AN-50e System
PTP / PMP
User Manual

Copyright Information

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1 Important Safety & Service Notices

1.1 Safety Warnings

1. Read this User Manual and follow all operating and safety instructions.
2. Keep all product information for future reference.
3. This product is supplied with a grounding power plug. Do not defeat this important safety feature.
4. Power requirements are indicated on product-marking label. Do not exceed the described limits.
5. Always replace the fuse with the correct type and current rating.
6. Position the power cord to avoid possible damage; do not overload wall outlets.
7. Do not place this product on or near a direct heat source, and avoid placing objects on the terminal.
8. Do not operate this device near water or in a wet location.
9. Use only a damp cloth for cleaning. Do not use liquid or aerosol cleaners. Disconnect the power before cleaning.
10. Protect the terminal by disconnecting the power if not used for long periods.
11. Mount the terminal in a Telco rack on a stable horizontal surface.
12. The radio transceiver units must not be located near power lines or other electrical power circuits.
13. The radio transceiver 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 of the transceiver unit, mast, lead-in wire and discharge unit, location of discharge unit, size of grounding conductors and connection requirements for grounding electrodes.
14. Installation of the transceiver must be contracted to a professional installer.

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 will void the warranty.
2. Disconnect the power to this product and return it for service if the following conditions apply:
   a) The terminal does not function after following the operating instructions outlined in this manual.
   b) Liquid has been spilled, a foreign object is inside, or the terminal has been exposed to rain.
   c) The product has been dropped or the housing is damaged.
3. Locate the serial number of the terminal, antenna, and transceiver 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 back of the terminal.

1.4 FCC Notice

1. The System is used as a fixed wireless Ethernet bridge that requires professional installation with specified antennas and output power levels certified under the FCC Grant for System for point-to-point mode of operations.
2. FCC RF Exposure Requirements:

   T-54 and T-58: The antenna(s) used for these radios must be fixed-mounted on outdoor permanent structures. In point-to-point applications each antenna must be separated from all persons by a distance of at least 2.5 meters. In point-to-multipoint applications each antenna must be separated from all persons by a distance of at least 20 centimetres.
3. The System is certified by the FCC and Industry Canada with the 5.4/5.8 GHz directional and parabolic antennas listed in the Appendix of this manual.
4. For fixed, point-to-point mode of operations, the transmitting antennas must be directional as specified in this User Manual; the use of omni-directional antenna is prohibit for point-to-point operation.
5. For Class A Unintentional Radiators: 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. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.
6. Warning: Changes or modifications not expressly approved by Redline Communications Inc. could void the user's authority to operate the equipment.

1.5 UL Information

- The equipment must be properly grounded according with NEC and other local safety code requirements
- Caution for all AC and DC models: Double Pole/Neutral Fusing.
- The DC source must be fused at Time Delay 2.5A, 250V.
- The DC input wiring must be minimum 18 AWG.
- The DC input source must be SELV.
- The DC input source must comply with local electrical codes.
- To meet the over voltage safety requirements on the telecommunications cables, a minimum 26 AWG telecommunication line cord must be used.
- "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."
- 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.

1.6 ENTELA

The AN-50e system is ENTELA approved for health and safety.

1.7 CE Notice

The AN-50e systems are CE certified for operation from 5.4 GHz to 5.8 GHz.

Installation

The transceiver and antenna equipment must be installed by a qualified professional installer and must be installed in compliance with regional, national, and local regulations. It is the responsibility of the system installer and/or system operator to ensure the installed system does not exceed any operational constraints identified by local regulations.

Refer to the sections in this product User Guide for detailed information about the correct installation steps to ensure power and frequency settings are set correctly before connecting the antenna.

5.8 GHz Systems

Redline Communications Inc. wireless systems comply with the essential requirements of the Directive 1999/5/EC. This product may be used in all EU countries (and other countries following the EU directive 1999/5/EC) that have implemented nationally a decision to allow use of the 5.8 GHz frequency band. Not all countries have allowed access to the frequency band and system installers should be aware of the regulations for any specific country prior to installation.

National Interface documents may identify, amongst other parameters, a maximum output power for the system, expressed in terms of an EIRP level which must not be exceeded. Any use of a combination of output power and antenna resulting in an EIRP level above the national limit may be considered illegal and is outside the scope of the Redline Communications Inc. Directive 1999/5/EC compliance declaration.

5.4 GHz Systems

Redline Communications Inc. wireless systems comply with the essential requirements of the Directive 1999/5/EC. This product may be used in all EU countries (and other countries following the EU directive 1999/5/EC) that have implemented nationally the appropriate ECC Decision[1] to harmonize use of the 5.4 GHz frequency band. Not all countries have allowed access to the frequency band and system installers should be aware of the regulations for any specific country prior to installation.

The ECC Decision states, in part, that the maximum output power of the system must not exceed an EIRP level of 30 dBm. Any use of a combination of output power and antenna resulting in an EIRP level above 30 dBm is illegal and is outside the scope of the Redline Communications Inc. Directive 1999/5/EC compliance declaration.

Antenna Selection

Refer to the product User Guide for a list of Redline Communications approved antennas. Antennas not listed in the User Guide are outside the scope of this Declaration.

DFS, ATPC & Channel Selection

Redline Communications Inc. wireless systems shipped to all EU countries (and other countries following the EU directive 1999/5/EC) have the DFS and ATPC features permanently enabled. Frequency selection will also be restricted where controlled by regulation.

Conformance Documents

View the conformance documents at the following web site address:

http://www.redlinecommunications.com/conformance/

[1] **ECC/DEC/(04)JJ "**ECC Decision of [DD MM 2004] on the harmonised use of the 5 GHz frequency bands for the implementation of Wireless Access Systems including Radio Local Area Networks (WAS/RLANs)" can be found at www.ero.dk

1.8 Lightning Protection

WARNING: The following notes are general recommendations for the system. *The wireless equipment should be installed by a qualified professional installer and 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:

- Poorly grounded tower/antenna sites that can conduct high lightning strike energy into equipment.
- 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 tower grounding system disperses most of the surge energy from a tower strike away from the building and equipment. The remaining energy on the IF cable shield and center conductor can be directed safely to ground by using a lightning arrestor in series with the IF cable.

To limit the equipment damage due to a lightning strike, the following practices are recommended for the wireless system:

- Provide direct grounding from the antenna mounting bracket, the radio and antenna and the lightning arrestors to the same ground point at the base of the tower or a ground bus on the building. Use the grounding screws on the antenna bracket and the radio and antenna for terminating the ground wires.
- Install one RF lightning protector between the radio and antenna in series with the RF cable.
- A lightning arrestor in series with the IF cable at the point of entry to the building.
- Install a lightning arrestor in series with the IF cable at the transceiver on the tower/mast.
- The AC wall outlet ground for the terminal must be connected to the same grounding system as the radio and antenna lightning protectors.
- The ground connection on the back of the terminal should be connected to the same ground for the building.

1.9 Product Information

Use the following table to record important system information:

Product Information
Terminal SN: _____ MAC Address _____ Transceiver SN: _____ Model #: _____ Antenna Model No.: _____ Antenna SN: _____
Serial Number Stickers

Chapter

2

2 Getting Started

Congratulations on your purchase of Redline Communications' Access Node-50e wireless broadband system. Redline Communications is a world leader in design and production of Broadband Fixed Wireless (BFW) systems.

The AN-50e system consists of an indoor terminal and an outdoor radio (transceiver and antenna).

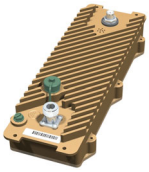
Figure 1: **AN-50e System**: **Terminal, Transceiver, and Antenna**

A point-to-point (PTP) link is comprised of a sector controller and a subscriber. The sector controller is connected to customer Ethernet network. The sector controller establishes a bi-directional data link with an AN-50e subscriber. The subscriber is connected to the remote-end customer Ethernet network and receives and sends data under the control of the master system.

The AN-50e can also be deployed in a point-to-multipoint (PMP) configuration, with the sector controller functioning as a central hub communicating to a number of subscribers.

The following terms are used in this manual:

Table 1: Terms

Term		Description
AN-50e System	AN-50e terminal (IDU)	Indoor unit 
	AN-50e Radio (ODU)	Transceiver + Antenna  
Master System		Master Mode ☑ The terminal configured as sector controller equipment. This system controls the wireless link polling and transmission opportunities. The master system is connected to customer Ethernet network and establishes a bi-directional data link over-the-air with one or more subscriber AN-50e systems.
Subscriber		Master Mode ☐ The terminal configured as subscriber equipment. The subscriber is connected to the customer Ethernet network and receives and sends data over-the-air under control of the sector controller.

Chapter

3

3 System Overview

The AN-50e is a high-performance, high-speed wireless Ethernet bridge terminal providing a scalable multi-service platform from a common equipment infrastructure and management system.

The system operates in the 5.4 GHz to 5.8 GHz band and includes advanced technologies to address inter-cell interference. The system also delivers enhanced security through a proprietary over-the-air encryption scheme.

The AN-50e can be equipped with a narrow beam antenna to provide high directivity for long-range operations over 80 km in clear line of sight (LOS) conditions.

Figure 2: AN-50e terminal

The AN-50e system is a Class A digital device for use in a commercial, industrial or business environment. The system is equipped with dynamic frequency selection (DFS) to detect interference from other devices using the same frequency and automatically take a pre-selected action, such as disable transmission or relocate transmission to alternative frequency. The system also includes an automatic transmitter power control (ATPC) function to automatically adjust the Tx level of subscribers to match a selected RSSI value.

The AN-50e system utilizes Redline's advanced Medium Access Control (MAC) design to provide efficient transmission of data in both PTP and PMP modes. In PMP mode, the MAC incorporates a proprietary polling algorithm to support up to 250 individual subscriber stations from a single sector controller operating in a single sector. Note that multiple sector controllers can be installed on a single rooftop or tower to provide multi-sector coverage.

A single sector AN-50e PMP implements a distributed wireless L2 switch, with one uplink port located on the sector controller (master) distributing bandwidth to a variable number of subscriber stations.

- Each subscriber station (remote-end) is considered a separate wireless link.
- Each configured wireless link adds to the switch one remote-end port that is the Ethernet port on the corresponding subscriber station.
- Each link (remote-end) is assigned one ID that is used to manage both the connection traffic and the wireless link.
- The switch supports one broadcast/multicast group called default group, which is automatically assigned a fixed ID.

The sector controller MAC utilizes a request/grant polling mechanism to determine which subscriber station requires bandwidth. This is achieved by periodically polling each subscriber station to determine if there is a request for bandwidth. If the subscriber station requests bandwidth then the MAC allocates the appropriate number of time slots, in both the downstream and upstream direction, in accordance with the CIR rate limits specified for that particular subscriber station. The AN-50e PMP system supports 18 programmable CIR levels. Through an external calculator the minimum Committed Information rate CIR rates allowed for each subscriber station can be determined. Note that a minimum CIR of 8 Kbps implies almost no CIR, and is referred to as Best Effort (BE) service.

With multiple subscriber stations compete for bandwidth, the MAC ensures that time slots are allocated in a balanced manner, according to the different CIR levels, during periods of over-subscription. For example, during peak times, the MAC will first deny time slot allocations for everything above the provisioned CIR, and then reduce bandwidth in a proportional manner to the remaining units with varying CIR levels and priorities. With the support of CIR, the service provider can offer different grades of service to each end user in a controlled manner based on their service level agreements or contracts.

Chapter
4

4 Physical Description

***Important**: The AN-50e system must be installed by a professional installer who is familiar with both data network issues and RF installations including grounding and lightning protection.*

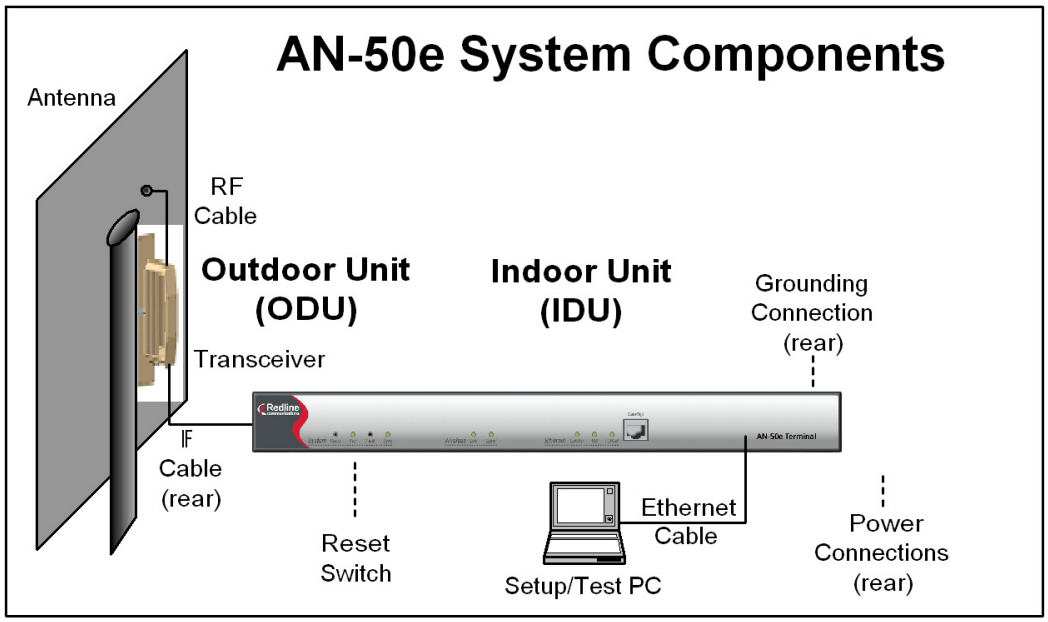


Figure 3: AN-50e System Components

4.1 AN-50e Terminal

The front panel of the terminal includes a LAN interface and three groups of LED indicators: system, Wireless, and Ethernet. The rear of the terminal includes the power connections, an F-Type female connector for the IF cable, and a BNC connector for the time signal (future release).

4.1.1 Mounting

The terminal can be freestanding on a flat surface, or mounted into a standard 19-inch or 24-inch equipment rack (mounting brackets provided).

4.1.2 Power Supply

Power supply options include AC or DC supplies. Refer to the appendix for specifications and DC terminal connections.

Grounding Connection

A ground connection terminal is located on the back of the AN-50e system. Correct grounding is very important for safe operation of wireless equipment. Refer to the installation section for additional information.

System Fuse

Removable fuses located at the rear of the terminal protect the system power inputs.

Warning to service personnel:
Caution for all AC and DC models – Double Pole/Neutral fusing.

4.1.3 Time Synchronization Port

The AN-50e has one BNC input on the rear panel for time synchronization. This port accepts a standard IRIG-B signal (1 pps) from a GPS satellite clock. This port is currently disabled and may be enabled in a future software release.

4.1.4 Wireless Section

This section describes the wireless port and LEDs.

IF Port (Radio Control)

The terminal has a female F-type connector (rear of chassis) for interconnection with the system radio.

The IF cable carries the following signals between the terminal and the radio:

- OFDM IF signal at 815 MHz
- Local Oscillator (LO) signal at 2.5 GHz
- 24 Volt DC voltage for the transceiver electronics
- Control signal between IDU and ODU

Wireless LEDs

There are two wireless indicator LEDs on the front panel.

Figure 4: Front Panel - Wireless LEDs

Link LED

The Wireless Link LED lights solid green when the wireless link is established.

When the Link LED is off, it is an indication there is a problem with either the terminal link, radio, or with the actual propagation path itself. Check the RF Status parameters in the System Status screen. The following table lists some of the potential causes.

Table 2: Wireless Link LED Diagnostics

Symptom	Possible Problem	Solution
No wireless link (Link LED does not illuminate)	Slave system is not on or is malfunctioning.	Verify operation of slave system.
	The propagation path is blocked.	Clear path or re-locate antennas.
	The transceiver is mal-functioning.	Repair or replace transceiver
	Antenna has moved and is no longer aligned with slave system.	Re-align the antenna.
	Cable between transceiver and antenna or between transceiver and terminal not properly connected.	Properly secure cables.
	Power not getting to the transceiver from the terminal.	Repair or replace terminal.
	Receiver and transmitter have been set to different RF channels.	Make sure both terminals are operating on the same RF channel.

Signal LED

When adaptive modulation is disabled, the Wireless Signal LED lights solid green if the system is operating at a BER of less than 1 x 10e-9. The LED flashes if the number of errors exceeds this limit. If the wireless link becomes very poor, the LED turns off.

When adaptive modulation is enabled, the Wireless Signal LED lights solid green if the system is operating at a rate equal to or higher than the configured Uncoded Burst Rate. The LED flashes when the system is operating at a modulation scheme with a lower maximum burst rate. The Signal LED turns off if the system cannot maintain a link using the lowest modulation scheme. Intermittent flashing may not indicate a serious problem. Refer to the following table for additional information.

Table 3: Wireless Signal LED Diagnostics

Symptom	Possible Problem	Solution
Weak RF Link (Signal LED flashes)	Obstructions in the propagation path causing signal degradation.	Try to remove obstacles or re-locate antenna.
	Antenna moved, due to high winds.	Re-align the antenna.
	Poor cable connection between transceiver and antenna.	Repair or replace the RF cable.

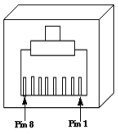
4.1.5 Ethernet Section

This section describes the terminal Ethernet port and LEDs.

Ethernet Data/Management Port

The Ethernet Data/Mgt port is always enabled. This port is used for user data traffic and in-band management (HTTP, FTP, SNMP, and TELNET). The AN-50e Ethernet port can be set for auto-negotiate or manually set to full duplex or half duplex mode for 10 Mbps or 100 Mbps operation.

Table 4: Terminal LAN Ethernet Port Pinout

Jack Pin	Function	Pin Location
1	Rx +	
2	Rx -	
3	Tx +	
6	Tx -	

***Important**: Connecting the Ethernet port to a telephone connection will damage the terminal.*

Ethernet LEDs

The Ethernet portion of the front panel display has three LEDs.

Figure 5: Front Panel: Ethernet LEDs

FD/Col LED

The FD/Col LED lights solid green when the LAN connection is operating in full duplex mode and flashes when collisions are detected on the Ethernet port. When connected to a hub, it is typical to have intermittent packet collisions. Refer to the following table.

Table 5: Ethernet Link/Collision LED Diagnostics

Symptom	Possible Problem	Solution
Link Collision (*FD/Col* LED flashes)	Collisions are normal for half duplex links. If the terminal is connected to equipment manually set to full duplex, the terminal is not able to negotiate and remains set to half duplex and CRC errors will be reported.	Change the configuration to auto-negotiation.
	Incompatible Ethernet port speed.	Confirm speed and duplex mode of both devices.

Note: Port speed/duplex selection is not available on the AN-50.

100 LED

The 100 LED lights solid green when the Ethernet port is operating at 100 Mb/s. The LED is not illuminated when the port is operating in 10 Mb/s mode. The terminal and the connected host device must both be set to auto-negotiate or to the required port speed (10Base-T to 100Base-T) for correct operation.

Table 6: Ethernet 100 LED Diagnostics

Symptom	Possible Problem	Solution
Ethernet Link 100 LED off	Connected Ethernet device is manually set for 10Base-T operation.	Change Ethernet Mode setting to Auto or 100 in the System Configuration web screen.
	The connected Ethernet device manually set to operate at 10Base-T.	If the terminal LAN port is connected to a host computer or server operating at 10Base-T, you may have to change the settings for that device.

Link/Act LED

The Link/Act LED lights solid green when the Local Area Network (LAN) connection is established, and there is no traffic. The Link LED flashes when the Local Area Network (LAN) connection is established and traffic is detected.

The Link/Act LED is functioning properly and traffic is detected. If the LED is off, it may indicate one of the problems listed in the following table:

Table 7: Ethernet Link/Act LED Diagnostics

Symptom	Possible Problem	Solution
No Ethernet Link (*Link/Act* LED off)	Poor cable connection between terminal and Ethernet equipment.	Carefully check all cable connections.
	Wrong type of cable between terminal and Ethernet equipment.	If the terminal LAN port is connected to a switch or router, then ensure a straight-through cable is used.
	The connected Ethernet equipment may be malfunctioning.	Repair or replace faulty equipment.
	System processor malfunction.	Apply short reset or long reset.

4.1.6 System Section

This section describes other general features of the front panel.

System LEDs

The System LEDs indicate power supply status, and system fault status.

Figure 6: Front Panel: Reset Switch and System LEDs

Pwr LED

The Pwr LED lights solid green when the AC and/or DC power is properly applied to the terminal. The Pwr light does not illuminate if there is an internal power supply failure, if the power cables are disconnected, or the fuse is blown.

Table 8: System Power LED Diagnostics

Symptom	Possible Problem	Solution
Pwr LED does not illuminate	On/Off switch in Off position	Turn power switch on at back of terminal.
	Fuse blown	Replace fuse (spares are provided). See section 7 for details.
	Power cord disconnected	Securely connect cord to terminal and outlet
	One of the dual power supplies is defective or powered off (redundant configuration).	Schedule maintenance to replace defective power supply.

Fault LED

The Fault LED lights solid red to indicate a serious problem with the system software or hardware. Check the IF cable for loose connections. Also, refer to the System Logs screen and RF Status codes for additional information about the problem. Alternatively, if a short-reset or long-reset does not resolve the problem, contact your local representative.

Sync LED

The Sync LED lights solid green when the terminal clock is synchronized with the external GPS clock (future release).

Note: The Sync LED is not available on the AN-50.

Reset Switch

The reset switch is recessed in the front panel of the terminal. To operate the switch, use a small narrow object (i.e., paper clip) to depress the switch.

Depressing the reset button for less than five seconds activates a short-reset (equivalent to cycling power on the terminal). Depressing the reset button for longer than five seconds activates a long-reset and some parameters are changed to the factory default settings. Refer to the following table for details.

Table 9: Front Panel Reset Switch

Operation	Result
Depress switch < 5 seconds.	Statistical values are reset. A short reset may also be activated remotely from the Web maintenance tool by clicking on the System Reset button at the bottom of the System Configuration screen.
Depress switch > 5 seconds.	Reload the factory default configuration for the following settings: IP Address, IP Subnet Mask, Channel, System Name, Username, and Password. Refer to 6.1: Factory Default Settings on page 49.

4.2 System Radio

4.2.1 Transceiver

The radio transceiver is housed in an aluminum alloy case. The connectors are listed in the following sections.

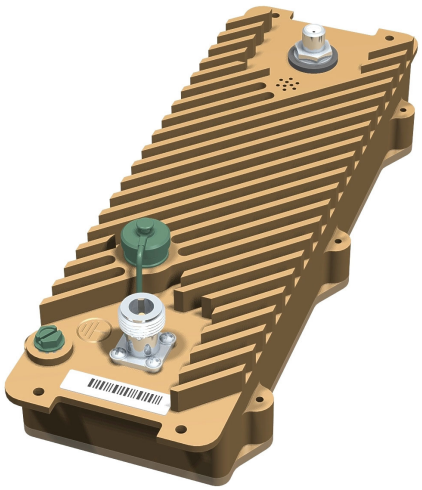


Figure 7: Transceiver

4.2.2 IF Port (Radio Control)

The transceiver IF port (female F-type connector) is for communications with the indoor terminal. This port is connected to the terminal using coaxial cable.

4.2.3 RF Connector

The transceiver RF port (female N-type connector) is for sending/receiving the RF signal to/from the antenna. A short coaxial cable is provided to connect the transceiver to the antenna.

4.2.4 Alignment Pin and Audible Signal

For basic alignment using the received signal, an alignment buzzer (intermittent tone sweep generator) is available on all transceivers. A faster repetition rate of the buzzer indicates a stronger the signal is being received from the remote end. Some transceivers also have a voltage alignment pin. On equipped systems, you can adjust for a voltage peak using a DC voltmeter. Use the Web interface to select either the buzzer or voltage alignment pin.

4.2.5 Antenna

The same antenna type can be used for both ends of any PTP deployment.

Figure 8: **One-Foot Flat Antenna**

4.2.6 Antenna Mounting Bracket

A vertical mount bracket is provided with the system. The vertical mount bracket can accommodate 1 ¾" to 4 ½" (4.45 cm to 11.45 cm) OD masts found on many commercial tower installations.

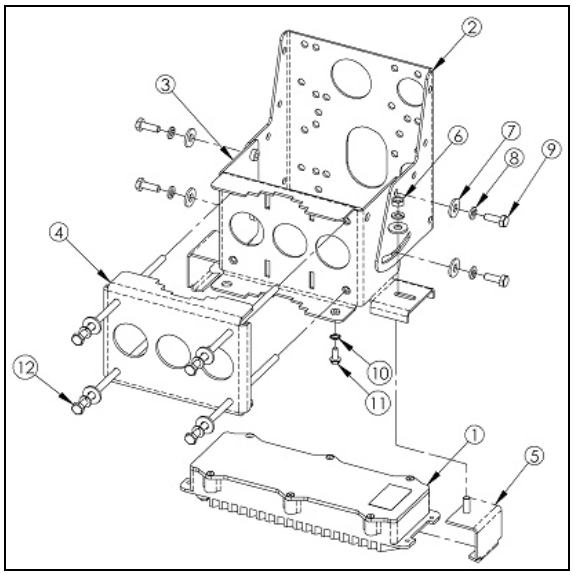


Figure 9: **Flat Panel Antenna Bracket Assembly (with transceiver)**

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Chapter

5

5 Using the Web Interface

This section: describes the procedures for configuring and operating the terminal via the web interface. The PMP and PTP options employ the same system hardware and are configured by software loads. The screens and systems menus are similar with minor changes depending on the selection of PTP/PMP and Master/Slave selection.

The following sections include sample screens from an AN-50e system configured for operation as a PMP Master. All unique fields are described for both PTP and PMP selections. Common fields are listed using the PMP field name.

Communication with the terminal is achieved over the Ethernet port using hypertext transfer protocol (HTTP). This offers the advantage of allowing the operator to access and control the terminal remotely from any geographical location having access to the Internet.

5.1 System Menu

When the user is successfully logged in, the General information page will be displayed. On the left will be a menu of all available pages. The operator can point and click on any of the blue text lines in the menu to display the selected page.

Figure 10: On-Screen Menu

The ID browser and ID Config/Status items will only be available on the system configured as PMP Master.

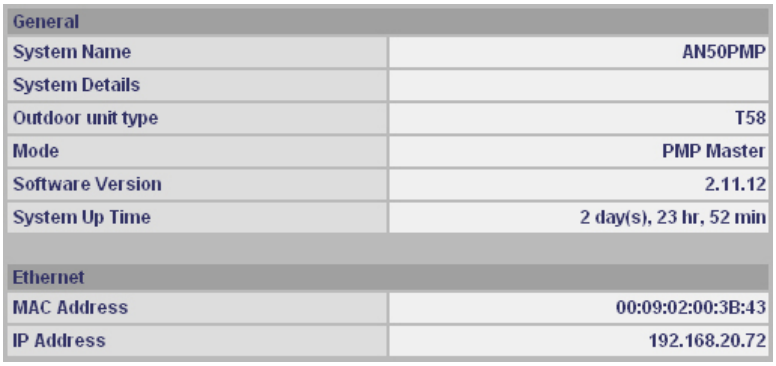
The administrator (admin) has unrestricted access to all screens. All other users have restricted access. See the following table for details.

Table 10: Web Screens				
Screen	**Admin Access**	**User Access**	**System**	**Description**
System Information	X	X	PTP / PMP	View general system identification and configuration settings.
System Statistics	X	X	PTP / PMP	View system information, Ethernet statistics, and wireless statistics.
System Log	X	X	PTP / PMP	View the system activity and error messages recorded by the terminal.
System Config	X		PTP / PMP	View and adjust configuration settings for general system identification, IP address, management functions, and wireless.
Change Password	X	X	PTP / PMP	Change your login password.
ID Browser	X		PMP	Select a slave (subscriber) system to view or configure.
ID Config/Status	X		PMP	Display the configuration and statistics for a selected slave (subscriber) system.
Upload Software	X		PTP / PMP	Upgrade the terminal with new software.

Table 11: Default System Users		
Username	**Default Password**	**Description**
admin	admin	Access to all screens.
user	user	Access restricted to monitoring screens.

5.2 System Information

Click System Information to view general system settings (read-only).



General	
System Name	AN50PMP
System Details	
Outdoor unit type	T58
Mode	PMP Master
Software Version	2.11.12
System Up Time	2 day(s), 23 hr, 52 min
Ethernet	
MAC Address	00:09:02:00:3B:43
IP Address	192.168.20.72

Figure 11: General Information Screen

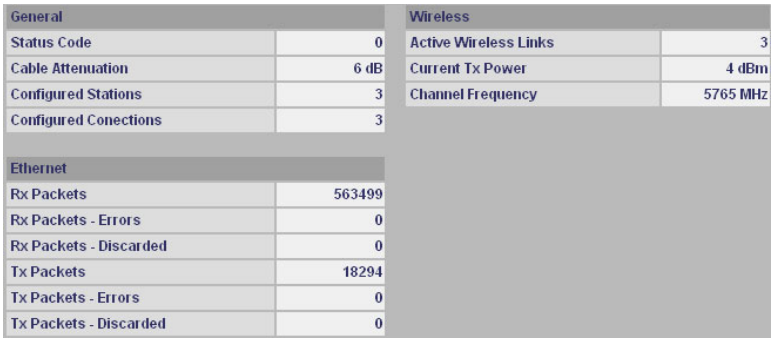
Default Gateway Address: (PTP) IP address of the default router/gateway.
Ethernet MAC Address: (PTP) MAC Address of this terminal.
Hardware Revision: (PTP) Indicates the hardware revision level.
IP Address: IP address of the terminal.
IP Subnet Mask: (PTP) IP subnet mask.
MAC Address: Hardware address of terminal.
Master Mode: (PTP) Displays if the system operation mode is set to Master.
Mode: (PMP) Displays the system operation mode (PTP/PMP and master/slave).
Outdoor Unit Type: Displays the transceiver type.
RF Link Established: (PTP) Status for the wireless link connection.

Yes - RF link has been successfully established with the remote-end terminal.
No - RF link has not been established with the remote-end terminal.

Software Version: Displays the software version in use.
System Details: Displays the user-assigned location and contact information.
System Name: Displays the user-assigned system name.
System Up Time: Displays the time elapsed since the system was restarted.
Time Since System Restart: (see System Up Time)
Uncoded Burst Rate: (PTP) The current uncoded burst rate for the link.

5.3 System Statistics

Click System Status in the menu to view system, Ethernet and wireless statistics. Note that some fields in the PTP screens are included in the System Information screen.



General	
Status Code	0
Cable Attenuation	6 dB
Configured Stations	3
Configured Conections	3

Ethernet	
Rx Packets	563499
Rx Packets - Errors	0
Rx Packets - Discarded	0
Tx Packets	18294
Tx Packets - Errors	0
Tx Packets - Discarded	0

Wireless	
Active Wireless Links	3
Current Tx Power	4 dBm
Channel Frequency	5765 MHz

Figure 12: System Status Screen

Active Wireless Links: (PMP) Displays the number of active wireless links to subscriber (slave) systems.

Cable Attenuation: Displays the measured attenuation of the 800 MHz signal over the IF cable.

Channel Frequency: Displays the current channel selection.

Code: An error code indicating the condition of the system RF components. See the RF Status Error Code Table 20**:** RF Status Error Codes on page 52 for details. Code zero is normal.

Configured Connections: (PMP) Displays the number of hosts on configured subscriber (PMP Slave) systems. See section 5.8: ID Config/Status (PMP) on page 41.

Configured Stations: (PMP) Displays the number of configured subscriber (slave) system. See section 5.8: ID Config/Status (PMP) on page 41.

Current Tx Power: Transmit power level.

Default Gateway Address: (PTP) IP address of the default router/gateway.

Ethernet MAC Address: MAC Address of this terminal.

IP Address: (PTP) IP address of the terminal.

IP Subnet Mask: (PTP) IP subnet mask.

Link Distance [Miles or Km]: (PTP) Distance between systems.

Master Mode: (PTP) Displays if the system operation mode is set to Master.

Received Signal Strength: **Max**: Max. RSSI measured since the last screen refresh.

Received Signal Strength: **Mean**: Ave. RSSI measured since the last screen refresh.

Received Signal Strength: **Min**: Min. RSSI measured since the last screen refresh.

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

RF Channel Frequency: (see Channel Frequency)

RF Status [Error Code] : (see Status Code)

RF Link Established: (PTP) Status for the wireless link connection.

Yes - RF link has been successfully established with the remote-end terminal.

No - RF link has not been established with the remote-end terminal.

Rx Packets: PTP - number of Ethernet/wireless packets received. PMP - number of Ethernet packets received.

Rx Packets: **Discarded**: PTP - number of Ethernet/wireless packets discarded. PMP - Number of Ethernet packets discarded.

Rx Packets: **Errors**: (PMP) Number of Ethernet packets received with errors.

Rx Packets: **Retransmitted**: (PTP) Number of wireless packets retransmitted.

SINADR: (PTP) Average signal to interference, noise and distortion ratio measured since the last screen refresh. The measurement includes the effects of AGC.

PMP - Refer to section 5.10: Link Statistics Screen (PMP) on page 44.

Software Version: (see System Information screen)

Status Code: Error code indicating the condition of the system RF components. Code '0' is normal operation.

System Name: Displays the user-assigned system name.

Tx Packets: PTP - number of wireless packets (including Ethernet frames and error correction bytes) successfully transmitted over the air. PMP - number of Ethernet packets transmitted.

Tx Packets: **Discarded**: PTP - Total number of transmitted wireless packets discarded by the remote system, due to degradation in the RF link. PMP - Total number of transmitted Ethernet packets discarded

Tx Packets: **Errors**: (PMP) Number of Ethernet frames and error correction bytes with errors.

Tx Packets - Retransmitted: (PTP) Number of wireless packets retransmitted over the air. The retransmission scheme is based on the Automatic Repeat Request (ARQ) algorithm that detects when packets are lost, and makes a request to the MAC scheduler to repeat transmission of the lost packets.

Tx Power: See Current Tx Power.

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

5.4 System Logs Screen

Click System Logs in the menu to view the system activity and error messages recorded by the terminal.

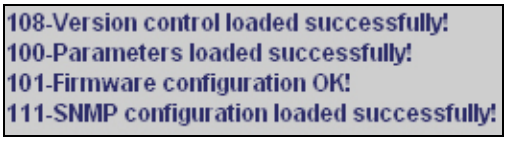


Figure 13: System Logs Screen

The logs will also indicate if the following transactions were successfully completed:

Change Password:	System Password screen.
Save Configuration:	Configuration screen.
Send Options Key:	AN-50e Options screen
Upload:	Upload Software screen.

Refer to section 6: Diagnostics and Troubleshooting on page 49 for a detailed description of all event messages.

5.5 System Configuration Screen

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

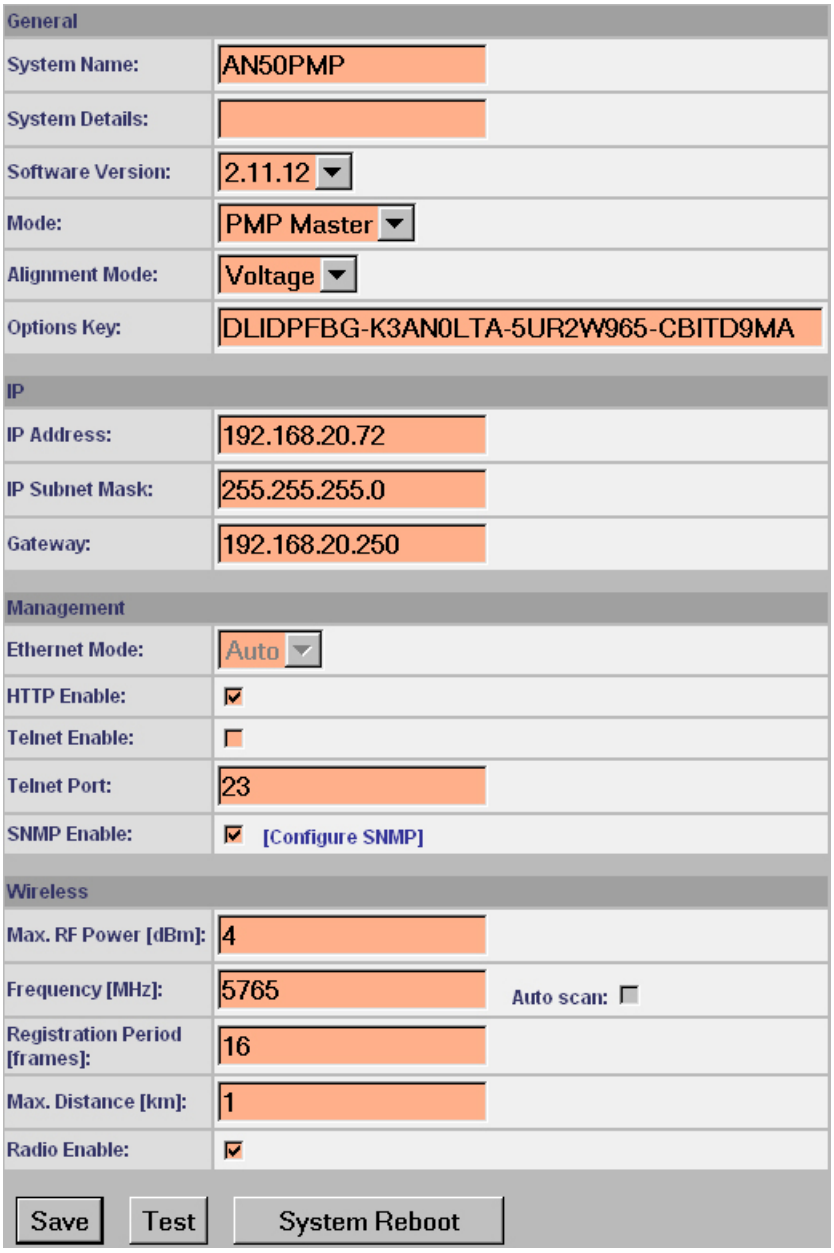


Figure 14: PMP Configuration Screen

***Important**: Ensure that all fields on the* System *Configuration Screen are filled out properly for the sector controller and subscriber stations. Errors in these fields will result in the inability to establish a communication link. Please review each setting carefully to ensure a quick, trouble-free deployment.*

Adaptive Modulation: (PMP) Check this box ☑ to enable adaptive modulation mode.

It is recommended to use adaptive modulation mode when using Ethernet only traffic. When enabled, the system can automatically change the modulation scheme to the highest possible order, based on measured RF performance. Adjust the modulation scheme by setting the Uncoded Burst Rate parameter. If packet errors exceed one in one million, the system will automatically step down the modulation scheme to maintain the link.

Alignment Mode: Select the mode to use when aligning the system antenna. Only one of the alignment functions will be enabled at any time (i.e., selecting Voltage will disable the audible alignment buzzer).

PMP:

Voltage: Enable the voltage alignment pin on the transceiver (if equipped).

Buzzer: Enable the audible alignment buzzer on the transceiver.

PTP:

Check this box ☑ to enable the audible alignment buzzer on the transceiver. Uncheck this box ☐ to enable the voltage alignment pin on the transceiver (if equipped).

ATPC Enable: Check this box ☑ to enable the ATPC function. The master-end system will automatically adjust the Tx level of both the sector controller and subscribers to optimize the system performance.

Note: This hardware-enabled feature is not available on the AN-50.

Auto Scan: (PTP) Check ☑ this box to enable the remote-end system to automatically scan for the transmitting/receiving frequency channel of the Master-end system.

Configure SNMP: Click on this text to display the SNMP Configuration screen. Refer to section 5.12: SNMP Settings Screen on page 47.

Default Gateway Address: (see Gateway)

DFS Action: Select the mode of operation for DFS.

***Important**: Where required by regional regulations, DFS is enabled by the system options key and cannot be disabled.*

The system set to master-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:

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 (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 the system suspends operation until the thirty-minute time interval expires for at least one channel.

Note: This hardware-enabled feature is not available on the AN-50.

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

It is important that the DFS Antenna Gain matches the actual antenna gain.

If the DFS Antenna Gain is set higher than the true antenna gain, the system is less sensitive to detecting interference, and is not operating in compliance with the UK/ETSI standard. If the DFS 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.

Note: This hardware-enabled feature is not available on the AN-50.

Encryption Enable: (PTP) Check this box ☑ to enable over-the-air encryption.

If encryption is enabled, no Ethernet packets can be transferred unless encryption is enabled on both the local and subscriber terminals. Encryption is only available for PTP operation.

Encryption Key: (PTP) Enter the MAC address of the subscriber as the over-the-air data encryption key. No Ethernet packets can be transferred unless the correct encryption is entered at both the sector controller and subscribers.

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

Auto - Auto-negotiate the speed connection speed.

10 - Operate at 100Base-T only.

100 - Operate at 100Base-T only.

HD - Operate at half-duplex only.

FD - Operate in full duplex only.

Note: This hardware-enabled feature is not available on the AN-50.

Gateway: Enter the IP address of the default gateway on the Ethernet segment.

General Antenna Alignment: (PTP) Check this box ☑ to enable the voltage alignment pin on the transceiver (if equipped).

Flow Control Enable: (PTP) Check this box ☑ to enable flow control on the terminal. The Flow control feature enables the terminal to request other Ethernet devices to pause transmission during busy periods.

Freq. [MHz]: Enter the channel center frequency of the system. The table below specifies the center frequencies of each permitted channel. To avoid interference,

the channel frequencies of two links operating within close proximity must be separated by 20 MHz or more. Availability of frequency bands listed in the following tables is based on the factory entered option key.

The following table lists the 5.8 GHz channels available in the United Kingdom.

Table 12: UK: RF Channel Frequencies
T-58 Radio: 5.8 GHz
Center Frequency (GHz)
5.735
5.755
5.775

The following table lists the channels available in CE regulated regions.

Table 13: CE: RF Channel Frequencies		
T-54 Radio: 5.4 GHz		
Center Frequency (GHz)	Center Frequency (GHz)	Center Frequency (GHz)
5.500	5.580	5.660
5.520	5.600	5.680
5.540	5.620	5.700
5.560	5.640	

The following table lists the channels available in the America's.

Table 14: North America: RF Channel Frequencies	
T-54 Radio: 5.4 GHz*	T-58 Radio: 5.8 GHz
Center Frequency (GHz)	Center Frequency (GHz)
5.480 to 5.715 (steps of 5 MHz)	5.735 to 5.815 (steps of 5 MHz)

**Pending regulatory approval for some regions.*

General Antenna Alignment: Check this box ☑ to enable the antenna alignment audible tone generator in the T-54 or T-58 transceiver.

HTTP Enable: Check this box ☑ to enable configuration using the HTTP (Web) interface.

IP Address: Enter the IP address for this terminal.

IP Subnet Mask: Enter the IP subnet mask.

Link Length: (PTP) Enter the actual length of the path that the wave travels in order to establish the link. This value is used to calculate the transmission-to-response interval and disregard reflections of the transmitted signal. Valid only if Link Length Mode is set for Manual.

Link Length Mode: (PTP) Select the mode for determining the distance of the wireless link. See Link Length.

Auto: Distance is calculated automatically by the terminal.

Manual: Operator enters Link distance.

Link Measurements Units: (PTP) Select the units for the Link Length field. Valid only if Link Length Mode is set for Manual.

Miles: Link length distance is displayed in miles.

Kilometers: Link length distance is displayed in kilometers.

Master Mode: (PTP) Check this box ☑ to enable the system to operate as the sector controller. Each link is comprised of a sector controller and one or more subscribers. The sector controller establishes and manages the bi-directional data link with each AN-50e subscriber. The subscriber receives and sends data under the control of the sector controller.

Important: Only one system in a wireless link must be set for Master mode.

Max. Distance [km]: (PMP) Enter the distance to the farthest subscriber station (PMP Slave). This setting is used to calculate the registration period required to accommodate all subscribers within that range.

Max. RF Power [dBm]: Enter the Tx power level (dBm). This setting is for the transceiver output only. The actual broadcast power of the system will depend on the gain of the connected antenna. Section 7.3: Antenna and Power Specifications on page 60 lists the maximum transmit power setting based on the antenna gain for a series of frequency settings. There are restrictions on the maximum transmit power settings when operating at data rates above 24 Mb/s.

***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.*

Table 15**:** Max. Operational Power Per Channel (in dBm) vs. Modulation lists the maximum transmit power levels for each modulation setting. Restrictions exist when operating at data rates above 24 Mb/s.

Table 15: Max. Operational Power Per Channel (in dBm) vs. Modulation

	64 QAM ¾ (54 Mb/s)	64 QAM ⅔ (48 Mb/s)	16 QAM ¾ (36 Mb/s)	16 QAM ½ (24 Mb/s)	QPSK ¾ (18 Mb/s)	QPSK ½ (12 Mb/s)	BPSK ¾ (9 Mb/s)	BPSK ½ (6 Mb/s)
Max. Tx Power	14	15	19	20	20	20	20	20

Mode: (PMP) The system designated as master establishes and manages the bi-directional data link with slave system(s). The slave (subscriber) system receives and sends data under the control of the master system.

PTP Master: Set this terminal to operate as the master system on a PTP link. Each PTP link is comprised of one master system and one slave system.

PTP Slave: Set this terminal to operate as the slave system on a PTP link.

PMP Master: Set this terminal to operate as the master on a PMP link. Each PMP link is comprised of a master (sector controller) and one of more slave (subscriber) systems.

PMP Slave: Set this terminal to operate as a slave system on a PMP link.

Modulation Reduction Level: (PTP) This manual setting specifies how many levels to drop the modulation during re-transmission of erroneous wireless packets. The level can be set from 0-7, with 2 being the recommended value. This setting is valid only when Adaptive Modulation is disabled.

Options Key: Displays the user-entered system options key. The options key controls the availability of functions and default settings on the AN-50e. This includes maximum Tx power levels and the DFS function. The key is personalized to each terminal's MAC address. Please ensure that the correct MAC address is provided when requesting a key from your local representative. Enter the key (case sensitive), ensure it is correct, and click the Activate button.

Radio Enable: Check this box ☑ to enable the radio transmitter.

Registration Period [frames]: (PMP) The number of data frames transmitted between registration periods. For example, a setting of '16' would transmit sixteen frames of user data and then check for new subscriber (PMP Slave) stations.

RF Freq. [MHz]: (see Freq. [MHz])

Save: Click this button to save the current parameter settings. Note that when certain parameters are changed clicking Save will initiate a system reboot.

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' beside the check box displays the SNMP Configuration screen. See section 5.12: SNMP Settings on page 47 for additional information on setting up SNMP for the AN-50e.

Software Version: Select the version of system software to load at reset. The system includes memory to hold two independent system software images. See Upload Software Section 5.11: for additional details.

System Details: Enter additional descriptive details about this terminal. The description can be any combination of up to 20 letters and numbers.

System Name: Enter the name for this terminal. The name can be any combination of up to 20 letters and numbers. Use the drop-down menu to select between the two

System Reset: Click this button to boot the system. Resets all statistics and unsaved changes to the configuration will be lost.

Telnet Enable: Check this box ☑ to enable configuration using a Telnet session. Refer to the CLI commands in section 7.4: CLI Interface on page 63.

Telnet Port: Enter the Telnet port address. The default Telnet port is 23. The port can be changed to any other number between 23 and 65,000, excluding port 80.

Test: Click this button to have the system reset using the current configuration settings. After a period of five minutes, the system will reboot using the previously saved settings and current settings will be lost. Click the Save button at any time to save the current changes.

Tx Power [dBm]: (see Max. RF Power [dBm])

Uncoded Burst Rate [Mb/s]: (PTP) Select the desired uncoded burst rate for the link. For PMP rates see section 5.9: ID Configuration Screen (PMP) on page 42.

5.6 System Password Screen

Clicking on System Password in the left hand menu will display the System Password screen. This screen allows the operator to modify the system passwords.

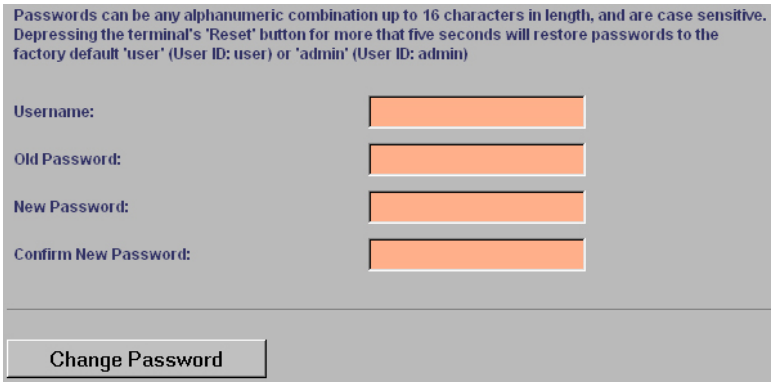


Figure 15: System Password Screen

The factory default password for the system is 'admin' for the username 'admin' and 'user' for the username 'user'. To change the password, enter the username and the old password. Enter a new password in the two lower fields using any alphanumeric combination. Note the field is case sensitive and can be up to sixteen characters in length.

Confirm New Password: Re-enter new password (avoids typing errors).

New Password: Enter new password.

Old Password: Enter current password.

Username: Enter user name.

Note: The original factory default passwords can be restored by depressing the front panel Reset button for more that five seconds. This will also reset the configuration to the factory default settings. The software version is not effected.

5.7 ID Browser (PMP)

Click ID Browser in the menu to view the ID search screen. Use this screen to locate an ID by entering the name associated with the ID.

If the ID number is known, it can be entered directly in the ID Config/Status screen (see sections following).

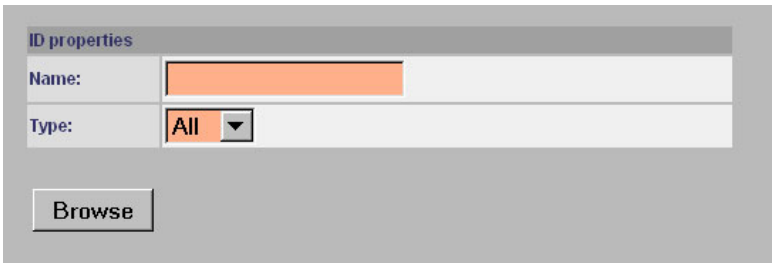


Figure 16: ID Browse Screen

ID: Enter the name of the ID to view or configure.

If the ID name is not known, leave the search field blank and click the Browse button to list all configured IDs.

Type: Select the type of channel ID to be included in the search results.

All: Search all IDs.

Link: Search only the IDs associated with links (subscriber stations).

Browse: Click the Browse button to initiate a search. The results screen will display all IDs meeting the search criteria. Click on the name (blue text) to go to the main configuration screen for that ID.

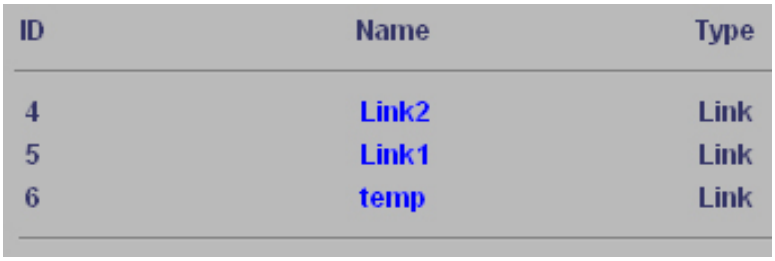


Figure 17: ID Browse Results Screen

5.8 ID Config/Status (PMP)

For all PMP systems, a subscriber (slave) system link ID must be configured in the sector controller (master) system before a wireless link can be established to that remote subscriber system.

Click ID Config/Status in the menu to view the ID Properties screen. This screen provides controls to view/change IDs and to display statistics.

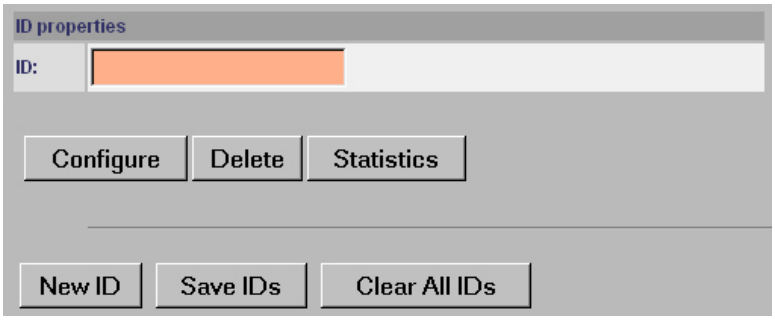


Figure 18: ID Config / Status Screen

Clear All IDs: (PMP master only) Click this button to clear all IDs from the ID tables This process can not be undone.

Configure: (PMP master only) Click this button to display the Link Configuration screen for the selected ID.

Delete: (PMP master only) Click to delete the selected ID.

ID: Enter the channel ID to be configured, deleted, or displayed. If the ID number is not known, click ID Browser in the menu (left side of screen) to find the ID using the name search feature.

New ID: (PMP master only) Click the New ID button to open the Link Configuration screen and create a new ID entry.

Save IDs: (PMP master only) Save all IDs.

Statistics: Click to display the Link/Connection Status screen for the selected ID.

5.9 ID Configuration Screen (PMP)

The Wireless Link screen is displayed by entering a link number in ID field of the ID Config/Status screen and clicking the Configure button (PMP master only).

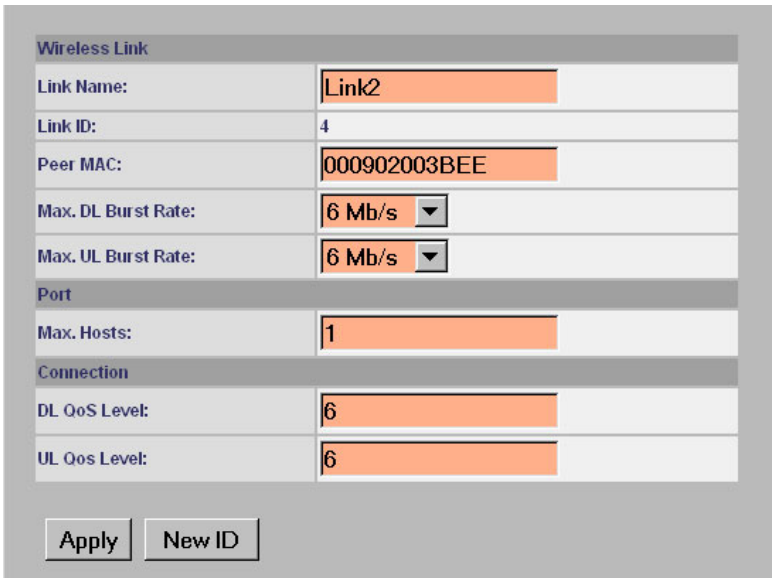


Figure 19: **Link Configuration**

The fields in the Link Configuration screen must be filled in for each subscriber (PMP slave) system.

Apply: Click this button to save editing changes to the current link ID configuration.

DL QoS Level: Enter the downlink QoS level.

Important: To permanently save the current ID configuration, you must click the Save ID button in the ID Config/Status screen. Otherwise, all the configuration changes made since the last save operation will be discarded on the next reboot.

Link ID: Do not enter data for this field. The numeric ID for the link is generated automatically when a link is created.

Link Name: Enter the name for this link (up to eight letters and numbers).

Max Host: Defines the maximum number of hosts (i.e., MAC address of PCs, etc) to be learned from the subscriber (slave) system.

Max UL Burst Rate: Maximum uplink (UL) burst rate. This is the maximum upstream burst rate the sector controller (master) will use to receive data from this subscriber (slave) system.

Max. DL Burst Rate: Maximum downlink (DL) burst rate. This is the maximum downstream burst rate the sector controller (master) will use to send data to this subscriber (slave) system.

New ID: Click this button to save the current ID configuration under a new Link Name. This function can be used to create a new ID with the same or similar characteristics as an existing link.

Peer MAC: Enter the MAC address of the subscriber (slave) system.

UL QoS Level: Enter the uplink QoS level.

Use the Redline 'AN-50 PMP Configuration Tool' to calculate the required settings to distribute bandwidth between multiple subscriber systems.

The following table provides recommended settings for the QoS and SINADR when configuring a PMP system.

Table 16: PMP QoS and SINADR Settings

UBR (Mbps)	QOS Level	SINADR(dB)
54	40	25
48	40	23
36	35	18
24	20	15
18	18	11
12	12	9
9	9	7
6	6	-

5.10 Link Statistics Screen (PMP)

The Link Statistics screen is displayed by selecting a link in the ID Browse screen and then clicking the Statistics button at the bottom of the screen.

General		
Link Name:	Link1	
Link ID:	5	
Peer MAC:	000902003B43	
Active:	Yes	
Link Up Time:	0 day(s), 01 hr, 51 min	
Link Lost Count:	0	
Status Code:	0000	
Configured Connections:	1	
Wireless	**Downlink**	**Uplink**
Burst Rate:	6Mb/s	6Mb/s
RSSI:	-67dBm	-71dBm
SINADR:	15dB	15dB
Lost Frames:	0	0
Block	**Downlink**	**Uplink**
Blocks Total:	65895	31446
Blocks Retransmitted:	0	0
Blocks Discarded:	0	0
Packet	**Downlink**	**Uplink**
Packets Discarded:	0	0
Packets Transmitted:	17190	720
Packets Received:	17188	724

Figure 20: Link Statistics Screen (PMP)

Active: "Yes" indicates the RF link with the remote terminal is established. "No" indicates there is no RF link to the remote terminal.

Blocks Discarded: Displays the number of times blocks have been lost.

Blocks Retransmitted: Displays the number of blocks retransmitted.

Blocks Total: Displays the number of blocks transmitted from PMP Master to the PMP Slave (downlink) and from PMP Slave to the PMP Master (uplink). Note that the system fragments and concatenates Ethernet packets into blocks for transmission over the air.

Burst Rate: Displays the current Tx burst rates.

Configured Connections: Displays the total number of connections configured for this link.

Link ID: Displays the link ID for this wireless link.

Link Lost Count: Displays the number of times the link was lost since system restart.

Lost Frames: Displays the number of times the link was lost since system restart.

Link Name: Displays the name for this wireless link.

Link Up time: Displays the time since the unit was started.

Packets Discarded: Displays the number of Ethernet packets discarded due to buffer overflow.

Packets Received: Displays the number of Ethernet packets received.

Packets Transmitted: Displays the number of Ethernet packets transmitted.

Peer MAC: On the sector controller (PMP Master) this field displays the MAC address of the subscriber (PMP Slave). On the subscriber this field displays the MAC address of the sector controller.

RSSI: Displays the average received signal strength (RSSI) for the wireless link.

SINADR: Indicates the average signal to interference noise and distortion ratio (SINADR). This measurement includes the effects of AGC.

Status Code: An error code indicating the condition of the system RF components. See the RF Status Error Code Table 20**:** RF Status Error Codes on page 52 for details. Code zero is normal.

5.11 Upload Software

Clicking on Upload Software in the left hand menu will display the Upload AN-50e Software screen. The upload screen shown is used to upgrade the terminal with new software stored in a binary file on a server or host computer.

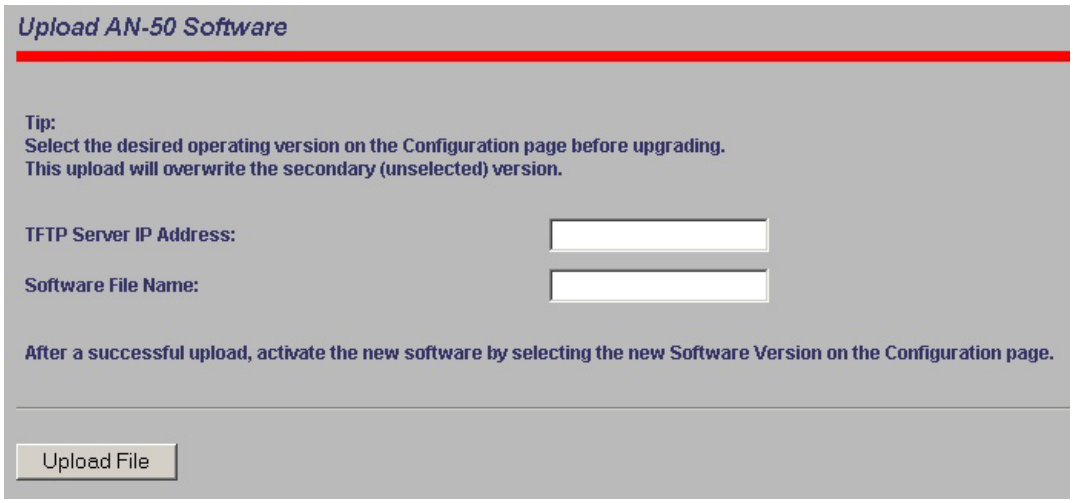


Figure 21: **Upload Software Screen**

TFTP Server IP Address: IP address of the computer that runs the TFTP server that contains the upgrade software in binary format.

Software File Name: Name of the binary file including the file extension.

The terminal contains two non-volatile RAM banks for storing two versions of the software. It is important to select the desired operating version before beginning the upgrade process, as the upload will always overwrite the non-operational (unselected) version. Use the System Configuration screen (section 0) to select the current operating version of system software.

The upgrade process is achieved remotely using the Trivial File Transfer Protocol (TFTP). The operator must fill in two input fields: TFTP Server IP Address and File Name.

After typing the TFTP Server IP Address and File Name, click the Upload File button to begin the file transfer. A status screen will display the number of bytes transferred from the TFTP server to the terminal in real time. The upgrade file size is approximately 1.8 MB and will take approximately two to four minutes to download from the server to the terminal memory.

When the file transfer is complete, the terminal will verify the integrity of the new software. If errors were introduced during the transfer process, the terminal will reject the new software load and provide a warning that the upgrade was unsuccessful. In this case, the operator will need to repeat the upload process.

Use the System Configuration screen (section 5.5) to select the current operating version of system software.

5.12 SNMP Settings Screen

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

Figure 22: System Configuration Screen - SNMP Access

The SNMP Configuration screen displays a list of the current communities. The control buttons can be used to add, edit, or delete communities.

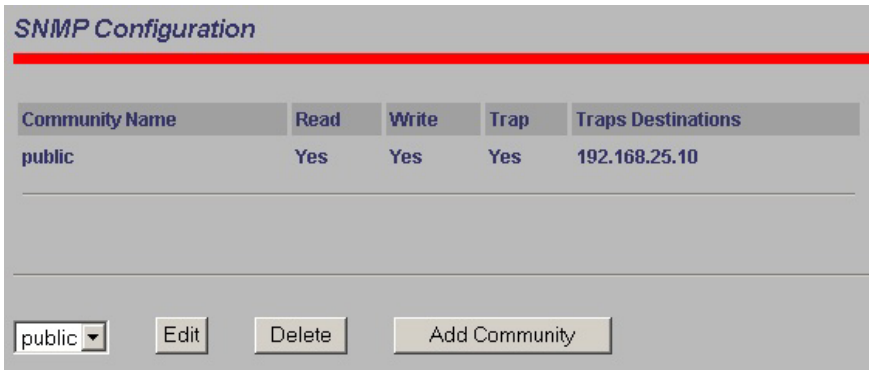


Figure 23: SNMP Configuration Screen

Add Community: Click the Add Community button to add a new community. The Community Configuration/Trap Configuration screen will be displayed.

Delete: Select the community from the pull down menu (bottom left of screen) and then click the Delete button to delete that community. Note that it is not possible to delete the public SNMP community, but the access level can be changed.

Edit: Select a community from the pull down menu and click the Edit button to modify an existing community. The Community Configuration/Trap Configuration screen will be displayed.

SNMP Configuration: The list of defined communities is displayed in the Community Name table.

Community Configuration:

Community Access - Read: Check the Read box to grant read access permission to members of this community. Uncheck this box (☐) to deny read permission.

Community Access - Write: Check this box ☐ to grant write access permission to members of this community. Uncheck this box (☐) to deny write permission.

Community Name: The SNMP community name. After clicking Save this name will appear in the drop down list on the main SNMP Configuration screen.

Trap Configuration:

Save: Click Save to permanently save the current parameters and return to the main SNMP configuration screen.

Trap Destination (IP Addr. 1): Enter the IP address of the Trap Host in dotted decimal format. At least one (1) IP address is required.

Trap Destination (IP Addr. 3): Enter the IP address of the Trap Host in dotted decimal format. This address may be left blank.

Trap Destination (IP Addr. 4): Enter the IP address of the Trap Host in dotted decimal format. This address may be left blank.

Trap Destination (IP Addr.2): Enter the IP address of the Trap Host in dotted decimal format. This address may be left blank.

Trap Enable: When the SNMP Agent in the terminal detects an error condition, a message known as a trap is sent. A Trap Host is an IP system/server that is set up to receive SNMP trap messages. Checking this option enables sending traps.

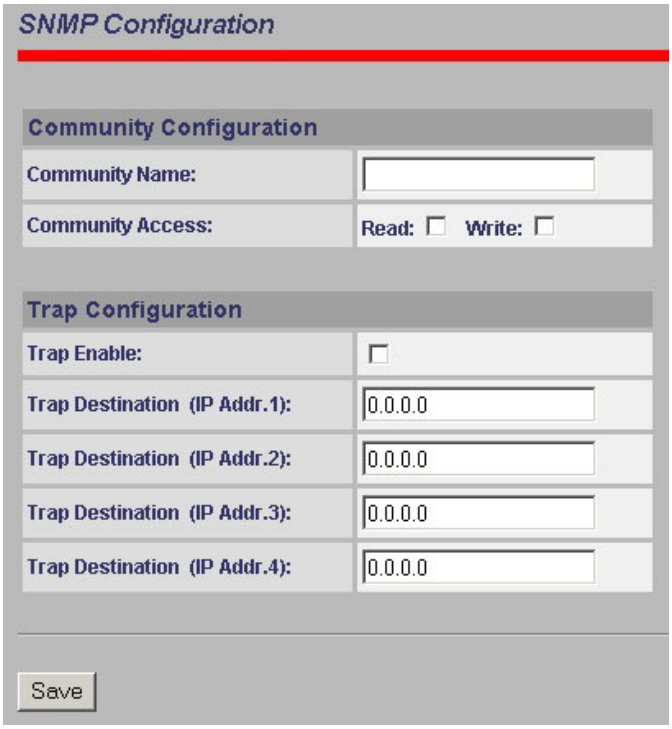


Figure 24: SNMP Community/Trap Settings Screen

Chapter

6

6 Diagnostics and Troubleshooting

Troubleshooting can be performed using the front panel LEDs and the host computer/server connected locally or remotely to the terminal.

Important: Before beginning any troubleshooting via the front panel, check that all cables are securely attached. Also, verify that all fields on the System *Configuration page are correct for both the sector controller and* subscriber *(entry errors in these fields may cause the terminal to be unable to establish a communication link).*

This section provides basic diagnostic and troubleshooting procedures to help solve problems that may occur with the system. If, after reading this section, you are unable to get the system operating properly, please contact your local Redline representative. Include the model name and serial number of the system (located on the back of the terminal) in your communications.

6.1 Factory Default Settings

The following parameters are the factory default setting for the terminal.

Table 17: Factory Default Settings

Section	Item	Factory Default Setting
System	User Name	admin
	Password	admin
Ethernet	IP Address	192.168.25.2
	Subnet Mask	255.255.255.0
	Gateway	0.0.0.0
Wireless	RF Channel	Set by factory key.
	Tx power	14 dBm
	Encryption	Disabled / no key

6.2 Troubleshooting the Web Interface

These troubleshooting hints assume that the status LEDs on the front panel of the terminal indicates normal functionality.

Table 18: Web Interface Diagnostics

Symptom	Possible Problem	Solution
Home Screen (General Information) cannot be accessed.	Incorrect IP address and/or Subnet Mask.	Perform a ping test from the host computer command line. If the ping test is unsuccessful, then the problem is with the IP address. Perform a long reset to apply the default address (192.168.25.2) and Subnet Mask (255.255.255.0)
	Problems with host computer, or terminal.	If the ping is successful try a short reset of the terminal, and/or reboot the host computer.
	Host PC ARP table is incorrectly configured	Run 'arp:d' whenever the terminal is swapped. Check that the subnet mask for the host PC matches the subnet mask of the terminal. Check that the host PC's address is 192.168.25.n, where 'n' is not equal to 0,2, or 255.

Attempt to login to the terminal using a Web browser. Microsoft Internet Explorer is recommended. If the terminal does not respond by displaying the login dialog box, check that the correct IP address is being used. The value 192.168.25.2 is the factory default value and may have been changed during installation.

The next test is to verify the IP address is reachable from the computer. Use the ping command to test the connection between the terminal and host computer. The system will always respond to ping frames less that 577 bytes in length.

>ping 192.168.25.2

If the ping test is successful, the host computer was able to send and receive packets to/from the terminal. The problem may be with the Internet browser or related settings on the host computer. Re-boot the host computer to try to resolve the problem.

If the ping is unsuccessful, there may be problems using that IP address; the IP address may be incorrect, or there may be a duplicate address. For correct operation the host computer and the terminal must appear to be on the same subnet. For example, if the terminal is using the factory default settings, the host computer could be set for an IP of *192.168.25.3 and a subnet mask of 255.255.255.0.*

If the correct IP address of the terminal cannot be determined, it is recommended to perform a long reset to restore the terminal to the default value.

Warning: performing a long reset will restore the terminal's IP address (192.168.25.2) and IP Subnet Mask (255.255.255.0) to the factory default value.

6.3 RF Error Codes

The terminal monitors the status of the outdoor transceiver unit and reports any fault conditions in the system logs.

Table 19 lists the general fault conditions are reported by the system.

Table 19: RF Errors

Error Type	Description
AN-50e PLL Error	The PLL (Phase Locked Loop) section within the terminal experienced an error. The System Fault LED may light. Try resetting the terminal.
Communication Error Over IF Cable	Communication between the terminal and the T-54 or T-58 Transceiver failed. Check the IF cable and connectors.
Radio High Temp. Warning	The T-54 or T-58 Transceiver's internal temperature rose above 185F / 85C. The transceiver will shut down for 30 seconds to allow cooling time.
Radio Power Supply Fault	Indicates a fault in the transceiver's power supply. This error could be due to a problem with the internal power supply, or with the power source from the terminal. If the Low DC Voltage At Radio error is also indicated, (see below) check the IF cable and connectors. If the Low DC Voltage At Radio error is *not* indicated, the T-54 or T-58 Transceiver will require servicing.
Low DC Voltage At Radio Input	The DC voltage at the transceiver (carried by the IF cable from the terminal) is lower than the required 24 VDC. Check the IF cable and connectors. The minimum required voltage for operation is 12 VDC.

See Table 20**:** RF Status Error Codes for a list of the thirty-two possible error codes.

Table 20: RF Status Error Codes					
Error Code	**Terminal PLL Error**	**Comm Error Over IF Cable**	**Radio High Temp. Warning**	**Radio Power Supply Fault**	**Low DC Voltage At Radio Input**
0	No Errors	No Errors	No Errors	No Errors	No Errors
1					**X**
2				**X**	
3				**X**	**X**
4			**X**		
5			**X**		**X**
6			**X**	**X**	
7			**X**	**X**	**X**
8		**X**			
9		**X**			**X**
10		**X**		**X**	
11		**X**		**X**	**X**
12		**X**	**X**		
13		**X**	**X**		**X**
14		**X**	**X**	**X**	
15		**X**	**X**	**X**	**X**
16	**X**				
17	**X**				**X**
18	**X**			**X**	
19	**X**			**X**	**X**
20	**X**		**X**		
21	**X**		**X**		**X**
22	**X**		**X**	**X**	
23	**X**		**X**	**X**	**X**
24	**X**	**X**			
25	**X**	**X**			**X**
26	**X**	**X**		**X**	
27	**X**	**X**		**X**	**X**
28	**X**	**X**	**X**		
29	**X**	**X**	**X**		**X**
30	**X**	**X**	**X**	**X**	
31	**X**	**X**	**X**	**X**	**X**

6.4 System Error Log Messages

The following table provides a brief description of the key messages recorded in the logs by the system.

Table 21: System Log Messages

Log Message	Description
100-Parameters loaded successfully!	All system parameters have been successfully downloaded.
101-Firmware configuration OK!	The onboard firmware configuration has been properly set up.
102-Ethernet port configured!	The Ethernet port has been properly configured and is operational.
103-Parameters saved successfully!	The latest configuration parameters have been successfully saved into the system memory.
104-Upgrade OK!	The software upgrade process completed successfully.
105-Password changed successfully!	The system password was successfully changed.
106-Firmware programmed OK!	The firmware was successfully programmed.
107-Statistics initialized!	Reset of statistics was successful.
108-Version control loaded successfully!	Software version control data was successfully loaded.
109-Options Key activated!	Product Options Key was accepted.
110-Options Key already used!	The Product Options Key was not accepted because it was already used once. Contact your local Redline representative.
111-SNMP configuration loaded successfully!	The SNMP configuration was successfully loaded.
201-EEPROM corrupted. Def. param. loaded!	The memory area containing the system configuration has been corrupted. Default parameters loaded.
202-Error while saving parameters!	The latest configuration parameters have not been successfully saved. In this case, repeat the save configuration process to try to resolve the problem.
203-Another upgrade in progress!	The system is already in upgrade mode, in the event the operator inadvertently invoked multiple simultaneous upgrades.
204-Invalid upgrade parameters!	The parameter entered is in error. If this message appears, check for typing errors.
205-Upgrade failed!	The software upgrade process completed unsuccessfully.
206-Password changed unsuccessfully!	The new password entered into the system was not successful. In this case, repeat the process.
207-Timeout on reading data packet!	The system has timeout looking for packets from the host computer or server. Check for obvious problems such as disconnected or faulty cable.
209-TFTP error received!	The Trivial File Transfer Protocol (TFTP) routine used to download the software to the terminal during the Upgrade process failed. Likely cause is disconnected or faulty cable.
210-Error: TFTP unknown message!	The TFTP client received an unknown message. In this case, repeat the upgrade process.
211-Error: while writing flash!	While writing the new software into terminal flash memory an unexpected error occurred. Try to repeat the process and if the error persists contact your local representative.

Table 21: System Log Messages	
Log Message	**Description**
212-Error firmware configuration!	An unexpected error occurred while writing the onboard firmware configuration. Try to repeat the process.
213-Firmware programming failed!	The firmware programming failed.
214-Error while loading version control!	Software version control data was not loaded successfully.
215-Log buffer full!	The log buffer overflowed.
216-Invalid Options Key!	User entered an invalid Product Options key.
217- PLL unlocked!	One or more RF synthesizers unlocked. The unit stopped RF transmissions and attempted to reprogram the synthesizers. If this message repeats or if the RF link is not back on, try to reset the terminal. If the problem persists, contact customer support.
218-Outdoor unit over temperature!	The T-54 or T-58 Transceiver's internal temperature rose above 185F / 85C. The transceiver will shut down for 30 seconds to allow cooling.
219-Excessive DC loss on IF cable!	The DC voltage at the transceiver (carried by the IF cable from the terminal) is lower than the required 24 VDC. Check the IF cable and connectors.
220-Outdoor unit power supply fault!	Indicates a fault in the transceiver's power supply. This error could be due to a problem with the internal power supply, or with the power source from the terminal. If the 'Excessive DC loss on IF cable' error is also indicated, check the IF cable and connectors. If not, the T-54 or T-58 Transceiver will require servicing.
221-\public\ community can't be deleted!	The default 'Public' SNMP community cannot be deleted.
222-Max. community number already defined!	No more communities may be defined, as the maximum number has been reached
223-Community name already defined!	The name for the SNMP community has already been used. Choose another name.
224-MIB initialization error!	MIB construction process generated an error. Try to reset the terminal. If the problem persists, contact customer support.
225-Error while loading SNMP configuration!	EEPROM memory was corrupted and the SNMP configuration couldn't be loaded. Default SNMP configuration was loaded.
226-Error while saving SNMP configuration!	SNMP configuration saving process wasn't successfully. Try again. If the problem persists, contact customer support.

6.5 Replacing System Fuse

IMPORTANT: Always completely remove power from the system before performing any maintenance on the terminal or transceiver.

Warning to service personnel:
Caution for all AC and DC models – Double Pole/Neutral fusing.

To replace fuse:

1. Disconnect power from the terminal.
2. Pry off the black plastic cover located on the back panel beside the power switch and extract the red fuse holder.
3. Use an approved tool to remove the glass-cased fuses from the holder.
   Be certain to replace the fuse(s) into the lower half of the holder, as shown in the diagram below. The fuse holder holds two fuses, both of which are active.
   Be certain to use fuses of the same type and rating.

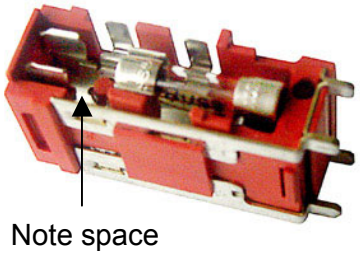


Figure 25: Fuse Holder

4. Replace the fuse holder in the system terminal and secure.
5. Restore power to the system.

Chapter

7

7 Appendix

7.1 System Specifications

Table 22: AN-50e Technical Specifications

Wireless System	
System Capability:	LOS, Optical-LOS, and Non-LOS
RF Band:	T-54 Radio: 5.470 GHz to 5.725 GHz T-58 Radio: 5.725 GHz to 5.825 GHz
Center Frequency Steps:	5 MHz[1]
Channel Size:	20 MHz
RF Dynamic Range:	> 50 dB
Data Rate:	Up to 49 Mbps average Ethernet rate[2]
Max TX Power:	-20 dBm to 20 dBm (region specific)[3]
Rx Sensitivity:	-86 dBm @ 6 Mbps (based on BER of 1x10e-9)
IF Cable:	Multiplexed IF, DC, control (Tx/Rx, AGC, APC) Up to 68 m (225 ft) using RG-6U cable[4] Up to 228 m (750 ft) using high-grade cable[4]
Network Attributes:	802.1p[5] network traffic prioritization 802.3x[5] Ethernet flow control Automatic link distance ranging[5] DHCP pass-through Transparent bridge VLAN pass-through
Dynamic Channel Control:	Dynamic Frequency Selection (DFS), Automatic Transmit Power Control (ATPC)
Modulation/Coding Rates:	Adaptive Modulation (bi-directional burst to burst) auto selects; 1/2 BPSK, 3/4 BPSK, 1/2 QPSK, 3/4 QPSK, 1/2 16 QAM, 3/4 16 QAM, 2/3 64 QAM and 3/4 64 QAM
Over The Air Encryption:	64-bit private key encryption
MAC:	PTP and PMP deployment TDMA Concatenation/Fragmentation[6] Automatic Repeat Request (ARQ) error correction Dynamic adaptive modulation (BPSK to 64 QAM)
Range:	Up to 25 km (15 mi) line-of-sight @ 33 dBm EIRP (for Europe) Up to 80 km (50 mi) line-of-sight @ 48 dBm EIRP
Network Services:	Transparent to 802.3 services and applications
Duplex Technique:	Dynamic TDD (time division duplex)

Table 22: AN-50e Technical Specifications

Wireless Transmission:	OFDM (orthogonal frequency division multiplexing)
Network Connection:	10/100 Ethernet (RJ-45)
System Configuration:	HTTP (Web) interface, SNMP CLI via Telnet and local console
Network Management:	SNMP: standard and proprietary MIBs Full management by RedAccess NMS
Power Requirements:	39 W maximum Single/dual auto-sensing 110/220/240 VAC 50/60 Hz Single/dual 18 - 72 VDC
Redundant Power:	Optional dual AC or dual DC power supply (dual cord) with automatic fail-over
Compliance:	EN 60950, EN 301 893, EN 301 390, EN 301 489-1 & 17, FCC part 15
Operating Temperature:	IDU Operating Cond.: 5 C to 40 C, IDU Short-Term Cond.: -5 C to 55 C for up to 16 hours ODU Operating Cond.: -40 C to 60 C
Dimensions/Weight:	IDU: 431.8 x 304.8 x 44.45 mm (17 x 12 x 1.75 in)
Humidity:	IDU: Up to 95% non-condensing
Weight:	2.5 Kg (5.5 lb)

[1] Center frequency is dependent on region.
[2] *Actual Ethernet data throughput is dependent on: protocols, packet size, burst rate, transmission latency, and link distance.*
[3] In some countries outside of North America, the maximum operational power per channel with a given antenna is limited in accordance to maximum allowable EIRP levels for the region.
[4] With two lightning arrestors installed.
[5] Point-to-Point Mode only.
[6] Point-to-Multipoint mode only.
Subject to change without notice.

7.2 DC Power Supply Cable Connections

This section provides important instructions for connecting to a DC power source.

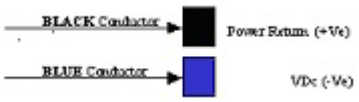
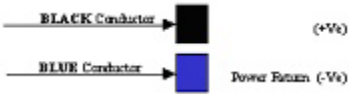
The DC power supply (optional) is rated for operation using 24, 48, or 60 VDC. Power is connected to the terminal via a fused power entry module located on the rear of the terminal. All DC terminals are shipped with a power cord assembly, consisting of the power entry module's mating dual pin polarized female plug, pre-crimped with 18 AWG blue and black insulated wires.

Important: All power wiring must be at least 18 AWG.

The DC power input is floating (+Ve and -Ve not connected to chassis), allowing positive (minus to ground), negative (positive to ground) and floating power connections as required. Refer to table below for connection details.

If the terminal does not power-on, it is possible that the blue and black wires are connected incorrectly resulting in a reversal of polarity. In this case the diode protection prevents permanent damage to the power supply. Reverse the power connections and verify that the terminal powers up properly.

Table 23: DC Power Supply Cable Connections

Wire Color	Negative DC Power (-18 to -72 VDC)	Positive DC Power (+18 to +72 VDC)
Blue	Negative power	Power Return
Black	Power Return	Positive Power
Schematics		

Note: DC units are not equipped with power switches and activate immediately when connected to a power source.

Note: The Widemouth power supply options are not available for the AN-50.

7.3 Antenna and Power Specifications

7.3.1 T-58 Radio: Antenna Power Specifications

The system is FCC certified for the antennas listed in the following table.

Table 24: T-58 Radio: Antenna Power Specifications

P/N	Ant. Gain (dBi)	Antenna Type	App.	Minimum Conducted Power (dBm)	Max Conducted Power Ratings (dBm)	Average GUI Power Display (dBm)	FCC Max EIRP (dBm)
48-00006	28	Directional Flat Panel	PTP	-20	26	20	No Limit
48-00020-01	22	Directional Flat Panel	PTP	-20	26	20	No Limit
48-00030	22	Directional Parabolic	PTP	-20	26	20	No Limit
48-00031	28	Directional Parabolic	PTP	-20	26	20	No Limit
48-00032	31.2	Directional Parabolic	PTP	-20	26	20	No Limit
48-00033	34.6	Directional Parabolic	PTP	-20	26	20	No Limit
48-00006	28	Directional Flat Panel	PMP	-20	8	2	36 dBm
48-00014	15	Directional Flat Panel	PMP	-20	21	15	36 dBm
48-00017	14	Directional Flat Panel	PMP	-20	22	16	36 dBm
48-00020-01	22	Directional Flat Panel	PMP	-20	13	6	36 dBm
48-00028	17	Directional Flat Panel	PMP	-20	19	13	36 dBm
48-00029	16	Directional Flat Panel	PMP	-20	20	14	36 dBm
48-00030	22	Directional Parabolic	PMP	-20	14	8	36 dBm
48-00031	28	Directional Parabolic	PMP	-20	8	2	36 dBm
48-00032	31.2	Directional Parabolic	PMP	-20	4	-2	36 dBm
48-00033	34.6	Directional Parabolic	PMP	-20	1	-5	36 dBm
48-00047	15	Directional Flat Panel	PMP	-12.7	21	15	36
48-00048	9	Omni-Directional	PMP	-12.7	27	20	36

***Note**: The RF output power and selection must be professionally programmed and installed by the manufacturer or a trained professional installer for compliance with FCC requirements of maximum EIRP of 36 dBm.*

7.3.2 T-54 Radio: Maximum RF Power vs. Antenna Gain

The following table provides the adjustment available for maximum RF power settings based on the angle of deployment. Applies to sectorized antennas only.

Table 25: 5.4 GHz Band RF Power vs. Antenna Gain

	A6017 RWS	A9016 RWS	A6015 MTS	A9014 MTS
Deg	dBm	dBm	dBm	dBm
0	-1	0	4	2
1	0	1	5	3
2	1			4
3				5
4				6
...				
12	2			
13	3			
14	4			
15	5			
...				
24	6			
25		2		
26		3		
27		4	6	
28		5	7	
29		6	8	
...				
32				7
37				8
39				9
...				
45		7		

7.3.3 Operational Power for T54 (FCC)

The following table provides the maximum RF power settings based on the gain of the antenna.

Table 26: 5.4 GHz -- Antenna Gain vs. Max. Op. Power

Ant. Gain [dBi]	Max. Power [dBm]		Ant. Gain [dBi]	Max. Power [dBm]
6.0	15		21.0	-1
6.5	15		21.5	-1
7.0	14		22.0	-2
7.5	14		22.5	-2
8.0	13		23.0	-3
8.5	13		23.5	-3
9.0	12		24.0	-4
9.5	12		24.5	-4
10.0	11		25.0	-5
10.5	11		25.5	-5
11.0	10		26.0	-6
11.5	10		26.5	-6
12.0	9		27.0	-7
12.5	9		27.5	-7
13.0	8		28.0	-8
13.5	8		28.5	-8
14.0	7		29.0	-9
14.5	7		29.5	-9
15.0	5		30.0	-9
15.5	5		30.5	-10
16.0	4		31.0	-10
16.5	4		31.5	-11
17.0	3		32.0	-11
17.5	3		32.5	-12
18.0	2		33.0	-12
18.5	2		33.5	-13
19.0	1		34.0	-13
19.5	1		34.5	-14
20.0	0		35.0	-14
20.5	0			

7.4 CLI Interface

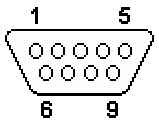
7.4.1 Console (RS-232) Port

All operator communications with the terminal may be made using a direct connection to the serial Console Port on the back of the terminal. This section describes the procedures for configuring and operating the terminal via the Console Port using the command line interface (CLI).

Connect a PC/Terminal to the terminal's serial port DB-9 connector using a cross-connect or null modem cable (DB-9 female-female). Set the PC/Terminal to emulate a VT-52 or VT-100 terminal, using the following port settings: Bits Per Second: 9600; Data Bits: 8; Parity: None; Stop Bits: 1; Flow Control: Hardware

The following table lists the terminal 9 PIN D-SUB male connector pinout.

Table 27: Console (RS-232) Port Pinout



Pin	Name	RS232	V.24	Description
2	RXD	BB	104	Receive Data
3	TXD	BA	103	Transmit Data
5	GND	AB	102	System Ground

V.24 column is ITU-TSS V.24 circuit name.
RS232 column is RS232 circuit name.

7.4.2 Connecting via Telnet

All operator communications with the terminal may be made using CLI over Telnet. This offers the advantage of allowing the operator to access and control the terminal remotely from any geographical location, without the need for a web browser. This section describes the procedures for configuring and operating the terminal via Telnet using the command line interface (CLI).

To connect to the terminal, Telnet to the IP address of the terminal (default address shown below).

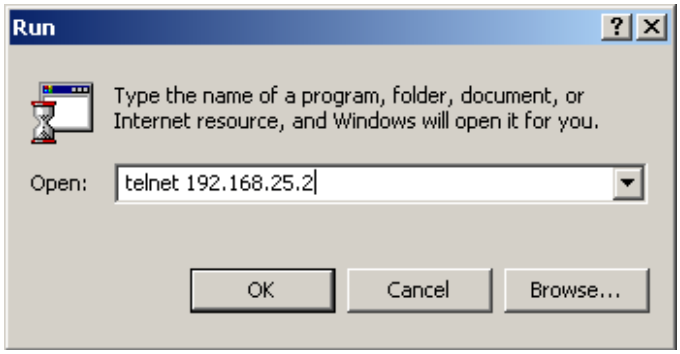


Figure 26: Connecting via Telnet

When the command prompt screen appears, login using the Username: admin and Password: admin. The terminal may now be configured and queried using a set of CLI commands. Type 'help' for a list of general commands.

7.4.3 CLI Commands

The following commands are available via Telnet and Console connections to the terminal. For online help, type 'help <command>' at the command prompt.

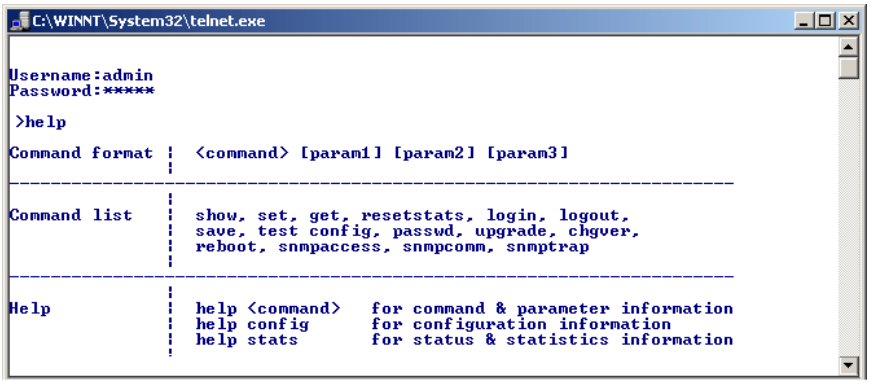


Figure 27: CLI Help Screen

General Commands

Table 28: CLI - General Commands	
Command	**Description**
chgver	Swaps the operating and secondary software versions
get	Get <parameter name> displays the value for a status parameter. For configuration parameters, use Set command.
login	Allows login under a different username and password
logout	Disconnects user from the terminal.
passwd	Change password for user. passwd <username> <newpassword>
reboot	Reboots the terminal. Reboot <time in seconds>
resetstats	Resets all statistics
save config	Permanently saves system configuration settings. This command is required to activate all Configuration settings set previously
save snmp	Permanently saves SNMP configuration settings. This command is required to activate all SNMP settings set previously.
set	Set one configuration parameter: <parameter name> [<value>] Without <value>, 'set' returns the actual value for configuration parameters. For status parameters, use the Get command.
show config	Returns a list of all System Configuration parameters.
show log	Returns a list of current system log entries.
show snmp	Returns a list of all SNMP communities and related parameters.
show stats	Returns a list of all System Status parameters.
snmpaccess	Modify access rights for a community (see snmpcomm) snmpaccess <community name> <access>
snmpcomm	To add a new SNMP community: snmpcomm add <community name> <access> <access> can be: r,w,t or any combination To delete an SNMP community snmpcomm del <community name>
snmptrap	To add a trap destination for an SNMP community: snmptrap add <community name> <IP destination> To delete a trap destination for an SNMP community: snmptrap del <community name> <IP destination>
test config	Allows testing of configuration settings for 5 minutes, after which the system reverts to the previously saved settings. To make settings permanent use 'save' command.
upgrade	Begin a software upload. upgrade <ipaddr> <filename>

General Information

Table 29: CLI - General Information Commands	
Command	**Description**
gateway	Specifies the IP address of the default router
ipaddr	Specifies the IP address used by the local terminal
ipmask	Specifies the IP Subnet Mask used by the local terminal
macaddr	Specifies the Ethernet MAC address used by local terminal
master	Indicates whether the system is operating as the master system. *Important: For each set of* Systems*, only one terminal must be designated Master.*
rflink	Yes: RF link up / No: RF link down
starttime	Specifies the time elapsed since the system started
swver	Specifies the operating software version
sysdetails	Specifies the location, telephone #, contact information, etc.
sysname	Identifies the local terminal
ubrate	Indicates the system's current uncoded burst rate

System Status

Table 30: CLI - System Status	
Command	**Description**
cableattn	The attenuation of the signal over the IF cable
erxpkt	Number of packets successfully received locally
erxpktd	Number of packet errors received locally
etxpkt	Number of Ethernet packets transmitted
gateway	Specifies the IP address of the default router
ipaddr	Specifies the IP address used by the local terminal
ipmask	Specifies the IP Subnet Mask used by the local terminal
ll	Actual length of the path that the wave travels.
macaddr	Specifies the Ethernet MAC address used locally
master	Indicates if the system is serving as the master system. *Important: For each set of* Systems*, only one terminal must be designated Master.*
resetstats	Resets all statistics
rffreq	The frequency in use
rflink	Yes: RF link up. No: RF link down
rfstatus	An error code (0-31), indicating the RF status
rssimax	The maximum received signal strength
rssimean	The average received signal strength
rssimin	The minimum received signal strength
sinadr	The no. of successful wireless packets received over the air
swver	Specifies the operating software version

Table 30: CLI - System Status	
Command	**Description**
sysname	Identifies the local terminal
txpower	The actual current transmit power level
ubrate	Indicates the system's current uncoded burst rate
wrxpkt	The no. of successful wireless packets received over the air
wrxpktd	The no. of wireless packets received with errors over the air
wrxpktr	The no. of wireless packets retransmitted over the air
wtxpkt	The no. of wireless packets successfully transmitted over the air
wtxptd	The no. of transmitted packets discarded by the subscriber
wtxpktr	The no. of wireless packets retransmitted over the air

System Configuration

Table 31: CLI - System Configuration	
Command	**Description**
adaptmod	Enables Adaptive Modulation mode.
buzzer	Specifies whether the antenna buzzer is enabled - defaults to voltage.
chgver	Change the operating software version
encrypt	Specifies whether over-the-air data encryption is enabled
encryptkey	Enter the subscriber's MAC address if encryption is enabled
flowctrl	Specifies whether flow control on the Ethernet port is enabled
gateway	Specifies the IP address of the default router
http	Specifies whether configuration over HTTP is enabled
ipaddr	Specifies the IP address used by the local terminal
ipmask	Specifies the IP Subnet Mask used by the local terminal
llmod	Specifies if the link length is calculated automatically or manually. Available options: off for auto and on for manual.
llmu	Specifies the current measurements units used for the link length. Available options: off for miles and on for kilometers.
ll	Actual length of the path that the wave travels.
macaddr	Specifies the Ethernet MAC address used by the local terminal
master	Indicates whether the system is operating as the master system. *Important: For each set of* Systems*, only one terminal must be designated Master.*
modreduct	Used when 'AdaptMod' is disabled.
radio	Specifies whether radio transmission is enabled
reboot	Reset all statistics and reboot the terminal
rfchannel	Available channel options: 1, 1A, 2, 2A, 3, 3A, 4, 4A, 5.
save config	Permanently saves configuration settings
snmp	Specifies whether configuration over SNMP is enabled
sysdetails	Specifies the location, telephone #, contact information, etc.
sysname	Identifies the local terminal
telnet	Specifies whether configuration over telnet is enabled

Table 31: CLI - System Configuration	
Command	**Description**
telnetport	Specifies the TCP port used for telnet
test config	Allows testing of these settings for 5 minutes, after which the system reverts to the previously saved settings. Use 'Save' to make settings permanent .
txpower	Specifies the max. power level of the system
ubrate	Sets the desired burst rate for the link.

7.5 Glossary Of Terms

Table 32: Glossary of Terms

Term	Definition
Antenna Gain	The measure of antenna performance relative to a theoretical antenna called an isotropic antenna.
ARQ	Automatic Repeat Request. This is the protocol used over the air for error correction.
ATPC	Automatic Transmission Power Control. The link master-end system automatically adjusts the Tx level of subscriber to match a target RSSI value.
Beamwidth	The angle of signal coverage provided by an antenna.
BFW	Broadband Fixed Wireless
Bps	Bits Per Second A unit of measurement for the rate at which data is transmitted.
BPSK	Binary Phase Shift Keying.
Channel	A communications path wide enough to permit a single RF transmission.
dB	A ratio expressed in decibels.
dBi	A ratio, measured in decibels, of the effective gain of an antenna compared to an isotropic antenna.
dBm	Decibels above a milliwatt
DFS	Dynamic Frequency Selection (DFS) can detect interference from other devices using the same frequency (especially radar) and automatically take a pre-selected action such as disable transmission or relocate transmission to alternative frequency.
DHCP	Dynamic Host Configuration Protocol. A DHCP server will automatically issue IP addresses within a specified range to devices on a network.
Directional Antenna	An antenna that concentrates transmission power into one direction.
Encryption	For the purposes of privacy, the transformation of data into an unreadable format until reformatted with a decryption key.
Ethernet	A LAN architecture using a bus or star topology
FD	Full Duplex. Refers to the transmission of data in two directions simultaneously (i.e. a telephone)
FWA	Fixed Wireless Access
Gain	The ratio of the output amplitude of a signal to the input amplitude of a signal. Typically expressed in decibels (dB).
Gateway	A network point that acts as an entrance to another network.
GHz	Gigahertz. 1,000,000,000 Hz, or 1,000 MHz
GUI	Graphical User Interface
IF	Intermediate Frequency.
IP	Internet Protocol. See TCP/IP.
Isotropic	A theoretic construct of an antenna that radiates its signal 360 degrees both vertically and horizontally—a perfect sphere. Generally used as a reference.

Table 32: Glossary of Terms	
Term	**Definition**
IXC	Inter-exchange Carrier. A long-distance phone company.
LEC	Local Exchange Carriers. The traditional local wired phone company.
LED	Light Emitting Diode
LOS	Line Of Sight. A clear direct path between two antennas, with no obstructions within the first Fresnel zone.
MAC	Media Access Control. A unique number assigned to a network device. Corresponds to ISO Network Model Layer 2 data link layer.
MHz	Megahertz. 1,000,000 Hz
Modem	MOdulator/DEModulator. A hardware device that converts digital data into analog and vice versa.
Modulation	Any of several techniques for combining user information with a transmitter carrier signal.
Multipath	The radio echoes created as a radio signal bounces off objects.
NVRAM	Non-volatile RAM. System parameters are stored in NVRAM. This data is not affected by powering off the system.
NLOS	Non Line Of Sight. Completely obstructed path between two antennas.
OFDM	Orthogonal Frequency Division Multiplexing. OFDM spreads data to be transmitted over a large number of orthogonal carriers.
OLOS	Optical Line Of Sight. A clear direct path between two antennas, with obstructions within the first Fresnel zone.
Packet	A bundle of data organized in a specific way for transmission. The three principal elements of a packet include the header, the text, and the trailer (error detection and correction bits).
PHY	Physical Layer. Provides for the transmission of data through a communications channel by defining the electrical, mechanical, and procedural specifications.
PMP	Point to Multipoint
PTP	Point to Point
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
Receiver Sensitivity	A measurement of the weakest signal a receiver can receive and still correctly translate it into data.
RF	Radio Frequency
Rx	Receiver
S/N	Signal to Noise Ratio
SINADR	Signal to noise and distortion ratio.
TCP/IP	Transmission Control Protocol/Internet Protocol The standard set of protocols used by the Internet for transferring information between computers, handsets, and other devices.
TFTP	Trivial File Transfer Protocol
Tx	Transmitter

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