

MDS entraNET Series™



Access Point



Remote

900 MHz and 2400 MHz Extended Range IP Networking Transceivers *Firmware Release 3.0*

MDS 05-4565A01, Rev. A
MAY 2007



GE MDS
industrial wireless networks

Refer to the *Installation Reference Chart* at the middle of this guide for essential installation and configuration details.

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Manual Revision and Accuracy

While every reasonable effort has been made to ensure the accuracy of this manual, product improvements may result in minor differences between the manual and the product shipped to you. If you have questions or need an exact specification for a product, please contact our Technical Services Team using the information at the back of this guide. Microwave Data Systems reserves its right to correct any errors or omissions. Updated information may also be available on our Web site at: www.GEMds.com. This manual is for the use of professionals to guide them in the installation, operation and basic system maintenance of the equipment described.

OPERATIONAL & SAFETY NOTICES

RF Exposure



Professional installation required. The radio equipment described in this guide emits radio frequency energy. Although the power level is low, the concentrated energy from a directional antenna may pose a health hazard. Do not allow people to come closer than 23 cm (9 inches) to the antenna when the transmitter is operating in indoor or outdoor environments. More information on RF exposure is available on the Internet at www.fcc.gov/oet/info/documents/bulletins.

Installation in Hazardous Locations

The transceiver is not acceptable as a stand-alone unit for use in hazardous locations. It must either be mounted within another piece of equipment which is certified for hazardous locations, or installed within guidelines, or conditions of approval set forth below:

1. The transceiver must be mounted within a separate enclosure which is suitable for the intended application.
2. The antenna feedline, DC power cable and interface cable must be routed through conduit in accordance with applicable electrical codes.
3. Installation, operation and maintenance of the transceiver should be in accordance with the transceiver's manual, and applicable electrical codes.
4. Tampering or replacement with non-factory components may adversely affect the safe use of the transceiver in hazardous locations, and may void the approval.
5. A power connector with screw-type retaining screws as supplied by the manufacturer must be used.
6. Articles 500 through 502 of the National Electrical Code (NFPA 70) provide further information on hazardous locations and approved wiring methods.



EXPLOSION HAZARD!

Do not connect or disconnect equipment unless power has been switched off or the area is known to be non-hazardous.

Refer to Articles 500 through 502 of the National Electrical Code (NFPA 70) for further information on hazardous locations and approved Division 2 wiring methods.

Environmental Information



The manufacture of this equipment has required the extraction and use of natural resources. Improper disposal may contaminate the environment and present a health risk due to hazardous substances contained within. To avoid dissemination of these substances into our environment, and to limit the demand on natural resources, we encourage you to use the appropriate recycling systems for disposal. These systems will reuse or recycle most of the materials found in this equipment in a sound way. Please contact MDS or your supplier for more information on the proper disposal of this equipment.

About This Guide

This guide presents installation and initial operating instructions for the MDS *entraNET* Series™ networking transceivers. Following installation, we suggest keeping this guide near the equipment for future reference.

The scope of this manual is limited to the safe and effective installation of the unit in typical office or non-hazardous industrial settings. Users who require optimization of the equipment's capabilities and operating range should read the *MDS entraNET 900/2400 Transceiver Installation and Operation Guide*, P/N 05-4055A01. This manual provides more in-depth information on antenna selection and optimization, and extensive coverage on user-controllable parameters and diagnostic tools.

Key installation information is contained on the *Installation Reference Chart* found at the center of this guide.

PRODUCT DESCRIPTION

The entraNET system is an easy-to-install wireless solution supporting long-range serial and Ethernet data transmission at a speed of 106 kbps. The typical system set-up includes an Access Point (AP) transceiver and one or multiple Remote transceivers.

Feature Summary

The MDS entraNET design makes installation and configuration an easy task, while allowing for configuration changes in the future.

- Long-range transmission over favorable, unobstructed terrain, with sufficient antenna heights
- Fast, 106 kbps data speed—Ten times faster than 9.6 kbps radios
- Low power consumption—Sleep and Shutdown modes to enable solar-powered operation
- Repeater configurations—A repeater scheme can be established to extend the transmission range or to work around obstructions in a network. This is accomplished by connecting two radios back to back at a single site.
- Industrial-grade product—Extended temperature range for trouble-free operation in extreme environments
- Robust radio communications—Designed to perform in high-interference environments
- MDS Security Suite—Blocks common attack schemes and prevents “rogue” hardware from gaining access to or control of a network. Common attack events are logged and reported via alarms.
- Simple setup—Ethernet bridge configuration option requires minimal setup
- Serial ports—Embedded terminal server for serial interface equipment

GE MDS CYBER SECURITY SUITE

The operation and management of an enterprise is becoming increasingly dependent on electronic information flow. An accompanying concern is the cyber security of the communication infrastructure.

The entraNET transceivers are capable of dealing with many common security issues. [Table 1](#) profiles security risks and how the transceivers provide a solution for minimizing vulnerability.

Table 1. entraNET Cyber Security Highlights

Security Level	Specification
<ul style="list-style-type: none"> • MDS Cyber Security Suite, Level 3: 	<ul style="list-style-type: none"> • RC4-128 encryption • Automatic rotating key algorithm • Approved AP/Remotes list (local authentication) • Failed login lockdown • 900 MHz operation and proprietary data framing

INSTALLATION PLANNING

It is highly recommended that the Access Point unit be installed *first*. With this plan, you can quickly check the operation of each associated Remote as it is placed on the air.

Should further information be needed, see “[TECHNICAL ASSISTANCE](#)” on [Page 28](#) of this guide for information on contacting the MDS Technical Services Group. You will also find support information at the GE MDS Web site: www.GEmds.com.

INSTALLATION STEPS

There are three main requirements for installing the transceiver. They are: adequate and stable DC power, a good antenna system, and the correct interface between the transceiver and the data device.

Step 1 – Mount the Radios

[Figure 1](#) shows the dimensions of the AP transceiver with mounting brackets attached. [Figure 2](#) shows the same view for a Remote transceiver. When mounting entraNET transceivers, choose a location that provides easy access to the connectors on the end of the radio and an unobstructed view of the LED status indicators.



Figure 1. AP Mounting Bracket Spacing

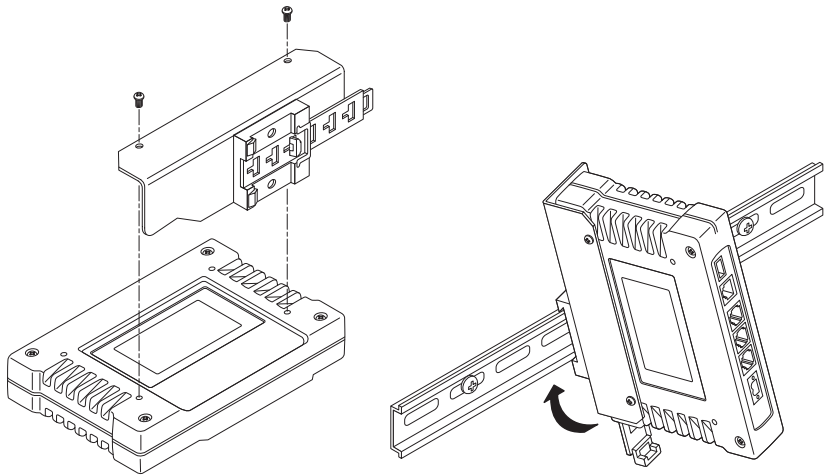


Figure 2. Remote Mounting Brackets Spacing

DIN Rail Mounting Option

The radio is available with an optional 35 mm DIN Rail Mounting Bracket (Part No. 03-4022A02). Equipment cabinets and racks of recent design often employ this type of mounting. A transceiver with a DIN bracket can be quickly installed or removed without tools.

[Figure 3 on Page 7](#) shows how the DIN rail bracket attaches to the back of the radio, and how the entire radio attaches to the mounting rail.



Step 1: Attach the bracket using the two screws provided. (Attach to the end opposite the connectors.)

Step 2: Snap the assembly onto the DIN rail. To remove the radio, pull down on the release tab.

Figure 3. DIN Rail Mounting Details for MDS Equipment

Step 2—Install the Antenna

To minimize radio frequency interference, the antenna should be mounted at least nine inches (> 23 cm) from the connected device(s), sensors and other components of the system.

Step 3—Measure & Connect DC Power

The power applied to transceivers (AP and Remotes) must be within 6–30 Vdc and be capable of continuously providing a minimum of 11 Watts. (Typical power consumption is 800 mA at 13.8 Vdc for the AP and 600 mA at 13.8 Vdc for Remotes.)

A power connector with screw terminals is provided with each radio. Strip the wire leads to 6 mm (0.25"). Be sure to observe proper polarity, as shown in [Figure 4](#), with the positive lead (+) on the left.

NOTE: It takes approximately 30 seconds for the AP transceiver to power up and be ready for operation. The Remote requires approximately five seconds to power up.

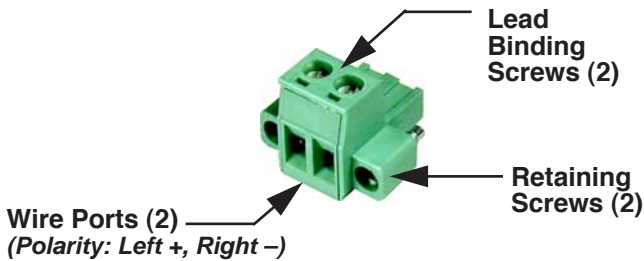


Figure 4. DC Power Connector



The transceiver must be used only with negative-ground systems. Make sure the polarity of the power source is correct. The radio is protected from reverse polarity by an internal diode and an on-board fuse.

Step 4—Configure the AP

The AP must be configured first, as Remote transceivers depend on the AP beacon signal to achieve a connected (linked) state. For detailed AP menu navigation instructions, refer to the *MDS entraNET System Guide (05-4055A01)*.

- a. Connect to the AP using a serial or Ethernet connection.

Console Terminal Connection (recommended for first-time log-in)

To configure the AP using the serial COM1 port, connect a PC to the COM1 port on the radio and configure HyperTerminal with the following data parameters:

- 19200 bps
- 8 bits, no parity, one stop bit (8N1)
- hardware flow control disabled
- VT100 emulation

Telnet Connection Using the AP LAN Port

To configure the AP via its LAN port, connect a PC Ethernet port to the AP with an Ethernet crossover cable, and start a telnet session to the IP address of the AP. The default is 192.168.1.1.

- b. Log in to the AP as follows:

- Press the **[ENTER]** key to receive the **login** prompt. The COM1/LAN LED flashes to indicate data communications.
- At the **login** prompt, enter the username (**admin** is the default username). Press **[ENTER]**.
- At the **Password** prompt, enter the password (**admin** is the default password). Press **[ENTER]**. Upon successful log-in, the *Starting Information Screen* appears.

c. Review the current settings and make any necessary changes.

Typically, the parameters shown in **Table 2** are the only settings that need to be set or reviewed. A complete list of AP commands appears in the *MDS entraNET System Guide (05-4055A01)*.

Table 2. Key AP Parameters & Defaults

Menu Item	Management System Location	Default	Values or Range
IP Address	Main Menu >> Network Configuration > IP Configuration	192.168.1.1	Contact your Network Administrator. If IP Address Mode (below) is set to Dynamic, IP Address is configured automatically.
IP Address Mode	Main Menu >> Network Configuration > IP Configuration	Static	Static Dynamic
IP Netmask	Main Menu >> Network Configuration > IP Configuration	255.255.0.0	Settable per customer requirements

Table 2. Key AP Parameters &

Menu Item	Management System Location	Default	Values or Range
Net Address	Main Menu >> Network Configuration > Wireless MAC Configuration	9999	1-15 alphanumeric characters. A good choice is the last four digits of the AP serial number.
RF Output Power (non-ETSI)	Main Menu >> Radio Configuration >	900 MHz: 30 dBm 2.4 GHz: 27 dBm	900 MHz: 20–30 dBm 2.4 GHz: 17-27 dBm
RF Output Power (ETSI)	Main Menu >> Radio Configuration >	2.4 GHz: 20 dBm	2.4 GHz: 10-20 dBm
Password Changes	Main Menu >> Security Configuration > User Passwords	Administrator Password: admin (lower case) Guest Password: guest (lower case)	<ul style="list-style-type: none"> • 1–8 alphanumeric characters • Passwords are case sensitive; can be mixed case

Step 5—Configure the Remote Radio

- a. Connect a PC to the COM1 port on the radio. Establish a HyperTerminal session with the following data parameters:
 - 19200 bps
 - 8 bits, no parity, one stop bit (8N1)
 - hardware flow control disabled
 - VT100 emulation

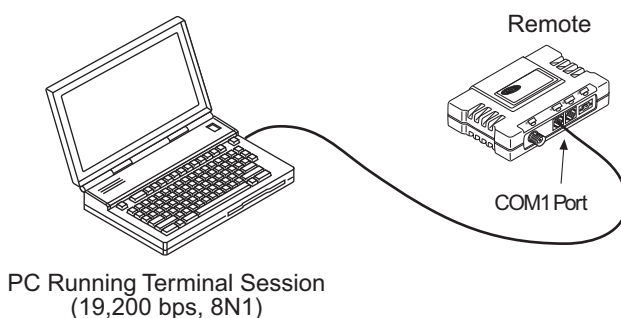


Figure 5. Remote Configuration Setup

- b. Login to the remote radio:
 - Press **[ENTER]** several times to receive the **entranet>** prompt. (The COM1/ETH LED blinks to indicate data communication.)
 - At the **entranet>** prompt, enter **login**. Press **[ENTER]**.
 - At the next prompt, enter the username (the default username is **admin**). Press **[ENTER]**.
 - At next prompt, enter the password (the default password is **admin**). Press **[ENTER]**. The radio is now ready to accept commands.
- c. Set or Verify Network Address:
 - Type **RADIO NETADDR=** to display the currently programmed network address.
 - If changes are required, type **RADIO NETADDR=<netaddr>**, where **<netaddr>** is 1-15 alphanumeric characters. (The network address of the Remote radio **must** match that of the AP.)
7. Verify that the LINK LED lights to indicate successful connection with the AP. (It may take several seconds for the LED to light.)

Step 6—Connect the Terminal Equipment

Be sure not to overload the radio network with high-bandwidth LAN traffic during this test. Refer to the *MDS entraNET System Guide (05-4055A01)* for more information.

Ethernet Device Connection to Remote

NOTE: Verify that the Remote ETH port is enabled (on) using the **ETH** command. If it is not, use the **ETH=ON** command to enable the port.

Connect an Ethernet endpoint to the Remote ETH port. The ETH port supports any Ethernet-compatible device. This includes a device that uses the Internet Protocol (IP).

Serial Device Connection to Remote

Connect a serial device to the Remote COM2 port and verify that the port settings are compatible with the connected device (baud rate, data format, etc.).

Step 7—Check for Normal Operation

In this step you will verify the proper operation of wireless communications between an Access Point and the associated Remotes.

At All Units...

Observe the transceiver LEDs on the top cover for the proper indications. In a normally operating system, the following LED indications should be seen within 30 seconds of start-up:

- PWR—Lit continuously
- LINK—Lit continuously (unless Sleep is enabled)
- ETH—On, or blinks intermittently
- COM1/COM2—Blinks to indicate data communications

Table 3 on Page 13 provides details on the LED functions for Remotes and AP radios.

Table 3. Transceiver LED Functions

LED Label	Activity	Indication
LAN/ETH	ON	LAN or endpoint detected
	Blinking	Data TX or RX
	OFF	LAN or endpoint not detected
COM1 (MGT System)	Blinking	Data TX or RX
	OFF	No data activity
COM2	Blinking	Data TX or RX
	OFF	No data activity
PWR	ON	Primary power (DC) present
	Blinking	Radio in “Alarmed” state
	OFF	Primary power (DC) absent
LINK (AP)	ON	Lights when radio has finished its startup cycle. Remains lit.
LINK (Remote)	ON	Connected to an AP
	OFF	Not connected to an AP

At the Access Point Unit...

- a. If the Access Point unit is the first unit you are installing, send a **PING** command to it through the LAN port. This verifies basic LAN connectivity.
- b. Connect to the radio’s management system via Telnet and check for the list of connected Remotes.
- c. Check the **Starting Information** screen for the **Device Status**. It will show one of the following:
 - Operational**— The unit is operating normally.
 - Alarmed**— An alarm event has been logged and not cleared.

At Remote Units...

- a. Look for the LINK LED to light and remain on. This indicates the unit has successfully associated with the Access Point. (Association may take several seconds.)

- b. Check the **Starting Information** screen for the **Device Status** (also known as Connection Status). It will show one of the following:
 - Scanning**—The unit is looking for an Access Point beacon signal.
 - Exp(ecting) Sync(hronization)**—The unit has found a valid beacon signal for its network.
 - Hop Sync**—The unit has changed its frequency hopping pattern to match that of the Access Point.
 - Connected** —The unit has a radio (RF) connection with the Access Point, but has not obtained cyber-security clearance to pass data.
 - Associated** —This unit has successfully synchronized and associated with an Access Point. This is the normal status.
 - Alarmed**—The unit is has detected one or more alarms that have not been cleared.
- c. When the network is operating properly based on observation of the unit’s LEDs, connect a computer to the transceiver’s data port that will be used by the local terminal equipment. Send the **PING** command to verify the communications link integrity with the Access Point.
- d. After the **PING** command is successful, connect the terminal equipment to the radio’s data port and verify normal operation.

If all checks are OK, you are finished with the installation at this site.

Resetting to Factory Defaults (Use with Care)

This procedure may be useful when several parameters have been modified, and there is no track of changes. It causes the transceiver to return to a known-operational state.

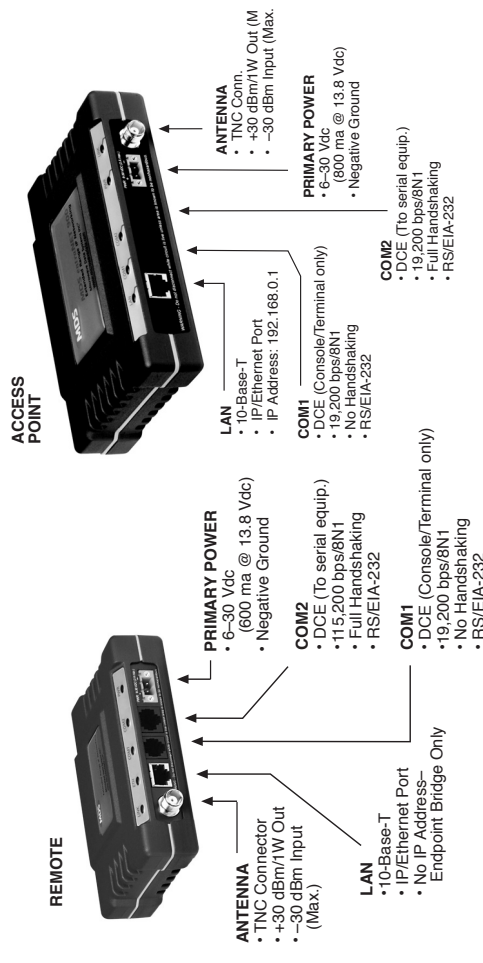
To reset all transceiver parameters back to the factory defaults, including the password (default = **admin**), you must enter a special code (authorization key) provided by the factory in place of the user name at the time of login.

To reset the admin password to the factory default (“admin”) (Figure 6):

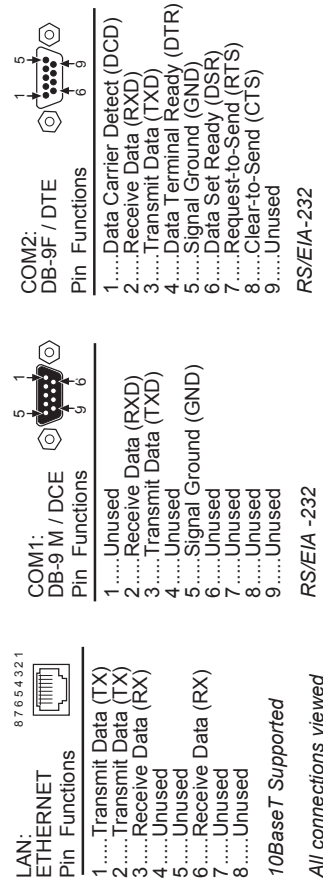
LED FUNCTIONS & INDICATIONS

LAN	ON LAN detected Flashing Data TX/RX OFF LAN not detected	PWR	ON Primary power (DC) present Flashing Alarm present OFF Primary power (DC) absent
COM1	Flashing Data TX/RX Activity OFF No data activity	LINK	ON Default state Flashing Data Tx/Rx
COM2	Flashing Data TX/RX Activity OFF No data activity	LINK	ON Associated to AP Flashing Data Tx/Rx OFF Not Associated with AP

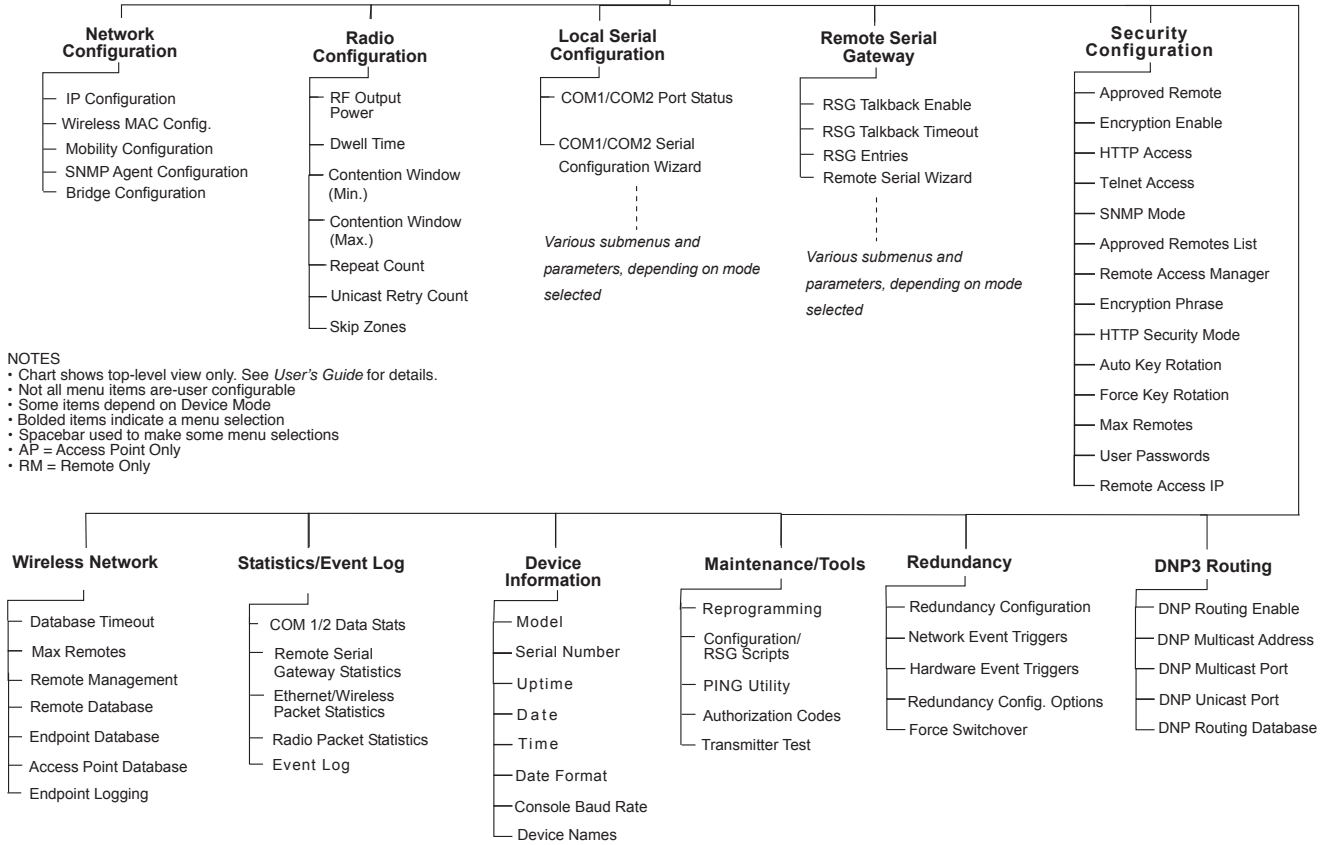
INTERFACE FUNCTIONS AND DEFAULTS



INTERFACE PINOUTS



MAIN MENU



MANAGEMENT SYSTEM Menu Flowchart

INSTALLATION REFERENCE CHART

Detailed instructions are contained in the Reference Manual, P/N 05-4055A01

INSTALLATION SUMMARY

Step 1 — Initial Checkout

Set the equipment up in a tabletop arrangement.

Review the transceiver's Configuration. As a minimum, Access Points must have the following programmed: IP Address, IP Network identifier, and Radio Network Address. (RF output power and Password should also be reviewed and set as necessary.) Remote radios normally require only a Radio Network Address to be set. (Note: The Remote Radio Network Address *must* match that of the AP.)

Connect data equipment to the transceivers.

Verify proper exchange of data communications by viewing the LEDs:

PWR—Lit continuously

LINK—Lit continuously

ETH—Lit continuously (unless Sleep is activated)

COM2—Blinking to indicate exchange of data communications

Step 2 — Endpoint Connectivity (PING) Test—for Ethernet Systems Only

Verify the link integrity between the Access Point and endpoint devices connected to Remotes by issuing a **PING** command from the AP.

Step 3 — Set Configuration of AP and Remote Radios

Step 4 — Install the Equipment in the Field

After basic installation, optimize the performance of the radio network.

KEY AP PARAMETERS & DEFAULTS

Menu Item	Management System Location	Default	Values or Range
IP Address	Main Menu >> Network Configuration >> IP Configuration	192.168.1.1	Contact your Network Administrator. If IP Address Mode (below) is set to Dynamic, IP Address is configured automatically.
IP Address Mode	Main Menu >> Network Configuration > IP Configuration	Static	Static Dynamic
IP Netmask	Main Menu >> Network Configuration > IP Configuration	255.255.0.0	Settable per customer requirements
Net Address	Main Menu >> Network Configuration > Wireless MAC Configuration	9999	1-15 alphanumeric characters*
RF Output Power (non-ETSI)	Main Menu >> Radio Configuration >	900 MHz: 30 dBm 2.4 GHz: 27 dBm	900 MHz: 20–30 dBm 2.4 GHz: 17-27 dBm
RF Output Power (ETSI)	Main Menu >> Radio Configuration >	2.4 GHz: 20 dBm	2.4 GHz: 10-20 dBm
Password Changes	Main Menu >> Security Configuration > User Passwords	Administrator Password: admin (lower case) Guest Password: guest (lower case)	• 1–8 alphanumeric characters • Passwords are case sensitive; can be mixed case

* We recommend setting Net Address to the last four digits of the AP serial number to reduce the chance of conflict with other nearby entraNET systems.

1. At the login prompt, type authcode.
2. At the password prompt, type authcode.
3. At the authorization prompt, enter the authorization code.

```
(none) login: authcode
Password:
MDS EntraNET Access Point

No directory, logging in with HOME=/
MDS EntraNET
Device Name: AP EntraNET 900
Serial Number: 1437374

Enter Authorization Code>
```

Figure 6. Reset Password to Factory Default

NOTE: For enhanced security, consider using a misspelled word. This helps protect against sophisticated hackers who may use a database of common words (as, for example, in a dictionary attack) to determine a password. An even better approach is to use a password that includes some numbers. Making the password as long as possible (up to the full eight characters) also improves its security.

AIMING DIRECTIONAL ANTENNAS FOR MAXIMUM RSSI

The wireless network integrity depends, in a large part, on stable radio signal levels being received at each end of a data link. In general, signal levels stronger than -90 dBm provides the basis for reliable communication that includes a 15 dB fade margin. As the distance between the AP and Remotes increases, the influence of terrain, foliage, and man-made obstructions become more influential, and the use of directional antennas at remote locations becomes necessary. Directional antennas usually require some fine-tuning of their bearing to optimize the received signal strength. The transceiver has a built-in received signal strength indicator (RSSI) that can be used to tell you when the antenna is in a position that provides the optimum received signal.

RSSI measurements and Wireless Packet Statistics are based on multiple samples over a period of several seconds. The average of these measurements is displayed by the entraNET MS.

The measurement and antenna alignment process usually takes 10 or more minutes at each transceiver.

The path to the *Management System Menu* item is shown in bold text below each step of the procedure.

Procedure

1. Verify that the Remote is associated with an AP radio. Observe the condition of the LINK LED.

LINK LED = on or blinking

This indicates that you have an adequate signal level for the measurements, and it is safe to proceed.

2. View and record the **Radio Retries** and **No Ack** counts on the *Radio Packet Statistics Screen* (Figure 8 on Page 24). This information will be used later.
3. Clear the **Radio Statistics** history.
4. Read the RSSI level at the Remote (**RADIO RSSI=**).
5. Optimize the RSSI by slowly adjusting the direction of the antenna and watching for a peak in received signal strength. Get the RSSI indication several times after making each adjustment, so that the RSSI accurately reflects any change in the link signal strength. The higher the indication (less negative), the stronger the signal level (that is, -60 is better than -70).
6. View the **Radio Retries** and **No Ack** counts at the point of maximum RSSI level. They should be the same or lower than the previous reading.

(Main Menu > Performance Information > Packet Statistics > Wireless Packet Statistics)

If the RSSI peak results in an increase in the **Radio Retries** and **No Ack** counts, the antenna may be aimed at an undesired signal source. Try a different antenna orientation.

TROUBLESHOOTING

Successful troubleshooting of a wireless system is not difficult, but requires a logical approach. It is best to begin troubleshooting at the AP radio, as the rest of the system depends on the AP for synchronization data. If the AP has problems, the operation of the entire wireless network is affected.

When communication problems are found, it is good practice to begin by checking the simple things. Applying basic troubleshooting techniques in a logical progression can identify many problems.

Multiple Communication Layers

It is important to remember the operation of the network is built upon a radio communications link. On top of that are two data levels—wireless MAC, and the data layer. The wireless aspect of the AP and the Remotes radios to be connected must operate properly so data-layer traffic can function.

Radio Configuration

There are over 50 parameters in the entraNET MS. With so many settings, a parameter may be incorrectly set, and then what was changed is forgotten.

To help you avoid these problems, we recommend creating an archive of the transceiver profile when your installation is complete in a Configuration File. This file can be reloaded into the transceiver to restore the radio to the factory defaults or to known working settings. For details on creating and archiving Configuration Files, refer to the *MDS entraNET System Guide (05-4055A01)*.

Technical Assistance

If problems cannot be resolved using the guidance provided here, review the GE MDS Web site's technical support area for recent software or firmware updates, general troubleshooting help, and service information. Additional help is available through the GE MDS Technical Support Department (refer to [TECHNICAL ASSISTANCE on Page 28](#)).

Interpreting the Front Panel LEDs

An important set of troubleshooting tools are the LED status indicators on the front panel of the transceiver. They should be checked whenever a problem is suspected. [Table 3 on Page 13](#) describes the function of each status LED. [Table 4 on Page 18](#) below provides suggestions for resolving common system difficulties using the LEDs. [Table 6 on Page 20](#) provides other simple troubleshooting techniques.

Table 4. Troubleshooting With LEDs

Symptom	Possible Cause and Resolution
PWR LED does not turn on.	<ul style="list-style-type: none"> a. The voltage is too low, or is the wrong polarity. Check for the proper supply voltage at the power connector (6–30 Vdc). See Figure 4 on Page 8 for polarity details. b. This is a transient condition. Cycle the power and wait about 30 seconds for the radio to restart. Recheck for normal operation.
LINK LED does not turn on.	<ul style="list-style-type: none"> a. The Remote network address does not match the desired AP. Verify that the system has a unique network address. b. The Remote is not yet associated with a transceiver having the same network address. Use the RADIO command to check the status of the process of associating the radio with the AP. c. Poor antenna system. Check the antenna, feedline, and connectors. Reflected power should be less than 10% of the forward power reading (SWR 2:1 or lower). Also, check for the proper heading of the directional antennas as described in AIMING DIRECTIONAL ANTENNAS FOR MAXIMUM RSSI on Page 15.
PWR LED is blinking.	<p>The radio is reporting an alarm condition. View the current alarms and the Event Log. Correct the problem, if possible.</p> <p>Blinking continues until the source of the alarm is corrected (for example, a valid IP address is entered, etc.).</p>

Table 4. Troubleshooting With LEDs (*Continued*)

Symptom	Possible Cause and Resolution
LAN/ETH LED does not turn on.	<ol style="list-style-type: none"> Verify that the Ethernet cable is connected at both ends. Verify that the proper type of Ethernet cable (straight-through or crossover) is used. See Table 5 below for the proper cable type.
COM1 or COM2 LED does not show traffic.	Check the configuration of COM port and the remote serial gateway settings.

[Table 5](#) below shows the proper type of Ethernet cable to use with the radio when connecting to external devices.

Table 5. Proper Ethernet Cable Type

Radio Type	Connected Device	Cable Type Required
AP	Hub or network switch	Straight-through
AP	PC	Crossover
Remote	PC	Straight-through
Remote	Hub or network switch	Select for the external device port

Troubleshooting Using the Embedded Management System

If following the suggestions in [Table 4 on Page 18](#) does not resolve the problem, there are some additional tools and techniques that can be used. The Embedded Management System is a good source of information that may be used remotely to provide preliminary diagnostic information, or may even provide a path to correcting the problem.

Table 6. Troubleshooting with the Embedded Management System

Symptom	Possible Cause and Resolution
Remote does not associate	<ol style="list-style-type: none">Verify that the AP has a sufficiently large number in the “Max Remotes” parameter of the <i>Network Configuration Menu</i>.If “Approved Remotes” is enabled on the <i>Security Configuration Menu</i> (at the AP), verify that the correct serial number is listed in the Approved Remotes List.On the Remote, if “Restrict” is turned on in the APLIST command, verify that the AP is included in the list of Approved APs.Check for the proper heading of directional antennas as described in AIMING DIRECTIONAL ANTENNAS FOR MAXIMUM RSSI on Page 15.The encryption mode is not set correctly in all radios of the network.If this occurs after upgrading firmware, disable encryption, then re-enter the encryption phrase

Table 6. Troubleshooting with the Embedded Management System (*Continued*)

Symptom	Possible Cause and Resolution
Cannot access the <i>entraNET AP Menu</i> (through COM1)	<ul style="list-style-type: none"> a. Check for secure cable connections. The serial data cable should be as short as possible, never exceeding 50 ft./15m. b. If the radio is an AP, connect using a Telnet session or a Web browser. c. Disable the serial mode for COM1 (Serial Gateway Configuration>COM1 Serial Data Port>Status>Disabled) <p>Or, if you know the radio data configuration, follow the numbered steps below:</p> <ul style="list-style-type: none"> 1. Connect to COM1 via a terminal set to VT100 and the port data baud rate. 2. Enter + + + <input type="button" value="ENTER"/> 3. Change the terminal baud rate to match the transceiver console baud rate. 4. Enter + + + <input type="button" value="ENTER"/>
Cannot access the Remote command interface	<ul style="list-style-type: none"> a. Check for secure cable connections. Serial data cable should be as short as possible, never exceeding 50 feet (15 meters). b. Connect to the AP menu and manage the Remote via the Serial Configuration menu. Check the configuration for COM1 or COM2, as applicable.
Display on terminal or Telnet screen is garbled	<ul style="list-style-type: none"> a. Verify that the terminal or terminal emulator or Telnet application is set to VT100. Restart the terminal program.
Cannot pass IP data to the WAN.	<ul style="list-style-type: none"> a. Verify the AP IP settings. b. Use the PING command to test communication with the AP and endpoints connected to Remote radios in the local radio system. c. If successful with the local PING, attempt to PING an IP radio attached to a radio. d. If successful with the LAN PINGs, try connecting to a known radio in the WAN.

Table 6. Troubleshooting with the Embedded Management System (*Continued*)

Symptom	Possible Cause and Resolution
Wireless retry count is too high	<p>There may be Radio Frequency Interference (RFI).</p> <ol style="list-style-type: none">If omnidirectional antennas are used, consider changing to directional antennas. This often limits interference to and from other stations.Try skipping some zones where persistent interference is suspected, or packets per zone are disparate.The installation of a filter in the antenna feedline may be necessary. Consult MDS for further assistance.
Password forgotten.	<ol style="list-style-type: none">Connect to the transceiver using a terminal through the COM1 port.Call MDS. Get a password-resetting Authorization Key.Enter the Authorization Key at the login prompt as a password.

The following is a summary of how several screens in the entraNET MS can be used as diagnostic tools. For information on how to connect to the entraNET MS, see “[Step 4—Configure the AP](#)” on Page 8.

Ethernet Packet Statistics Menu

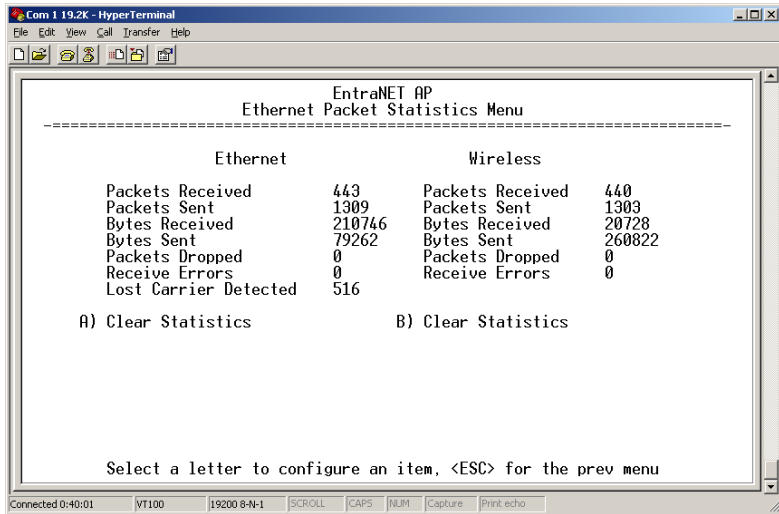


Figure 7. Sample Packet Statistics Screen

This screen provides detailed information on data exchanges between the radio being viewed and the network through the network layer. These include:

Wireless Packet Statistics

- Packets received
- Packets sent
- Bytes received
- Bytes sent
- Packets dropped
- Receive errors
- Retries
- Retry errors

Ethernet Packet Statistics

- Packets received
- Packets sent
- Bytes received
- Bytes sent
- Packets dropped
- Receive errors
- Retries
- Retry errors
- Lost carrier detected

The most significant fields are **Retries**, **Retry Errors**, **Receive Errors**, and **Lost Carrier Detected**. If the data values are more than 10% of their sent and received counterparts, or the **Lost Carrier Detected** value is greater than a few dozen, there may be trouble with interference, or a loss of the Ethernet signal. Note that this does not refer to the over-the-air (RF) carrier, but only to the Ethernet carrier.

When troubleshooting throughput quality issues, a check should also be made of the *Radio Packet Statistics Screen* shown in [Figure 8](#). This menu provides a review of packet statistics from a radio link (RF) perspective.

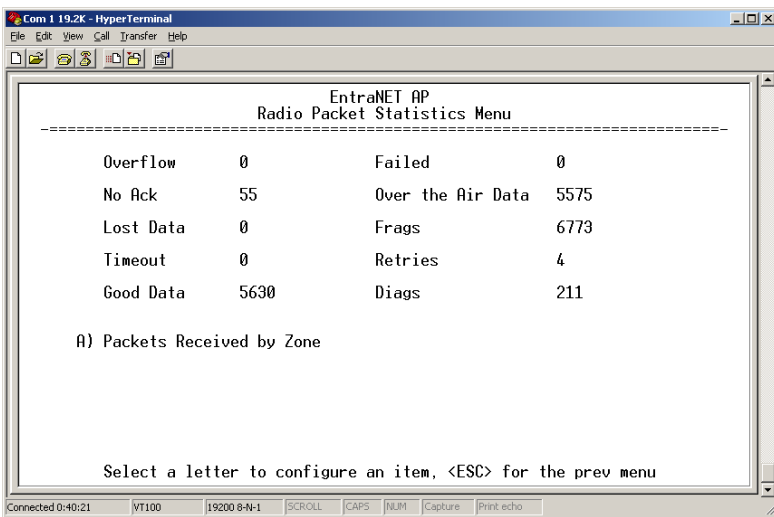


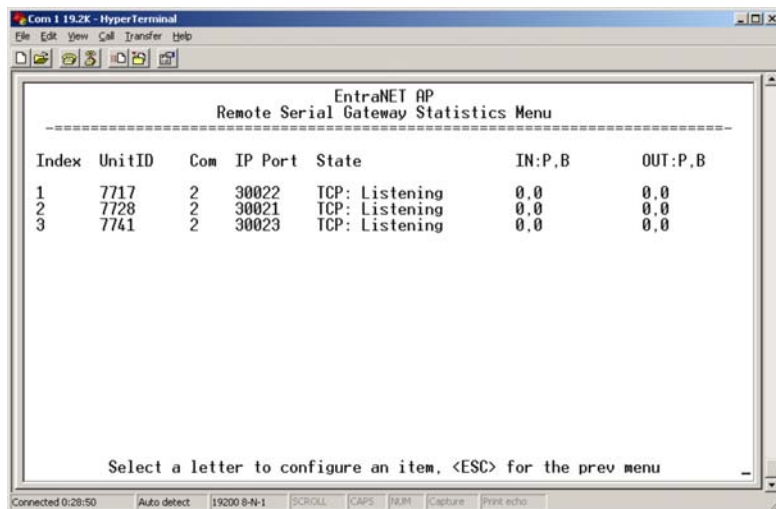
Figure 8. Radio Packet Statistics Screen

It is also helpful to check the RSSI of incoming signals. If the RSSI levels in each zone are within a few decibels (dB) of each other, but less than -90 dBm, then check the aiming of the antenna system. See [“AIMING DIRECTIONAL ANTENNAS FOR MAXIMUM RSSI”](#) on [Page 15](#) for details.

NOTE: The average signal level should be -95 dBm or stronger for reliable performance with an allowance for fade margin.

Another place to look for trouble is in **Packets Received by Zone**. The packets should be evenly distributed across all zones (1-5% variation). If they are not, interference in the disparate zones should be suspected. Blocking these zones may eliminate or reduce harmful interference.

Serial Port and Remote Serial Statistics Menu



Index	UnitID	Com	IP Port	State	IN:P,B	OUT:P,B
1	7717	2	30022	TCP: Listening	0,0	0,0
2	7728	2	30021	TCP: Listening	0,0	0,0
3	7741	2	30023	TCP: Listening	0,0	0,0

Select a letter to configure an item, <ESC> for the prev menu

Figure 9. Serial Data Statistics Screen

This screen provides top-level information on data exchanges between the radio serial ports and the network through the wireless and the Ethernet (data) layers. These include:

- Bytes In On Port xxx
- Bytes In On Socket xxx
- Bytes Out On Port xxx
- Bytes Out On Socket xxx

You can use this information as an indicator of port activity at the data and IP levels.



TECHNICAL ASSISTANCE

Technical assistance for GE MDS products is available from our Technical Support Department during business hours (8:00 A.M.—5:30 P.M. Eastern Time). When calling, please give the complete model number of the radio, along with a description of the trouble symptom(s) you are experiencing. In many cases, problems can be resolved over the telephone, without the need for returning the unit to the factory. Please use one of the following means for product assistance:

Phone: 585 241-5510 E-Mail: TechSupport@GEmds.com
FAX: 585 242-8369 Web: www.GEmds.com

FACTORY SERVICE

If return of the equipment is necessary, you must obtain a Service Request Order (SRO) number. This number helps expedite the repair so that the equipment can be repaired and returned to you as quickly as possible. Please be sure to include the SRO number on the outside of the shipping box, and on any correspondence relating to the repair. No equipment will be accepted for repair without an SRO number.

SRO numbers are issued online at www.GEmds.com/support/product/sro/. Your number will be issued immediately after the required information is entered. Please be sure to have the model number(s), serial number(s), detailed reason for return, ship to address, bill to address, and contact name, phone number, and fax number available when requesting an SRO number. A purchase order number or pre-payment will be required for any units that are out of warranty, or for product conversion.

If you prefer, you may contact our Product Services department to obtain an SRO number:

Phone Number: 585-241-5540 Fax Number: 585-242-8400
E-mail Address: productservices@GEmds.com

The radio must be properly packed for return to the factory. The original shipping container and packaging materials should be used whenever possible. All factory returns should be addressed to:

GE MDS, LLC
Product Services Department
(SRO No. XXXX)
175 Science Parkway
Rochester, NY 14620 USA

When repairs have been completed, the equipment will be returned to you by the same shipping method used to send it to the factory. Please specify if you wish to make different shipping arrangements. To inquire about an in-process repair, you may contact our Product Services Group using the Phone, Fax, or E-mail information given above.



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