



GAI-TRONICS® CORPORATION  
A HUBBELL COMPANY

# SP2 Configuration Guide

## TABLE OF CONTENTS

<i>Confidentiality Notice</i> .....	1
<i>Introduction</i> .....	1
<b>SP2 Station Design</b> .....	1
<b>SP2 System Configuration</b> .....	2
<b>SP2 Console</b> .....	2
<i>Provisioning</i> .....	2
<b>Local Provisioning</b> .....	2
Using PuTTY for SP2 Administration .....	2
Serial Port Connection (Out-of-Band).....	3
Network Connection (In-Band) .....	5
The Command Line Interface (CLI) .....	7
SP2 Station Local Configuration .....	9
Multicast Audio Communications .....	15
<b>TFTP Boot Provisioning</b> .....	21
<b>Mutual Provisioning</b> .....	21
System Configuration File—Section Labels.....	22
System Configuration File Profiles.....	23
Generating a System Configuration .....	24
Configuring the First SP2 Station .....	24
<i>The SP2 Console</i> .....	25
<b>Installation Requirements</b> .....	25
<b>Installation Procedure</b> .....	25
<b>Running the SP2 Console Application</b> .....	26
<b>Opening the SP2 Dashboard</b> .....	27
Dashboard Toolbar .....	28
SP2 Station Information and Control .....	29
Global Commands .....	31
Individual Station Commands.....	32
<b>Creating or Loading SP2 Mutual Provisioning Configurations</b> .....	33
Creating a New Configuration .....	33
Loading an Existing Configuration.....	33
<i>Mutual Provisioning with the SP2 Configuration Utility</i> .....	34
<b>Configuration Utility Menu Bar</b> .....	35
<b>SP2 Auxiliary Tasks</b> .....	35
Find Station.....	35
Search Button .....	36
Station List Button.....	36
Multicast Sockets.....	38

Software Paths .....	38
<b>Configuration Parameter Field Flags .....</b>	<b>38</b>
<b>Parameter Groups .....</b>	<b>39</b>
<b>Station Parameter Configuration and Precedence .....</b>	<b>39</b>
<b>Global System Properties Panel.....</b>	<b>40</b>
<b>Manage Groups Panel .....</b>	<b>41</b>
<b>Station View Panel .....</b>	<b>42</b>
<b>Manage Profiles Panel .....</b>	<b>44</b>
<b>Expandable Parameter Groups .....</b>	<b>45</b>
Global System Settings .....	45
Page Receive (Rx) Sockets .....	46
Page Transmit (TX) Sockets .....	46
Party Sockets.....	47
Audio Settings.....	47
LED/RTU/Miscellaneous .....	48
Network Settings.....	48
<i>Appendix A—Preventing Windows from Assigning Multiple COM Ports.....</i>	<i>49</i>
<i>Glossary of Terms .....</i>	<i>52</i>

## LIST OF TABLES

Table 1. Command Line Interface Commands .....	8
Table 2. General Station Parameters.....	11
Table 3. IP Parameters .....	12
Table 4. Server Parameters .....	13
Table 5. Input/Output Parameters .....	14
Table 6. Multicast Socket Parameters.....	16
Table 7. Handset Timeout Parameters .....	17
Table 8. F/W and Configuration Filename Parameters.....	18
Table 9. Audio Volume Parameters.....	18
Table 10. Diagnostic Parameters .....	19
Table 11. SP2 Input/Output States.....	20

## LIST OF FIGURES

Figure 1. Installing the SP2 Console.....	25
Figure 2. Installation Preferences.....	26
Figure 3. SP2 Console Initial Menu.....	27
Figure 4. Master Station Discovery .....	27
Figure 5. SP2 Discovered Stations.....	28
Figure 6. SP2 Dashboard Menu .....	28
Figure 7. Dashboard Options Dialog Box.....	29
Figure 8. SP2 Dashboard .....	30
Figure 9. Global Commands .....	31
Figure 10. Reboot Confirmation Dialog Box.....	31
Figure 11. Speaker Calibration Confirmation.....	31
Figure 12. Update Firmware Confirmation.....	31
Figure 13. Setting TFTP Server IP Address .....	32
Figure 14. Load Configuration .....	32
Figure 15. Reset Master Confirmation.....	32
Figure 16. Telnet Lock/Unlock.....	32
Figure 17. Master and Member SP2 Station Dashboards .....	33
Figure 18. Creating a New Configuration.....	33
Figure 19. SP2 Configuration Utility—System Properties Button .....	34
Figure 20. Configuration Utility Menu Bar .....	35
Figure 21. Save Changes Dialog Boxes.....	35
Figure 22. Find Station Utility .....	35
Figure 23. Station Not Found Dialog Box .....	36
Figure 24. Manage Stations Screen.....	36
Figure 25. Add Stations Dialog Box.....	37
Figure 26. Multicast Sockets Dialog Box .....	38
Figure 27. Configuration Software Paths Dialog Box .....	38
Figure 28. Section Label Buttons.....	38
Figure 29. Global System Properties Panel with Global System Settings Expanded .....	40
Figure 30. Manage Groups Panel.....	41
Figure 31. Station View Panel (No Station Selected).....	42
Figure 32. Station Shown in Station View Panel.....	43
Figure 33. Manage Profiles Panel .....	44
Figure 34. Global System Settings Panel.....	45
Figure 35. Page Receive (RX) Sockets Panel .....	46
Figure 36. Page Transmit (TX) Sockets Panel.....	46
Figure 37. Party Line Sockets Panel .....	47
Figure 38. Audio Settings Parameter Group.....	47
Figure 39. LED, RTU, and Miscellaneous Parameters.....	48
Figure 40. Network Settings Parameters.....	48



GAI-TRONICS® CORPORATION  
A HUBBELL COMPANY

# SP2 Configuration Guide

---

## Confidentiality Notice

This manual is provided solely as an installation, operation, and maintenance guide, which contains sensitive business and technical information, that is confidential and proprietary to GAI-Tronics. GAI-Tronics retains all intellectual property and other rights in or to the information contained herein, and such information may only be used in connection with the operation of your GAI-Tronics product or system. This manual may not be disclosed in any form, in whole or in part, directly or indirectly, to any third party.

## Introduction

This guide provides information on the configuration and programming of GAI-Tronics' range of SP2 Handset/Speaker Amplifier Stations. The GAI-Tronics SP2 station is a modular industrial multicast Voice over Internet Protocol (VoIP) communications system that can include from two to 4,096 stations. SP2 handset/speaker amplifier stations have been designed to mimic the behavior of GAI-Tronics traditional analog Page/Party® stations using a 100 Mbps Ethernet network infrastructure rather than a multi-pair cable platform. Ethernet switches and routers detect and isolate network faults so the loss of a single station will not adversely affect the system as a whole.

SP2 stations require a 100 Mbps link to an Ethernet switch or router and therefore must be wired using Category 5 or better cable. To ensure the quality of SP2 audio, it is recommended that SP2 network traffic be isolated from other devices and that network switches and routers be properly configured for Internet Group Management Protocol (IGMP) snooping and multicast filtering. Public connectivity to the network used by the SP2 stations should be eliminated to ensure the security of the SP2 network system. Maximum cable runs between SP2 stations and network switches are limited to 100 meters to comply with Ethernet standards.

A major difference between SP2 handset/speaker amplifier stations and analog Page/Party® stations is that the audio communication channels between SP2 devices are software configured rather than hardwired connections. This allows flexibility when establishing different communication zones throughout a system and additional stations can easily be added to the system at any time.

GAI-Tronics SP2 handset/speaker amplifier stations are available in a variety of models & styles, including handset and amplifier only models. The configuration methods covered in this manual are common to all models.

## SP2 Station Design

SP2 stations are designed around a digital signal processor with integral Ethernet NIC and 64 MB of ram. The digital signal processor is programmed to implement Ethernet, audio manager, command line interface (CLI), configuration monitor, general I/O manager, health monitor, SMTP, Telnet, and TFTP services. An on board external supervision circuit is used to detect issues in the running processes and services and will automatically reboot the device if a problem is detected.

## SP2 System Configuration

There are three methods for configuring SP2 stations in an SP2 system; local, TFTP boot, and mutual provisioning. Using local configuration mode, the configuration of each SP2 station is defined by setting all of the locally stored configuration parameters on each device. TFTP boot provisioning provides a method of configuring SP2 systems by using individual station configuration files stored on a TFTP server. The mutual provisioning method allows an administrator to design an entire SP2 system architecture by setting up one or more SP2 stations as masters that serve a standardized configuration to all of the other SP2 stations in the system.

**SP2 RELEASE NOTE:** The second octet of the Page and Party Sockets was changed from .0 to .1 in firmware version 1.3.2. SP2 stations running older firmware must be updated or the second octet of the IP address must be changed to .1 for these stations to communicate with stations running newer firmware.

## SP2 Console

The SP2 Console is a graphical application developed to simplify the configuration of SP2 systems and is the most straightforward method for implementing SP2 systems using mutual provisioning. The application presents expandable groups of settings arranged around the top down system, group, station, and profile hierarchy of the mutual provisioning configuration file. This organizes the information and facilitates the creation of the master file used by all of the SP2 stations in a mutually provisioned SP2 environment. The application also provides methods for pushing configurations to the SP2 stations to implement the mutual provisioning process and provides SP2 station information.

## Provisioning

### Local Provisioning

There are two ways to locally manage SP2 stations; in-band management and out-of-band management. In-band management entails connecting to a station through an existing network infrastructure using a telnet connection from an administrative computer. If the network is down or the station is unreachable; out-of-band management must be used to configure the device. Out-of-band management requires a direct USB cable connection from an administrative computer to the SP2 station for administration.

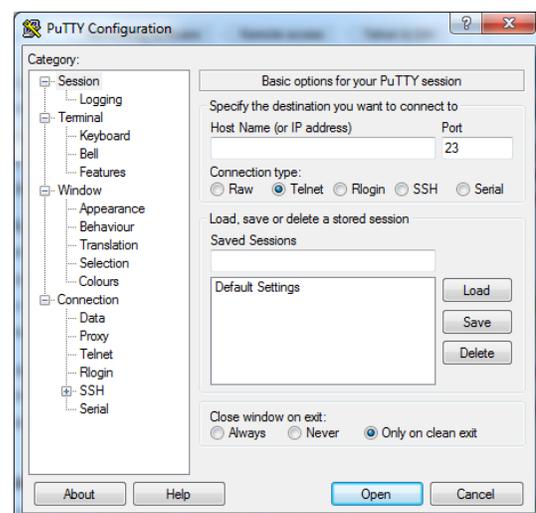
Upon accessing an SP2 station using either in-band or out-of-band management, the administrator is prompted for credentials. After successful authentication, read/write access to all of the station's configuration parameters is permitted. The administrator then connects to each station in turn and configures their individual configuration parameters as necessary.

### Using PuTTY for SP2 Administration

PuTTY is a program used for and network file transfers. Several are supported for in-band management including and raw socket connections. For Out-of-Band management, a serial port connection has been supported since version 0.59.

PuTTY can be downloaded from various Internet sites. After downloading, install PuTTY on the administrative computer and then run the application.

Upon start-up, the PuTTY configuration screen will appear as shown:



Prior to connecting to an SP2 station, additional information must be entered to define the type of connection to be used (In-Band or Out-of-Band). In-band connections utilize the LAN for communication and require the entry of each SP2 station's IP address and selection of telnet for the connection type. Out of band connections are setup on the SERIAL page located under the CONNECTION group of the CATEGORY panel in the PuTTY Configuration window.

### Serial Port Connection (Out-of-Band)

With the SP2 station energized, connect a USB cable between the administrative PC (Windows 7 or later) and the SP2 printed circuit board. The USB cable must be a USB-A to USB-B type as shown.

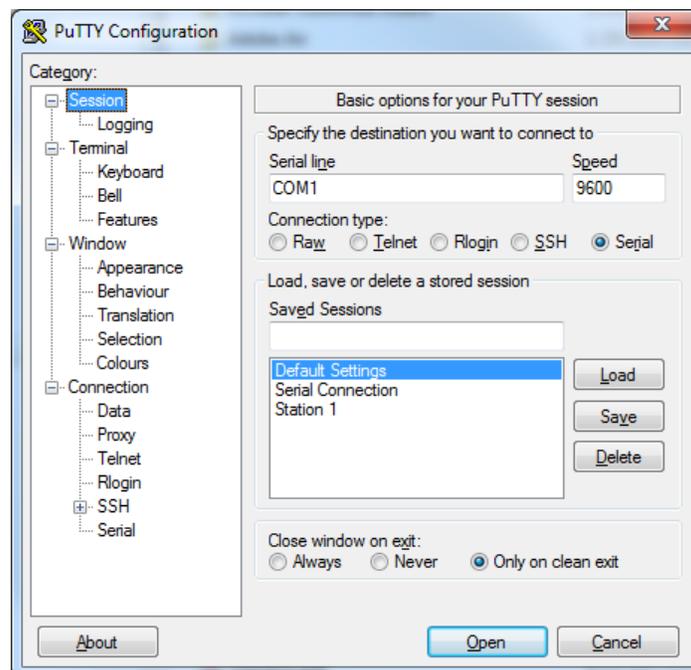


Upon connection to the SP2 station, the serial port drivers will be automatically loaded and a COM port number will be assigned to the USB port on the Administrative PC. Find the assigned COM port number assigned to this connection by looking it up in *Device Manager* located in the Windows control panel. The COM port number must be entered into the PuTTY application later.

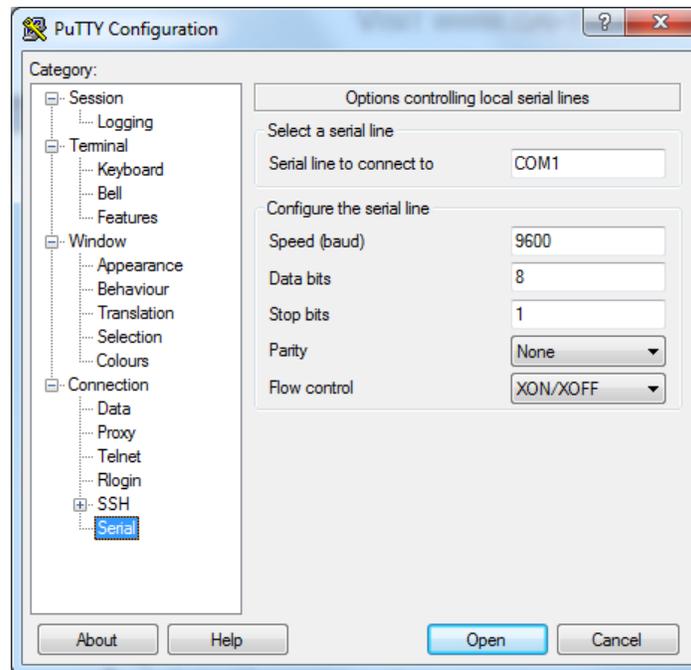
**NOTE:** If Windows doesn't automatically locate and install the proper Virtual COM Port (VCP) driver then it will need to be downloaded from FTDI's website at <http://www.ftdichip.com>.

**NOTE:** Windows may assign a new COM port for each SP2 station that is connected to the administrative PC. To avoid this the registry can be modified to reuse the same COM port for all SP2 devices. See [Appendix A—Preventing Windows from Assigning Multiple COM Ports](#) for instructions.

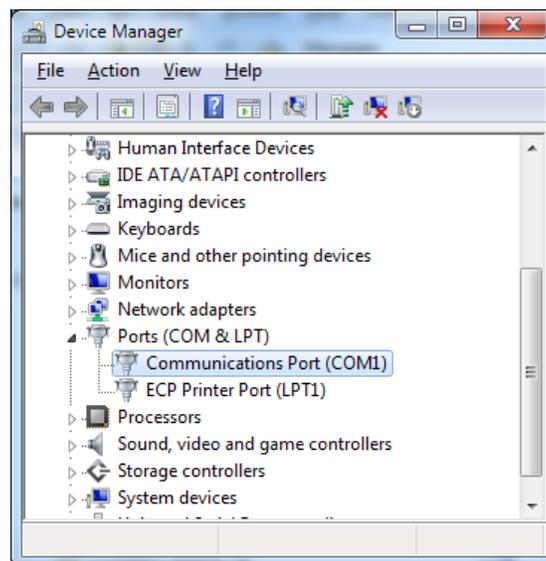
1. Run the PuTTY software.
2. In the SESSION settings page in the CATEGORY panel select SERIAL for the connection type. Do not worry about the remaining serial port settings here, they will be set in the next screen. Note that sessions can be named and saved for future use when connecting to SP2 stations.



3. Navigate to the SERIAL settings page under the CONNECTION group in the CATEGORY panel.



4. Enter the COM port number in the SERIAL LINE TO CONNECT TO field of the PuTTY Serial configuration screen. (The COM port information is found on the Device Manager screen below).

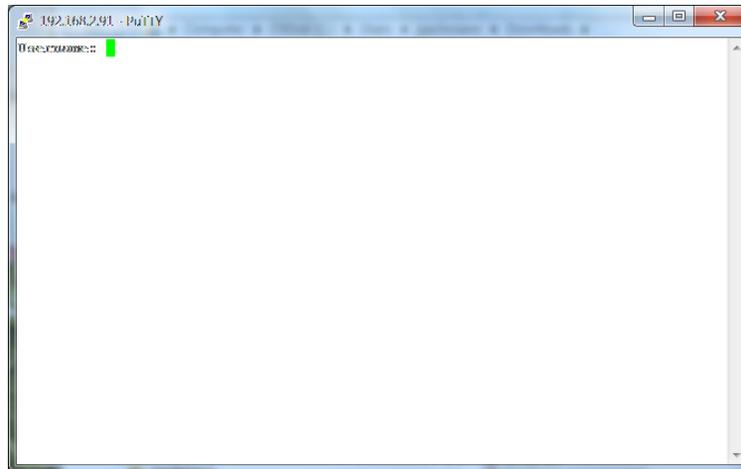


5. Enter the serial line parameters in the PuTTY configuration screen above as follows:

**NOTE:** These values must match the values found on the port settings tab in the COM port properties dialog box in device manager.

- Speed (Baud): 57600
- Data Bits: 8
- Stop Bit: 1
- Parity: None
- Follow Control: None

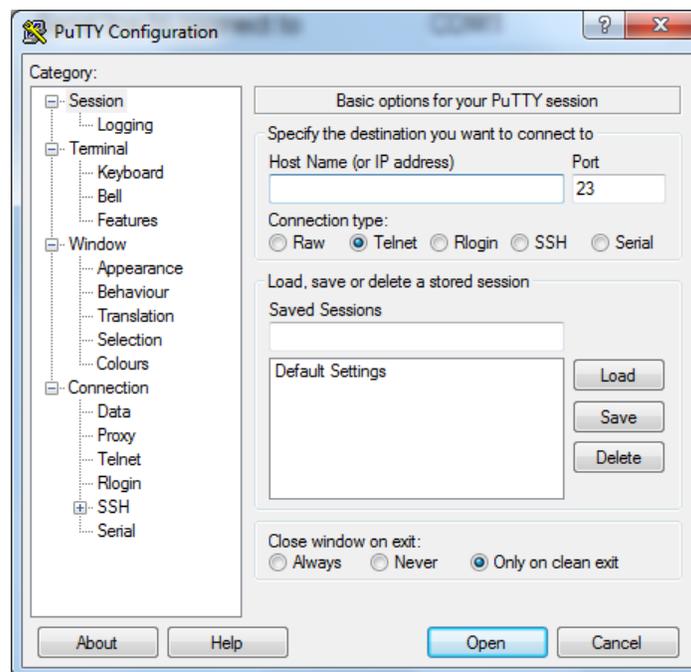
6. Select OPEN. The following log-in screen will appear upon successful connection to the SP2 station.



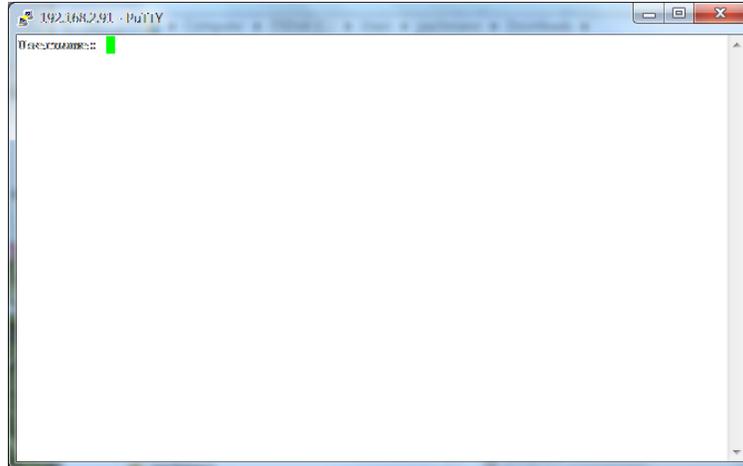
7. Enter the user name: USER
8. Enter Password: PASS

### Network Connection (In-Band)

1. Run the PuTTY software.
2. On the SESSION settings page in the CATEGORY panel, enter the host name or the IP address of the SP2 station.
3. For the CONNECTION TYPE, select the TELNET radio button
4. Select OPEN.



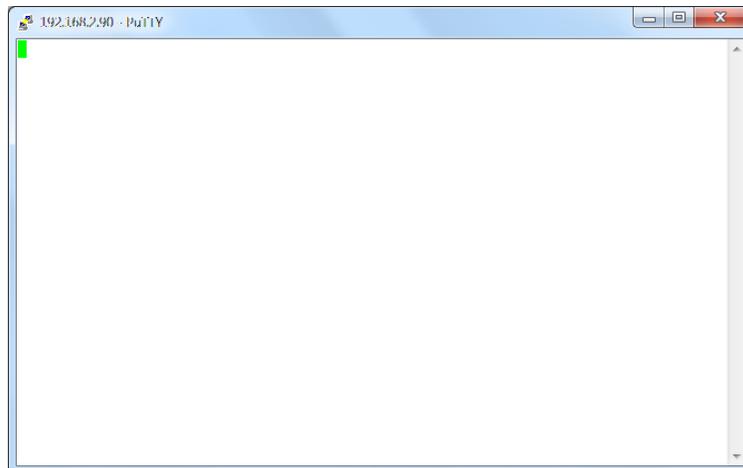
- The following log-in screen will appear upon successful access to the SP2 station.



- Enter the user name: **USER**

- Enter Password: **PASS**

**NOTE:** If the SP2 station cannot be reached, the screen will appear blank as shown below.



## The Command Line Interface (CLI)

Once connected to an SP2 station using telnet via the network or a USB serial connection, an administrator can alter a station's configuration parameters using the CLI. The command line is simply a place where you enter commands for the SP2 station to execute. The SP2 station will attempt to carry out any command that it understands. The syntax of the SP2 commands can have up to three parts: 1) the command name, 2) the configuration parameter name, and 3) the setting name or value. The command name always comes first. The configuration parameter and setting come next but have different rules depending on which SP2 command is being issued. Some commands do not act upon parameters that store values to act upon. These commands simply execute when entered.

Below are examples of the command line syntax for some commonly used SP2 commands. All valid commands, parameters, and settings are listed and described in Tables 1 through 11 on the following pages.

1. Retrieve all the current configuration parameters and their settings

ENTER:

> **get ALL**

2. Retrieve the SP2 station's MAC address

ENTER:

> **get MAC**

3. Change the station's IP Address to 192.168.1.50

ENTER:

> **set ADDRESS 192.168.1.50**

4. Change the multicast socket (IP address & port number) assigned to party line #1.

- Address = 239.1.0.1
- Port = 50000

ENTER:

> **set PARTY\_1\_SOCK 239.1.0.1:50000**

5. Change the multicast socket (IP address & port number) that the SP2 will transmit on when the paging. If using the multi-zone page switch option, this would be position "A" on the page selector switch.

- Address = 239.1.1.1
- Port = 50002

ENTER:

> **set PAGETX\_A\_SOCK 239.1.1.1:50002**

6. Change the first multicast socket (IP address & port number) that the SP2 will monitor for incoming pages.

- Address = 239.1.1.1
- Port = 50002

ENTER:

> **set PAGERX\_1\_SOCK 239.1.1.1:50002**

Table 1. Command Line Interface Commands

Command Name	Description
<b>GET</b> <PARAMETER> or <PARAMETER GROUP>	<p>Returns the currently programmed value in the specified &lt;PARAMETER&gt; or &lt;PARAMETER GROUP&gt;</p> <p>The following tables provide information for each individual <i>PARAMETER</i>:</p> <p><u>Table 2</u> for General Station Parameters,  <u>Table 3</u> for IP Parameters,  <u>Table 4</u> for Server Parameters,  <u>Table 5</u> for Input/Output Parameters,  <u>Table 6</u> for Multicast Socket Parameters,  <u>Table 7</u> for Handset Timeout Parameters,  <u>Table 8</u> for Firmware and Configuration Filename Parameters,  <u>Table 9</u> for Audio Volume Parameters, and  <u>Table 10</u> for Diagnostic Parameters.</p> <p>A parameter group is a collection of similar parameters. Valid <i>PARAMETER GROUPS</i> are:</p> <ul style="list-style-type: none"> <li>• ALL</li> <li>• IP</li> <li>• OUTPUTS</li> <li>• PARTY</li> <li>• PAGERX</li> <li>• PAGETX</li> <li>• VOLUME</li> </ul> <p>Each parameter and its current setting is returned; separated by carriage return/line feeds.</p>
<b>SET</b> <PARAMETER> <SETTING>	<p>Changes the &lt;SETTING&gt; for the specified &lt;PARAMETER&gt;</p> <p>Refer to the tables listed in the <b>GET</b> command above for information about each <i>PARAMETER</i>.</p>
<b>REBOOT</b>	<p>Resets the SP2 Station.</p> <p><b>NOTE:</b> The station must be reset to accept any value changes in its configuration. Following a <b>REBOOT</b> command; if necessary, the administrator must re-connect to the unit through a serial or network telnet connection.</p>
<b>SAVECFG</b>	<p>Sends the station's current configuration data to the TFTP server specified in the <i>TFTPSERVER</i> parameter. The configuration data is saved to a text file using the pathname specified in the <i>CFG_FILENAME</i> parameter.</p> <p><b>NOTE:</b> If the file transfer is successful, the message "Configuration File Download Successful" is returned.</p>
<b>LOADCFG</b>	<p>Retrieves the configuration file stored in the pathname specified in the <i>CFG_FILENAME</i> parameter from the TFTP server specified in the <i>TFTPSERVER</i> parameter.</p> <p><b>NOTE:</b> If the file transfer is successful, the message "Configuration File Upload Successful" is returned.</p> <p>The file parameters are then stored as the station's new configuration and the station will automatically reboot to implement the new configuration.</p>

<b>Command Name</b>	<b>Description</b>
<b>UPDATE</b> <FILE>	Perform a firmware update from the TFTP server specified by the <b>TFTPSERVER</b> parameter using the pathname specified in the <FILE> argument.
<b>RSTFAC</b>	Restore all factory default settings as stored in the SP2 firmware and automatically reboot the SP2 station. <b>NOTE:</b> The speaker calibration value is not reset by this command.
<b>LOADFACCFG</b>	Restores all parameters stored on the TFTP server in the pathname defined in the <b>FAC_FILENAME</b> parameter. The <b>TFTPSERVER</b> parameter must be defined.
<b>EMAIL</b>	Sends a test email The “To” and “From” email addresses are defined in the <b>SMTPTO</b> and <b>SMTPFROM</b> parameters. The <b>SMTPSERVER</b> , <b>SMTPPORT</b> , and <b>SMTPPASS</b> parameters must already be defined in the stations configuration.
<b>STATUS</b>	Returns the current status of the SP2 station, including the software version, configuration version, group and station IDs, currently selected page and party lines, and the RTU input/output and fault status. If the <b>CFG_MODE</b> parameter is set to <b>MUTUAL</b> , it will also report the current master group and station ID, master station IP address, mutual provisioning state, and the mutual provisioning checksum.
<b>TIME</b>	Returns the time currently stored in the station’s real time clock in UTC.
<b>SPKRCALIB</b>	Performs a self-diagnostic speaker calibration test for speaker monitoring and stores the results in flash memory. Station speaker calibration should be cleared and repeated whenever a station is relocated or a speaker is rewired/replaced. The command “SET SPKR_CALIB 0” will reset this parameter.

### SP2 Station Local Configuration

Each SP2 Station stores its own configuration containing the values set for each parameter for proper operation within the SP2 system. The configuration defines many parameters such as the station identity on the network, audio connections to other stations, and operating parameters such as volume levels, etc. Below is a sample configuration file showing all of the parameters with their factory default settings. Tables two through ten below provide information on each parameter grouped by function. Table eleven provides the input/output states used to control the internal LEDs and the output RTU contacts.

## Listing 1. Default SP2 Station Parameters

```

UNIT=SP2;
SERIAL=0000;
DESIGNATION=FACTORY;
VERSION=0;
CFG_MODE=MUTUAL;
MASTERLIST=0.01,0.02,0.03;
MAC=00:17:AE:00:00:F6;
HOSTNAME=GTC-0000;
NWMODE=DHCP;
ADDRESS=0.0.0.0;
MASK=0.0.0.0;
GATEWAY=0.0.0.0;
DNS=0.0.0.0;
ACTTL=8;
MCTTL=8;
TFTPSEVER=0.0.0.0;
SMTPSEVER=0.0.0.0;
SMTPPORT=25;
SMTPFROM=PHONENAME@NETWORK.COM;
SMTPTO=NAME@COMPANY.COM;
SMTPPASS=pass;
SNTPSEVER=0.0.0.0;
SNMPSEVER=0.0.0.0
SNMPPORT=162;
CONTROL_SOCKET=239.239.239.239:50000;
PROVISION_SOCKET=239.255.0.255:1000;
LED1=OFF;
LED2=OFF;
LED3=OFF;
LED4=OFF;
LED5=OFF;
RTU_OP1=OFF;
RTU_IP1=OFF;
RTU_IP2=OFF;
RS_IP1=OFF;
RS_IP2=OFF;
PARTY_1_SOCKET=239.1.0.1:50000;
PARTY_2_SOCKET=239.1.0.2:50000;
PARTY_3_SOCKET=239.1.0.3:50000;
PARTY_4_SOCKET=239.1.0.4:50000;
PARTY_5_SOCKET=239.1.0.5:50000;
PAGERX_1_SOCKET=239.1.1.1:50002;
PAGERX_1_PPIO=1;
PAGERX_1_OUT=BOTH;
PAGERX_2_SOCKET=239.1.1.2:50002;
PAGERX_2_PPIO=2;
PAGERX_2_OUT=BOTH;
PAGERX_3_SOCKET=239.1.1.3:50002;
PAGERX_3_PPIO=3;
PAGERX_3_OUT=BOTH;
PAGERX_4_SOCKET=239.1.1.4:50002;
PAGERX_4_PPIO=4;
PAGERX_4_OUT=BOTH;
PAGERX_5_SOCKET=239.1.1.5:50002;
PAGERX_5_PPIO=5;
PAGERX_5_OUT=BOTH;
PAGERX_6_SOCKET=0.0.0.0:0;
PAGERX_6_PPIO=6;
PAGERX_6_OUT=BOTH;
PAGERX_7_SOCKET=0.0.0.0:0;
PAGERX_7_PPIO=7;
PAGERX_7_OUT=BOTH;
PAGERX_8_SOCKET=0.0.0.0:0;
PAGERX_8_PPIO=8;
PAGERX_8_OUT=BOTH;
PAGETX_A_SOCKET=239.1.1.1:50002;
PAGETX_A_DEFER=TRUE;
PAGETX_A_PRE=FALSE;
PAGETX_B_SOCKET=239.1.1.2:50002;
PAGETX_B_DEFER=TRUE;
PAGETX_B_PRE=FALSE;
PAGETX_C_SOCKET=239.1.1.3:50002;
PAGETX_C_DEFER=TRUE;
PAGETX_C_PRE=FALSE;
PAGETX_D_SOCKET=239.1.1.4:50002;
PAGETX_D_DEFER=TRUE;
PAGETX_D_PRE=FALSE;
PAGETX_E_SOCKET=239.1.1.5:50002;
PAGETX_E_DEFER=TRUE;
PAGETX_E_PRE=FALSE;
600OHM_TX_SOCKET=0.0.0.0:0;
600OHM_TX_DEFER=TRUE;
600OHM_TX_PRE=FALSE;
MUTE_SPKR=TRUE;
HSINVERT=FALSE;
HSTIMEOUT=8;
PBTIMEOUT=2;
CFG_FILENAME=%HOST-CFG.TXT;
FAC_FILENAME=FILENAME.TXT;
HANDSETVOL=250;
HEADSETVOL=100;
MICVOL=30;
AMPVOL=4;
ALS_ENABLE=FALSE;
ALS_OFFSET=10;
600OHM_OUT_VOL=775;
MUTE1=00:00:00:00;
MUTE2=00:00:00:00;
MUTE3=00:00:00:00;
MUTE4=00:00:00:00;
MUTE5=00:00:00:00;
MUTE6=00:00:00:00;
EZALLCALL=FALSE;
DIAGS=HANDSET+SPEAKER;
PROFILE=0;
TELNET_LOCK=FALSE
ENC=FALSE

```

**NOTE:** Additional parameters and their stored values may appear when executing “GET” commands. These parameters are reserved for future functions and are not explained in this manual.

The following tables provide information about the various system parameters. When a parameter has a default setting, that setting is **bold** in the tables below.

Table 2. General Station Parameters

<b>Parameter Name</b>	<b>Description &amp; Valid Settings</b>
<b>UNIT</b>	Defines the device as belonging to the SP2 family of stations. This value cannot be changed. <b>SP2</b>
<b>SERIAL</b>	The station's serial number assigned by GAI-Tronics during manufacturing. (Read Only)
<b>DESIGNATION</b>	The system designation is a string value in the configuration file that indicates the name of the SP2 system when <b>CFG_MODE</b> is set to <b>MUTUAL</b> . There can be only one system designation on a network.
<b>VERSION</b>	The station's current configuration version. This parameter is used when <b>CFG_MODE</b> is set to either <b>TFTP</b> or <b>MUTUAL</b> . It is important to update the <b>VERSION</b> parameter in the configuration file by one whenever making a change to the configuration. The SP2 stations use this in conjunction with the CRC of the file to determine whether to use and save these parameters.
<b>CFG_MODE</b>	Defines how a station will acquire its configuration parameters on boot-up. Valid settings are: <ul style="list-style-type: none"> <li>• <b>STD</b>—On Boot-up, load the locally stored configuration settings.</li> <li>• <b>TFTP</b>—On boot-up, load the configuration settings from the pathname specified in <b>CFG_FILENAME</b> from the TFTP server specified in <b>TFTPSERVER</b></li> <li>• <b>MUTUAL</b>—Load a master configuration file that contains information for all SP2 stations on a network. The designated master SP2 station distributes these parameters to the appropriate SP2 stations.</li> </ul>
<b>MASTERLIST</b>	Contains a list of the group and station numbers of the master SP2 stations in a system in order from highest to lowest priority. The list is formatted as follows: G.SS, G.SS, ... (G=Group, S=Station Number). Example 0.01, 0.02, 0.03 Only applicable if <b>CFG_MODE</b> = <b>MUTUAL</b> . <b>Do NOT</b> modify this parameter.
<b>PROFILE<sub>n</sub></b> (n = 0–9)	When <b>CFG_MODE</b> is set to <b>MUTUAL</b> a unit with this parameter configured will apply the settings located in the [PROFILE <sub>n</sub> ] section of the mutual configuration file obtained from the master station where n:=0–9.
<b>MAC</b>	Media Access Control (MAC) address; also called the physical address, is a unique identifier assigned to network interfaces for communication on a physical network segment. GAI-Tronics is assigned the prefix 0017AE; therefore, all MAC addresses for SP2 stations will be: 00:17:AE:xx:xx:xx (where "x" can be 0–F). <b>NOTE:</b> This address must be unique among all devices on a network. <b>NOTE:</b> MAC addresses are factory configured and cannot be changed by the end user. This parameter is read only.
<b>HOSTNAME</b>	A unique name to identify a station on the network. A maximum of 32 characters consisting of "a–z", "0–9" and "-" can be used. The default hostname is assigned using the station's serial number.

Parameter Name	Description & Valid Settings
<b>NWMODE</b>	<p>Defines how the station acquires its IP Address. Valid settings are:</p> <ul style="list-style-type: none"> <li>• Static—set using the <i>ADDRESS</i> parameter.</li> <li>• <b>DHCP</b>—acquires the address from a DHCP Server on the network.</li> </ul> <p><b>NOTE:</b> If <i>NWMODE</i> is set to <b>DHCP</b> and no DHCP server is present then after approximately four minutes the station will assign itself an Automatic Private IP Address (APIPA). The stations will then function correctly if the page and party sockets have been configured correctly. This condition should be resolved as quickly as possible.</p>
<b>TELNET_LOCK</b>	<p>This setting controls the telnet service on the SP2 stations. Valid settings are:</p> <ul style="list-style-type: none"> <li>• TRUE—The telnet service is disabled on the SP2 stations.</li> <li>• FALSE—Telnet is not disabled.</li> <li>• <b>Not Configured</b></li> </ul> <p><b>NOTE:</b> If the <b>TELNET_LOCK</b> parameter is configured in the configuration file then the telnet lock function in the SP2 Dashboard will be overridden for the stations to which the setting applies.</p>
<b>ENC</b>	<p>This setting controls the encryption of the provisioning channel. Valid settings are:</p> <p>TRUE—The provisioning channel used for obtaining the configuration from the master is encrypted.</p> <p>FALSE—The provisioning channel is not encrypted.</p> <p><b>NOTE:</b> This setting is only compatible with SP2 hardware versions &gt;= 1.3.0.</p>

Table 3. IP Parameters

Parameter Name	Description & Valid Settings
<b>ADDRESS</b>	<p>Stores the station's IP address: IPv4 format: 0.0.0.0–255.255.255.255</p> <p>Refer to <i>Private IP Addresses</i> in the Glossary of Terms section of this manual for valid IPv4 addresses and formatting.</p> <p><b>NOTE:</b> If the <i>NWMODE</i> parameter is set to <b>DHCP</b>, this parameter will be provided by the DHCP server.</p>
<b>MASK</b>	<p>Stores the station's subnet mask, which identifies the subnet that the IP address belongs to. IPv4 format: 0.0.0.0–255.255.255.254. The default SP2 network is class C with the corresponding mask set to 255.255.255.0.</p> <p><b>NOTE:</b> If the <i>NWMODE</i> parameter is set to <b>DHCP</b>, this parameter will be provided by the DHCP server.</p>

<b>Parameter Name</b>	<b>Description &amp; Valid Settings</b>
<b>GATEWAY</b>	The IP Address of the subnet's default gateway in IPv4 format. <b>NOTE:</b> If the <i>NWMODE</i> parameter is set to <b>DHCP</b> , this parameter will be provided by the DHCP server.
<b>DNS</b>	The IP address of the domain name server in IPv4 format. <b>NOTE:</b> If the <i>NWMODE</i> parameter is set to <b>DHCP</b> ; this parameter will be provided by the DHCP server.
<b>ACTTL</b>	Audio Time to Live (TTL) determines the number of router hops that audio data will traverse before being discarded. Valid settings: 1 to 255
<b>MCTTL</b>	Multicast Time to Live (TTL) determines how many router hops an IP data packet can make in the network before being discarded. This is used by the control and provisioning sockets. Valid settings: 1 to 255
<b>CONTROL_SOCK</b>	This multicast socket is used by the SP2 Dashboard and Console to discover and control SP2 units in a network. Do NOT modify this parameter.
<b>PROVISION_SOCK</b>	While <i>CFG_MODE</i> is set to <b>MUTUAL</b> this channel is used for communication among SP2's. Do NOT modify this parameter.

Table 4. Server Parameters

<b>Parameter Name</b>	<b>Description &amp; Valid Settings</b>
<b>TFTPSERVER</b>	IP address of the TFTP Server in IPv4 format.
<b>SMTPSERVER</b>	IP address of the SMTP server in IPv4 format.
<b>SMTPPORT</b>	The port number for the email server. Commonly used SMTP ports: 25 or 587
<b>SMTPFROM</b>	The email address of the mailbox account used to send the email. It appears in the "FROM" field when the SP2 station sends an email. e.g. PHONENAME@NETWORK.COM
<b>SMTPTO</b>	This is the email address appearing in the "TO" field when the SP2 station sends an email. e.g. NAME@COMPANY.COM
<b>SMTPPASS</b>	Password of the sending account used for authentication to the SMTP server
<b>SNTPSERVER</b>	IP address of the time server in IPv4 format
<b>SNMPSERVER</b>	IP address of the simple network management protocol server for monitoring. Default is <b>0.0.0.0</b> for disabled The SNMP MIB can be found on the resources tab at <a href="http://www.gai-tronics.com">www.gai-tronics.com</a> .
<b>SNMPPORT</b>	Port of the SNMP monitoring server.

Table 5. Input/Output Parameters

<b>Parameter Name</b>	<b>Description &amp; Valid Settings</b>
<b>LED<sub>n</sub></b> ( <b>n</b> = 1,2,3,4, or 5)	<p>The SP2 circuit board contains five LEDs that can be used for diagnostic purposes when performing maintenance or system commissioning. The LEDs can be configured to turn ON when various station conditions are true. Each LED (1–5) is programmed individually.</p> <p>Valid output conditions to turn on an LED are provided in <a href="#">Table 11</a></p>
<b>RTU_OP1</b>	<p>The SP2 station provides an output relay contact that can be used for signaling or activation of external devices. The relay can be configured to turn ON during various station operating conditions.</p> <p>Valid output conditions to control RTU_OP1 are provided in <a href="#">Table 11</a></p>
<b>RTU_IP<sub>n</sub></b> ( <b>n</b> = 1 or 2)	<p>The SP2 station provides two input circuits to monitor voltage free switch contacts, beacon cabling, or speaker loop cabling. Each input must be configured for the function being used.</p> <ul style="list-style-type: none"> <li>• When monitoring input switch(s), the SP2 can be configured to send an email and/or activate the RTU relay output. The input switch cabling can be monitored for line faults by installing end-of-line resistors.</li> <li>• When monitoring the cabling for a beacon or speaker loop, the station can be configured to send an email when a line fault is detected.</li> </ul> <p>Refer to the SP2 hardware manual for connection details.</p> <p>Valid settings are:</p> <ul style="list-style-type: none"> <li>• <b>Off:</b> Input circuit default</li> <li>• <b>NO:</b> Normally open switch with no line supervision</li> <li>• <b>NC:</b> Normally closed with no line supervision</li> <li>• <b>NO_S:</b> A single normally open switch with line supervision</li> <li>• <b>MNO_S:</b> Multiple normally open switches with line supervision</li> <li>• <b>NC_S:</b> Normally closed switch with line supervision</li> <li>• <b>SB_S:</b> Single beacon supervised</li> <li>• <b>HV_S:</b> 70/100 V speaker monitoring</li> </ul> <p><b>NOTE:</b> This option should only be used on stations with the No. 69652 70 V/100 V Termination board.</p> <p><b>NOTE:</b> When the 70 V/100 V termination board is installed, RTU input one cannot be used.</p>

Parameter Name	Description & Valid Settings
<b>RS_IPn</b> (n = 1 or 2)	<p>The SP2 station provides two inputs to represent the input contacts located on an installed remote subset.</p> <p><b>NOTE:</b> <b>RS_IP1</b> makes use of the party switch input; therefore, monitoring of input one can only be configured on single party subsets.  <b>RS_IP2</b> utilizes the page switch input; therefore, monitoring of input two can only be configured on stations that do not have a page selection switch.</p> <p>Valid functions are:</p> <ul style="list-style-type: none"> <li>• <b>Off</b></li> <li>• <b>NO:</b> Normally Open</li> <li>• <b>NC:</b> Normally Closed</li> </ul>
<b>EZALLCALL</b>	<p>This parameter is only valid on handset stations equipped with an “All Call” paging pushbutton. This parameter determines whether or not the handset pressbar must be depressed when making a page to the <b>PAGETX_B SOCK</b> multicast socket.</p> <p>Valid values are:</p> <ul style="list-style-type: none"> <li>• <b>TRUE</b>—Only the <b>ALL CALL</b> button needs to be pressed after lifting the handset to start paging to the <b>PAGETX_B SOCK</b> multicast address. The handset pressbar does not need to be pressed to initiate the page. Pressing the handset pressbar without holding the <b>ALL CALL</b> button will initiate a page on <b>PAGETX_A SOCK</b>.</li> <li>• <b>FALSE</b>—The handset pressbar must always be pressed to make a page including the use of the <b>ALL CALL</b> button.</li> </ul> <p><b>NOTE:</b> Do not set this parameter to <b>TRUE</b> on stations that do not have an <b>ALL CALL</b> button.</p>

## Multicast Audio Communications

All audio communication (page and party lines) between SP2 stations on a local area network are established using multicast sockets. A multicast socket consists of a multicast IP address and a port number. The IPv4 multicast address ranges is: 224.0.0.0–239.255.255.255.

Certain blocks of multicast addresses are reserved for network protocols. For example, the range of addresses between 224.0.0.0 and 224.0.0.255, inclusive, is reserved for the use of routing protocols and other low-level topology discovery or maintenance protocols. When configuring SP2 stations, use the “admin-local scoped” address block 239.0.0.0–239.255.255.255 (excluding 239.0.X.Y and 239.128.X.Y) to avoid conflicts with other network protocols.

Ports are numbers assigned to processes running on computers that allow the processes to transmit and receive information on an IP network. The valid port number range is: 1–65535. Port numbers are assigned in various ways, based on three ranges: system ports (0–1023), user ports (1024–49151), and dynamic and/or private ports (49152–65535). When configuring SP2 stations, use only even numbered “private ports” 49152–65534 to avoid conflicts with other network protocols.

Table 6. Multicast Socket Parameters

Parameter Name	Description & Valid Settings
<b>PARTY_n SOCK</b> (n = 1–5)	<p>The standard SP2 station is equipped with five party lines for conversations. Each <i>PARTY</i> socket (1–5) consists of a multicast IP address and a port number. A multicast socket must be configured for each party line (1–5) or be disabled by setting the IP address and port to 0.0.0.0:0. The <i>PARTY_n SOCK</i> parameter corresponds to the party line selector switch position 1–5 on the SP2 Station.</p> <p>IPv4 format: xxx.xxx.xxx.xxx:P x = Address P = Port number (49152–65534)</p>
<b>PAGERX_n SOCK</b> (n = 1–8)	<p>SP2 stations are capable of receiving page audio from eight different multicast network sockets. Each <i>PAGERX</i> socket (1–8) consists of a multicast IP address and a port number. A multicast socket must be configured for each page line (1–8) or be disabled by setting the IP address and port to 0.0.0.0:0.</p> <p>IPv4 format: xxx.xxx.xxx.xxx:P x = Address P = Port number (49152–65534)</p>
<b>PAGERX_n PRIORITY</b> (n = 1–8)	<p>This parameter determines the priority of the <i>PAGERX</i> (1–8) sockets above. If more than one <i>PAGERX</i> socket is received at the same time, only the highest priority page will be processed. The processed audio is then passed to the path configured via the <i>PAGERX_n_OUT</i> parameter; speaker and/or 600-ohm audio output.</p> <p>Priority 1 is the highest and 8 is the lowest.</p>
<b>PAGERX_n_OUT</b> (n = 1–8)	<p>This parameter determines the audio output path for each of the eight <i>PAGERX_n SOCK</i> sockets above. A contact closure is provided to indicate the 600-ohm output is active. Valid settings for output are:</p> <ul style="list-style-type: none"> <li>• <b>600OHMOUT</b>—sends the received audio stream only to the 600 ohm output. The output volume setting is stored in the <i>600OHM_OUT_VOL</i> parameter.</li> <li>• <b>SPEAKER</b>—sends the received audio stream only to the speaker output. The output volume setting is stored in the <i>AMPVOL</i> parameter.</li> <li>• <b>BOTH</b>—sends the received audio stream to both the 600 ohm &amp; speaker output. The output volume setting is stored in the <i>AMPVOL</i> parameter.</li> </ul>
<b>PAGETX_n SOCK</b> (n = A–E)	<p>SP2 stations are capable of transmitting page audio on five different multicast network sockets. Each <i>PAGETX</i> multicast socket (A–E) consists of a multicast IP address and a port number. A multicast socket must be configured for each page line (A–E) or be disabled by setting the IP address and port to 0.0.0.0:0. The <i>PAGETX_n SOCK</i> parameter corresponds to the page selector switch position on the SP2 Station.</p> <p>Stations that are not equipped with a page selector switch will transmit all paging audio on <i>PAGETX_A SOCK</i>. All unused sockets must be set to 0.0.0.0:0.</p> <p>IPv4 format is: xxx.xxx.xxx.xxx:P x = Address P = Port number (49152–65534)</p>

<b>Parameter Name</b>	<b>Description &amp; Valid Settings</b>
<b>PAGETX_n_DEFER</b> (n = A–E)	This parameter is used to prevent two SP2 stations from simultaneously sending a page on the same PAGETX socket. Valid settings are: <ul style="list-style-type: none"> <li>• <b>TRUE</b>—if a page is already in progress on the currently selected PAGETX line (A–E), the station will NOT transmit and an alert tone will be heard by the operator.</li> <li>• <b>FALSE</b>—the station will transmit audio onto the currently selected PAGETX line (A–E) regardless of the current paging status.</li> </ul>
<b>PAGETX_n_PRE</b> (n = A–E)	This parameter determines if a pre-announcement tone will be played over the speakers prior to each outgoing page on this channel. Valid settings are: <ul style="list-style-type: none"> <li>• <b>TRUE</b>—A fixed pre-announcement tone will be played before each outgoing page from the configured channel.</li> <li>• <b>FALSE</b>—The page is broadcast without playing the pre-announcement tone.</li> </ul>
<b>600OHM_TX SOCK</b>	This parameter configures the multicast socket to where the 600 ohm audio will be transmitted. 600 ohm input is always the highest priority audio source. IPv4 format is: xxx.xxx.xxx.xxx:P x = Address P = Port number (49152–65534)
<b>600OHM_TX_DEFER</b>	This parameter is used to prevent 600 ohm audio from being transmitted if an audio stream is currently being received on the same multicast socket. Valid settings are: <ul style="list-style-type: none"> <li>• <b>TRUE</b>—Do not transmit audio to a multicast socket that is currently receiving an audio stream.</li> <li>• <b>FALSE</b>—Transmit the audio without regard for incoming audio on the configured multicast socket.</li> </ul>

Table 7. Handset Timeout Parameters

<b>Parameter Name</b>	<b>Description &amp; Valid Settings</b>
<b>HSINVERT</b>	This parameter enables the inversion of the current physical state of the hook-switch represented by the ON-HOOK and OFF_HOOK variables. Valid settings are: <ul style="list-style-type: none"> <li>• <b>TRUE</b>—ON-HOOK and OFF-HOOK values are reversed.</li> <li>• <b>FALSE</b>—ON-HOOK and OFF-HOOK values are represent the actual current state of the handset.</li> </ul>
<b>HSTIMEOUT</b>	The hook-switch timeout parameter is used to limit the amount of time that an SP2 station can be off hook. This parameter is configured in minutes with a default of eight minutes. A setting of zero disables the hookswitch timeout.
<b>PBTIMEOUT</b>	This parameter is used to limit the amount of time that a page can continue. This parameter is configured in minutes with a default timeout of two minutes. A setting of zero disables the pressbar timeout.

Table 8. F/W and Configuration Filename Parameters

Parameter Name	Description & Valid Settings
<b>CFG_FILENAME</b>	<p>The pathname of an SP2 station's configuration file stored on the TFTP Server. The filename must have a <b>.txt</b> extension.</p> <p>Example pathname: <b>folder/folder/filename.txt</b></p> <p>When the <i>CFG_MODE</i> parameter is set to <b>TFTP</b> the following tokens can be used to differentiate separate SP2 stations' configuration filenames:</p> <ul style="list-style-type: none"> <li>• %MACID = MAC address of the SP2 Station.</li> <li>• %ip = IP address assigned to the SP2 station. (<b>NOTE:</b> This variable should only be used when <i>NWMODE</i> = <b>STATIC</b>.)</li> <li>• %name = Designation of the SP2 station.</li> <li>• %grp = Current setting of the hexadecimal address switch.</li> <li>• %stn = Current setting of the hexadecimal station switches.</li> </ul> <p><b>Important Note:</b> <i>Unique filenames are required for each SP2 station when using TFTP provisioning to avoid duplicate Hostnames, IP addresses, etc.</i></p>
<b>FAC_FILENAME</b>	<p>This parameter stores the pathname for an additional/alternate SP2 configuration file. The configuration file pointed to by this parameter can be used to store a site specific default configuration or can be used to test alternate settings without losing the settings stored in the <i>CFG_FILENAME</i> location.</p>

Table 9. Audio Volume Parameters

Parameter Name	Description & Valid Settings
<b>HANDSETVOL</b>	<p>Sets the volume of the handset receiver. The value stored represents the amplitude in millivolts (mV)<sub>RMS</sub>.</p> <p>Valid settings are: 100, 125, 150, 175, 200, 225, <b>250</b>, 275, 300, 325, 350</p> <p><b>NOTE:</b> If this setting is specified in the configuration file, it will override any adjustments made to the potentiometer on the SP2 PCBA.</p>
<b>HEADSETVOL</b>	<p>Sets the volume of the headset receiver. The value stored represents the amplitude in millivolts (mV)<sub>RMS</sub>.</p> <p>Valid settings are: 75, <b>100</b>, 125, 150, 175, 200</p> <p><b>NOTE:</b> If this setting is specified in the configuration file, it will override any adjustments made to the potentiometer on the SP2 PCBA.</p>
<b>MICVOL</b>	<p>Sets the gain of the handset microphone in decibels (dB).</p> <p>Valid settings are: -12, -6, <b>0</b>, 6, 12, 18, 24, 30</p> <p><b>NOTE:</b> If this setting is specified in the configuration file, it will override any adjustments made to the potentiometer on the SP2 PCBA.</p>

Parameter Name	Description & Valid Settings
<b>AMPVOL</b>	Used with the <i>PAGERX_n_OUT</i> parameter, this parameter sets the audio volume level of the output amplifier. The value stored represents the power output of the station amplifier in watts (W) <sub>RMS</sub> . Valid settings are: .008, .016, .032, .063, .125, .25, .5, 1, 2, 4, 9, 14, 18, 24, 30 <b>NOTE:</b> If this setting is specified in the configuration file, it will override any adjustments made to the potentiometer on the SP2 PCBA.
<b>MUTE_SPKR</b>	Allows muting of incoming pages while a page is being transmitted on any PAGETX socket (A–E). Valid settings are: <ul style="list-style-type: none"> <li>• <b>TRUE</b>—All locally generated and received page audio is muted while transmitting audio pages.</li> <li>• <b>FALSE</b>—Received page audio is broadcast over the station’s external speaker simultaneously while transmitting an outgoing page.</li> </ul>
<b>ALS_ENABLE</b>	Enables the ambient level sensing (Smart Volume) feature of the SP2 Station. Valid Settings are: <ul style="list-style-type: none"> <li>• <b>TRUE</b>—Smart Volume is enabled</li> <li>• <b>FALSE</b>—Smart Volume is disabled</li> </ul>
<b>ALS_OFFSET</b>	Determines the speaker broadcast volume level above the measured ambient noise level. The value entered represents the offset in decibels (dbA). Valid settings are: <b>10</b> dB to 80 dB SPL
<b>600OHM_OUT_VOL</b>	Used with the <i>PAGERX_n_OUT</i> parameter, this parameter sets the audio level of the 600 ohm audio output. The value entered represents the amplitude in millivolts (mV) <sub>RMS</sub> . If the <i>PAGERX_n_OUT</i> parameter is set to <b>BOTH</b> then the value stored in the <i>AMPVOL</i> parameter overrides this setting. Valid Settings are: 100, 200, 300, 500, 700, <b>775</b> , 900, 1000 <b>NOTE:</b> If this setting is specified in the configuration file, it will override any adjustments made to the potentiometer on the SP2 PCBA.
<b>MUTE1... MUTE6</b>	These parameters are used for feedback prevention by mutual muting of those stations that are in close proximity to a station that is transmitting a page. The parameters must be configured with the last four octets of the MAC addresses of the stations that cause feedback while they are transmitting. Format: 00:00:00:00

Table 10. Diagnostic Parameters

Parameter Name	Description & Valid Settings
<b>DIAGS</b>	This parameter determines whether the handset, headset, and/or the speaker will be tested each time the diagnostic self- test runs. Set this to <b>HANDSET+HEADSET+SPEAKER</b> to execute all diagnostics, any combination of the three, or <b>OFF</b> .

Input/output parameters are maintained in RAM by the general I/O manager while the SP2 station is energized. These parameters are variables containing information regarding the current state of the SP2 station. These logical states are used to control the function of the five LEDs and the RTU Output.

Table 11. SP2 Input/Output States

<b>Variable Name</b>	<b>Description &amp; Valid Values</b>
<b>RXPAGEANY</b>	A page is being received on any page line.
<b>RXPAGEn</b>	A page is being received on page line n, where n:=1–8.
<b>TXPAGEANY</b>	A page is being transmitted on any of the configured page lines.
<b>TXPAGEn</b>	A page is being transmitted on the selected page line where n:=A–E.
<b>PARTY</b>	The station is receiving audio on one or more party lines.
<b>PARTYn</b>	The station is receiving audio on party line n, where n:=1–5.
<b>ONHOOK</b>	The handset is on-hook.
<b>OFFHOOK</b>	The handset is off-hook.
<b>ON</b>	Always ON.
<b>OFF</b>	Always OFF.
<b>HEALTHY</b>	No fault conditions are detected.
<b>FAULTY</b>	Any fault condition is detected.
<b>LINKUP</b>	The network interface physical link is up.
<b>LINKDOWN</b>	The network interface physical link is down.
<b>RTUIP1ACTIVE</b>	RTU input one is in the active state.
<b>RTUIP1INACTIVE</b>	RTU input one is in the idle state.
<b>RTUIP1OPEN</b>	An open circuit fault is detected on RTU input one.
<b>RTUIP1SHORT</b>	A short circuit fault is detected on RTU input one.
<b>RTUIP1GROUND</b>	An earth ground fault is detected on RTU input one.
<b>RTUIP1LINE</b>	A short circuit line fault is detected on RTU input one.
<b>RTUIP2ACTIVE</b>	RTU input two is in the active state.
<b>RTUIP2INACTIVE</b>	RTU input two is in the idle state.
<b>RTUIP2OPEN</b>	An open circuit fault is detected on RTU input two.
<b>RTUIP2SHORT</b>	A short circuit fault is detected on RTU input two.
<b>RSIP1ACTIVE</b>	The desktop subset's input one is active.
<b>RSIP1INACTIVE</b>	The desktop subset's input one is inactive.
<b>RSIP2ACTIVE</b>	The desktop subset's input two is active.
<b>RSIP2INACTIVE</b>	The desktop subset's input two is inactive.

## TFTP Boot Provisioning

Rather than manually setting SP2 station parameters on every device as explained above; SP2 stations can be configured to access a TFTP server to retrieve (download) a configuration file that contains their parameter settings. SP2 stations configured for TFTP boot use the locally stored settings on startup and then check the TFTP server for configuration changes. This is accomplished by comparing the version of the running configuration with the that contained in the file downloaded from the TFTP server. If a change has been made, the station will implement the new settings and reboot. If the configuration version has not changed then the station continues to run with the existing settings loaded at boot-up.

To utilize TFTP boot configurations, an administrator must initially install and configure a TFTP server. The configuration file for each station is then created and stored on the TFTP server. To accomplish this, the first station is manually configured to obtain an initial configuration file which is then copied and modified for each station that will obtain its configuration from the TFTP server. Individual stations are then set up to look for their configuration from the TFTP server.

Individual SP2 stations are set up to access the TFTP server upon boot-up by initially powering them up using the factory default settings. Once this occurs, each station will need to be accessed using local provisioning to set the *CFG\_MODE*, *TFTPSERVER*, and *CFG\_FILENAME* parameters (See [The Command Line Interface \(CLI\)](#) and [SP2 Station Local Configuration](#) sections for information regarding SP2 station settings). Another reboot is then required to apply these settings. Upon reboot, the stations connect to the TFTP server, download the proper configuration, and reboot again to apply the settings. If a DHCP server is not available on the network then the *NWMODE* parameter must be set to **STATIC** and the *ADDRESS*, *MASK*, *GATEWAY*, and *DNS* parameters will need to be locally configured for the stations to access the TFTP server.

## Mutual Provisioning

This design technique allows SP2 stations in a system to obtain their system configuration without requiring a fixed central point configuration server or human administration. This also streamlines the initial set-up process by separating the system design and planning stages from the system installation phase. These features minimize the cost and effort required to maintain or replace SP2 stations in an existing system should one fail or if a system configuration change is needed.

Mutual provisioning is only used for configuration. It does not affect and is not required for actual station operation. SP2 stations configured to operate in mutual provisioning mode use parameter settings derived by combining the system configuration obtained from the master SP2 station and their locally stored configuration parameters. The system settings are merged with the local settings so that the system settings override any locally configured parameters. It is therefore important to not configure those parameters in the system file that will need to be configured locally on the SP2 stations.

**NOTE:** The one exception to this is with the *TELNET\_LOCK* parameter. If the *TELNET\_LOCK* parameter is configured in the configuration file then the telnet lock function in the SP2 Dashboard will be overridden for the stations to which the setting applies.

Mutual provisioning utilizes a single system-wide configuration that is maintained on an SP2 station configured to be the master station in the system. The system-wide configuration file contains all of the parameters as a locally stored configuration with the addition of labels and comments. The labels used in the system configuration file are [SYSTEM], [GROUPn], [G.SS], and [PROFILEn]. The purpose of these labels is discussed below in the [System Configuration File—Section Labels](#) section. The system configuration file contains all of the settings necessary for every station that will operate in the system. The system configuration file is limited to 100 KB in size.

System wide control is via a single “Master” station. Master stations are provisioned with a local configuration. The station designated as the master station and any stations configured as backup master stations are determined by the value stored in the *MASTERLIST* parameter. The “Master” station is determined by the order in which they appear in *MASTERLIST* parameter. Backup master stations act like normal SP2 stations until the current master station fails. The failure of the master is determined by listening for the heartbeat packet on the command channel.

SP2 stations obtain the system configuration through the use of a provisioning channel. A provisioning channel is a special multicast socket used by the SP2 stations in a system to download the system configuration from the master station. The system configuration is stored alongside the local configuration in non-volatile ram on the stations. The master SP2 station in a system sends a heartbeat packet on the provisioning channel every three seconds containing a check sum for the current system configuration. SP2 stations in the system compare the check sum to the check sum of their currently stored system configuration. If the checksum has been updated, the stations will download the new system configuration and reboot.

Additional SP2 systems are configured for mutual provisioning by adjusting the “Group” and “Station Number” hex switches located on the main PCBA in the SP2 station. These switches also control the group and station number used to apply system settings to individual groups and/or stations using labels in the system configuration file. The *CFG\_MODE* parameter’s factory default setting is **MUTUAL** so this will not need to be configured before connecting and booting the remaining SP2 stations in the system.

### **System Configuration File—Section Labels**

Section labels are used in the mutual provisioning configuration file to divide the SP2 station parameters into a hierarchy that governs the precedence in which the configured settings are applied. There are four section labels used in the mutually provisioned configuration file.

[SYSTEM]—This label is required in the system configuration file for mutual provisioning to function. This label must be placed at the top (first line) and bottom (last line) of the configuration file. Global parameters that are meant for all SP2 stations should be placed at the top of the configuration file below the [SYSTEM] label.

[GROUPn]—Where n can be 0–F (in hex). SP2 stations with their group hex switch set for a particular group will utilize the parameters specified under the matching group label.

[G.SS]—Where G = group number (0–F) and S = Station number (00–FF). An SP2 station with group and station number hex switches set to any particular group and station number will implement the parameters configured under that label. Only one station can be assigned to each unique G.SS station identifier.

[PROFILEn]—Where n can be zero through nine. Profiles are used when a unique set of parameters is required for a set of stations. This label and the parameters defined under it should be placed at the bottom of the system configuration file before the ending [SYSTEM] label.

Although parameters can be placed under any label; it is important that the *DESIGNATION*, *VERSION*, *CFG\_MODE*, and *MASTERLIST* parameters be placed only under the first [SYSTEM] label, making them global. Do not repeat these settings under any other label.

//—This label at the beginning of a line indicates that the line is a comment. Comments are ignored by the SP2 stations.

## System Configuration File Profiles

Profiles can be used in the configuration file to set unique configuration options for special situations such as having one station in each zone or group having special features. This is implemented in the system configuration file by assigning a profile number to a station in the [G.SS] section of the system configuration and then adding the [PROFILEn] section to the configuration file containing any special settings that might be needed. Up to nine unique profiles can be configured in the system.

Listing 2. Example System Configuration File

```
[SYSTEM];
//GLOBAL SETTINGS START
DESIGNATION=CUSTOM_DESIGNATION;
VERSION=0;
CFG_MODE=MUTUAL;
MASTERLIST=0.01,0.02,0.03;
NWMODE=DHCP;
TFTPSEVER=0.0.0.0;
SMTPSERVER=0.0.0.0;
SMTPPORT=25;
SMTPFROM=PHONENAME@NETWORK.COM;
SMTPTO=NAME@COMPANY.COM;
SMTPPASS=pass;
SNTPSERVER=0.0.0.0;
//GLOBAL SETTINGS END
//GROUP1 SETTINGS START
[GROUP1];
LED1=ON;
LED2=OFF;
LED3=OFF;
LED4=OFF;
LED5=OFF;
//GROUP1 SETTINGS END
//GROUP2 SETTINGS START
[GROUP2];
LED1=OFF;
LED2=ON;
LED3=OFF;
LED4=OFF;
LED5=OFF;
//GROUP2 SETTINGS END
//STATION 0.01 SETTINGS START
[0.01];
PARTY_1_SOCK=239.1.0.1:50000;
PARTY_2_SOCK=239.1.0.2:50000;
PARTY_3_SOCK=239.1.0.3:50000;
PARTY_4_SOCK=239.1.0.4:50000;
PARTY_5_SOCK=239.1.0.5:50000;
PAGERX_1_SOCK=239.1.1.1:50002;
PAGERX_1_PPIO=1;
PAGERX_1_OUT=BOTH;
PAGERX_2_SOCK=239.1.1.2:50002;
PAGERX_2_PPIO=2;
PAGERX_2_OUT=BOTH;
PAGERX_3_SOCK=239.1.1.3:50002;
PAGERX_3_PPIO=3;
PAGERX_3_OUT=BOTH;
PAGERX_4_SOCK=239.1.1.4:50002;
PAGERX_4_PPIO=4;
PAGERX_4_OUT=BOTH;
PAGERX_5_SOCK=239.1.1.5:50002;
PAGERX_5_PPIO=5;
PAGERX_5_OUT=BOTH;
PAGERX_6_SOCK=0.0.0.0:0;
PAGERX_6_PPIO=6;
PAGERX_6_OUT=BOTH;
PAGERX_7_SOCK=0.0.0.0:0;
PAGERX_7_PPIO=7;
PAGERX_7_OUT=BOTH;
PAGERX_8_SOCK=0.0.0.0:0;
PAGERX_8_PPIO=8;
PAGERX_8_OUT=BOTH;
PAGETX_A_SOCK=239.1.1.1:50002;
PAGETX_A_DEFER=TRUE;
PAGETX_A_PRE=FALSE;
PAGETX_B_SOCK=239.1.1.2:50002;
PAGETX_B_DEFER=TRUE;
PAGETX_B_PRE=FALSE;
PAGETX_C_SOCK=239.1.1.3:50002;
PAGETX_C_DEFER=TRUE;
PAGETX_C_PRE=FALSE;
PAGETX_D_SOCK=239.1.1.4:50002;
PAGETX_D_DEFER=TRUE;
PAGETX_D_PRE=FALSE;
PAGETX_E_SOCK=239.1.1.5:50002;
PAGETX_E_DEFER=TRUE;
PAGETX_E_PRE=FALSE;
600OHM_TX_SOCK=0.0.0.0:0;
600OHM_TX_DEFER=TRUE;
600OHM_TX_PRE=FALSE;
MUTE_SPKR=FALSE;
HSINVERT=FALSE;
HSTIMEOUT=8;
PBTIMEOUT=2;
CFG_FILENAME=%HOST-CFG.TXT;
FAC_FILENAME=FILENAME.TXT;
HANDSETVOL=250;
HEADSETVOL=100;
AMPVOL=4;
ALS_ENABLE=FALSE;
ALS_OFFSET=10;
600OHM_OUT_VOL=775;
MUTE1=00:00:00:00;
MUTE2=00:00:00:00;
MUTE3=00:00:00:00;
MUTE4=00:00:00:00;
MUTE5=00:00:00:00;
MUTE6=00:00:00:00;
EZALLCALL=FALSE;
DIAGS=HANDSET+SPEAKER;
```

## Generating a System Configuration

To create a template to start from, a local configuration file can be generated from the first SP2 station. Start by connecting to the first station using local provisioning and perform the following commands:

**NOTE:** The TFTP SERVER IP address and CFG\_FILENAME values are implementation specific.

The basic flow of events for setting up a system when using mutual provisioning mode is as follows:

1. >> **SET CFG\_MODE STD**
2. >> **SET TFTP SERVER 192.168.1.221**
3. >> **SET CFG\_FILENAME SYSTEM1.TXT**
4. >> **REBOOT**

After the reboot, reconnect to the station and execute the following command:

5. >> **SAVECFG**

A system configuration file has now been saved to the TFTP server. Adjust the local configuration to conform with the example below to make a valid system configuration. All of the parameters in the default local configuration file can be maintained in the system configuration file. If a parameter is not in the system configuration file, an SP2 station will use what is locally configured at the station for that value. A system configuration must start and end with the [SYSTEM] label. SP2 stations read the configuration file parameters from the top down. If a parameter is listed more than once; the SP2 station will take the last valid setting that applies.

**NOTE:** Do not configure volume settings in the system configuration if you wish to adjust them locally.

## Configuring the First SP2 Station

The first SP2 station must be configured with the station ID (group/zone and station number) of the highest priority station stored in the *MASTERLIST* parameter in the configuration file. This station is then connected to a laptop/PC using a network cable or USB cable and powered up.

An administrator must then connect to this station and either update the existing system configuration or load a previously generated system configuration file as shown below.

**NOTE:** Creating or updating a system configuration must be carried out on the current master station. For initial configuration, setting the group/station switches of the first station to 0.01 forces the assignment of the static IP address 192.168.1.125. The master station IP address information can also be obtained by connecting to any SP2 station and executing the “**STATUS**” command.

1. >> **SET CFG\_MODE STD**
2. >> **SET TFTP SERVER 192.168.1.221**
3. >> **SET CFG\_FILENAME SYSTEM1.TXT**
4. >> **REBOOT**

Use the **LOADCFG** command once a valid system configuration exists on the TFTP server. Be sure to have *CFG\_MODE=MUTUAL* and a *DESIGNATION* other than **FACTORY** in your system configuration. When the **LOADCFG** command is executed the unit will reboot and will become the master station that will provide additional units the system configuration as they are powered on.

5. >> **LOADCFG**

To load additional units set the station ID (group/zone and station number) as desired and then power on the unit. The master station will transfer the system configuration to that unit. The unit will then reboot and implement the settings contained in the system configuration file.

**NOTE:** A reboot should always be executed after changing the group/station hex switches to a different addresses.

## The SP2 Console

The SP2 Console application is used to logically organize and simplify the configuration and modification of SP2 systems running in mutual provisioning mode. It is divided into two parts, the SP2 Dashboard and the SP2 Configuration Utility. The SP2 Dashboard provides information and control of the SP2 stations in a mutually provisioned system. The SP2 Configuration Utility displays the SP2 station parameters in expandable groups of configuration settings for the system, group, station, and profile levels of the SP2 configuration hierarchy to facilitate configuration of the system.

## Installation Requirements

The SP2 Console application is an Adobe AIR application. Therefore, the host computer must have Adobe AIR installed prior to installing the SP2 Console application,. The software is free, and the newest version can be downloaded and installed from Adobe's Internet website, <http://get.adobe.com/air>.

After installing Adobe AIR, the SP2 Console application can be installed as described below.

## Installation Procedure

1. Navigate to the location where the **SP2Console.air** installation package is stored and double click it to begin the installation.
2. Click the **INSTALL** button when the screen below appears.

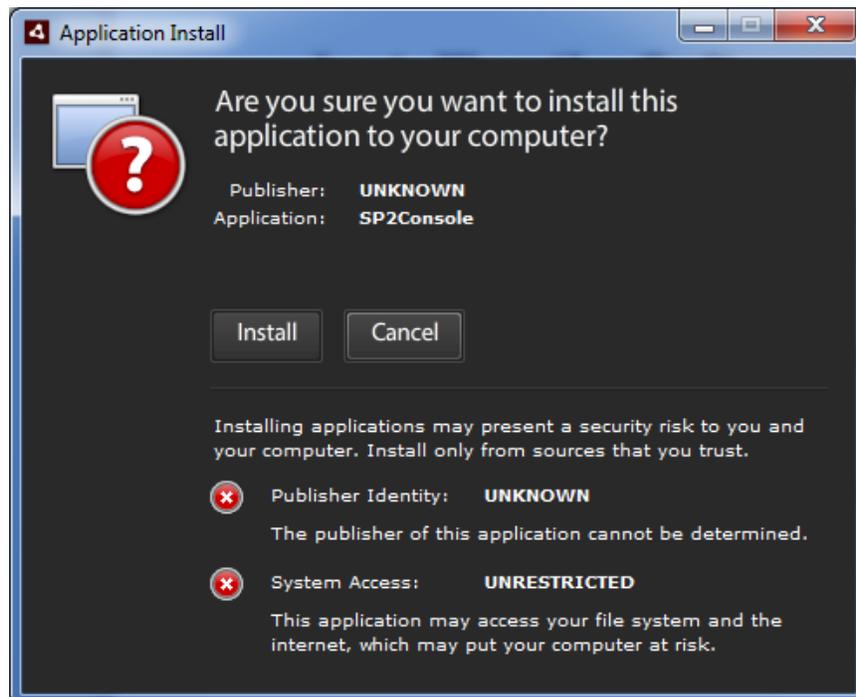


Figure 1. Installing the SP2 Console

3. Keep the default INSTALLATION PREFERENCES and INSTALLATION LOCATION and click CONTINUE.

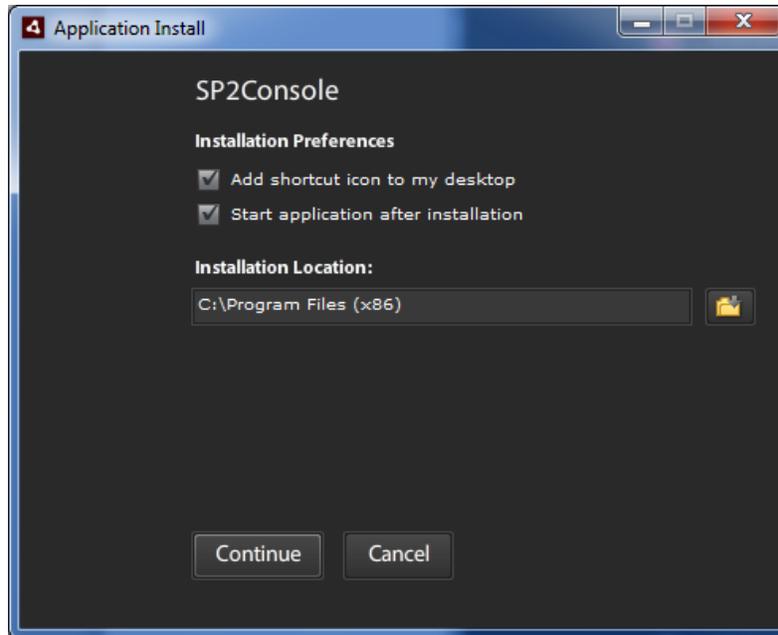
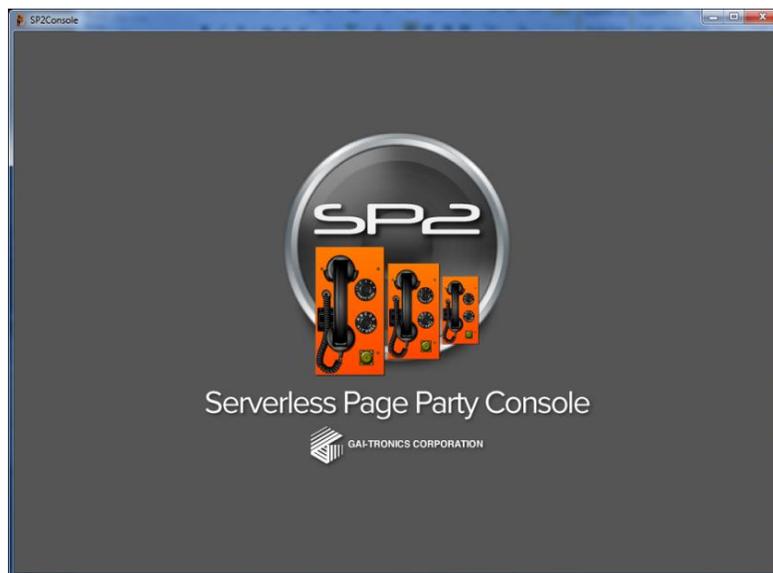


Figure 2. Installation Preferences

4. Accept any security warnings as necessary to continue the installation.
5. The SP2 Console automatically launches when the installation completes.

## Running the SP2 Console Application

Start the SP2 Console application from the start-menu, desktop, or taskbar shortcut created during installation. The splash screen below is displayed while the program opens. A three button menu is then presented; providing options for creating a new configuration, loading an existing configuration, or opening the SP2 Dashboard. The SP2 Dashboard functionality will be described next, followed by the mutual provisioning configuration details.



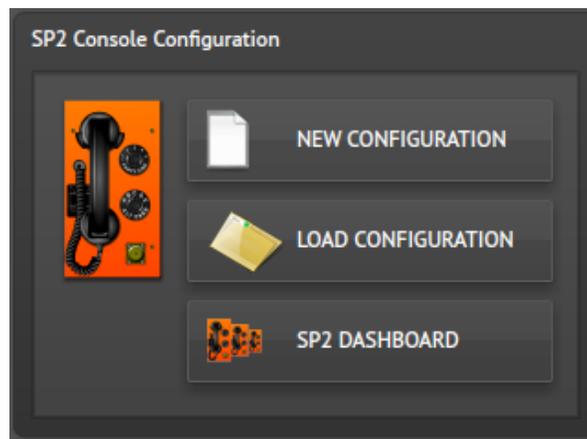


Figure 3. SP2 Console Initial Menu

## Opening the SP2 Dashboard

Clicking the SP2 DASHBOARD button opens the dashboard. The dashboard is a station information and control utility for SP2 stations. While loading, and anytime the toolbar refresh button is clicked; the SP2 station discovery takes place. All running stations with the CONTROL SOCKET parameter configured with the default setting in their configuration file will respond to the discovery and show up in the discovered stations list as shown in [Figure 5](#). If no master station is located, the “Master Station Not Found” message will be displayed in the first line. The dashboard opens displaying the master station (if found) and the SP2 stations located on the network.

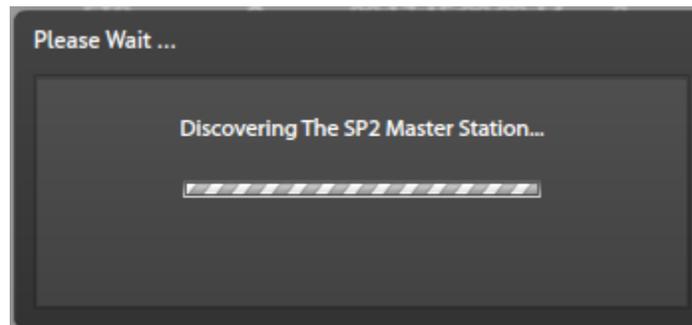


Figure 4. Master Station Discovery

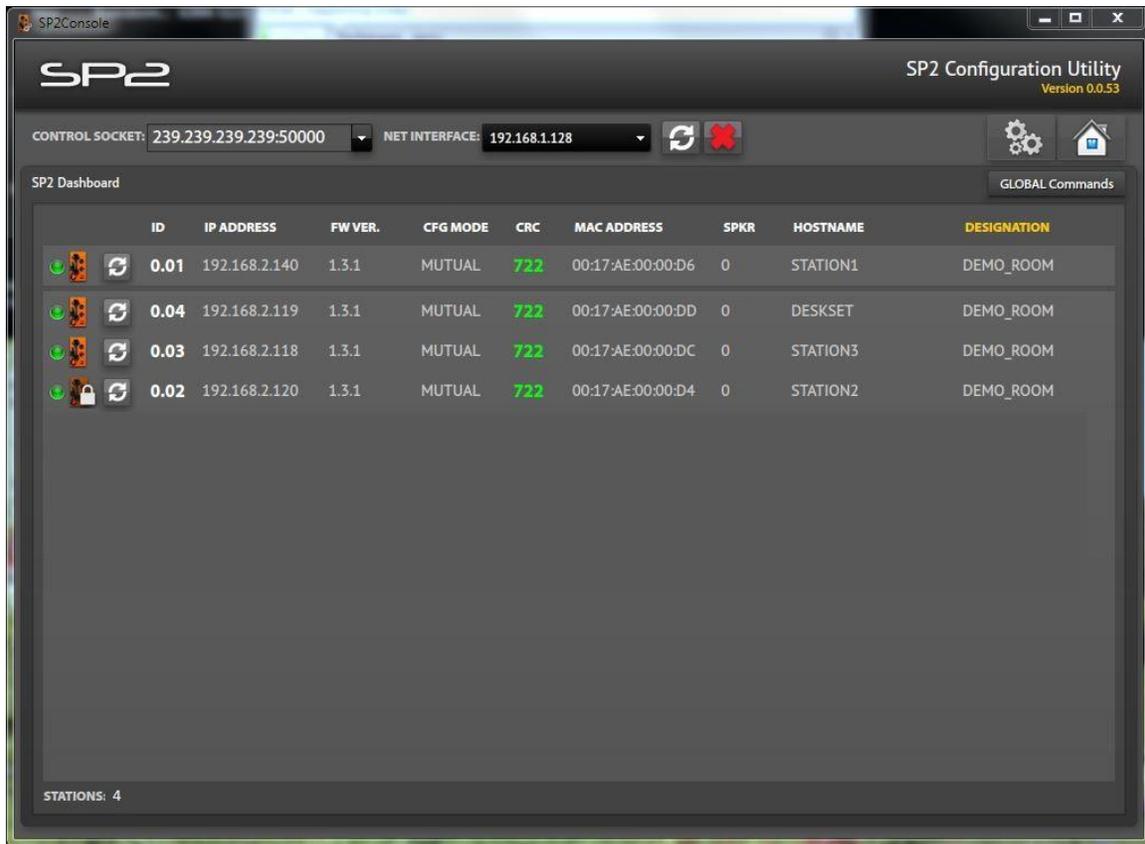


Figure 5. SP2 Discovered Stations

### Dashboard Toolbar

At the top of the SP2 Dashboard window is the toolbar. The toolbar displays the CONTROL SOCKET and NET INTERFACE system parameters followed by the refresh, clear result, system options, and home buttons. The CONTROL SOCKET field displays the multicast socket used by the SP2 stations for sending and receiving station control information. The NET INTERFACE field shows the IP address of the network interface on the PC connected to the network containing the SP2 stations. If multiple network cards are connected to individual networks, then the dropdown can be used to select a different subnet to search for stations.



Figure 6. SP2 Dashboard Menu

**Refresh**—The refresh button forces an SP2 discovery to take place immediately.

**Clear Result**—Clears all information from the SP2 dashboard that was discovered in previous discoveries.

**Dashboard Options**—The GEARS toolbar button opens the DASHBOARD OPTIONS dialog box displayed below. The following options are provided:

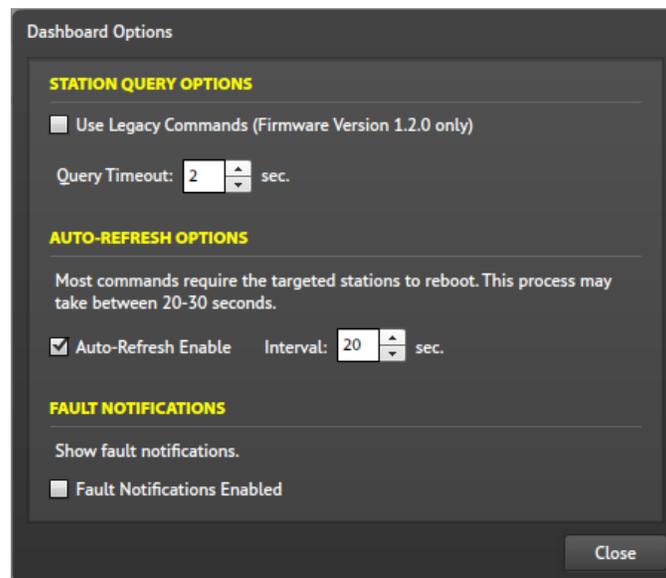


Figure 7. Dashboard Options Dialog Box

### STATION QUERY OPTIONS

- **Use Legacy Commands (firmware Version 1.2.0 only)**—This option modifies the SP2 station query to find only the stations running this firmware version. This only applies to installations with SP2 stations using firmware version 1.2.0. Stations running newer firmware are not discovered.
- **Query Timeout**—Sets the dashboard timeout for listening for replies from the SP2 stations.

### AUTO-REFRESH OPTIONS

**Auto-Refresh Enable**—This checkbox enables/disables an automatic refresh query of the SP2 station after a command has been issued.

**Interval:**—Sets the amount of time in seconds before the automatic refresh query takes place after a command has been issued.

### FAULT NOTIFICATIONS

**Fault Notifications Enabled**—This checkbox enables/disables the display of fault notifications in the dashboard. With this option enabled, the status LED icon will blink red for all stations with faults. An SP2 discovery must be executed to refresh the display after toggling this option. This option resets each time the application is closed.

**Home**—The HOME button closes the dashboard and returns the user to the initial SP2 console menu.

## SP2 Station Information and Control

After performing an SP2 station discovery; each station's status, configuration CRC, firmware version, and network information is displayed in the SP2 DASHBOARD panel. The SP2 station information provided in the dashboard is organized in columns for the station parameters displayed. The master station is always at the top of the list with the remaining discovered stations initially sorted by station ID. Clicking on any column will sort the stations by that attribute and the column heading turns yellow to indicate the currently selected sort column. The number of stations discovered is displayed in the status bar at the bottom of the panel. On the far right end of the dashboard title bar is the GLOBAL COMMANDS button. The global commands accessed from this button are discussed in the next section.

ID	IP ADDRESS	FW VER.	CFG MODE	CRC	MAC ADDRESS	SPKR	HOSTNAME	DESIGNATION
0.01	192.168.2.140	1.3.1	MUTUAL	722	00:17:AE:00:00:D6	0	STATION1	DEMO_ROOM
0.04	192.168.2.119	1.3.1	MUTUAL	722	00:17:AE:00:00:DD	0	DESKSET	DEMO_ROOM
0.02	192.168.2.120	1.3.1	MUTUAL	722	00:17:AE:00:00:D4	0	STATION2	DEMO_ROOM
0.03	192.168.2.118	1.3.1	MUTUAL	722	00:17:AE:00:00:DC	0	STATION3	DEMO_ROOM
5.01	192.168.1.207	0.1.0.4273	STD	6131	00:17:AE:00:01:80	0	GTC-SVS-002-02	FACTORY
0.00	192.168.1.183	1.3.1	MUTUAL	0	00:17:AE:00:00:FB	-3325	GTC-0000	FACTORY
0.00	192.168.1.176	1.3.1	STD	0	00:17:AE:00:00:A4	0	GTC-0123456789	GT_TESTBED
0.0F	192.168.1.173	1.3.1	MUTUAL	9E23	00:17:AE:00:01:0E	0	GTC-SERIAL-1234	JUHL

Figure 8. SP2 Dashboard

**Status LED icon**—The status LED icon will display green for all stations without faults. If fault notifications have been enabled in the DASHBOARD OPTIONS dialog box, then the indicator LED icon will blink red on any stations with faults. It is not possible to determine the exact nature of the fault from the SP2 Console application. A dark status LED icon indicates that the station was located in a previous discovery but did not reply to the most recent discovery.

**Station Icon**—The SP2 station icon indicates the SP2 device type. SP2 stations with fiber connectivity have a different icon displayed.

**Padlock Icon**—A padlock icon over the SP2 station icon indicates that the station's telnet service is currently disabled.

**Refresh Button**—The refresh button will perform an SP2 discovery for the particular station to refresh its data.

**ID**—The ID column provides the group and station number configured on the SP2 main PCBA of the station formatted as Group. Station; (0–F).(01–FF).

**IP Address**—The current network address of the station.

**FW Ver.**—The firmware version currently running on the station. All SP2 firmware files are stored on the TFTP server defined in the TFTP SERVER field in the configuration file. Firmware filename formats are SPP\_Verision.LDR, for networked stations and SPP\_FiberVersion.LDR for stations connected via fiber optic cable. *Version* is the current firmware version, Ex. 1.3.1.

**CFG Mode**—This provides the current configuration mode for the station; STD, TFTP, or MUTUAL

**CRC**—Every station in an SP2 system calculates a Cyclical Redundancy Checksum (CRC) based upon a hash of the current configuration. The master station CRC and all stations with matching CRCs are running identical configurations and the value will be green. Stations with differing CRC values will show the CRC as gray. SP2 stations with the same designation as the master but different CRCs need to be provisioned from the master station and restarted.

**MAC Address**—The Media Access Control (hardware) address for the network interface in the SP2 station.

**SPKR**—The currently configured load calibration value for the SP2 station speaker. A zero value indicates that calibration has not taken place.

**Hostname**—The network name assigned to the SP2 station.

**Designation**—The designation attribute is obtained from the currently running configuration on each station. Stations with identical designations are operating in the same SP2 mutually provisioned system.

**Global Commands**

The COMMANDS TO ALL STATIONS menu shown to the right is accessed by clicking the GLOBAL COMMANDS button on the far right end of the SP2 DASHBOARD title bar, directly under the OPTIONS and HOME buttons. Commands executed here will affect all stations on the network that receive the command.

**Reboot**—Causes all stations that receive the command to reboot. The following confirmation dialog box will appear.

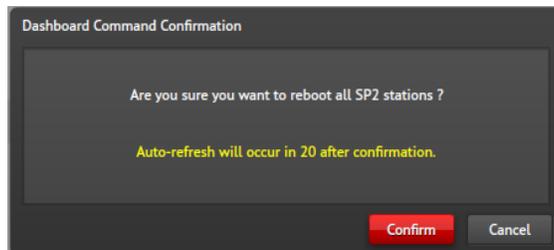


Figure 10. Reboot Confirmation Dialog Box

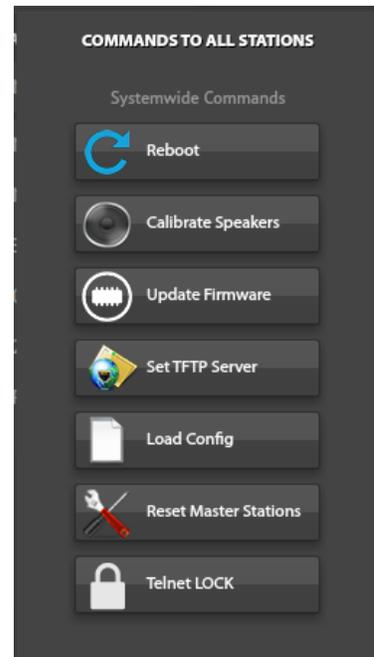


Figure 9. Global Commands

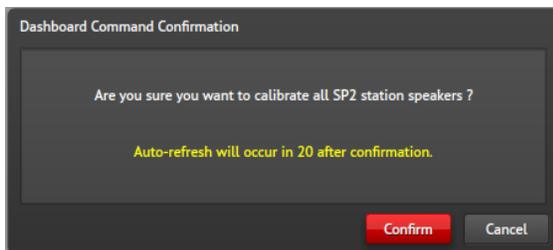


Figure 11. Speaker Calibration Confirmation

**Calibrate Speakers**—Each station will perform a speaker calibration that determines if any changes have occurred that prevent the proper functioning of the station’s speaker

**Update Firmware**—All stations will request the latest firmware from the TFTP Server configured in the **TFTPSERVER** parameter and then reboot to apply the settings. The pathname of the firmware must be entered in the dialog box to the right. A pathname includes the complete path including the filename on the TFTP Server for the file.

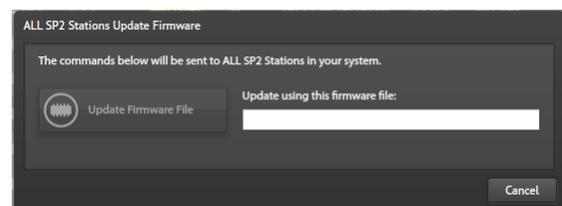


Figure 12. Update Firmware Confirmation

**Set TFTP Server**—Clicking the **SET TFTP SERVER** button opens the dialog box to the right. Enter the IP address of the TFTP server where the firmware and configuration files are stored. The value entered is validated to ensure a valid IP address is entered.

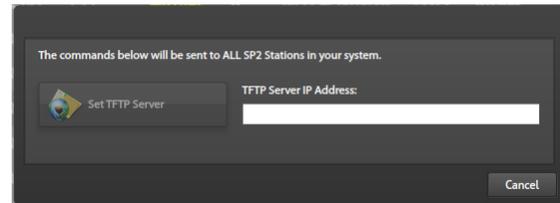


Figure 13. Setting TFTP Server IP Address

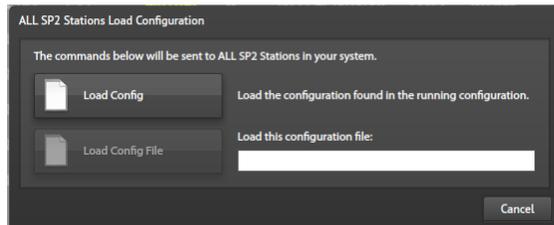


Figure 14. Load Configuration

**Reset Master Stations**—The **RESET MASTER STATIONS** command causes all master SP2 stations in a mutually configured system to perform a factory reset. This includes any potential master stations. The IDs of the stations that will be reset are [0.01], [0.02], and [0.03] if they exist.

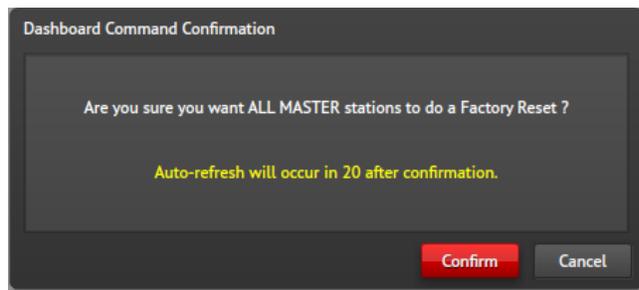


Figure 15. Reset Master Confirmation

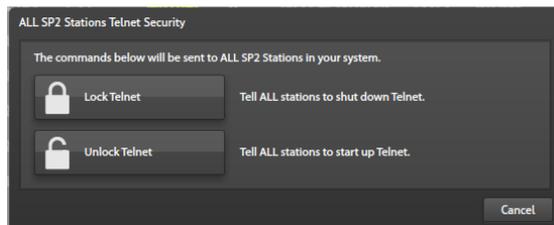


Figure 16. Telnet Lock/Unlock

**Telnet Lock**—The **TELNET LOCK** button opens the dialog box to the left. The **LOCK TELNET** and **UNLOCK TELNET** buttons instruct the stations to stop or start the telnet service. This command is overridden if a station has the **TELNET\_LOCK** parameter explicitly configured in its local configuration.

Click the **GLOBAL COMMANDS** button to close the **COMMANDS TO ALL STATIONS** menu.

### Individual Station Commands

Double clicking any station from the **SP2 DASHBOARD** opens the **SP2 STATION COMMANDS** dashboard for that station. The master station dashboard varies slightly from the remaining member stations in the system. The two station dashboards are shown below in [Figure 17](#). The master station's command dashboard includes a **MASTER STATION** label and the **DOWNLOAD CONFIGURATION** command button is active where it is disabled for the member stations. Executing any of the commands from a station command dashboard will affect only the station whose command dashboard is open. The configuration information at the top of the command dashboard is the same as what is displayed in the main **SP2 DASHBOARD** window, except here the configured TFTP server IP address is displayed and the speaker gain setting is omitted. When any of the commands are executed, a dialog box similar to those displayed for the global system commands will appear for confirmation as necessary.

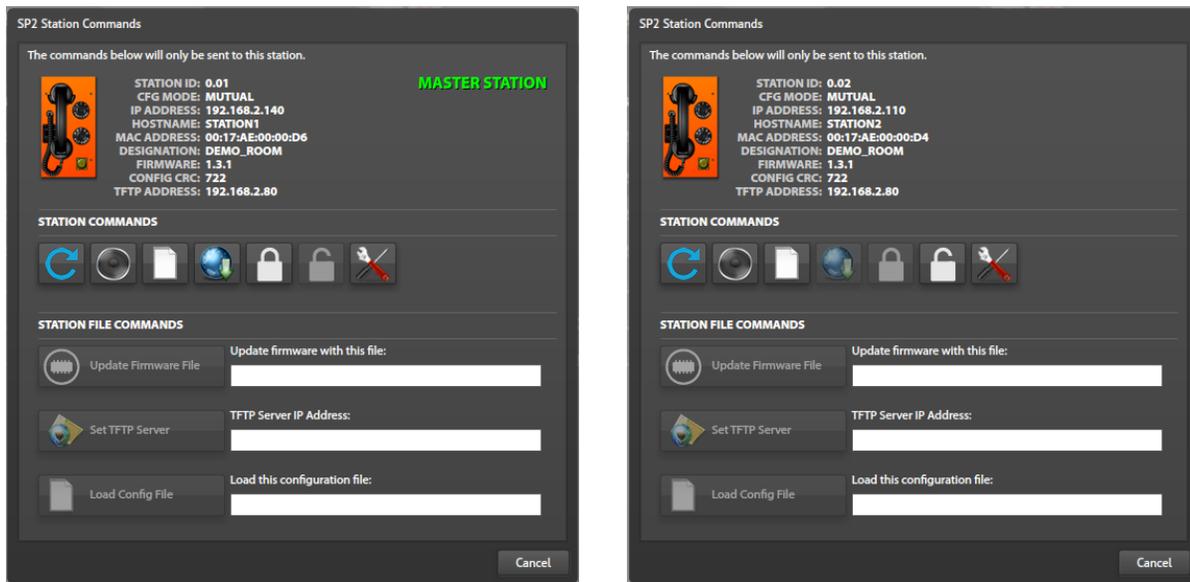


Figure 17. Master and Member SP2 Station Dashboards

## Creating or Loading SP2 Mutual Provisioning Configurations

### Creating a New Configuration

Click the “NEW CONFIGURATION” button from the initial menu to open the CREATE NEW CONFIGURATION dialog box. The CURRENT DIRECTORY, displayed below the dialog box title bar, is where the SP2 configurations are stored. If desired, click the CHANGE... button and select a different location for storing and accessing SP2 configurations. After entering a valid filename, click the **CREATE CONFIGURATION** button. If a configuration with that name already exists, confirmation to replace the existing configuration with a new configuration is required. Click the **OVERWRITE** button to replace the existing configuration with the default configuration. The console creates the configuration file and opens the SYSTEM PROPERTIES screen in the SP2 Configuration Utility.

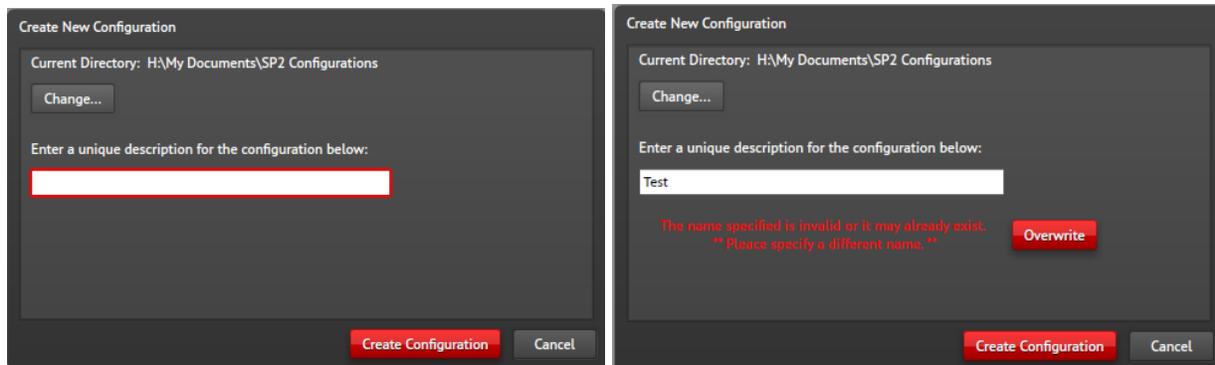


Figure 18. Creating a New Configuration

### Loading an Existing Configuration

Clicking the LOAD CONFIGURATION button from the initial menu opens the file open dialog box enabling the selection of an existing SP2 configuration. Browse to the storage location if necessary then select and open the desired configuration. Once a configuration is loaded, the SP2 Configuration Utility screen opens.

## Mutual Provisioning with the SP2 Configuration Utility

The SP2 Configuration Utility is arranged with a title and menu bar at the top of the window. Four buttons, corresponding to the configuration file section labels, are located down the left side of the window, with the FIND STATION, MULTICAST SOCKETS, and SOFTWARE PATHS auxiliary utilities located directly below them. When any of the configuration section buttons are selected, the main panel will contain expandable attribute groups containing the parameters that are configurable at the currently selected level. Individual parameters are accessed by clicking the section button followed by the parameter group corresponding to the setting type requiring modification.

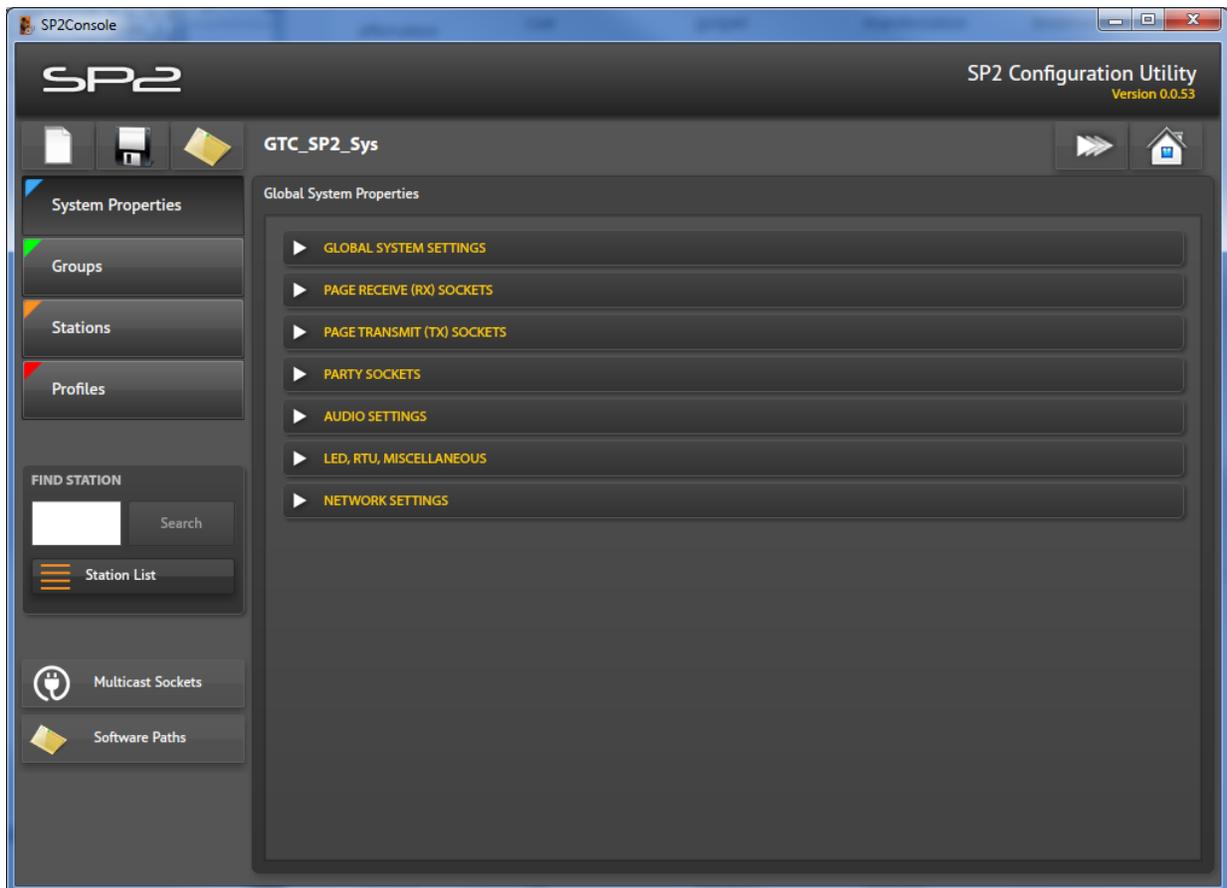


Figure 19. SP2 Configuration Utility—System Properties Button

## Configuration Utility Menu Bar

At the top of the screen is a menu bar containing five system wide functions that can be accessed from any configuration screen. The function of the menu bar buttons is as follows:



Figure 20. Configuration Utility Menu Bar

**New**—Displays the **SAVE CHANGES?** dialog box before opening the **CREATE NEW CONFIGURATION** dialog box. See the [Creating a New Configuration](#) section.

**Save**—Opens the **SAVE CONFIGURATION CHANGES?** dialog box. This dialog box allows changing the current directory and saving the configuration to a new name and provides the current configuration filename.

**Open**—Opens the **SAVE CHANGES?** dialog box before opening the file open dialog box to select a new configuration to load into the console.

**Collapse All**—Collapses all parameter groups on the currently selected panel.

**Home**—Displays the **SAVE CHANGES?** dialog box before opening the initial SP2 Console menu

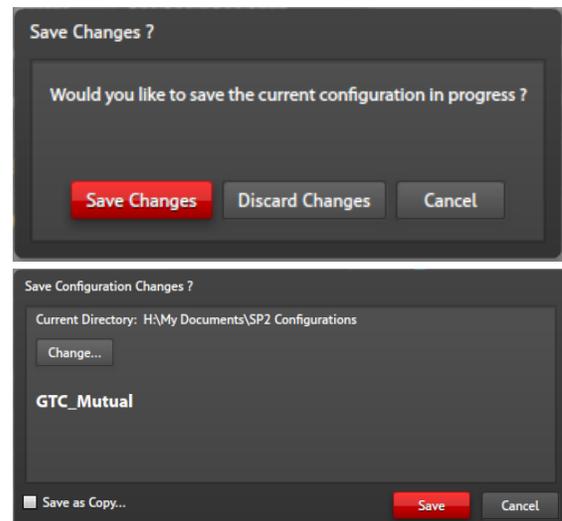


Figure 21. Save Changes Dialog Boxes

## SP2 Auxiliary Tasks

The SP2 Configuration Utility has three auxiliary functions that are used to add stations to the mutual configuration, add multicast sockets to the configuration, and to modify the path to the root of the TFTP server. The buttons used to access these functions are located on the lower left side of the SP2 Configuration Utility. The **MULTICAST SOCKETS** and **SOFTWARE PATHS** utilities are only accessible while the **SYSTEM PROPERTIES** button is active because these settings are only meaningful at the global system level of the configuration.

### Find Station

The find station utility locates existing SP2 stations in the configuration for assignment of specific parameter values at the [GROUP], [STATION], or [PROFILE] levels of the mutually provisioned system. It also provides the ability to add additional SP2 station identifiers to the system configuration.

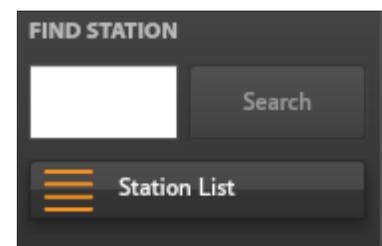


Figure 22. Find Station Utility

**Search Button**—The search button locates the stations that are already defined in the configuration. Enter a valid station ID with the format G.SS, where G is the group number to which the station belongs and SS is the station number in that group. The **SEARCH** button becomes active when a valid station ID has been entered. If the station identifier exists, the utility display's that station's **STATION VIEW** panel. See the [Station View Panel](#) section of this manual for information specific to configuring a station with unique properties. If the station is not found then the utility prompts to add the station to the configuration as shown in [Figure 23](#). Click the **CREATE STATION** button to add the station's ID to the configuration or **CANCEL** to exit the dialog box without adding the station to the configuration. Adding the station will open that station's **STATION VIEW PANEL**.

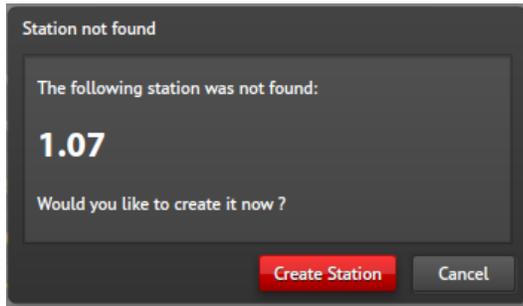


Figure 23. Station Not Found Dialog Box

**Station List Button**—The station list button opens the **MANAGE STATIONS** screen shown below. This screen provides filtered lists of station identifiers in the SP2 mutual configuration. All stations in the configuration are listed on this screen when no filter is applied. SP2 stations are displayed in the list with the **UNIT** parameter preceding the station identifier. Double clicking any station in the list will open the **STATION VIEW** panel for that station.

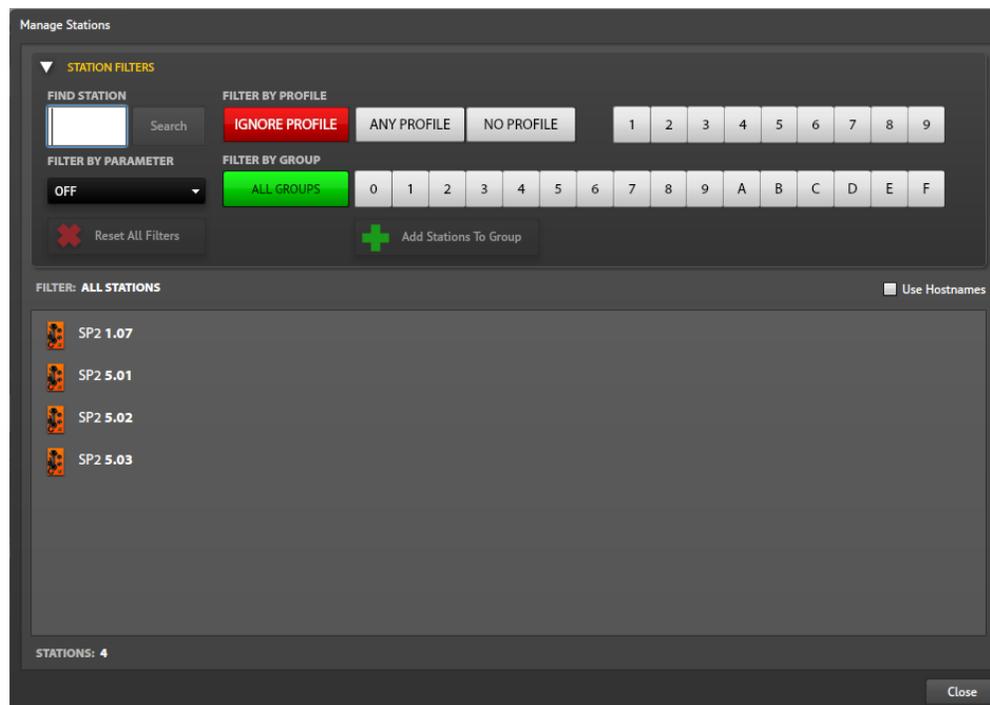


Figure 24. Manage Stations Screen

**STATION FILTERS**—The **STATION FILTERS** pane inside the **MANAGE STATIONS** screen gives multiple methods to displaying the desired stations. Expand and collapse the filter pane by clicking on the **STATION FILTERS** expansion button.

**Find Station/Search**—Facilitates finding those stations that have already been added to the configuration but are not displayed because of the active filter. See the [Find Station](#) information in the previous section.

**Filter by Parameter**—Select a parameter from the dropdown list to display the only those stations that have the selected parameter configured in the [G.SS] section of the configuration. All of the station parameters that can be configured at the station level are selectable from the list.

**Reset All Filters**—This removes all applied filters in the pane to display all of the stations with identifiers in the mutual configuration.

**Filter by Profile**—This filter has four selectable options; IGNORE PROFILE, ANY PROFILE, NO PROFILE, or PROFILE 1..9. The **RED BUTTON** is the currently selected option. Information on profiles is provided in the [Manage Profiles Panel](#) section later in this manual.

- **Ignore Profile**—This is the default option that will display all stations regardless of profile assignment.
- **Any Profile**—This option displays all stations that have any profile assigned.
- **No Profile**—The NO PROFILE filter lists only those stations that do not have a profile assigned.
- **Profile 1..9**—Find and list the stations that will apply the selected profile.

**Filter by Group**—Filtering by the group number locates all stations in the configuration with their group selector switch set to the selected group number, 0..F.

**Add Stations to Group**—This button opens the dialog box at the right for adding stations to the configuration in the group selected above.

**STATIONS TO ADD:**—Enter the number of stations, 1–250, that need to be added to this configuration where their group selector switch will be set to the group number selected in the filter.

**SET NWMODE STATIC**—Select this checkbox to set the station's **NW-MODE** parameter to Static. Static IP addresses will need to be configured for all stations in the configuration.

**START ADDRESS**—Enter the class C IP address of the first station. The remaining stations will be added with incremental IP addresses assigned.

**CREATE STATIONS**—Click this button to create the number of stations entered. If **SET NWMODE STATIC** is selected and a valid class C address IP address is entered in the field then the stations will be created as requested.

**CANCEL**—Closes the dialog box without creating any stations in the configuration.

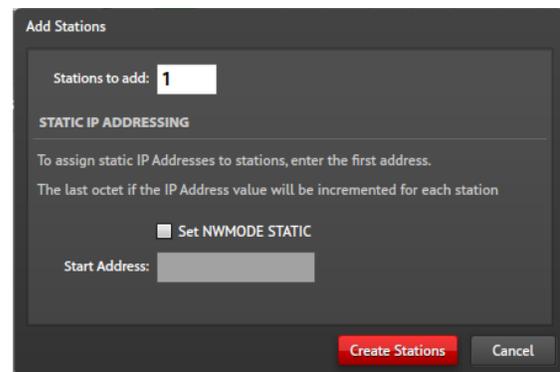


Figure 25. Add Stations Dialog Box

**Filter**—Displays the applied filters. Ex. GROUP1, IGNORING PROFILES

**Use Hostnames**—Select this checkbox to list the SP2 stations by their host names instead of by their stations IDs. Valid SP2 Station hostnames can be 28 characters long. With this option selected, fewer stations will be visible on the screen.

**Stations**—Shows how many stations are currently displayed in the pane inside the **MANAGE STATIONS** panel. If a group filter is applied, the number of remaining stations that can be created in that group will also be displayed.

**Close**—Closes the **MANAGE STATIONS** panel.

### Multicast Sockets

The multicast sockets button opens the MULTICAST SOCKETS dialog box for adding new IP multicast sockets for use in the SP2 mutual configuration. New IP multicast sockets must be defined for any non-default configurations.

**Add Multicast Socket**—Enter a valid IP multicast socket address in the field and click the ADD MULTICAST SOCKET button to add the new socket to the list. Valid SP2 sockets must have IP addresses and ports in the following range: (239.1–127|129–255.0–255.0–255: 0–65534).

**Multicast Sockets Available**—This field lists the multicast sockets already defined in the system.

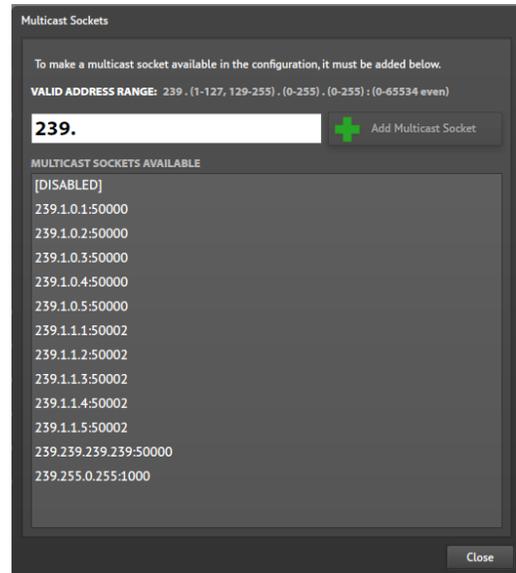


Figure 26. Multicast Sockets Dialog Box

### Software Paths

The CONFIGURATION SOFTWARE PATHS dialog box displayed below is used to modify the path to the parent directory of the configuration file on the TFTP server.

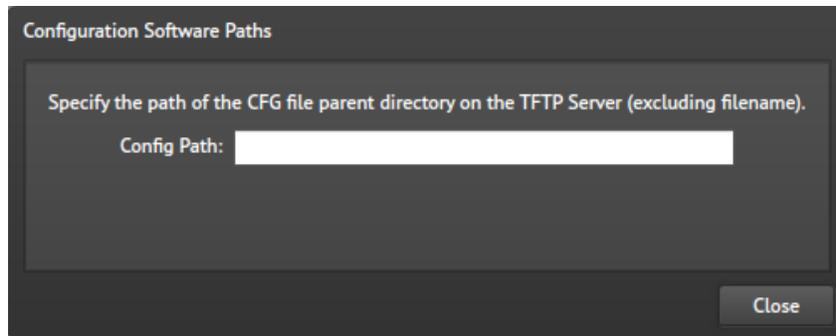


Figure 27. Configuration Software Paths Dialog Box

**Config Path:**—Enter the path to the parent folder of the configuration file on the TFTP Server.

### Configuration Parameter Field Flags

The SP2 configuration utility makes use of colored flags on each parameter field to show where in the SP2 configuration hierarchy that each setting has been configured. The flags are displayed as colored triangular overlays on the upper left corner of each attribute field label and will match the flag overlay color displayed on the section label button from where it was set. This facilitates the determination of the section label in the configuration file where each particular setting is configured.

The flag colors are blue for parameters configured under the [SYSTEM] label, green for parameters set under the [GROUP] label, orange if specified under the [STATION] label, and red for those assigned in the [PROFILES] label section. The flags are visible on every field in the configuration utility and appear exactly as displayed on the section label buttons.

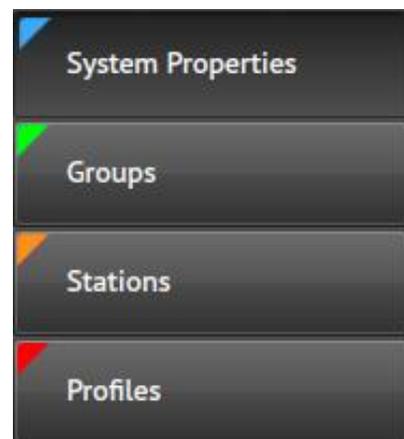


Figure 28. Section Label Buttons Showing Flag Colors

## Parameter Groups

In each panel of the SP2 Configuration Utility window, the SP2 station attributes are organized by function into expandable groups of parameters. These groups consist of the GLOBAL SYSTEM SETTINGS, PAGE RECEIVE (RX) SOCKETS, PAGE TRANSMIT (TX) SOCKETS, PARTY SOCKETS, AUDIO SETTINGS, LED/RTU/ MISCELLANEOUS, and NETWORK SETTINGS. The GLOBAL SYSTEM SETTINGS parameter group is only applicable at the system label level so this parameter group does not appear under any other section label.

The panels, accessed using the buttons down the left side of the screen, correspond to the labels in the configuration file. These panels are discussed in the following sections. Except for the GLOBAL SYSTEM SETTINGS parameters, the remaining parameter groups are identical under each section label in the configuration file, so each parameter group will only be covered once in the [Expandable Parameter Group](#) section. The function of each individual station attribute is explained in the tables located under the [SP2 Station Local Configuration](#) section of this manual. Links to the associated table containing the information for each attribute are provided.

## Station Parameter Configuration and Precedence

All essential parameter values for the SP2 stations in a mutually configured system are preconfigured at the global level of the SP2 configuration hierarchy and appear with a slightly dimmed flag to indicate that they are configured with the default settings. Changing the value assigned to an attribute at this level of the hierarchy is accomplished by clicking the desired field and then modifying the assigned value using the method required for the field type.

On the remaining three configuration panels for the group, station, and profile levels of the hierarchy, it is necessary to click on the field label to activate the field at that level before clicking in the field to modify the value. The configuration utility will always display the value that will be assigned for each attribute with the flag illustrating the level at which the parameter was configured.

**NOTE:** Audio settings affecting any station should not be implemented in the system configuration if hardware settings have been adjusted on that station. Mutual provisioning configuration settings overwrite configured hardware audio settings with the last applied value. Attempting to modify one of these parameters will superimpose a red exclamation point over the field name to draw attention to the operation of this parameter when configured in mutual provisioning.

**NOTE:** If the **TELNET\_LOCK** parameter is configured in the configuration file then the telnet lock function in the SP2 Dashboard will be overridden for the stations to which the setting applies.

## Global System Properties Panel

The GLOBAL SYSTEM PROPERTIES panel is accessed by clicking on the SYSTEM PROPERTIES button on the left side of the window. Settings configured here correspond to the [SYSTEM] label in the configuration file. When a configuration is opened in the SP2 Console, the GLOBAL SYSTEM PROPERTIES panel is displayed with the GLOBAL SYSTEM SETTINGS parameter group expanded.

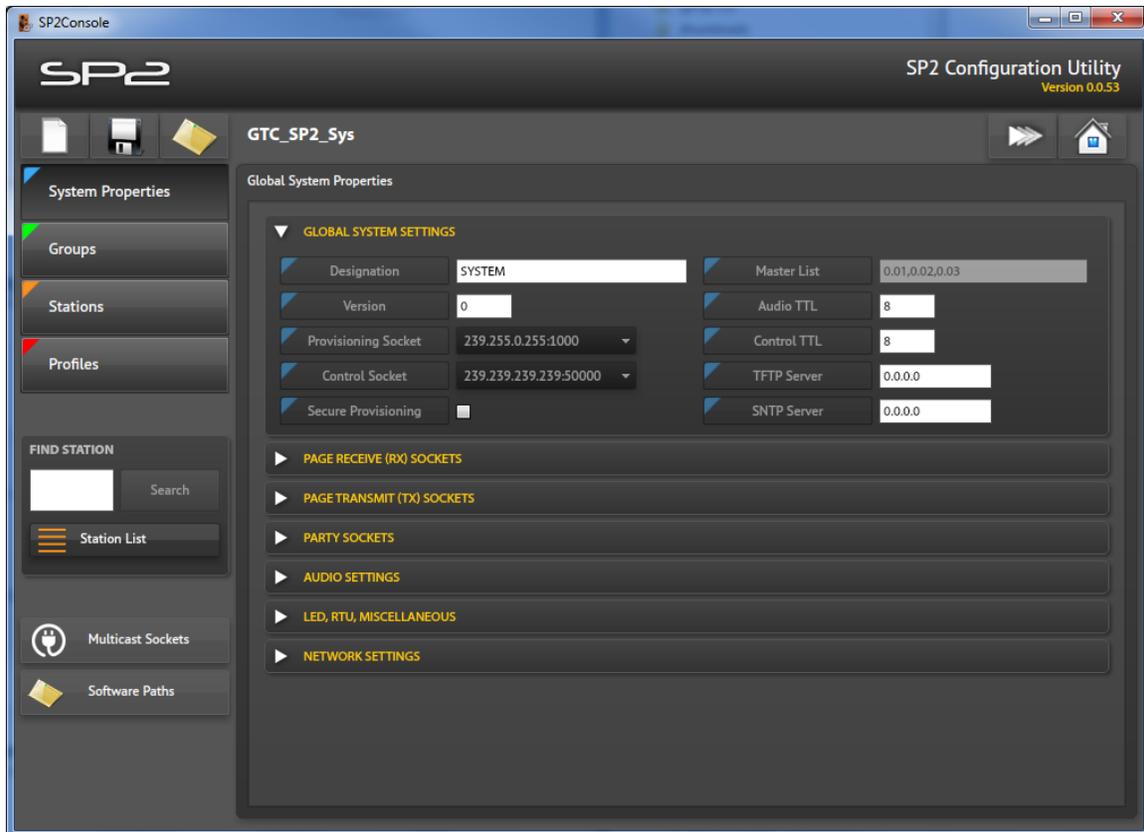


Figure 29. Global System Properties Panel with Global System Settings Expanded

## Manage Groups Panel

Clicking the **GROUPS** button on the left side of the SP2 Configuration Utility displays the **MANAGE GROUPS** panel. Groups in an SP2 configuration relate to the hexadecimal group-selector switch position in the physical SP2 stations. All stations with the same switch setting are in the same group. The stations will be organized in up to 16 groups of up to 250 stations each.

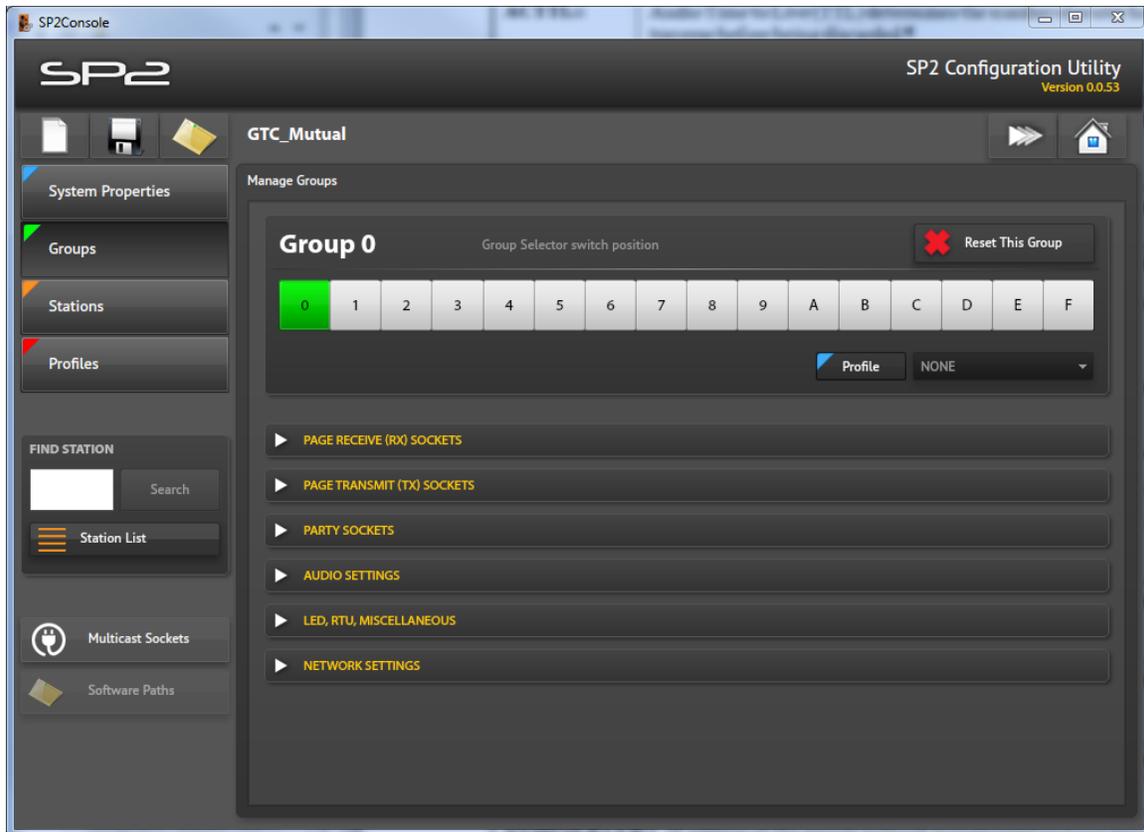


Figure 30. Manage Groups Panel

**Group Selector Switch Position**—Select a group from the 16 available groups when the SP2 stations need the same parameters configured at this level in the hierarchy.

**Reset this Group**—Clicking the **RESET THIS GROUP** button removes all attribute settings configured for the selected group.

**Profile**—SP2 Stations with the same group selector switch position can be assigned a profile. Profiles provide a method of assigning different values to attributes from what is assigned at the group and station levels of the hierarchy. To assign a profile to a group, click the **PROFILE** field label and select profile one through nine from the dropdown list.

**Collapsed Parameter Groups**—The collapsed parameter groups are displayed below the station information pane. Click the expand arrow to open the group containing parameters needing modification. See the [Expandable Parameter Groups](#) section for information on the settings in each parameter group.

## Station View Panel

The STATION VIEW panel permits the configuration of attributes for individual SP2 stations in a mutually configured system. The panel is accessed by clicking the STATIONS button on the left side of the window. The station view panel works with the STATION LIST to open the properties of a particular station in the configuration.

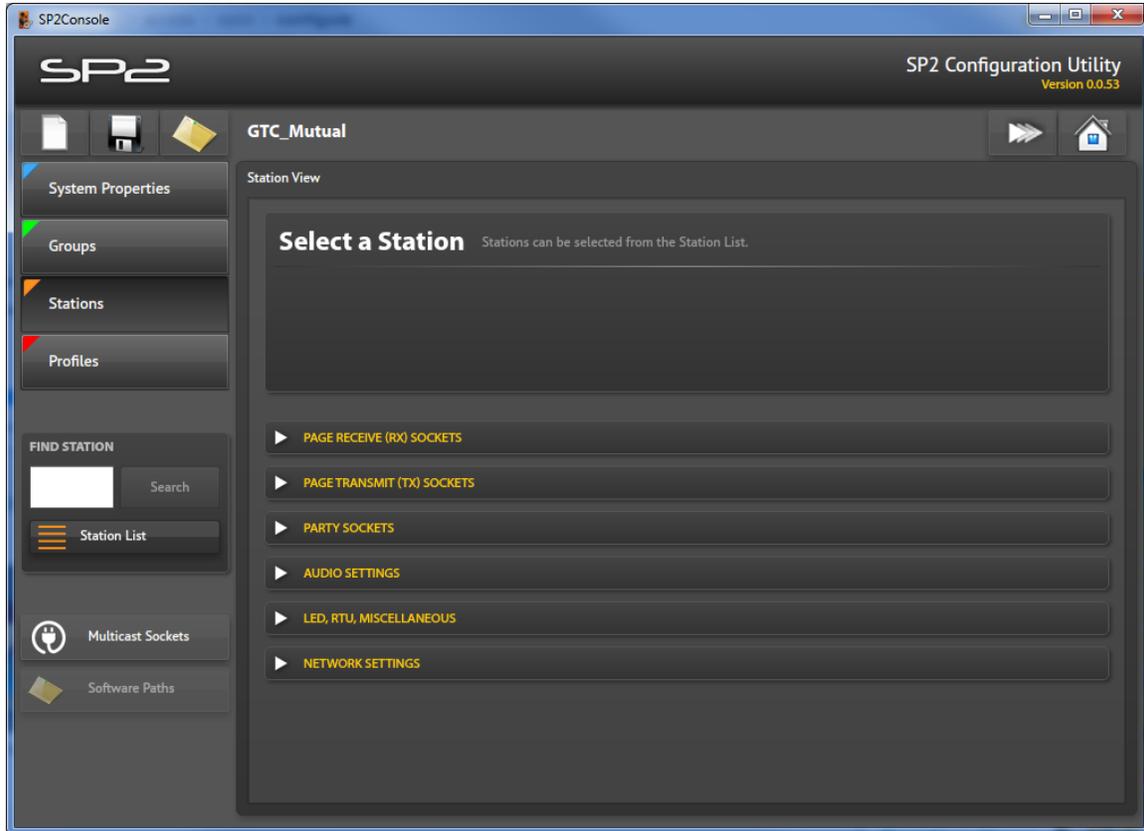


Figure 31. Station View Panel (No Station Selected)

**Select a Station**—Stations can be selected from the station view list. The [Find Station](#) section documents the functionality of the STATION LIST utility. Once a station has been selected, the configuration properties for that station are displayed in the STATION VIEW panel.

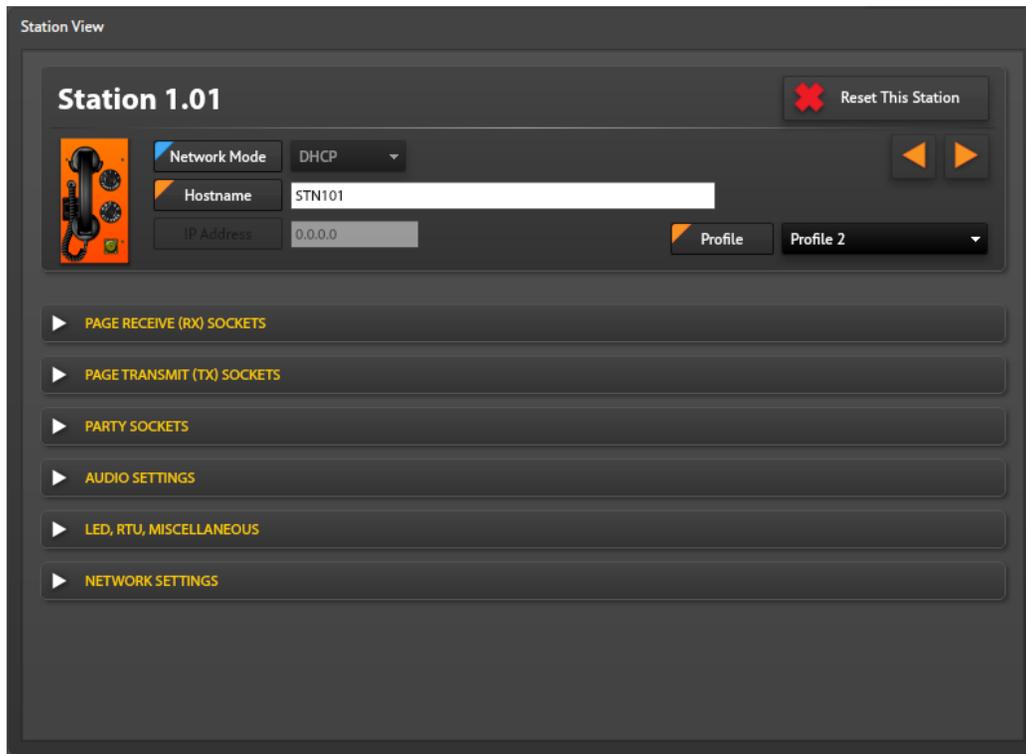


Figure 32. Station Shown in Station View Panel

**Station 1.01**—The station currently selected for modification is displayed at the top of the STATION VIEW panel

**Reset This Station**—Clicking this button removes all changes to the selected station’s parameters. This is an undo action for all parameters modified in all of the parameter groups for this station.

**Network Mode**—The NETWORK MODE field designates the current mode used by this station to obtain its IP address.

◀ ▶—These two navigation buttons cycle through the SP2 stations that have identifiers in the system. This allows browsing to a different station’s settings without having to use the station list utility.

**Hostname**—This field holds the name that this station will have on the IP network. The orange flag shows that the default name filtered down from the system level is being overridden with a different value.

**IP Address**—This field is currently grayed out because the network mode for this station is DHCP. The NETWORK MODE parameter can be changed for this station, which would unlock this field enabling the entry of a valid IP address.

**Profile**—The profile button allows additional parameter changes to this station by adding any settings contained in the profile assigned to the station. The flag button is orange to denote that this setting is being changed at the [STATION] level in the hierarchy. Profiles are configured on the MANAGE PROFILES PANEL covered in the next section.

**Collapsed Parameter Groups**—The collapsed parameter groups are displayed below the station information pane. Click the expand arrow to open the group containing parameters needing modification. See the [Expandable Parameter Groups](#) section for information on the settings in each parameter group.

## Manage Profiles Panel

Profiles can be assigned to groups and stations. The mechanism that enables the settings in a profile to be applied are configured at the [GROUP] and/or [STATION] level in the mutual provisioning configuration. See the [Manage Groups Panel](#) or the [Parameter Groups](#) sections earlier in this manual for information on assigning a profile to a group or station.

**NOTE:** Configuration changes to any parameter that are implemented in a profile will override the previously set value for all parameters assigned in the profile.

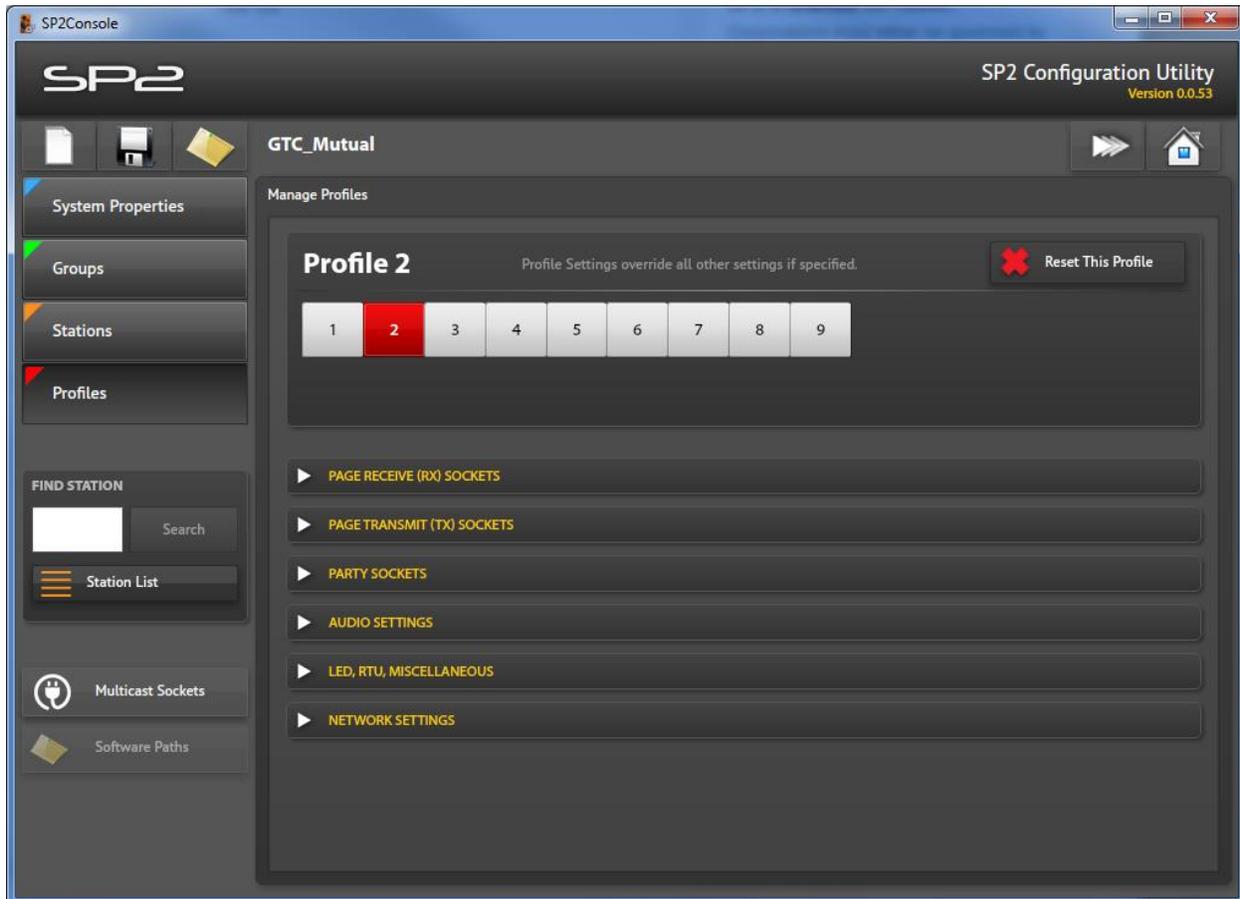


Figure 33. Manage Profiles Panel

**Profile 2**—The currently selected profile is displayed at the top of the MANAGE PROFILES panel. The box selected containing the number of the profile will be red.

**Reset This Profile**—Clicking this button will remove all changes made to this profile.

**Collapsed Parameter Groups**—The collapsed parameter groups are displayed below the station information pane. Click the expand arrow to open the group containing the parameter needing modification. See the [Expandable Parameter Groups](#) section for information on the settings in each parameter group.

## Expandable Parameter Groups

### Global System Settings

The GLOBAL SYSTEM SETTINGS parameter group contains settings that apply to the entire system and are only incorporated at [SYSTEM] level in the mutual provisioning configuration hierarchy. The flags on the field names are grayed slightly to indicate that the system default settings are the current settings to be applied.

The screenshot shows the 'GLOBAL SYSTEM SETTINGS' panel with the following fields and values:

Field Name	Value
Designation	SYSTEM
Version	0
Provisioning Socket	239.255.0.255:1000
Control Socket	239.239.239.239:50000
Secure Provisioning	<input type="checkbox"/>
Master List	0.01,0.02,0.03
Audio TTL	8
Control TTL	8
TFTP Server	0.0.0.0
SNTP Server	0.0.0.0

Figure 34. Global System Settings Panel

**Designation**—[Table 2](#)

**Version**—[Table 2](#)

**Provisioning Socket**—[Table 3](#)

**Control Socket**—[Table 3](#)

**Secure Provisioning**—This SP2 Console setting is for compatibility with stations having firmware earlier than version 3.2.0.

**Master List**—[Table 2](#)

**Audio TTL**—See the ACTTTL parameter in [Table 3](#)

**Control TTL**—See the MCTTTL parameter in [Table 3](#)

**TFTP Server**—[Table 4](#)

**SNTP Server**—[Table 4](#)

## Page Receive (Rx) Sockets

Multicast Socket Assignments		Incoming Page Routing	
Page Receive (RX) 1	239.1.1.1:50002	Audio Output	BOTH
Page Receive (RX) 2	239.1.1.2:50002	Audio Output	BOTH
Page Receive (RX) 3	239.1.1.3:50002	Audio Output	BOTH
Page Receive (RX) 4	239.1.1.4:50002	Audio Output	BOTH
Page Receive (RX) 5	239.1.1.5:50002	Audio Output	BOTH
Page Receive (RX) 6	[DISABLED]	Audio Output	BOTH
Page Receive (RX) 7	[DISABLED]	Audio Output	BOTH
Page Receive (RX) 8	[DISABLED]	Audio Output	BOTH

Figure 35. Page Receive (RX) Sockets Panel

**Multicast Socket Assignments**—The page receive sockets are controlled by the **PAGERX\_n SOCK** parameter detailed in [Table 6](#), where “n” is the page receive socket number ranging from one through eight. If additional multicast sockets are needed, they must be created using the **MULTICAST SOCKETS** utility. (See the [Multicast Sockets](#) section.)

**Incoming Page Routing**—The **AUDIO OUTPUT** fields under this heading are controlled by the **PAGERX\_n\_OUT** parameter, where n = 1–8, are covered in [Table 6](#)

## Page Transmit (TX) Sockets

Multicast Socket Assignments		Page Transmit Defer	Pre-Announcement Tone
Page Transmit (TX) A	239.1.1.1:50002	DEFER <input checked="" type="checkbox"/>	PRE <input type="checkbox"/>
Page Transmit (TX) B	239.1.1.2:50002	DEFER <input checked="" type="checkbox"/>	PRE <input type="checkbox"/>
Page Transmit (TX) C	239.1.1.3:50002	DEFER <input checked="" type="checkbox"/>	PRE <input type="checkbox"/>
Page Transmit (TX) D	239.1.1.4:50002	DEFER <input checked="" type="checkbox"/>	PRE <input type="checkbox"/>
Page Transmit (TX) E	239.1.1.5:50002	DEFER <input checked="" type="checkbox"/>	PRE <input type="checkbox"/>
600 Ohm Transmit (TX)	[DISABLED]	DEFER <input checked="" type="checkbox"/>	PRE <input type="checkbox"/>

Figure 36. Page Transmit (TX) Sockets Panel

**Multicast Socket Assignments**—The page transmit sockets assigned here are controlled by the **PAGETX\_n SOCK** parameter, where n = A–E. The **600 OHM TRANSMIT (TX)** field is controlled by the **600OHM\_TX SOCK** parameter. Both of these parameters are covered in [Table 6](#). If additional multicast sockets are needed, they must be created using the **MULTICAST SOCKETS** utility. (See the [Multicast Sockets](#) section.)

**Page Transmit Defer**—The **PAGETX\_n\_DEFER** parameter, where n = A–E, is a true/false value defaulting to **TRUE**. If this attribute needs to be modified, select the field to enable it and then check or uncheck the checkbox as necessary.

**Pre-Announcement Tone**—The PRE fields under the PRE-ANNOUNCEMENT TONE heading are controlled by the **PAGETX\_n\_PRE** parameter, where n = A–E. This is covered in [Table 6](#). This parameter is a true/false parameter defaulting to **FALSE**.

## Party Sockets

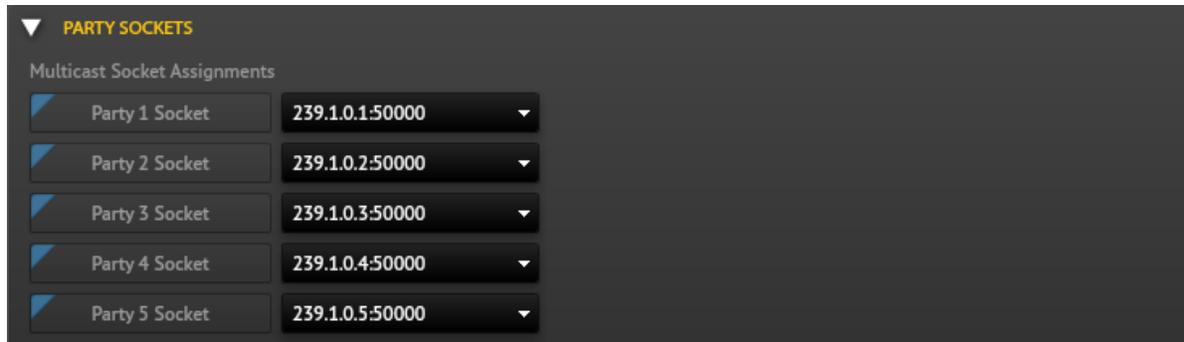


Figure 37. Party Line Sockets Panel

**Multicast Socket Assignments**—The party line IP sockets are stored in the **PARTY\_n SOCK** parameter, where n = 1–5. The information for this parameter is located in [Table 6](#)

## Audio Settings

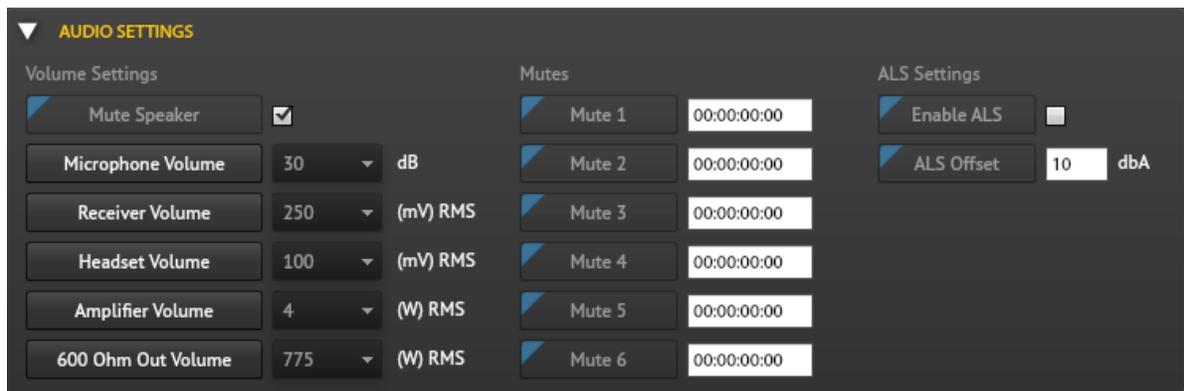


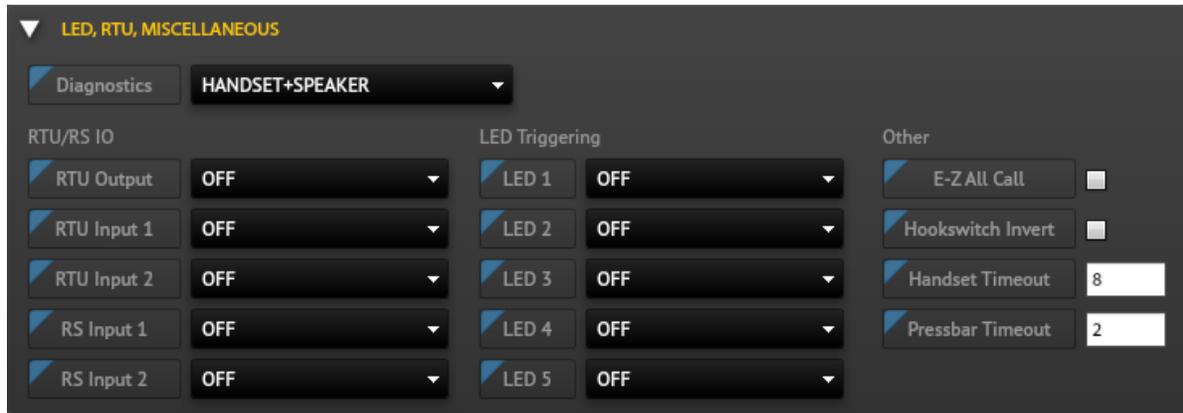
Figure 38. Audio Settings Parameter Group

**Volume Settings**—Information on these settings is provided in [Table 9](#)

**NOTE:** The MICROPHONE VOLUME, RECEIVER VOLUME, HEADSET VOLUME, AMPLIFIER VOLUME, and 600 OHM OUT VOLUME settings do not have a field flag indicating where they received their original settings. This is because any settings assigned here will overwrite the hardware settings, if configured on the local stations.

**Mutes**—This information is included in [Table 9](#)

**ALS Settings**—ALS Settings are covered in [Table 9](#)

**LED/RTU/Miscellaneous**


LED, RTU, MISCELLANEOUS		
Diagnostics		
HANDSET+SPEAKER		
RTU/RS IO	LED Triggering	Other
RTU Output	LED 1	E-Z All Call
RTU Input 1	LED 2	Hookswitch Invert
RTU Input 2	LED 3	Handset Timeout
RS Input 1	LED 4	Pressbar Timeout
RS Input 2	LED 5	

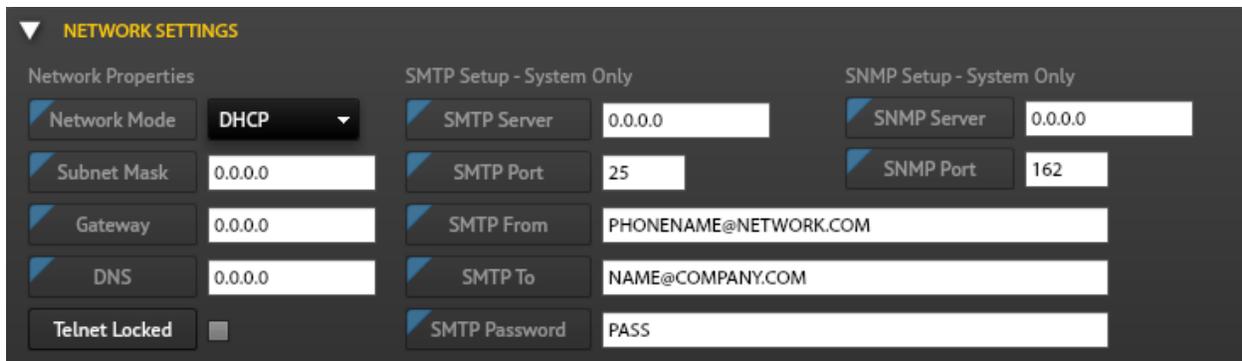
Figure 39. LED, RTU, and Miscellaneous Parameters

**Diagnostics**—Information for this parameter is given in [Table 10](#)

**RTU/RS IO**—The RTU/RS Input/Output parameter information can be found in [Table 5](#)

**LED Triggering**—LED triggering information is located in [Table 5](#)

**Other**—The E-Z All Call parameter information is located in [Table 5](#). The remaining parameters under the OTHER heading are located in [Table 7](#)

**Network Settings**


NETWORK SETTINGS		
Network Properties	SMTP Setup - System Only	SNMP Setup - System Only
Network Mode	SMTP Server	SNMP Server
Subnet Mask	SMTP Port	SNMP Port
Gateway	SMTP From	
DNS	SMTP To	
Telnet Locked	SMTP Password	

Figure 40. Network Settings Parameters

**Network Properties**—The Network Mode parameter is described in [Table 2](#). Details for the remaining properties are provided in [Table 3](#)

**SMTP Setup – System Only**—These settings are included here for informational purposes only. These settings are maintained in the global system settings parameter group which is only accessible from the global system properties panel.

**SNMP Setup – System Only**— These settings are included here for informational purposes only. These settings are maintained in the global system settings parameter group which is only accessible from the global system properties panel.

## Appendix A—Preventing Windows from Assigning Multiple COM Ports

**⚠ WARNING ⚠** Serious problems might occur if you modify the registry incorrectly. These problems might require that you reinstall the operating system.

To prevent Windows from assigning a new COM port number each time a new device with a FT232RL IC is plugged into a USB port, the FTDI enumeration instructions must be DISABLED. This is done by editing the registry on the Administrative computer. Two entries must be set in the following key: HKEY\_LOCAL\_MACHINE\SYSTEM\CurrentControlSet\Control\UsbFlags register.

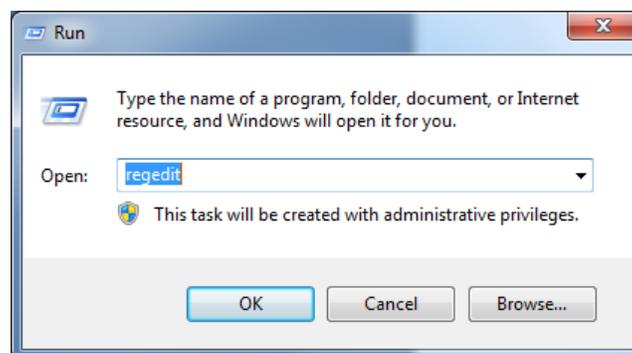
They are:

- IgnoreHWSerNum04036001
- IgnoreHWSerNum04036010

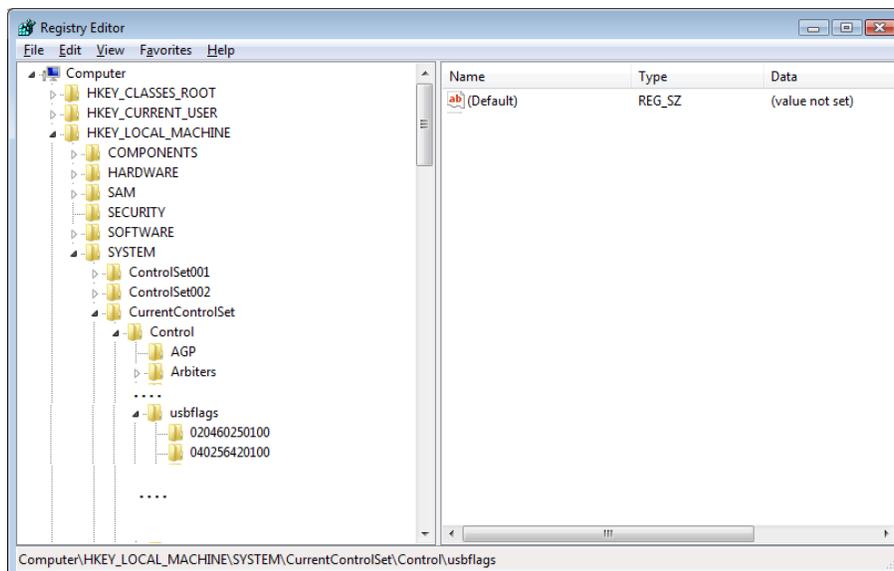
Each entry must have a value of *01*.

Step by step instructions are outlined below:

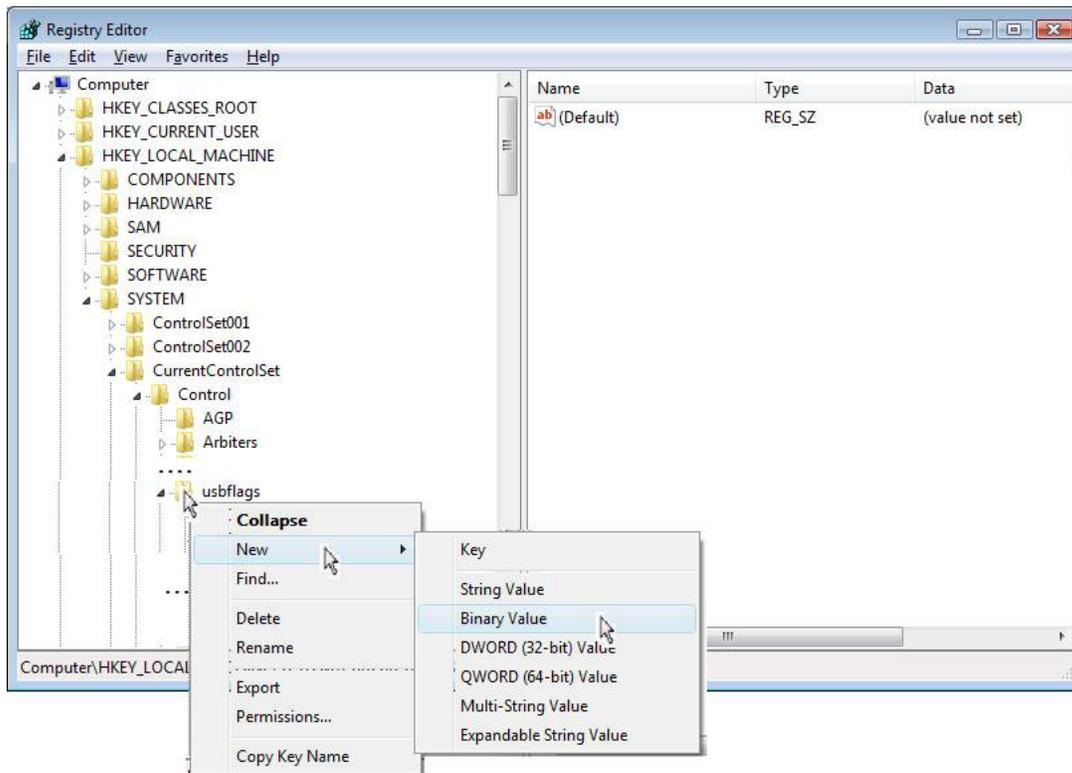
1. Click the Start Menu, select RUN and type *regedit*.



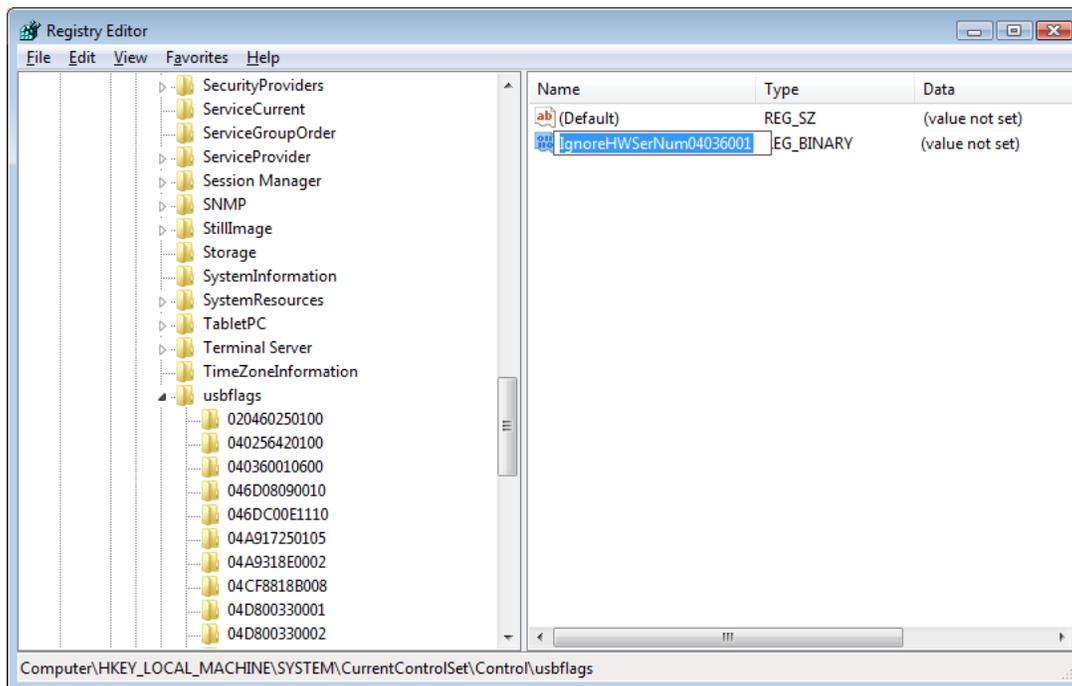
2. Navigate to HKEY\_LOCAL\_MACHINE\SYSTEM\CurrentControlSet\Control\usbflags



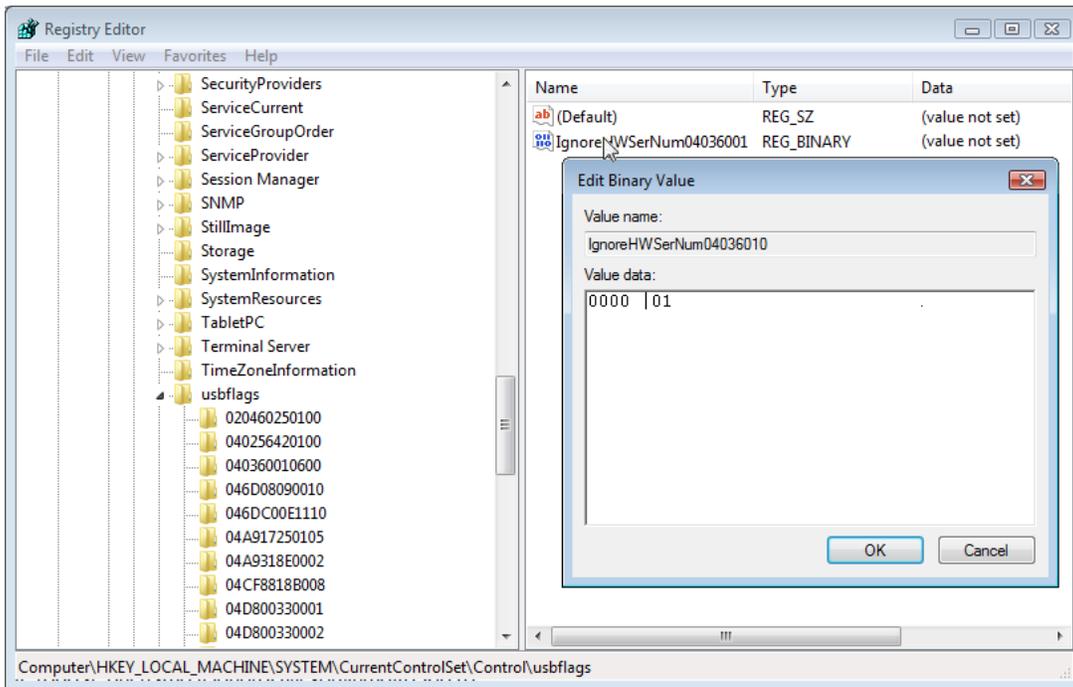
3. Right-click usbflags.
  - A. Select New
  - B. Select Binary Value.



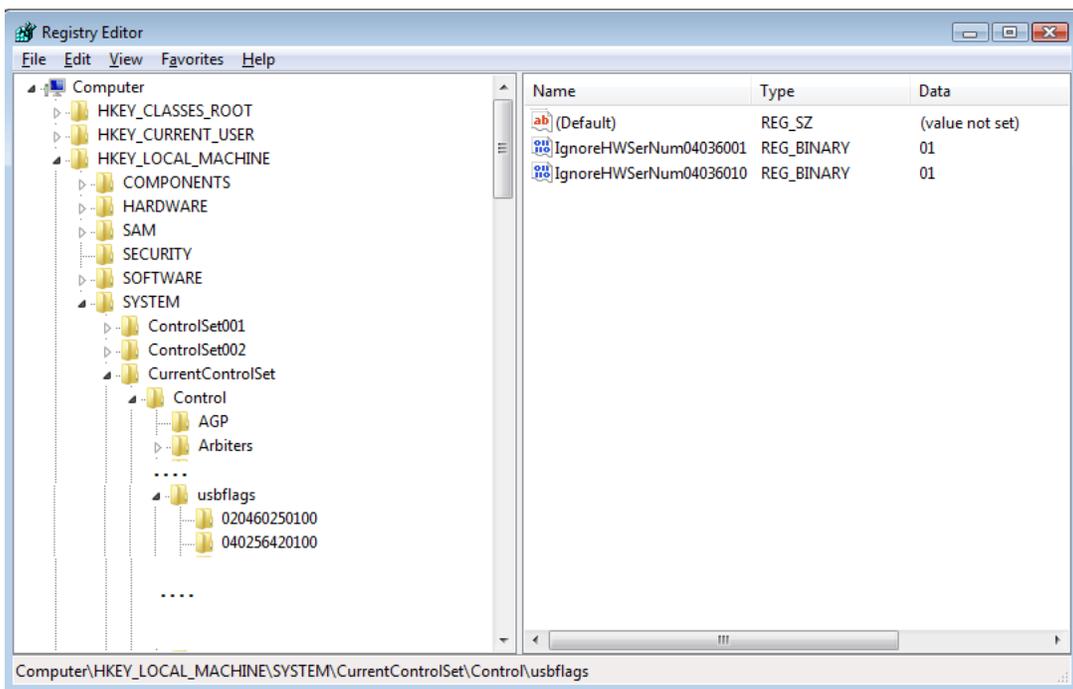
4. Name the new entry: IgnoreHWSerNum04036001



5. Double-click the new entry  
Enter: **01** then click **OK**



6. Add another new Binary Value entry to usbflags as described above.
  - A. Name the new entry: IgnoreHWSerNum04036010
  - B. Assign value of: 01



---

## Glossary of Terms

<b>ALS</b>	Ambient Level Sensing is used to monitor external speakers by sensing ambient noise levels to adjust speaker volume.
<b>MAC ADDRESS</b>	A Media Access Control (MAC) address, also called the physical address, is assigned to for communication on a physical network segment. MAC addresses are assigned by the manufacturer of a (NIC) and are stored in its hardware. Each NIC must have a unique MAC address on a physical network.
<b>IP ADDRESS</b>	<p>Internet Protocol address (IP address) is a numerical label assigned to each device participating in a that uses the for communication.</p> <p>Two versions of the Internet Protocol (IP) are in use: IP Version 4 (IPv4) and IP Version 6 (Ipv6). Each version defines an IP address differently.</p> <ul style="list-style-type: none"><li>• An IPv4 address consists of 32 (4 octets).</li><li>• Example: 192.168.1.100</li><li>• An Ipv6 address consists of 128 bits. Eight groups of four digits</li></ul> <p>Example: 2001:0db8:0:0:0:ff00:0042:8329</p>
<b>PRIVATE IP ADDRESS</b>	<p>IP Addresses which are reserved for use on private networks. These addresses cannot connect directly to the Internet.</p> <p>IPv4:</p> <ul style="list-style-type: none"><li>• 10.0.0.0 – 10.255.255.255</li><li>• 172.16.0.0 – 172.31.25.255</li><li>• 192.168.0.0 – 192.168.255.255</li></ul>
<b>SUBNET MASK</b>	<p>Used in conjunction with an IPv4 IP address, the subnet is used to separate an into logical network and host address components. Every host on a unique logical network must have the same subnet mask.</p> <p>Subnet Mask format—xxx.xxx.xxx.xxx (where xxx = 0-255)</p>
<b>DEFAULT GATEWAY</b>	The IP address of the router to which all packets will be routed to for hosts that are not located on the same logical network. This is the address of the network router used to connect to devices on a different network.
<b>HOSTNAME</b>	Hostnames are human-readable nicknames that resolve to the IP address of a device connected to a network. Hostnames are typically used in an administrative capacity and may appear in computer browser lists, active directory lists, to hostname resolutions, email headers, etc.
<b>DHCP</b>	Dynamic Host Configuration Protocol is a network service used to automatically assign IP address configuration data to hosts configured to request it upon boot-up. A DHCP server typically assigns an IP address, subnet mask, default gateway, and DNS server addresses.
<b>DNS</b>	Domain Name System is a network service used by IP network hosts to convert host names to IP addresses
<b>IGMP</b>	Internet Group Management Protocol is a communications protocol used by hosts, switches, and routers for creating, joining, and leaving multicast groups.

<b>TIME-TO-LIVE (TTL)</b>	This is a mechanism that limits the lifespan of IP data packets in a network. Data is discarded if the prescribed TTL elapses. Each time the IP data packet passes through a router, the TTL value is decremented by a value of 1. When the value reaches 0, the IP data packet is discarded. A TTL of 1 is restricted to the same subnet and won't be forwarded by a router.
<b>SMTP</b>	Simple Mail Transfer Protocol is the procedure behind the flow email on the Internet.
<b>SNMP</b>	Simple Network Management Protocol is used for collecting information from and sending configuration commands out to network devices.
<b>SNTP</b>	Simple Network Time Protocol is the method used by IP network devices to obtain standardized time from a time server.
<b>TFTP</b>	Trivial File Transfer Protocol is a subset of the FTP file transfer protocol used by network clients to issue requests to read or write to/from a particular file on an FTP server computer.
<b>CONFIGURATION</b>	A named collection of settings that defines a station's behavior.
<b>NETWORK SOCKET</b>	A network socket is the endpoint address of a service used in between hosts on a computer network. A port address is a number assigned to a service running on a particular host. A socket address is the combination of the IP address of the host and IP address and port number of the service, much like one end of a telephone connection is the combination of a phone number and a particular extension. Based on this address, Internet sockets deliver incoming data packets to the appropriate application IP address, process, or thread.