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# **ASTi**

## **PC'ver User Guide**

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Product Name: PC'ver User Guide

ASTi PC'ver User Guide

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ASTi

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# Table of Contents

<b>1.0. Introduction</b>	<b>1</b>
<b>2.0. System Requirements</b>	<b>3</b>
<b>2.1. Minimum Hardware Requirements</b>	<b>3</b>
<b>2.2. Minimum Software Requirements</b>	<b>4</b>
<b>2.3. Installation Procedure</b>	<b>5</b>
<i>Figure 1: PC'ver Installation Menu</i>	5
<b>2.4. Running the Application for the First Time</b>	<b>8</b>
2.4.1. Selecting the IP Address and Port for the PC'ver Stub	8
<i>Figure 2: IP Address Selection for the PC'ver Stub</i>	8
<i>Figure 3: Setting DIS LAN Options</i>	9
2.4.2. Selecting the IP Address and Port for the PC'ver GUI	10
<i>Figure 4: IP Address Selection for the PC'ver GUI</i>	10
<i>Figure 5: TCP/IP Filtering Properties</i>	11
<i>Figure 6: PC'ver Stub</i>	12
<b>3.0. Features</b>	<b>13</b>
<b>3.1. PC'ver Stub</b>	<b>13</b>
<i>Figure 7: Minimize PC'ver Stub</i>	13
<i>Figure 8: PC'ver Stub Icon</i>	13
3.1.1. Configuration Options	14
<i>Figure 9: PC'ver Stub Configuration Options</i>	14
<i>Figure 10: Operating Mode Options</i>	16
3.1.2. DIS LAN Options and User Host Control	18
<i>Figure 11: Enabling Host Control</i>	19
3.1.3. Self-test and Diagnostic Functions	20
<i>Figure 12: PC'ver Stub Host Communications</i>	21
<i>Figure 13: PC'ver Stub DIS Radio Comms</i>	22
<i>Figure 14: PC'ver Stub Self-Test</i>	23
<i>Figure 15: Self-Test and Diagnostics</i>	24
<i>Figure 16: PC'ver Stub Device Options</i>	25
<i>Figure 17: PC'ver Stub Audio Optimization</i>	26
3.1.4. PC'ver Stub Additional Information	27

<b>3.2. PC'ver GUI .....</b>	<b>28</b>
<i>Figure 18: PC'ver Enhanced version GUI on Windows XP .....</i>	<i>29</i>
<i>Figure 19: PC'ver GUI Push-To-Talk Selection .....</i>	<i>30</i>
<i>Figure 20: PC'ver GUI Icon .....</i>	<i>30</i>
<i>Figure 21: Host/Stub Comms .....</i>	<i>31</i>
3.2.1. Options Control .....	32
<i>Figure 22: PC'ver GUI Options .....</i>	<i>32</i>
<i>Figure 23: PC'ver Stub Configuration Options .....</i>	<i>33</i>
<i>Figure 24: Supported Radios and Intercoms for PC'ver Enhanced Version .....</i>	<i>34</i>
<i>Figure 25: Selecting 4 Radios or Intercoms .....</i>	<i>34</i>
<i>Figure 26: Remote Host Name .....</i>	<i>34</i>
<i>Figure 27: Selecting Remote Manager Host Name .....</i>	<i>35</i>
<i>Figure 28: GUI Options Changing DIS Parameters .....</i>	<i>36</i>
<i>Figure 29: DIS Parameters .....</i>	<i>36</i>
<i>Figure 30: Preset Channels .....</i>	<i>38</i>
<i>Figure 31: Preset Radio Options .....</i>	<i>39</i>
<i>Figure 32: GUI Options Volume Controls .....</i>	<i>39</i>
3.2.2. Radio Control and Monitor Features .....	40
<i>Figure 33: Frequency MHz .....</i>	<i>40</i>
<i>Figure 34: Radio Setup .....</i>	<i>40</i>
<i>Figure 35: PC'ver GUI Cipher Options .....</i>	<i>41</i>
<i>Figure 36: PC'ver GUI Radio Volume and Audio Control/Monitor .....</i>	<i>42</i>
3.2.3. Intercom Control and Monitor Features .....	43
<i>Figure 37: PC'ver GUI Intercom Control .....</i>	<i>43</i>

**Appendix A: Troubleshooting** ..... **44**

- Symptom: Receiving a “dinput8.dll” error message ..... 44
- Symptom: Audio Breakage ..... 44
- Symptom: No Audio ..... 44
- Symptom: No Communications Between PC’ver Stub & PC’ver GUI ..... 44
- Symptom: No Radio Communications with Remote Radios ..... 45
- Symptom: Poor Audio Quality Received by the Remote Radio ..... 45
- Symptom: Poor Audio Quality Received by the Local Radio ..... 46
- Figure 38: Windows Display Properties* ..... 46
- Figure 39: Windows Effects Properties* ..... 47
- Symptom: Software Does Not Recognize the Software License ..... 48
- Troubleshooting Broadcast Mask** ..... **49**
- Figure 40: PC’ver GUI Host and PC’ver Stub Communications Indicator* ..... 49
- PC’ver GUI Network Settings ..... 49
- Figure 41: PC’ver GUI Options IP Address Settings* ..... 49
- Figure 42: PC’ver GUI IP Settings* ..... 50
- Stub Network Settings ..... 50
- Figure 43: PC’ver Stub Network Settings* ..... 50
- Example Network Settings ..... 51
- Appendix B: Customer GUI Development** ..... **52**
- Appendix C: PC’ver Radius Volatility** ..... **53**
- Volatile Memory ..... 53



## 1.0. Introduction

PC'ver products bring plug-and-play DIS radio and intercom communications suite of applications to the Windows XP (32-bit) workstation. PC'ver provides simple, intercom and DIS-based radio communications over existing IP network architectures. The purpose of this document is to provide an overview of the PC'ver's system requirements and features.

PC'ver includes the ASTi Radius USB device. The Radius USB device is a compact, in-line device with built in push-to-talk (PTT) switch. This is a standard USB device providing direct connection to the user's PC via standard A to mini B USB cable (supports 1.1 and 2.0).

Two main versions of PC'ver:

1. The PC'ver Standard version supports two (2) half-duplex, DIS radios and two (2) full-duplex DIS intercom channels.

The PC'ver Standard version requires the Radius USB device to function. This removes the need to have a unique license for every target platform. If the Radius USB device is disconnected during normal operation, the software stops functioning. Support for this version is limited to two Question/Response emails to [support@astipcver.com](mailto:support@astipcver.com), for general information email:

`info@astipcver.com`

2. The PC'ver Enhanced version supports four (4) half-duplex, DIS radios and four (4) full-duplex DIS intercom channels.

The PC'ver Enhanced version requires both the Radius USB device and a computer-specific license file. The license file is generated based on the target PC's ethernet hardware (MAC) address. If the software detects the proper license file without also having a Radius USB device connected, it will not function. If only the Radius USB device is detected (improper or no license file found), then the software will still function as the standard version. Two hours of support time are included with the PC'ver Enhanced version via telephone or email.

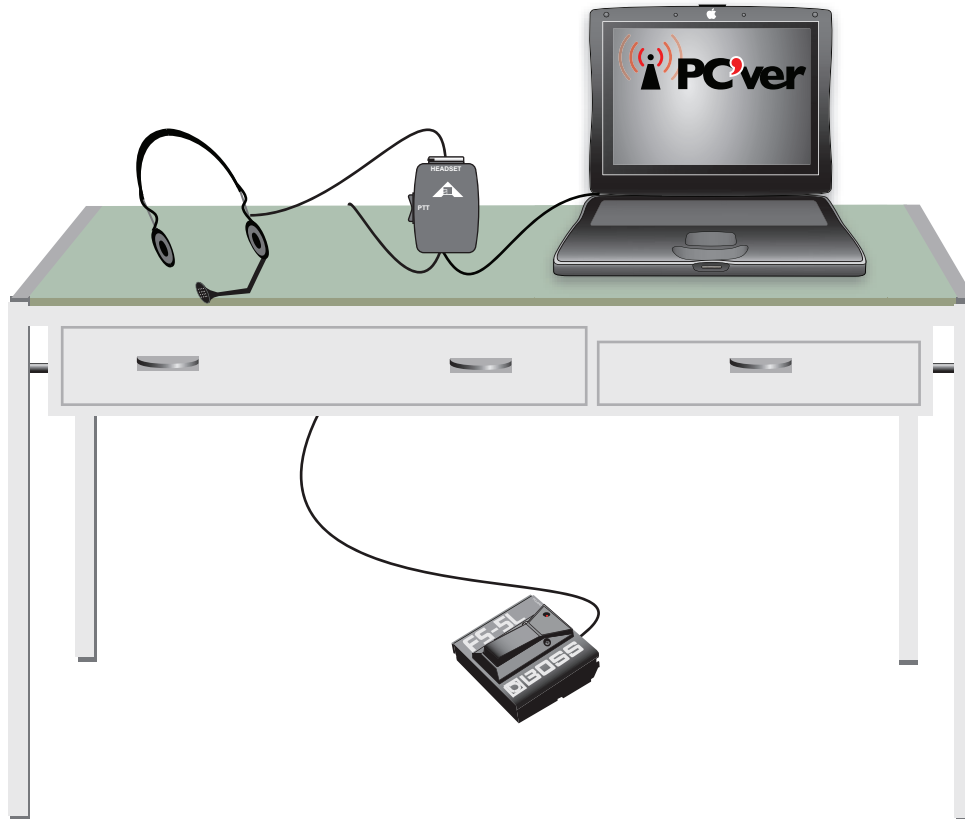
PC'ver's communications are fully interoperable with ASTi's DACS Model Builder and Telestra Model Builder Visual intercoms and simulated radios.

The Radius USB device has commercial headset support and direct connection to the PC USB port. This eliminates the need for PC sound cards, and provides a built in solution to Push-To-Talk detection. The in-line PTT switch features momentary transmit and latched positions. The 5-pin female XLR connector is for use with Telex standard commercial headsets.

The PC'ver GUI provides the user with control windows and support for two intercom channels and two simulated radios or in the PC'ver Enhanced version, four intercoms and four simulated radios.

## PC'ver Footswitch PTT Option

The footswitch works in parallel with the Radius USB device's PTT switch providing the ability to use either the Radius or the footswitch or both simultaneously. The footswitch option comes with a Boss Footswitch and a standard 10-foot cable with a 3.5 millimeter mono connection plug. The Radius module with the footswitch option includes a 3.5 millimeter mono jack.



## 2.0. System Requirements

### 2.1. Minimum Hardware Requirements

The PC'ver software runs on a standard Intel/Windows XP (32-bit) platform\* with an available USB port and an ethernet network connection.

The minimum hardware requirements are:

- 800 MHz Intel compatible PC
- 256 MB recommended for Windows-XP (32-bit)
- Available HDD space of 50 MB
- USB port (USB 1.1 and 2.0 supported)
- Standard network interface card (NIC / ethernet) (must be attached)
- Video card with a minimum resolution of 1152 x 864 (For best results, it is recommended to use video settings of 1280 x 1024.)
- Mouse
- Keyboard
- CD-ROM drive for software installation

The Radius USB device has been tested and works with the following headsets:

- Telex PH-44R5 (included with standard purchase)
- Telex PH-88R (not available with PC'ver purchase)

\*The minimum hardware platform recommendation demonstrates satisfactory application performance. Note that other applications in use on the same PC may affect PC'ver performance.

Actual memory utilization is typically around 5 MB for the PC'ver Stub and 5 to 6 MB for the PC'ver GUI.

## 2.2. Minimum Software Requirements

The PC'ver Stub and PC'ver GUI were designed to operate with Windows XP (32-bit) with DirectX version 8 or greater. ***Users must have DirectX 8.0 or higher installed before installing PC'ver.*** Check the current version of DirectX by going to the Start menu, and select "RUN," and enter "dxdiag."

If the DirectX version needs to be updated, go to the DirectX Homepage (<http://www.microsoft.com/windows/directx/default.aspx>) and download the latest version.

The monitor resolution must be 1280 x 1024.

**Note:** While there is not a particular service pack known to be required for PC'ver, all product testing was performed with Windows XP Professional (Version 5.1.2600, Service Pack 1 and Service Pack 2).

## 2.3. Installation Procedure

1. Insert the CD-ROM, the installer will run automatically, unless the CD-ROM **autorun** feature has been turned off from within Windows.
  - a. If autorun has been turned off go the Start menu and click on “My Computer” then click on the CD ROM drive.
  - b. Next run the **ASTiInstallationController.exe** file located in the home directory of the CD.

**Note:** ASTi recommends accepting the default destination directories, but alternative locations may be selected. If the installation is performed under the Windows “Program Files” directory, it may be necessary to change the default directory/file access privileges to allow write access to the sub-directories.

2. Choose “PC'ver” from the installation menu.

The installation has two separate install dialogues. First, the PC'ver Stub is installed followed by the PC'ver GUI. Both are installed in their respective default directories. An icon for both is automatically placed on the desktop.



Figure 1: PC'ver Installation Menu

3. Once the installation of the “**PC'ver GUI**” and “**PC'ver Stub**” is complete, all required sub-directories and files are extracted into those two directories.

After the installation process has finished, the screen will automatically return back to the main installation menu.

**Note:** The PC'ver Stub is controlled by a UDP message sequence, therefore the PC'ver GUI may be located either on the same physical PC as the PC'ver Stub, or on any PC that is connected to the same LAN that the PC'ver Stub is using for the simulated radio communications.

4. The next step is to install the driver for the Radius USB device associated with PC'ver by choosing “**Radius Driver.**”
5. The user is asked to connect the Radius USB device. Click “**OK**” after this is done.

**Note:** During the installation, Windows will warn that the “**Micronas Composite USB-Device has not passed Windows Logo testing**”. Click “**Continue Anyway**” and proceed.

6. If you are running **Standard PC'ver** (ASTi P/N PCR-SV-002) you may begin using PC'ver.
7. Enhanced Software License:

If you are running **Enhanced PC'ver** (ASTi P/N PCR-SVE-002) you must first install the software license. Contact ASTi for the software license file, we will need your computer's mac address to enable the license file. Copy the software license file (.pvl filename) to your c:\Documents and Settings\All Users\Documents\ASTi License Files directory.

You may begin using PC'ver.

Windows designates the Radius USB device as the default audio device. From the Control Panel ensure that the Radius USB device is selected as the default Windows “**Sound Playback**” and the default “**Sound Recording**” device.

To set the Windows audio output and input levels, open the “**Sounds and Audio Devices**” folder from the Control Panel and select the “**Audio**” tab. The volume for the “Sound Playback” and “Sound Recording” devices should be set to about 75% of maximum.

The DIS Radio Diagnostic Tool (RDT) is included on the PC'ver CD-ROM Installation page for demonstration purposes only, and will operate fully for 15 minutes at a time. The full version of the RDT is not included in the purchase price of any other PC'ver software. For more information on the RDT please see “**DIS Radio Diagnostic Tool**” which can be viewed from the ASTi products web page (<http://www.asti-usa.com/windows/index.html>).

The DIS Transforming Bridge is also included on the PC'ver CD-ROM Installation page for demonstration purposes only, and will operate fully for 15 minutes at a time. The full version is not included in the purchase price of any other PC'ver software. The DIS Transforming Bridge provides the capability to ‘bridge’ DIS PDU’s between two ethernet TCP/IP subnets. In addition to the basic bridging capability, the application also provides the capability to perform optional filtering and/or transformations back and forth between the two subnets. For more information please view the ASTi products web page as mentioned above.

## 2.4. Running the Application for the First Time

When running the PC'ver Stub and the PC'ver GUI the user must have a network connection and a connected Radius USB device. After opening the PC'ver Stub and PC'ver GUI for the first time, a dialog box will open requesting to select the DIS LAN IP address, Broadcast Mask and the UDP Port for the DIS LAN.

### 2.4.1. Selecting the IP Address and Port for the PC'ver Stub

Before getting started, open the PC'ver Stub.

1. Select the local IP address for the DIS LAN from the drop down list. If there is more than one network connection the **Allow IP/Port Sharing** checkbox becomes active.
2. Select the Broadcast Mask setting according to the DIS LAN sub-net settings. The user can check the “**User Specified**” option and manually enter the corresponding broadcast mask. *It is mandatory that the selected broadcast mask correspond to the Windows TCP/IP sub-net mask for the selected IP address* (For more information see Appendix A: Troubleshooting Broadcast Masks).
3. Enter the DIS UDP Port number for the DIS traffic in the dialog box.

Either UDP Broadcasting or UDP Multicasting mode of communication may be selected, but it is essential that the same mode be selected for PC'ver, and that the same Multicast Group or the same Sub-Net is selected for both applications.

If DIS traffic is on multicast check the “**Active**” box. Then select “Single Group” or “Multiple Groups” and manually enter the Multicast Group Address. The “**LSO from Ex ID**” option allows the user to choose the Least Significant Octet (LSO) from the exercise IDs on the system.

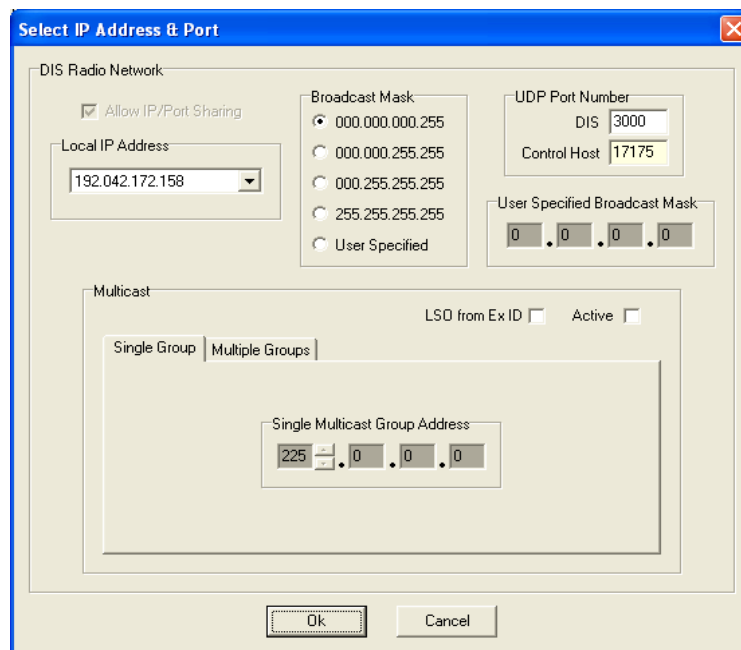


Figure 2: IP Address Selection for the PC'ver Stub

The IP address selection procedure described above is completed when running the application for the first time. However, it is possible to change the IP address selections at any time by clicking on the “Set” button within the “DIS LAN Options” group on the center section of the PC'ver Stub.

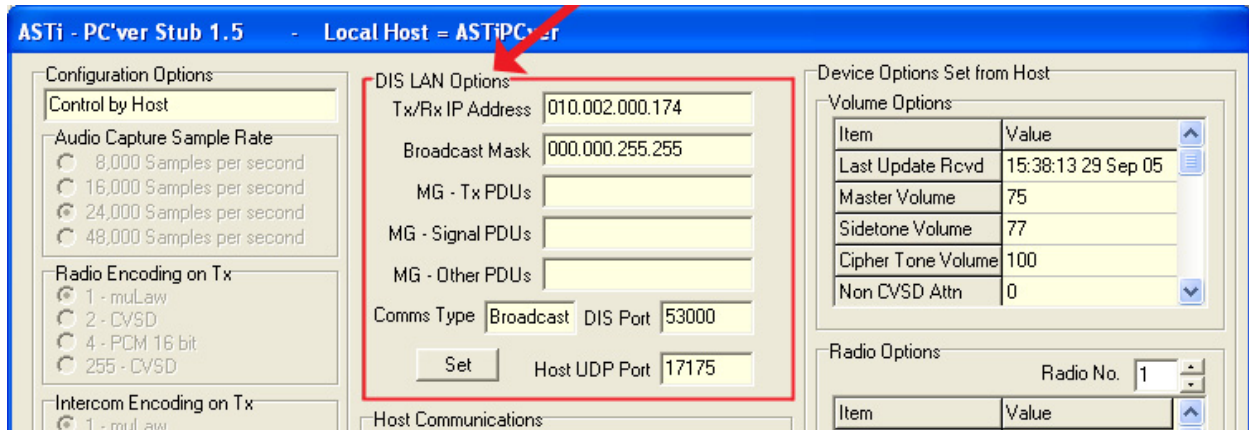


Figure 3: Setting DIS LAN Options

## 2.4.2. Selecting the IP Address and Port for the PC'ver GUI

1. Select the host local IP address for the DIS LAN from the drop down list. Then select either the option “**On same PC**” or “**Target PC'ver IP Address.**” If PC'ver is not running on the same PC, enter the IP address of the computer running the PC'ver Stub.
2. The UDP Port of 17175 is shown, but this number is not selectable. This is shown for user purposes only. The communications between PC'ver and the PC'ver GUI run on this UDP port number.
3. Select the Broadcast Mask setting according to the DIS LAN sub-net settings. The user can check the “**User Specified**” option and manually enter the corresponding broadcast mask. ***It is mandatory that the selected broadcast mask correspond to the Windows TCP/IP sub-net mask for the selected IP address*** (For more information see Appendix A: Troubleshooting Broadcast Masks).

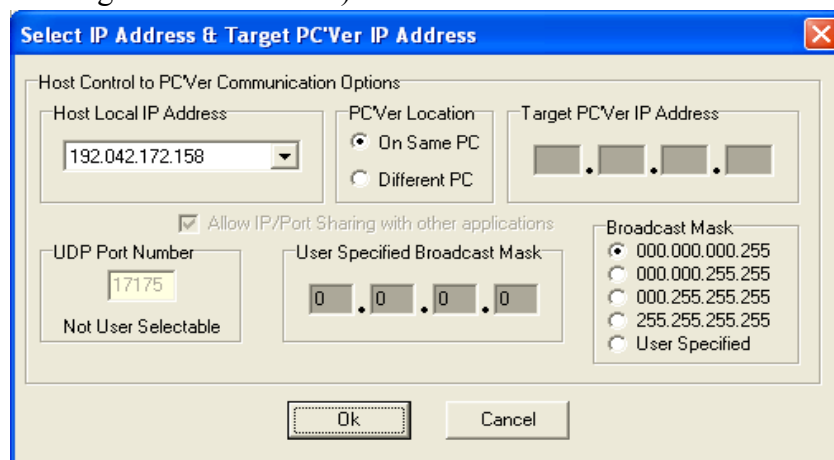


Figure 4: IP Address Selection for the PC'ver GUI

In Windows, open the Network Connection settings and select the Local Area Connection. Open the Internet Protocol (TCP/IP) Properties and select the Advanced TCP/IP Settings. Select the Options tab and the TCP/IP filtering properties, ensure that **Permit All** is selected.

**Note:** If these settings are not correct the PC'ver GUI and Stub will not communicate due to UDP limitations.

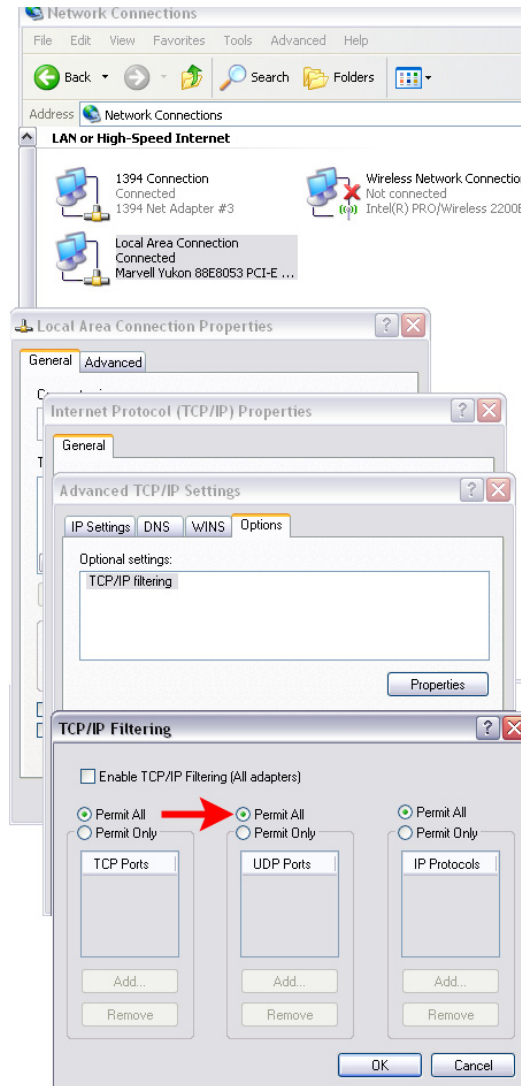


Figure 5: TCP/IP Filtering Properties

Once the IP selections are complete, PC'ver is ready for execution and will display the window shown below. The PC'ver Stub and PC'ver GUI both display the PC'ver version at the top of the window.

The “Configuration Options” on the left hand side are normally selected from the PC'ver GUI, to start using PC'ver right away these may be left at the “as shipped” defaults.

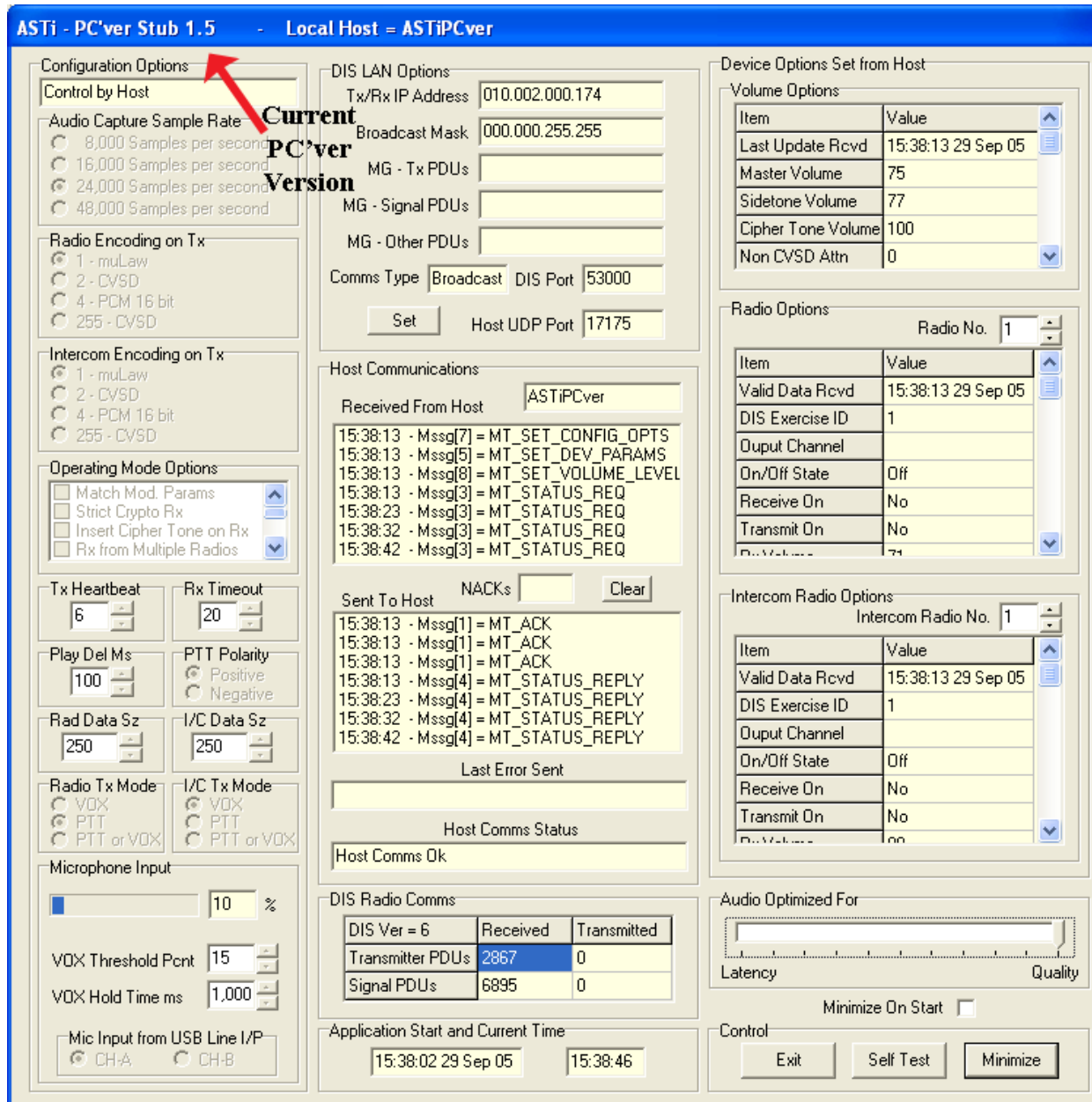


Figure 6: PC'ver Stub

## 3.0. Features

### 3.1. PC'ver Stub

The PC'ver Stub provides facilities to select or change the communications network parameters, display the built-in self-test and diagnostic functions, and to monitor or control the configuration parameters to be used for the simulated intercoms and radios.

All controls that the user can manipulate, either for intercom/radio parameters or PC'ver configuration, are controlled via the communication LAN using TCP/IP UDP packets on port number 17175.

The PC'ver Stub has been designed to operate with the main window minimized during normal operation. Select the “Minimize on Start” check box in the bottom right hand corner and click the minimize button to close the PC'ver Stub window. Minimizing the PC'ver Stub places the application icon in the Windows Tray area on the right hand side of the Windows Task Bar. To exit the PC'ver Stub select “Exit” in the control options, in the bottom right hand corner of the PC'ver Stub.

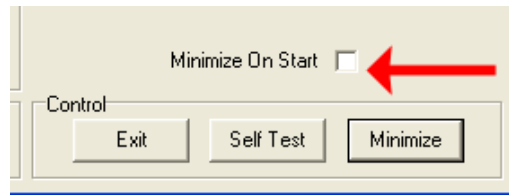


Figure 7: Minimize PC'ver Stub



Figure 8: PC'ver Stub Icon

### 3.1.1. Configuration Options

The display group on the left hand side of the PC'ver Stub window contains the PC'ver Configuration Options. These options may be set either locally from the PC'ver Stub, or remotely from the PC'ver GUI. The PC'ver Stub defaults to local control mode on start, but remote control may be requested or terminated by the remote PC'ver GUI at any time.

**Note: Control is mutually exclusive.** If remote control is requested by the host, local control is no longer possible, but the display information will reflect the current values as specified by the host. Control will revert to local control from the PC'ver Stub if communications with the host fail.

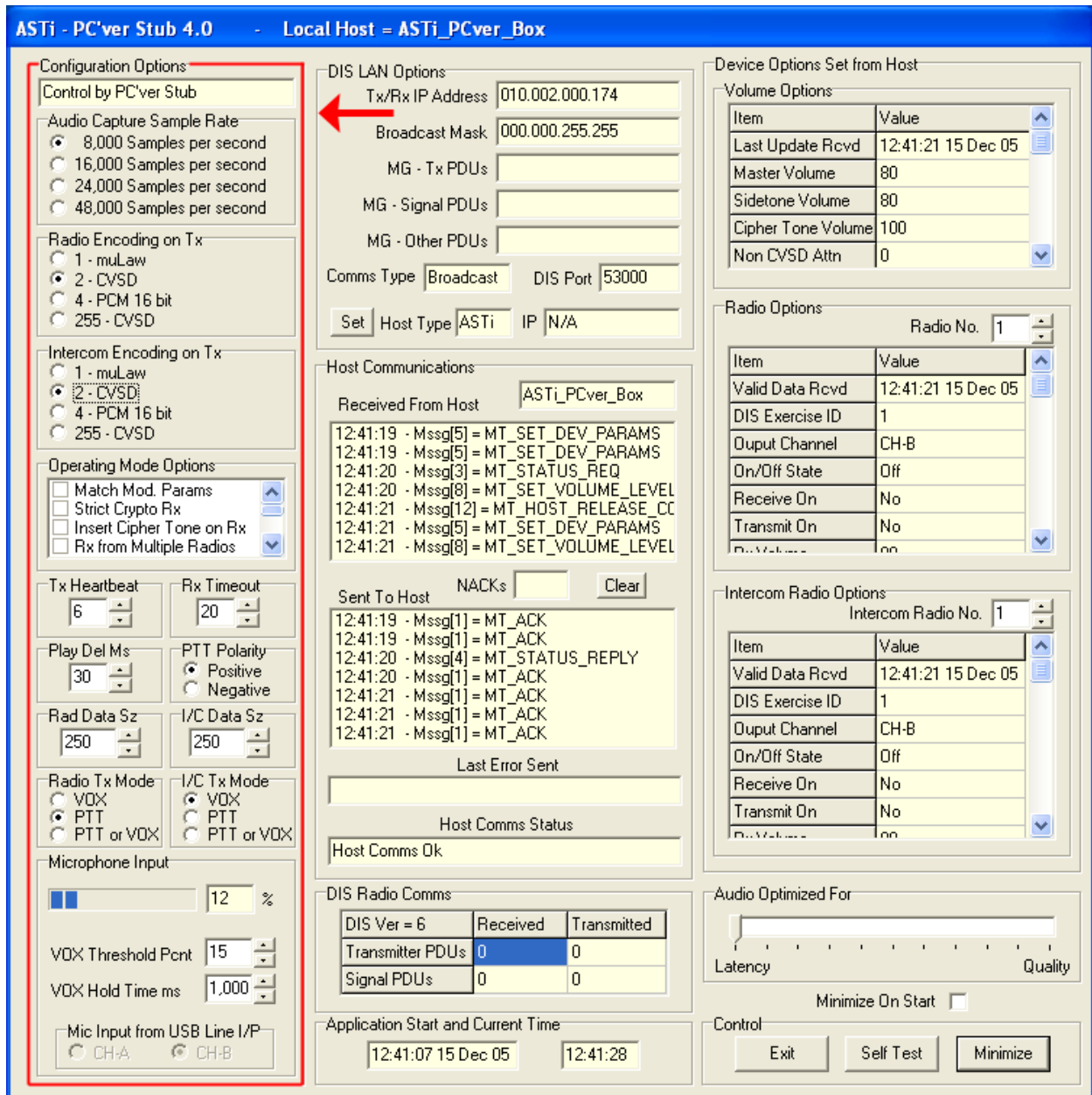


Figure 9: PC'ver Stub Configuration Options

## Audio Capture Sample Rate

The audio capture sample rate may be selected from the four available options of 8,000, 16,000, 24,000 and 48,000 samples per second. The sample rate selection applies only to the local audio capture and the sample rate used in the transmitted Signal PDUs. Reception from remote radios/intercoms will be accepted for any sample rate in the range of 8,000 to 48,000 samples per second.

## Radio and Intercom Encoding for Transmitted Signal PDUs

Two separate sections are provided to select the transmitted Signal PDUs' encoding scheme for radios and intercoms. The encoding scheme may be selected from the four available options of 8 bit muLaw, CVSD, 16 bit PCM and code 255 CVSD. Note that the selected encoding scheme is used only for the transmitted Signal PDUs, and any of the four available encoding schemes plus 8 bit PCM will be accepted from remote radios and intercoms regardless of the transmitted encoding scheme selection.

## Operating Mode Options

There are six options provided to allow user configuration of PC'ver operating mode.

1. **Match Modulation Parameters-** The default mode for PC'ver does not require matching modulation parameters for its radios to receive transmissions from a remote radio. If this option is activated, PC'ver will only receive audio from a remote radio if the specified modulation parameters match.
2. **Strict Crypto Operation-** The default mode for PC'ver does not require matching crypto settings or crypto key settings. If this option is activated, PC'ver will only receive audio from a remote radio operating in crypto mode if the crypto settings and the crypto keys are compatible. Note, however, that if the local radio is in crypto mode, it will still receive "in clear" transmissions from the remote radio.
3. **Insert Cipher Tone on Rx-** The default mode for PC'ver is to rely on the remote radio to insert any cipher tone required. If this option is activated, PC'ver will insert a cipher tone at the start of receiving any valid cipher transmission. The tone injected is contained in the file Cipher Tone.wav file located in the PC'ver home directory, this file may be replaced with any valid wave file.
4. **Rx from Multiple Radios-** The default mode for PC'ver is to receive from only one remote radio at a time (intercoms, on the other hand, are party line). If this option is activated, radio reception will operate in party line mode; the local radio will receive from multiple remote radios simultaneously. PC'ver does not support ranging; if multiple radios are transmitting on the same frequency, PC'ver will receive the communication from the "first in" transmission.
5. **No Un-Supported Report-** The default mode for PC'ver is to send a message to the PC'ver GUI if it receives a Signal PDU that uses either an unsupported sample rate or an unsupported encoding scheme. The PC'ver GUI will then display a message with the signal PDU that was rejected from the identified remote radio. If this option is activated, the unsupported message will not be displayed in the PC'ver GUI.

6. **Strict SINCGARS Rx**- This option is only available if the “Match Modulation Parameters” option is active. If this option is activated, matching of the SINCGARS frequency hopping parameters will also be required to receive audio from a remote radio.

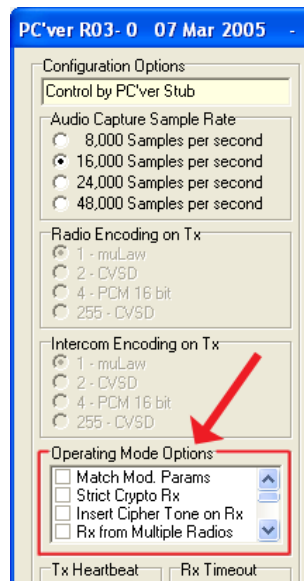


Figure 9: Operating Mode Options

### Tx Heartbeat

This option specifies the time, in seconds, to send Transmitter PDU heartbeats for any active radios and intercoms. The transmitter heartbeat PDU will be sent even if the radio is transmitting continuously for a period in excess of the heartbeat value.

### Rx Timeout

This option specifies the timeout period in seconds for the remote radios/intercoms. If a valid PDU is received not from a remote radio/intercom for the selected number of seconds, that radio/intercom will be deleted from the list of remote radios/intercoms maintained by PC'ver. Audio reception from that remote radio/intercom will only be possible once a valid Transmitter PDU is received. Signal PDUs will be accepted for the heartbeat function.

### Play Delay ms

This option specifies the minimum amount of audio in milliseconds that must be available to commence playing the remote audio. Playing audio will only be delayed for a maximum time equal to twice the specified value. This option is provided to minimize the possibility of audio break-up should subsequent Signal PDUs be delayed on the network. Larger values will minimize the likelihood of audio break-up, but will also increase audio latency. The default value is 100 ms, and that should be adequate for most configurations.

### **PTT Polarity**

This option is provided to enable reversal of the Radius USB device's PTT polarity. For configurations that provide hardware polarity reversal, this option provides facilities to ensure that the software is compatible with the hardware settings. The Self-Test Diagnostic dialog display may be used to verify the correct setting for this option. (See section 3.1.2. Self-test and Diagnostic Functions for more information).

### **Radio Data Size**

This option specifies the minimum amount of encoded audio data in BYTES to pack in each Signal PDU for the radios. As this parameter is expressed in bytes, the optimum value depends both on the Audio Capture Sample Rate and the Encoding Scheme. The default value of 300 bytes has been selected for 8,000 samples per second encoded as muLaw, and any other sample rate and/or encoding scheme may require using a different value.

### **Intercom Data Size**

This option specifies the minimum amount of encoded audio data in BYTES to pack in each Signal PDU for the intercoms. As this parameter is expressed in bytes, the optimum value depends both on the Audio Capture Sample Rate and the Encoding Scheme. The default value of 300 bytes has been selected for 8,000 samples per second encoded as muLaw, and any other sample rate and/or encoding scheme may require using a different value.

### **Radio and Intercom Tx Modes**

These two option groups provide facilities to select the transmit activation mode for the radios and the intercoms. Transmit activation may be by PTT or VOX or any combination of the two. The defaults are PTT for the radios and VOX for the intercoms, but any other mode may be selected.

### **Microphone Input Options**

The Microphone Input Options may be set either locally from the PC'ver Stub, or remotely from the PC'ver GUI. However, the feedback display of microphone input percentage is only available locally in the PC'ver Stub. Even if these values are set from the PC'ver GUI, it will help to have the PC'ver Stub window visible when appropriate VOX level values are selected.

### **VOX Threshold Percent**

The current microphone input level is shown as a bar graph and as a digital percentage. The digital percentage value may be used to select an appropriate setting for the VOX Threshold Percent value. This value determines at what microphone input level the VOX should activate (if selected).

### **VOX Hold Time in ms**

The VOX Hold Time in ms specifies the number of milliseconds the microphone input must be under the threshold value to deactivate VOX transmission.

### 3.1.2. DIS LAN Options and User Host Control

The PC'ver stub provides a section to set the DIS LAN Options and User Host Control during setup. To change the GUI and Host IP address settings after setup click the 'Set' button.

The PC'ver Stub provides the ability to network with a host computer. This is very similar to the functionality of the DACS and Telestra systems, allowing remote operation to view simple UDP interface.

**Process Example:** The host constructs a buffer of all PC'ver relevant data from the appropriate systems, and transmits the buffer via the UDP over the ethernet. The PC'ver stub receives the buffer and then processes the data to produce sounds and communication operations.

#### Enabling PC'ver Host Control

1. Select the "User Host" tab at the top of the "Select IP Address & Port" screen.
2. Select the local IP address for PC'ver.
3. Next select the appropriate Unicast or Multicast tab and enter the associated IP address for the host computer.
4. In the UDP Port Nos. box, enter the transmit and receive UDP port values.

After clicking the 'Ok' button, the PC'ver stub will wait for UDP packets from the selected IP address.

Please see the PC'ver web site Support page for the PC'ver Host Control Interface Definition (<http://www.astipcver.com/support/index.html>).

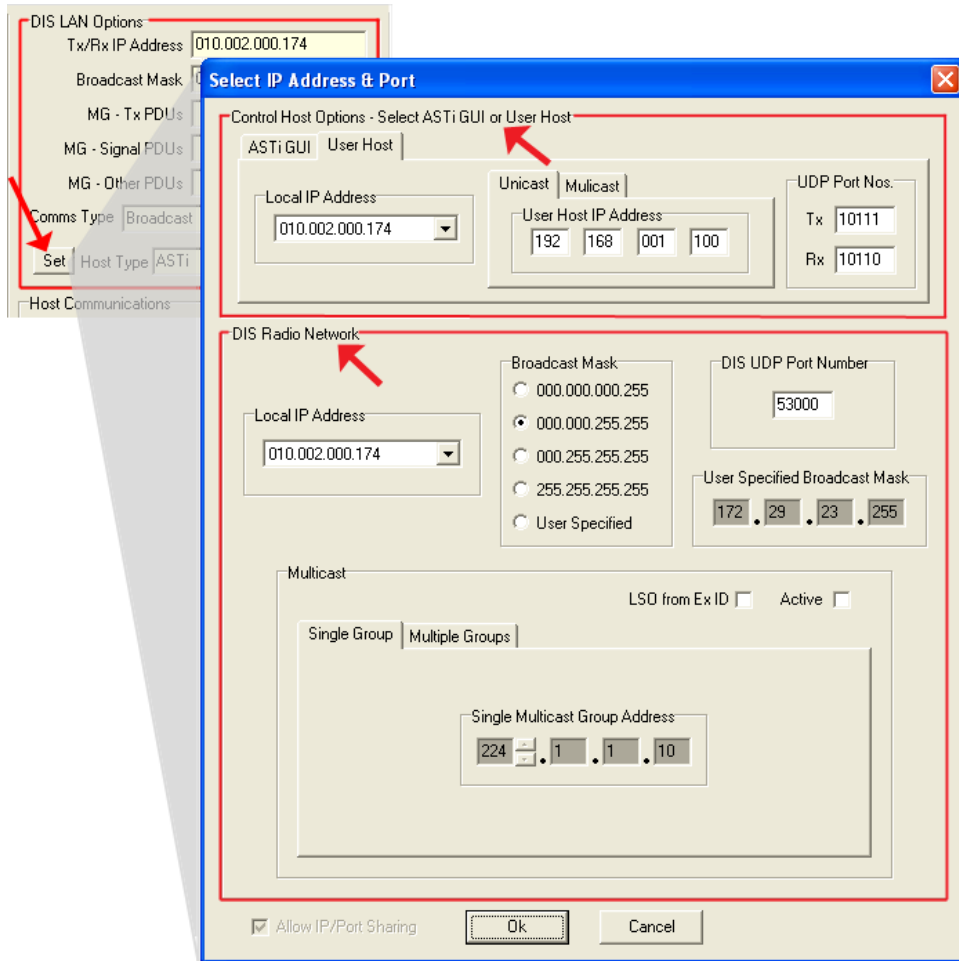


Figure 10: Enabling Host Control

### 3.1.3. Self-test and Diagnostic Functions

The PC'ver Stub main window provides facilities to:

- Verify detection of the Radius USB device
- Monitor communications with the GUI
- Monitor communications on the DIS LAN
- Monitor details of input, audio output and audio capture devices detected by Windows DirectX
- Self-test audio output and audio capture functions

#### Host Communications

The “Host Communications” display group is located at the center of the PC'ver Stub window. This display group is useful to monitor Host communications with the PC'ver GUI.

The “Host Communications” group displays:

- The last seven messages received from the Host
- A count of the number of host messages rejected with a Negative Acknowledge (NACK)
- Details of the last error message sent to the host
- The last seven messages sent from PC'ver Stub to the host
- The current PC'ver Stub-Host communication status.

The only unsolicited messages that the PC'ver Stub will send to the host (e.g., the PC'ver GUI) are intercom/radio receive status messages. All other messages sent to the PC'ver GUI will be in response to a previous message that was sent to the PC'ver Stub. The intercoms/radios must be activated by a message from the host, therefore the PC'ver Stub will never initiate communications with a host.

The Host Communications section also displays the Host Comms status, which reads “**Host Comms Ok**” if the PC'ver Stub has communications with the PC'ver GUI. Once communication with a host has been established, should the host fail to execute a hand-shake with the PC'ver Stub for 20 seconds, the communications status will indicate “**Host Comms Timed Out**” and the box will turn red, as shown in the figure below. If the PC'ver Stub window is minimized at that point, the icon in the Windows Task Bar will flash, indicating attention is needed.

If communication with the host times out, any active radios or intercoms will be automatically reset to the “off” state.

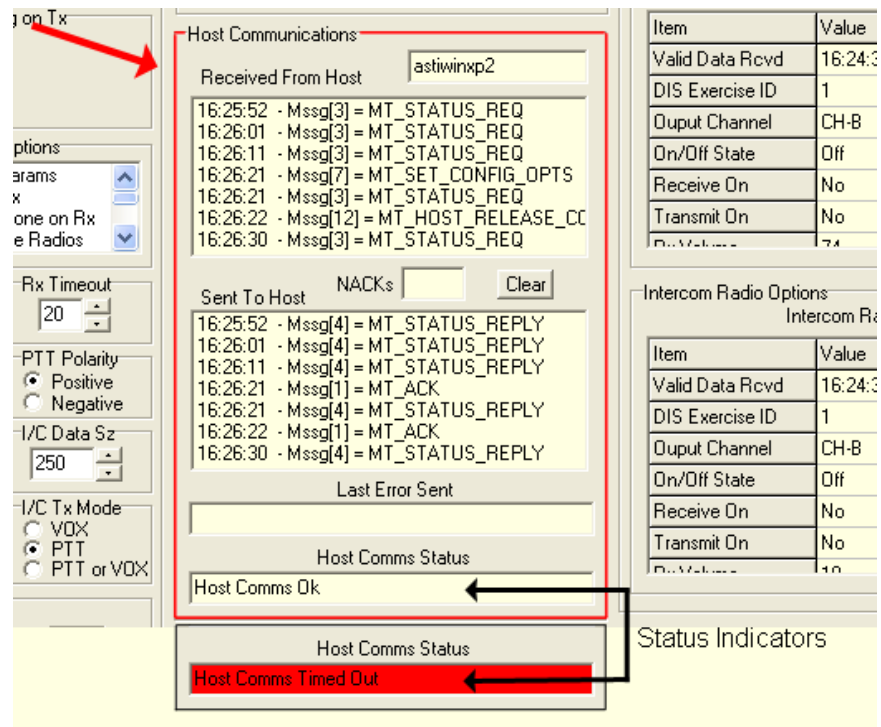


Figure 11: PC'ver Stub Host Communications

## DIS Radio Comms

The “DIS Radio Comms” display group, located at the bottom center of the PC'ver Stub, monitors DIS LAN communications. This group displays the DIS Protocol Version currently in use and counts the number of DIS Transmitter and DIS Signal PDUs transmitted and received.

For the received PDU counts, only PDUs operating on one of the active intercom or radio frequencies will increment the count. The counters may be manually reset by right clicking on the count display grid.

**Note:** The default DIS Protocol version is 6, but it may be set to 4, 5 or 6 by the host. Each time the PC'ver Stub is opened, it will use the last specified DIS Protocol version.

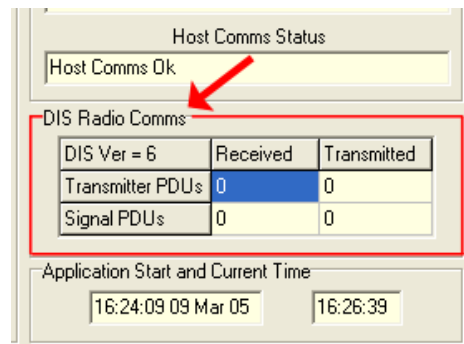


Figure 12: PC'ver Stub DIS Radio Comms

## Self-Test Functions

On the PC'ver Stub click the “Self-Test” button to display the “Self-Test and Diagnostics” window. The Self-Test and Diagnostics provides the facilities to:

- Verify the Radius USB device serial number and detection status
- View the current state of the PTT hardware
- Test the audio output and audio input

## Audio Resynch

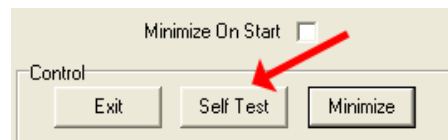
The I/P Resynch counter is a count of the number of times the USB audio input had to be re-synchronized. Slow incrementing of this counter is normal.

## Microphone Loopback

Audio input may be tested by means of the Microphone Loopback which can test each individual channel, or both channels simultaneously. If the hardware loopback option is selected, a test runs to the local hardware by sending audio from the headset to the Radius USB device and back to the headset. If the software loopback option is selected, the software controls the test to verify the audio is going into the PC'ver and back out.

## Audio Output

Audio output may be tested by playing the selected audio wave file on the selected output channel(s). The “Repeat Options” allows the test to perform playback once, several times, or continuously.



*Figure 13: PC'ver Stub Self-Test*

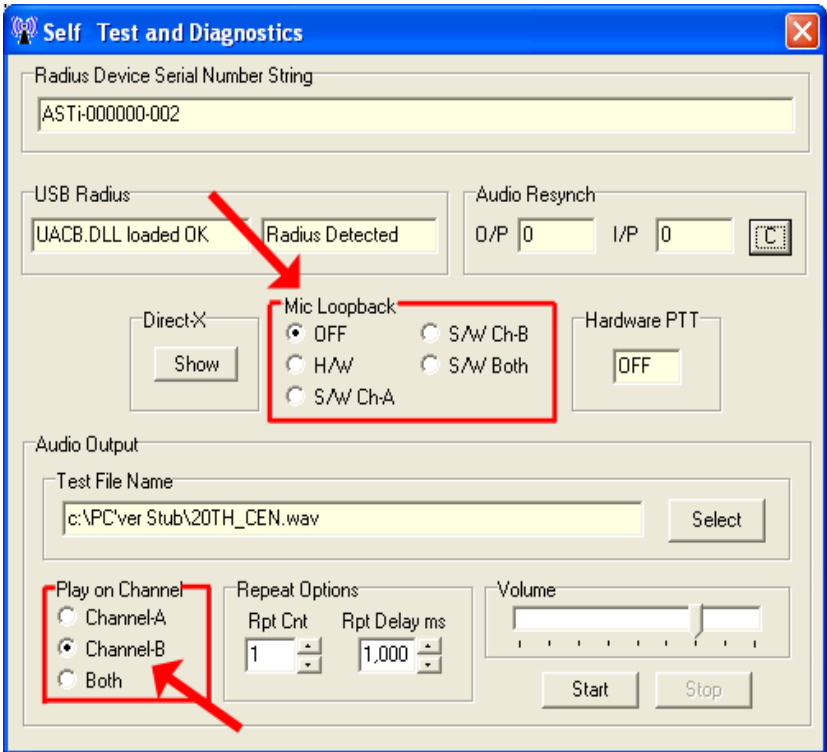


Figure 14: Self-Test and Diagnostics

## Device Options Set from the Host

The “Device Options Set from Host” display group contains three display-only information sub-groups. These sub-groups show information for the current Volume, Radio, and Intercom Options as set from the PC'ver GUI. Each display sub-group contains the date and time of the most-recent, valid information received from the host. All Radio/Intercom options will be reset if communications with the host fail.

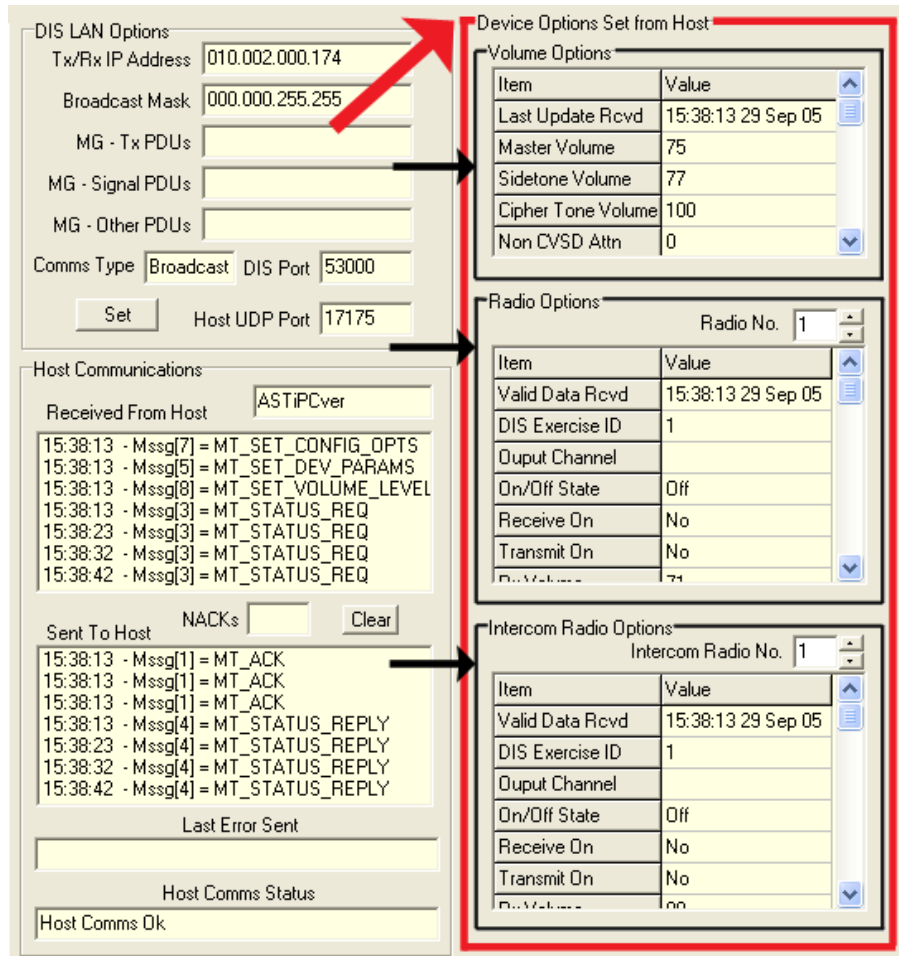


Figure 15: PC'ver Stub Device Options

## Audio Optimization

The audio can be optimized for latency or quality. This feature allows the user to prioritize between the speed and sound quality received from the DIS network. If the user sets the slider to the latency side, audio is directed to the headset as soon as it is received. This option can result in audio breakup and possible poor audio quality, but reduces end-to-end latency. If the user sets the slider to the quality side, the audio is buffered longer resulting in smooth continuous audio. The quality option may cause a slightly longer delay due to increased buffer times to ensure good sound quality.

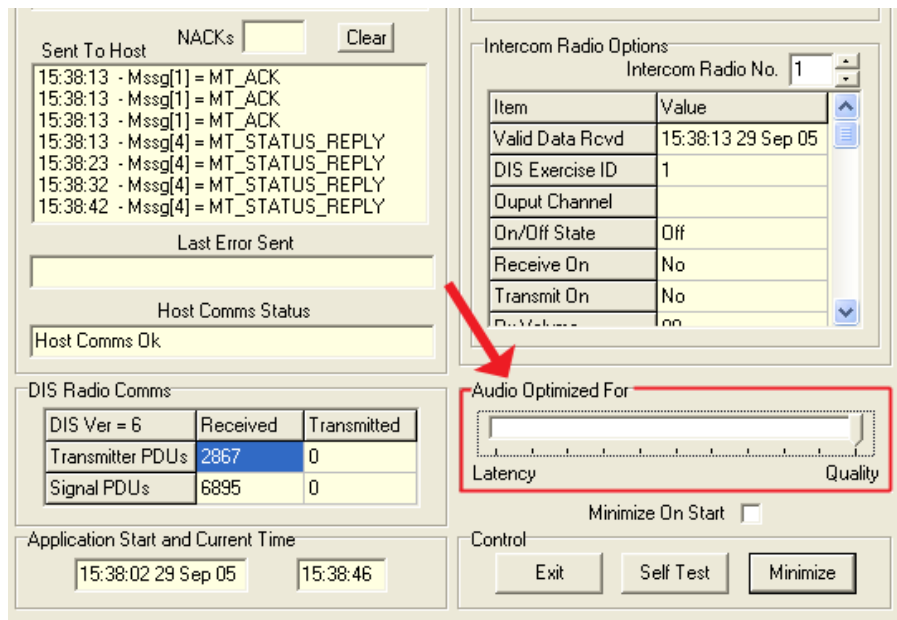


Figure 16: PC'ver Stub Audio Optimization

### **3.1.4. PC'ver Stub Additional Information**

#### **Radio In-Band Tuning Criteria and Ranging**

PC'ver only provides low fidelity simulation for DIS radios. In-band logic is not applied to determine reception from a remote radio. The frequencies must match precisely for reception.

PC'ver does not perform ranging logic to determine if transmission from a remote radio should be received. As ranging calculations are not provided, ranging effects like fading and background noise are not simulated. PC'ver does allow for its radios to have a position for other software to use if necessary. This is done with latitude, longitude, and height.

#### **Volume Controls**

PC'ver provides independent volume controls for Sidetone Playback and Master Audio Output, as well as audio output volume controls for each individual intercom and radio.

PC'ver relies on the Windows audio capture volume setting to change the microphone input level. In addition to the various volume controls provided by PC'ver, the Windows Wave Play volume setting will also effect the actual audio output level.

While the PC'ver Stub performs the logic associated with the processing of the volume controls, the actual controls are manipulated via the PC'ver GUI.

## 3.2. PC'ver GUI

While the PC'ver Stub provides all the functionality required for the actual intercom and simulated radio communications, user controls are located in the PC'ver GUI. The PC'ver GUI communicates with the PC'ver Stub by means of broadcast UDP packets via the communication LAN on a dedicated port number of 17175 using TCP/IP.

While most of the controls and displays on the PC'ver GUI should be self-explanatory, placing the cursor over any control or display component will display a Windows "hint" providing a short explanation of its function.

### **Stereo Function**

Under the 'Ear' option, check the left or right box to designate voice streams to radio and intercom operators. The stereo options allow the user to specify which radio and intercom voice streams to listen to through the left or right ear of their headset eliminating radio and intercom confusion. The user can also listen to a single audio stream in both ears.

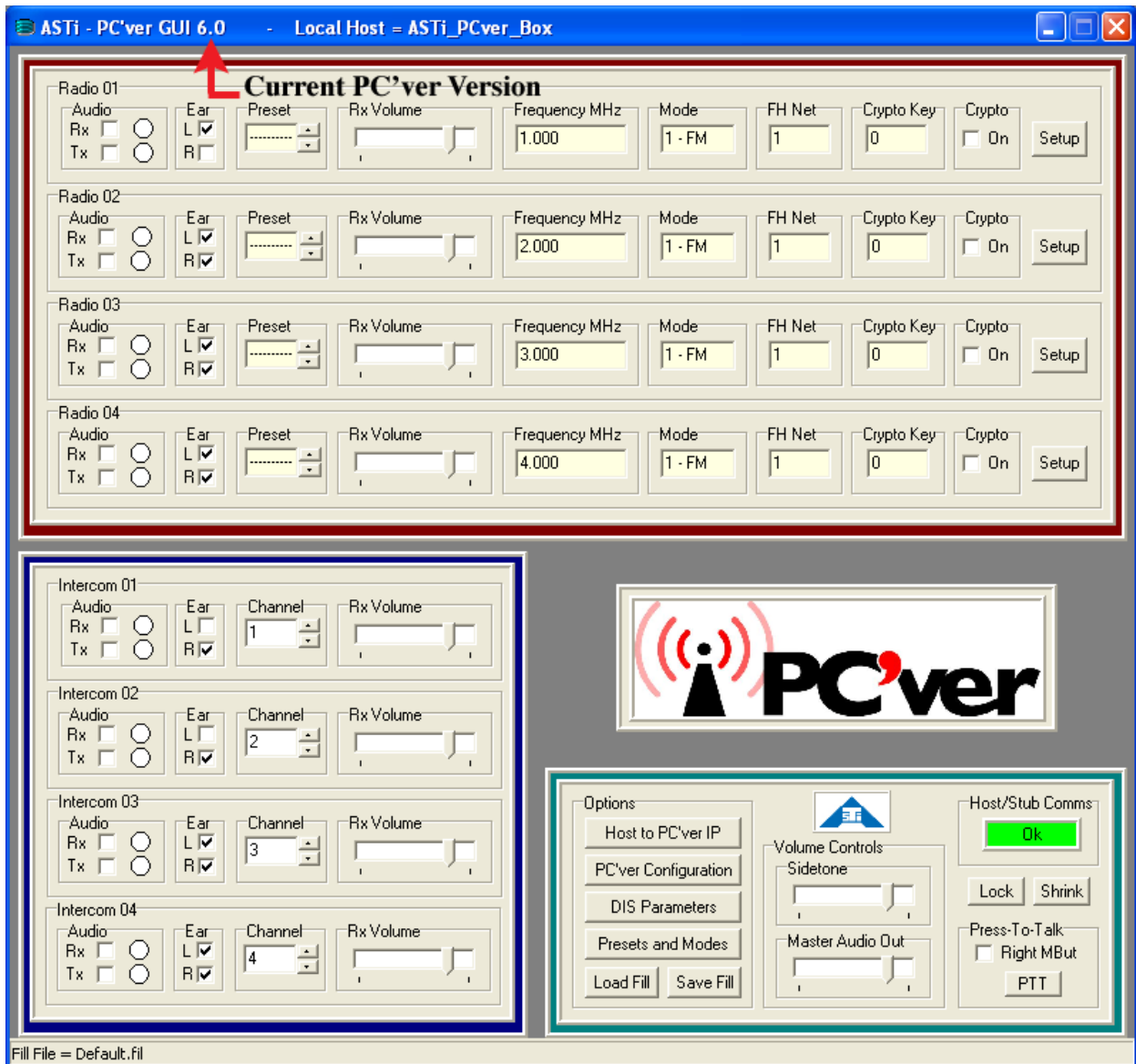


Figure 17: PC'ver Enhanced version GUI on Windows XP

**Note:** Customers may develop their own PC'ver GUI. For more information please see Appendix B: Customer GUI Development.

## Push-To-Talk Software

In addition to the push-to-talk (PTT) provided with the Radius USB device, the PC'ver GUI also provides two software mechanisms to act as PTT controls. First, a PTT button is provided that may be pressed to activate the PTT function. Second, if the user checks the "Right Mbut" checkbox, the right mouse button on the PC running the PC'ver GUI will be interpreted as a PTT activation.

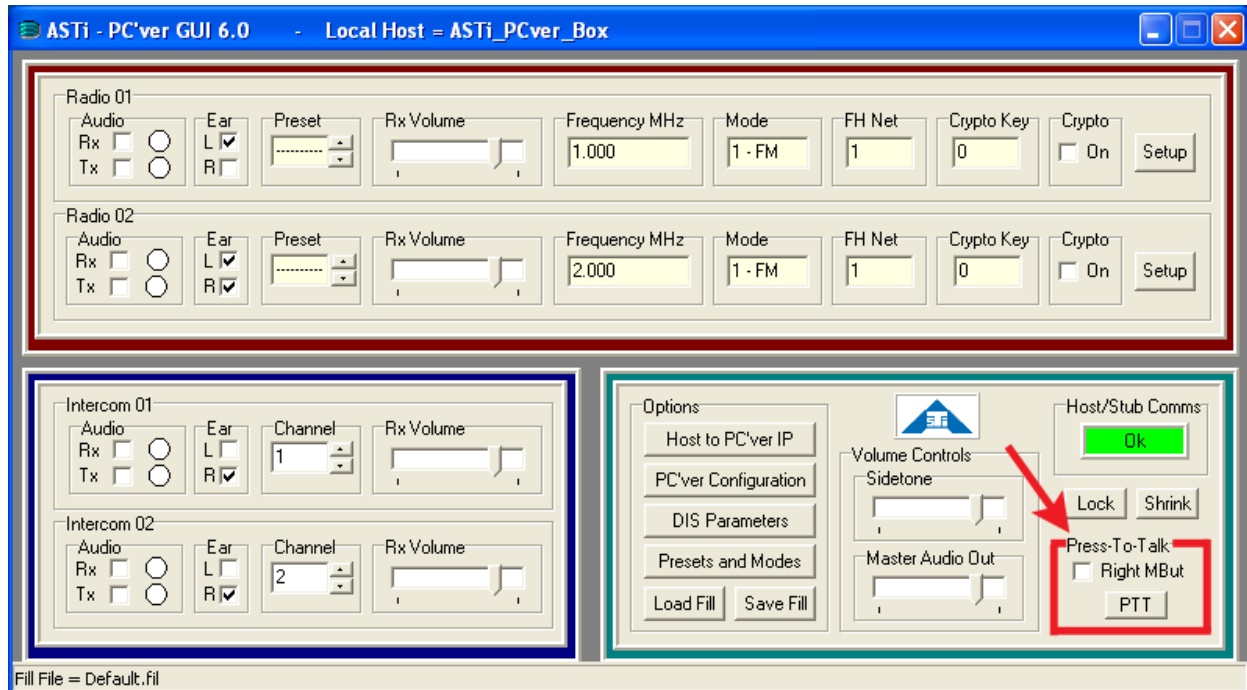


Figure 18: PC'ver GUI Push-To-Talk Selection



Figure 19: PC'ver GUI Icon

When communication is established between the PC'ver GUI and the PC'ver Stub, the “**Host-Stub Comms**” status indicator will read “**OK**” and turn green. If communications with the PC'ver Stub fails, this indicator will turn red and read “**Timed Out**”.

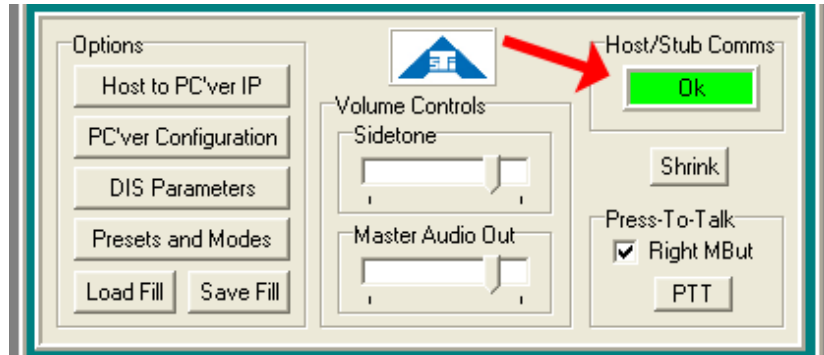


Figure 20: Host/Stub Comms

### 3.2.1. Options Control

There are six option buttons at the bottom right corner of the PC'ver GUI's main window. These buttons provide the ability to view and/or select all of the PC'ver options, as well as facilities to view and/or remotely select any of the available configuration options for the PC'ver Stub.

Depending on the PC'ver version, the user may have the ability to activate a password lock mode to prevent others from changing the option settings.

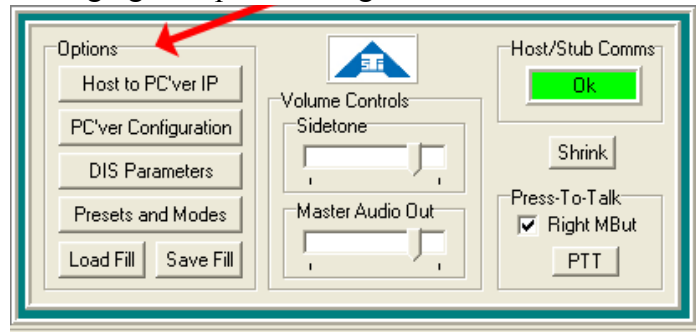


Figure 21: PC'ver GUI Options

#### Host to PC'ver IP

When the PC'ver GUI is started for the first time, the IP selection dialog box will automatically display. (For more information on IP address settings see section, 2.4.2. Selecting the IP Address and Port for the PC'ver GUI.) To change any of the TCP/IP communications options after initial setup, click the "Host to PC'ver IP" button on the main screen to display the "Select the IP Address" dialog box which allows the user to make changes.

Once an IP and broadcast mask (or Multicast group) have been selected, those parameters will be used on subsequent executions of PC'ver unless manually changed.

## PC'ver Configuration

Clicking the “PC'ver Configuration” button will display a dialog box that provides facilities for monitoring and changing the values of the various PC'ver configuration options. The display group on the left side shows the current values for the various PC'ver configuration options.

At the bottom right corner, “Set Options From” allows the user to specify where to enter the PC'ver configuration options. If “Host” is selected, entry of the various configuration options in the PC'ver GUI or other host program will be enabled, and any changes requested via the various data entry fields will be immediately communicated to PC'ver. The new values should reflect in the display group on the left side within 10 seconds.

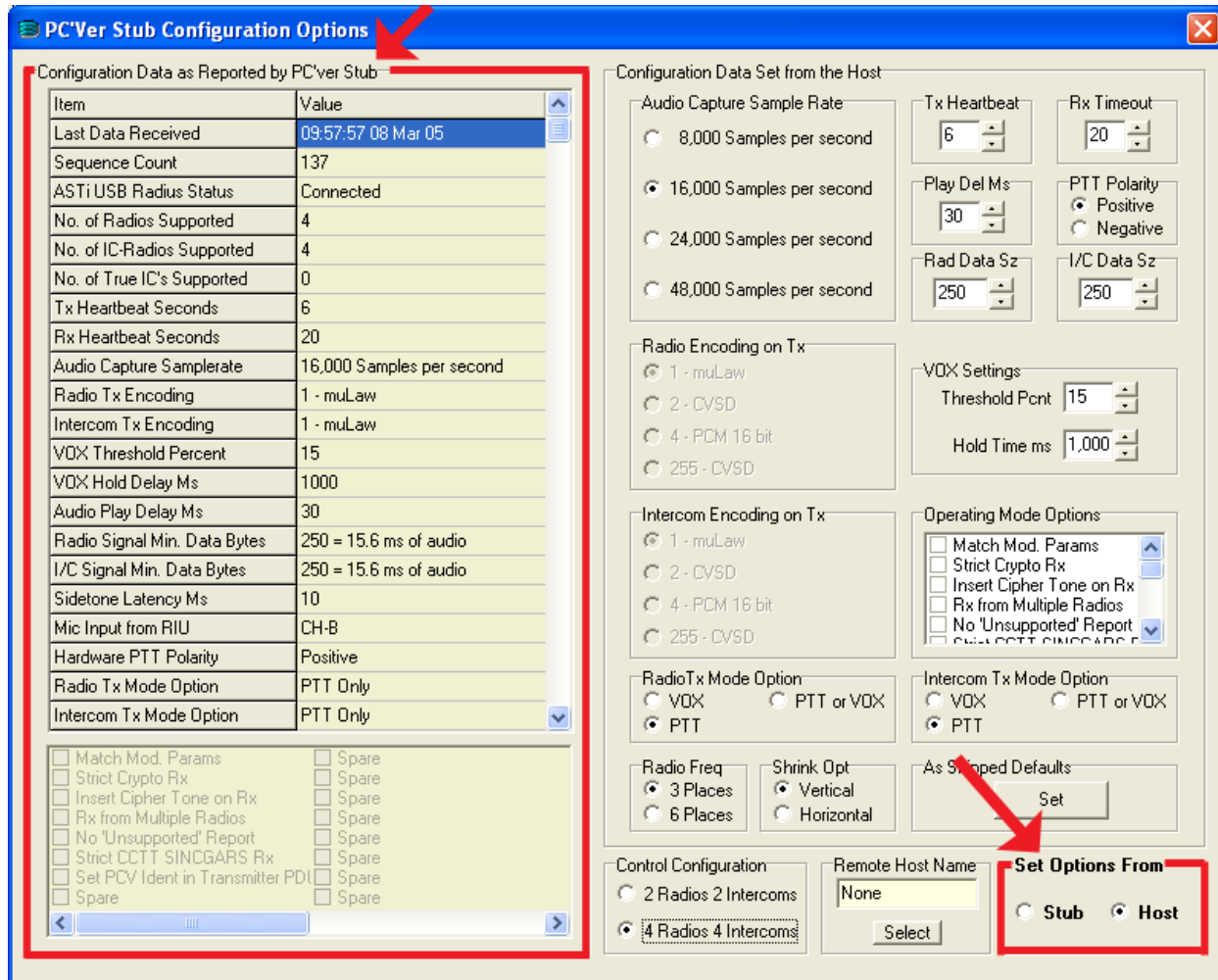


Figure 22: PC'ver Stub Configuration Options

The fourth and fifth entries in the “Configuration Data as Reported by PC'ver Stub” section shows the number of simulated radios and intercoms supported by PC'ver that are currently connected to the PC'ver GUI. If the currently connected PC'ver Stub is the PC'ver Enhanced version, the number of supported radios and intercoms is 4, and the option to configure the PC'ver GUI for 4 Radios/4 Intercoms is enabled.

Item	Value
Last Data Received	09:57:57 08 Mar 05
Sequence Count	137
ASTi USB Radius Status	Connected
No. of Radios Supported	4
No. of IC-Radios Supported	4
No. of True IC's Supported	0
Tx Heartbeat Seconds	6
Rx Heartbeat Seconds	20

Figure 23: Supported Radios and Intercoms for PC'ver Enhanced Version

Under “Control Configuration” select the “4 Radios 4 Intercoms” option to be able to view the 4 radios/intercoms in PC'ver.

The screenshot shows the configuration window with several sections. The 'Control Configuration' section is highlighted with a red box, showing two radio button options: '2 Radios 2 Intercoms' (unselected) and '4 Radios 4 Intercoms' (selected). Other sections include 'RadioTx Mode Option' (PTT selected), 'Intercom Tx Mode Option' (PTT selected), 'Radio Freq' (3 Places selected), 'Shrink Opt' (Vertical selected), and 'Set Options From' (Host selected).

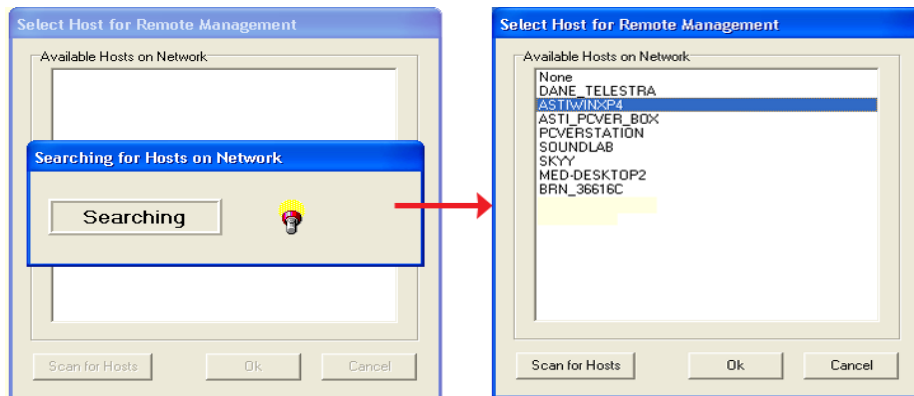
Figure 24: Selecting 4 Radios or Intercoms

If Remote Manager is managing PC'ver, the user must select the “Remote Host Name” from the configuration options.

The screenshot shows the configuration window with the 'Remote Host Name' field highlighted by a red box and a red arrow pointing to it. The field contains the text 'ASTi-PC'ver'. The 'Control Configuration' section is also highlighted with a red box, showing '4 Radios 4 Intercoms' selected. Other sections are the same as in Figure 24.

Figure 25: Remote Host Name

After clicking “Select,” PC'ver may take a few minutes to complete the search for hosts on the network. Then a list will display the possible hosts, choose the host managing the PC'ver and click “Ok.”



*Figure 26: Selecting Remote Manager Host Name*

## DIS Parameters

If the PC'ver Stub and the PC'ver GUI are being used in non-DIS “Voice Over IP” mode, these parameters may be left at the default values, and nothing further is required.

If the applications are being used in a DIS environment, clicking the “**DIS Parameters**” button will display a dialog box where all the required DIS parameters for each simulated radio and intercom may be specified.

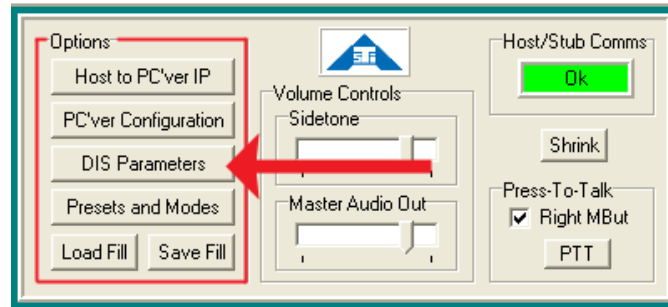


Figure 27: GUI Options Changing DIS Parameters

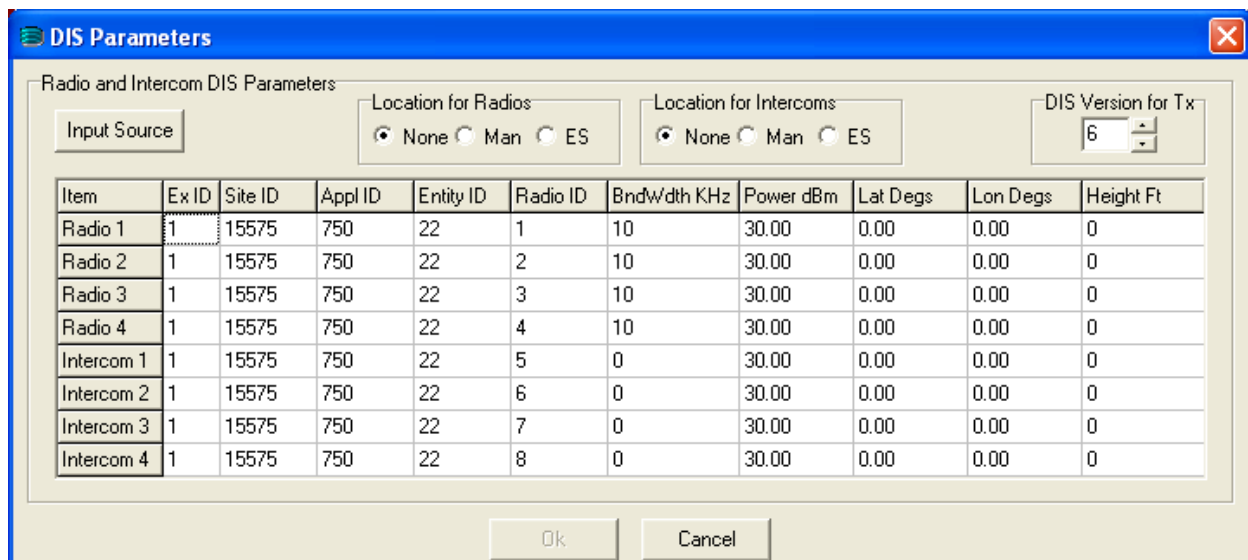


Figure 28: DIS Parameters

In a DIS exercise, each simulated radio and intercom must be uniquely identified by a combination of Exercise ID, Site ID, Application ID, Entity ID and Radio ID. Simulated radios and intercoms operating on the same exercise ID and same frequency may communicate with each other.

The PC'ver GUI default values are:

- **Ex ID** = 1
- **Site ID** = 15575
- **Application ID** = 750
- **Entity ID** = The low order byte of the local IP address
- **Radio ID** is 1 to 4 for the simulated radios and 5 to 8 for intercoms

If a remote radio is detected on the network with the same unique identifier as one of the local radios, an error message will be displayed identifying the remote source by its IP address.

Values for the various fields in the display grid may be entered directly, and are verified by clicking the "OK" button. In addition to the unique radio identifiers, the user can select the Bandwidth, Power and Manual Location for the intercom/radio objects.

## Preset Radio Channels

While the operating frequency for each radio may be set to any arbitrary valid value, facilities are provided to enter frequencies for 30 “Preset Channels” that may be selected for any radio by simply selecting the “Preset” number instead of entering the actual frequency.

As seen in the figure below, the 30 preset channels are arranged in blocks of 5. For easier recall and recognition, each preset radio can be assigned a “Descriptor” name on the right side of the dialog. The user can right click on a descriptor name and if the preset radio is in use an ‘X’ will appear. For more information on the mode options select “**Mode Definitions.**”

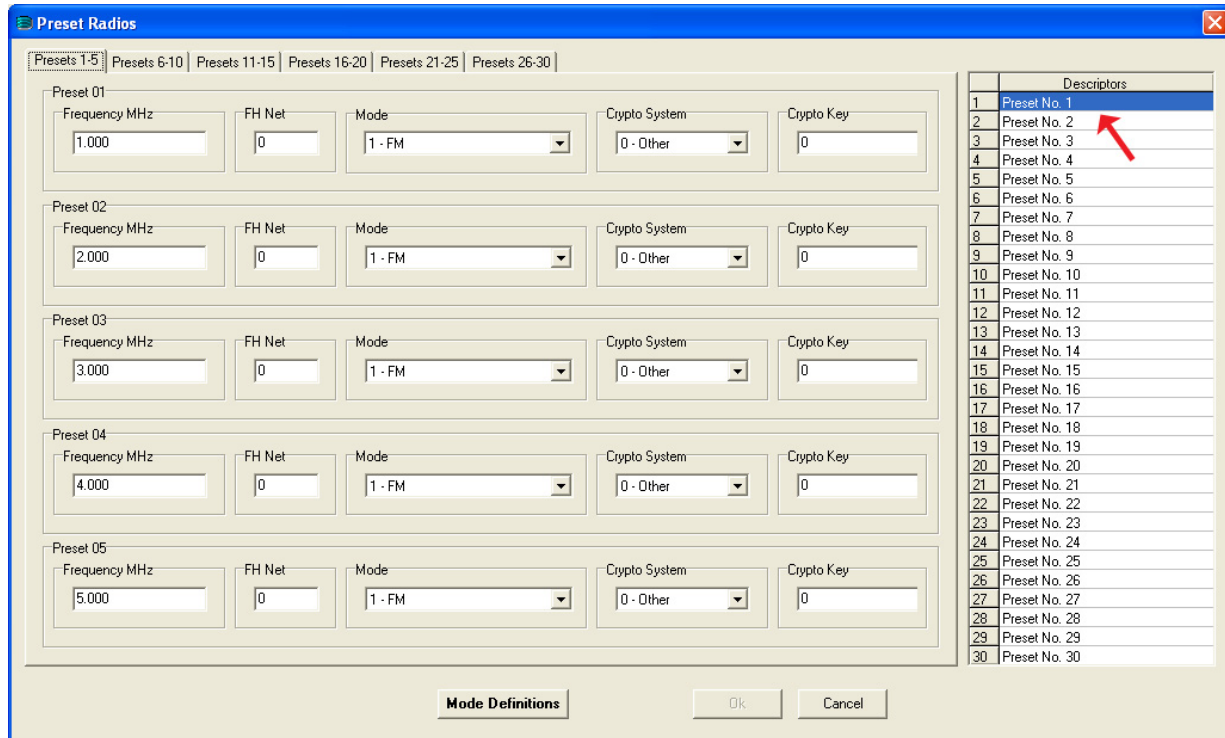


Figure 29: Preset Channels

## Load Fill and Save Fill

All PC'ver Options can be saved through the “**Save Fill**” button. When the user chooses to save the options a file is created and saved to the user’s PC saving everything set in the PC'ver GUI except for the Audio Transmit and Receive options, which automatically default to off. To import a previously saved file click “**Load Fill**.”

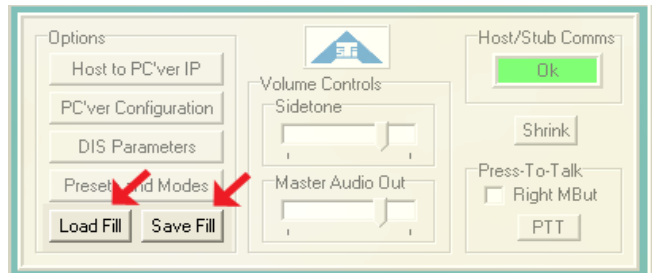


Figure 30: Preset Radio Options

## Master Volume Controls

The Master Volume controls located at the bottom center of the PC'ver GUI main window are for Sidetone Playback and Master Audio Output.

The volume control is not provided for the microphone input level. The microphone input level control relies on the Windows audio capture volume setting on the PC running the PC'ver Stub. Also note that in addition to the various volume controls provided by the PC'ver GUI, the Windows Wave Play volume setting on the PC running the PC'ver Stub will also effect the actual audio input/output level.

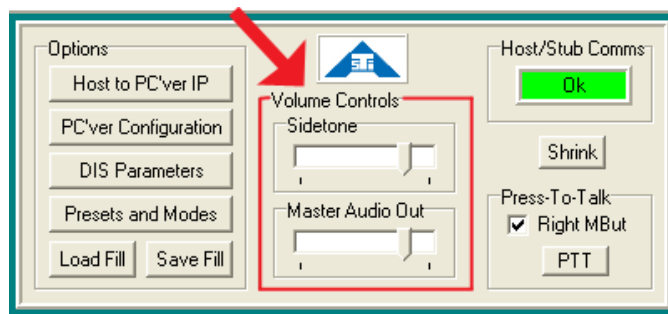


Figure 31: GUI Options Volume Controls

### 3.2.2. Radio Control and Monitor Features

Each of the supported simulated radios have five groups of controls/monitors. These five groups provide all of the radio functionality required for operational control and monitoring.

#### Frequency MHz

The Frequency MHz edit box displays the current operating frequency for each radio. Valid operating frequencies for radios are between 0.1 MHz and 99,999.0 MHz, with each of the supported radios tuned to a unique frequency. To receive audio from a remote radio, the remote radio must be tuned precisely to the same frequency as the local radio.

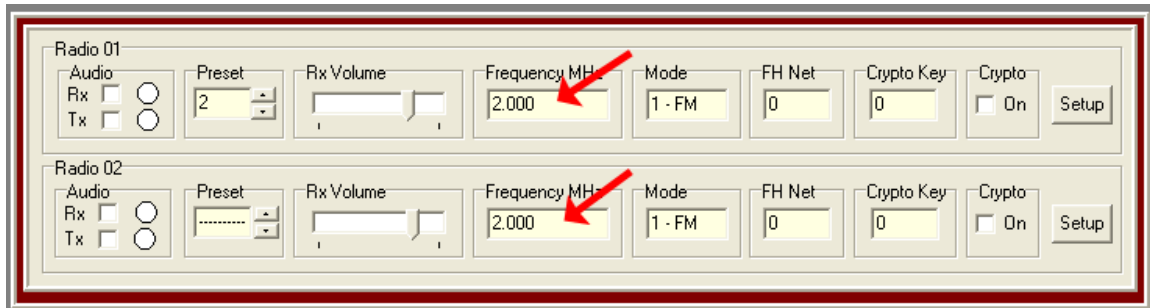


Figure 32: Frequency MHz

To select an operating frequency for a radio, click the “**Setup**” button, and the Radio Setup dialog box will be displayed as shown below. The Radio Setup dialog box will initially display the current radio frequency as the default value. The new radio operating frequency may then be entered directly in MHz, or one of the current Preset Radio Values (channels) may be selected from the drop down list. The “**OK**” button will enable after making a valid entry.

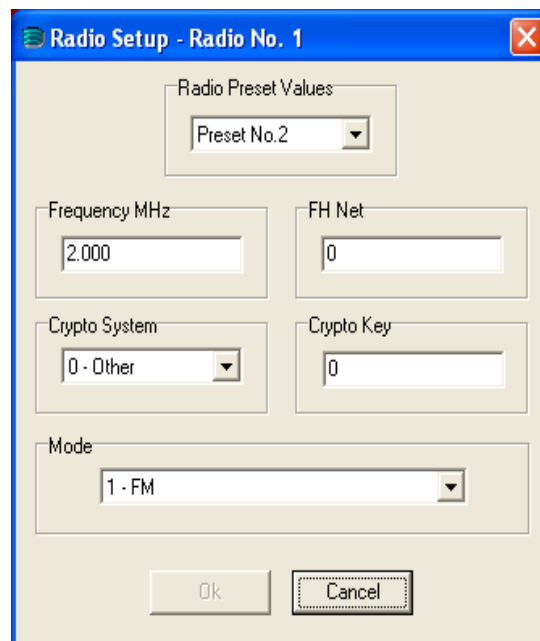


Figure 33: Radio Setup

## Cipher Options

The radio features configurable DIS crypto net and crypto key variables. The Cipher Options group provides facilities to select a Crypto Device for the simulated radio, enter the Cipher Key and enable/disable cipher mode. The enable/disable function and the cipher key may be entered at any time, but the simulated radio crypto device may only be selected while the radio is **off**.

Note that in accordance with the DIS standard when cipher mode is activated, the actual audio transmission is not really enciphered, but rather an indication is set in the Transmitter PDU to indicate that the radio is operating in simulated enciphered mode.

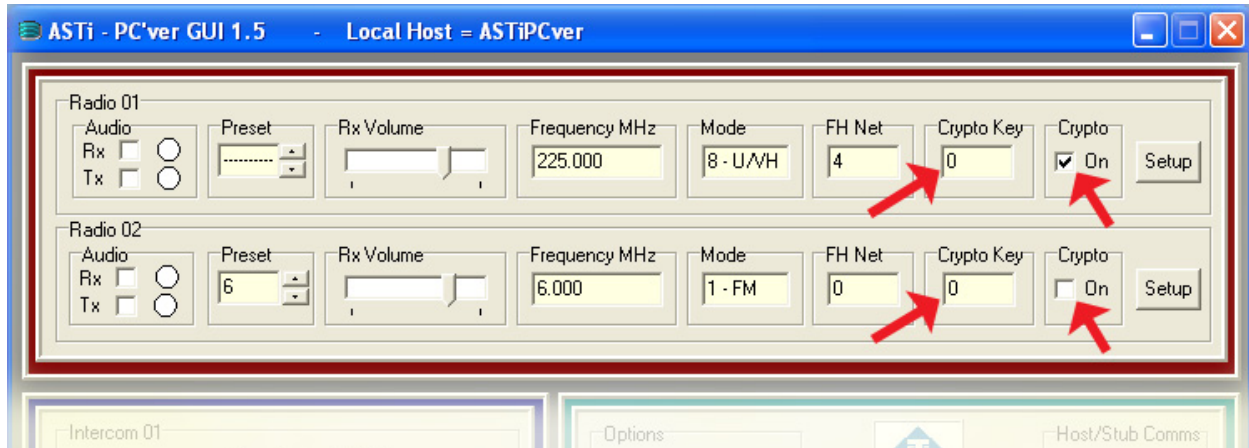


Figure 34: PC'ver GUI Cipher Options

## Rx Volume

The Rx Volume control provides facilities to vary the audio output volume for an individual radio. The actual audio output volume is determined by multiplying the volume percentage for the individual radio with the master audio output volume percentage.

## Audio Control/Monitor

In the Audio group check the 'Rx' and 'Tx' to enable the radio receive and/or transmit. Audio transmission is activated when radio transmit is enabled. That is, if PTT mode is selected for the radios, transmission will only occur when the PTT is activated.

The Tx indicator turns green for the appropriate radio when transmitting audio. When a radio is receiving and playing audio, the radio Rx indicator will turn green. If the received audio is suppressed due to a modulation parameter or crypto setting mismatch, the Rx indicator will turn yellow.

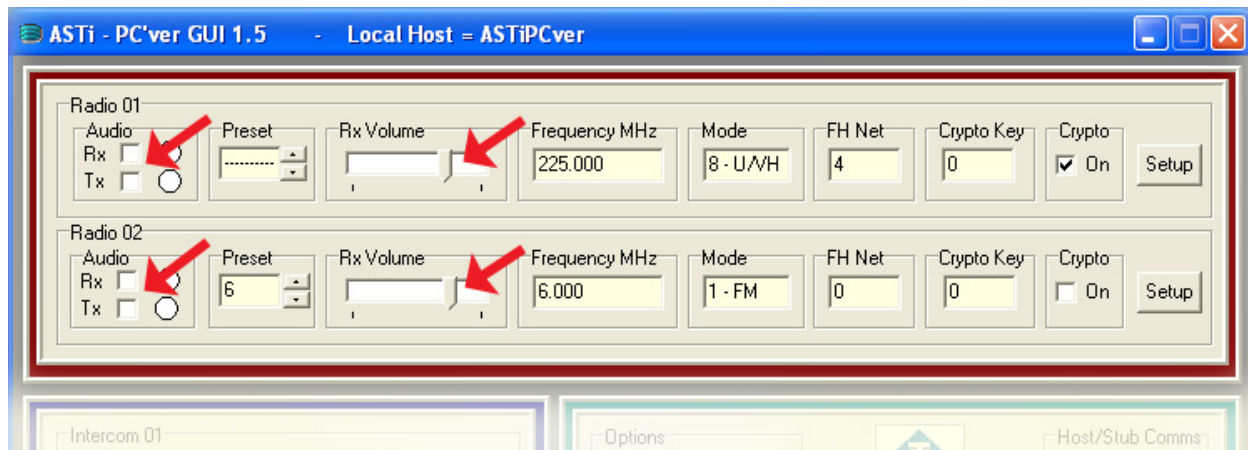


Figure 35: PC'ver GUI Radio Volume and Audio Control/Monitor

### 3.2.3. Intercom Control and Monitor Features

Each of the supported intercoms have five groups of controls/monitors. These five groups provide all of the functionality required for operational control and monitoring for the intercom.

#### Channel

The Channel edit box displays the current operating channel for the intercom. Valid operating channels for intercoms assume a frequency value between 1 Hz and 100,000 Hz, with each of the supported intercoms tuned to a unique channel frequency. To receive audio from a remote intercom, the remote intercom must be tuned to the same channel as the local intercom.

To select an operating channel for an intercom, double-click on the current channel display. Then enter a new operating channel (in Hz). If an invalid channel is entered, the Channel Box will turn red.

#### Rx Volume

The Rx Volume control provides facilities to vary the audio output volume for an individual intercom. The actual audio output volume is determined by multiplying the volume percentage for the individual intercom with the master audio output volume percentage.

#### Audio Control/Monitor

In the Intercom Audio group check the 'Rx' and 'Tx' to enable the radio receive and/or transmit. When transmit is enabled for an intercom in the ON state, the actual audio transmission will be determined by the selected intercom transmit option. That is, if VOX mode is selected for the intercom, transmission will only occur when the VOX condition is activated.

The Tx indicator turns green for the appropriate intercom when transmitting audio. When an intercom is receiving and playing audio, the Rx indicator will turn green.

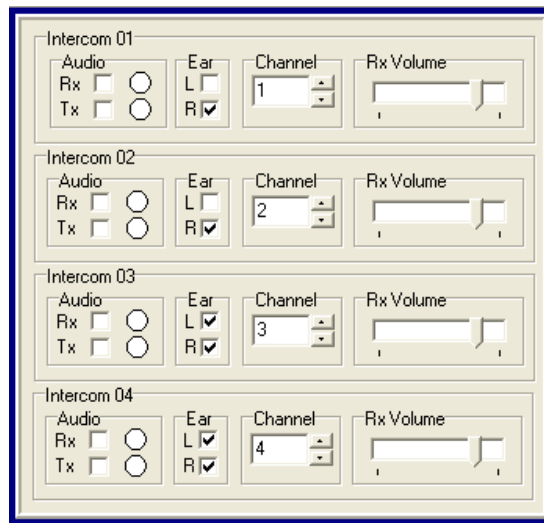


Figure 36: PC'ver GUI Intercom Control

## Appendix A: Troubleshooting

### Symptom: Receiving a “dinput8.dll” error message

If this message is received, then DirectX® 8.0 or higher has not been properly installed. Check the current version of DirectX by going to the START menu, select “RUN”, and enter “dxdiag”. If the DirectX version needs to be updated, go to the DirectX Homepage (<http://www.microsoft.com/windows/directx/default.aspx>) and download the latest version.

### Symptom: Audio Breakage

Performance testing of PC'ver has indicated that the main limiting factor in performance capability is the total PDUs per second on the DIS LAN.

The rule of thumb that stress testing has indicated is the ability to cope with around 4,000 PDUs per second for each GHz of processing power available. For example, a 2.0 GHz desktop PC should be able to cope with a total volume of DIS traffic of 8,000 PDUs per second.

### Symptom: No Audio

If problems are experienced with the audio, use the PC'ver Stub Self-test facility to:

- First verify audio output by playing a test wave file.
- Then test the microphone input by use of the loopback facility.

If problems are encountered with the inbuilt Self-test facility, check the following:

- The Windows default audio and default audio capture devices are selected to the correct hardware.
- The Windows Wave File play and Audio Capture volume settings are set close to the maximum values.
- Verify that the Radius USB device has been detected by the PC'ver Stub.
- Check any external hardware mute and/or volume controls that might exist.

### Symptom: No Communications Between PC'ver Stub & PC'ver GUI

If the communications between the PC'ver Stub and the PC'ver GUI are not working correctly, check the following:

- Ensure that both applications are trying to communicate on the same sub-net with matching broadcast masks or are selected to the same Multicast group.
- Ensure that the broadcast masks selected are compatible with the IP Mask selected under Windows for the sub-net. See ‘Troubleshooting Broadcast Masks’ in this Appendix for additional information.
- If the applications are running on the same PC, ensure that the network card is connected to a HUB as ethernet transmit/receive is required even if the applications are running on the same PC.
- Navigate to Windows Network Connections \ Local Area Connection Properties \ Internet Protocol (TCP/IP) Properties \ Advanced TCP/IP Settings in the Options tab in the TCP/IP Filtering properties. Ensure that **Permit All** is selected under the UDP Ports category **NOT Permit Only**. Then check the box **Enable TCP/IP Filtering (all adaptors)**.

### **Symptom: No Radio Communications with Remote Radios**

If valid communications between PC'ver and the PC'ver GUI are established, but the simulated radio(s) will not communicate with remote radios:

- Ensure that compatible DIS parameters are selected, especially the Exercise ID.
- Verify that TCP/IP communications is possible with the remote radio by Pinging the remote machine.
- Ensure that the sub-net settings at the local and the remote machines are compatible.
- Ensure that the same DIS Port number is being used by the local and remote machines.
- Ensure that the correct frequency is selected for the local and remote radios.
- Verify that DIS Transmitter and Signal PDUs are being received and transmitted by PC'ver.

### **Symptom: Poor Audio Quality Received by the Remote Radio**

If the remote radio is reporting receiving poor audio quality, check the current encoding scheme, audio capture sample rate and the number of data bytes transmitting in the radio and intercom PDUs.

In particular, look at the PC'ver GUI display of the current values, where the audio per Signal PDU in milliseconds is displayed along with the minimum data bytes per signal PDU. The millisecond value is calculated taking into account the encoding scheme, sample rate and the amount of data transmitted per Signal PDU.

While there is not an “absolute correct value” in practice, combinations that represent less than 30 ms worth of audio per Signal PDU will probably result in audio drop out due to transmission delays on the network.

### Symptom: Poor Audio Quality Received by the Local Radio

If poor audio quality is experienced for audio received by the local radio, try increasing the Play Delay ms parameter. If that does not improve the situation, check if it is possible for the remote radio to increase the amount of audio being transmitted per Signal PDU.

Windows will also become uninteruptible while doing certain manipulations, such as window dragging. Window dragging can cause intermittent break up of the audio stream. In order to alleviate this, make sure that the “Show windows contents while dragging” is unchecked. This is found by clicking the “Effects” button under the “Appearance” tab of the “Display Properties” as shown below.

If the Radio Diagnostic Tool is running in conjunction with PC'ver, this effect can become more pronounced.

The ASTi recommended hardware configuration for optimum performance when running the Radio Diagnostic Tool and PC'ver together is a 2.8 MHz Pentium 4 machine. Celeron processors with on-board graphics are not recommended for running the Radio Diagnostic Tool in conjunction with PC'ver. Celeron processors are capable of running PC'ver without the Radio Diagnostic Tool.

Audio quality of the local hardware may also be tested with the “Audio Output” test facility in the Self-test dialog box of the PC'ver Stub.

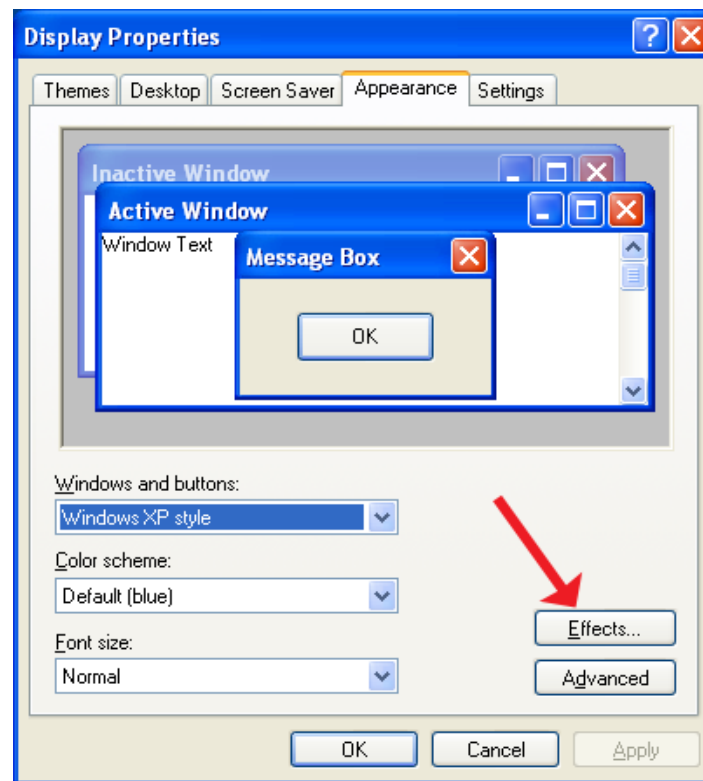


Figure 37: Windows Display Properties

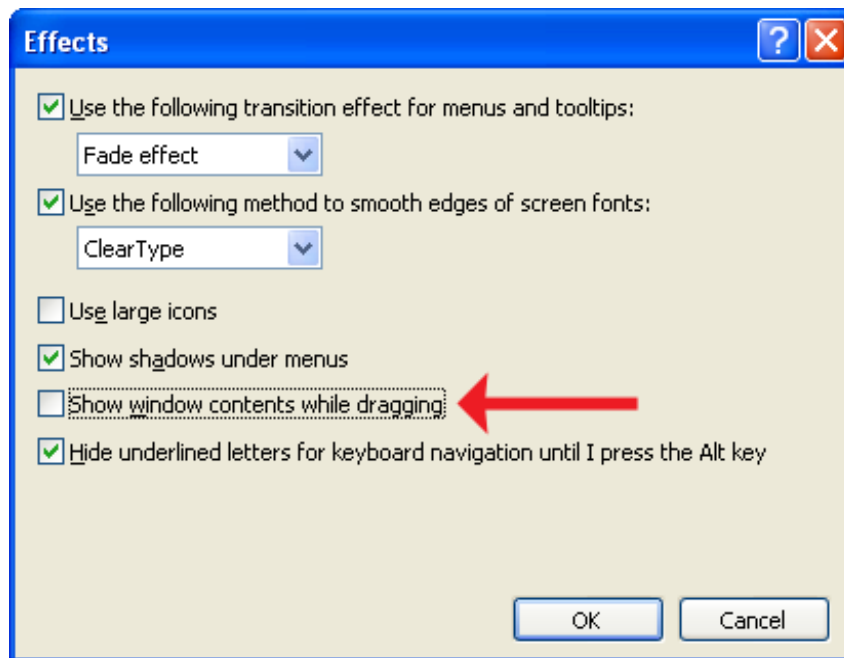


Figure 38: Windows Effects Properties

**Symptom: Software Does Not Recognize the Software License**

If you have purchased a software license and the application continues to run in the limited “free trial” mode you may need to turn on your Net Bios over TCP/IP. This allows the application to detect all MAC addresses running on your Windows XP workstation.

To turn on NetBIOS over TCP/IP:

1. Select **Start**, open the **Control Panel**, and then click “**Network and Internet Connections.**”
2. Click “**Network Connections.**”
3. Right-click on “**Local Area Connection,**” and then click “**Properties.**”
4. Select “**Internet Protocol (TCP/IP)**”, and then click “**Properties.**”
5. Click the “**General**” tab, and then click “**Advanced.**”
6. Select the “**WINS**” tab.
7. Under **NetBIOS** setting, select “**Enable NetBIOS over TCP/IP,**” and then click “**OK**” two times.
8. Click “**Close**” to close the Local Area Connection Properties dialog box.
9. Close the “**Network Connections**” window.

## Troubleshooting Broadcast Mask

PC'ver network settings must be configured to use subnet and broadcast masks that complement each other. The program will run significantly slower, and may freeze, if the subnet and broadcast masks are not set to the appropriate values. The broadcast mask must be set in both the PC'ver Stub and the PC'ver GUI; if these settings do not match, both programs will cease to communicate.

The PC'ver Stub and the PC'ver GUI settings default to a **broadcast mask of 0.0.0.255** (typical for a Class C network). If PC'ver is operating correctly, the PC'ver GUI's "Host/Stub Comms" status indicator box will turn green. If, however, the subnet and broadcast masks are not complementary, the box will turn red indicating a problem.

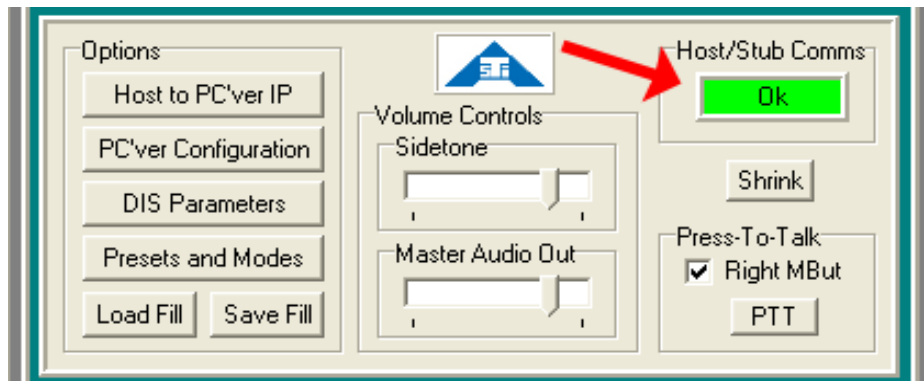


Figure 38: PC'ver GUI Host and PC'ver Stub Communications Indicator

## PC'ver GUI Network Settings

The first time the software is launched after installation, the network settings will automatically open. Otherwise, to change network settings in the PC'ver GUI, click the "Host to PC'ver IP" button in the bottom "Options" section.

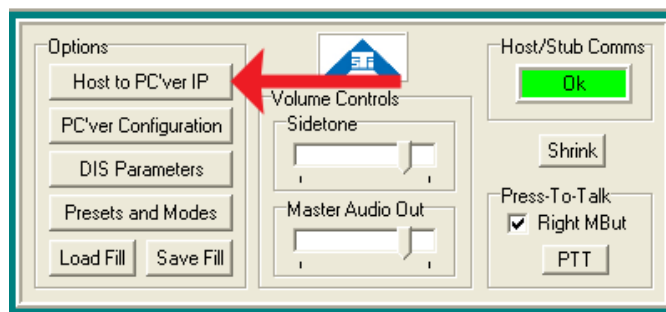


Figure 39: PC'ver GUI Options IP Address Settings

When the “**Select IP Address and Target PC'ver IP Address**” window opens, select the broadcast mask setting that complements your subnet mask (see examples below). To specify a broadcast mask other than the typical broadcast numbers shown, click on the “**User Specified Broadcast Mask**” option. Then, manually enter the broadcast mask dotted-quad in the boxes directly to the left.

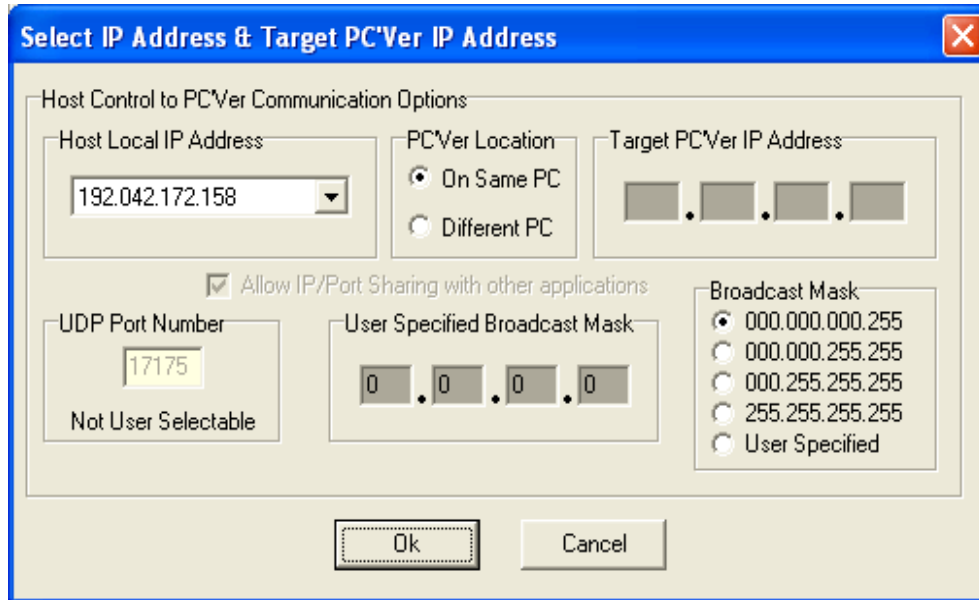


Figure 40: PC'ver GUI IP Settings

### Stub Network Settings

To access network settings in the PC'ver Stub click, the “**Set**” button in the “**DIS LAN Options**” section of the display. In the resulting window, set the broadcast mask as described above.

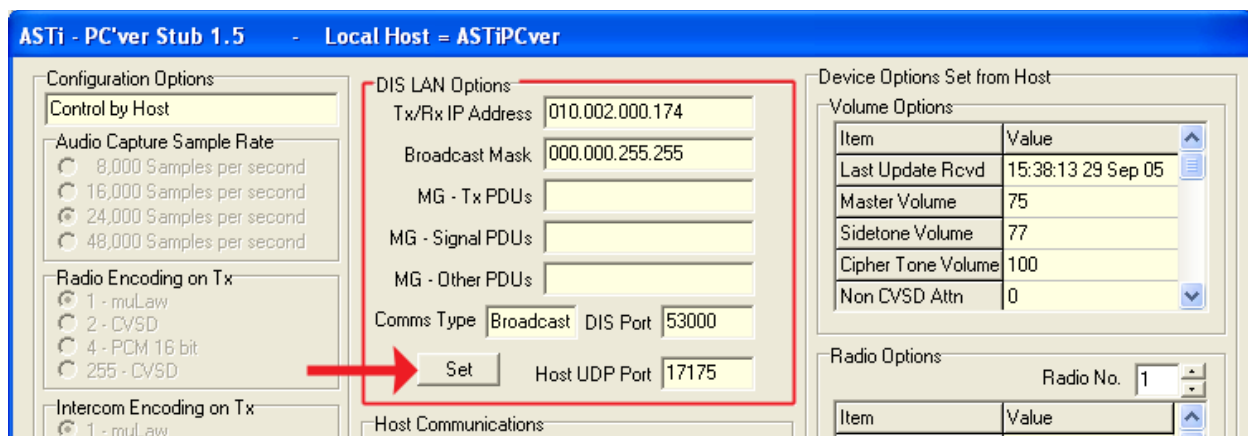


Figure 41: PC'ver Stub Network Settings

## Example Network Settings

The following table displays example Network Settings, note the complimentary subnet mask and broadcast mask settings.

<b>Typical Class A Network</b>	
Example IP:	10.1.1.1
CIDR:	/8
Subnet Mask:	255.0.0.0
Broadcast Mask:	0.255.255.255
<b>Typical Class B Network</b>	
Example IP:	172.16.1.1
CIDR:	/16
Subnet Mask:	255.255.0.0
Broadcast Mask:	0.0.255.255
<b>Typical Class C Network</b>	
Example IP:	192.168.1.1
CIDR:	/24
Subnet Mask:	255.255.255.0
Broadcast Mask:	0.0.0.255
<b>Special Case Class B</b>	
Example IP:	10.1.1.1
CIDR:	/20
Subnet Mask:	255.255.240.0
Broadcast Mask:	0.0.15.255

*Table 1: Network Settings*

## Appendix B: Customer GUI Development

Customers may develop their own PC'ver GUI using information contained in the published communications protocol, or PC'ver may be controlled by using the PC'ver GUI that is included as part of the PC'ver package. To aid the development of a customer designed GUI, both the PC'ver Stub and PC'ver GUI provide built-in diagnostic facilities to monitor the message exchange between the applications.

Details of the communications protocol between the PC'ver Stub and the PC'ver GUI are defined in the file HostPCRadioProtocol.h which is a standard C header file containing all the constant and structure definitions of the protocol. This file is available upon request.

## Appendix C: PC'ver Radius Volatility

### Volatile Memory

Volatile Memory	
Micro-controller Internal RAM 4 KB	No Temporary Program Storage  Remove Power Count to 30 Restore Power

### Non-Volatile Memory

Non-Volatile Memory	
128Kb EEPROM Firmware	No process to clear
64Kb ROM Firmware	No process to clear