



The RIOS Graphical User Interface
Control Software for the SyTech RIOS Interoperable Communications Gateway

Designed and Manufactured by:

Systems Engineering Technologies Corporation

6121 Lincolnia Road
Alexandria, Virginia 22312
TEL. 703-941-7887
www.SyTechCorp.com

Control Systems Manual
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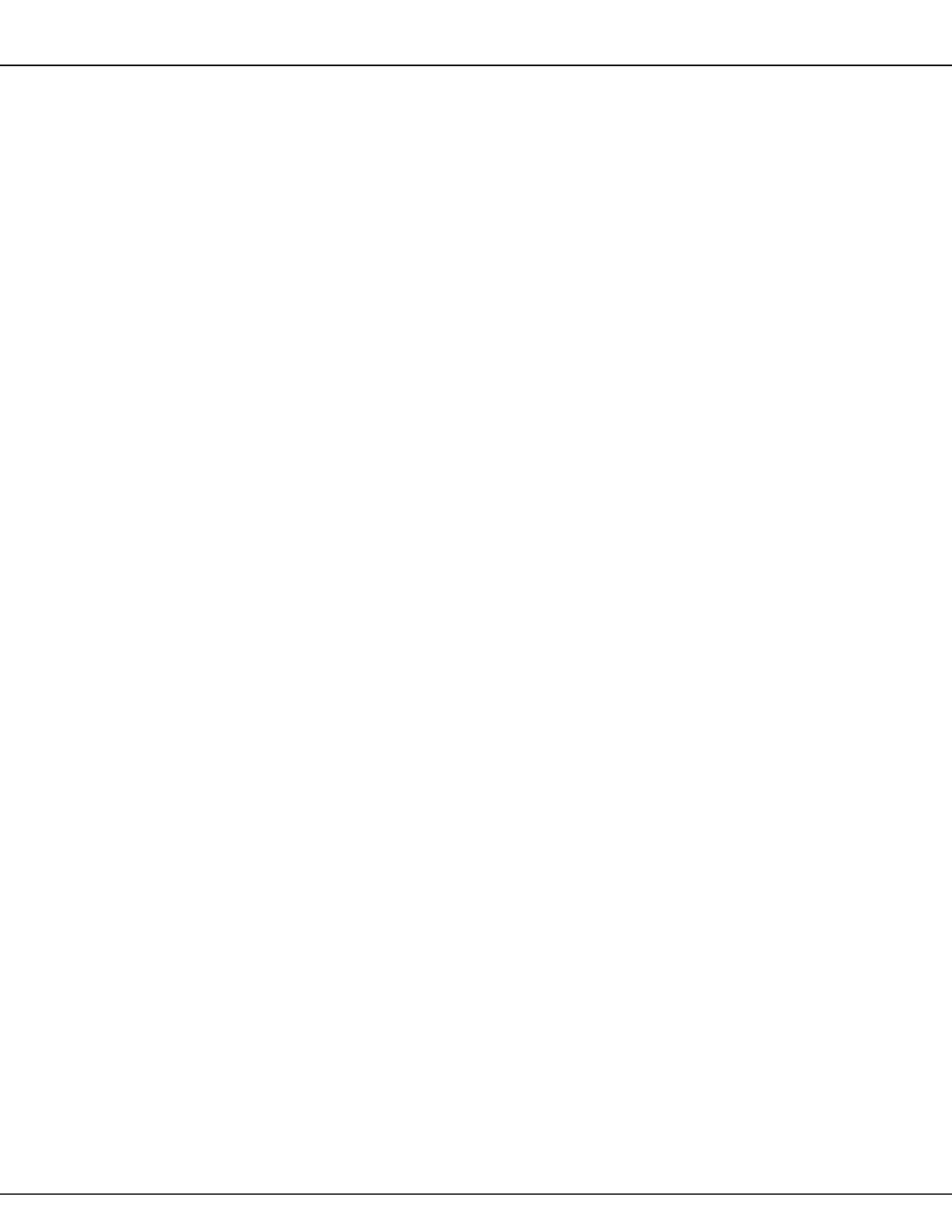


Table of Contents

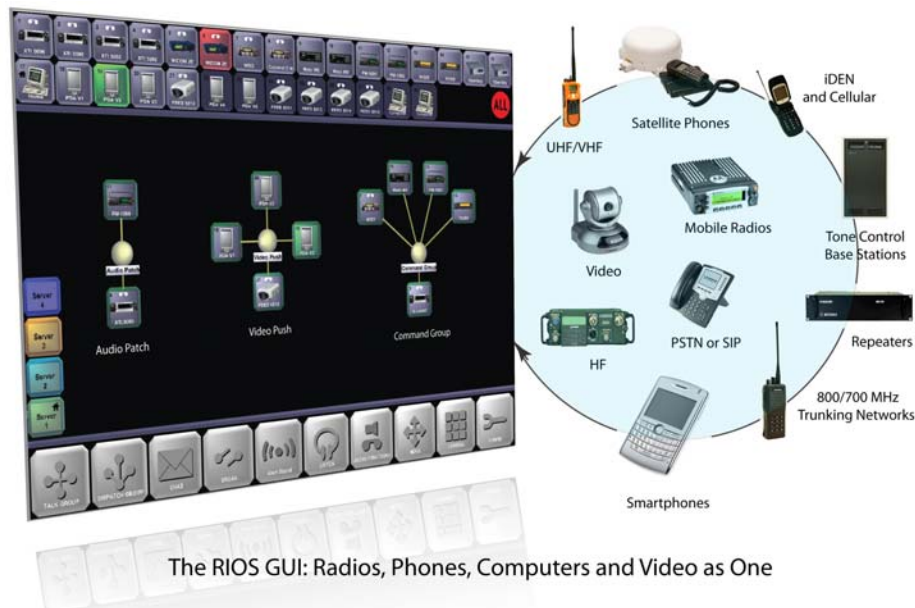
Welcome to RIOS	1
Getting Started	3
Creating Interoperability	5
2.00 Understanding Functions.....	5
2.01 The Talkgroup Function.....	6
2.02 The Move Function.....	7
2.03 The Break Function.....	7
2.04 The Dispatch Function.....	8
2.05 The Listen Function.....	9
2.06 The Record Function.....	10
2.07 Instant Recall.....	11
2.08 Volume Control.....	12
2.09 The Private Function.....	14
2.10 The Talk Pedal Function.....	14
2.11 Signal Alerts.....	16
2.12 Dual Tone Paging.....	17
2.13 Activity Log.....	19
Gateway Management	20
3.00 Understanding Gateways.....	20
3.01 Loading Assets.....	21
3.02 Connecting a Walk-Up Radio.....	22
3.03 Connecting a Telephony Gateway.....	25
3.04 Connecting a DSP2 Gateway.....	27
3.05 Remote Connection with DTMF Devices.....	27
3.06 Saving and Loading Presets.....	28
3.07 Configuring Gateway Audio.....	29
3.08 Gateway Permissions.....	31
3.09 SIP Profiles.....	32
RIOS Wide-Area Network	34
4.00 Understanding RIOS Wide-Area Network.....	34
4.01 Site Configuration.....	35
4.02 Creating Wide-Area Talkgroups.....	36
4.03 RIOS Chat.....	37
4.04 Remote Radio Control.....	39
4.05 Network Connections.....	40
RIOS Administration	42
5.00 General Administration.....	42
5.01 Upgrading RIOS Software.....	42
5.02 Editing User Rights.....	44
5.03 Troubleshooting RIOS.....	47



Welcome to RIOS

SyTech RIOS – An Introduction

The SyTech Radio Interoperability System (RIOS) interoperates dissimilar communication networks by collecting and converting local communication signals into digital IP packets. RIOS accepts signal from variety of sources and consolidates their capabilities into a unified operating platform. Control the system is accomplished via the RIOS Graphical User Interface (GUI). Figure I-1 below illustrates the RIOS Interoperability Conversion.



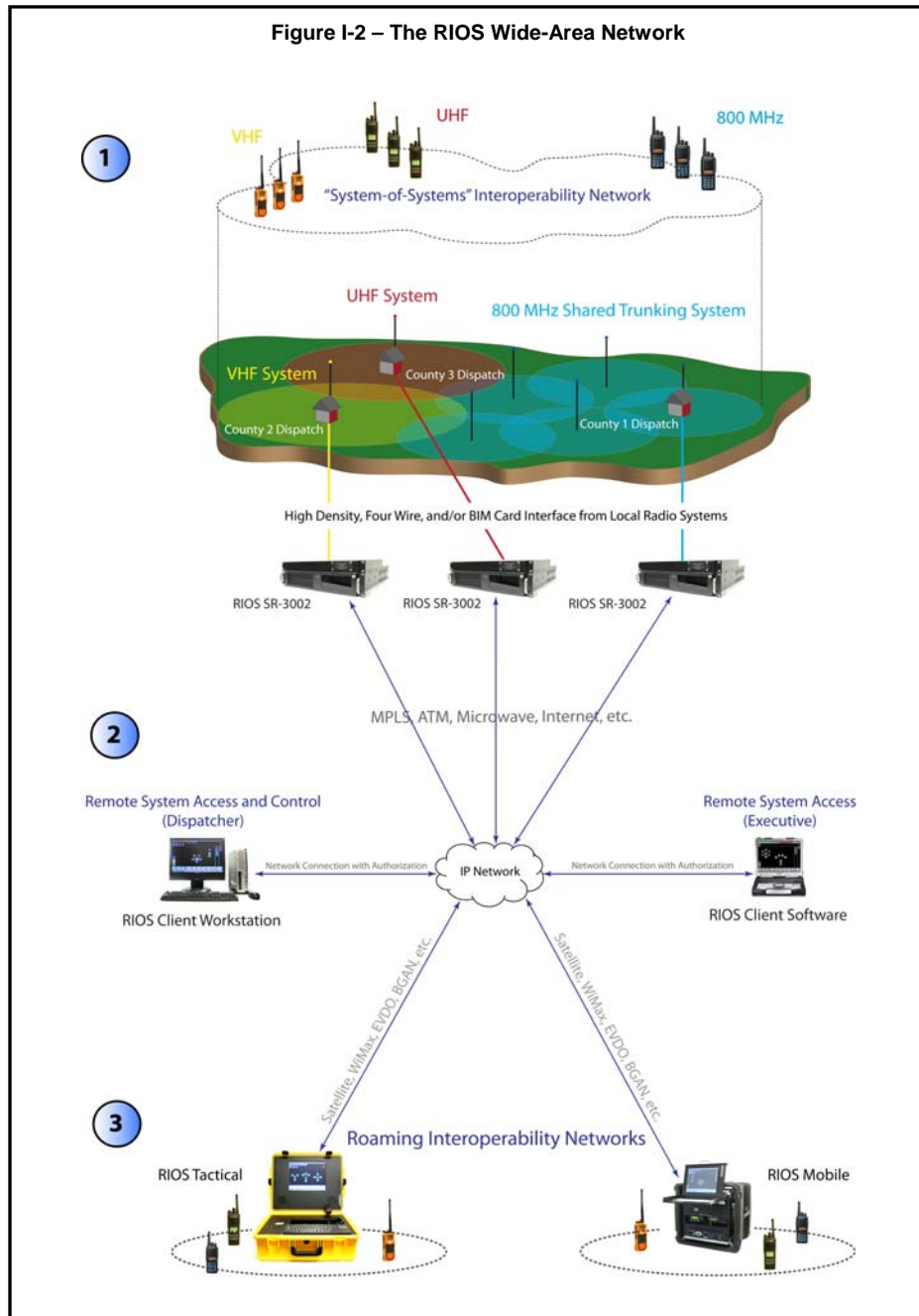
The purpose of this manual is to train and equip the RIOS operator with the basic, as well as the advanced, fundamentals of creating effective interoperability. After completing this manual the novice RIOS operator will be able to:

- Interconnect dissimilar communication networks
- Monitor and record interoperated communications
- Optimize gateway parameters to deliver high-quality audio transmissions
- Extend radio range via RIOS Wide-Area Network
- Send customized alert signals
- Communicate off the air with RIOS Chat text messaging
- Remotely control Gateway Radios (where applicable)

RIOS solutions range from standalone servers, tactical interoperability kits, remote-client PCs, and state-wide networks connected across diverse IP networks. Wide-area RIOS network result in a fully interoperated communications perimeter unlimited by physical terrain and distance.

Operators of RIOS GUI have the ability to interoperate local agency networks while offering wide-area connectivity to remote RIOS networks.

All RIOS Servers connect using a single IP address via peer-to-peer internet protocol networking. Figure I-2, The RIOS Wide-Area Network, displays a RIOS configuration whereby (1) public-safety radio systems, (2) remote-client PCs and (3) roaming interoperability networks are connected across various IP networks.



For setup instructions please refer to the RIOS Administrator Manual. After the system is setup, this companion manual is all that is required for proper operation. Should you have any questions please contact RIOS Technical Support at 703.941.7887.

Getting Started with RIOS GUI

1.00 Starting RIOS GUI

Supply power to the master switch. Wait for the machine to boot and initialize. The RIOS Desktop will appear as in **Figure 1.1**.

RIOS Software operates within a client/server environment of Microsoft Windows. The server program (RIOS Service) starts automatically during the boot process. The control program (RIOS Client, the GUI) must be launch by the user. RIOS GUI can started from the Desktop as well as from within its home folder, C:\Program Files\RIOS. The RIOS GUI application is titled, "RIOS Client".

Start RIOS GUI from the Desktop

1. Start RIOS GUI from the Windows Desktop by double clicking the **RIOS Shortcut**.

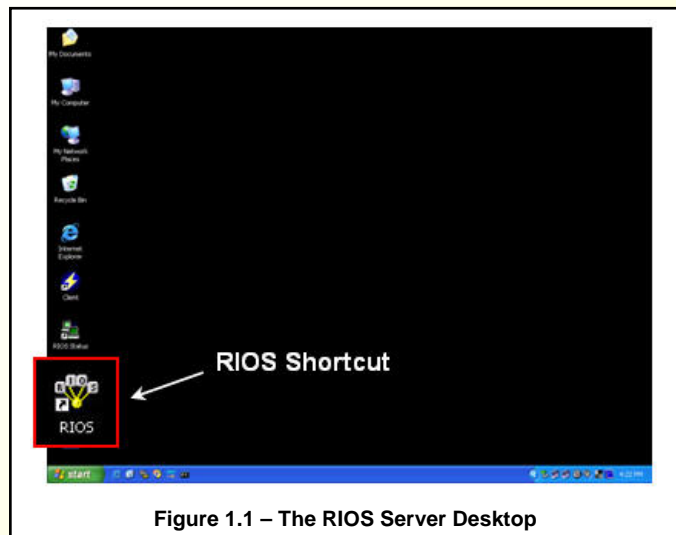


Figure 1.1 – The RIOS Server Desktop

The RIOS Desktop is displayed in **Figure 1.1**. In this example the RIOS icon is located in the last position of the shortcut column and magnified for clarification.

- The RIOS Login Screen will appear as shown in **Figure 1.2**. Input the **User ID** and press **Enter**. The default User ID is "1".

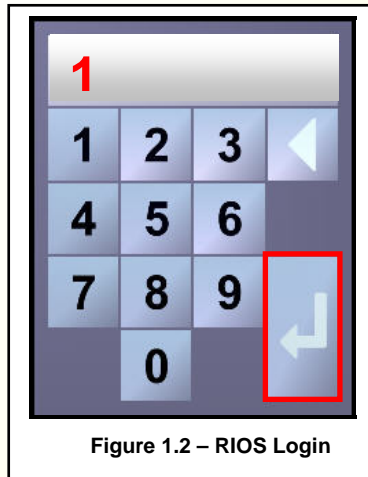


Figure 1.2 – RIOS Login

- Wait for RIOS to connect. After RIOS has initialized, the RIOS Client interface will appear as in **Figure 1.3**

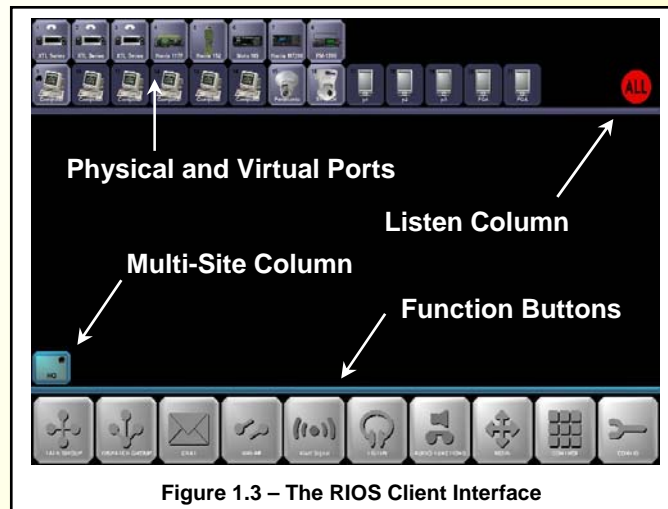



Figure 1.3 – The RIOS Client Interface

The RIOS Client interface consists of the **Work Area** and four icon groupings; clockwise from the top they are as follows, **Gateway Ports**, **Listen Column**, **Function Buttons** and **Multi-Site Column**.

2.01 The Talkgroup Function

A **Talkgroup** is on-screen representation of two or more **Physical or Virtual Ports connected in two-way communication**. Talkgroups are the main ingredient of RIOS interoperability and will be used frequently throughout this manual.

Create a VHF, UHF and 800 MHz Talk Group

1. Activate the **Talk Group** Function. 
2. Select the **Gateway Ports** that correspond to the appropriate VHF, UHF and 800 MHz gateway devices.
3. Confirm the group by deselecting the **Talk Group** Function.

A Talk Group named "New" will appear as in **Figure 2.1**. This arrangement graphically illustrates three Gateway Ports and their respective devices and native networks connected within an interoperated group.

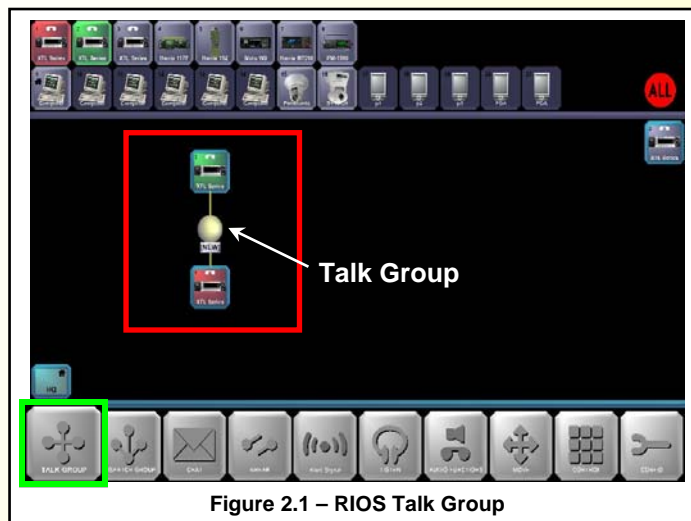


Figure 2.1 – RIOS Talk Group


Add a new Gateway to an existing Talk Group by activating the Talk Group Function, selecting the center sphere of the Talk Group, selecting the new gateway, and confirming the action by deselecting the Talk Group Function.

Change the name of a Talk Group by selecting the Configure Function, followed by the center node of the group to be renamed.

2.02 The Move Function

The Move Function is used to move groups to new locations within the Work Area. Move allows individual operators to customize their display to suit their particular needs.

Move a Talk Group

1. Activate the **Move** Function. 
2. Drag the **Center Node** of the Group to its new location.
3. Turn off the Move Function by deselecting the **Move** Function.


Rotate the gateways of a group by selecting the Move Function, a gateway within the group and dragging the asset around the center node.

2.03 The Break Function

The Break Function can be used to:

- (1) Disconnect one or more gateways from a group.
- (2) Disconnect or “break” an entire group.
- (3) Remove a gateway from the Listen Column.
- (4) Log off the RIOS GUI without closing the application.

Break a Talk Group


1. Activate the **Break** Function. 
2. Select the **Center Node** of the Talk Group to be removed.
3. Confirm the break by deselecting the **Break** Function.

Remove individual gateways from a Talk Group by activating the Break Function, selecting the gateway from within a group and confirming the break by deselecting the Break Function.

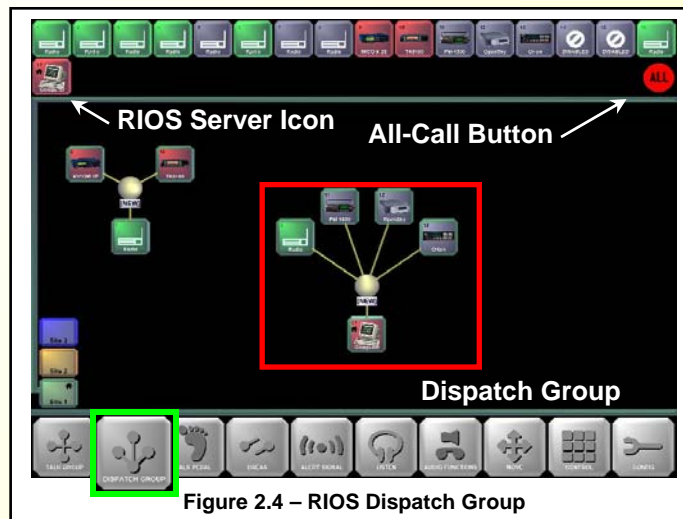
2.04 The Dispatch Group Function

A Dispatch Group allows one Gateway Port (usually the RIOS Server) to act as the dispatcher to connected gateway networks. A Gateway Port assigned as the dispatcher can transmit and receive audio to and from the gateways within the dispatch group; however, audio transmitted by the *other gateways* within the dispatch group will only be heard by the dispatcher, not the individual Gateway Ports.

Create a RIOS Server Dispatch Group

1. Activate the **Dispatch Group** Function. 
2. Select the **RIOS Server** IP Port. The server icon appears as the left-most Computer IP Port with the small house icon.
3. Select the **Ports** that will be included in the dispatch group.
4. Confirm the group by deselecting the **Dispatch Group** Function.

A Dispatch Group will appear as in **Figure 2.4**. Notice the convergence of communication lines toward the RIOS Server.




The RIOS operator can transmit via on-screen push-to-talk by selecting an individual port or the center node of a group and broadcasting using a microphone headset. In addition, the operator can transmit to all Physical and IP Ports by depressing the All-Call Button.

2.05 The Listen Function

The Listen Function is used to monitor port audio. Ports in listen mode will appear in the Listen Column along the right-hand side of the display. The three modes of simultaneous audio are Mono, Stereo and Quad Mode.

Monitor a Talk Group

1. Activate the Listen Function. 
2. Select the Gateway Ports to be monitored.
3. Confirm the gateway by deselecting the Listen Function.

Inside the Listen Column audio is prioritized from left to right, top to bottom. The first gateway selected will have the highest listening priority. Push-To-Talk transmissions will automatically be placed in Listen Mode as shown in **Figure 2.5**.

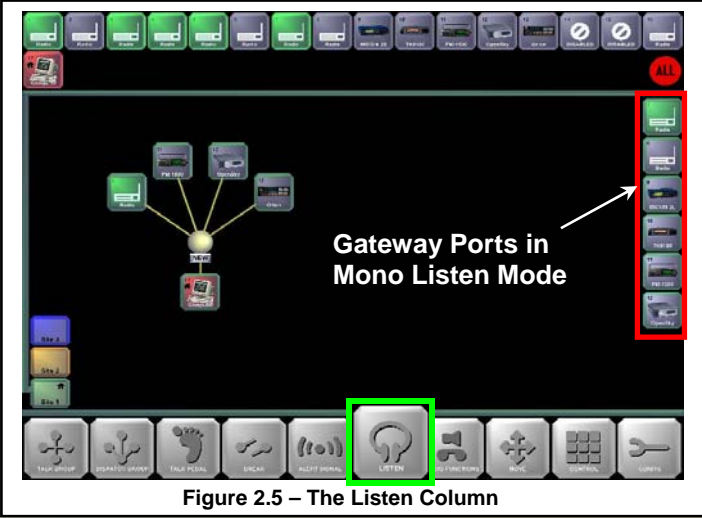


Figure 2.5 – The Listen Column

Use the Break Function to remove a gateway in listen mode.


Change the listening priority by activating the Move Function and dragging the port to the desired position within the Listen Column. After the necessary moves are complete, turn off the Move Function by deselecting it.

Change the audio mode by selecting Configure, the RIOS Server icon, General. The user can toggle amongst Mono, Stereo and Quad styles of listening.

2.06 Audio Functions


The Audio Function Button provides access to a variety audio controls and tools. Recording, Playback, Instant Recall, Volume and Speaker Headset Control can be accessed with this function. **Function** is a software option that allows audio traffic to be recorded to the hard drive of the RIOS Server.

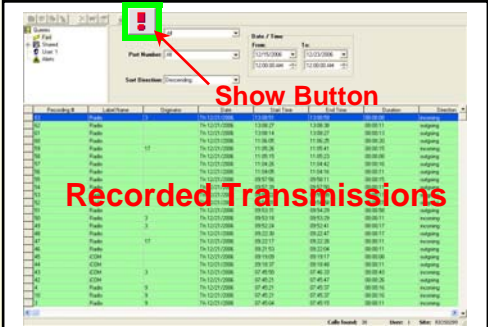
Record a Gateway

1. Select the **Audio Function** Button
2. Activate the **Record** Function. 
3. Select the **Gateways Ports** to be recorded.
4. Confirm the recording by deselecting the **Record** Function. Turn off the recording by repeating the process.

Recording is based on a port-by-port basis and can be turned on or off at any time.


Playback a Recording

1. Select the **Audio Function** Button.
2. Select the **Playback** Button.  The server will launch the **ADACS application** as seen in **Figure 2.6**.



Recorded Transmissions

Figure 2.6 – The ADACS Database

3. Update the recording table by selecting the **Show Button**  denoted by the red exclamation point.
4. **Double click the recording** from within the table.

2.07 Instant Recall

Instant Recall allows the user to playback transmissions and receptions for individual ports.

Playback a Recording with Instant Recall

1. Activate the **Audio Function** Button.
2. Instant Recall will automatically be activated. Select the **Gateway Port** to playback.

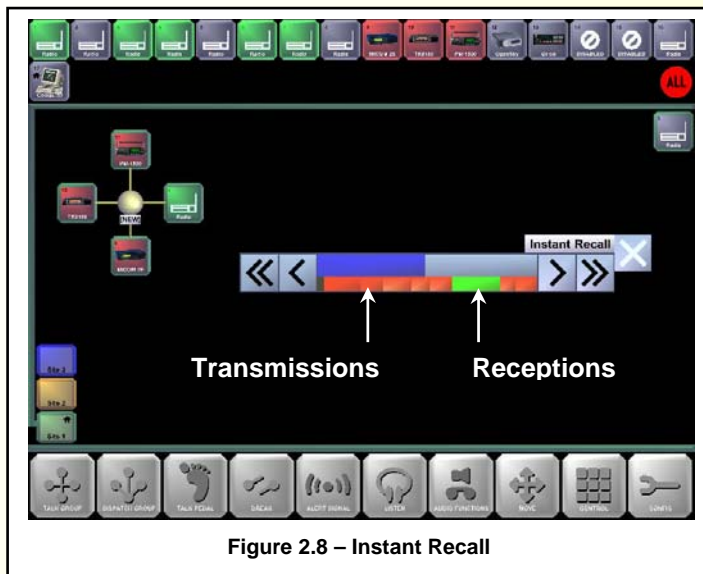


Figure 2.8 – Instant Recall

3. The user can **select any portion** of the Instant Recall display to playback receptions and transmissions.

Transmissions (from the perspective of the gateway) are shown in red while receptions are shown in green. Recall time is determined within the Client Configuration File with a maximum value of 8 minutes.


4. Close the Instant Recall display by selecting the “**x**” marker. .

2.08 Volume Control

The microphone input and speaker output can be controlled from within the RIOS GUI using the Audio Function and Volume Button.

Adjust Microphone and Speaker Settings

1. Activate the **Audio Function** Button. The Volume Function will appear in the Function Row to the right of the Audio Function



2. Activate the **Volume** Function. The Volume Control interface will appear as in **Figure 2.7**. The display correlates to style of Listen Mode setting (Mono, Stereo, Quad).

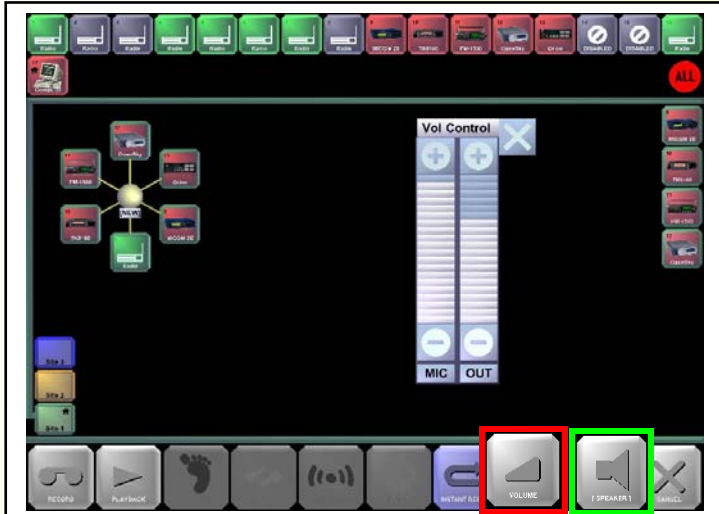



Figure 2.7 – Volume Control

3. Adjust the volume by using **plus/minus controls** or by **selecting the desired level**. To mute the volume, select output source indicator at the bottom of the Volume Control interface. Muted audio will be highlighted in red as in **Figure 2.7** where Channel 3 and 4 are currently muted.

4. The user can switch between **speaker and headset** output by toggling the Speaker/Headset Button directly to the right on the Volume Button.



RIOS Volume Control determines the audio levels for the RIOS Server soundboard; hence, all server applications, including ADACS Playback, will be effected by RIOS Volume Control.

Individual ports can have their audio levels modified with the Volume Button

Adjust Port Volume Settings

Activate the **Audio Function** Button. The Volume Function will appear in the Function Row to the right of the Audio Function. Activate the **Volume** Function and select a port to adjust its volume.

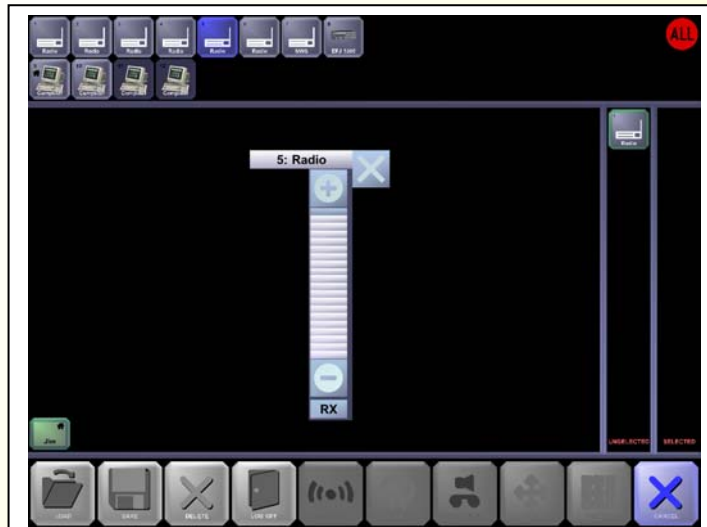



Figure 2.7 – Volume Control per Asset

Adjust the volume by using **plus/minus controls** or by **selecting the desired level**. Modifying this value will change how loud the receive audio is for that port.

2.09 Private Connections

Private Connections allow two **Virtual or Physical Ports** to be linked together in a **priority communications network**. This function is used when members of different Talk Groups request a connection to another port while continuing to listen to their current Talkgroup.

Create a Private Connection

1. Select the **Talkgroup Function**.
2. Activate the **Private Function**. 
3. Select the **Gateway Ports** to be connected.
4. Confirm the private connection by deselecting the **Private Function**.


Private connections are represented by a color coded circle within the corresponding gateway icons.

To remove a private connection activate the Private Function, select one of the ports within the private connection, disable the connection by confirming the Private Function.

2.10 The Talk Pedal Function

An after-market talk pedal may be used to trigger the push-to-talk feature within RIOS GUI. With this configuration the dispatcher can depress the talk pedal to transmit through the selected ports.

Connect a Talk Pedal

1. Connect the Talk Pedal to ComPort2 on the RIOS I/O Chassis.
2. Activate the **Talk Pedal Function**. 
3. Select the desired **Gateway Ports**.
4. Confirm the talk pedal by deselecting the **Talk Pedal Function**.

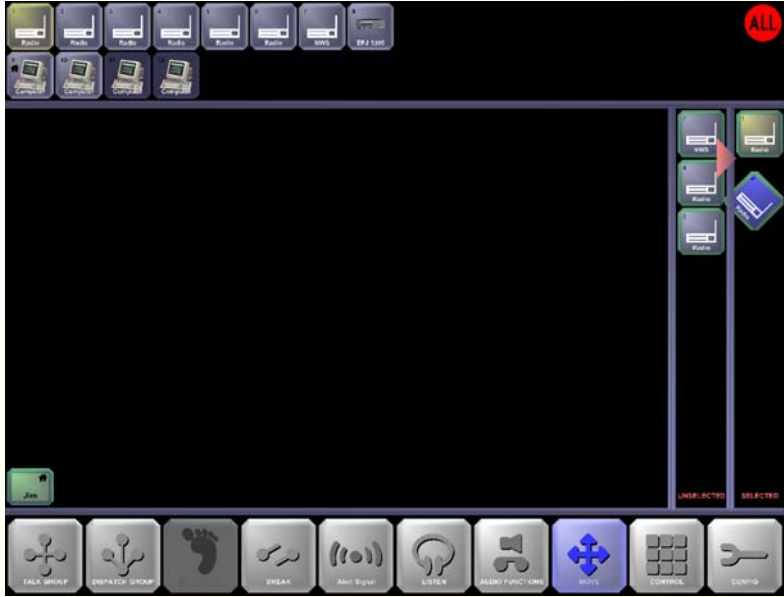
Gateway Ports with the talk pedal applied will be highlighted in gold.

The Talk Pedal in Dispatch Mode

Upon request Sytech the client can be installed in dispatch mode. This allows h ports to be activated by the foot pedal by being in selected.

Connect a Talk Pedal

1. **Move to Unselected Column** by selecting listen function then desired port and selecting the listen function again.




2. **Move to Selected Column** by selecting the move function and dragging the desired port from the unselected to the selected column. (port should then turn yellow denoting that it is selected for Talk Pedal use)
3. The selected asset will now key up when depressing your Talk Pedal.

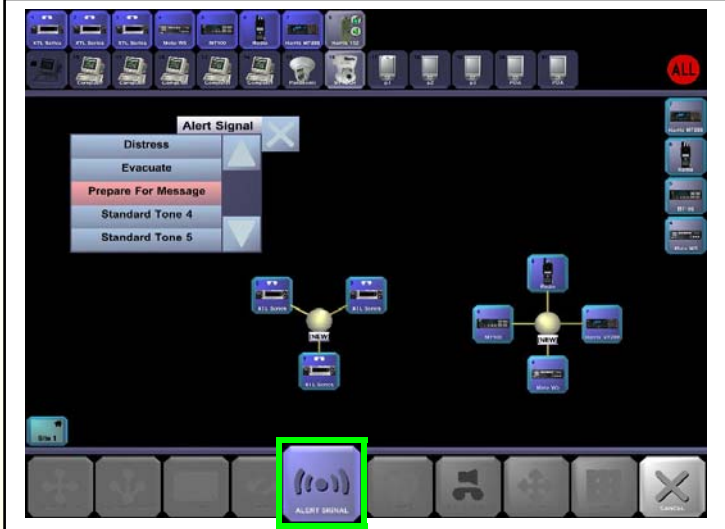
The Universal Control Head can also select or deselect an asset using the SEL button, see section 4.04 for details.

2.11 Alert Signals

Alert Signals allow the user to send customized recording through one or more ports. The user may copy .wav files into the C:\Program Files\RIOS \AlertSignals Folder as desired.

Send an Alert Signal to Multiple Radio Ports

1. Activate the **Alert Signal** Button. 
2. Select the **Gateway Port** to receive the alert. The user can select individual gateways or the center node of a Talkgroup. Gateways that will receive the alert will turn blue.



The screenshot shows the RIOS graphical user interface. At the top, there is a row of various device icons. Below that, a menu titled 'Alert Signal' is open, listing options: 'Distress', 'Evacuate', 'Prepare For Message' (highlighted in pink), 'Standard Tone 4', and 'Standard Tone 5'. In the background, a network diagram shows several nodes connected to central hubs. At the bottom of the interface, a row of buttons is visible, with the 'Alert Signal' button (containing a speaker icon) highlighted with a green rectangular box.

Figure 2.11 – Alert Signals


3. Select **the tone** from the Alert Signals Menu. The selected tone will highlight in pink as in **Figure 2.11**.
4. Confirm the tone by deselecting the **Alert Signal**.

2.12 Dual Tone Paging

Dual Tone Paging allows the user to send a preset page through a properly programmed and connected radio entry point. The Paging Module within RIOS is a software upgrade and requires licensing for the availability of this feature.

Pages can be authored by accessing the Paging Window using the Control Function and selecting the Paging Function. SyTech recommends that only RIOS administrators have authoring permissions. This authorization can be configured within the RIOS UserEditor found in the RIOS Folder located in Program Files.

Author a Dual Tone Page

1. Select the **Control** Function. 
2. Select the **Page** Function.
3. The Paging Menu will appear. From the Pages Column, select **New**.
4. The Page Properties window will appear as shown **Figure 2.12**. **Input** the appropriate settings. More detail on these setting is provided on the following page.

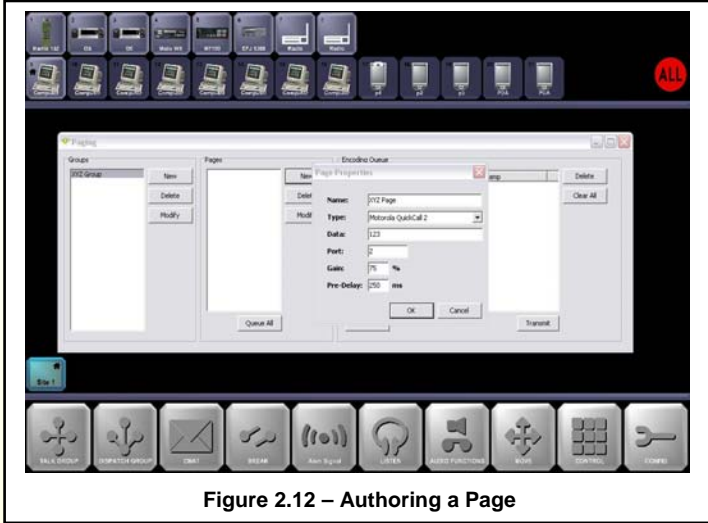


Figure 2.12 – Authoring a Page

5. Select **OK** and the Page will appear in the Pages Column.


Page Settings

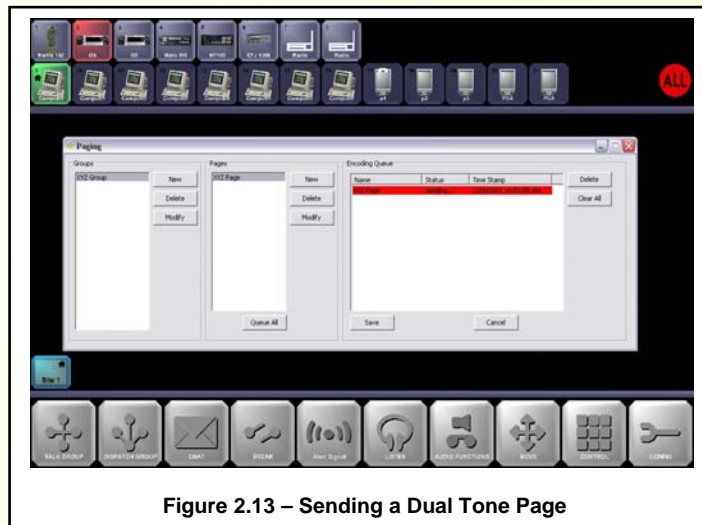
Type: Allows the user to select the protocol for the page. In most cases Motorola Quick Call 2 is the standard that is used.

Gain: Allows the user to set the amplitude of the tone or level as it is sent from RIOS. Usually, this number should be between 50 or 75 or so. However, the number will have to be determined by testing the radio that the page will be used on. Each radio channel will vary slightly and the final number will be determined by actual use of the page tone.

Pre Delay: Allows the user to set the delay time between when the radio is key and when the page is sent. If you are passing the page through a repeater system you will need a longer delay than if the page is going out on a simplex channel. It takes about 250 to 300 milliseconds of delay to allow for the radio to be keyed, come up to power, have the receiver at the repeater detect the signal, decode the CTCSS tone, key the repeater and pass the audio. SyTech recommends starting at 250 and test if the system passes the tone correctly.

Sending a Dual Tone Page

1. Select the **Control** Function. 
2. Select the **Page** Function.
3. The Paging Menu will appear. From the Pages Column, **double click the page(s)** you wish to send.
4. Within the Encoding Queue the page(s) will appear. Select **Transmit** and the page(s) will be sent as shown in **Figure 2.13**. While the pages are transmitting, the port will turn red.




After the page is sent, the port that sent the page will flash red for five seconds. After the page is complete, the dispatcher can PTT to the asset.

2.13 Activity Log

The Activity Log within RIOS allows the user to see a histogram of incoming and outgoing voice communications. The Activity Log includes Instant Recall capability by allowing the user to double click on the activity to hear the recent transmission and receptions within RIOS.

Please note that the Activity Log resets after it is closed. For long-term activity recording, SyTech recommends the RIOS Playback Module option for the RIOS Gateway.

Using the RIOS Activity Log

5. Select the **Control** Function. 
6. Select the **Activity Log** Function.
7. The Activity Log will appear will appear as in **Figure 2.14**. As activity occurs, the log displays all ports involved in the communication.

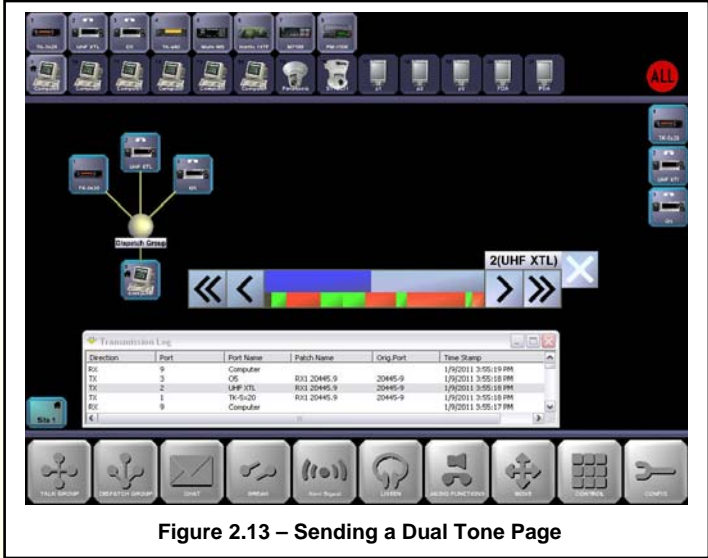


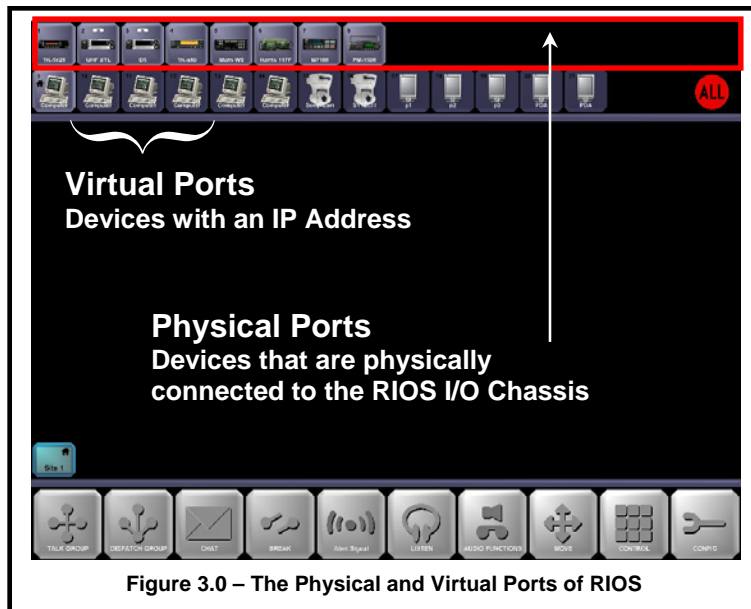
Figure 2.13 – Sending a Dual Tone Page

8. To replay a message, simply double click on the activity and the Instant Recall Menu is retrieved for that individual port. The Instant Recall timer is set to store the last two minutes of TX/RX voice.

Gateway Management

3.00 Understanding Gateways

A “radio entry point” or “gateway” device refers to a single, physical communications device capable of sending and receiving data within its base network. Within the RIOS GUI, gateway devices are represented on-screen as Physical Ports. For devices that connect with an IP address, Virtual Ports, are displayed in second row of RIOS Ports as shown in **Figure 3.0**.



Connected to the RIOS I/O chassis, gateway devices act as a go-between for dissimilar communication networks. Hence, **RIOS must have one gateway device for each network it attempts to incorporate**. For example, if the operator wishes to communicate within the VHF, UHF, or 800 MHz frequency bands, the operator must connect one gateway device from each frequency network. Because of this functional requirement, proper gateway connection and configuration are vital to effective interoperability.

RIOS Gateway Ports are configurable to a variety of devices including standard radio, Nextel Push-To-Talk, PSTN, cellular, satellite phones and IP clients such as computers, VoIP phones as well as legacy-card devices such as the Raytheon/JPS ACU-1000.

Section 3, *Gateway Management*, describes how to connect, load and configure Gateway Ports for effective interoperability.


Gateway Devices and the Configure Function

The Configure Function allows the RIOS users to load gateway devices, select Virtual Control Heads, adjust high-level gateway parameters, and perform simple tasks such as volume control, audio output designation, and user log off. The following section relies upon the use of the Configure Function.

3.01 Loading Assets

The Configure Function allows the user to designate Gateway Ports as general devices, such as generic radios and landline, load specific device profiles enabling **Universal Control Heads (UCH)**, or disable Gateway Ports.

Loading a Non-Generic Radio

1. Activate the **Configure** Function. 
2. Select the **Physical Port** that will receive the new profile. The Configure Menu will appear as in **Figure 3.1**.

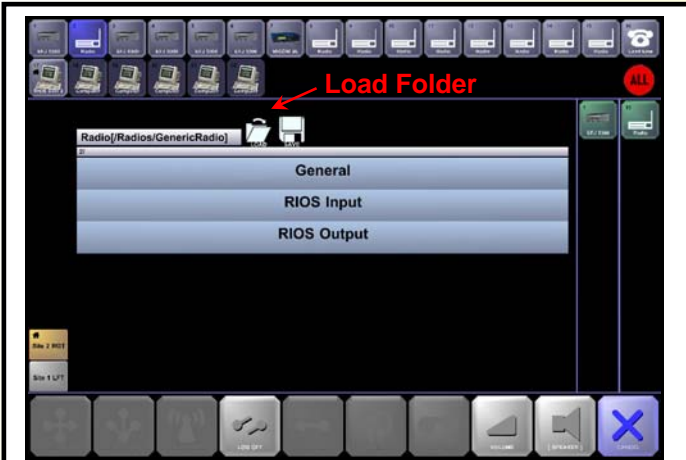


Figure 3.1 – The Configure Menu

3. Select the folder icon titled "**Load**". The Load Profile menu will appear.
4. Select **Radios** as the type of device to be loaded.
5. If your RIOS package included Universal Control Heads, select the desired folder icon.
6. RIOS will insert the loaded radio icon into the Physical Port.

3.02 Connecting a Walk-Up Radio

All gateway devices are connected to the RIOS I/O chassis via high-density 26-pin male connectors. Most RIOS packages ship with integrated radios and the requisite gateway cabling as specified by the customer. In addition to the standard RIOS package, a cache of frequently-used cables may also have been purchased to support the possibility of walk-up radios.

A variety of connection methods exist when dealing with walk-up radios at an incident site. For agencies that wish to interoperate, the quickest method of interoperability is to switch all radios to the local, regional or national interoperable frequency. However, due the demands of some agencies, this option may not be available. Instead, **the agencies requesting interoperability can provide a single device**, for example a handheld UHF radio, **to act as a gateway into the agency's frequency network**. After connecting the walk-up radio to RIOS, the operator can patch communications within the device's native network to their own network.

In the event of a radio without a cable, the operator may choose to program the base-station radio to match the frequency of the walk-up. Consult the radio manufacturer for frequency programming.

SyTech maintains an inventory of radio cables. If timing permits, contact your SyTech representative for cable availability and purchasing options.

Connect a Walk-Up Radio

1. **Test** the validity of the handheld device by transmitting and receiving from a second radio within the device's native network. Confirm signal strength and power.
2. **Locate** the appropriate cable from the cable cache.
3. **Attach** the HD 26-pin connector to an open port on the RIOS I/O Chassis. Fully tighten the thumbs screws as shown in **Figure 3.2a**.

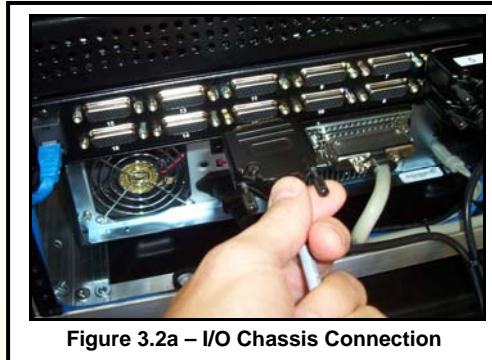


Figure 3.2a – I/O Chassis Connection

4. Firmly **connect** the radio-receiver end of the cable to the microphone port on the walk-up radio as shown in **Figure 3.2b**.



Figure 3.2b – Handheld Gateway Connection

5. If the walk-up radio is connected to a port with a generic radio loaded as the Gateway Port, **key the second radio** to test for connectivity. If the radios are connect correctly and set to the same channel, the Gateway Port will turn **GREEN** when the second radio is keyed.

If the Gateway requires configuration **proceed** to the next section for instruction configuring walk-up radio.

Configure and Confirm a Walk-Up Radio

1. After connecting the walk-up radio, activate the **Configuration** Function.
2. Select the **Gateway Port** that corresponds to the walk-up radio.
3. The Configuration Window will appear. Select "**Load**" folder from the top of the Configuration Window.
4. The Load Profile Window appears. Select the **Radios** row followed by the profile type of the walk-up radio. If the profile was not purchased, select **GenericRadio** from the list. A radio icon will appear in the configured gateway.
5. **Key the second radio** as in **Figure 3.2c**. If the icon turns **GREEN** the walk-up radio and the device network are now connected to RIOS. If the gateway doesn't light green, check the channels, cables and configuration.



Figure 3.2c – Keying the Second Radio

6. **Create a Talkgroup** to test for network connectivity. The receiving port will turn **GREEN** while the transmitting port will turn **RED**. Test for audio connectivity.

3.03 Telephony Gateways - Connecting and Dialing

A variety of telephony devices can be connected to the RIOS I/O Chassis. The following subsections briefly describe the connection methods of PTSN, Cellular, and VoIP gateway options.

PTSN Gateways

Connect a standard analog telephone line to RIOS by connecting the two-wire PTSN cable to the RIOS I/O chassis. Plug the PTSN cable into to a functioning wall jack. Configure the corresponding Physical Port by selecting Configure, Load, Phones, and POTS. RIOS will load the POTS icon into the Physical Port.

RIOS can send and accepts calls using this line. When RIOS receives a call, the port will ring and flash red. Answer the call by selecting the port. An answered call will appear in the Listen Column.

Cellular Gateways

A cellular phone connected as a gateway will allow all cellular users within any cellular network to call into RIOS. Cellular gateways can be extremely usefully, allowing non-radio personnel to communicate within radio networks. Cellular gateways, however, can be a challenge as most cellular phone makes and models require a unique cable. If your agency requires an cellular phone cable contact SyTech for purchasing details.

In an effort to support cellular and Push-to-Talk devices, many RIOS Packages ship with Nextel Gateway cables. If available, the RIOS operator can connect and load the Nextel Push-to-Talk profile by selecting Configure, Load, Phones, and Nextel. RIOS will load the Nextel icon into the Gateway.

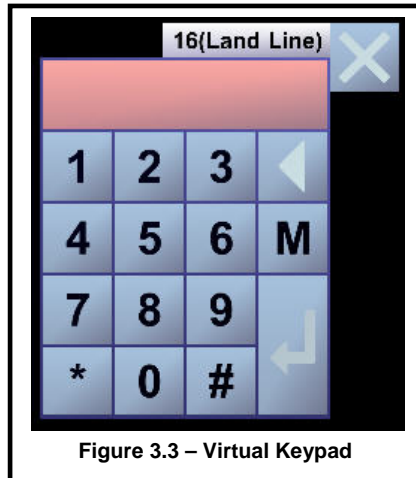
VoIP Gateways

Integrated RIOS packages may connect to a telephony backhaul by connecting the RIOS PTSN cable into a call managing router. With this arrangement, the user should configure the corresponding Gateway Port to POTS line and call out with standing VoIP call structure.

For example, if the router offers port 90 as a telephony plug-in, remote users may call into RIOS by dialing the ten digit access number of the VoIP server (703-654-06xx), and, when prompted, entering the router extension (101), followed by the port number, in this case port 90.

The **RIOS Virtual Keypad** can be used for the dial service of PTSN, cellular, satellite and VoIP phones.

Start the Keypad Control by activating the Control Function and selecting a Port that has a telephony device connected. The Virtual Keypad will appear as in **Figure 3.3**.



The operator is able to enter a phone number, private or group ID number of the party, group, or agency they wishes to call. Once the number is entered, pressing the return key will initiate the call.

The display at the top of the keypad will display the call status. Once the call is active it can be placed into a Talk or Dispatch group.

The “M” key on the keypad when pressed will open a Phone book which will allow you to save phone numbers and access the last dialed numbers.

3.04 DSP2 Card Ports

RIOS IP Ports can be configured to communicate with DSP2 card ports such as the Raytheon JPS ACU-1000. With this configuration each IP Port represents a module card of the interoperating device. RIOS allows the user to load the “ACU” profile and set the IP Port address to the IP address of the corresponding module card. Figure 3.4 displays an ACU configuration menu of a loaded ACU profile.

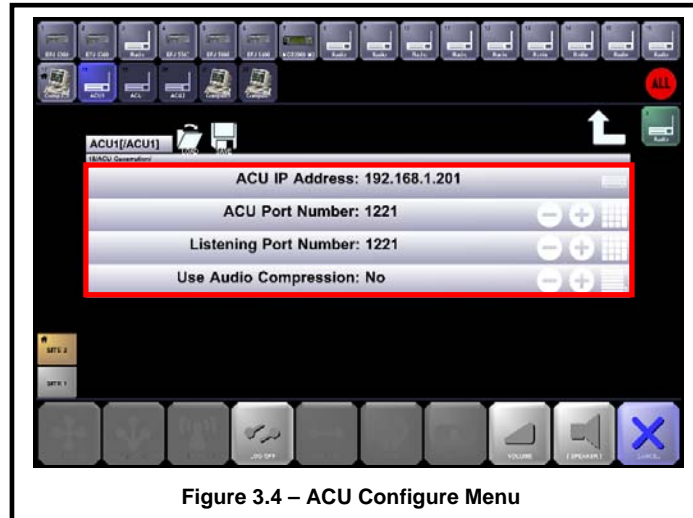


Figure 3.4 – ACU Configure Menu

3.05 Remote Connection with DTMF Devices

RIOS users have the ability to create Talkgroups from DTMF radios and landlines.

Create a Talkgroup from a connected DTMF radio by selecting the Configure Function, General, and enabling Remote Connect. Key the DTMF radio while pressing the “*” key. Release. RIOS will respond “Please enter the destination code followed by the pound key.” While keying the radio, press the number key of the corresponding physical port followed by the “#” key. Release. RIOS will connect the gateways and respond, “You are now in a Talkgroup.”

Create a Talkgroup from a DTMF landline by selecting the Configure Function, General, and enabling Remote Connect for the PTSN Gateway Port. Dial the corresponding phone number of the established PTSN Gateway Port. When prompted, input the User ID followed by the pound key. Next, enter the destination code (Gateway Port number) followed by the pound key. RIOS will connect the gateways and respond, “You are now in a Talkgroup.”

3.06 Saving and Loading Presets

Presets allow the user to save and reload local groups and configurations based on likely situations and scenarios.

Save a Preset Configuration

1. After arranging a configuration, select the **Configure** Function.
2. Select the **Save** button that appears in the Function Row.

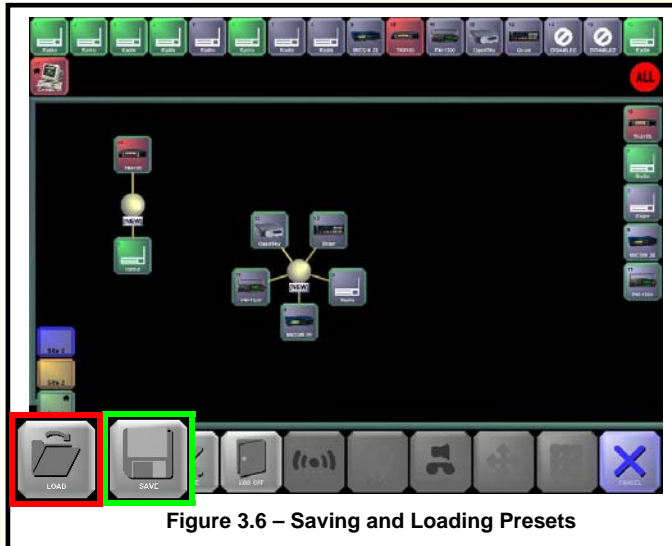


Figure 3.6 – Saving and Loading Presets

3. Select the **+** sign to open the keyboard control. **Type the name of the Preset to be saved.** Select **Enter**

Load a Preset Configuration

7. Select the **Configure** Function.
8. Select the **Load** Button from the Function Row. Previously saved presets will be available. Select the **desired preset**. RIOS will load the configuration along with the corresponding local attributes such as the Listen Column and Radio Channels and Frequency.

Presets are intended to be used on the local level only and not with wide-area assets. Delete presets by selecting the Delete button followed by the Presets to be erased.

3.07 Configuring Port Audio

Configuring a Physical or Virtual Port refers to the customization of gateway parameters to deliver the highest quality audio while offering the operator highest level of control. The three main setting categories within the Configure Function are **General**, **Input** and **Output** as shown in Figure 3.6. The three categories are described as follows:

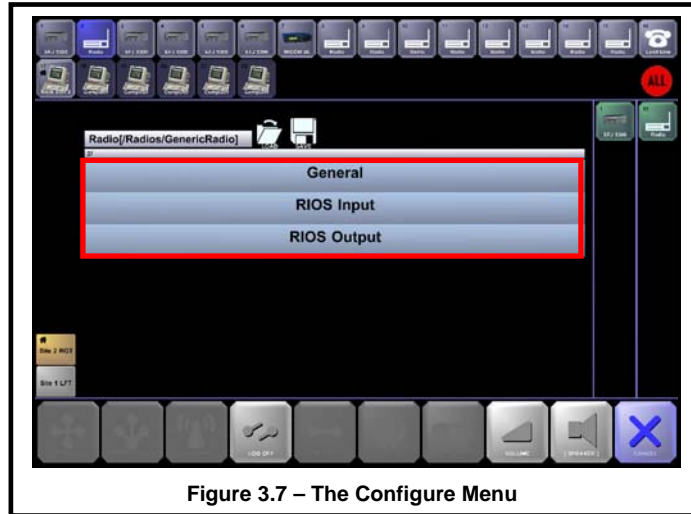


Figure 3.7 – The Configure Menu

1. **General:** Selecting this menu item will allow the operator to name the port. A keyboard appears on the monitor screen. From here the operator has the option of renaming the port to reflect the gateway device attached to it or the name of the Agency Network associated with the gateway device, such as Police, Fire, or EMS. Other General options include the ability to select a gateway device to Receive Audio only, Transmit Audio only or Receive and Transmit Audio and turn on the Secure Connection Reminder.
2. **Input:** The RIOS CTI Board refers to the physical device within the RIOS Server that converts analog audio signals into digital pulse code modulated (PCM) data streams. The CTI board creates events, performs certain tasks, and makes certain decisions based on the Input parameter values entered. **Both Input and Output are from the perspective of the CTI Board.** Input options are described as follows:
 - A. **Gain:** Use this function to set the gain level going into the CTI channel. Raising the volume on the gateway device will have the same effect as increasing the Input Gain. It is recommended to first adjust the gateway device volume level to mid-range and then adjust the Input Gain to a comfortable listening level. Any changes to the Gain Setting **MUST** be done prior to the adjustment of VOX settings.

- B. VOX Level: This option is used to set at what audio level, on the leading edge, the VOX will trigger on. An incoming signal must be above this parameter setting to be considered a valid signal. If a remote radio is transmitting and the RIOS is not indicating a receive signal, lower the Trigger On Level, raise the gateway device volume control, or raise the gateway input gain in the RIOS Input menu. If the RIOS is having frequent faults triggers, raise this level.
 - C. VOX On Time: This is used to determine the duration of the VOX signal to be considered valid. An incoming signal must remain above the Trigger On Level for this time duration to generate a VOX Activated event.
 - D. VOX Off Time: An active signal must fall below this parameter value in order to be considered an end of signal. This parameter is normally set to the same value as the VOX Trigger On Level.
 - E. Pre Buffers: This parameter tells the RIOS to buffer the selected number of 40ms blocks of audio. Buffering is required to ensure that the first couple of syllables of the audio transmission are not lost due to other time delays such as VOX On Time.
- 3. Output:** These parameters tell the CTI board to perform certain functions on the signal leaving the board. The settings accessible to the operator for adjustment of audio quality are as follows:
- A. Gain: This is the gain setting going to the Gateway radio microphone input. The CTI card can raise or lower the signal level out the CTI channel. Raising the volume at the remote radio will have a similar affect.
 - B. Echo Suppress Time: The CTI board is a full duplex device. As audio comes in on the receive side, crosstalk puts some of the signal on the transmit side. The Echo Suppress timer stops the VOX from activating until the timer has expired.
 - C. Delay Time: This setting is the amount of time RIOS will listen for acknowledgement tones during which time all incoming audio is buffered. If not received the audio is dumped and the process is reset.
 - D. Acknowledgement Tone Threshold: This parameter provides the time measurement the CTI board uses to determine if the ACK tone reply is long or short. The CTI board starts a timer when it detects the ACK signal. If the ACK signal is shorter than the ACK Tone Threshold, the RIOS will start sending the buffered audio. If a long tone or series of short tones is detected, the RIOS will understand this to be a negative ACK and the audio buffers will be discarded.

3.08 Gateway Permissions

Gateway Permissions allow sites to grant and deny monitor and connection rights to remote RIOS Sites. For Wide-Area RIOS Systems, monitor rights are denoted with a speaker icon within the icon while connection rights are illustrated with a lock/unlock icon.

Edit Monitor and Connection Rights

1. Activate the **Configure** Function.
2. Select the **Gateway Port** that to edit rights. The Configure Menu will appear as in **Figure 3.8**.

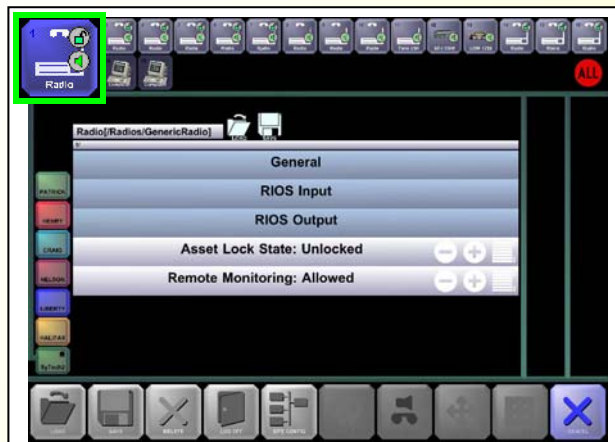


Figure 3.8 – Editing Monitor and Connection Rights

3. The user has the ability to toggle among **“Unlocked”**, **“Lock”**, and **“Unlocked (temp)”** for connection rights. Unlock **“temp”** will allow a remote site to connect once before the asset will return to the locked position.
4. The user has the ability to toggle among **“Allowed”** and **“Not Allowed”** for monitoring right.
5. Confirm the desired state by selecting the **Config Function**.

3.09 SIP Profiles

The Sessions Initiated Protocol Profile provides a profile-interface means to a variety of Voice over IP devices. When deal with SIP, RIOS requires a SIP server which, depending on type of configuration requested, can run internal to the RIOS Server or remotely from a SIP providing service.

SIP Devices load as Virtual Ports (second row) within RIOS. The user can designate a Virtual Port to be a SIP device using the Configuration Function as described in Section 3.01.

Once the Virtual Port has been loaded as a SIP device, the profile will be able for configuration as shown in Figure 3.9a, *The RIOS SIP Menu*.

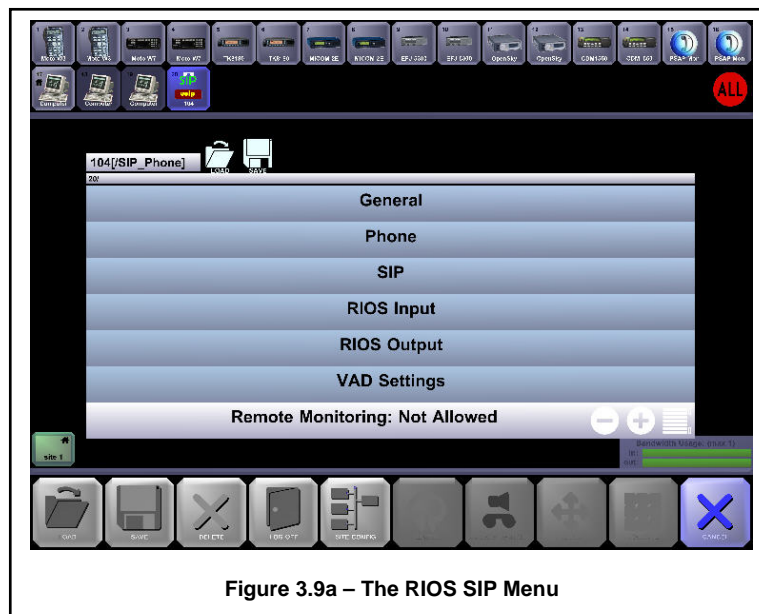


Figure 3.9a – The RIOS SIP Menu

For the most part, the available configurations are unchanged from other profiles. The main differences are The RIOS SIP Setup Menu and The RIOS SIP VAD Menu.

The RIOS SIP Setup Menu shown in Figure 3.9b, provides the setup configurations for working with the SIP server where User-ID/EXT refers to an extension location of a SIP enabled device; simply put, the phone number of the device.

The password and server address refer to the SIP server location. The user should not have to adjust Packet Reordering.

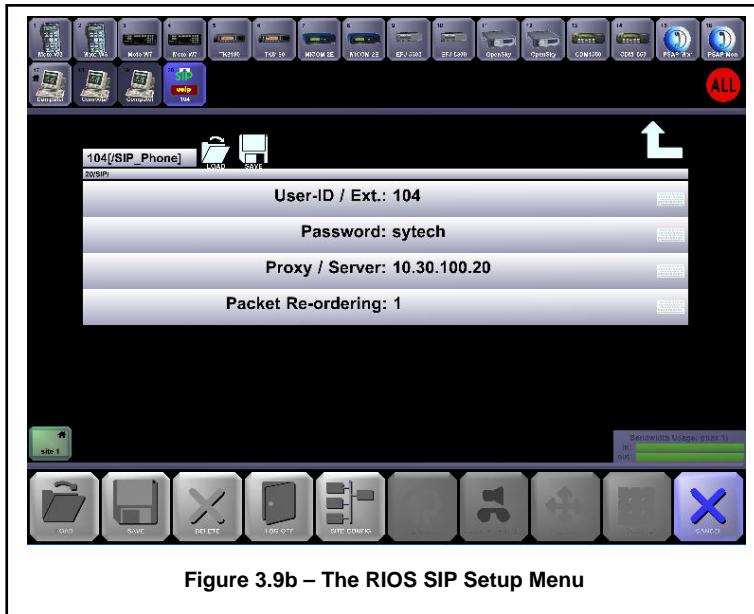


Figure 3.9b – The RIOS SIP Setup Menu

The RIOS SIP VAD Menu provides the configuration interface to adjust the SIP profile's voice activity detection settings.

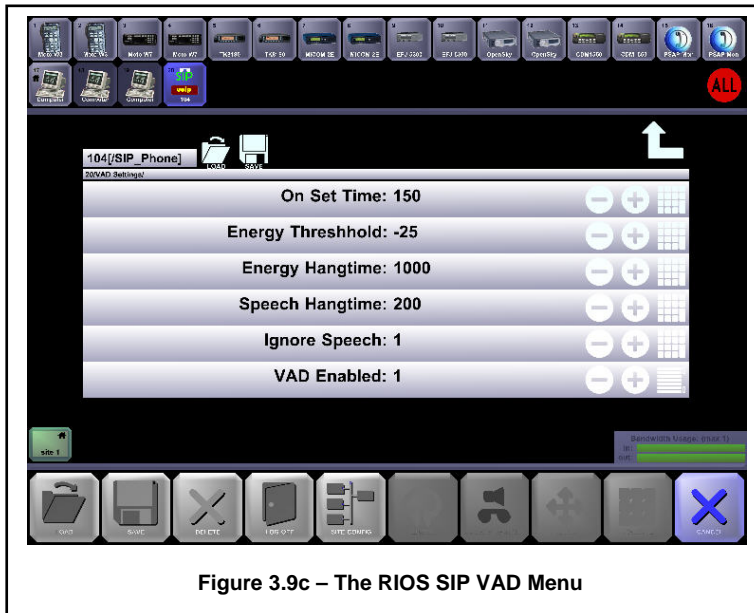


Figure 3.9c – The RIOS SIP VAD Menu

The RIOS Wide-Area Network

4.00 Understanding the RIOS Wide-Area Network

By converting voice and data signals into digital IP packets, RIOS is capable of routing radio communications to remote RIOS networks. This configuration is referred to as RIOS Wide-Area Network.

The technique of utilizing TCP/IP networks to transmit voice and data offers a heightened degree of redundancy and cost effectiveness over traditional tower/repeater forms of radio communication systems. The implementation and proper use of The RIOS Wide-Area Network can provide a reliable, easy-to-use interoperated radio network unlimited by physical terrain and distance.

RIOS uses the same graphical-user interface for both Local and Wide-Area Radio Interoperability. Global assets of remote RIOS networks are accessed via the Multi-Site Column found on the left-hand side of the interface as in **Figure 4.0**.

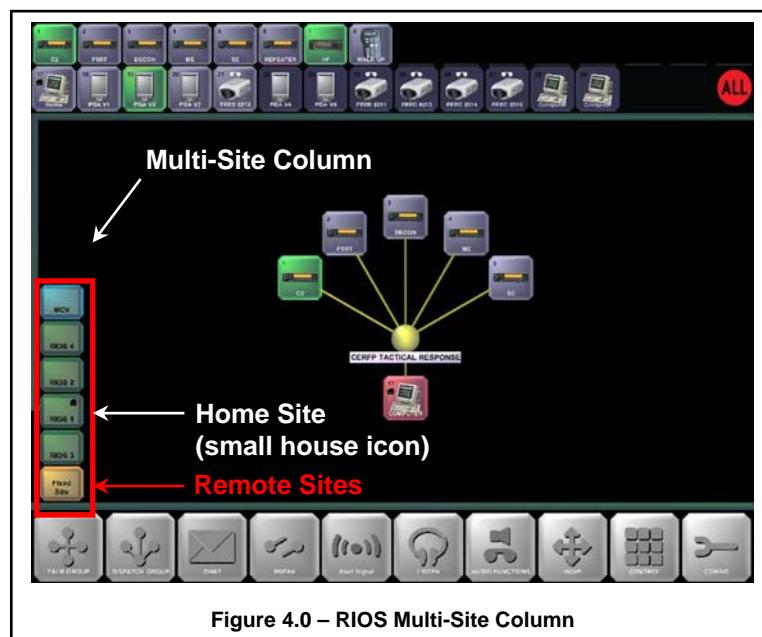


Figure 4.0 – RIOS Multi-Site Column

The home site of the local RIOS user is highlighted in green and displays a small house icon. On-line far sites are highlighted in blue and gold.

Change the display name of a site icon by using the Configure Function and selecting the icon to be changed.

4.01 Global Configuration: Building the Site List

Depending on the complexity of the communication network, the desired network arrangement may require configuration. Remote Sites are added to the Site list using the RIOS Global Configuration Application.

Build the RIOS Site List

1. Launch the **Global Configuration** Application from C:\Program Files\RIOS or by double clicking the Global Configuration shortcut. The RIOS Client Configuration Window will appear as in **Figure 4.1**.

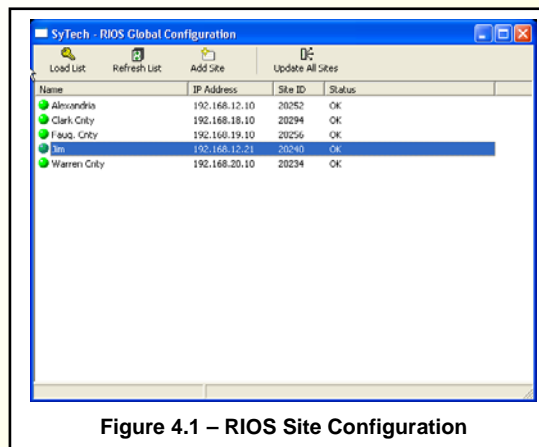


Figure 4.1 – RIOS Site Configuration

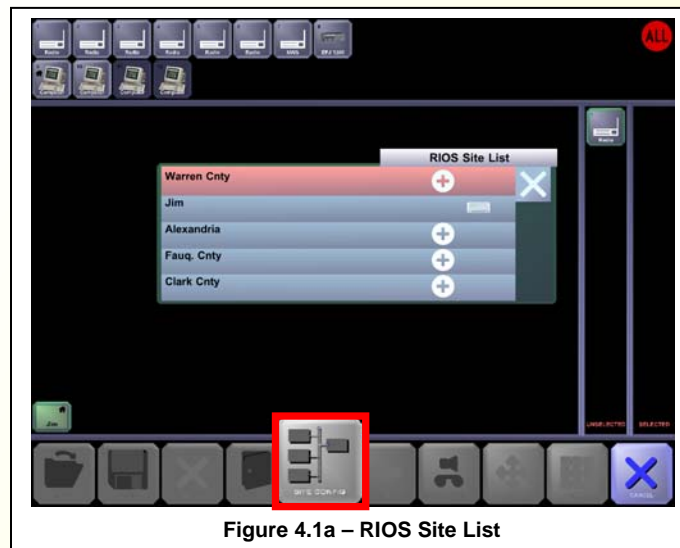
2. **Log on to your Home Site** by entering your home site IP address in the IP Address box and entering your home site logon in the user ID box.
3. **Add the Remote Sites** by selecting Add Site. Then enter the Remote sites name, IP address and Site ID in the appropriate box.
4. **Update Remote Sites** by Clicking Update All Sites.

4.01 Site Configuration: Adding to the Multi-Site Column

After updating your site list with all of the remote sites, you can add them to the Multi-Site column. In order to do this, you need to open up the RIOS Client from the shortcut on you desktop.

Build the RIOS Multi-Site Column

1. **Launch the RIOS Client** by double clicking the shortcut on you desktop and logon using the user ID for your home site.




2. Bring up your Site List by selecting the **Config Function** and pressing the Site Config Button
3. Add or Remove Remote Sites by selecting the **plus or minus icons** next to the desired site.
4. When Done press the **X** to close the window and cancel to the exit the RIOS Ste List menu
5. The New Multi-Site Should be located in the bottom left of your client screen.

4.02 Creating Wide-Area Groups

The methods of creating *wide-area* interoperability are identical to creating *local* interoperability within RIOS GUI. The basic fundamentals of Talk Groups, Dispatch Groups and other functions remain unchanged within the wide-area environment.

Create a Wide-Area Group

1. Activate the **Talkgroup** Function.
2. Select the **Gateway Ports from the Home Site**. 
3. Select the **Far Site** from the Multi-Site Column.
4. Select the **Gateways from the Far Site**.
5. Confirm the Talkgroup by deselecting the **Talkgroup** Function. A Wide-Area Group will appear as in **Figure 4.2**.

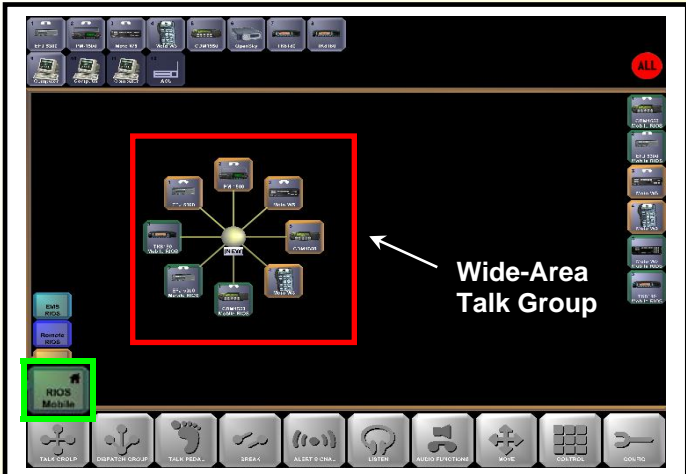


Figure 4.2 – RIOS Wide-Area Talk Group


By accessing RIOS remote sites from the Multi-Site Column, RIOS users can connect local radios and communication networks to remote RIOS Gateways Networks located anywhere in the world.

RIOS allows the user to determine site color to help identify which assets belong to which site. Change the site color by selecting Configure, followed by the Site you wish to change. Assets belonging to the Site will be highlighted with the corresponding color.

4.03 The RIOS Chat Feature

The RIOS Chat feature allows operators to send and receive text messages from within RIOS GUI. This feature can be highly useful during an incident as it allows remote RIOS users the ability to communicate off the air.

Send a Text Message with RIOS Chat

1. Activate the **Control** Function. The Chat Button will appear directly to the left of the Control Function.
2. Active the **Chat** Function. 
3. Select the **Local or Far-Site IP Ports** to receive the RIOS Chat Session.
4. Confirm the chat by deselecting the **Chat** Function.
5. Touch the **Text Input Window** of the chat session. An activated the window will turn pink as in **Figure 4.3**.

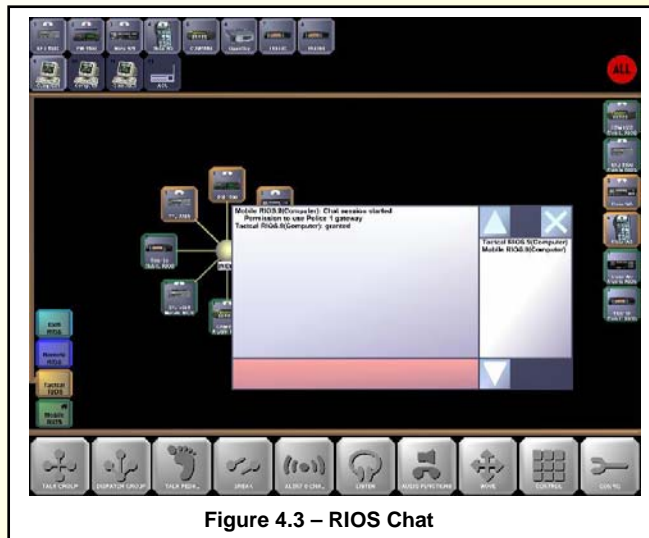


Figure 4.3 – RIOS Chat


6. **Type** your message and hit return to send.
7. **X-out** of RIOS Chat when session is complete.

The user can operate as many chat sessions as necessary. New RIOS Chat Sessions will begin at the same screen position for every new session. The user can move the chat window by dragging it anywhere on the screen.

4.04 Remote Radio Control (Universal)

Remote Radio Control allows users to remotely control previously purchased and loaded Virtual Control Heads for base-station radios. Control of the base-station radios can be performed locally or globally to adjust zone frequency and other pertinent radio settings.

Remotely Control a Base-Station Radio

1. Activate the **Control** Function. 
2. Select the **Gateway Port** of the base station with the corresponding Virtual Control Head. A VCH similar to **Figure 4.4** will appear.

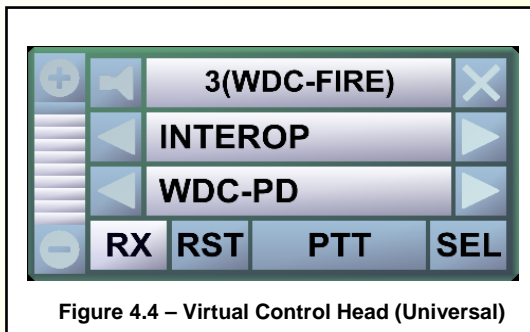


Figure 4.4 – Virtual Control Head (Universal)

3. The user can switch between radio zones (top row) and channels (bottom row) by **tooggling the arrow** to the right and left of the rows.
4. The user can utilize the programmed VCH buttons such as Reset, PTT, Sel(to select or unselect talk pedal use) and the Volume control on the left side(to change the volume on incoming signals).

If radio specific functions are required you can change the control head type in the port configuration under general options.

4.05 RIOS Network Connections

The RIOS SR-3000 models ships with two network cards. The “**Local Area Connection**” card is intended to connect to a protected IP network for use with Wide-Area RIOS. The associated IP address of the LAN connection is a static address allocated by user.

The “**RIOS Connection**” card is a **mandatory** static IP connection to the RIOS I/O Chassis. Any change to the IP configuration will disable all RIOS Gateway Ports.

The IP Address for the RIOS connection should always be 10.100.16.10 and appear as in **Figure 4.6**.

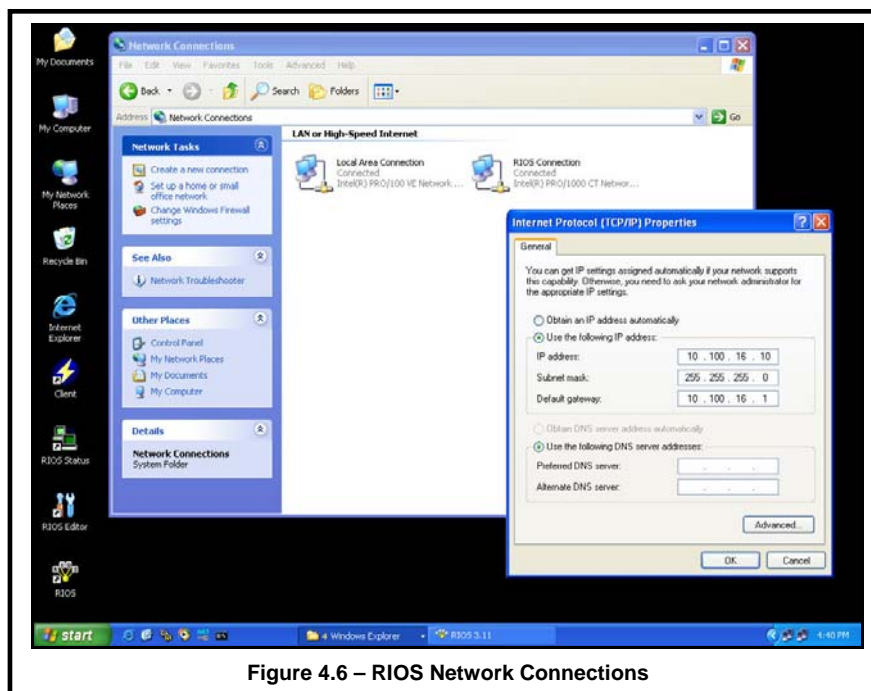


Figure 4.6 – RIOS Network Connections

The RIOS SRT ship with 2 network connections as well. However, with these models, both connections are available for connectivity and do not require specific assignment.

Please note that the RIOS Server and Client configuration file read this IP address, if the IP address is altered the corresponding configuration might need to be altered as well. For help with RIOS configuration settings please contact a SyTech representative to talk you through this process.

User Notes

RIOS Administration

5.00 General Administration

RIOS software upgrades, user IDs, user rights, network connections, and troubleshooting are discussed in the RIOS Administration Section. Though these topics are important, they are not necessary for the day-to-day operation of the SRT.

5.01 Upgrading RIOS Software

The user may elect to upgrade software as new versions of RIOS become available.

Upgrade the RIOS Software

1. Open the **Local Services** Window located on Window Taskbar (**Figure 5.1**). **Stop the RIOS Server Service** located at the top of the Services List.
2. **Uninstall** RIOS Client and RIOS Server using Control Panel, Add or Remove Programs.
3. Open the location of the new RIOS software. If an upgrade for Ai-Logix SmartWORKS is present, install the new drivers. The driver version for RIOS 3.13 should be SmartWORKS 3.7.0.
4. **Install RIOS Server** with the prompted defaults. RIOS Server must be installed before RIOS Client.
5. **Install RIOS Client** with the prompted defaults.
6. Copy and Paste the "**All Sites**" file to the C:\Program Files\RIOS Folder. This file must contain the correct site names and IP addresses of the RIOS Servers that will connect within the wide-area network (NOT REQUIRED ON MOST SYSTEMS).

Figure 5.1 displays the E:\Upgrade Folder and the C:\Program Files\RIOS Folder and their necessary components. Notice the All Sites file copied to the RIOS Folder.

7. Create new Desktop Shortcuts for **RIOS Client**, **RIOS Status** and **RIOS User Editor**. Paste these shortcuts to the Desktop and close the Folders.
8. **Create a shortcut for Global Configuration** by copying and pasting the RIOS Client Shortcut. Open the Properties of the shortcut. Set the Target to “C:\Program Files\RIOS” /mode:config. Hit Apply.
9. **Restart** the RIOS Server. Restarting will resume all Services.
10. After the server initializes, open **Site Configuration** and add the sites as discussed in Section 4.1. The user should see the sites from the All Sites file. Save the desired sites.
11. **Test** the new RIOS installation with available RIOS Servers.

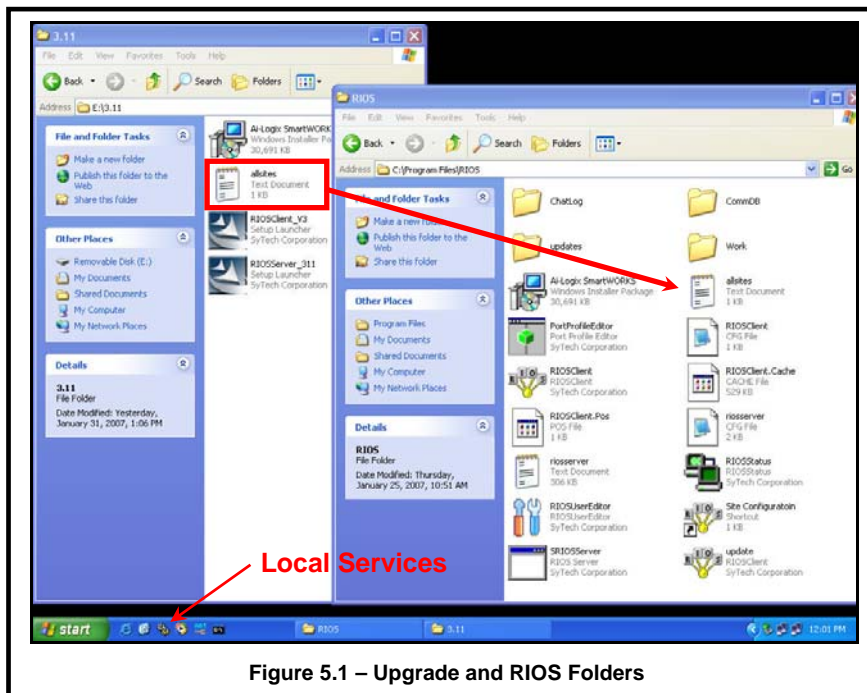


Figure 5.1 – Upgrade and RIOS Folders

5.02 Editing User Accounts

Access to user accounts can be achieved by starting the RIOS User Editor. This program can be found in the c:\ProgramFiles\RIOS folder. Once the program starts, you will need to login using an existing user password. Before a new user account can be setup, a group that the user will be assigned to needs to be established. Once the groups are defined, individual user accounts can be setup and assigned to specific groups.

Change a User ID by selecting the user from the group. The Name and User ID will appear to the right. Change the password and press Apply.

5.02.1 New Group

To establish a new group, press the New Group button and enter the desired name for the group. To edit an existing group, simply click on the group name. User rights are assigned to each group by placing check marks in the boxes next to each privilege in the list provided.

Do not delete the default group before creating a new group. If this happens you must contact SyTech to resolve this problem.

5.02.2 User Rights

Can Make and Break Connections

With this box checked, any member of this group will have access to the Talk Group, Dispatch Group, and Private buttons on the RIOS display. If the box is unchecked, these buttons will not appear on the display when the user logs on. The Break button will be limited to removing gateways from the Listen column or logging out of the RIOS.

Can Control Recording

This provides access to the Record button if the recorder option was installed.

Can Arrange Screen

Allows users to access to the Move button for the purpose of repositioning Talk/Dispatch Groups displayed on the screen.

Can Go To User Setup

Allows users to access the Configure button for changing gateway parameters. This capability should be restricted to administrators.

Can Use “RIOS Client”

Members of this group with this privilege can control the RIOS Server remotely. The RIOS GUI software provides the interface to the RIOS server. This software can be used on any computer connected to the RIOS server through a TCP/IP network connection. The software licensing determines how many simultaneous RIOS Clients can be logged on the RIOS server. When multiple RIOS Clients are logged on, any changes made by one Client will be mirrored on all Client screens.

Can Initiate Chat Sessions

This privilege allows the user to initiate a chat session using RIOS Chat. If the user does not have this privilege the user will be able to receive and reply to messages but unable to start chat sessions.

Can See Playback Client

This privilege restricts the use of ADACS Playback within RIOS GUI. The user can record Gateway Ports without the Playback Client.

Can Dial In and Use Voice Prompt

This privilege only applies to phone gateways and will only take effect if the phone gateway is configured to “Accept Incoming Calls” and the “User Identification” is set to “YES”. When a remote user dials the RIOS phone number, the RIOS will request the user enter their User Identification number. Even if the user has a valid User ID number, the RIOS will deny access unless this privilege is checked. If the user has this privilege, the RIOS will ask for the Identification number of the gateway to connect with.

Can Transmit

This privilege restricts the user from being able to transmit through the RIOS Client

Can Load Presets

This privilege allows the user to load preset radio profile configurations

Can Save Presets

This allows the user to save any current profile configuration they have set.

Can Send Alert Signal

This privilege allows the user to use the alert signal function

Can See Bandwidth Indicator

This privilege allows the user to see a bandwidth indicator which shows how much bandwidth RIOS is using.

Can Use Global Configuration

This privilege allows the user to use the Global Configuration tool.

Can Control Mic Volume

This privilege allows the user to change the mic volume settings in the RIOS client

5.02.3 Creating a New User

To establish a new user account, highlight the group the new user will be assigned to and then press the New User button. Fill in the User Name and Identification Number.

This will be the number the user will use to logon the RIOS. The RIOS is delivered with a default user ID of "1".

5.02.4 Delete

Highlight the user or group to delete and then press this button.

5.02.5 Global Rights

Asset Configuration

Asset Configuration allows the local user to configure remote gateways. With this privilege disabled, the local user will see darkened gateways while attempting to configure remote gateways. The three levels of Asset Configuration are "Disabled", "Only Local Assets", and "All Assets" (Default).

Control Window Access

Control Window Access allows the local user to control remote gateways. With this privilege disabled, the local user will see darkened gateways while attempting to control gateways. The three levels of Asset Configuration are "Disabled", "Only Local Assets", and "All Assets" (Default).

"All" Call Scope

Allows the administrator to select how the All Button will transmit. Choose between "All Assets of Local Site Only" or "All Assets on all Sites" to receive an ALL Button transmission. The default selection is "All Assets on all Sites".

5.03 Troubleshooting RIOS

This section is intended to provide aid for correcting the most common problems encountered while operating RIOS. If the problem persists after going through these procedures, please call SyTech's RIOS Tech Support at 703-941-7887.

Mode	Symptom	Solution
Start Up	The computer appears to freeze during the boot process for about 30 seconds and then continues on.	Verify the HardLock device is properly attached to the parallel port on the server
	The RIOS Login keypad does not appear after double clicking the RIOS Client icon.	Verify the HardLock Device is properly attached to the parallel port on the server. Verify that the RIOS Client software is not already running but minimized. Verify the "Shortcut to RIOS Client" icon is properly addressed to C:/ADACS/BIN/RIOS.
Operation	Radio does not key when the gateway button is pressed.	<p>Verify the gateway device and RIOS Power Module are turned on.</p> <p>Verify the gateway device is connected to the correct I/O module port.</p> <p>Verify the gateway device is using the correct cable.</p> <p>Check the CAT5 cable between the I/O Module and the 8-port Switch and the RIOS Server and the 8-port Switch.</p> <p>Verify Windows LAN connection is enabled.</p> <p>Verify the RIOS sees the serial port by pressing</p> <p><Configure>, gateway, <Status>, <Serial>.</p> <p>Verify that the RIOS can key the radio by pressing <Configure>, gateway, <RIOS Output>, <PTT>.</p> <p>Verify that Windows can see</p>

		the I/O module by pressing <Start>, <RUN>, "CMD", "ping 10.100.16.20".
	Server can transmit on gateway radio but remote radio does not receive.	Verify the radios are functioning properly by disconnect the gateway radio and performing a voice check with the remote radio. Verify the RIOS microphone connection. Increase the RIOS output by pressing <Configure>, gateway, <RIOS Output>, <Gain>.
	Remote radio transmits but gateway radio does not receive (no Rx LED).	Verify the radios are functioning properly by disconnect the gateway radio and performing a voice check with the remote radio. Lower the RIOS VOX trigger level by pressing <Configure>, gateway, <RIOS Input>, <VOX Trigger Level>. Increase the RIOS input gain by pressing <Configure>, gateway, <RIOS Input>, <Gain>.
	The first syllable of every voice transmission is lost at the remote radio.	Verify the radios are not going into a power saver mode. Increase the number of PreBuffers by pressing <Configure>, gateway, <RIOS Input>, <PreBuffers>.
Operation	The first syllable of some but not all voice transmission is lost at the remote radio.	Increase the number of PreBuffers by pressing <Configure>, gateway, <RIOS Input>, <PreBuffers>. Audio at the RIOS Server sounds clipped (i.e., "tinny"). Disconnect the gateway radio and performing a voice check with the remote radio to verify the radios are set to the appropriate volume levels. Increase the RIOS input gain by pressing <Configure>, gateway, <RIOS Input>, <Gain>.
	Audio at the remote	Disconnect the gateway radio

	end sounds clipped (i.e., "tinny").	and performing a voice check with the remote radio to verify the radios are set to the appropriate volume levels. Verify the RIOS Server microphone is at a proper distance from the speaker. Lower the RIOS output gain by pressing <Configure>, gateway, <RIOS Output>, <Gain>.
	VOX breaks when remote radio stops talking but radio is still keyed.	Verify that the gateway radio volume level is at mid-level. Decrease the VOX trigger level by pressing <Configure>, gateway, <RIOS Input>, <VOX Trigger Level>. Increase the RIOS input level by pressing <Configure>, gateway, <RIOS Input>, <Gain>.
	"Ping/Pong" between radios in a talk group.	Verify that the gateway radio volume level is at mid-level. Increase the Echo Suppression time by pressing <Configure>, gateway, <RIOS Output>, <Echo Suppression>.

