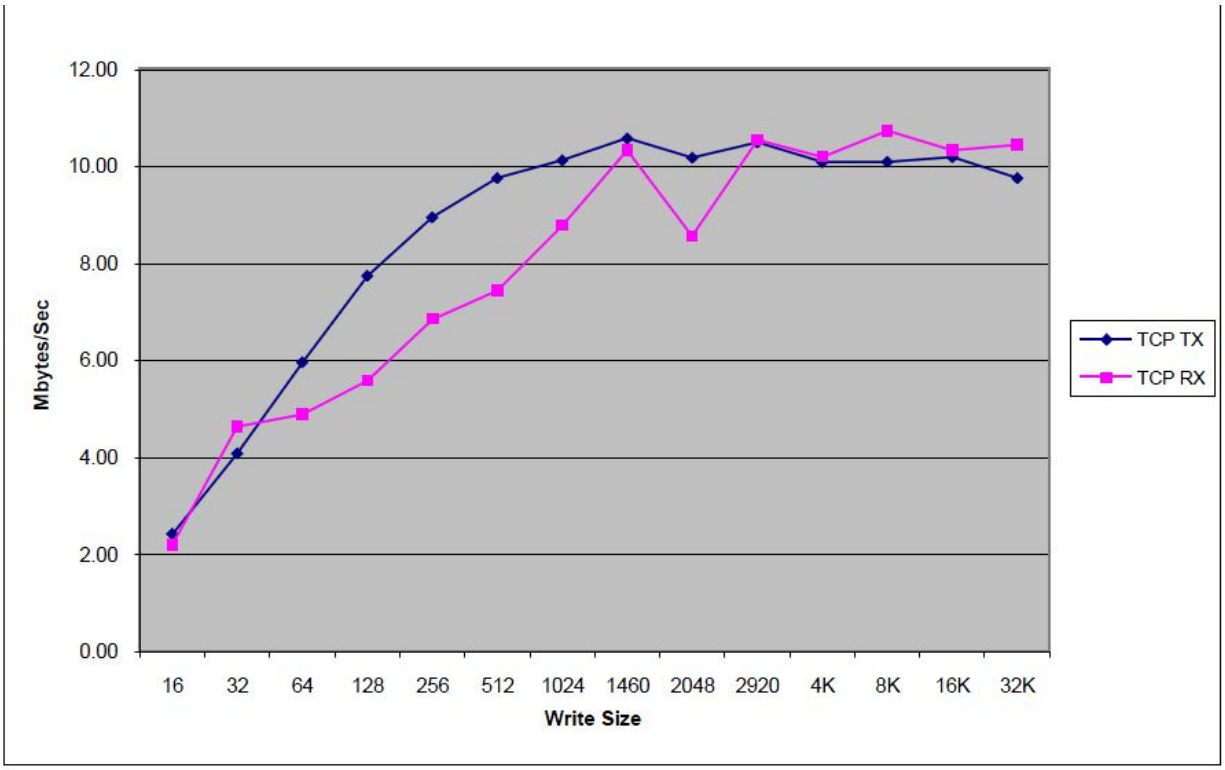
- Industry-leading, field-proven VoIP engine
- TCP/IPv4 Networking Stack, ***optional*** IPv6
- Hardware
  - BF516 running at 300MHz, 8MB RAM, 4MB Flash
  - SSM2603 high-fidelity stereo audio codec
  - 10/100Mbps Ethernet via RMII
  - Digital GPIO
- All software and hardware already integrated and optimized

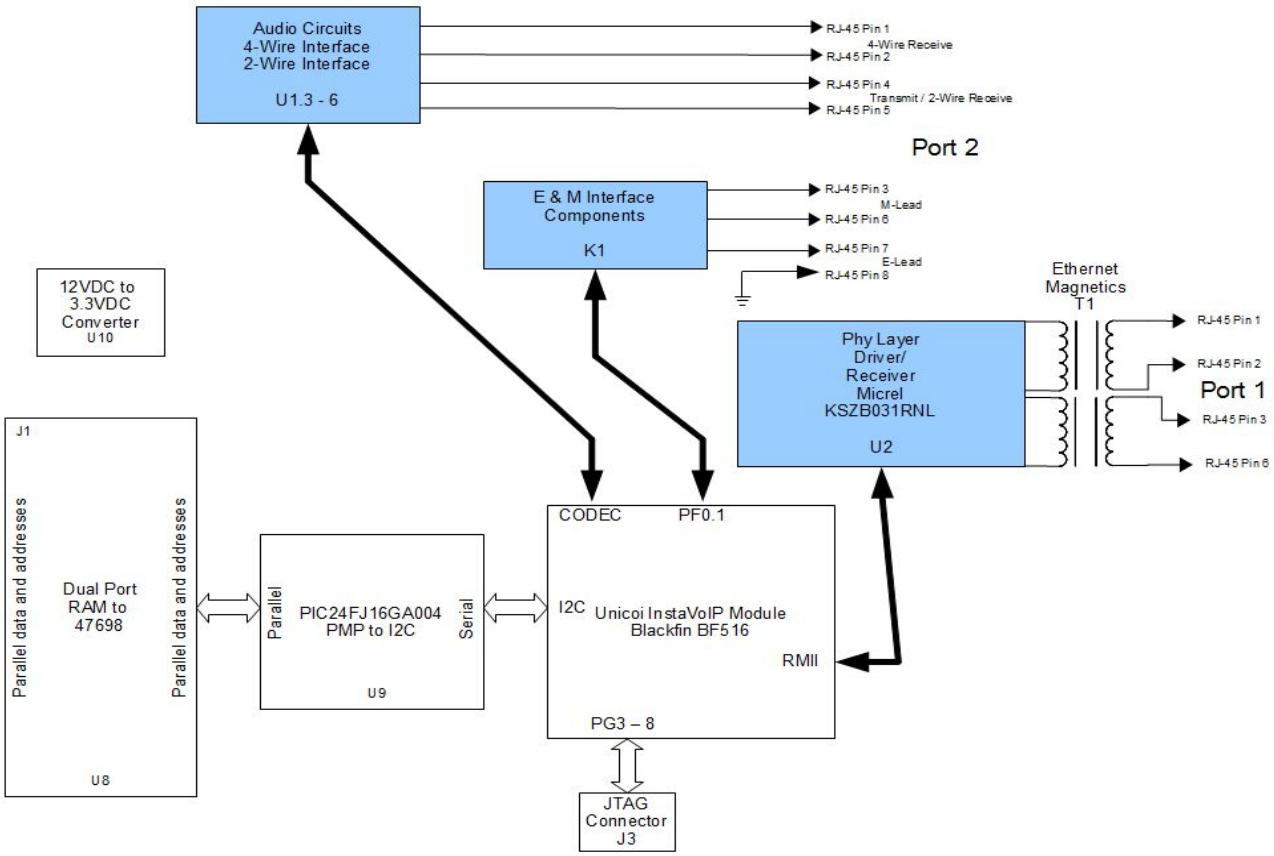
476-777 SPECIFICATIONS

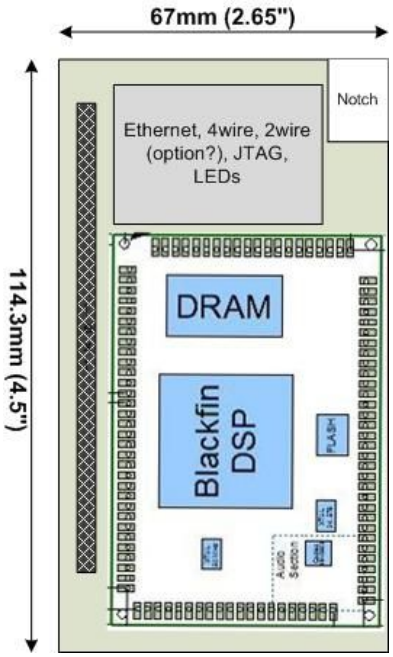
POWER REQUIREMENTS	+5 VDC @ 150 mA maximum +12 VDC @ 170 mA maximum -12 VDC @ 40 mA maximum (3.25 Watts maximum)
VoIP PORT	
Format	Supports 10Base-T and 100Base-T IEEE 802.3u specification full duplex
Cable	Straight or cross-over, auto-detected
Line Impedance	100Ω
Line Voltage Level	1.0 V Peak nominal
LED Indicators	100Base-T indicated by green LED on RJ-45 connector Activity indicated by red LED on RJ-45 connector
VF AUDIO PORT	
Format	4-wire or 2-wire user selectable
Input & Output Levels	-16 to +7 dBm, adjustable in 0.1 dB steps
Input Impedance	600Ω, must be loaded with 600Ω in 2-wire format
Frequency Response	300 to 3400 Hz ±0.5 dBm ref. to 1 KHz
Isolation	>60 dB
Idle Noise	<20 dbrnCO
VF PORT M-LEAD RELAY	
Maximum Contact Voltage	60 VDC, 20 VRMS AC
Maximum Current	50 mA
VF PORT E-LEAD INPUT	
High Input	Open circuit or ≥±1.8 VDC
Low Input	Ground, negative voltage or ≤0.32 VDC
True Sense	User determined by software
ENVIRONMENTAL	
Operating Temperature	0 to 50°C
Storage Temperature	-40 to 80°C
Relative Humidity	0 to 95% , non-condensing
Maximum Altitude	15,000 ft (4572 meters)
PHYSICAL	
PC Board Dimensions	2.65" W x 4.50" L x 0.80" H (6.73 cm x 11.40 cm x 2.03 cm)
Weight	2.3 oz (67 g)

Networking Performance

The 476-777 module has a very high performance networking implementation. Below is a graph of TCP RX & TX throughput for its Ethernet Connection.




Audio Circuits
4-Wire Interface
2-Wire Interface
U1.3 - 6
RJ-45 Pin 1
4-Wire Receive
RJ-45 Pin 2
RJ-45 Pin 4
Transmit / 2-Wire Receive
RJ-45 Pin 5
Port 2
E & M Interface
Components
K1
RJ-45 Pin 3
M-Lead
RJ-45 Pin 6
RJ-45 Pin 7
E-Lead
RJ-45 Pin 8
12VDC to
3.3VDC
Converter
U10
Ethernet
Magnetics
T1
Phy Layer
Driver/
Receiver
Micrel
KSZB031RNL
U2
RJ-45 Pin 1
RJ-45 Pin 2
Port 1
RJ-45 Pin 3
RJ-45 Pin 6
J1
Parallel data and addresses
Dual Port
RAM to
47698
Parallel data and addresses
U8
Parallel
PIC24FJ16GA004
PMP to I2C
Serial
U9
CODEC
PF0.1
I2C
Unicoi InstaVoIP Module
Blackfin BF516
RMII
PG3 – 8
JTAG
Connector
J3


67mm (2.65")
114.3mm (4.5")
Notch
Ethernet, 4wire, 2wire
(option?), JTAG,
LEDs
DRAM
Blackfin
DSP

Fusion Voice Engine™

Fusion Voice Engine (trademarked by Unicoi Systems Inc.) is a software library that implements the audio core of a Voice-over-IP (VoIP) module. The main usage pattern is to create and control analog (i.e. speaker and microphone) and digital (i.e. RTP) "channels" and combine them into "conversations" which provide conferencing capabilities. Channels additionally provide granular control of audio processing for maximizing audio quality.

Fusion Voice Engine has two main components: the Audio Processing System and the RTP Protocol Implementation. The Audio Processing System includes audio algorithms (e.g. automatic gain control (AGC), noise suppression, DTMF detection/generation, etc.), voice codecs (e.g. G.711, iLBC, Speex, etc.), channels and conversations (i.e. conferencing). The RTP component is a full standards-based RTP protocol implementation and an RTP digital channel provides integration into the Audio Processing System; Secure RTP (SRTP) is an available option.

Features highlights of the Voice Engine:

• Multiple active conversations, where each conversation conferences all attached channels

• Analog audio channel with various echo canceller options:

Acoustic Echo Suppression (AES)

Acoustic Echo Cancellation (AEC); provided separately as an option

Line Echo Cancellation (LEC)

• Variety of audio algorithms such as AGC, Noise Suppression, DTMF detection/generation, volume control, mute, call progress tones, etc. o Also available are Radio-over-IP (RoIP) specific tone generation/detection algorithms.

• RTP digital audio channel with optional support for Secure RTP

• Plug-in architecture for voice codecs and echo cancellation

• Wide-range of sampling rates supported: 8kHz ("narrowband"), 16kHz ("wideband", or "HD"), 32kHz ("ultra-wideband", or "Ultra-HD") and 48kHz ("CD Audio")

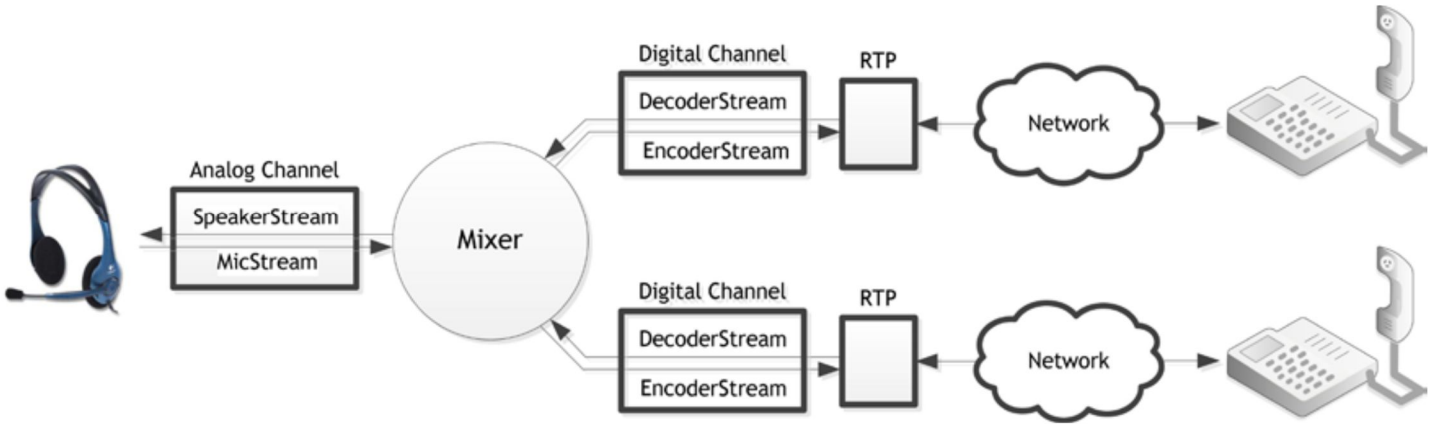
• Interface to WAV audio player

The following codecs are always available with the Voice Engine:

• Linear PCM– narrowband, wideband, ultra-wideband and CD audio
• G.711 u-Law
• G.711 a-Law
• G.726 – 16, 24, 32 and 40 kbps
• G.722
• DVI4 – narrowband, wideband and ultra-wideband

Fusion Architecture Overview

Fusion Voice Engine's architecture centers on conversations, channels and streams. A conversation contains one or more channels which in turn contain a single or a mated pair of streams which are, in general, a sequence of audio processing algorithms. More specifically, an analog channel always contains a mated speaker and microphone stream, and a digital channel contains an encoder and/or a decoder stream. A typical 3-way conference call scenario is depicted here:



Conversations

Conversations conferences one or more channels together. The outgoing audio leaving the conversation and going into any channel is a mixture of all other channel's incoming audio entering the conversation. For example, the diagram on the left shows three channels connected to a single conversation; the diagram on the right is looking at only the outgoing audio from Channel 3 which is a combination of the incoming audio from Channel 1 and Channel 2.

The conversation understands a channel's mated streams and thus knows that incoming audio from Channel 3 should not be included in the outgoing audio for Channel 3.

Channels can be added and removed from conversations as necessary and without bounds, but a channel can only be part of one conversation at any time.

Audio entering and leaving the conversation is linear PCM at the highest sampling rate used in the attached channels. However, the sampling rate will not cross the value which was used to initialize the Voice Engine.

Radio over IP (RoIP)

Traditional VoIP implementations utilize proprietary signaling to handle Push-to-Talk events over the IP layer. This has created some incompatibility issues with various manufacturers of VoIP solutions. Raven's implementation is designed to rely on non-proprietary protocols to control radio keying in order to achieve true VoIP/RoIP interoperability.

Since VoIP technologies are packet-based and considered "unreliable", traditional keying tones ("hold tones") are often interrupted or dropped by the characteristics of normal IP-based networks. This causes radio stations to stop keying their transmitters which results in potential loss of important audio or annoying squelch "ping-pong" effects.

Out-of-the box Raven utilizes a VoIP “PTT” process that relies on a voice activity detection algorithm (VAD) along with console tone detection and remote keying of stations . At the source end of the conversation, the M4x will send packets while voice activity is detected along with DC input (COR) and VOX (three layers of voice transmission verification) on the audio input to the VoIP session or hold tone (low-level guard tone). This process turns on or off RTP streams based on these conditions. If the destination has packets to process then, if provisioned, the ***destination*** will provide DC or EIA tone keying of radios accordingly.

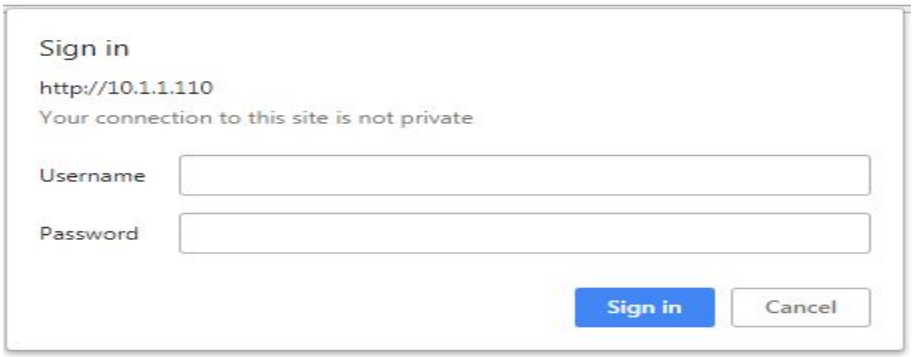
When set up properly, the source endpoint relies on COR and VOX at the initial input from the console to initiate the VoIP keying sequence. The VAD further requires voiced speech for packet to be sent and the presence of packets at the destination indicates that the appropriate keying option should be applied to the station. The VoIP layer handles much of the timing and delays automatically but you can tune audio, PTT, and hold on delays in the output analog port as needed. ***Most RoIP needs will be achieved through this process; however, if you require additional sophistication in your RoIP needs, ask us what other options are available. M4x is limited only by your imagination.***

Configuring the M4x Voice Over IP (VoIP) Module

Basic Configuration

Connect port 7 of the M4x unit that has 8 ports to your network. For a 2 port M4x connect port 2 to your network.

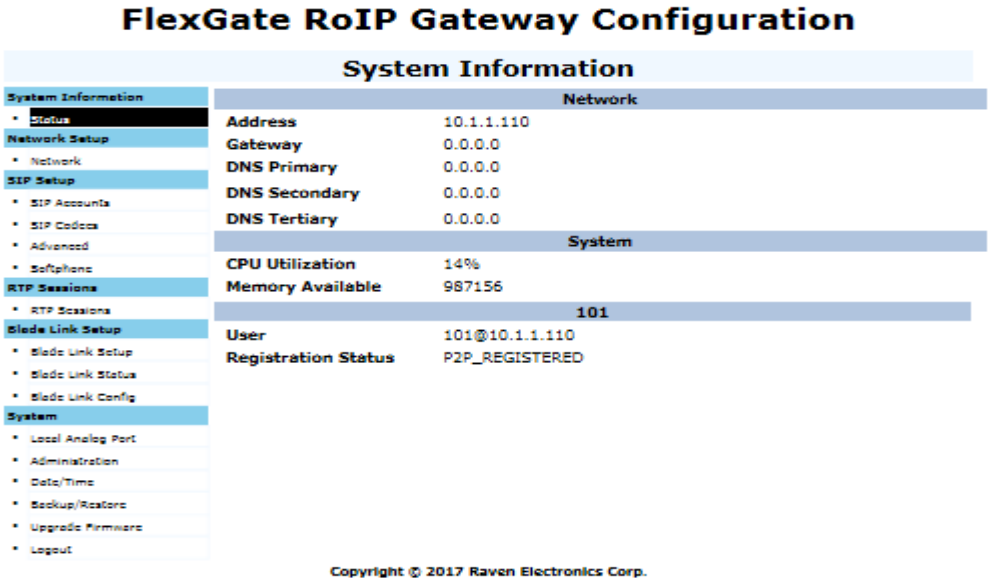
Open a web browser and type into the URL bar the default IP address of the M4x which is 10.1.1.253. Your computer will need to be on the same subnet as the M4x to access the web page.



Once you have navigated to the M4x the login screen will appear. The default user name and password are admin and admin. Once you have accessed the web configuration it is highly recommended that you change the user name and password.

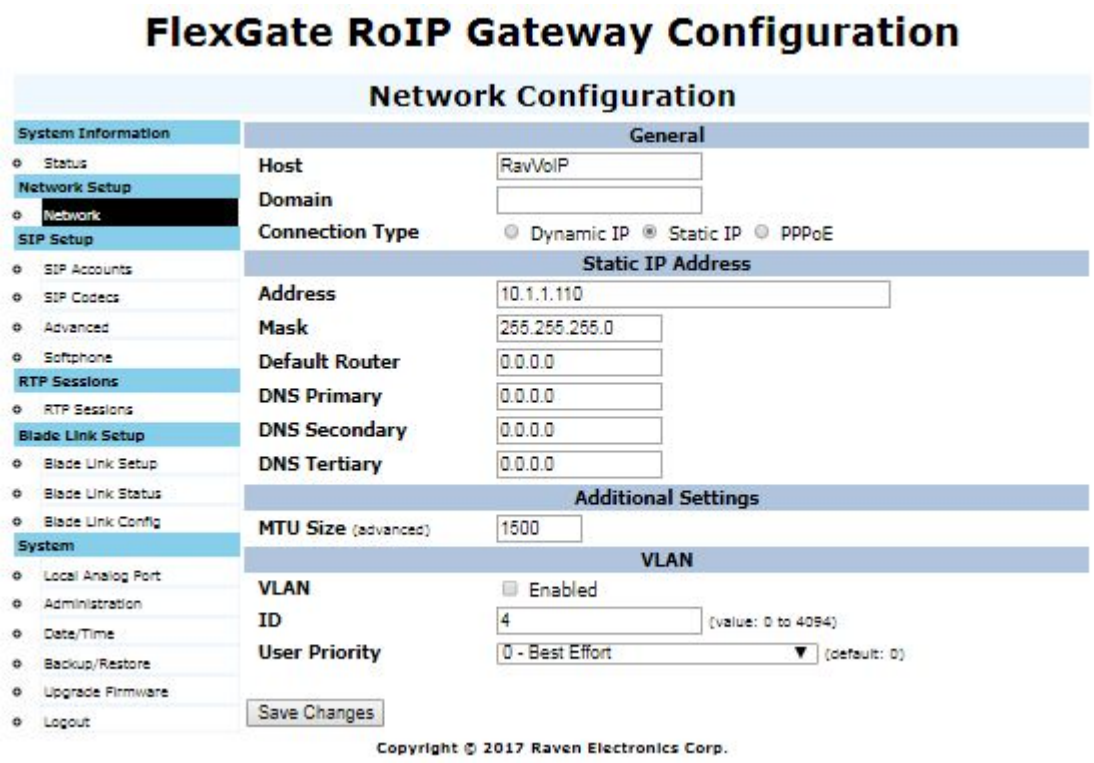
Status Page

1. This page will give you the current status of the network settings, CPU Utilization, the amount of memory available and the SIP registration status.



us to SIP servers.

Network Settings

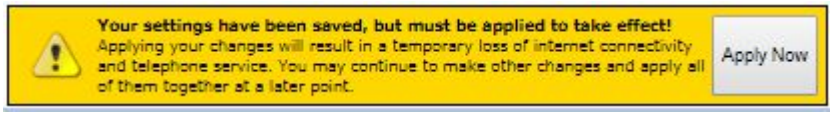


Configuring Network Settings

Navigate to the network page.

Input the network settings into the static IP address section and select the save button. Once the new settings have been saved the module will go through a reboot process. Once this process is complete you will need to navigate to the new IP address. If the new network settings are not on your computers subnet you will need to change the computers network settings.

Make sure to select save changes when done. After save changes has been selected an apply now box will drop down. Select the apply now button to apply the changes just made.



The box below are links to step by step instructions to change Microsoft IP addresses.

The link below is directed towards Microsoft.com support pages. This will apply to Windows 7, Windows 8.1, Windows 10. It is a step by step guide on changing IP addresses in Windows.

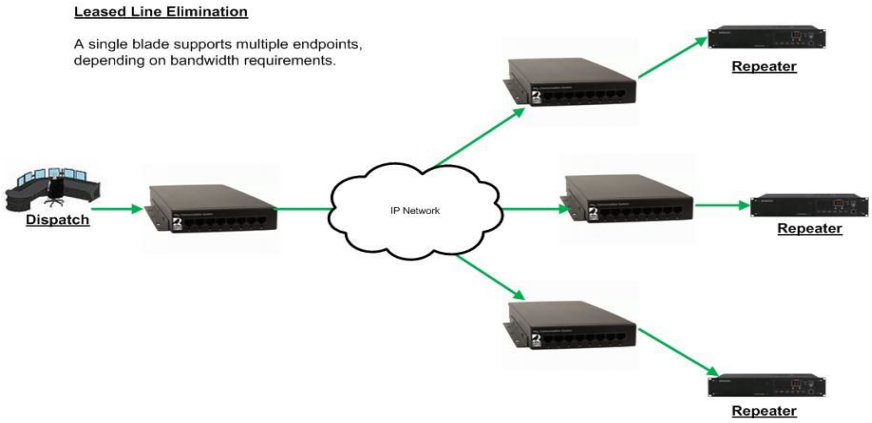
https://support.microsoft.com/en-us/help/15089/windows-change-tcp-ip-settings

Unicast Sessions

A unicast session is a point to point communication between two distinct endpoints. Endpoints are typically Raven M4x devices but can be any system that supports standard RTP sessions.

For basic backhaul or leased line elimination of radio, telco, or 4-wire devices unicast RTP sessions are an easy way to provide remote connectivity to audio resources.

Raven's implementation of unicast allows users to set up multi-point unicast sessions where one or more source devices can communicate with multiple Raven M4x systems as shown.



Note: Unicast sessions create a copy of each RTP stream for every endpoint associated with a session. While set up for unicast is simple as switches and routers are not required to be set to allow multicast packets to pass, it does use extra bandwidth. Bandwidth requirements should be considered when configuring multiple unicast sessions.

Creating a Unicast session

Navigate to the RTP sessions tab.

Select the blade port associated with the radio appointed for IP backhaul.

Insert the dispatch blade IP address which will be the IP address that the radio traffic will be sent to.

Select the UDP port for RX and TX. These ports will need to be opened or forwarded in the remote end firewall.

Unicast does not require a TTL.

Silence suppression is defaulted at disable on voice. The other two options are disable on COR or always disabled. Silence suppression is used to reduce bandwidth when no call is taking place.

This module contains 15 different codecs. G.711 is the most commonly used codec. Different codecs use different percentages of the CPU. Refer the chart below for CPU usage.

Radio Keying will depend on the settings in the radio. Once the type of radio keying is determined select the type of keying by using the drop-down menu.

TX/RX levels can be set from -12 dbm to +7 dbm.

Keep alive is a check box feature that will allow a message to be sent out to another device to check that the link between the two is either operating or to prevent the link from being broken.

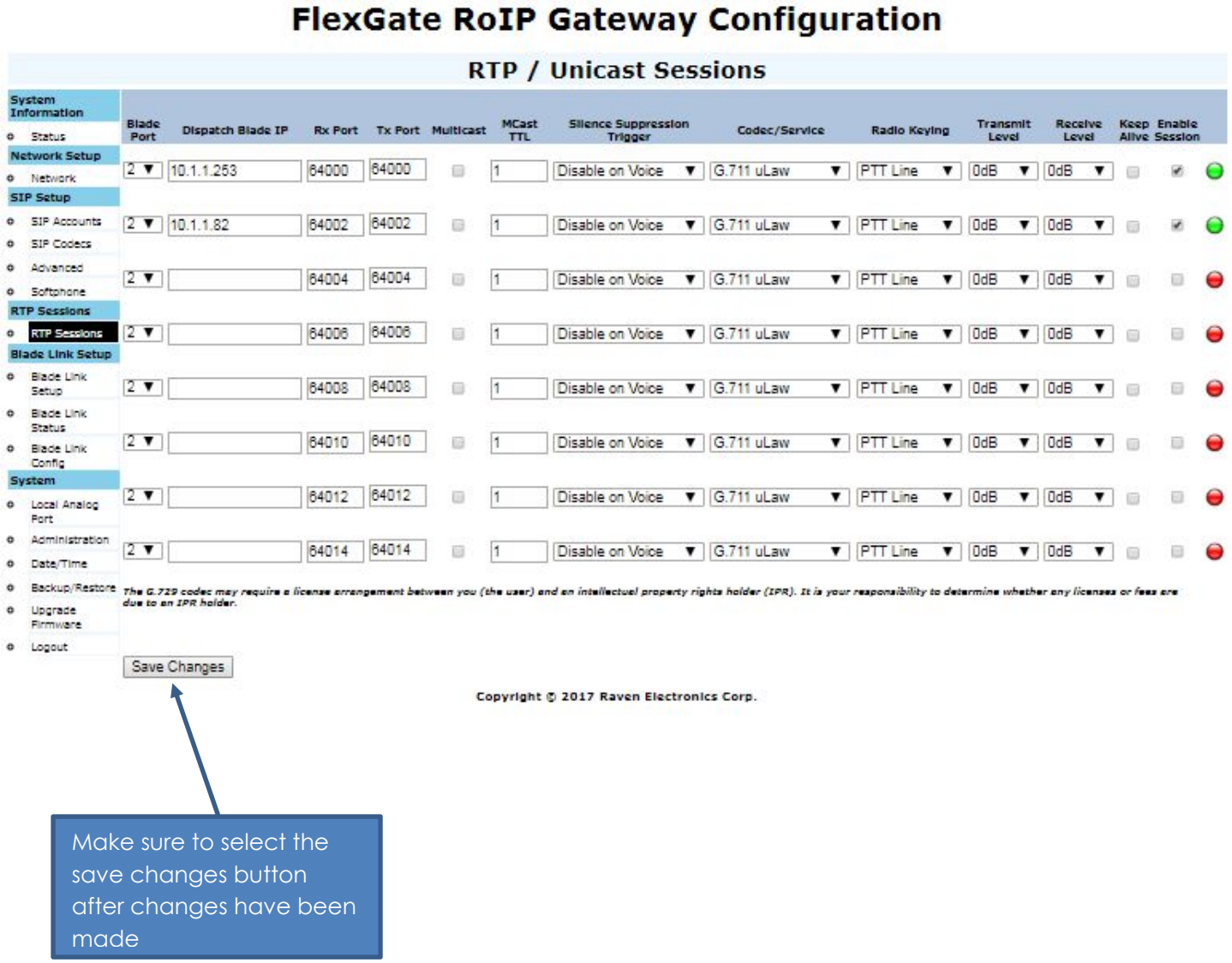
The enable check box allows the session to be enabled. If the settings have been configured correctly the red circle next to the check box will change from to green.

1. Always select save changes after settings have been changes.

Codec CPU Usage

Below is a table which – for each codec - shows the amount of CPU time per channel.

CODEC	CPU Idle Time 1 Channel	CPU Idle Time 2 Channels	CPU Time per Channel
G.711u	89.46%	87.28%	2.18%
G.711a	88.69%	86.86%	1.83%
G.726 16kbps	83.68%	75.62%	8.06%
G.726 24kbps	80.45%	71.07%	9.38%
G.726 fixed	84.43%	75.14%	9.29%
G.726 40kbps	82.8%	74.95%	7.85%
G.722 HD	83.49%	77.51%	5.98%
DVI4 Narrowband	88.75%	86.51%	2.24%
DVI4 HD	91.78%	88.03%	3.75%
DVI4 Ultra HD	83.02%	76.90%	6.12%
Linear PCM	88.41%	85.5%	1.22%
Linear PCM HD	90.19%	87.47%	2.72%
Linear PCM Ultra HD	83.31%	74.52%	8.79%
ILBC30	73.13%	53.79%	19.34%
ILBC20	73.84%	57.01%	16.83%
Speex Narrowband	77.69%	62.35%	15.34%
Speex Wideband	71.02%	56.03%	14.99%
Speex Ultra Wideband	61.21%	35.33%	25.88%
G.729AB	83.03%	72.01%	11.02%

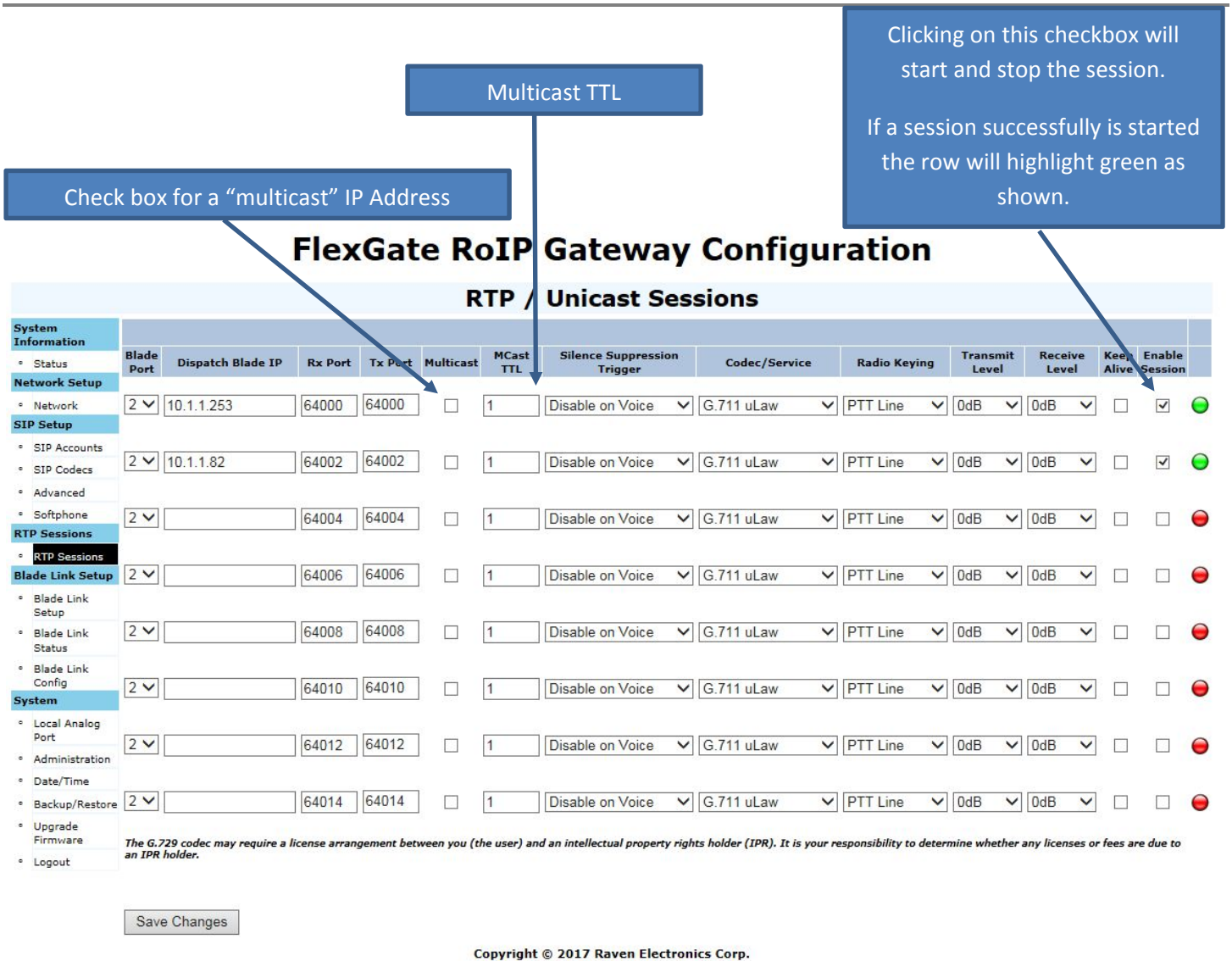


Multicast Sessions

A ***multicast*** session is a point to multipoint communication between several endpoints. Endpoints are typically Raven M4x devices but can be any system that supports standard RTP multicast sessions.

Set up for a multicast session is identical in many ways to setting up a unicast session; however, some pre-configuration strategy must be considered. While VoIP multicasting is a bandwidth saving technology that reduces the number of copies of RTP packets per receiver it can be difficult to troubleshoot and set up. Devices between a source multicast device and a receiver all need to be set up to allow multicast traffic to pass. This manual does not go into detail on this form of set up but steps should be taken to plan a multicast implementation.

Additionally, multicast requires the use of multicast addresses. Please refer to the Internet Assigned Numbers Authority (http://www.iana.org) for details.



Multicast Configuration

Follow the instructions for unicast to create a multicast session. There are two settings that will differ between the two.

1. The dispatch IP address will be a multicast address. The link above will direct towards a list of approved multicast addresses.

2. The TTL will need to be modified to the network that it is placed in. TTL is an abbreviation for Time to Live. The TTL will determine the number of hosts that the multicast packets are sent to. This will most likely be determined by the IT department.

.

Session Initiation Protocol

The M4x VoIP module support Session Initiation Protocol (SIP) communications between one or more SIP-compliant endpoints. SIP provides functionality to register with SIP proxy servers and can be used to manage individual calls including connect, call transfer, hold, and conference.

Raven's implementation of SIP allows for basically any port object (4 or 2 wire analog channels, POTS, etc.) on the M4x Blade to have a SIP account associated with it. This makes it very simple to connect other SIP devices to resources on an M4x Blade.

SIP accounts are configured in individual port settings tabs. Once account information is added an analog resource on an M4x Blade can be "dialed up" from other SIP devices and softphones. Proxy registration along with point-to-point registration is supported in the M4x implementation of SIP.

Configuring a SIP Account

Navigate to the SIP account page in the Web Configuration page.

The Sip account must first be created in the SIP server and then those credentials can be entered into the SIP account configuration section.

The analog 4 wire port that is associated with that SIP account must be assigned. If it is a two-port unit select the check box labeled last port on blade. For a multiport unit first select the module and then the port associated with the radio that will be connected with the SIP account. M4x can hold up to 4 modules and each module has the capability of two four wire connections. Select auto answer calls to allow the radio end to answer the call without any user actions.

SIP endpoint radio keying must be entered to be able to key and dekey the radio. Voice activated keying is an option but DTMF is a preferred way to key the radio.

Proxy settings are only to be used if registering to a proxy server. If you are not registering to a proxy server leave this section blank.

Additional settings can be changed to add or delete both silence suppression and AGC or automatic gain control. Jitter can also be adjusted if choppiness occurs in the audio. The session timeout timer can be used to take down a session if no audio has been detected for an allotted amount of time.

Auto connect settings can be added. Connect on start will allow the M4x unit to automatically connect to the session during power up. Primary SIP URI to auto-call is an addressing scheme that communicates who to call via SIP. Reconnect on hang up will reconnect the call is it is disconnected.

FlexGate RoIP Gateway Configuration

SIP Account

System Information
- Status

Network Setup
- Network

SIP Setup
- SIP Accounts
- SIP Codecs
- Advanced
- Softphone

RTP Sessions
- RTP Sessions

Blade Link Setup
- Blade Link Setup
- Blade Link Status
- Blade Link Config

System
- Local Analog Port
- Administration
- Date/Time
- Backup/Restore
- Upgrade Firmware
- Logout

SIP Account Management

Select Existing Account: 101

SIP Account Configuration

Account Active	☑ Enable
Description	101
Username/Number	101
Display Name	101
SIP Domain/IP Address	

Associated Analog Port Settings

Use VoIP Module Analog Port?	☑ (last port on blade)
M4x Module Number	1 (M4x Module Number (1 - 4))
M4x Module Port	2 (M4x Module Port Number (1 - 2))
Auto Answer Calls	☑
Translate DTMF	☐ (DDS DTMF is converted to analog DTMF)

SIP Endpoint Radio Keying Options (if not using Blade Link)

Enable SIP Endpoint Keying	☐
Keying Type	Voice Activated ◉ DTMF Activated ○
Key Radio DTMF Address	-
Clear DTMF Buffer	#
Use Keying Tones	☐ F1 - 1950Hz
Mute Input DTMF Code	1
UnMute Input DTMF Code	2
Play PTT/Mute Notification To Endpoint	☑

Proxy Settings

Proxy	(leave blank to register with domain)
Proxy Port	0 (advanced; set to 0 to auto detect)
TCP/IP Port	0 (advanced; default 5060)
Username	
Password	
Register with Server	☐ Enabled

Additional Settings

Silence Suppression	☑ (suppress RTP packets when silent)
AGC	☑ (automatic gain control)
Jitter Critical Depth	300 (ms) default = 300
Jitter Target Depth	90 (ms) default = 90
Session Timer	102 (Seconds)

Auto Connect Settings

Connect On Start	☐
Primary SIP URI to Auto-Call	
Secondary SIP URI Auto-Call	
Reconnect on Hangup	☐

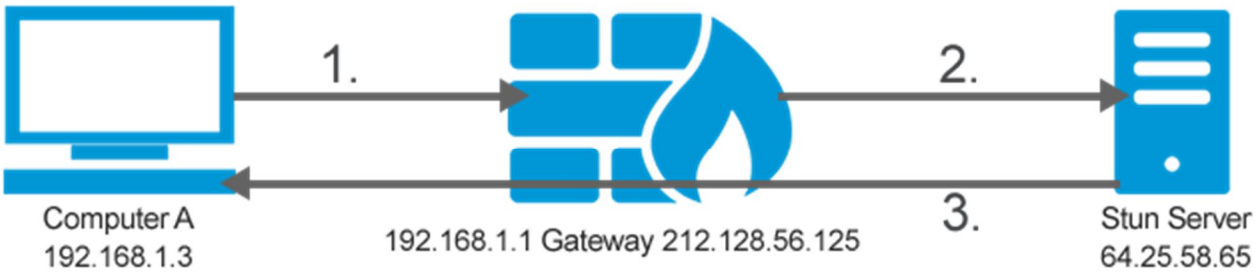
Save Changes

SIP Codecs

The same codecs that are availble to RTP are also availble to SIP. See the diagram on page 49 to see the estimated CPU usage of each codec.

Advanced

A STUN (Session Traversal of User Datagram Protocol [UDP] Through Network Address Translators [NATs]) server allows NAT clients (i.e. IP Phones behind a firewall) to setup phone calls to a VoIP provider hosted outside of the local network.



The STUN server allows clients to find out their public address, the type of NAT they are behind and the Internet side port associated by the NAT with a particular local port. This information is used to set up UDP communication between the client and the VoIP provider to establish a call. The STUN protocol is defined in RFC 3489.

The STUN server is contacted on UDP port 3478, however the server will hint clients to perform tests on alternate IP and port number too (STUN servers have two IP addresses). The RFC states that this port and IP are arbitrary

Softphone

This feature will allow the user to directly dial a softphone from the web interface. It will also allow the user to adjust both speaker and microphone volume from the web interface.

Blade Link

Blade Link is used to make a TCP connection between M4x units that contain a VOIP module. Blade link can also be configured in FlexGate to link an M4x to FlexGate. Blade link only needs to be configured in one of the M4x units or the FlexGate.

Configuring Blade Link

Navigate to the Blade Link setup page.

Enter the IP address of the remote M4x then select add to add it to the blade address list. This can be done with several units. Then select save changes

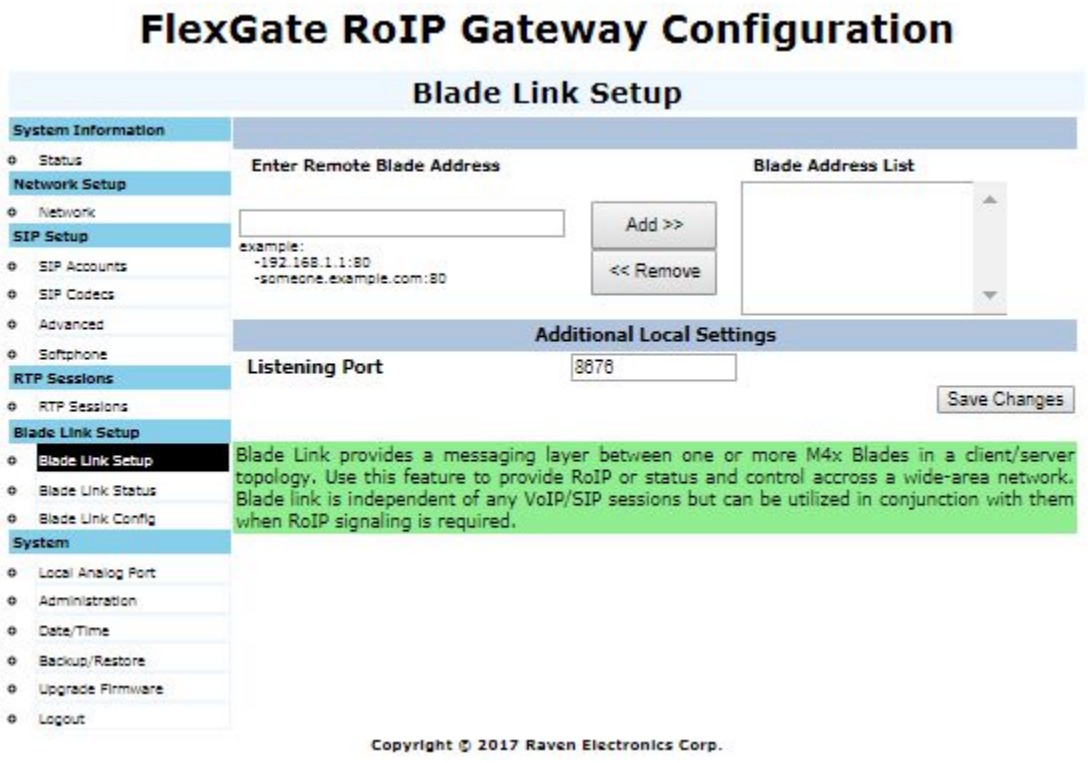
Once the Blade Link has been established navigate to the Blade Link config page and select the + sign next to the unit to be configured.

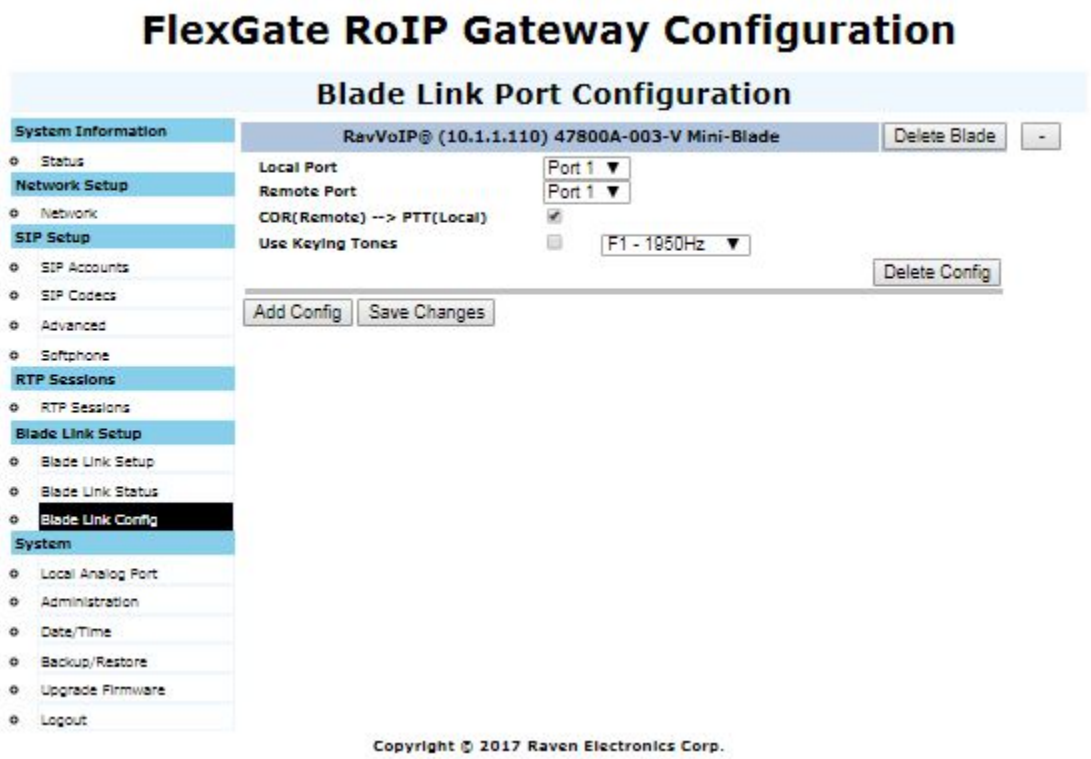
Select the add config button.

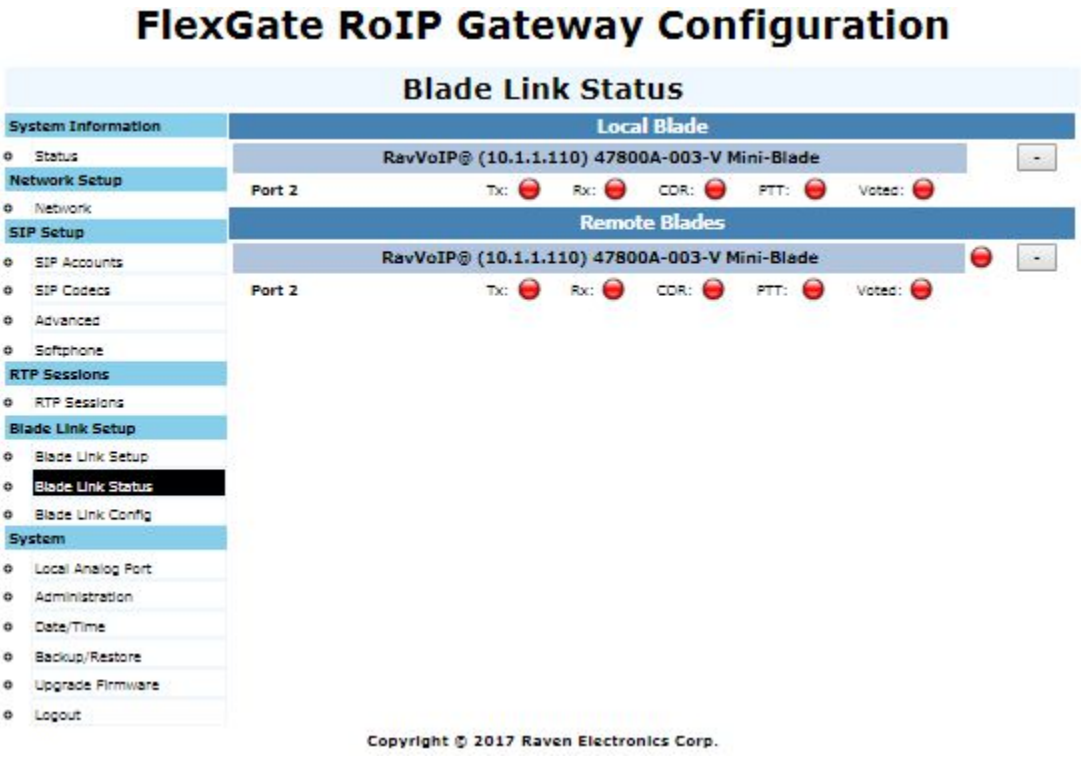
Select the local port associated with the radio connected to the unit and then select the port associated with the radio on the remote unit.

Now select the type of keying and then save changes.

Navigate to the Blade Link status page to observe real communication status of the M4x by selecting the + next to the unit to be observed. The red circle will turn green when it is communicating.

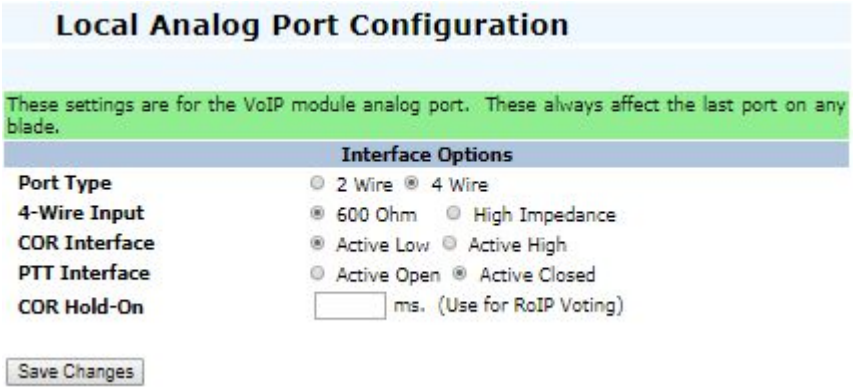



FlexGate RoIP Gateway Configuration
Blade Link Port Configuration
System Information
Status
Network Setup
Network
SIP Setup
SIP Accounts
SIP Codecs
Advanced
Softphone
RTP Sessions
RTP Sessions
Blade Link Setup
Blade Link Setup
Blade Link Status
Blade Link Config
System
Local Analog Port
Administration
Date/Time
Backup/Restore
Upgrade Firmware
Logout
RavVoIP@ (10.1.1.110) 47800A-003-V Mini-Blade
Delete Blade
-
Local Port
Port 1
Remote Port
Port 1
COR(Remote) --> PTT(Local)
Use Keying Tones
F1 - 1950Hz
Delete Config
Add Config
Save Changes
Copyright © 2017 Raven Electronics Corp.


FlexGate RoIP Gateway Configuration
Blade Link Status
System Information
Status
Network Setup
Network
SIP Setup
SIP Accounts
SIP Codecs
Advanced
Softphone
RTP Sessions
RTP Sessions
Blade Link Setup
Blade Link Setup
Blade Link Status
Blade Link Config
System
Local Analog Port
Administration
Date/Time
Backup/Restore
Upgrade Firmware
Logout
Local Blade
RavVoIP@ (10.1.1.110) 47800A-003-V Mini-Blade
-
Port 2
Tx:
Rx:
COR:
PTT:
Voted:
Remote Blades
RavVoIP@ (10.1.1.110) 47800A-003-V Mini-Blade
-
Port 2
Tx:
Rx:
COR:
PTT:
Voted:
Copyright © 2017 Raven Electronics Corp.

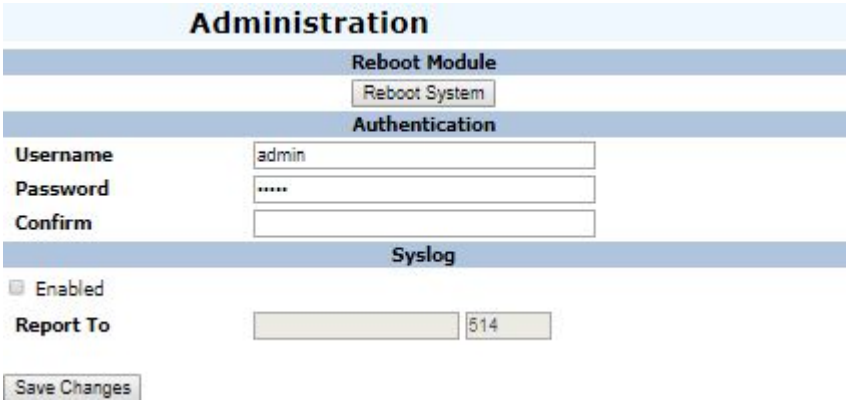
Local Analog Port

This section allows users to change settings to the analog 4 wire port. To change the setting just click on the option that needs to be changed and select save changes.



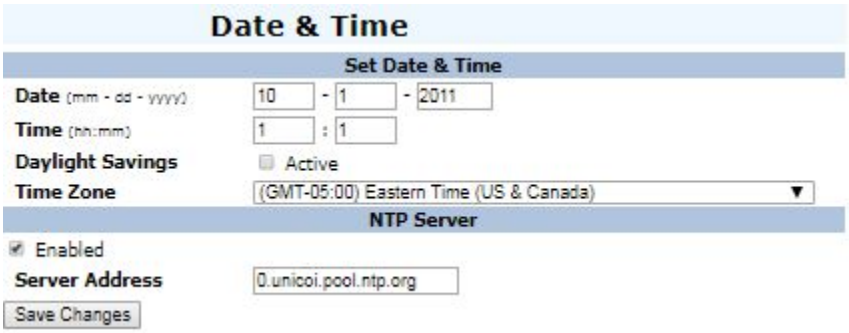
Administration

From the administration tab users can reboot the VOIP/ROIP module directly from the webpage. The user name and password can also be changed here. Event messages can also be programmed to be sent to a syslog server.



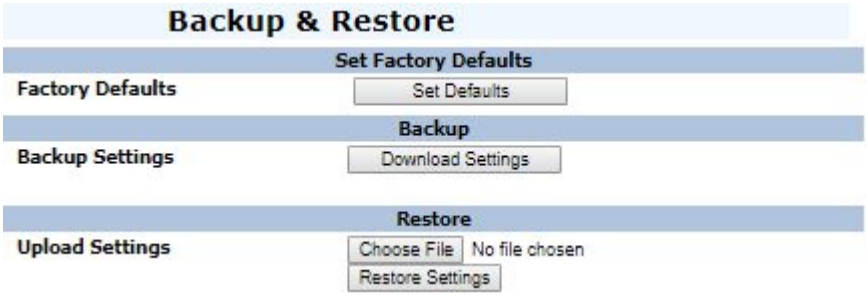
Date and Time

The date and time can be changed from this tab. Daylight savings time can be turned on or off. The time zone can be changed. The module can also be synced up with an NTP server.



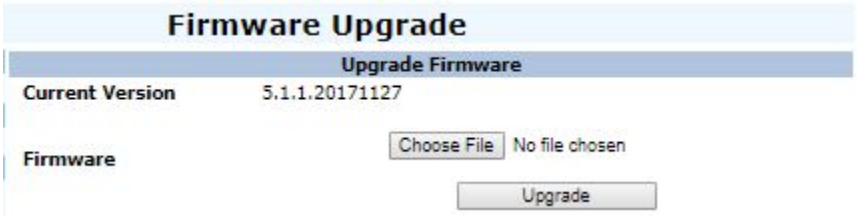
Backup & Restore

The VOIP/ROIP module can be restored back to factory settings. Once the set defaults button is selected it will prompt confirm to reset back to factory defaults. A backup or restore file can be taken from this page. That backup file can also be entered here to restore the previous settings.



Firmware upgrade

The firmware version can be read from this section. A new firmware version can also be uploaded to the module from this section. Only upgrade the firmware if advised to do so by the manufacturer.



Logout

Once all settings have been changed make sure to log out. If you forget to log out don't worry the module has a built-in timer that will automatically log out after 5 minutes of no activity.

Troubleshooting

Setting Factory Defaults

This procedure is useful should the M4x VoIP module appear to not be functioning properly and setting changes appear not be resolving the issues. If you are consistently receiving a "VoIP Module did not boot in time" when starting the M4x user software then this procedure should recover factory default settings and return you to normal functioning operation.

1. Power off the blade by removing the DC power input.
2. Locate ST2 on the 476-777 VoIP module (labeled "ERASE MEM NORM").
3. Remove the jumper installed on pins 2 and 3 ("NORM") and install it across pins 1 and 2 ("ERASE MEM").
4. Apply power to the blade by replacing the DC power input.
5. After a short time all the LEDs on the front panel should be illuminated. This indicates that the factory default settings were restored.
6. Power off the blade by removing the DC power input.
7. Remove the strap from pins 1 and 2 and replace across pins 2 and 3 of ST2.
8. Apply power to the blade by replacing the DC power input.
9. Factory default settings will be restored.

Chapter 7 – Voting

Features

Receiver voting provides a method of expanding coverage for a radio network. Receivers in the network are routed to a central voting system which votes the receiver with the best quality audio, and routes the voted audio to a console or to other repeaters.

The Raven M4x SNR Voter/Comparator product is a special version of the Raven M4x Blade (shown on the front cover of this manual). The Raven M4x Blade can be licensed to enable the creation of SNR (signal-to-noise) or noise-only vote groups. The licensing basically "turns on" the SNR feature which allows the audio from receivers to be analyzed to determine its quality; the quality level is translated into a value (in decibels) that is used to compare the quality of audio between different receivers. The receiver with the highest SNR value is chosen as the "voted" receiver.

"Raven M4x SNR Voter/Comparator" and "Raven M4x Blade" are used interchangeably in this manual.

A Raven SNR vote group is created using the Raven M4x Communication System Software provided with the Raven M4x Blade. There are a number of features that can be software-configured to create a vote group tailored to a specific network. These features include:

- Automatic transmitter steering
- Manual transmitter steering
- Default transmission
- Flexible audio routing to any transmitter based on which receiver is voted
- Console priority
- Voting that commences based on status tone, COR, or VOX threshold
- Lack-of-audio timeout for voted receivers
- Keying of transmitters/repeaters with keying tones or with PTT
- Visual representation of voting activity for each member of the vote group
- Sub-comparators can be created and fed into a main vote comparator to create large vote groups

The Raven M4x Communication System Software also contains a wizard to help walk the user through the individual steps involved in building a vote group. Once vote groups are created and saved, the vote group can later be modified (using the M4x Software) either manually, or via the wizard. Additionally, multiple, unrelated, vote groups can be created on a single Raven M4x Blade. Further, vote group configurations can be "burned" to the flash memory on the M4x Blade so that a host PC isn't needed to control the vote group.

Hardware Interface

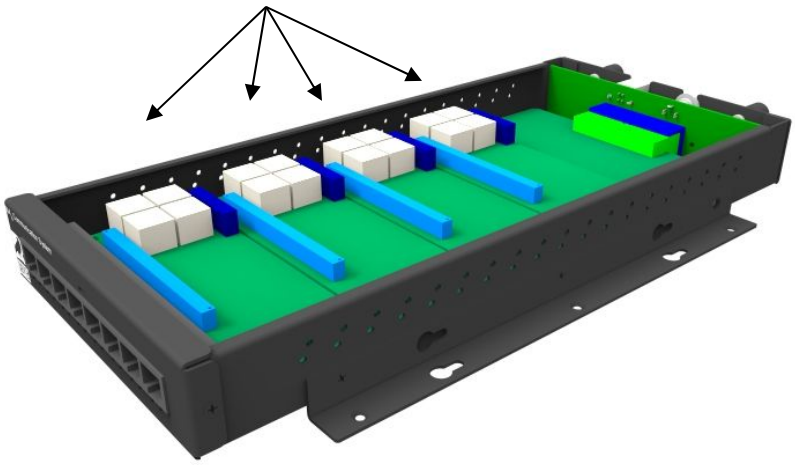
A Raven M4x Blade can house up to 4 Raven-manufactured, DSP-based (digital signal processing) communication modules (see Figure 1). The types of modules can be mixed and matched to tailor the M4x system to a particular need. Raven Electronics manufactures a number of different types of modules to interface to radios (or other 4-wire devices), 2- and 4-wire telephones, the public telephone network, and other types of communications equipment. Each M4x Blade is a USB device that can accept commands from a host computer. The host computer can also respond to different events that occur on a particular port.

A Raven M4x SNR Voter/Comparator generally uses either the Raven 476-150 or 476-151 4-wire E&M modules. The 476-150 module has a 600 ohm, 300-3400Hz interface; the 476-151 has a 600 ohm or high impedance input (software-selectable), a 600 ohm output, with a 5-3400Hz frequency range. The Raven 476-150/151 4-wire E&M module is used to interface to 4-wire communication equipment. Each 476-150/151 4-wire E&M module supports two ports of audio.

The main function of the 476-150/151 4-wire E&M module is to convert analog audio to the digital domain on one end and back to analog on the other. Once the audio is converted to the digital domain, it can be bridged with any other port in the system using the switching fabric provided by the backplane upon which the M4x modules ride. The 476-150/151 4-wire module can also provide the following features via software commands from the host computer:

- Notch filtering
- Level control
- PTT generation (for radios)
- COR detection (for radios)
- Audio delay
- Tone Detection (including DTMF and single tones)
- Tone Generation (single tones, call progress tones, DTMF)
- Signal-to-Noise Ratio Analysis for voting applications

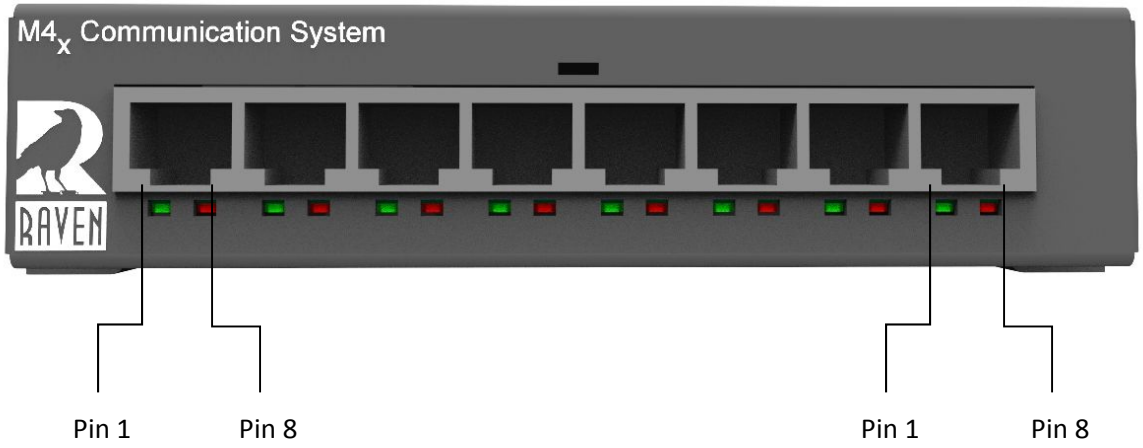
Raven 476-150/151 4-Wire E&M Modules



The Raven M4x SNR Voter/Comparator takes advantage of the 476-150/151 module's Signal-to-Noise Ratio Analysis feature to synthesize a simple, software-configurable voting product. A Raven M4x SNR Voter/Comparator is expandable simply by adding additional modules, and configuring those modules with the Raven M4x Software.

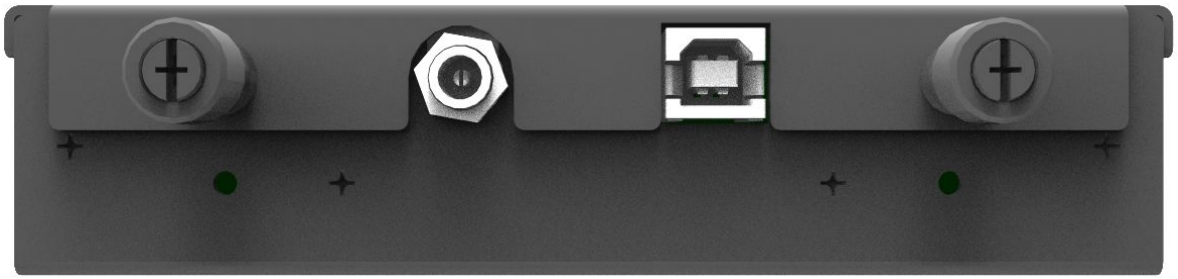
Physical connection to an individual port is made via an RJ45 connector available on the front of the M4x Blade. Each 476-150/151 4-wire RJ45 port has the following connections:

- 2 wires for analog receive
- 2 wires for analog transmit
- 2 wires for the PTT relay switch closure
- 2 wires for the COR input

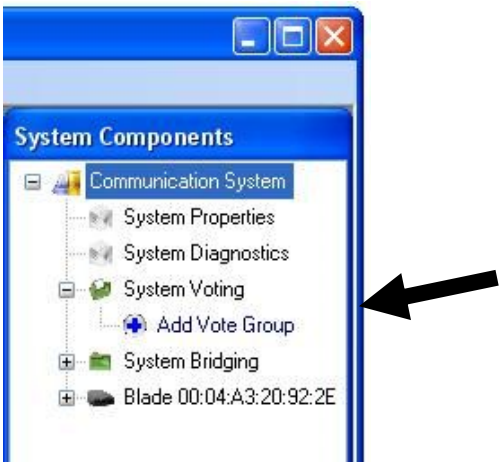


RJ-45 port pin number	M4x Blade Signal	Direction (with respect to the M4x Blade)
1	RX-A	Input
2	RX-B	Input
3	PTT	Output (switch closure)
4	TX-A	Output
5	TX-B	Output
6	PTT return	Output (switch closure return, optionally ground-able via jumper)
7	COR	Input (active low)
8	COR GND ref	Ground reference

There's a USB port on the rear of the Raven M4x Blade. This USB port is used by the Raven M4x Communication System Software to control and configure the M4x Blade. The M4x Blade is powered by a source of 9 to 18VDC; the power connector is also on the rear of the M4x Blade. See Figure 3.



To create a Raven SNR Vote Group, start the Raven M4x Software and attach to the Raven M4x Blade (as explained in a previous chapter).

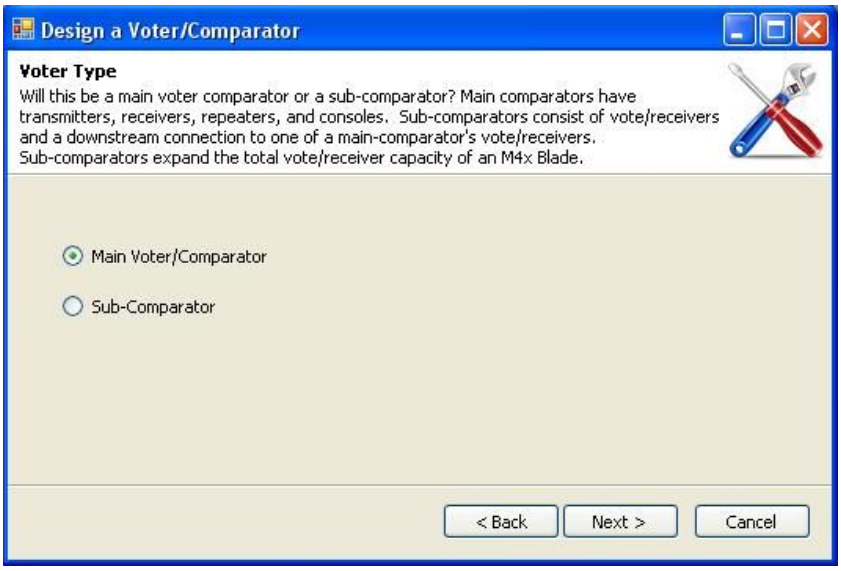


STEP 1

To create an SNR Vote Group, click on "Add Vote Group" in the System Components tree.

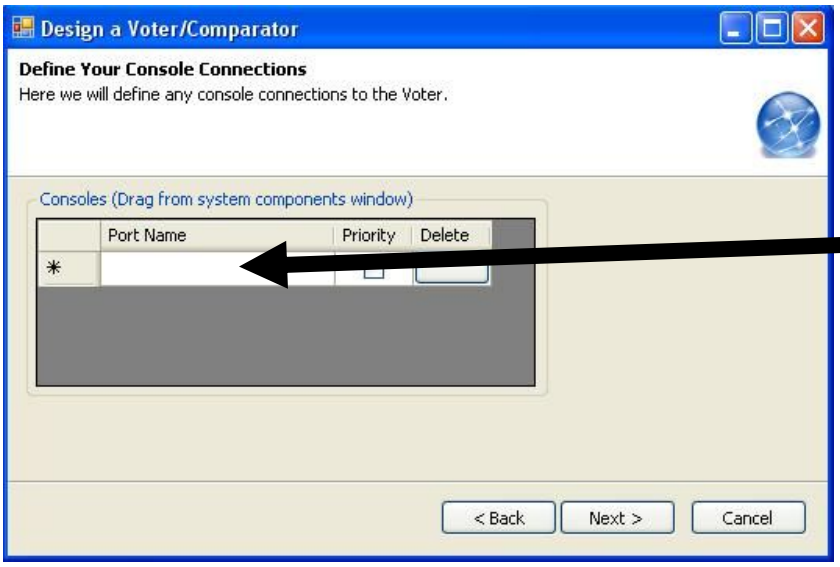
STEP 2

A wizard window appears to help you build and configure the SNR Vote Group. Click "Next" to continue.



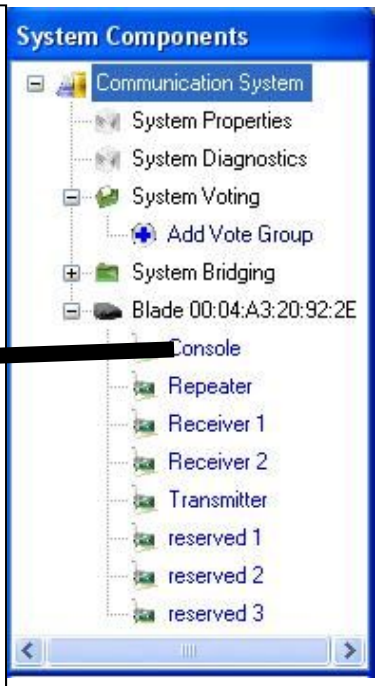
STEP 3

To start, you need to designate whether this SNR Vote Group is to be a Main Voter/Comparator or a Sub-comparator. A Sub-comparator feeds into the Main Voter/Comparator and allows voting to extend past the 8 port limit of an M4x Blade. Any transmission path (i.e., a console, a repeater, or a transmitter MUST reside on the Main Voter/Comparator. A Sub-comparator can only be used to vote receivers, and cannot have console, repeater, or transmitter connections. Choose the Voter Type and click "Next" to continue.

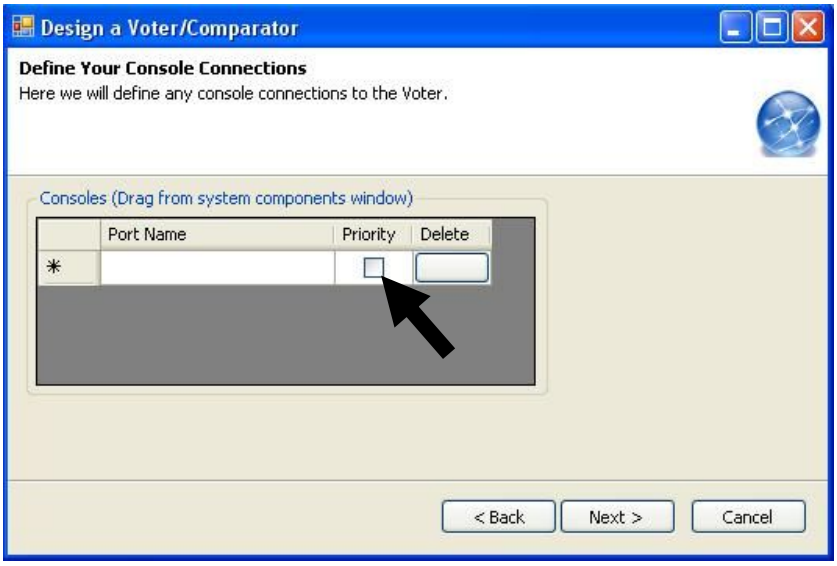


STEP 4

Some vote groups have a console connection. If you need voted audio to be sent to a console, drag and drop your console port into the Console Connections form.

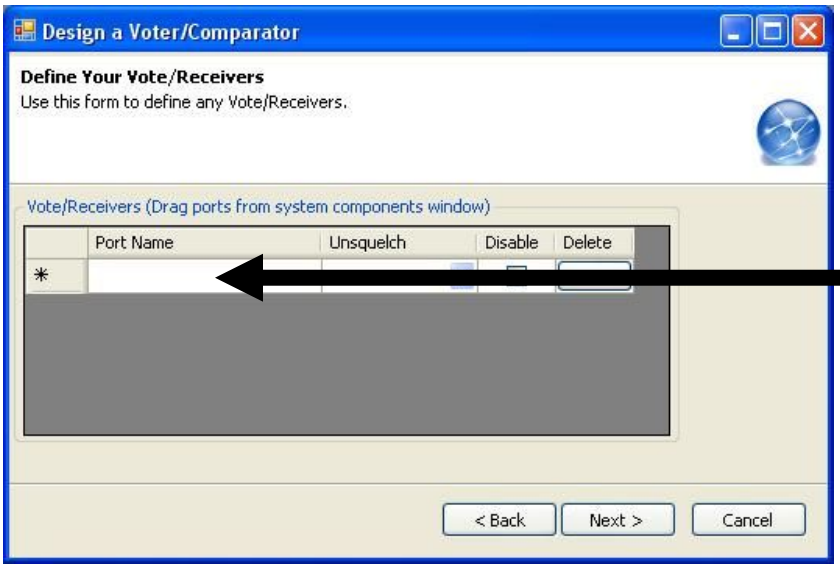


Note: You can designate more than 1 console connection if necessary.



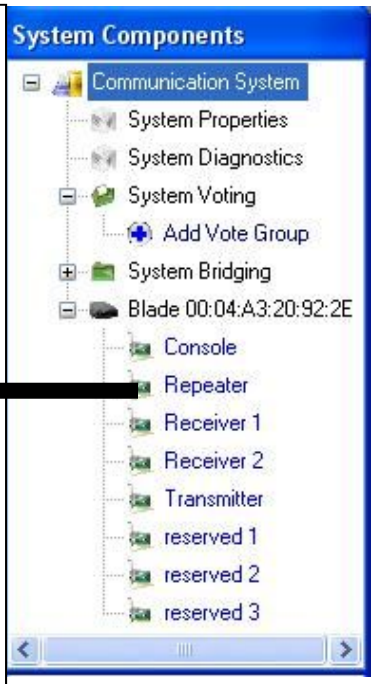
STEP 5

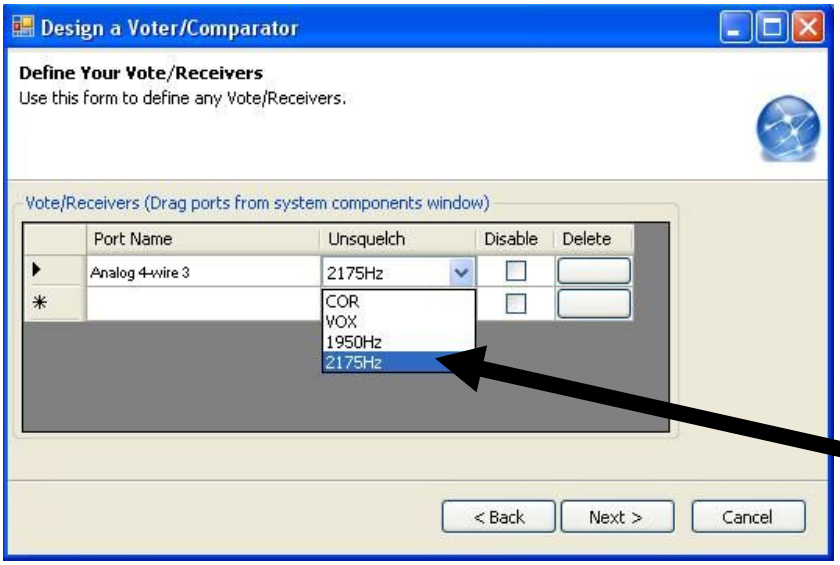
A console can be assigned "console priority", if necessary. When enabled, the console priority feature gives priority to any audio coming from the console (over any audio coming from a voted receiver). To assign priority to a console, check the "Priority" check box. Click the "Delete" button to remove a port from the list of consoles.



STEP 6

Drag and drop any port connections that you want voted into the Vote/Receiver form.





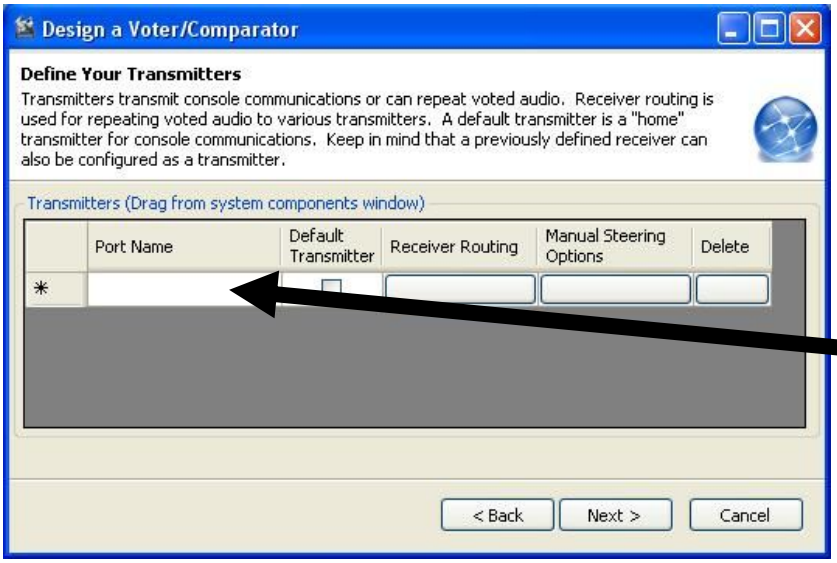
STEP 7

The Raven SNR Voter/Comparator can start voting on any one of these unsquelch indicators:

- COR
- Lack of 2175Hz status tone
- Lack of 1950Hz status tone
- VOX

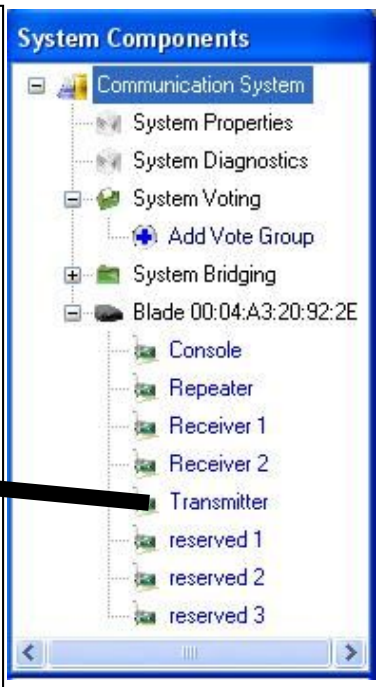
Choose your unsquelch indicator for each vote/receiver.

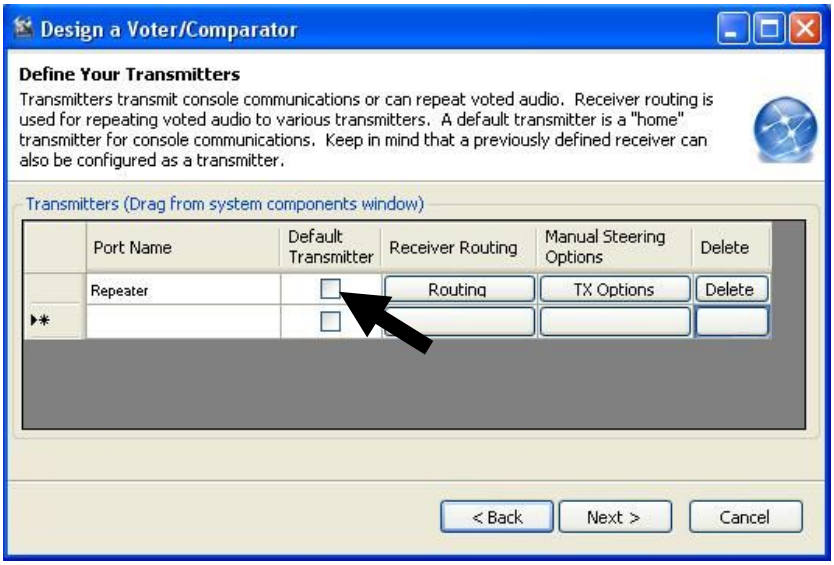
Note: A receiver can be removed from the voting pool while the vote group is active by clicking the "Disable" check box.



STEP 8

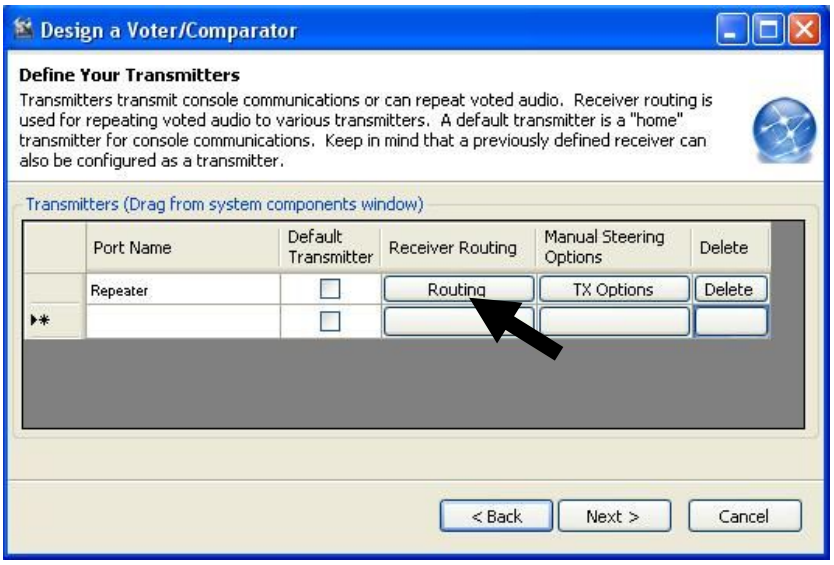
Drag and drop any port connections that you want to designate as transmitters. A transmitter transmits either console audio or repeated voted audio.





STEP 9

You can designate any transmitter as a "default" transmitter. Default transmitters transmit console audio when steering isn't active. Check the "Default Transmitter" check box to designate a transmitter as a default transmitter.



STEP 10

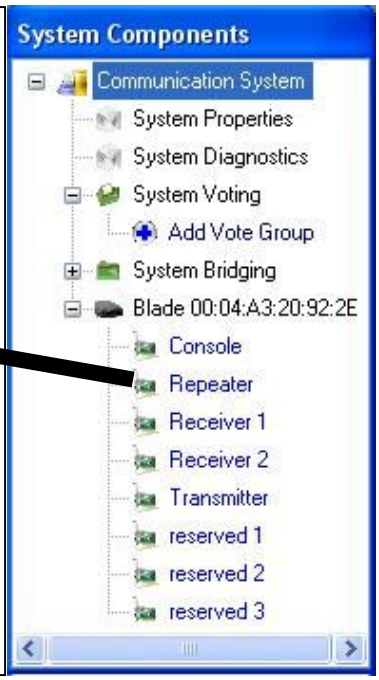
Any transmitter can be configured to transmit audio from any voted receiver. Click the "Receiver Routing" button to designate which receiver's voted audio will be transmitted by this transmitter.

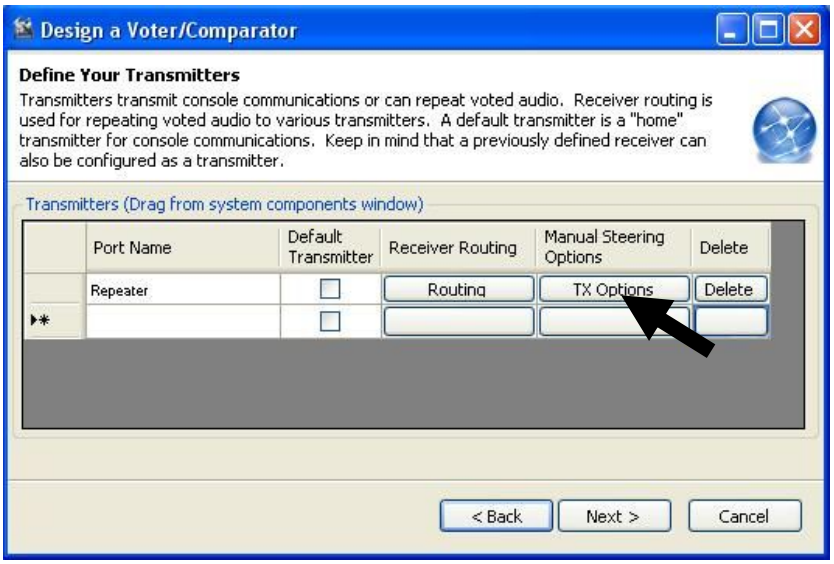
The "Define Receiver Routing" window opens when the "Receiver Routing" button is clicked.

STEP 11

Drag and drop into the "Define Receiver Routing" window any receiver port that you want

transmitted by the selected transmitter when the given receiver gets voted. Any receiver can be added to the selected transmitter's receiver routing list.

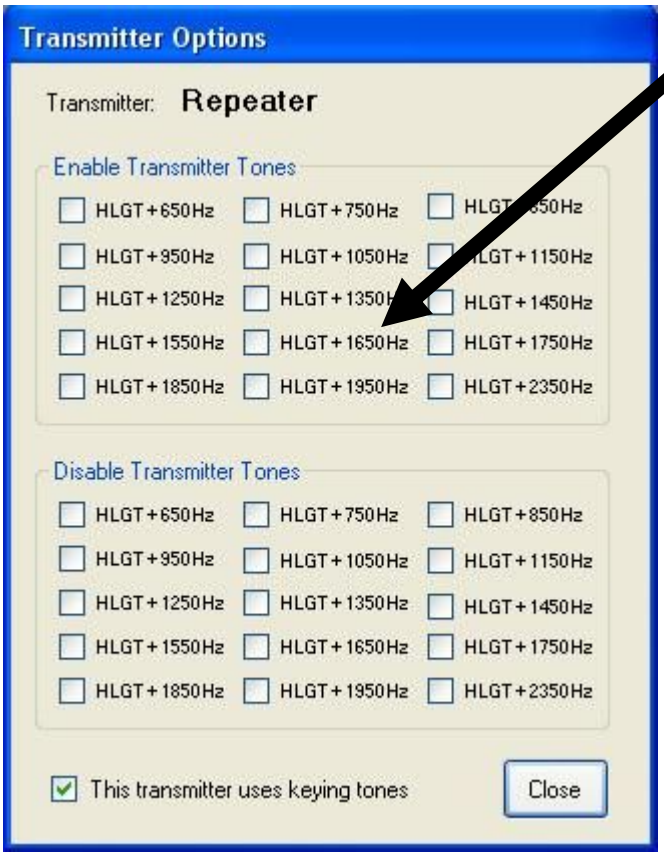




STEP 12

The transmitters in a Raven SNR Vote Group can be manually steered using function tones from a console. Click the "TX Options" button under the "Manual Steering Options" column to define the manual steering configuration for this transmitter.

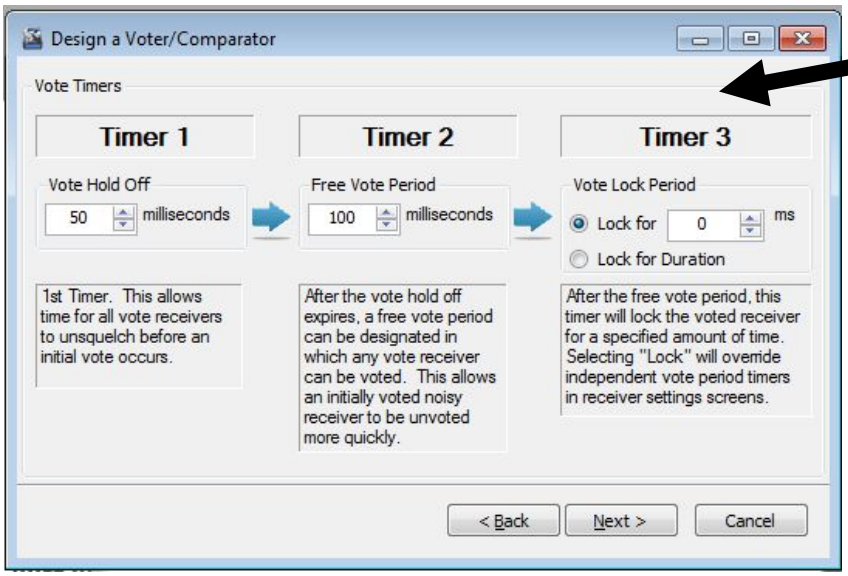
The "Transmitter Options" window opens when the "TX Options" button is clicked.



STEP 13

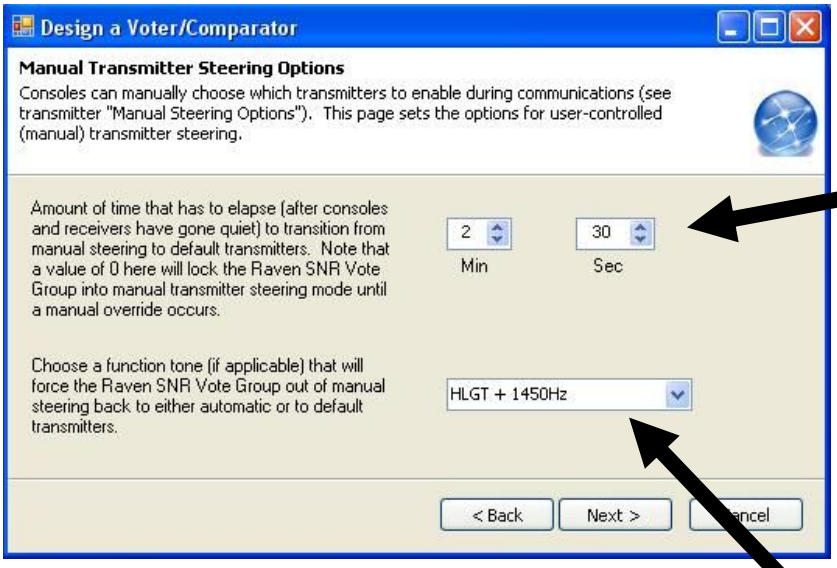
The "Transmitter Options" window is used to set up manual steering capabilities for this transmitter. To designate which function tones enable or disable this transmitter, click the check box next to the desired function tone. When a console generates the chosen function tone, the Raven SNR Vote Group will change to Manual Steering mode, and any transmitter that has been configured to be enabled (or disabled) by the chosen function tone will be enabled (or disabled). Once the vote group transitions to Manual Steering mode, a manual steering countdown timer starts that keeps the vote group in Manual Steering mode for the set time period. (This timer is set up in the next step).

The "Transmitter Options" window is also used to designate whether or not this transmitter is activated by keying tones. The vote group needs to know if keying tones are used so that keying tones are generated when necessary (it's assumed that if console audio is active, the keying tones were already generated by the console, and therefore don't need to be generated by the vote group).



STEP 14

Vote Timers provide control of how vote receivers initially vote. These settings are universal to all receivers and, when implemented properly will greatly improve the initial vote of receivers. Refer to the individual vote timer descriptions for more information.

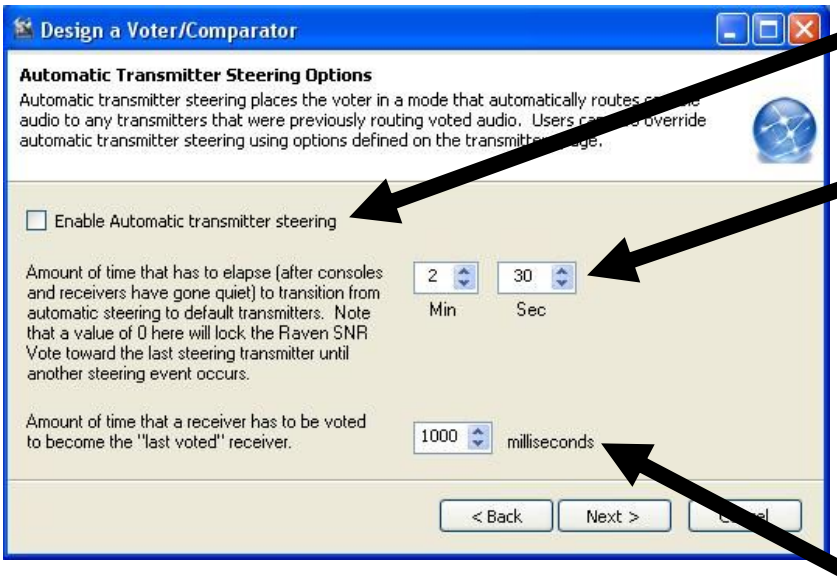


STEP 15

Use the "Manual Transmitter Steering Options" window to set the Manual Steering mode countdown timer. This timer keeps the Raven SNR Vote Group in Manual Steering mode until all voted receiver audio and all console audio has ceased. Once all audio has ceased, the timer starts counting down. If any port gets voted, or any console audio occurs, the timer is reset, forcing the vote group to stay in Manual Steering mode. If all audio ceases, and the timer expires, the vote group transitions back to Default mode.

The "Manual Transmitter Steering Options" window is also used to set a function tone (produced by a console) that forces the vote group out of Manual Steering mode, and back to Default mode.

Note: To lock a vote group into Manual Steering mode, set the Manual Steering mode countdown timer to 0. Once the vote group enters Manual Steering mode (via a function tone from the console), the vote group will remain in Manual Steering mode until the vote group is forced out of Manual Steering mode using the function tone (from the console) that's configured in the "Manual Transmitter Steering Options" window above.



Note: Automatic Transmitter Steering affects where console audio gets transmitted. If Automatic Transmitter Steering is enabled, console audio will be transmitted from any transmitter that has the currently-voted receiver in that transmitter's receiver routing. Also, during the countdown period of the Automatic Steering countdown timer, console audio will continue to be sent to transmitters having the "last-voted" receiver in that transmitter's receiver routing.

STEP 16

Check here to enable Automatic Steering.

Use the "Automatic Transmitter Steering Options" window to set the Automatic Steering mode countdown timer. This timer keeps the Raven SNR Vote Group in Automatic Steering mode until all voted receiver audio and all console audio has ceased. Once all audio has ceased, the timer starts counting down. If any port gets voted, or any console audio occurs, the timer is reset, forcing the vote group to stay in Automatic Steering mode. If all audio ceases, and the timer expires, the vote group transitions back to Default mode.

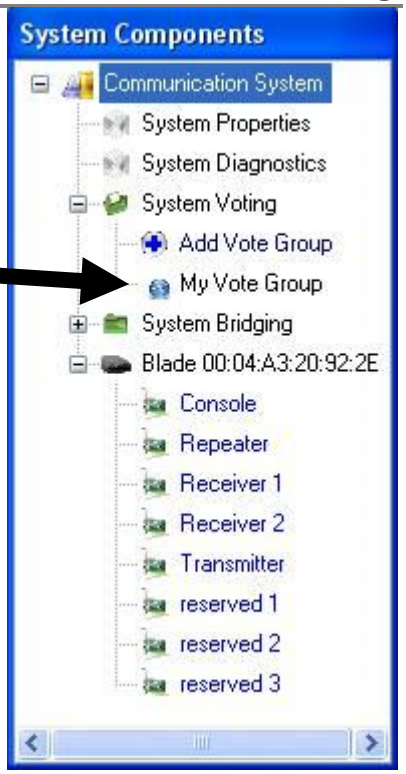
The "Automatic Transmitter Steering Options" window is also used to set a minimum amount of time that a receiver must be voted before it can be designated "last voted". This avoids spuriously-voted receivers from becoming last-voted.

STEP 17

Finish creating the Raven SNR Vote Group by assigning a name to the vote group, and choose one of the options to enable and/or save the new vote group.

Once the vote group is enabled, it's active and performing its voting functions.

Note that the new vote group shows up in the "System Components" tree.

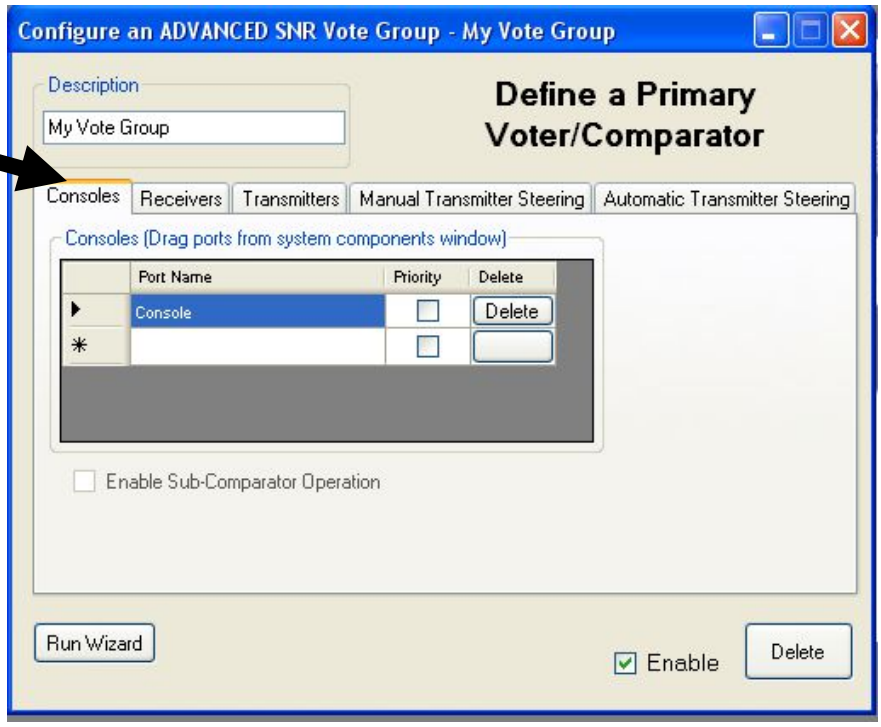


Manually Modifying a Raven SNR Vote Group

If you need to modify a vote group at a later time, click on the vote group name in the "System Components" tree. Changes can be made while the vote group is active, but some changes may not take effect until the vote group is disabled and then re-enabled.

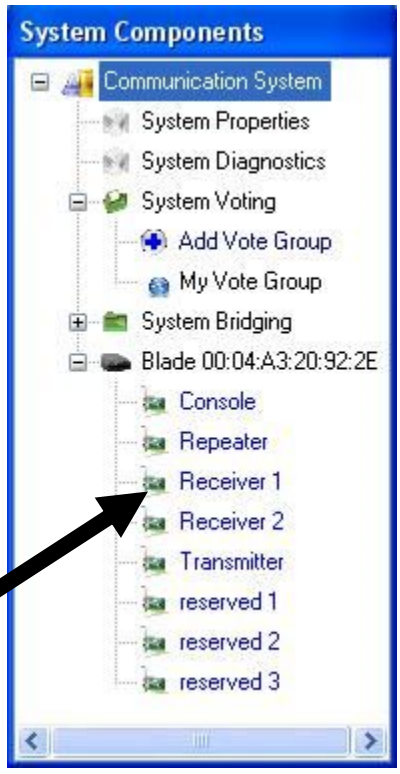
A tabbed version of the vote group setup program appears after clicking on the vote group name. The tabs allow you to view and set up the same vote group features that were set up using the wizard above.

Alternatively, to use the wizard to make changes to an existing vote group, click on the "Run Wizard" button.



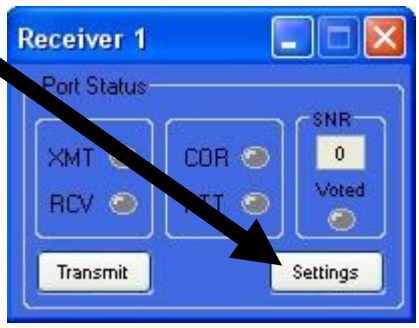
Modifying the Configuration of a Member of a Raven SNR Vote Group

There are a number of parameters that can be modified on each individual vote group member to tailor voting features to your needs. To gain access to these parameters, you can individually open each vote group member's port "Settings" window.



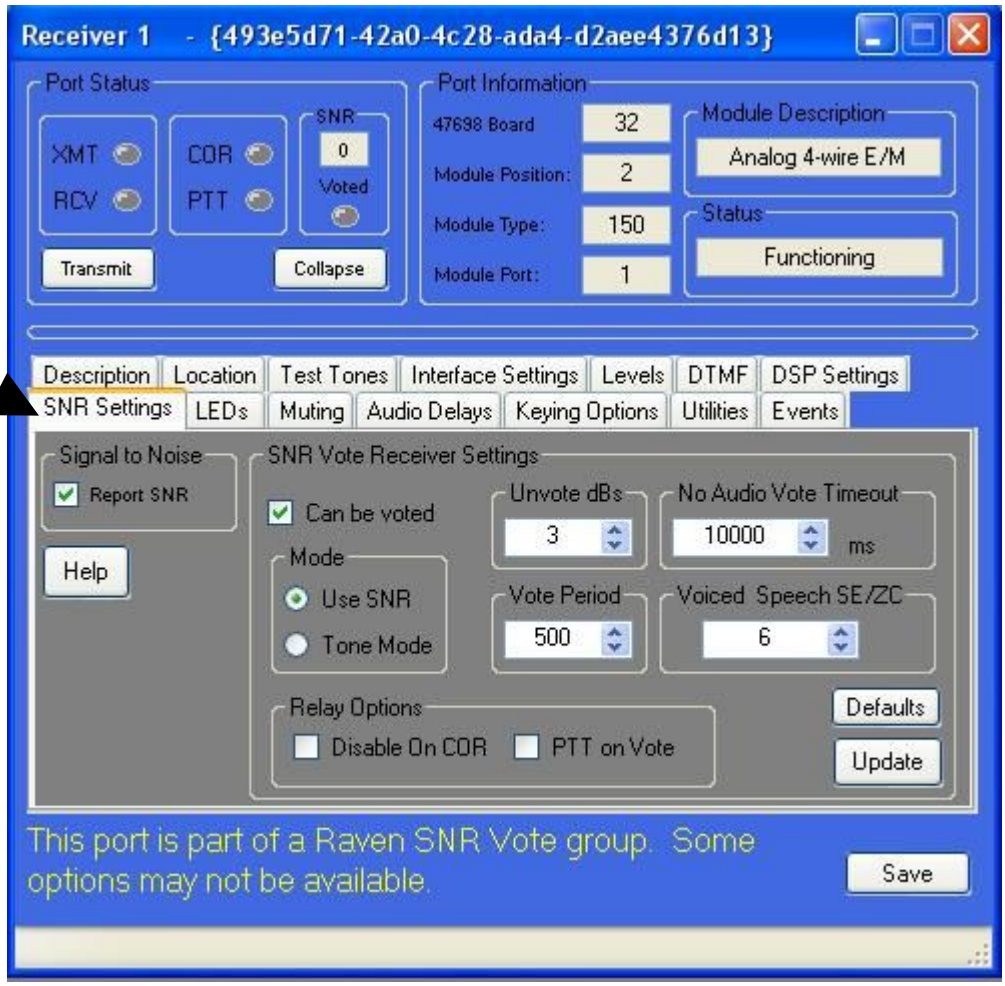
To gain access to a vote group member's settings, click on the name of the port in the "System Components" tree.

Clicking on the name of the port opens a port status window. Click on the "Settings" button to expand the port settings.



Modifying a Receiver's SNR Settings

Click the "SNR Settings" tab to access the SNR settings available for this port.



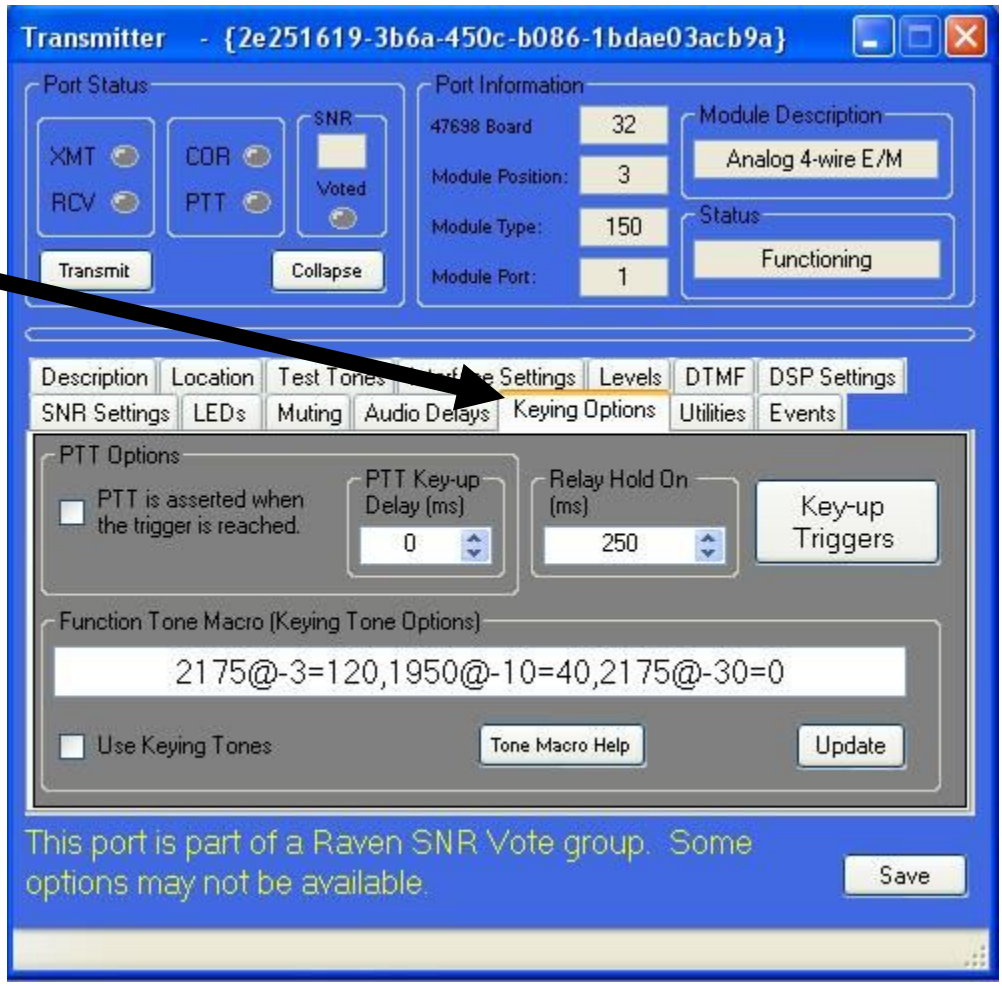
When you created the Raven SNR Vote Group, the SNR settings for each vote-receiver are automatically set to the defaults shown here. The following section describes the function of each of the vote-receiver's SNR settings.

- Report SNR
  - In order to be voted, the port needs to be configured to report an SNR value. Leave this box checked.
- Can be voted
  - In order to be voted, this box needs to be checked. To temporarily remove this vote-receiver from the voting pool, un-check this box.
- Mode
  - Leave this set to "Use SNR".
- Unvote dBs
  - To avoid unnecessary voting, you can set the number of SNR decibels (dBs) that are required for another receiver to out-vote this receiver. The default is 3.

- Vote Period
  - The "Vote Period" determines how quickly, once one receiver is voted, that another receiver can be voted. The Vote Period is in milliseconds. The default is 500ms.
- No Audio Vote Timeout
  - If a receiver goes unsquelched, but provides no audio, the receiver can be removed from the voting pool. The "No Audio Vote Timeout" determines how long to wait before removing it from the pool. The No Audio Vote Timeout default is in milliseconds with a default of 10000 (10 seconds).
- Voice Speech SE/2C
  - Leave this value set to 6.
- Disable on COR
  - If this box is checked, the receiver will be removed from the voting pool when COR goes active.
- PTT on Vote
  - If this box is checked, the receiver will assert PTT when it gets voted.

Modifying a Transmitter's Keying Options

Click the "Keying Options" tab to access the keying options available for this port.



A transmitter can be optionally keyed using either PTT or keying tones. This section describes the different keying options.

- PTT is asserted when the trigger is reached
    - If you're using PTT to key the transmitter, check this box.
- PTT Key-up Delay
    - This sets the amount of time, in milliseconds, that the transmitter port delays- after the presence of audio- before asserting PTT. This setting is rarely used, and is almost always set to 0.
- Relay Hold On
    - This is the amount of time, in milliseconds, that the PTT relay stays engaged after audio goes away.
- Use Keying Tones
    - If keying tones are used to key the transmitter, check this box. Also, fill out the correct Function Tone Macro (click "Tone Macro Help" for more information).
- Key-up Triggers
    - Leave the Key-up Trigger for a transmitter set to "On VOX".

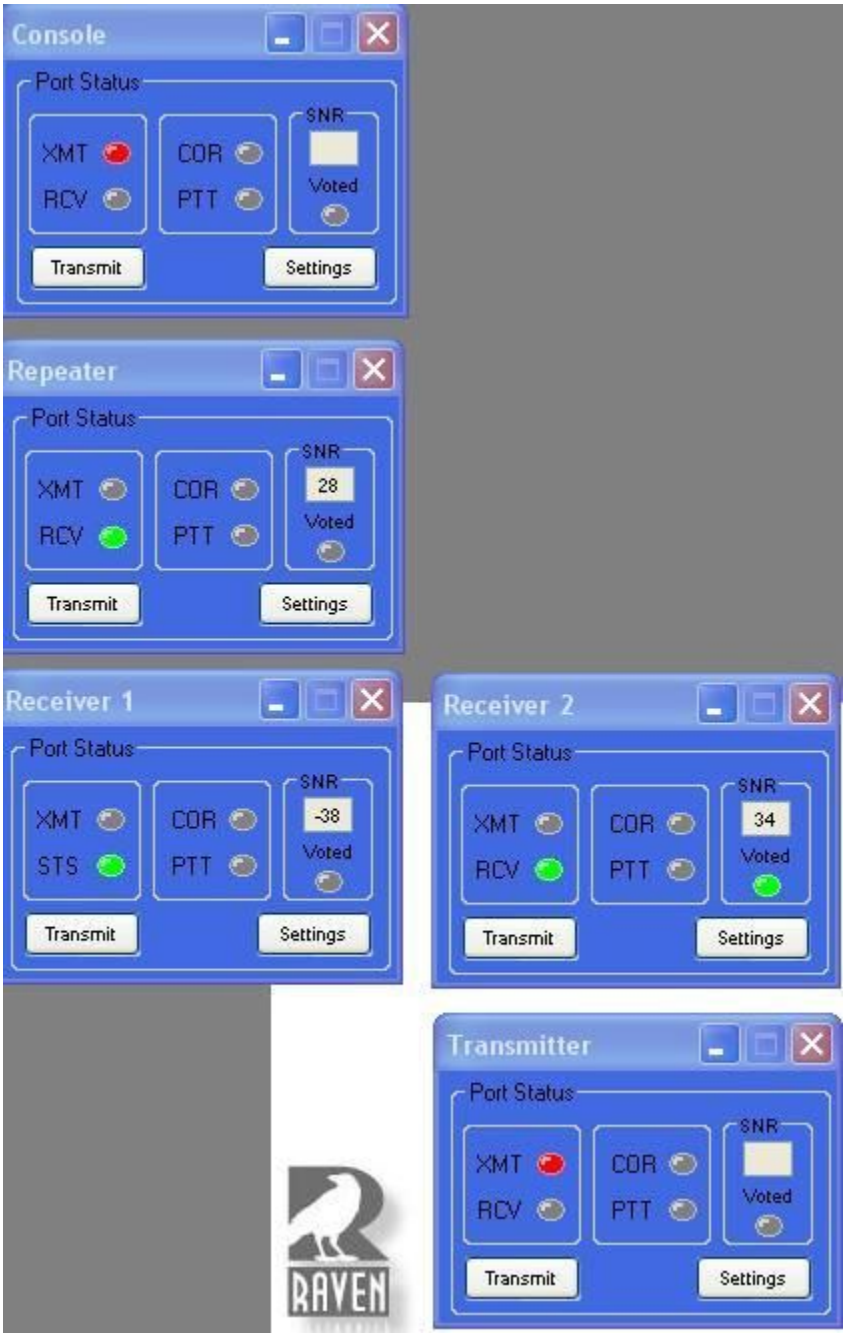
Raven SNR Vote Group Status

This section describes some of the vote group status information provided by the vote group member's port windows.

Receiver 2's voted audio is being sent to the Console.

Repeater is receiving audio. The audio has an SNR value of 28dB.

Receiver 1 is receiving status tone.



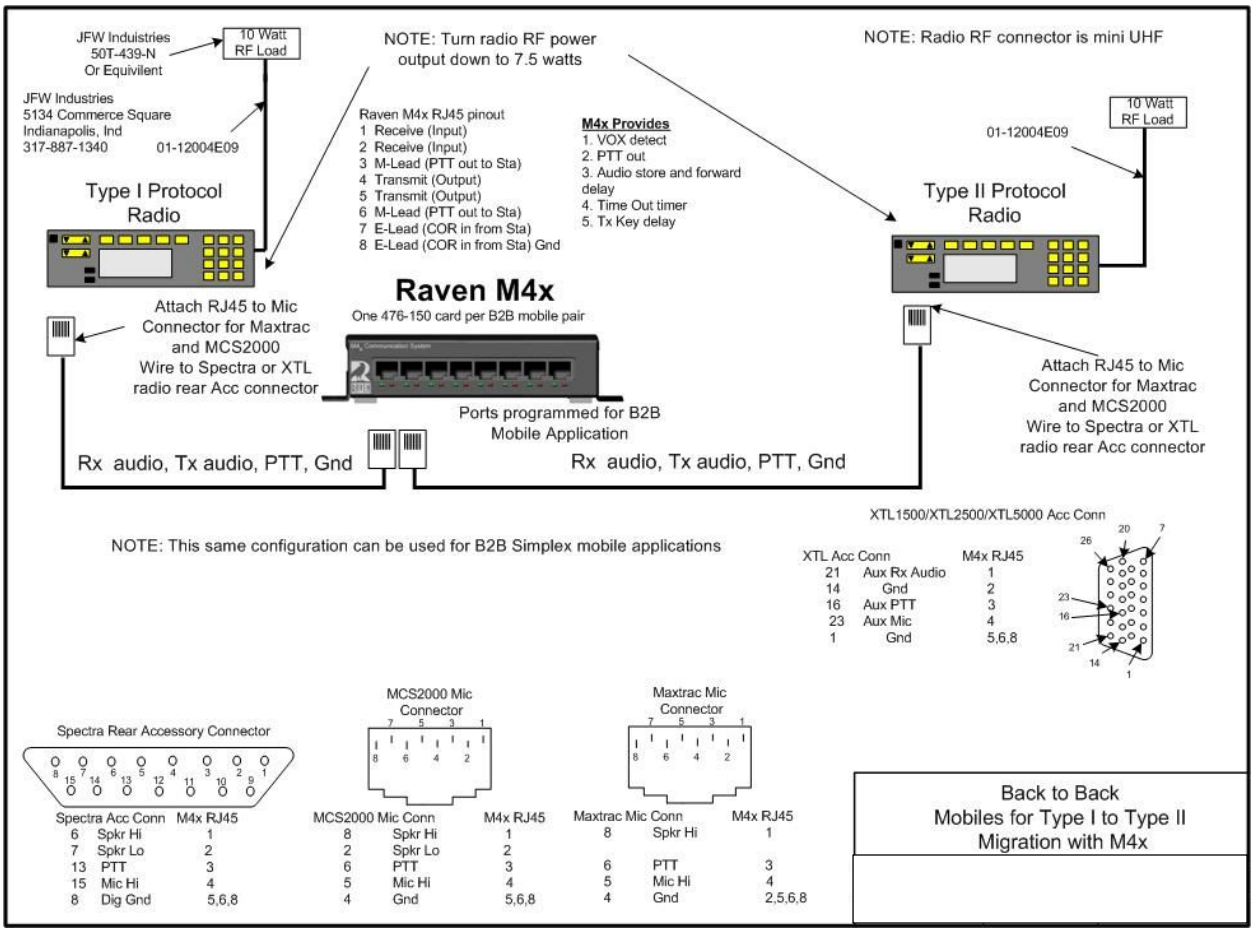
Receiver 2 is receiving audio. Receiver 2 has an SNR value of 34dB and is currently the voted receiver.

This transmitter is currently repeating Receiver 2's voted audio.

Chapter 8 – Custom Configurations

Custom Configurations

Custom configurations are a way of pre-packaging settings for use with the M4x Blade. These settings can vary depending upon your needs. Examples of various custom configurations include: Back-to-Back repeaters, SNR Voting schemes, Digital Voting, and many other possibilities. The custom configuration options allow users to simply drag and drop ports, and configure them with only a few clicks, instead of going through each port manually and adjusting the settings one tab at a time.



Adding a New Custom Configuration

To add a custom configuration to the software, contact Raven Electronics Corporation:

Raven Electronics Corporation
4655 Longley Lane, #106
Reno, Nevada 89502
(775) 858-2400 Phone
(775) 858-2410 Fax
info@ravencomm.com
sales@ravencomm.com

Our sales and engineering team would be happy to tailor a solution to your specific needs.

Loading a Custom Configuration

To load a custom configuration once the M4x Configuration Setup is running, select Actions, New Custom Config, then specific custom configuration.

Depending on the complexity and requirements of the custom configuration, additional documentation may be provided by Raven Electronics to assist in setting up the custom configuration.

Saving a Configuration

When a configuration is complete, press the Save button. This will save the configuration for that particular M4x Blade. The Save file is unique to the M4x Blade currently connected and configured. In order to use the same configuration for multiple M4x Blades, instead of pressing the Save button, go to the Action Menu. Select "Select Saved Blade Configuration to File" and click OK. When the "Save M4x Settings" appears, either keep the default file name (M4x Blade MAC Address — unique to every M4x Blade) and directory or assign a new one and new directory.

If configuring multiple M4x Blades on the same computer, name the saved file in such a way as to associate it with the M4x Blade that is being configured. The Serial Number on the back of the M4x Blade is an easy reference.

- After selecting the file name and directory, click "Save" and then click "OK". When choosing a directory, some users save the configuration file on a thumb drive or portable device.
- To confirm the saved configuration file works, go to the Actions Menu and select "Disconnect"
- Again, click on the Actions Menu and select "Database Save/Restore".
- Select "Delete/Remove" and then "Yes".
- From the Actions Menu, select "Connect" and "Local/USB".
- Expand the tree under System Components

CHAPTER 8

Saving M4x Blade Configurations

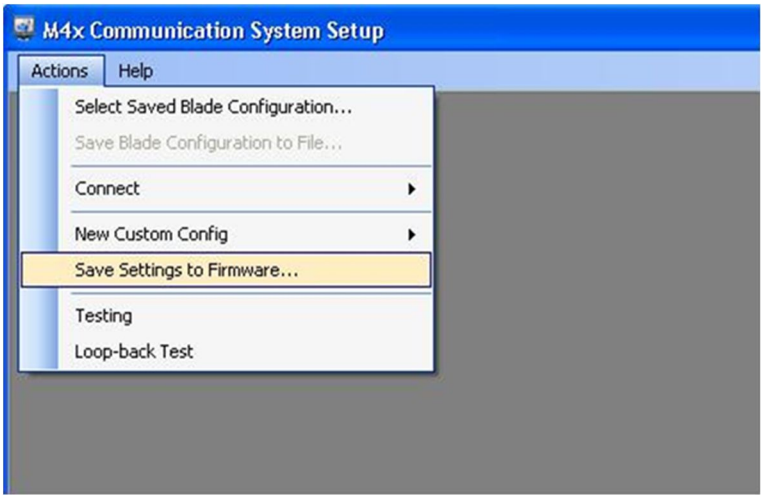
When the USB cable is connected to the Raven M4x SNR Voter/Comparator, and the M4x Communication System Software is active and communicating with the M4x SNR Voter/Comparator, then the M4x Communication System Software is in control of the SNR voting group configuration. Any Blade settings that are saved while the M4x Communication System Software is active are saved to the Windows registry of the PC controlling the Blade's USB port. If the M4x Communication System Software is re-started, the settings from the registry are read upon software start-up, and the M4x SNR Voter/Comparator is reconfigured as it was when the settings were saved to registry.

The Raven M4x SNR Voter/Comparator does not require that a PC be connected during normal voting operations. After any SNR voting groups have been configured (using the M4x Communication System Software), vote group setting can be burned to flash memory on the Raven M4x SNR Voter/Comparator. After flashing the settings, removing the USB cable and cycling power, the Raven M4x SNR Voter/Comparator is ready to operate independently of the M4x Communication System Software.

To save your vote group settings to flash, click on "Save Settings to Firmware…" from the Raven M4x Communication Software Actions menu and follow the prompts.

Save Settings to the Firmware of the M4x Blade

Choosing this option, as shown in the figure below, will allow the user or installer to save all set up settings to the firmware of the M4x Blade. This is useful if a computer will not be connected to the M4x Blade, and if the M4x Blade is required to run on saved settings away from a computer. Once settings are saved to the firmware, it is highly recommended to power cycle the M4x Blade; unplug and re-plug the M4x Blade back in to its power source.



Save M4x Blade Configuration to File

Choosing this option will allow the current configuration/settings to be saved as a .dat file within a directory of choice.

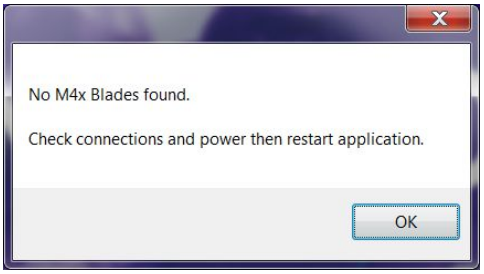
Select Saved Blade Configuration

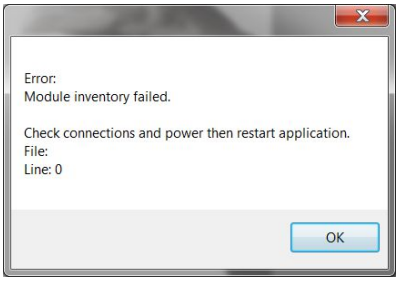
This option allows the .dat file to be loaded onto a M4x Blade. Both the Save button and Save Blade configuration to file does **NOT** save settings to the M4x Blade. Only saving settings to the firmware will allow the M4x Blade to run in a stand-alone situation after it is configured. This selection must be done before connecting to an M4x Blade in order to load the selected configuration to the M4x Blade.

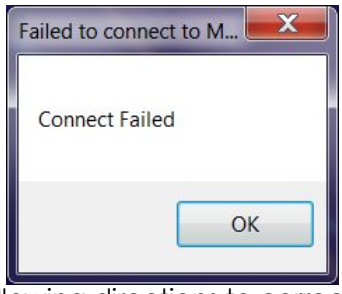
Chapter 9 – Troubleshooting

Common Error Messages

Check to be sure the M4x Blade is plugged into the computer as well as plugged into power.





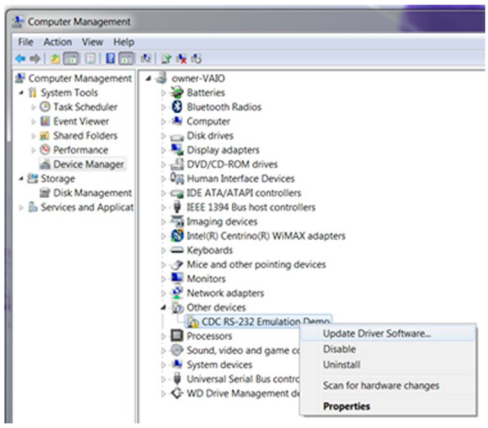


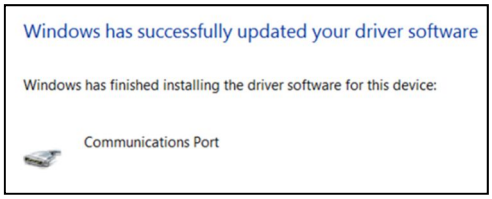
The incorrect driver was probably automatically installed. Please follow the following directions to correct the driver.

1. Right-click on Computer
2. Select Manage
3. Select Device Manager (under System Tools)
4. Click Other devices (on the right-hand side of the screen)
5. If CDC RS-232 Emulation Demo appears, Right-Click it
6. Left-click Update Driver Software … (refer to screen to the right)
7. Select to Browse for the Driver Software
8. Browse for the Folder. It will be found under the following directory:

   Programs —> Raven Electronics —> M4x —> Drivers

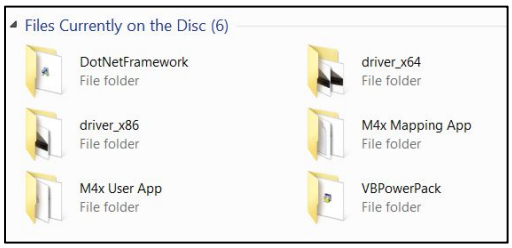
9. Click OK
10. A Windows Security screen appears. Select Install driver software anyway
11. When the driver has successfully been installed, the screen to the right will appear, press Close
12. In the Computer Management Screen, instead of Other Devices, Ports (COM & LPT) will be there
13. Now the software will recognize the M4x Blade is connected
14. Re-open the Software. Be sure the M4x Blade is physically connected.





Net 3.0 Install

If the computer installing the M4x software does not currently have Microsoft .Net 2.0 or higher installed, double-click on the file folder labeled dotnetfx.exe. This will begin the installation process of the .Net 2.0 firmware.



A security warning may pop up asking whether or not to run the install program or cancel. Hit the run button to continue.

In order to continue, agree to the terms of the license. Please review the EULA and click in the box to agree. Click the Install button to continue. When the install is done, press the finish button to complete the install process.

Visual Basic Power Packs Install

Next, install the required Visual Basic Power Packs software. Double-click the folder labeled VBPowerPack as shown in Figure 8 and then click on the file named VisualBasicPowerPack3Setup.exe. Once completed, click the Finish button to complete the process.

Driver Installation

Next, locate the folder named Drivers in the main directory on the install CD. Open the folder and locate the file named DPInst.exe. Double-click to launch the installer.

The program will ask you to wait as the drivers are installed. A warning dialog may come up as the drivers install asking whether or not to continue. Select Continue.

When the drivers have been successfully installed, the program will display a dialog box to notify the install was completed successfully. Click the Finish button to complete the process.

END OF DOCUMENT