RedCONNEX™

AN-80i PTP & PMP System

User Manual

Copyright Information

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Disclaimer

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1   Important Safety & Service Notices

1.1   Safety Warnings

1. PoE power adapter caution:

PoE Power adapter Caution

Warning to Service Personnel: 48 VDC

Connecting customer premises Ethernet equipment directly to the 'OUTPUT' connector on the AN-80i Power-over-Ethernet power adapter may damage customer network interface equipment. Customer equipment including personal computers, routers, etc., must only be connected to the 'INPUT' port on the PoE unit. Only the outdoors Ethernet interface cable to the AN-80i can be safely connected to the 'OUTPUT' connector.

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2. Installation of the system <u>must</u> be contracted to a professional installer.

3. Read this user manual and follow all operating and safety instructions.

4. Keep all product information for future reference.

5. The power requirements are indicated on the product-marking label. Do not exceed the described limits.

6. Use only a damp cloth for cleaning. Do not use liquid or aerosol cleaners. Disconnect the power before cleaning.

7. Disconnect power when unit is stored for long periods.

8. The AN-80i must not be located near power lines or other electrical power circuits.

9. The system must be properly grounded to protect against power surges and accumulated static electricity. It is the user's responsibility to install this device in accordance with the local electrical codes: correct installation procedures for grounding the AN-80i, mast, lead-in wire and discharge unit, location of discharge unit, size of grounding conductors and connection requirements for grounding electrodes.

1.2 Important Warning Symbols

The following symbols may be encountered during installation or troubleshooting. These warning symbols mean danger. Bodily injury may result if you are not aware of the safety hazards involved in working with electrical equipment and radio transmitters. Familiarize yourself with standard safety practices before continuing.

Electro-Magnetic Radiation   High Voltage

1.3 Important Service Information

1. Refer all repairs to qualified service personnel. Do not remove the covers or modify any part of this device, as this voids the warranty.

2. Locate the serial numbers and record these on your registration card for future reference. Use the space below to affix serial number stickers. Also, record the MAC address located on the AN-80i.

1.4 Lightning Protection

WARNING: The following notes are general recommendations for the system. The wireless equipment should be installed by a qualified professional installer who must follow local and national codes for electrical grounding and safety. Failure to meet safety requirements and/or use of non-standard practices and procedures could result in personal injury and damage to equipment. A direct lightning strike may cause serious damage even if these guidelines are followed.

All outdoor wireless equipment is susceptible to lightning damage from a direct hit or induced current from a near strike. Lightning protection and grounding practices in local and national electrical codes serve to minimize equipment damage, service outages, and serious injury. Reasons for lightning damage are summarized as:

a) Poorly grounded antenna sites that can conduct high lightning strike energy into equipment.

b) Lack of properly installed lightning protection equipment that can cause equipment failures from lightning induced currents.

A lighting protection system provides a means by which the energy may enter earth without passing through and damaging parts of a structure. A lightning protection system does not prevent lightning from striking; it provides a means for controlling it and preventing damage by providing a low resistance path for the discharge of energy to travel safely to ground. Improperly grounded connections are also a source of noise that can cause sensitive equipment to malfunction.

A good grounding system disperses most of the surge energy from a lightning strike away from the building and equipment. The remaining energy on the Ethernet cable shield and center conductor can be directed safely to ground by using a lightning arrestor in series with the cable.

If you have determined that it is appropriate to install lightning protection for your system, the following general industry practices are provided as a guideline only:

1. The AC wall outlet ground for the indoor POE adapter should be connected to the building grounding system. as the AN-80i lightning protectors.

2. Install a lightning arrestor in series with the Ethernet cable at the point of entry to the building. The grounding wire should be connected to the same termination point used for the tower or mast.

3. Install a lightning arrestor in series with the Ethernet cable as close to the AN-80i as practical. The grounding wire should be connected to the same termination point used for the tower or mast.

4. Provide direct grounding from the AN-80i, the mounting bracket, the antenna, and the Ethernet cable surge protection to the same ground bus on the building. Use the grounding screws provided for terminating the ground wires.

1.5   FCC & IC Notice

1. The Model AN-80i and its antenna <u>must</u> be professionally installed.

2. ⚠️WARNING -- FCC & IC RF Exposure Warnings

   To satisfy FCC and IC RF exposure requirements for RF transmitting devices, the following distances should be maintained between the antenna of this device and persons during device operation:

Table 1: FCC & IC RF Recommended Safe Separation Distances		
Frequency	**Application**	**Separation Distance**
5.4 GHz	PTP	20 centimeters or more
5.8 GHz	PTP	310 centimeters or more
5.8 GHz	PMP	20 centimeters or more

   To ensure compliance, operation at closer than these distances is not recommended. The antenna used for this transmitter must not be collocated in conjunction with any other antenna or transmitter.

3. High power radars are allocated as primary users (meaning they have priority) of 5250-5350 MHz and 5650-5850 MHz and these radars could cause interference and/or damage to LE-LAN devices.

4. FCC Information to Users @ FCC 15.21 & 15.105:

   This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

5. <u>Warning</u>: Changes or modifications not expressly approved by Redline Communications could void the user's authority to operate the equipment.

6. Refer to FCC & IC Certified Antennas beginning on page 85 for a list of certified antennas.

7. Where DFS is required by regional regulations, this function is permanently enabled at the factory and can <u>not</u> be disabled by the installer or end-user.

1.6   UL Information

1. The suitability of the supplied Ethernet cable is subject to the approval of Authority Having Jurisdiction and must comply with the local electrical code.

2. The equipment must be properly grounded according with NEC and other local safety code and building code requirements

3. To meet the over-voltage safety requirements on the telecommunications cables, a minimum 26 AWG telecommunication line cord must be used.

4. "Pour être en conformance avec les exigences finies de sûreté de sur-tension sur les câbles de télécommunications un fil de télécommunication ayant un caliber minimum de 26 AWG doit être utilisé."

5. Reminder to all the BWA system installers: Attention to Section 820-40 of the NEC which provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of cable entry as is practical.

6. AN-80i must be installed in compliance with relevant articles in National Electrical Code-NEC (and equivalent Canadian Code-CEC) including referenced articles 725, 800 and 810 in NEC.

7. RF coaxial cable connecting an antenna to AN-80i must comply with the local electrical code.

1.7   Product Information

Use the following table to record important system information:

Product Information
AN-80i SN: _____ MAC Address_____
PoE SN: _____ Model #: _____
Antenna Model No.: _____ Antenna SN: _____
Serial Number Stickers

2 System Overview

The Access Node 80i system is manufactured by Redline Communications -- a world leader in design and production of Broadband Fixed Wireless (BFW) systems.
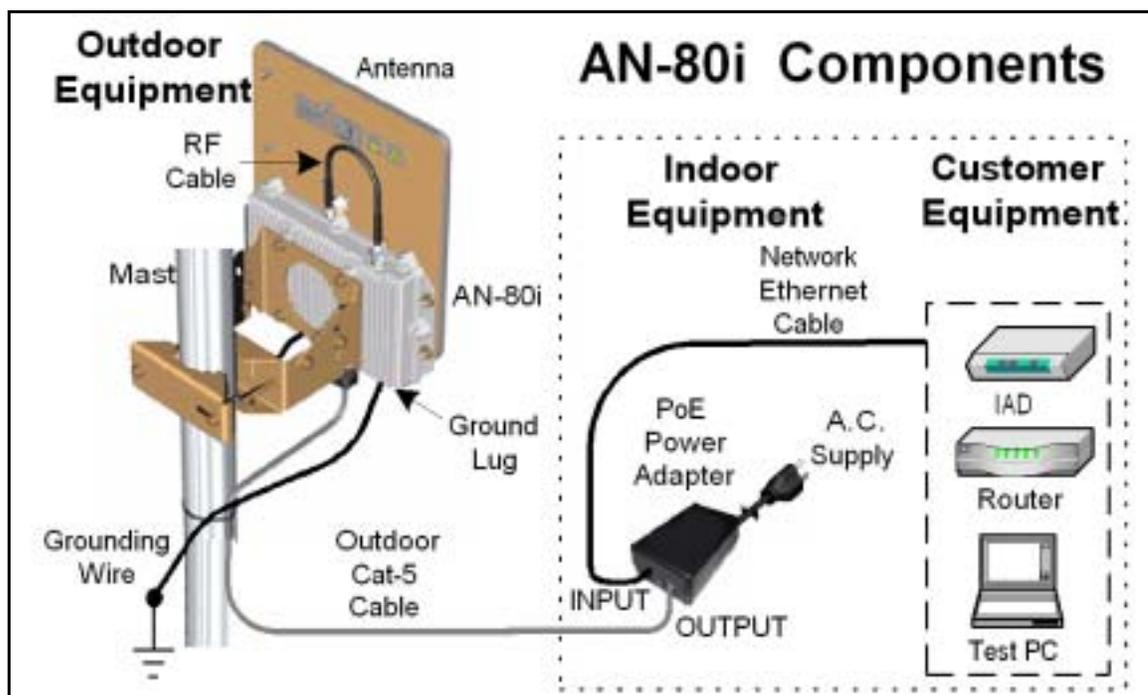
Figure 1: Intro - AN-80i Components

The AN-80i is a high-performance, high-speed wireless Ethernet bridge for use in a commercial, industrial, business, or government environment. The system can operate with a 5.4 GHz radio installed or a 5.8 GHz radio installed using a time division duplexing (TDD) RF transceiver to transmit and receive on the same RF channel. The main AN-80i features include: advanced technologies to address inter-cell interference, enhanced security features through a proprietary over-the-air encryption scheme, and Automatic Transmitter Power Control (ATPC) to automatically achieve and maintain optimum performance.

The AN-80i outdoor unit is housed in a weatherproof aluminum alloy case. The outdoor unit can be used with a selection of available external antennas. When equipped with a narrow beam antenna, the AN-80i supports long-range operations of over 50 miles (80 km) in clear line of sight (LOS) conditions. An indoor PoE power adapter provides operational power for the AN-80i and connection to the Ethernet network.

Each wireless link requires two AN-80i units. One AN-80i is configured as the PTP Sector Controller and controls the wireless link. This function is transparent to all Ethernet operations. The sector controller AN-80i uses a scheduled request/grant mechanism to arbitrate requests for bandwidth from the remote unit -- providing non contention-based traffic with predictable transmission characteristics. The second AN-80i operates as a PTP Subscriber under control of the sector controller unit.

Figure 2: Intro - AN-80i with Integrated Antenna

2.1 Ethernet Port

The AN-80i receives DC power and exchanges data with the indoor network through the Ethernet port. The AN-80i Ethernet port connects to the PoE Adapter using a weatherproof Cat. 5e Ethernet cable. The Ethernet port is a female RJ-45 connector.

2.2 RF Port

The RF port is used to sending and receive RF signal to/from the antenna. A short coaxial cable is provided to connect the transceiver to an external antenna. The RF port is a female N-type connector.

2.3 Mounting Brackets

There are two mounting brackets available for the AN-80i. The lightweight (two-point) antenna bracket provides convenient mounting of one foot flat panel antennas. The heavy-duty (four-point) antenna mounting bracket is available for mounting two foot flat panel and parabolic antennas.

2.4 Grounding Connection

A ground-lug is provided on the AN-80i chassis. Use this connection to terminate a grounding wire.

Important: Correct grounding is <u>very important</u> for safe operation of wireless equipment. Ensure that all grounding connections are made in accordance with local and national standards.

2.5 Antenna Alignment

The AN-80i includes an audible antenna alignment tool to assist in pointing the antenna for maximum signal strength. The signal will sound infrequently when a low signal is detected, and more often as the signal strength increases. The audible signal is enabled and disabled through the user interface:

Web: See *Antenna Alignment Buzzer Enable* on page 23

Telnet: See *buzzer* in CLI Set commands on page 64

2.6 Indoor Power Block (PoE Power Adapter)

The PoE power adapter provides operational power and connection to a local Ethernet network. The power block provides two Ethernet interfaces:

INPUT: The 10/100Base-T Ethernet port (RJ-45) for connection to local network equipment.

OUTPUT: The 10/100Base-T Ethernet port (RJ-45) port to carry signal and power to the AN-80i.
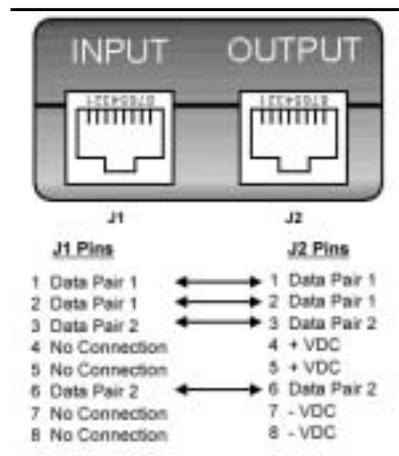
Figure 3: Intro - Indoor Power-over-Ethernet (PoE) Module

Important: PoE Adapter Type

Use the AN-80i <u>only</u> with CINCON PoE Adapter Model TR60A-POE-L.

PoE Power Adapter Caution

Warning to Service Personnel: 48 VDC

Connecting customer premises Ethernet equipment directly to the 'OUTPUT' connector on the AN-80i Power-over-Ethernet power adapter may damage customer network interface equipment. Customer equipment including personal computers, routers, etc., must only be connected to the 'INPUT' port on the PoE unit. Only the outdoor Ethernet interface cable to the AN-80i can be safely connected to the 'OUTPUT' connector.

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3 Web Interface - PTP

The Web Interface provides all required settings and statistics necessary to configure and monitor the operation of the AN-80i using a standard web browser. An operator can access and control the AN-80i remotely from any geographical location with HTTP connectivity to that unit.

3.1 System Login

On the PC, open a browser (Internet Explorer 6 or higher recommended). For new systems, enter the default IP address (192.168.25.2). The following dialog should be displayed:

Figure 4: **Web - Login Screen**

Login to the AN-80i using your user name and password. See Table 5**:** Web - Default System Users on page 30 for the factory default usernames and passwords.

If the IP address, username and/or password have been modified since installation, contact the network administrator to determine the current settings. If the IP address, or the user name and password cannot be determined. See Procedure to Reset AN-80i IP Address on page 75.

3.2   System Menu

Following a successful login, the General Information screen is displayed. On the left is a menu of all available screens. Point and click on the blue text of the menu to display that screen.
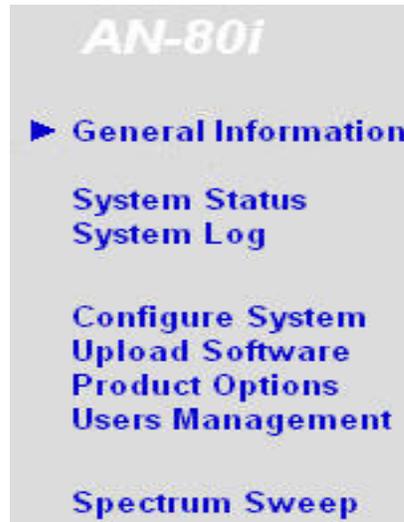
Figure 5: **Web - System Menu**

The administrator (admin) has unrestricted access to all screens. All other users have viewing access only. See 3.7: System Password Screen on page 29 for details.

3.3   System Information

Click General Information to view the system overview screen (read-only). Refer to the System Configuration screen for information about changing these settings.

General Information	
System	
System Name	Creation Link
System Details	Master-Redline
Contact	markf
Hardware Revision	10
System Mode	PTP Slave
Software Version	10.00.029
Time Since System Start	0 days, 3 h, 18 min, 28 sec
Ethernet	
Ethernet MAC Address	00:09:02:00:9a:c3
IP Address	192.168.25.32
IP Subnet Mask	255.255.255.0
Default Gateway Address	192.168.25.250
Wireless	
RF Link Established	Yes
Uncoded Burst Rate	54 Mb/s

Figure 6: **Web - General Information Screen**

General

System Name: User-assigned name for this AN-80i.

System Details: User-assigned system details information.

Contact: User-assigned contact information.

Hardware Version: Displays the hardware version of the AN-80i.

System Mode: The system designated as sector controller establishes and manages the bi-directional data link with a remote end AN-80i. Only one system in a wireless link must be set for Sector Controller mode.

   PTP Master: AN-80i begins transmitting automatically, sends poll messages to locate the remote AN-80i Slave, and negotiates operating settings for the link.

   PTP Slave: AN-80i waits passively, monitoring the selected channel(s) until polled by the PTP Master.

Software Version: Displays the software version in use.

Time Since System Start: Time since the system was last reset or powered-on.

Ethernet

Ethernet MAC Address: Hardware (MAC) address of this AN-80i. This address is also recorded on a label on the AN-80i chassis.

IP Address: User-assigned IP address of this AN-80i.

IP Subnet Mask: User assigned IP subnet mask.

Default Gateway Address: User-assigned IP address of the default router or gateway.

Wireless

RF Link **Established**: Status of the wireless link.

> **Yes** - RF link successfully established with remote-end AN-80i.

> **No** - RF link not established with remote-end AN-80i.

Uncoded Burst Rate: The current uncoded burst rate for the link.

3.4   System Status

Click System Status in the menu to view system, Ethernet statistics, and wireless interface statistics.

Figure 7: **Web - System Status Screen**

3.4.1   General information

System Name: Displays the user-assigned system name.

Software Version: Displays the software version in use.

RF Link Established: Status for the wireless link connection.

Yes - RF link has been successfully established with the remote-end AN-80i.

No - RF link has not been established with the remote-end AN-80i.

Uncoded Burst Rate: The negotiated uncoded burst rate (UBR) for the link.

System Mode: The sector controller system establishes and manages the wireless link with the remote end AN-80i. Each wireless link must have only one sector controller.

PTP Sector Controller: This unit begins transmitting automatically; sending poll messages to the remote AN-80i and negotiating the UBR (modulation and coding) for the wireless link.

PTP Subscriber: This unit waits passively, monitoring the selected channel(s) until polled by the PTP Sector Controller.

RF Channel Frequency: User-assigned RF channel.

Tx Power: The current transmit power level. If ATPC is enabled, this value may be different than the Tx Power setting in the System Configuration screen.

Link Distance [Miles or Km]: Distance between wireless systems. This may be the calculated or user-assigned distance (System Configuration screen).

Status Code: Code indicating the condition of the AN-80i system. Status indications are specific for PMP and PTP operation.

Ethernet MAC Address: System hardware address. This is also printed on a label affixed to the AN-80i.

IP Address: User-assigned IP address of the AN-80i.

IP Subnet Mask: User-assigned IP subnet mask.

Default Gateway Address: User-assigned IP for the default router or gateway.

3.4.2 Ethernet LAN Statistics

Rx Packets: Total packets received on the Ethernet port.

Rx Packets: **Discarded**: Total valid Ethernet frames received on the Ethernet port that are discarded due to lack of buffer space.

Tx Packets: Number of packets transmitted on the Ethernet port (including Ethernet frames and error correction bytes).

3.4.3 Wireless Statistics

Received Signal Strength: **Min**: Minimum measured RSSI value.

Received Signal Strength: **Mean**: Average measured RSSI value.

Received Signal Strength: **Max**: Maximum measured RSSI value.

SINADR: Average signal to interference, noise, and distortion ratio measured since the last screen refresh.

Rx Packets: Total number of packets received over the wireless interface.

Rx Packets: **Retransmitted** Number of packets received over the wireless interface that were retransmitted by the remote-end system (ARQ mechanism re-transmitting unacknowledged packets).

Rx Packets - Discarded: Number of received packets discarded due to errors.

Tx Packets: Number of packets transmitted over the wireless interface.

Tx Packets - Retransmitted: Number of packets re-transmitted over the wireless interface (ARQ mechanism re-transmitting unacknowledged packets).

Tx Packets: **Discarded**: Total number of packets transmitted over the wireless interface that were not acknowledged (discarded by remote-end due to errors).

3.4.4 Controls

Reset Statistics: Click this button to zero the counters for the wireless and Ethernet LAN Statistics displayed on this page.

3.5   System Logs Screen

Click System Log in the menu to view the system activity and error messages recorded by the AN-80i.
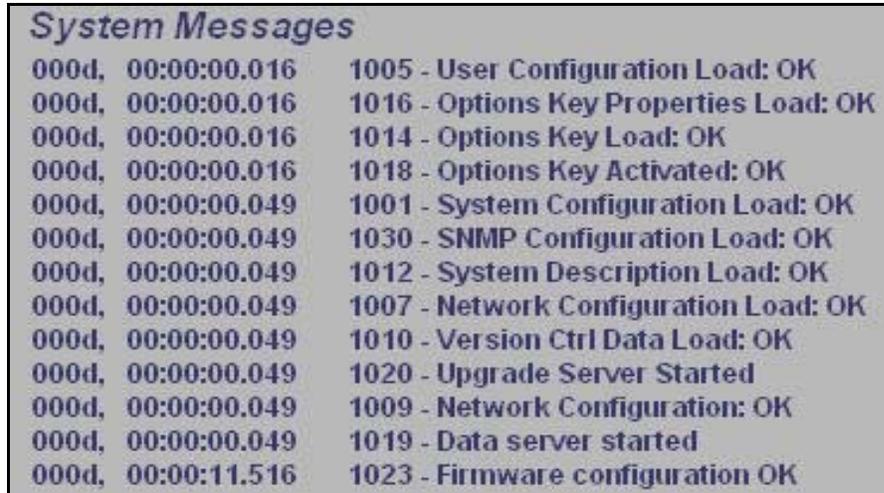
000d, 00:00:00.016	1005 - User Configuration Load: OK
000d, 00:00:00.016	1016 - Options Key Properties Load: OK
000d, 00:00:00.016	1014 - Options Key Load: OK
000d, 00:00:00.016	1018 - Options Key Activated: OK
000d, 00:00:00.049	1001 - System Configuration Load: OK
000d, 00:00:00.049	1030 - SNMP Configuration Load: OK
000d, 00:00:00.049	1012 - System Description Load: OK
000d, 00:00:00.049	1007 - Network Configuration Load: OK
000d, 00:00:00.049	1010 - Version Ctrl Data Load: OK
000d, 00:00:00.049	1020 - Upgrade Server Started
000d, 00:00:00.049	1009 - Network Configuration: OK
000d, 00:00:00.049	1019 - Data server started
000d, 00:00:11.516	1023 - Firmware configuration OK

Figure 8: **Web - System Log Messages**

Refer to section 6: Diagnostics and Troubleshooting on page 74 for descriptions of the system log messages..

3.6   System Configuration Screen

Click Configure System in the menu to view and adjust configuration settings for general system identification, Ethernet, and the wireless interface.

Figure 9: **Web - System and Network Configuration Screen**

General

System Name: Enter the name for this AN-80i. The name can be any combination of letters and numbers.

System Details: Enter additional descriptive details about this AN-80i. The description can be any combination of letters and numbers.

System Location: Enter additional descriptive details about this AN-80i. The description can be any combination of letters and numbers.

Contact: Enter additional descriptive details about this AN-80i. The description can be any combination of letters and numbers.

IP Address: Enter the IP address for this AN-80i. The IP address is routable through the Ethernet port and over the wireless interface.

IP Subnet Mask: Enter the IP subnet mask.

Default Gateway Address: Enter the IP address of the default gateway or router on the Ethernet segment connected to the AN-80i Ethernet port.

Flow Control Enable: Check this box ☑ to enable flow control functions (802.3x) on the AN-80i Ethernet port. Enabling this feature allows the AN-80i to request Ethernet devices to pause transmissions during busy periods.

SNTP Enable: Check this box ☑ to enable the SNTP protocol support. This feature allows AN-80i systems to time-stamp log messages using a network time server. When enabled, you must enter the network address of the SNTP server in the SNTP Server IP Address field.

SNTP Server IP Address: Enter the network address of the SNTP server. Valid only when the SNTP Enable field is checked.

Time Zone (GMT): Enter the hours offset from GMT for this time zone. Valid only when the SNTP Enable field is checked.

Syslog Enable: Check this box ☑ to enable the Syslog protocol support. This feature allows AN-80i log messages to be saved in a central repository. When enabled, you must enter the network address of the Syslog server in the Syslog Server IP Address field.

Syslog Server IP Address: Enter the network address of the Syslog server. Valid only when the Syslog Enable field is checked.

Ethernet Mode: Select the operating mode of the Ethernet port.

> **Auto** - Auto-negotiate the speed connection speed.
>
> **10** - Operate at 10Base-T only.
>
> **100** - Operate at 100Base-T only.
>
> **HD** - Operate at half-duplex only.
>
> **FD** - Operate in full duplex only.

Important: The auto-negotiate feature does not detect the speed and duplex of manually set Ethernet equipment. The auto-negotiate feature works correctly only when both communicating Ethernet devices are configured for auto-negotiate. Duplex mismatches may result in an unexpected loss of communications.

HTTP Enable: Check this box ☑ to enable the HTTP (Web) interface. If the option is deselected, only CLI commands will be available.

Telnet Enable: Check this box ☑ to enable a Telnet access (CLI) to the AN-80i. Refer to the CLI commands in CLI Interface on page 58.

Telnet Port: Enter Telnet port address (default is 23).

SNMP Enable: Check this box ☑ to enable the Simple Network Management Protocol (SNMP) agent. When this item is checked, clicking on the blue text [Configure SNMP] adjacent to the check box displays the SNMP Configuration screen.

Figure 10: **Web - Wireless Configuration Screen**

Wireless Configuration

RF Freq. [MHz]: Enter the center frequency for the RF channel. This setting must be identical for both AN-80i systems operating as a wireless link. The options key controls channel availability. Refer to Table 43: Spec. - Regional Identification Codes on page 87 for available channels.

Note: To minimize interference, the channel frequencies for AN-80i links operating in close proximity should be separated by a minimum of the channel size in use (to avoid overlapping bands).

Auto scan: Check this box ☑ to enable the AN-80i PTP Subscriber to automatically scan available channels and locate the current operating frequency of the AN-80i PTP Sector Controller.

Tx Power [dBm]: Enter the transmit power level (dBm). This setting is for the transceiver output only. The actual EIRP depends on the gain of the connected antenna (see

ETSI Certified Antennas on page 84).

Important: In some regions, the maximum operational power per channel for a specific antenna is limited in accordance with regulations specifying the maximum allowable EIRP levels. Refer to the FCC and CE notices in this manual.

See Table 2: Web - Max. Power (in dBm) and Modulation to determine the maximum transmit power level available at each modulation setting. When ATPC is enabled, the Tx power will be automatically adjusted to achieve optimum performance.

Table 2: Web - Max. Power (in dBm) and Modulation Settings							
Modulation	BPSK		QPSK		16 QAM		64 QAM	
Code Rate	1/2	3/4	1/2	3/4	1/2	3/4	2/3	3/4
Max Tx Power	20	20	20	20	20	20	17	17

DFS Action: Select the mode of operation for DFS.

The system set to sector controller-mode monitors for interference from radar devices and other equipment using the same channel frequency. When interference is detected, the system automatically takes the action selected using the drop-down menu:

Important: Where DFS is required by regional regulations, this function is permanently enabled at the factory and can <u>not</u> be disabled by the installer or end-user.

None: The DFS function is disabled.

Tx Off: Transmission is immediately disabled when radar signals are detected. This action is recorded in the message log and an SNMP trap message is sent (if SNMP enabled).

Following an interval of thirty minutes, the same channel is monitored for one minute and if there are no DFS triggering events, the system resumes normal operation. If DFS trigger conditions are still detected, operation is suspended for an additional thirty minutes. This cycle continues until no DFS trigger events are detected or the operator manually reconfigures the system.

Chg Freq: Relocate transmission to an alternative frequency immediately when radar signals are detected. This action is recorded in the message log and a trap message is sent (if SNMP enabled).

The new channel is selected based on allowable frequencies for the regulatory region of that installation. The channel is monitored for one minute before the system is allowed to transmit. If DFS triggering events are detected, the next available channel is selected and monitored. The system is not allowed to return to a channel on which DFS trigger events were detected for a period of thirty minutes. If DFS trigger events are detected on all channels, operation is suspended until the thirty-minute time interval expires for at least one channel.

Antenna Gain: Enter the gain (dBm) for the system antenna.

It is important that the Antenna Gain setting matches the actual antenna gain. If the antenna gain is set higher than the true antenna gain, the system is less sensitive to detecting interference, and is <u>not</u> operating in compliance with the UK/ETSI standard. If

the antenna gain is set lower than the true antenna gain, the system is more sensitive to interference and this may result in false DFS triggers.

ATPC Enable: Check this box ☑ to enable the AN-80i to monitor the received signal and request that the remote system adjustment its transmit level for optimum performance. The ATPC feature must be enabled on both AN-80i units.

Adaptive Modulation: Check this box ☑ to enable the AN-80i to automatically adjust the transmission modulation and code settings to achieve the highest UBR that will operate with a packet error rate (PER at layer 2) of less than 1x10e-6. If the PER exceeds 1x10e-6, the AN-80i automatically adjusts the modulation and code settings downwards (i.e., from 16 QAM 3/4 to 16 QAM 1/2) to operate at a lower UBR where the PER is acceptable.

When disabled, the modulation and code settings are entered manually using the Uncoded Burst Rate setting. See Table 2**:** Web - Max. Power (in dBm) and Modulation.

Channel Width: Select the channel bandwidth. Refer to Table 43: Spec. - Regional Identification Codes on page 87 for available channel widths.

Modulation Reduction Level: Enter the number of modulation/coding levels to step down during re-transmission of errored wireless packets. Each step down lowers the UBR. The level can be set from 0 to 7 (recommended value = 2).

Uncoded Burst Rate [Mb/s]: Select the desired UBR for the link. If Adaptive Modulation is disabled, the AN-80i will transmit using only the specified settings. See Table 2**:** Web - Max. Power (in dBm) and Modulation.

Ethernet Follows Wireless: Check this box ☑ to have the AN-80i disable and enable the Ethernet port function based on the status of the wireless interface. This feature allows switches and routers to trigger configuration changes based on changes to the AN-80i Ethernet port status.

Disabled (☐): The AN-80i Ethernet port is always enabled.

Enabled (☑): The Ethernet port status is controlled based on the status of the wireless interface. See the following table.

Table 3: Web - Ethernet Status Indication		
Configuration Setting	**Wireless interface Status**	**Ethernet Port Status**
Ethernet Follows Wireless ☐	Link Up	Enabled
	Link Down	Enabled
Ethernet Follows Wireless ☑	Link Up	Enabled
	Link Down	Disabled

Important: The Ethernet Follows Wireless setting affects <u>all</u> data and management traffic (HTTP, TELNET, and SNMP). When enabled, it is <u>not</u> possible to establish communications with the AN-80i using the Ethernet port while the wireless interface is down. If the wireless interface is down, the Ethernet Follows Wireless setting can only be set to 'off' by using the IP recovery procedure. See 6.2: Procedure to Reset AN-80i IP Address on page 75.

System Mode: Set the operating mode for each AN-80i system.

PTP Sector Controller: This unit begins transmitting automatically; sends poll messages to the remote AN-80i, and negotiates the wireless link.

PTP Subscriber: This unit waits passively, monitoring the selected channel(s) until polled by the PTP Sector Controller, and participates in negotiating the wireless link.

Software Version: Select the version of system software to load when the AN-80i is rebooted. The system holds two independent software images.

Encryption Enable: Check this box ☑ to enable encryption of data transmitted over the wireless interface. When encryption is enabled, no Ethernet packets can be transferred over-the-air unless encryption is enabled on the remote-end AN-80i, and the correct encryption key is entered on both AN-80i units.

Encryption Key: The key is used to encrypt data in a way that can be decoded by the remote-end AN-80i. Enter the MAC address of the communicating AN-80i.

Link **Length Measurement Mode**: Select the mode for setting/measuring the distance between this and the remote-end AN-80i.

Auto: Distance is calculated automatically by the AN-80i.

Manual: Enter the link distance manually in the Link Length field.

Link **Length**: Enter the actual length of the path that the radio wave travels between the two AN-80i units. The Link length is used to calculate the transmission-to-response interval and reject reflections of the transmitted signal. This setting is valid only when the Link Length Mode is set to Manual.

Link **Length Measurements Unit**: Select the units for the Link Length field.

Mile: Link length distance is displayed in miles.

Km: Link length distance is displayed in kilometers.

Antenna Alignment Buzzer Enable: Check this box ☑ to enable the antenna alignment audible tone generator in the transceiver. The rate of the tone is proportional to the receive signal strength (faster = stronger signal).

Radio Enable: Check this box ☑ to enable the radio transmitter. If this box is unchecked (☐), it will <u>not</u> be possible to establish a wireless link.

Controls

Save: Click to save the parameter settings displayed in the configuration screen.

Note: Changes to some parameters cause the AN-80i to initiate a system reset when the Save button is selected.

Test: Click this button to have the AN-80i load the current settings displayed in the configuration screen. The AN-80i will operate with these settings for a period of five minutes. During the 'test' period, you may click the Save button at any time to save this configuration permanently (also terminating the five minute timer). If the Save button is not selected during the five minute test period, the AN-80i is rebooted and the previously saved settings are reloaded.

System Reboot: Click this button to immediately reboot the AN-80i. All statistics counters are reset.

3.7 System Password Screen

Click Users Management in the left hand menu to display the System Password screen. This screen allows the operator to modify the system passwords.

The AN-80i supports two groups of users: admin and user. See Table 5**:** Web - Default System Users on 30 for the factory default login values. See Table 4**:** Web - Screens and User Access on page 30 for permissions associated with each group.
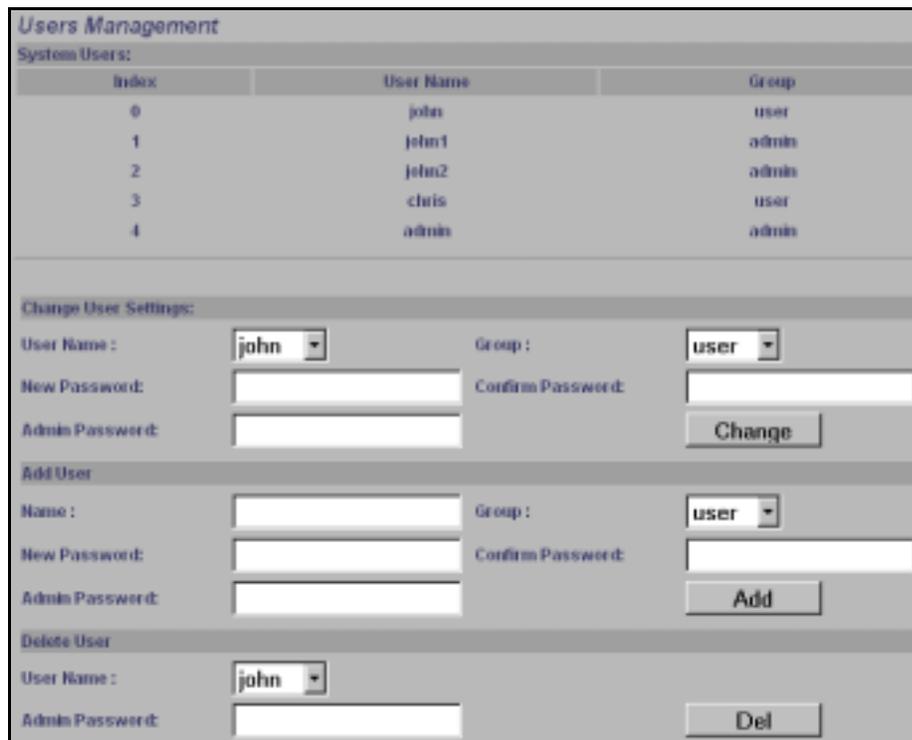
Figure 11: **Web - System Password Screen**

Change User Settings

Use this dialog to change the settings for an existing user.

User name: Select an existing user to be modified.

Group: Select the group to be associated with this username.

New Password: Enter the new password for this user.

Confirm Password: Re-enter new password for this user.

Admin Password: Enter the administrator password (security feature).

Change: Click the Change button to make these changes effective.

Add User

Use this dialog to add a new user.

User name: Enter a name for the new user.

Group: Select a group for the new user.

New Password: Enter a password for the new user.

Confirm Password: Re-enter the password for the new user.

Admin Password: Enter the administrator password (security feature).

Add: Click the Add button to make these changes effective.

Delete User

Use this dialog to delete an existing user.

User name: Select an existing user.

Admin Password: Enter the administrator password (security feature).

Del: Click the Del button to make these changes effective.

Group Permissions

The following table lists the permissions associated with each group.

Table 4: Web - Screens and User Access			
Screen	**Admin Access**	**User Access**	**Description**
General Information	X	X	View general system identification and configuration settings.
System Status	X	X	View system information, Ethernet statistics, and wireless statistics.
System Log	X	X	View the system status messages recorded by the AN-80i.
Configure System	X		View and adjust configuration system, IP address, management, and wireless settings.
Upload Software	X		Upload a new software binary file.
Users Management	X X	X	Change your login password. Add and delete users.
Product Options	X		View and change the product options key.
Spectrum Sweep	X		Scan a range of frequencies to detect other RF sources (interference).
Links	X		
Groups	X		
New Link	X		
New Group	X		
New Connection	X		
Save	X		
Clear All	X		

The following table lists the default login names and passwords.

Table 5: Web - Default System Users		
Group	**User Name**	**Default Password**
user	user	user
admin	admin	admin

> *Important: There must always be at least one 'administrator' account active on the AN-80i. You can **not** manage the AN-80i if all accounts are 'user'.*

3.8   AN-80i Product Options Screen

Click Product Options in the left hand menu to display the Product Options screen.

You may not be able to establish a link between AN-80i units, or configure all required parameter settings until you have entered the permanent options key. Permanent options keys must be purchased and are provided in electronic format. The options key (a string of numbers, letters, and dashes) enables AN-80i features including the maximum uncoded burst rate and frequency ranges (region codes). Every options key is unique to an AN-80i unit.

Each new AN-80i received from the factory will contain a temporary options key. This temporary key may provide temporary access to advanced options and settings. When the factory options key expires, only limited service will be available (restricted RF frequency, data rates, etc).

Important: A permanent Options Key <u>must</u> be entered for in-service operation. The factory temporary options key will expire and service will be interrupted.

Figure 12: Web - Product Options Screen

Options Key 1: Enter a valid permanent or temporary options key.

Options Key 2: Enter a valid permanent or temporary options key.

Active Options Key: Select the options key to use.

Entering the Options Key

1. Enter the key (case sensitive).

2. Review the entry to verify that the entered value is correct.

3. Select the options key to activate.

4. Click the Activate button to use the options associated with this key.

5. Click System Log in the menu and verify the key has been accepted.

Notes:
1. At least one valid permanent options key is required for operation. The system will prevent the operator from deleting all valid keys.

2. Keys are shared between PMP and PTP operation.

3. The active key selection <u>must</u> be made by the user. The software will use any valid selected permanent or temporary key.

4. The software will switch to the second options key if the first key is not valid (e.g., expired temporary key or when switching between PTP to PMP mode).

3.9   Upload Software

Click Upload Software in the left hand menu to display the Upload Software screen. This screen is used to upgrade the AN-80i with new software. The AN-80i contains non-volatile storage for two versions of the software. The upload overwrites the non-operational (unselected) version.
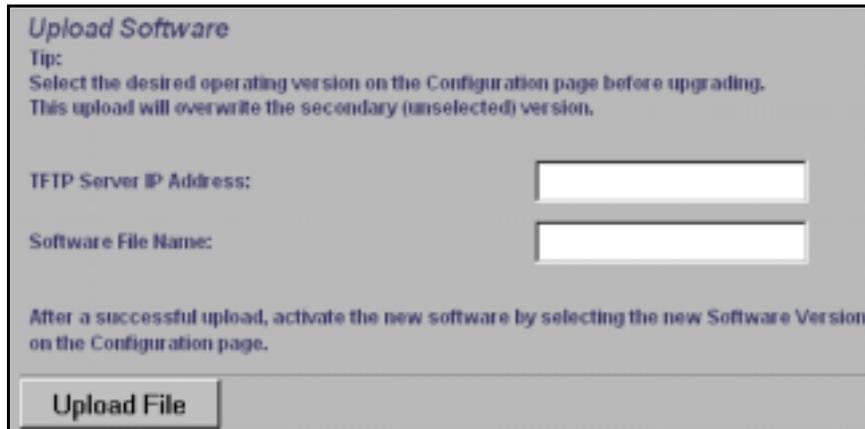

Figure 13: Web - Upload Software Screen

TFTP Server IP Address: Enter the IP address of the computer with the software upgrade file. This computer must be running a TFTP server.

Software File Name: Name of the software binary file (including file extension).
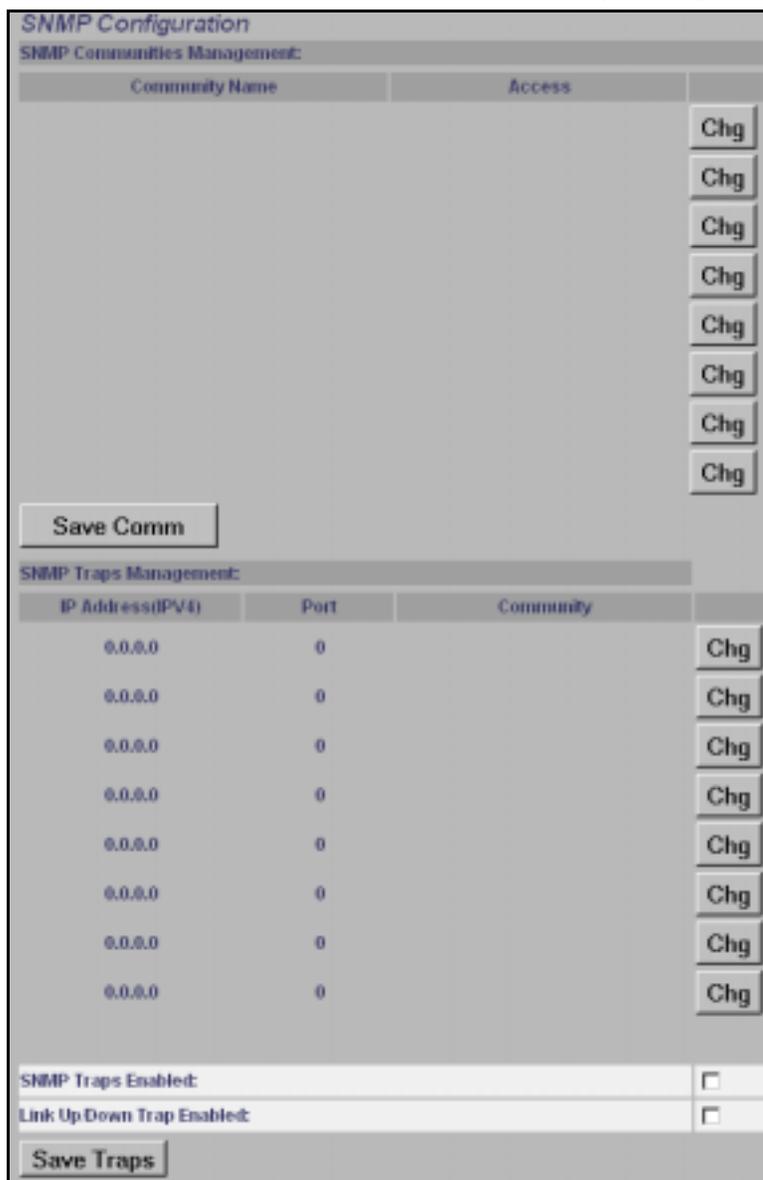
<u>Upgrade Steps</u>

Trivial File Transfer Protocol (TFTP) is used to upload the new software image file from your computer to the AN-80i. A TFTP server software must be installed and running on the computer you are using to upload the new software file. In addition, the AN-80i software binary file <u>must</u> be located in the default upload directory for the TFTP server.

1. Enter the IP Address of the computer running the TFTP server.

2. Enter the full name of the binary file (including the .bin extension).

3. Click the Upload File button to begin the file transfer. The upgrade file size is approximately two Megabytes and takes a minimum of two to four minutes to transfer. Slower network connections may take longer -- do not interrupt the transfer process.

4. When the file transfer is complete, the AN-80i verifies the integrity of the new software file. If errors were introduced during the transfer process, the software file is rejected and a warning message is registered in the event log, and you must repeat the upload.

5. When the transfer has completed successfully, use the System Configuration screen to select which software version to load on the next system reboot (does not switch automatically following upload).

3.10   SNMP Settings Screen

Click Configure SNMP (blue text) on the System Configuration screen to view and edit the SNMP settings. The hyperlink appears only if the SNMP Enable box is checked.

The SNMP protocol allows an application to interrogate the AN-80i for information saved in the MIB an to change enabled fields within the MIB. When the SNMP Agent in the AN-80i detects an error condition, a special message known as a trap can be sent (if enabled). A Trap Host is an IP system/server that is set up to receive SNMP trap messages. The SNMP Configuration screen displays a list of the current communities. The Chg buttons can be used to add, edit, or delete community settings.

Figure 14: Web - SNMP Configuration Screen

SNMP Community Management

Community Name: Displays the SNMP community name for each entry (maximum of eight entries).

Access: Displays the access permissions for each SNMP community.

   None: Deny read and write permission for this community.

   Read: Grant read access permission only for this community. Deny write permission.

   Write: Grant write access permission only for this community. Deny read permission.

   Read&Write: Grant read and write access permission for this community.

Chg: Click the Chg button to modify the settings for the adjacent entry.

Save Comm: Click the Save Comm button to save changes to the community settings.

SNMP Traps Management

IP Address(IPv4): IP address associated with this SNMP alarm.

Port: Destination port address associated with this SNMP alarm.

Community: Community associated with this SNMP alarm.

Chg: Click the Chg button to modify the settings for the adjacent entry.

SNMP Traps Enabled: Check this box ☑ to enable SNMP traps to be sent. If the box is not checked, all SNMP traps are disabled.

Link **Up/Down Trap Enabled**: Check this box ☑ to enable an SNMP trap to be generated for each link up and link down event.

Save Traps: Click the Save Traps button to save changes to the SNMP trap settings.

3.10.1 Change SNMP Community

Each entry in the SNMP Community Management table may be changed individually. Click the Chg button adjacent to any entry to modify the settings.
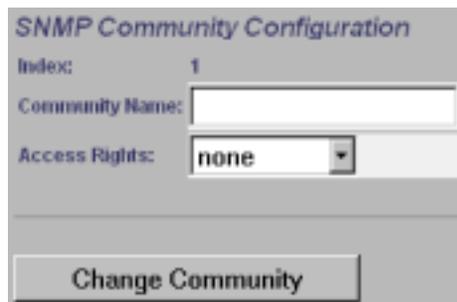
Figure 15: Web - SNMP Community Configuration Screen

Index: Display the unique reference number for this entry.

Community Name: Enter or modify the SNMP community name for this entry.

Access Rights: Select the access permissions for this entry.

   None: Deny read and write permission for this entry.

   Read: Grant read access permission only for this entry. Deny write permission.

   Write: Grant write access permission only for this entry. Deny read permission.

   Read&Write: Grant read and write access permission for this entry.

Change Community: Click the Change Community button to copy these settings to the community settings table. This action does not permanently save changes. To save changes to the community settings you must also click the Save Comm button in the SNMP Configuration screen.

3.10.2 Change SNMP Trap Configuration

Each of the eight entries in the SNMP Traps Management table may be changed individually. Click the Chg button to modify the settings for the adjacent entry.
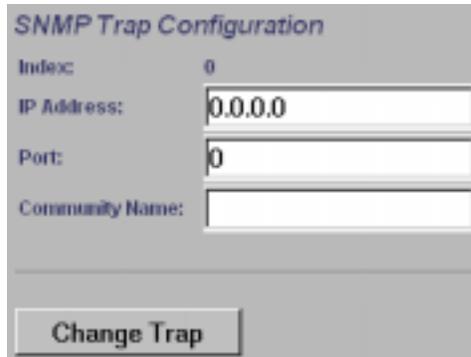
Figure 16: **Web - SNMP Trap Configuration Screen**

Index: Display the table position number for this entry. Position 0 is the first entry.

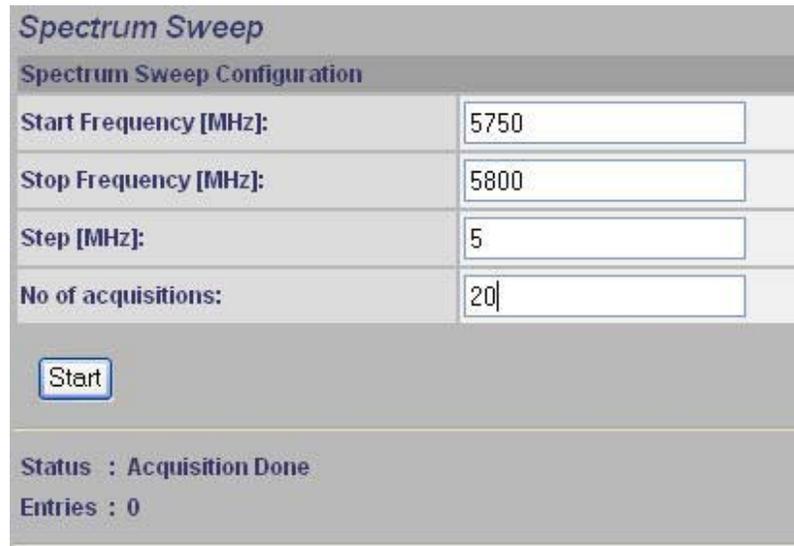**IP Address**: Enter the IP address (IPv4) associated with this SNMP alarm.

Port: Enter the destination port address associated with this SNMP alarm.

Community Name: Enter the SNMP community name for this entry.

Change Trap: Click the Change Trap button to copy these settings to the community settings table. This action does not permanently save changes. To save changes to the SNMP trap settings you must click the Save Traps button in the SNMP Configuration screen.

3.11 Spectrum Sweep

Click Spectrum Sweep in the left hand menu to display the Spectrum Sweep configuration screen. The spectrum sweep feature is an off-line RF survey tool to detect interference and evaluate spectrum availability. Configurable survey parameters include the high and low frequency limits, the step size, and the number of samples at each step. The output graph displays the maximum (red) and average (blue) RSSI for each step.

Figure 17: **Web - Spectrum Sweep Screen**

Start Frequency (MHz): Enter center frequency of the lowest channel to be scanned. See Table 43: Spec. - Regional Identification Codes on page 87.

End Frequency (MHz): Enter center frequency of the highest channel to be scanned. See Table 43: Spec. - Regional Identification Codes on page 87.

Step (MHz): Enter the frequency step (MHz) to use when scanning from the lowest to the highest frequency. The step selection must be a multiple of 2.5 MHz (i.e., 2.5, 5, etc).

No. of acquisitions: Enter the number of times the frequency will be sampled at each step. The recommended range is 10 to 100 samples. When a potentially clear channel is identified, reduce the frequency range and step size while increasing the sample size to monitor the channel over a longer period.

Start: Left-click the Start button to begin the scan.

Performing a Sweep

The transmitter of the Sector Controller is automatically disabled during the spectrum scan. If the scan is being performed from a Subscriber, the transmitter on the remote AN-80i for this link should be disabled during the test. You can use the configuration test feature to remotely (over-the-air) shut down the remote transmitter for 5 minutes and then recover automatically. See the description of the Test button in System Configuration Screen under the heading Controls on page 28.

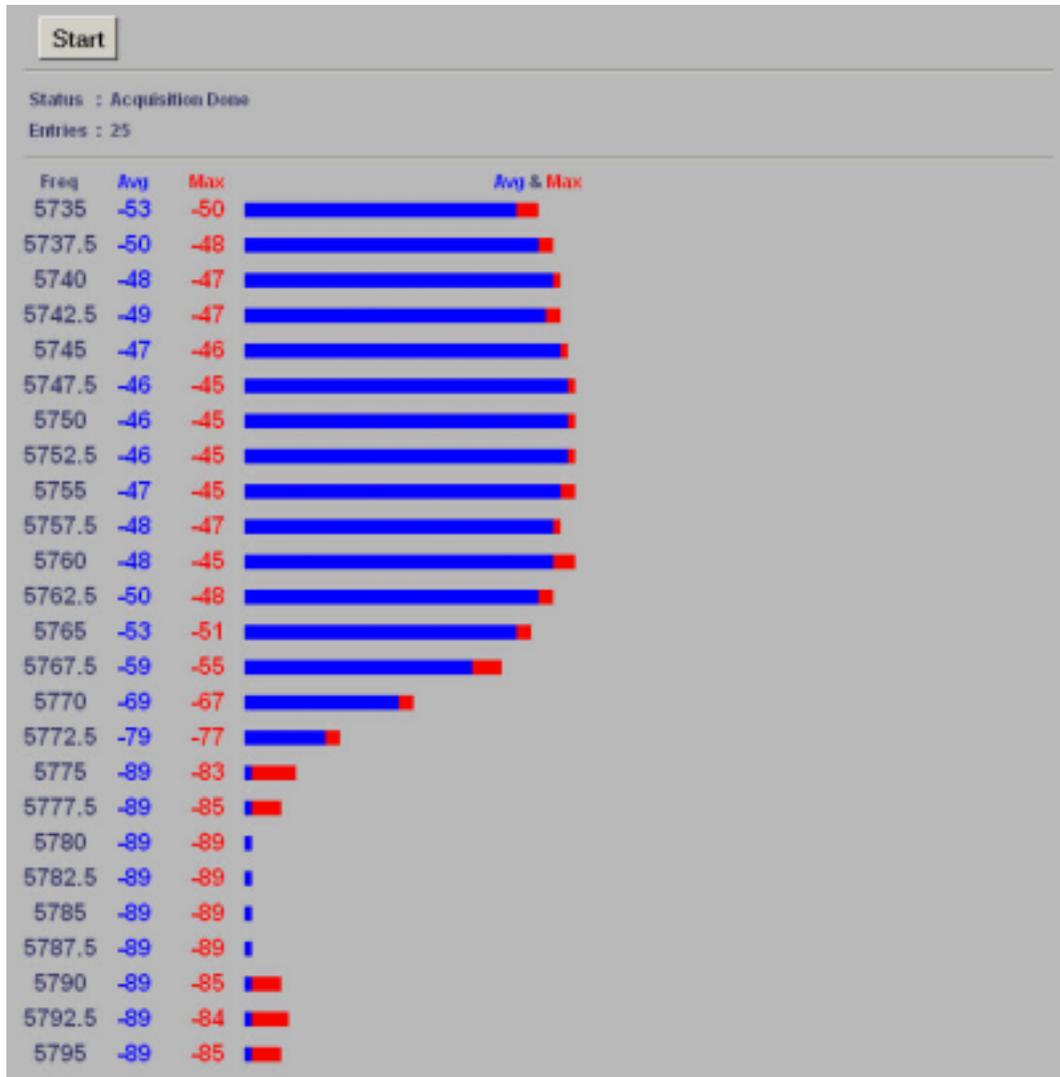| Table 6: Web - Performing a Spectrum Sweep	
Setting	**Description**
System Mode: Subscriber	No action required: Remote end will remain passive during sweep.
System Mode: Sector Controller	Use Web/CLI to disable radio on remote-end. Use 'test' function to save and remote end will restore radio operation automatically after 5 minutes.

Figure 18: Web - Spectrum Sweep Results