GE MDS RCL220 Manual
P/N 05-XXXXA01
Version 3

Table of Contents

1   Important Information

1.1 Antenna Installation Warnings

1. All antenna installation and servicing is to be performed by qualified technical personnel only. When servicing the antenna, or working at distances closer than those listed below, ensure the transmitter has been disabled.
2. Depending upon the application and the gain of the antenna, the total composite power could exceed 15 watts EIRP average vs. time. For fixed/mobile configuration, the distances in the table below must be followed.

Antenna Gain vs. Minimum Safety Distance
(Based upon a 4.26% Duty Cycle, 0 dB Feedline Loss)
Uncontrolled Environment Exposure limits

	Fixed/Mobile Antenna Gain		
	0-6 dBi	6-10 dBi	10-16.5 dBi
Minimum RF Safety Distance	0.4 meters	0.7 meters	1.6 meters

1.2 ESD Notice

To prevent malfunction or damage to this product, which may be caused by Electrostatic Discharge (ESD), the radio should be properly grounded at the time of installation. In addition, the installer or maintainer should follow proper ESD precautions, such as touching a bare metal object to dissipate body charge, prior to touching components or connecting/disconnecting cables.

1.3 FCC Approval Notice

This device is offered as a licensed transmitter per FCC Parts 80, 90 and 95. It is approved for use under the following conditions: Changes or modifications not expressly approved by the party responsible for compliance will void the user's authority to operate the equipment.

Installation, operation and maintenance of the transceiver should be in accordance with the transceiver's installation manual and applicable local, regional, and national electric codes. Tampering or replacement with non-factory components may adversely affect the safe use of the transceiver and may void the approvals.

1.4 FCC Part 15 Notice

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.

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

2 Introduction

This document provides details of the entraNET 220 System. The entraNET 220 System supports Repeaters, OCUs, and LCUs. Repeaters employ an Access Point and three Packaged Radio Modules. Each OCU employs an OEM Radio Module while each LCU employs one Access Point and one Packaged Radio Module.

MDS Radio Unit	Used for OCU	Used for LCU	Used for Repeater
entraNET 220 OEM Radio Module	1	0	0
entraNET 220 Packaged Radio Module	0	1	3
Access Point	0	1	1

Note that additional information vital to Phase V operation is given in SHL-028, The MDS entraNET 220 Phase V Primer.

Block diagrams for each unit are shown in the following figures.
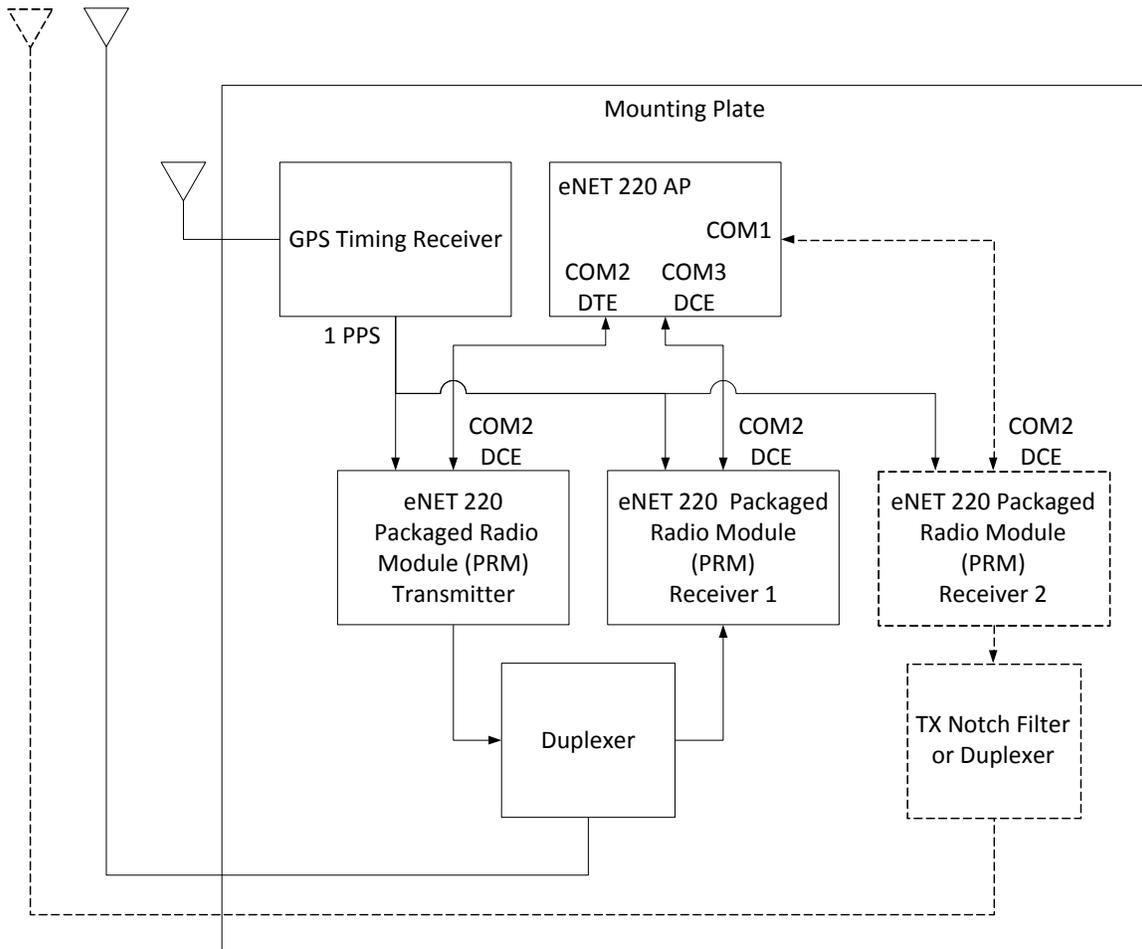
Figure 1 entraNET 220 Repeater Block Diagram
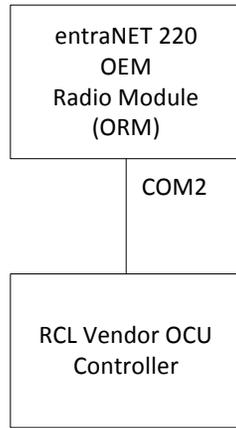
Figure 2 entraNET 220 OCU Unit Block Diagram
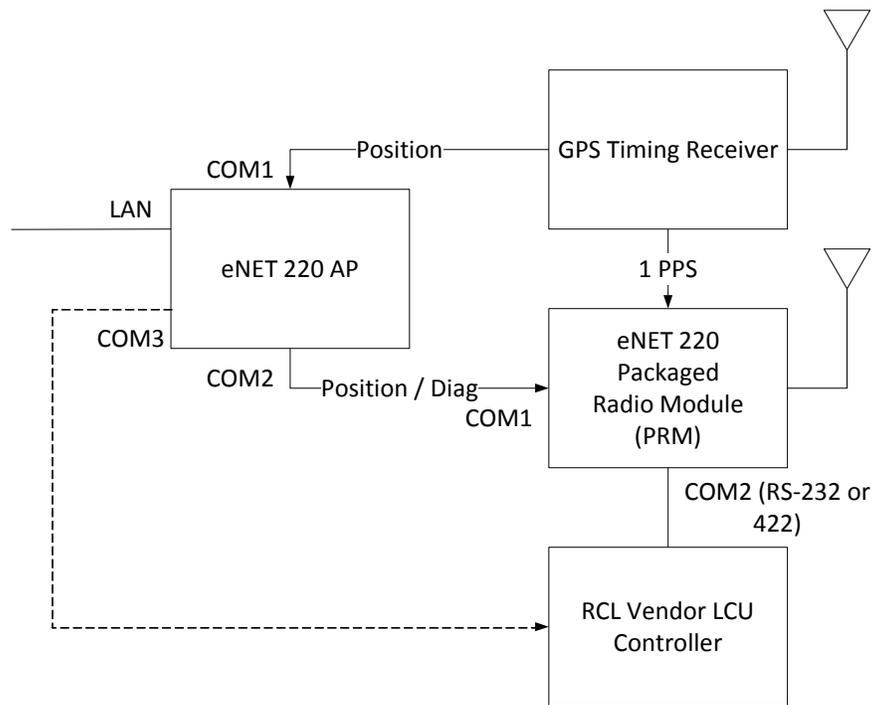
Figure 3 entraNET 220 LCU Unit Block Diagram

2.1 Access Point

This unit is used in the repeater and must also fit within the enclosure used at the LCU. Photos and mechanical dimensions of this unit appear below.

Figure 4 Access Point
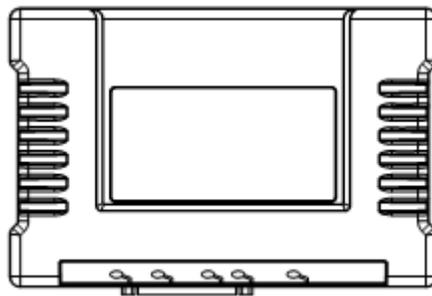
Figure 5 Access Point (Top View)
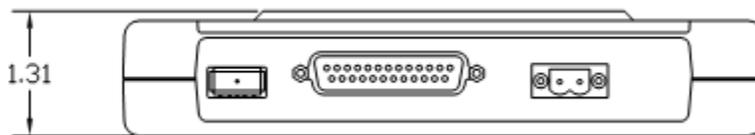
Figure 6 Access Point (Front View)
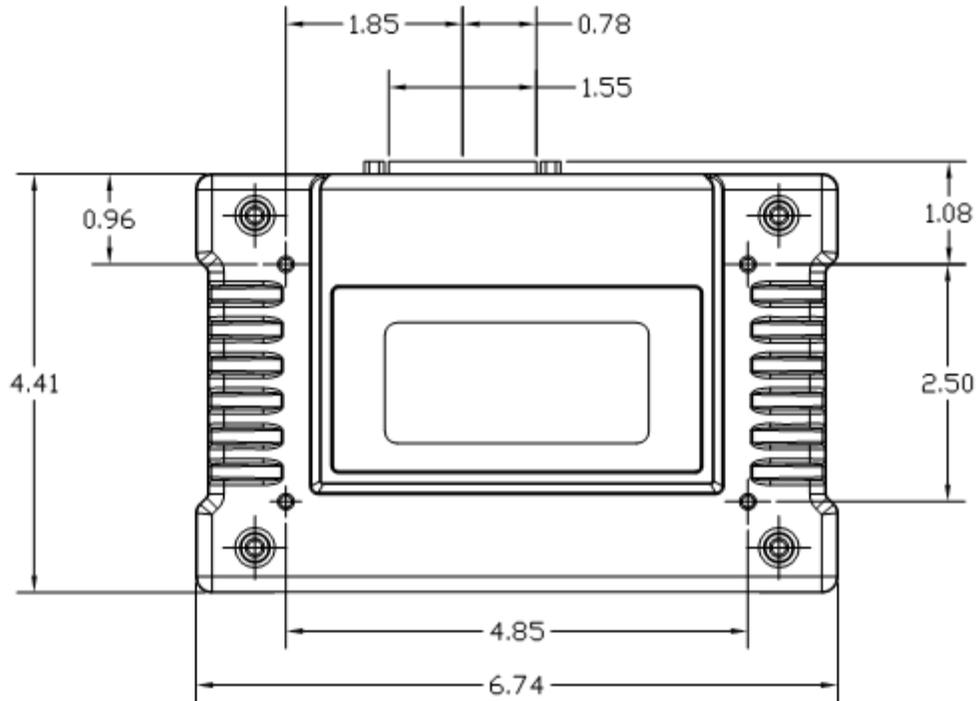
Figure 7 Access Point (Bottom View)
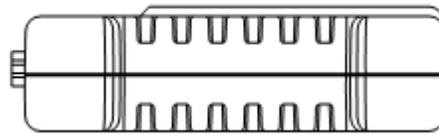
Figure 8 Access Point (Side View)
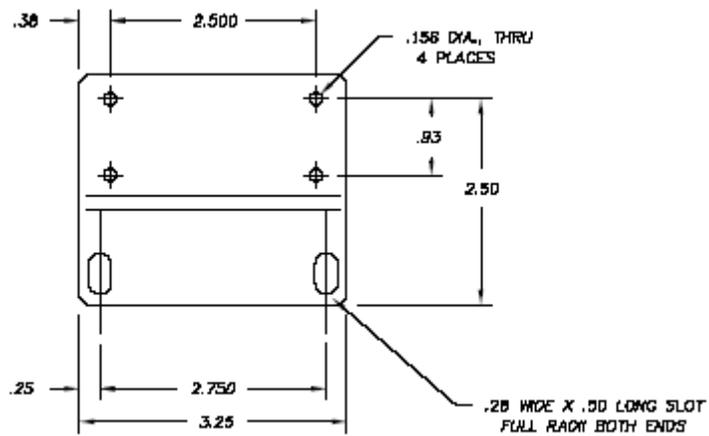
Figure 9 Mounting Bracket (Can be used with Access Point or Packaged Radio Module)

2.1.1 USB Port Connector Pinout

The Access Point provides a USB Port conforming to version 1.1 of the USB standard. The pinout for this connector is given in the table below.

Pin	Signal Name	Description
1	PC_USB_+5V	+5 VDC
2	USBD-	USB Data Minus
3	USBD+	USB Data Plus
4	GROUND	Ground

2.1.2 DB-25 Connector Pinout

The table below provides the pinout information for the final AP version employing a DB-25 connector. Please see "TD_RCL_Adapter_Board_Instruction_Sheet2.pdf" for information on our 03-4758A03 breakout kit for the Access Point and Packaged Radio Module.

DB-25 Pin	Signal	Direction WRT MDS Equipment
1	COM3_DCD	Input
2	COM2_TXD	Input
3	COM2_RXD	Output
4	COM2_RTS	Input
5	COM2_CTS	Output
6	COM3_TXD	Output
7	GND	Input/Output
8	COM2_DCD	Output
9	COM3_CTS	Input
10	COM3_RTS	Output
11	COM3_DTR	Output
12	COM3_RXD	Input
13	GND	Input/Output
14	ETH_TX_H	Output
15	ETH_TX_L	Output
16	ETH_RX_H	Input
17	ETH_RX_L	Input
18	EXT_KEY	Output
19	EXT_DET	Input
20	COM2_DTR	Input
21	ALARM_OUT	Output
22	GPS_PPS_L	Input
23	GPS_PPS_H	Input
24	COM1_RXD	Input
25	COM1_TXD	Output

The DB-25 connector is female, and the orientation of the connector as looking into the front panel of the unit is as shown below.

13	12	11	10	9	8	7	6	5	4	3	2	1
	25	24	23	22	21	20	19	18	17	16	15	14

2.1.3 Power Connector Pinout

The Access Point provides a Phoenix 17 76 69 2 connector for DC power in. A surge protection device such as a Polyphaser IS-17VDC-30A-NG capable of limiting the voltage input to the radio to less than 30 Volts should be employed.

Pin	Signal Name	Direction with respect to MDS Equipment	Description
1 (L)	PWR	Input	10 to 30 VDC input, 125 mA at 13.8 VDC
2 I	GROUND	Input	Power return.

2.2 entraNET 220 OEM Radio Module

This unit is used in each OCU. It is a two-board solution (as shown below) that mates with RCL vendor OCU hardware. Mechanical diagrams are provided below as well. The interfaces used by OEM Radio Modules are listed in the tables below.

Figure 10 entraNET 220 OEM Radio Module (SMB Connector Not Shown)
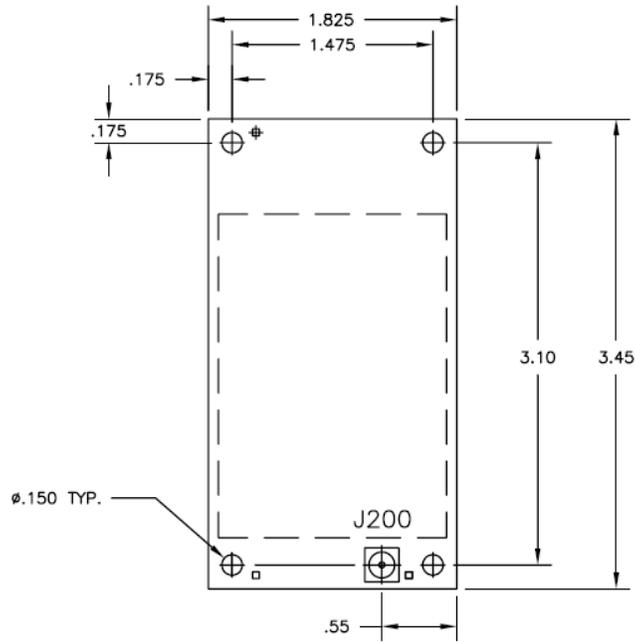
Figure 11 entraNET 220 OEM Radio Module (Top/Shield View)
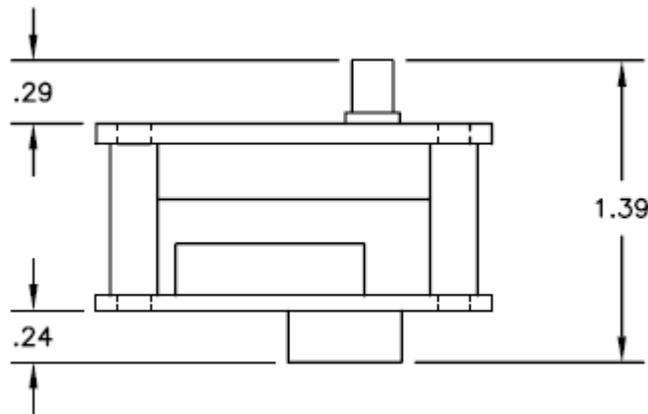
Figure 12 entraNET 220 OEM Radio Module (End View)
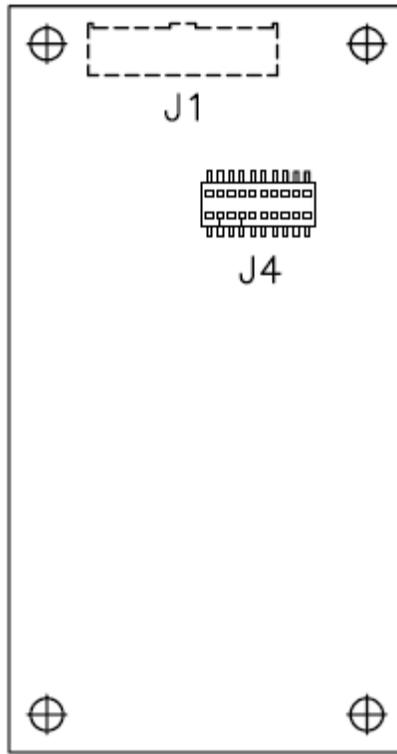
Figure 13 entraNET 220 OEM Radio Module (Bottom View)
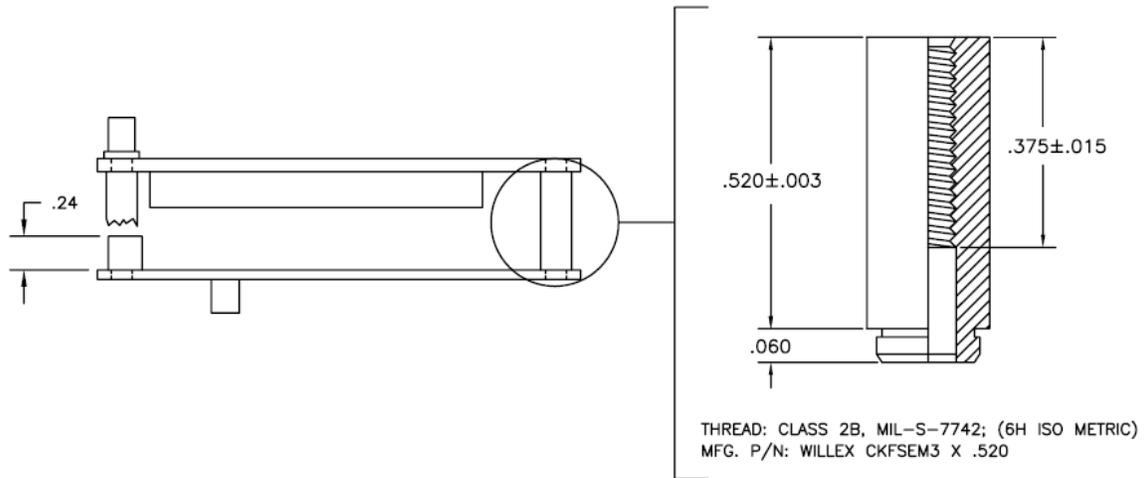
Figure 14 entraNET 220 OEM Radio Module (Side View with PEM detail)

2.2.1 J1 (Ribbon Cable) Connector Pinout

The J1 Connector is a Samtec STMM-108-02-T-D-SM-K-TR. The mating connector is a Samtec TCSD-08-D-xx.xx-01-F-N. J1 is the main interface to the OEM Radio Module.

Pin	Function	Direction WRT MDS Equipment	Notes
1	Not Connected		
2	VIN	Input	6 – 12 VDC, 1 A Max.
3	TXD	Input	Serial Data Input, 0 to 5 V.
4	IO1	Output	Slot Timing Signal. 0 to 3.3 V.
5	RXD	Output	Serial Data Output, 0 to 3.3 V.
6	IO2	Output	Reserved. 0 to 3.3 V.
7	Do Not Connect		
8	IO3	Input	ALARM_IN. 0 to 5 V.
9	Do Not Connect		
10	Not Connected		
11	Do Not Connect	Output	Reserved, -6 to +6 V.
12	Not Connected		
13	Do Not Connect	Input	Reserved, -12 to +12 V.
14	Not Connected		
15	GROUND	Input	Return for VIN and signals.
16	Not Connected		

2.2.2 J4 (Board Mount) Connector Pinout

The J4 Connector is a SAMTEC RSM-110-02-L-D-TR. J4 is not typically populated on the OEM Radio Module.

Pin	Function	Direction WRT MDS Equipment	Notes
1	Not Connected		
2	Not Connected		
3	Not Connected		
4	Not Connected		
5	IO3	Input	ALARM_IN. Active Low. 0 to 5 V.
6	Not Connected		
7	Not Connected		
8	Not Connected		
9	GROUND	Input	Return for VIN and signals.
10	TXD	Input	Serial Data Input. 0 to 5 V.
11	GROUND	Input	Return for VIN and signals.
12	IO2	Output	Reserved. 0 to 3.3 V.
13	IO1	Output	Slot Timing Signal. 0 to 3.3 V.
14	Not Connected		
15	Not Connected		
16	RXD	Output	Serial Data Output, 0 to 3.3 V.
17	VIN	Input	6 – 12 VDC, 1 A Max.
18	Not Connected		
19	VIN	Input	6 – 12 VDC, 1 A Max.
20	Not Connected		

2.2.3 RF Connector

The RF Connector is a straight mount 50 Ohm SMB jack.

2.3 entraNET 220 Packaged Radio Module

In the LCU, one entraNET 220 Packaged Radio Module is used. In the Repeater, three are used. Each instance employs identical hardware so that only one configuration must be spared. The packaged module is provided in a cast aluminum housing as shown. Mounting for this unit is shown below. Mechanical dimensions are also given. The interfaces used by Packaged Radio Modules are listed in the tables below.

Figure 15 entraNET 220 Packaged Radio Module
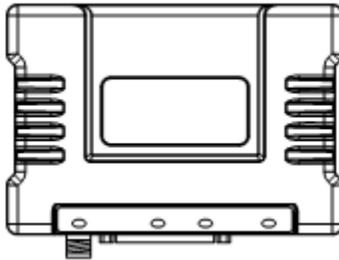
Figure 16 entraNET 220 Packaged Radio Module (Top View)
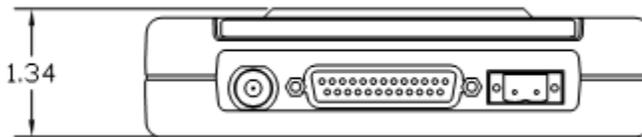
Figure 17 entraNET 220 Packaged Radio Module (Front View)
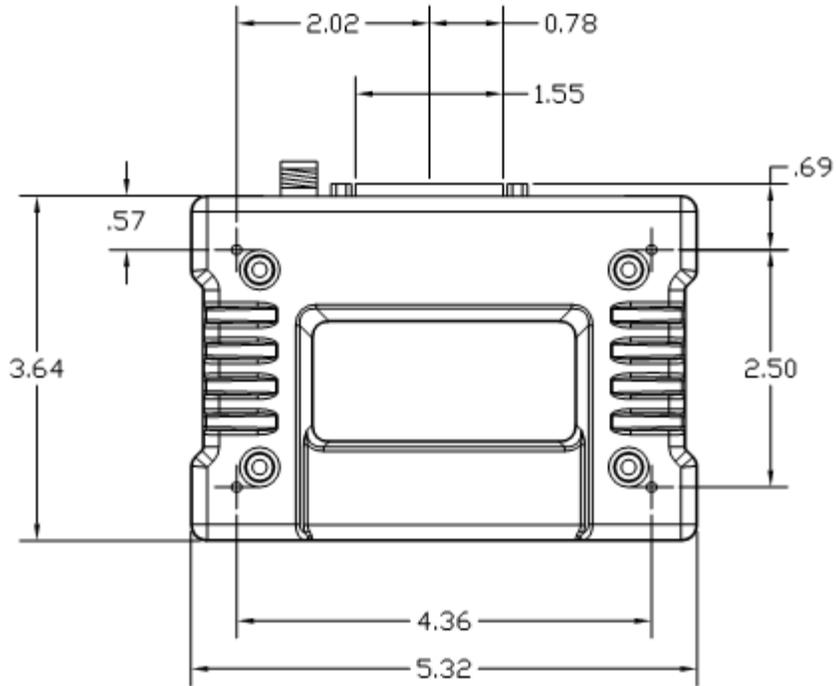
Figure 18 entraNET 220 Packaged Radio Module (Bottom View)
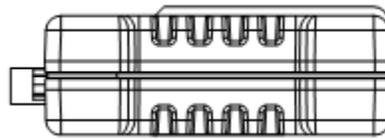
Figure 19 entraNET 220 Packaged Radio Module (Side View)

2.3.1 DB-25 Connector Pinout

The following table describes the pinout for the DB-25 version of the PRM. Please see "TD_RCL_Adapter_Board_Instruction_Sheet2.pdf" for information on our 03-4758A03 breakout kit for the Access Point and Packaged Radio Module.

New DB-25 Pin	Signal	Previous PRM Connector	Previous PRM Pin	Direction WRT MDS Equipment
1	COM3_DCD	N/A	N/A	Input
2	COM2_TXD/TXD+	J3 (COM2)	6	Input
3	COM2_RXD/RXD+	J3 (COM2)	5	Output
4	COM2_RTS/TXD-	J3 (COM2)	8	Input
5	COM2_CTS	J3 (COM2)	7	Output
6	COM3_TXD	N/A	N/A	Output
7	GND	J3 (COM2)	4	Input/Output
8	COM2_DCD/RXD-	J3 (COM2)	2	Output

New DB-25 Pin	Signal	Previous PRM Connector	Previous PRM Pin	Direction WRT MDS Equipment
9	COM3_CTS	N/A	N/A	Input
10	COM3_RTS	N/A	N/A	Output
11	COM3_DTR	N/A	N/A	Output
12	COM3_RXD	N/A	N/A	Input
13	GND	N/A	N/A	Input/Output
14	ETH_TX_H	N/A	N/A	Output
15	ETH_TX_L	N/A	N/A	Output
16	ETH_RX_H	N/A	N/A	Input
17	ETH_RX_L	N/A	N/A	Input
18	EXT_KEY	I/O	1	Output
19	EXT_DET	I/O	2	Input
20	COM2_DTR	J3 (COM2)	3	Input
21	ALARM_OUT	I/O	3	Output
22	GPS_PPS_L	I/O	5	Input
23	GPS_PPS_H	I/O	6	Input
24	TXD*	J5 (COM1)	5	Input
25	RXD**	J5 (COM1)	4	Output

* TXD is called COM1_RXD on the AP. It truly is an input to the MDS unit.
** RXD is called COM1_TXD on the AP. It truly is an output from the MDS unit.

The DB-25 connector is female, and the orientation of the connector as looking into the front panel of the unit is as shown below.

13	12	11	10	9	8	7	6	5	4	3	2	1
	25	24	23	22	21	20	19	18	17	16	15	14
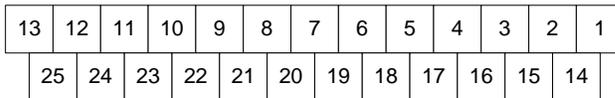
2.3.2 RF Connector

The RF connector is TNC. Lightning suppression such as a Polyphaser IS-B50 series protector should be employed between the antenna and the radio. The body of the protector should be well grounded to earth ground. In addition, the shield of the feedline should be connected to earth ground before entry into any inside enclosure.

2.3.3 Power Connector Pinout

The Packaged Radio Module provides a Phoenix 17 76 69 2 connector for DC power in. A surge protection device such as a Polyphaser IS-17VDC-30A-NG capable of limiting the voltage input to the radio to less than 30 Volts should be employed as near to the radio as possible.

Pin	Signal Name	Direction with respect to MDS Equipment	Description
1 (L)	PWR	Input	6 to 30 VDC input, 800 mA at 13.8 VDC
2 I	GROUND	Input	Power return.

3   Packaged or OEM Radio Command Line

For accessing the COM2 console of the Packaged Radio Module or the OEM Radio Module, use a serial terminal emulator program such as HyperTerminal, Putty, or ucon. The default settings are: baud rate 19200, no parity, 8 data bits, and 1 stop bit. The pins for this port are listed in section 2.3.1.

3.1 Common Setup Tasks

3.1.1 Key the Transmitter for Test Purposes

1. Log in to the radio on its COM2 console.
2. Put the radio into calibration mode by entering RADIO MODE=CAL.
3. Select the frequency for the test transmission, and enter with RADIO AUXTX=<frequency>.
4. Enter RADIO TXKEY=ON.
5. When finished, enter RADIO TXKEY=OFF.


```
COM15 - PuTTY

MODE=Calibration no TDMA Mode
COORDMODE=Distributed Coordination Mode
TXKEY=RF Transmitter Key OFF
BFREQ1=  221.966250 MHz
MFREQ1=  220.966250 MHz
BFREQ2=  221.993750 MHz
MFREQ2=  220.993750 MHz
BFREQ3=    0.000000 MHz
MFREQ3=    0.000000 MHz
BFREQ4=    0.000000 MHz
MFREQ4=    0.000000 MHz
AUXTX=  223.600000 MHz
AUXRX=  223.600000 MHz
TIMESLOT=0
RSSI=-120
YARDRSSI=-120
TXSTART=0
SYNCTIMEOUT=30
GROUPTIMEOUT=30


entraNET> radio txkey=on
TXKEY=RF Transmitter Key ON

entraNET>
```

The test transmission is modulated (not CW) and is a repetitive data pattern over the air.

3.1.2 Upgrade firmware on Packaged Radio Module or OEM Radio Module (outside OCU)

1. Log in to the radio on its COM2 console.
2. Put the radio into calibration mode by entering RADIO MODE=CAL.
3. Set the radio to stay in calibration mode on reboot RADIO TXSTART=0.
4. Set the radio to default to console mode COM2 DEFAULT=CONSOLE.
5. Close the terminal program.
6. Start the Remote Upgrade Utility, version 4.2.0 or later.
7. The PRM and ORM have different firmware versions (as do the AP when used in a repeater vs. onboard). Please be aware of the firmware version you are using and make sure it is appropriate for the unit you are working with.

8. In the Remote Upgrade Utility, select the PC COM port you are using to connect to the radio.
9. Set User Name to admin with the correct password (default admin).
10. Click Browse Package to locate the firmware file you will upgrade to.
11. Before clicking Upgrade Firmware, make sure "Reboot to new image after download" is selected and "Change Baud Rate" is NOT selected (leaving baud rate at the current value has proven more reliable).
12. If desired, select "Retrieve/Restore Configuration" to set the utility to query the radio's current configuration and restore it after the upgrade. This is needed when jumping several revisions of the firmware since some parameter locations could have changed setting parameters to their defaults upon upgrade.
13. Optionally, you may click "Get Configuration" to download the radio's settings to a text file you specify by clicking the "…" button on the same line.
14. Optionally, you may click "Set Configuration" to upload the radio's settings from a text file similarly.
15. When ready to upgrade the firmware, click "Upgrade Firmware".

The upgrade process goes through several steps, providing feedback in the bottom status bar as it progresses. There are three major steps: Upgrading the application image, upgrading the MCU image, and upgrading the DSP image. The whole process can take 5 to 10 minutes.

MDS Remote Firmware Upgrade Utility

File   Options   Help

Com Port COM15 ▼   User Name admin   Password *****

BrowsePackage   C:\Users\220023498\Downloads\sln-oomd-3_9_34.mpk

Cancel

☑ Reboot to new image after download   ☐ Change Baud Rate
☑ Retrieve/Restore Configuration

Get Configuration   C:\Users\220023498\Downloads\lcr_config.txt   ...

Set Configuration   ...

```
VER DSREV2=3.7.4
VER MSREV2=3.5.2
VER IMAGE=1
VER DSPSW=3.7.4  20Oct20
VER MCUSW=3.5.2  8Aug200
VER CONFIG=0
VER EVENT=8
VER LOG=2
VER HREV=0.0.0
VER XHREV=A
```

Getting Active Image...   19200

RCL220_manual_v3-draft.doc

RCL220_manual_v3-draft.doc

MDS Remote Firmware Upgrade Utility

File   Options   Help

Com Port [COM15 ▼]   User Name [admin]   Password [*****]

[BrowsePackage]   C:\Users\220023498\Downloads\sln-oomd-3_9_34.mpk

[Cancel]   ██████████

☑ Reboot to new image after download   ☐ Change Baud Rate
☑ Retrieve/Restore Configuration

[Get Configuration]   C:\Users\220023498\Downloads\lcr_config.txt   [...]

[Set Configuration]   [   ]   [...]

```
VER DSREV2=3.7.4
VER MSREV2=3.5.2
VER IMAGE=1
VER DSPSW=3.7.4   20Oct20
VER MCUSW=3.5.2   8Aug200
VER CONFIG=0
VER EVENT=8
VER LOG=2
VER HREV=0.0.0
VER XHREV=A
```

Downloaded 98304 of 196608 bytes to DSP2 Image (3 of 3 images)   19200

MDS Remote Firmware Upgrade Utility

File   Options   Help

Com Port COM15   ▼   User Name admin   Password *****

BrowsePackage   C:\Users\220023498\Downloads\sln-oomd-3_9_34.mpk

Cancel

☑ Reboot to new image after download   ☐ Change Baud Rate
☑ Retrieve/Restore Configuration

Get Configuration   C:\Users\220023498\Downloads\lcr_config.txt   ...

Set Configuration   ...

```
VER DSREV2=3.7.4
VER MSREV2=3.5.2
VER IMAGE=1
VER DSPSW=3.7.4   20Oct20
VER MCUSW=3.5.2   8Aug200
VER CONFIG=0
VER EVENT=8
VER LOG=2
VER HREV=0.0.0
VER XHREV=A
```

Rebooting to Image 2, please wait...   19200

When restoring the configuration, several parameters will return "Warning: Argument 0 Read Only!". This is expected operation.

If for some reason the upgrade process fails, you can log into the radio to see the status using the "VER" command. If the images you attempted to upgrade (APP, MCU, and DSP) are all filled in and the currently running image is the one you upgraded, the upgrade succeeded. If an image is not filled in, you will need to restart the upgrade process at step 1.

If the utility seems to hang when rebooting to the new firmware, you can attempt logging in via a terminal program to see what state it is in. When you do an upgrade, the Application processor has to perform an internal upgrade of the DSP and MCU. This takes a few minutes when first rebooting to the new firmware during which the command line will be non-responsive.

Sometimes the Remote Upgrade Utility never reports that the radio has booted to the new firmware even though it has, so you can also check this by logging into the radio with your terminal program. In this case, it is probable that the utility did not get to restore your configuration, so you should verify the configuration vs. the file retrieved.

There have been cases reported when the instructions are not followed correctly that the radio does not boot up. In this case, at 115,200 bps when the radio is first powered up you will see "Booting to Application Image N" and nothing more for over 10 minutes. In this situation, the radio must be returned to the factory for recovery.

IMPORTANT: You should verify a few important parameters after the upgrade:

DEVICE MODEL=220 REMOTE
DEVICE SER=<serial number printed on silver label of radio>

If any of these parameters are incorrect, you must correct them. The model and serial number require factory or engineer login.
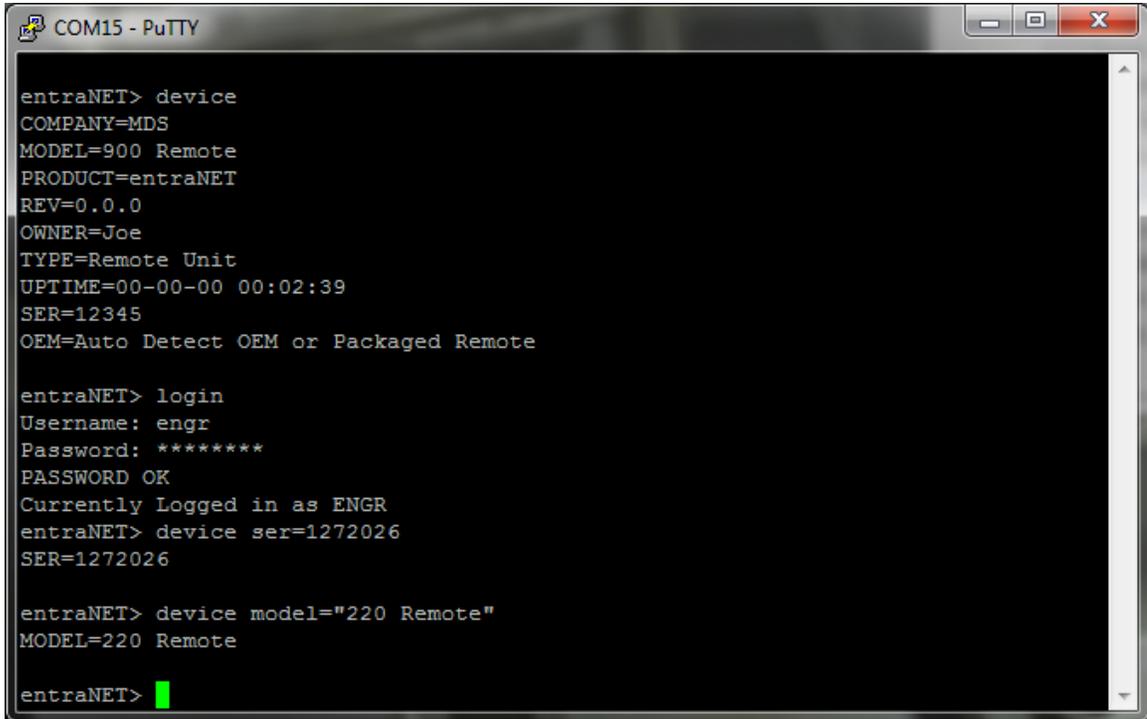

```
COM15 - PuTTY

entraNET> device
COMPANY=MDS
MODEL=900 Remote
PRODUCT=entraNET
REV=0.0.0
OWNER=Joe
TYPE=Remote Unit
UPTIME=00-00-00 00:02:39
SER=12345
OEM=Auto Detect OEM or Packaged Remote

entraNET> login
Username: engr
Password: ********
PASSWORD OK
Currently Logged in as ENGR
entraNET> device ser=1272026
SER=1272026

entraNET> device model="220 Remote"
MODEL=220 Remote

entraNET>
```

Frequencies are typically set by the OCU or LCU proper, but you can set J block frequencies with the ENGFREQ command, e.g. ENGFREQ BFREQ1=221.96625 MFREQ1=220.96625.

You can verify you are running the intended firmware with the VER command:
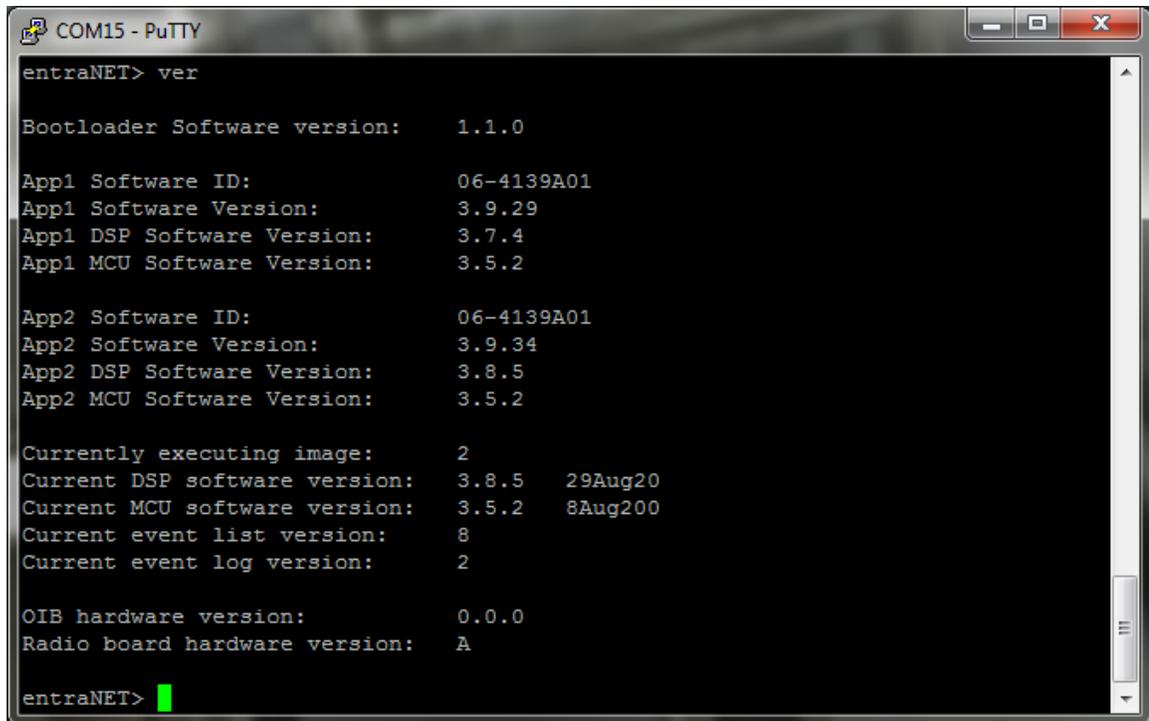
```
COM15 - PuTTY                                                    _ □ X

entraNET> ver

Bootloader Software version:     1.1.0

App1 Software ID:                06-4139A01
App1 Software Version:           3.9.29
App1 DSP Software Version:       3.7.4
App1 MCU Software Version:       3.5.2

App2 Software ID:                06-4139A01
App2 Software Version:           3.9.34
App2 DSP Software Version:       3.8.5
App2 MCU Software Version:       3.5.2

Currently executing image:       2
Current DSP software version:    3.8.5    29Aug20
Current MCU software version:    3.5.2    8Aug200
Current event list version:      8
Current event log version:       2

OIB hardware version:            0.0.0
Radio board hardware version:    A

entraNET>
```

In the example screenshot above, you can see that the radio is "Currently executing" application image 2, which is 3.9.34. The DSP and MCU versions are also reported, and these are typically different than the application image version.

3.1.3 Test Polling

Frequently it is desired to send and receive test messages between radios on the bench. To do this test, you will require two PRMs, power supplies, serial connectivity, RF cables and RF attenuators to join the radios' antenna ports, and the Poller and Responder utilities to simulate the LCU and OCU for sending and receiving messages.

BEWARE: Do not simply cable the two radios together or you may damage one or both of the receivers. Use at least 90 dB of attenuation between radios.

Alternately, you can poll over the air with suitable antennas, however you may not achieve 100% message success rate using this method.

1. Set up the Polling device as the LCR as shown below:
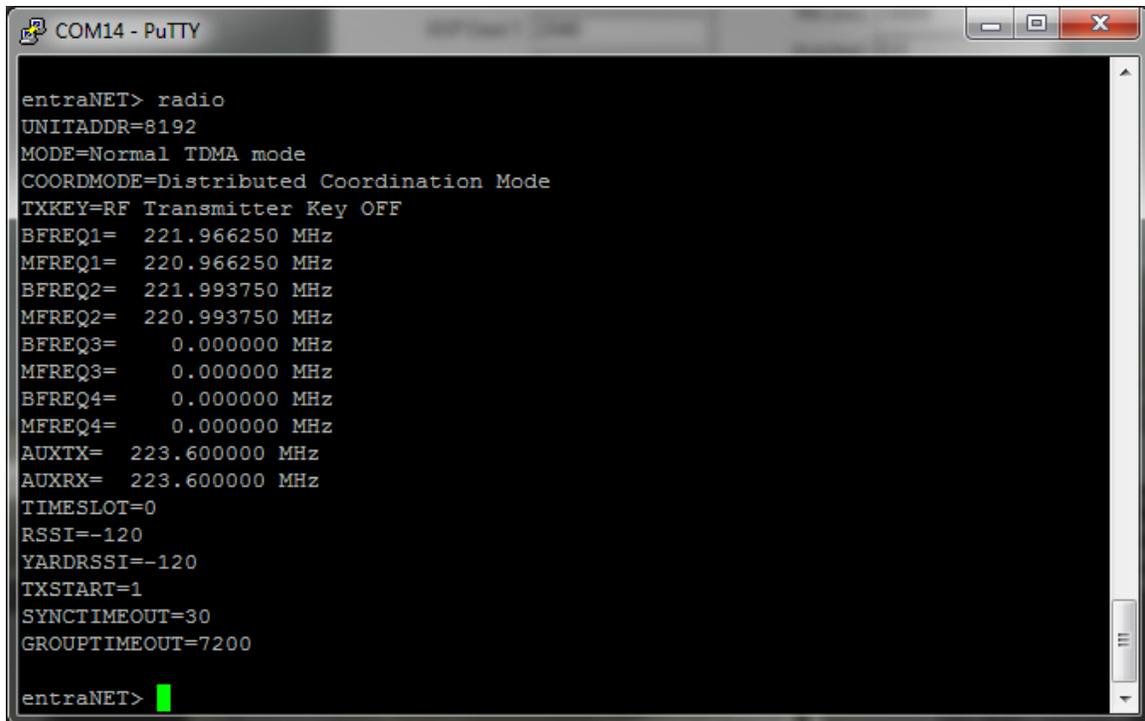
```
COM14 - PuTTY                                              _ □ ✕

entraNET> radio
UNITADDR=8192
MODE=Normal TDMA mode
COORDMODE=Distributed Coordination Mode
TXKEY=RF Transmitter Key OFF
BFREQ1=  221.966250 MHz
MFREQ1=  220.966250 MHz
BFREQ2=  221.993750 MHz
MFREQ2=  220.993750 MHz
BFREQ3=    0.000000 MHz
MFREQ3=    0.000000 MHz
BFREQ4=    0.000000 MHz
MFREQ4=    0.000000 MHz
AUXTX=  223.600000 MHz
AUXRX=  223.600000 MHz
TIMESLOT=0
RSSI=-120
YARDRSSI=-120
TXSTART=1
SYNCTIMEOUT=30
GROUPTIMEOUT=7200

entraNET> █
```

2. Set the Polling device (LCR) to data mode with COM2 DEFAULT=DATA MODE=DATA. Note: after this point, when you power cycle the radio it will come up into data mode so that it is ready to poll. To regain the console, type "+++" and then hit Enter.
3. Set the Responding device (OCR) as shown below:
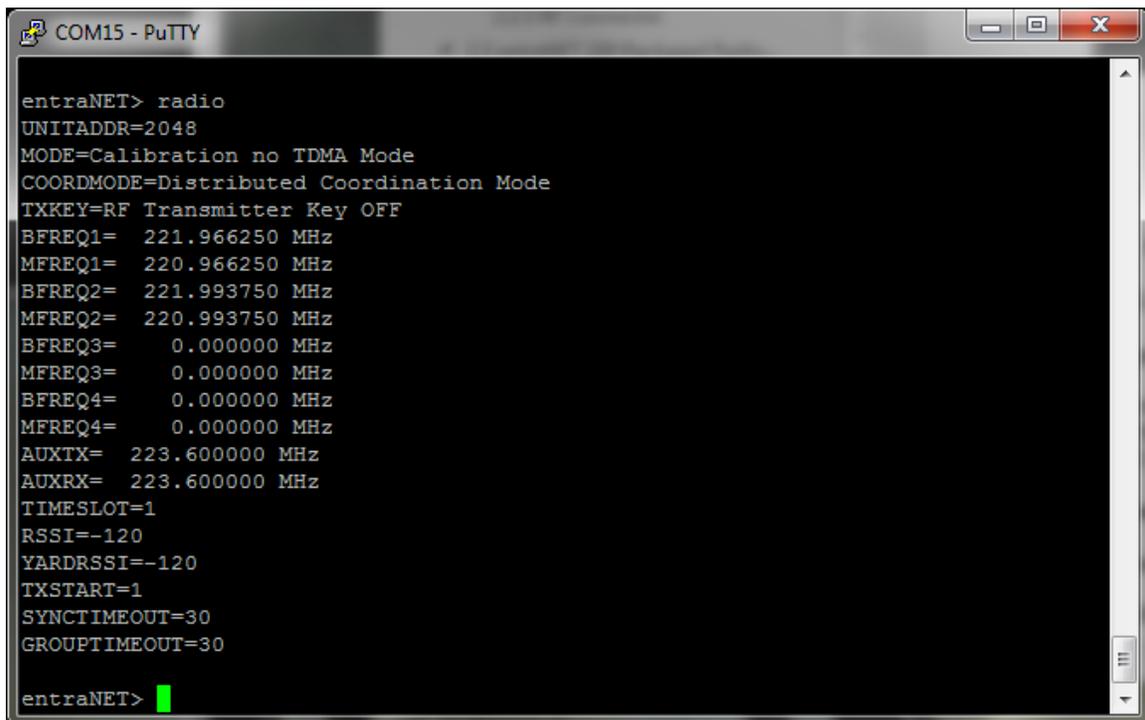
```
COM15 - PuTTY                                              _ □ ✕

entraNET> radio
UNITADDR=2048
MODE=Calibration no TDMA Mode
COORDMODE=Distributed Coordination Mode
TXKEY=RF Transmitter Key OFF
BFREQ1=  221.966250 MHz
MFREQ1=  220.966250 MHz
BFREQ2=  221.993750 MHz
MFREQ2=  220.993750 MHz
BFREQ3=    0.000000 MHz
MFREQ3=    0.000000 MHz
BFREQ4=    0.000000 MHz
MFREQ4=    0.000000 MHz
AUXTX=  223.600000 MHz
AUXRX=  223.600000 MHz
TIMESLOT=1
RSSI=-120
YARDRSSI=-120
TXSTART=1
SYNCTIMEOUT=30
GROUPTIMEOUT=30

entraNET> █
```

4. Set the Responding device (OCR) to data mode with COM2 DEFAULT=DATA MODE=DATA. Note: after this point, when you power cycle the radio it will come up into data mode so that it is ready to poll. To regain the console, type "+++" and then hit Enter.

5. Set the Poller application to match your Polling radio:
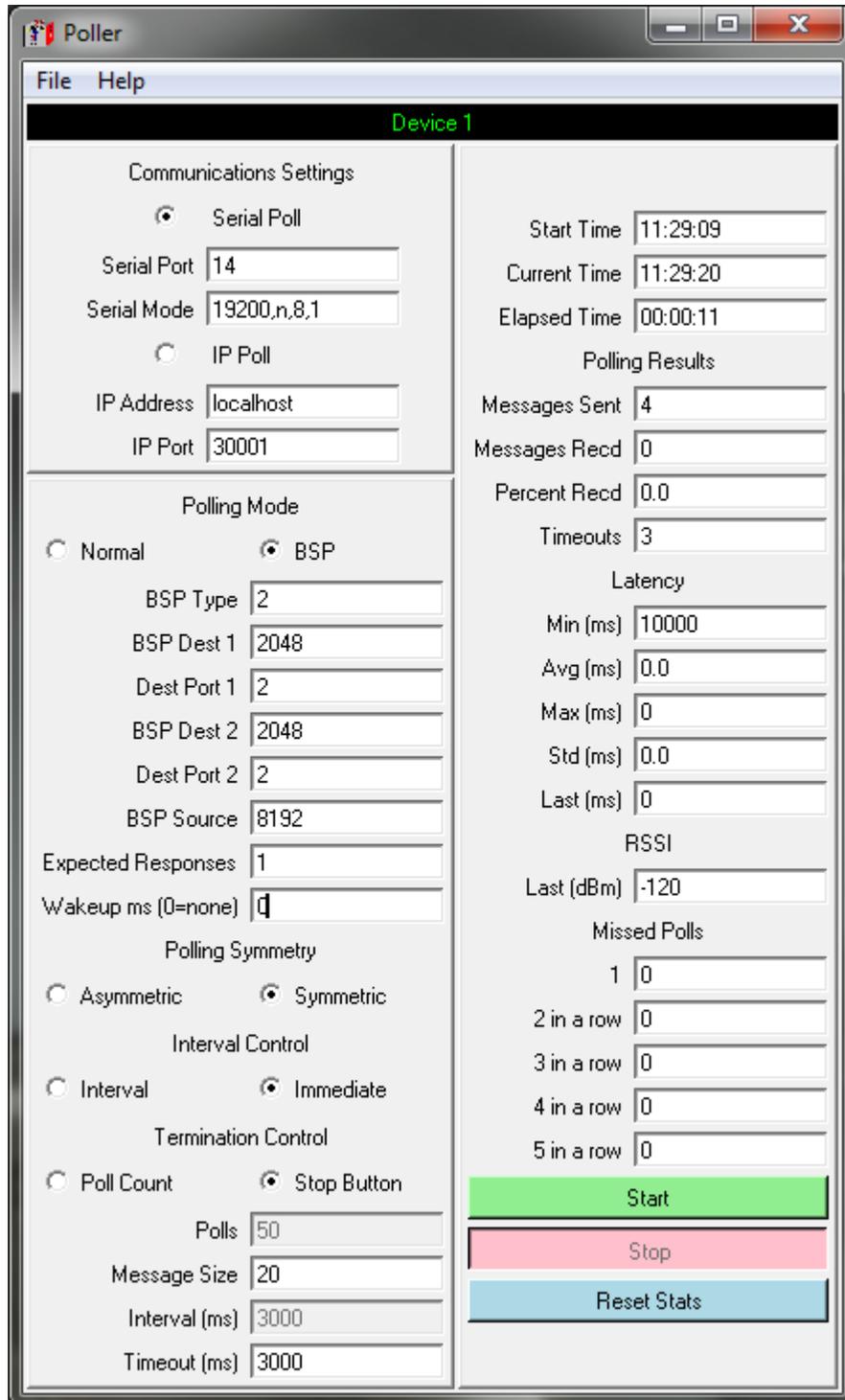
6. Set the Responder application to match your Responding radio:
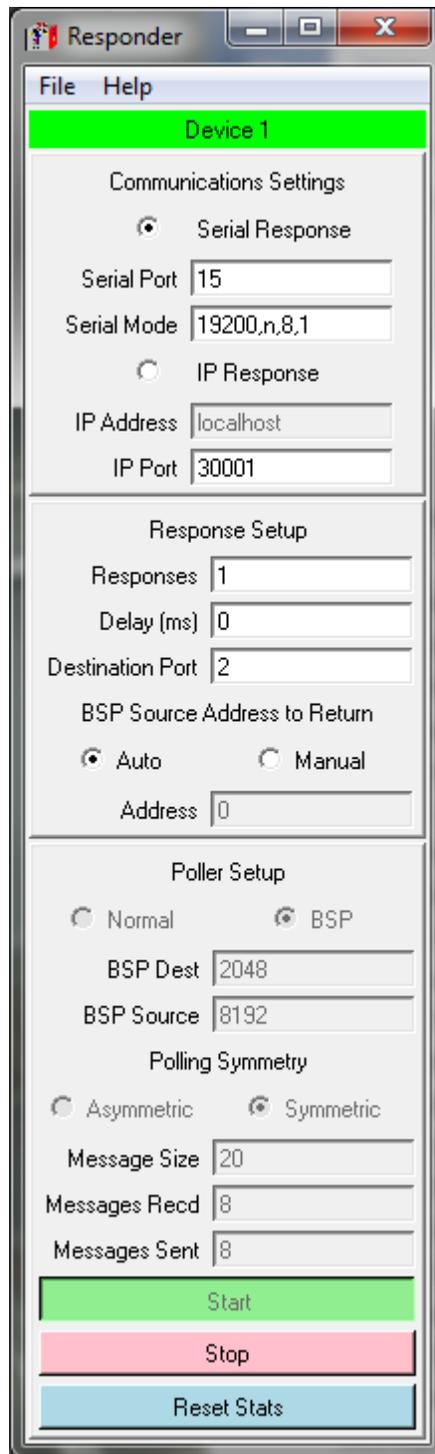
7. Hit Start on the Responder if necessary.
8. Hit Start on the Poller if necessary.
9. Observe operation.

3.2 Packaged or OEM Radio Command Reference

3.2.1 ALARM

Usage: ALARM {LEVEL} {HEX=}

Description: Displays the current alarm conditions by class. For each class, the specific events that can cause the alarm are listed along with their descriptions. NOTE: CMD=1 command not supported.

Access Level: Administrator

Optional Arguments:

    LEVEL *Read Only* for all users listed above. One of the following:

ALL	All Alarm Classes
INFORM	Non-persistent Info
MINOR	Minor Alarm
MAJOR	Major Alarm
CRITICAL	Critical Alarm

    HEX= *Read Only* for all users listed above. Displays the Alarm Hex Bits-Codes. It lists the hex bit codes for the current alarm condition by class. For each specific event that causes an alarm, the corresponding bit is set. Event bits are TBD.

3.2.2 AUTH

Usage: AUTH {KEY=<key>} {PRODUCT=<product>} {TYPE=<type>} {COM2=<com2>} {ETHERNET=<ethernet>} {MANAGEMENT=<management>} {SERIAL=<serial>} {DON'T_CARE=<dont_care>} {RUN=<run>} {ENDPOINTS=<endpoints>} {MOBILITY=<mobility>} {FACTDEF=<factdef>} {FSET=<fset>} {MAINTBAY=<maintbay>} {CMD=<cmd>}

Description: Used to set / display the authorization key and a list of authorized features.
NOTE: CMD=1 short form response command is supported.

Access Level: Administrator

Optional Arguments:

    KEY=<key> *Write Only* for all users, starting at Administrator. Add (or display last) authorization key, which is used to enable / disable software features. Only key for "reset config to factory defaults" can be entered from "user" access level.

Length: 1-16 characters

PRODUCT=<product> *Read only* for all users listed above.

ENTRANET   entraNET

TYPE=<type> *Read only* for all users listed above.

REMOTE   Remote
AP   Access Point

COM2=<com2> *Read Only* for all users listed above. com2 type

RS232   COM2 supports RS232
RS4XX   COM2 supports RS485

ETHERNET=<ethernet> *Read Only* for all users listed above.

DISABLED   Ethernet disabled
ENABLED   Ethernet enabled

MANAGEMENT=<management> *Read Only* for all users listed above.

DISABLED   Network management disabled
ENABLED   Network management enabled

SERIAL=<serial > *Read Only* for all users listed above.

DISABLED   Serial payload disabled
ENABLED   Serial payload enabled

DONT_CARE=<dont_care > *Read Only* for all users listed above.

0   X: don't care
1   X: don't care

RUN=<run> *Read Only* for all users listed above. Allowed to Run

DISABLED   Firmware disabled
ENABLED   Firmware enabled

ENDPOINTS=<endpoints> *Read Only* for all users listed above.

SINGLE   Single ethernet endpoint
MULTIPLE   Multiple ethernet endpoints

MOBILITY<mobility> *Read Only* for all users listed above.

DISABLED Mobility disabled
ENABLED   Mobility enabled

FACTDEF=<factdef> *Read Only* for all users listed above. Enable means change all configuration settings back to last saved Factory default.

DISABLED Do not reset to factor defaults
ENABLED   Reset to factory defaults

FSET<fset > *Read Only* for all users listed above. Select special company features set

BASIC   Basic generic features set
1   Company features set #1
2   Company features set #2
3   Company features set #3
4   Company features set #4
5   Company features set #5
6   Company features set #6

MAINTBAY<maintbay > *Read Only* for all users listed above. Maintenance Bay - serve OTA reprogramming

DISABLED Do not allow Maintenance Bay Mode
ENABLED   Allow Maintenance Bay Mode

CMD=<cmd> If set to 0, the command executes normally. If **<cmd>** is set to 1, the command reports all settings in a format that may be copied into a configuration script.

3.2.3 COM1

Usage: COM1 {MODE=<mode>} {BAUD=<baud>} {FORMAT=<format>} {CMD=<cmd>}

Description: Set / displays configuration of COM1.
NOTE: CMD=1 short form response command is supported.

Access Level: Administrator

Optional Arguments:

MODE=<mode> Read/*Write* for all users, starting at Administrator. This immediately switches the data port among various interface modes.

DISABLED	Com1 data mode disabled
DATA	Com1 in Reserved BSP PRAD Data mode
INT_LOOP	Com1 in Internal Loopback mode. <Distributor access level>
EXT_LOOP	Com1 in External Loopback mode <Distributor access level>
MDM_DEBUG	Com1 in MoDeM Debug mode

BAUD=<baud> *Read / Write.* Set / display baud rate setting.

1200	1200 bps
2400	2400 bps
4800	4800 bps
9600	9600 bps
19200	19200 bps
38400	38400 bps
57600	57600 bps
115200	115200 bps
230400	230400 bps modem debug only

FORMAT=<format> *Read / Write.* Set / display characters, parity, and stop bits setting of the COM port. '8N1' format.

7N1	7 char bits, no parity, 1 stop bit
7N2	7 char bits, no parity, 2 stop bits
7O1	7 char bits, odd parity, 1 stop bit
7O2	7 char bits, odd parity, 2 stop bits
7E1	7 char bits, even parity, 1 stop bit
7E2	7 char bits, even parity, 2 stop bits
8N1	8 char bits, no parity, 1 stop bit
8N2	8 char bits, no parity, 2 stop bits
8O1	8 char bits, odd parity, 1 stop bit
8O2	8 char bits, odd parity, 2 stop bits
8E1	8 char bits, even parity, 1 stop bit
8E2	8 char bits, even parity, 2 stop bits

CMD=<cmd> If set to 0, the command executes normally. If **<cmd>** is set to 1, the command reports all settings in a format that may be copied into a configuration script.

3.2.4 COM2

Usage: COM2 {DEFAULT=<default>} {MODE=<mode>} {LEVELS=<levels>} {BAUD=<baud>} {FORMAT=<format>} {DUPLEX=<duplex>} {CMD=<cmd>}

Description: Set / displays configuration of COM2.
NOTE: CMD=1 short form response command is supported.

Access Level: Administrator

Optional Arguments:

DEFAULT=<default> *Read / Write.* Set / display default mode of Com2 on boot.

CONSOLE	Com2 defaults to Command-line mode.
DATA	Com2 defaults to BSP data mode
INT_LOOP	Com2 defaults to Internal Loopback mode. <Distributor access level>
EXT_LOOP	Com2 defaults to External Loopback mode <Distributor access level>
SURVEY	Com2 defaults to Survey-BSP mode
SNIFFER	Com2 defaults to Sniffer-BSP mode (Repeater)

MODE=<mode> *Read / Write.* Set / display mode of COM2.To escape from data mode, enter three consecutive '+' characters to COM1 with at least 10 mSecs between them.

CONSOLE	Com2 in Command-line mode
DATA	Com2 defaults to Basic Serial Protocol mode
BSP	Com2 in BSP data mode
INT_LOOP	Com2 in Internal Loopback mode.
EXT_LOOP	Com2 in External Loopback mode
SURVEY	Com2 in Survey-BSP mode
SNIFFER	Com2 in Sniffer-BSP mode (Repeater)

BAUD=<baud> *Read / Write.* Set / display baud rate setting.

1200	1200 bps
2400	2400 bps
4800	4800 bps
9600	9600 bps
19200	19200 bps
38400	38400 bps
57600	57600 bps
115200	115200 bps

FORMAT=<format> *Read / Write.* Set / display characters, parity, and stop bits setting of the COM port. '8N1' format.

7N1	7 char bits, no parity, 1 stop bit
7N2	7 char bits, no parity, 2 stop bits
7O1	7 char bits, odd parity, 1 stop bit
7O2	7 char bits, odd parity, 2 stop bits
7E1	7 char bits, even parity, 1 stop bit

7E2	7 char bits, even parity, 2 stop bits
8N1	8 char bits, no parity, 1 stop bit
8N2	8 char bits, no parity, 2 stop bits
8O1	8 char bits, odd parity, 1 stop bit
8O2	8 char bits, odd parity, 2 stop bits
8E1	8 char bits, even parity, 1 stop bit
8E2	8 char bits, even parity, 2 stop bits

LEVELS=<levels> *Read / Write.* Set / display interface choice. Valid choice must be authorized by factory.

| RS232 | COM2 supports RS232 |
| RS485 | COM2 supports RS485 |

DUPLEX=<duplex >

| FULL | Full-Duplex |
| HALF | Half-Duplex |

CMD=<cmd> If set to 0, the command executes normally. If **<cmd>** is set to 1, the command reports all settings in a format that may be copied into a configuration script.

3.2.5 CONFIG

Usage: CONFIG {SHOW} {SAVE=}

Description: Save/Display the current configuration. The output is in a format that may be copied back into the command line in order to set the configuration.
NOTE: CMD=1 command not supported.

Access Level: Administrator

Optional Arguments:

SHOW *Read Only* for all users listed above. Display the current configuration.

SAVE= *Read Only.* Save the current configuration

| FACT | Save current config to factory config |

3.2.6 DEVICE

Usage: DEVICE {COMPANY=} {MODEL=} {PRODUCT=} {REV=} {OWNER=<owner>} {TYPE=<type>} {UPTIME=} {SER=} {OEM=<oem>} {CMD=<cmd>}

Description: Set / displays the device configuration. Items such as Owner, Company, and Serial Number can be found here.
NOTE: CMD=1 short form response command is supported.

Access Level: Administrator

Optional Arguments:

COMPANY= *Read Only*. Set / display company name.

Allowable length: 1 - 20 characters.

MODEL= *Read Only*. Set / display model number.

Allowable length: 1 - 20 characters.

PRODUCT= *Read Only*. Set / display product name.

Allowable length: 1 - 20 characters.

REV= *Read Only*. Set / display software ID.

Allowable length: 1 - 15 characters.

OWNER=<owner> *Read / Write*. Set / display owner information string. Owner can program any information (as 1 string).

Allowable length: 1 - 30 characters.

TYPE= *Read/Write, starting from Adminstrator. Select device to function as normal Remote or Repeater unit.*

REMOTE   Normal Remote Unit.
REPEATER   Repeater Unit.

UPTIME= *Read Only* for all users listed above. Current system uptime <YY-MM-DD hh:mm:ss>.

Allowable length: 1 - 11 characters.

SER= *Read Only*. Set / display device serial number.

Acceptable value range: 1 - 99999999

OEM=<oem> Force device to function as OEM (not Packaged) Remote

| OFF | Auto Detect OEM or Packaged Remote |
| ON | Forced to OEM Remote |

CMD=<cmd> If set to 0, the command executes normally. If **<cmd>** is set to 1, the command reports all settings in a format that may be copied into a configuration script.

3.2.7 ENCRYPT

Usage: ENCRYPT {LCU=<lcu>} {OCUA=<ocua>} {OCUB=<ocub>}{CMD=<cmd>}

Description: Set / displays the configuration for data encryption.
NOTE: CMD=1 short form response command is supported.

Access Level: Administrator

Optional Arguments:

LCU=<lcu> Read/ *Write. Set/ display for LCU* encryption index

Acceptable value range: 0 - 31

OCUA=<ocua> Read/ *Write. Set/ display for OCUA* encryption index

Acceptable value range: 0 - 31

OCUB=<ocub> Read/ *Write. Set/ display for OCUB* encryption index

Acceptable value range: 0 - 31

CMD=<cmd> If set to 0, the command executes normally. If **<cmd>** is set to 1, the command reports all settings in a format that may be copied into a configuration script.

3.2.8 GPS

Usage: GPS {FIX=<fix>} {SATS=<sats>} {LAT=<lat>} {LON=<lon>} {CMD=<cmd>}

Description:

Access Level: Administrator

Optional Arguments:

FIX=<fix> *Read Only.*

NO	No
YES	Yes
DIFF	Differential

SATS=<sats> *Read Only.* Number of tracked GPS satellites

> Acceptable value range: 0 - ????

LAT=<X.XXXXX> *Read Only.*

> Acceptable value range: X.XXXXX Degrees

LON=<X.XXXXX> *Read Only.*

> Acceptable value range: X.XXXXX Degrees

CMD=<cmd> If set to 0, the command executes normally. If **<cmd>** is set to 1, the command reports all settings in a format that may be copied into a configuration script.

3.2.9 HELP

Usage: HELP

Description: List commands supported for the current user login level.
NOTE: CMD=1 command not supported.

Access Level: Logged Out User

Optional Arguments:
none

3.2.10   LOG

Usage: LOG {CLEAR} {SHOW} {TOTAL=} {CMD=<cmd>}

Description: Set / display the event log information. Displays the number of entries in the event log. Optional arguments are used to clear or display the log.
NOTE: CMD=1 short form response command is supported.

Access Level: Administrator

Optional Arguments:

CLEAR *Write Only* for all users, starting at Administrator. Clear the event log

SHOW *Write Only* for all users, starting at Administrator. Show the event log

TOTAL= *Read Only* for all users listed above. Number of event log entries in log. Read only.

CMD=<cmd> If set to 0, the command executes normally. If **<cmd>** is set to 1, the command reports all settings in a format that may be copied into a configuration script.

3.2.11 LOGIN

Usage: LOGIN

Description: Secure Login. At prompt enter case sensitive <username> = ADMIN | FACT | ENGR. At prompt enter case sensitive <password>; can be up to 8 characters. NOTE: CMD=1 command not supported.

Access Level: Logged Out User

Optional Arguments:
none

3.2.12 LOGOUT

Usage: LOGOUT

Description: Log out
NOTE: CMD=1 command not supported.

Access Level: Administrator

Optional Arguments:
none

3.2.13 PASSWORD

Usage: PASSWORD {<username>}

Description: Sets the user login password for user at current access level or less.
NOTE: CMD=1 command not supported.

Access Level: Administrator

Optional Arguments:

<username> *Write Only* for all users, starting at Administrator. The login user name for which the password will be changed.

3.2.14   PROGRAM

Usage: PROGRAM {STATUS}{VERIFY=<verify>} {MODE=<mode>} {START_COUNT=<start_count>} {IMAGENUM=} {STATUS=}

Description: Allows a boot to the bootloader. At prompt enter 'y' or 'n'.
NOTE: CMD=1 command not supported.

Access Level: Administrator

Optional Arguments:

STATUS *Read Only.* Displays image reprogram status**VERIFY=<verify>** *Write Only* for all users, starting at Administrator. Select one or all images to perform checksum verification

ALL	All images
BOOT	Bootloader Image
APP1	App 1 Image
APP2	App 2 Image
DSP1	DSP 1 Image
DSP2	DSP 2 Image
MCU1	MCU 1 Image
MCU2	MCU 2 Image

MODE=<mode > Read/ *Write* for all users listed above.

COM1_RECEIVE	Accept reprogramming over the local serial port
RADIO_RECEIVE	Request reprogramming over the air
RADIO_SEND	Serve reprogramming requests over the air
COM1_SENDTEST	Initiate reprogramming over the local serial port

START_COUNT=<integer> Read/ *Write* for all users listed above.

Acceptable value range: 0 - ????

IMAGENUM=*Read Only*. The image index.

STATUS= *Read Only.*

IDLE	no update in progress
CLI_REPROG	Receiving reprogramming over the console
COM1_UPDATE	Receiving reprogramming over the local serial por
RADIO_SEND_LISTEN	Server awaiting reprogramming requests over the air
RADIO_SEND_UPDATE	Server sending reprogramming over the air
RADIO_REQUEST	Requesting over the air reprogramming
RADIO_UPDATE	Receiving over the air reprogramming
COM1_SEND	Server sending reprogramming over the local seria

3.2.15   RADIO

Usage: RADIO {COMMITCHANS} {UNITADDR=<unitaddr>} {RSSI=} {MODE=<mode>} {COORDMODE=<coordmode>} {TXKEY=<txkey>} {BFREQ1=<bfreq1>} {MFREQ1=<mfreq1>} {BFREQ2=<bfreq2>} {MFREQ2=<mfreq2>} {BFREQ3=<bfreq3>} {MFREQ3=} {BFREQ4=<bfreq4>} {MFREQ4=} {AUXTX=<auxtx>} {AUXRX=<auxrx>} {TIMESLOT=<timeslot>} {YARDRSSI=<integer>} {TXSTART=<number>} {SYNCTIMEOUT=<synctimeout>} {GROUPTIMEOUT=<grouptimeout>} {CMD=<cmd>}

Description: Set / display the radio configuration and status.
NOTE: CMD=1 short form response command is supported.

Access Level: Administrator

Optional Arguments:

   COMMITCHANS Update ROR channels 3/4 with last RCL Sync

   UNITADDR=<unitaddr> Read/ *Write* for all users, starting at Administrator.
Current Radio RCL Unit Address.

   Acceptable value range: 1 - 2097151

   MODE=<mode> Read/ *Write*, starting at Distributor. Current Radio Mode.

NORMAL	Normal TDMA Mode <default>
MAINT	Maintenance Mode, Low Power with no TDMA
CAL	Calibration no TDMA Mode
TEST	Test Mode, Low Power with TDMA
TRAFFIC	Traffic TDMA Mode

COORDMODE=<coordmode>

CCM	Centralized Coordination Mode
DCM	Distributed Coordination Mode

TXKEY=<txkeyState> Read/Write, starting at Adminstrator. Turn Tx Key State ON or OFF.

    OFF   RF Transmitter Key OFF
    ON   RF Transmitter Key ON.

BFREQ1=<XXX.XXXXXX> Read/ *Write* for all users, starting at Administrator. Current Primary Radio B (Repeater) Frequency.

Acceptable value range: 216-222 MHz Channels

MFREQ1=<XXX.XXXXXX > Read/ *Write* for all users, starting at Administrator. Current Primary Radio M (Mobile) Frequency.

Acceptable value range: 216-222 MHz Channels

BFREQ2=<XXX.XXXXXX> Read/ *Write* for all users, starting at Administrator. Current Secondary Radio B (Repeater) Frequency.

Acceptable value range: 216-222 MHz Channels

MFREQ2=<XXX.XXXXXX > Read/ *Write* for all users, starting at Administrator. Current Secondary Radio M (Mobile) Frequency.

Acceptable value range: 216-222 MHz Channels

BFREQ3=<XXX.XXXXXX> Read/ *Write* for all users, starting at Administrator. Current 3rd Radio B (Repeater) Frequency.

Acceptable value range: 216-222 MHz Channels

MFREQ3= *Read only*. Current 3rd Radio M (Mobile) Frequency.

Acceptable value range: 216-222 MHz Channels

BFREQ4=<XXX.XXXXXX> Read/ *Write* for all users, starting at Administrator. Current 4th Radio B (Repeater) Frequency.

Acceptable value range: 216-222 MHz Channels

MFREQ4= *Read only*. Current 4th Radio M (Mobile) Frequency.

Acceptable value range: 216-222 MHz Channels

TIMESLOT=<number> *Read/ Write* for all users, starting at Administrator. Timeslot to be used in Fixed DCM System.

> Acceptable value range: 0-14

RSSI=<number> *Read Only*. Read last 1 second raw RSSI.   The command will automatically sync-up to a 1 second window – consecutive RSSI commands will not be executed within the same 1 second window.

> Acceptable value range: -120-0 dBm

YARDRSSI=<yardrssi> *Read/ Write* for all users, starting at Administrator. Minimum in-yard RSSI value in dBm

> Acceptable value range (8bits integer): -128 to 127

AUXTX=<XXX.XXXXXX> *Read Only*. Auxillary Transmit Frequency. Value range: 216-222 MHz, 1Hz frequency step size

> Acceptable value range: 216-222 MHz Channels, 1Hz frequency step

AUXRX=<XXX.XXXXXX> *Read Only*. Auxillary Receive Frequency. Value range: 216-222 MHz, 1Hz frequency step size

> Acceptable value range: 216-222 MHz Channels, 1Hz frequency step

TXSTART=<txstart> *Read/ Write* for all users, starting at Administrator. Seconds to timeout before transmit at boot-up. If set to 0, transmit will never start.

> Acceptable value range: 0 - 30

SYNCTIMEOUT=<synctimeout> *Read/ Write* for all users, starting at Administrator. Seconds to timeout when LCR not hearing repeater synch

> Acceptable value range: 10 - 600

GROUPTIMEOUT=<grouptimeout> *Read/ Write* for all users, starting at Administrator. Seconds to timeout when LCR[OCR] not hearing OCR[CR]

> Acceptable value range: 5 - 600

CMD=<cmd> If set to 0, the command executes normally. If **<cmd>** is set to 1, the command reports all settings in a format that may be copied into a configuration script.

3.2.16   REBOOT

Usage: REBOOT {SAME} {APP1} {APP2} {OTHER}

Description: Reboot the radio's firmware.
NOTE: CMD=1 command not supported.

Access Level: Administrator

Optional Arguments:

SAME *Write Only* for all users, starting at Administrator. Same Image

APP1 *Write Only* for all users, starting at Administrator. Application Image 1

APP2 *Write Only* for all users, starting at Administrator. Application Image 2

OTHER *Write Only* for all users, starting at Administrator. Other Image

3.2.17   REPEATERS

Usage: REPEATERS {CLEAR} {CHANMASK=<chanmask>} {LASTBFREQ3=<lastbfreq3>} {LASTMFREQ3=<lastbfreq3>} {LASTBFREQ4=<lastbfreq4>} {LASTMFREQ4=<lastmfreq4>}

Description:

Access Level: Administrator

Optional Arguments:

CLEAR

CHANMASK=<chanmask> Repeater channel N availability. **<chanmask>** is a bitmap which sets the accessibility of four channels. Bit zero through three mask channels one through four, respectively. Setting a bit to 1 makes the corresponding channel available; setting it to 0 makes it unavailable.

Acceptable value range: 0 – 15

LASTBFREQ3=<XXX.XXXXXX> Committed channel 3 B(Repeater) Frequency

Acceptable value range: 216-222 MHz Channels

LASTMFREQ3=<XXX.XXXXXX> Committed channel 3 M(Mobile) Frequency

Acceptable value range: 216-222 MHz Channels

LASTBFREQ4=<XXX.XXXXXX> Committed channel 4 B(Repeater) Frequency

Acceptable value range: 216-222 MHz Channels

LASTMFREQ4=<XXX.XXXXXX> Committed channel 3 M(Mobile) Frequency

Acceptable value range: 216-222 MHz Channels

CMD=<cmd> If set to 0, the command executes normally. If **<cmd>** is set to 1, the command reports all settings in a format that may be copied into a configuration script.

3.2.18   SLEEP

Usage: SLEEP {MODE=<mode>} {WAKE=<wake>} {DTRSENSE=<dtrsense>} {HANGTIME=<hangtime>} {NOW=<now>} {CMD=<cmd>}

Description: Set / display the configuration of the radio's low power mode.
NOTE: CMD=1 short form response command is supported.

Access Level: Administrator

Optional Arguments:

MODE=<mode> *Write Only* for all users, starting at Administrator. This selects one of the low power operating modes the remote will operate under.

NONE	Normal mode
SLEEP	Sleep enabled
SHUTDOWN	Shutdown enabled

WAKE=<wake> *Write Only* for all users, starting at Administrator. This selects a control option to activate(enter) or deactivate(exit) sleep or shutdown modes.

DTR	Wake under DTR signal control
DATA	Wake up on data

DTRSENSE=<dtrsense> *Write Only* for all users, starting at Administrator. DTR sense setting.

LOW	DTR Active LOW

HIGH   DTR Active HIGH

NOW=<now > *Write Only* for all users, starting at Administrator.

SLEEP   Sleep immediate
SHUTDOWN   Shutdown immediate

HANGTIME=<hangtime> Read/ *Write* for all users, starting at Administrator. Minimum wake time in seconds before returning to low power mode.

Acceptable value range: 5 - 600

CMD=<cmd> If set to 0, the command executes normally. If **<cmd>** is set to 1, the command reports all settings in a format that may be copied into a configuration script.

3.2.19   STATS

Usage: STATS {ALL} {RADIO} {COM1} {COM2} {RESET}

Description: Radio statistics. If <device> (RADIO,COM1,COM2,ETH) is omitted, all statistics are displayed
NOTE: CMD=1 command not supported.

Access Level: Administrator

Optional Arguments:

ALL *Read Only* for all users listed above. Get all statistics

RADIO *Read Only* for all users listed above. Get radio packet statistics (TBD)

COM1 *Read Only* for all users listed above. Get COM1 packet statistics

COM2 *Read Only* for all users listed above. Get COM2 packet statistics

RESET *Write Only* for all users, starting at Administrator. Reset packet statistics for the indicated interface

3.2.20   VER

Usage: VER {BOOTREV=} {SWID1=} {SREV1=} {DSREV1=} {MSREV1=} {SWID2=} {SREV2=} {DSREV2=} {MSREV2=} {IMAGE=<image>} {DSPSW=} {MCUSW=} {CONFIG=} {EVENT=} {LOG=} {HREV=} {XHREV=} {CMD=<cmd>}

Description: Set/Display the current version Information.
NOTE: CMD=1 short form response command is supported.

Access Level: Administrator

Optional Arguments:

BOOTREV= *Read Only* for all users listed above. Bootloader Software Revision**SWID1=** *Read Only* for all users listed above. Current Image 1 Software ID text. (06-nnnnAnn)

Allowable length: 1 - 10 characters.

SREV1= *Read Only* for all users listed above. Image 1 Software version number. (xx.yy.zz)

Allowable length: 1 - 8 characters.

DSREV1= *Read Only* for all users listed above. Display ROR radio DSP software image 1 version.

Allowable length: 1 - 8 characters.

MSREV1= *Read Only* for all users listed above. Display ROR radio MCU software image 1 version.

Allowable length: 1 - 8 characters.

SWID2= *Read Only* for all users listed above. Current Image 2 Software ID text. (06-nnnnAnn)

Allowable length: 1 - 10 characters.

SREV2= *Read Only* for all users listed above. Image 2 Software version number. (xx.yy.zz)

Allowable length: 1 - 8 characters.

DSREV2= *Read Only* for all users listed above. Display ROR radio MCU software image 2 version.

Allowable length: 1 - 8 characters.

MSREV2= *Read Only* for all users listed above. Display ROR radio MCU software image 2 version.

> Allowable length: 1 - 8 characters.

IMAGE=<image> Read/ *Write* for all users, starting at Administrator. Selects boot image index.

> Acceptable value range: 1 – 2

DSPSW= *Read Only* for all users listed above. Current Radio DSP Software Version number. (xx.yy.zz)

> Allowable length: 1 - 15 characters.

MCUSW= *Read Only* for all users listed above. Current Radio MCU Software Version number. (xx.yy.zz)

> Allowable length: 1 - 15 characters.

CONFIG= *Read Only*. Config Table Version

EVENT= *Read Only* for all users listed above. This command is used to determine whether the current Event list properties need to be upgraded or not.

LOG= *Read Only* for all users listed above. This command is used to determine whether the current Log format needs to be upgraded or not.

HREV= *Read Only*. OIB Board Hardware Revision

> Allowable length: 1 - 8 characters.

XHREV= *Read Only*. OEM Radio Board Hardware Revision.

> Allowable length: 1 - 8 characters.

CMD=<cmd> If set to 0, the command executes normally. If **<cmd>** is set to 1, the command reports all settings in a format that may be copied into a configuration script.

3.2.21   YARD

Usage: YARD {CLEAR} {SHOW} {MODE=<mode>} {COORDMODE=<coordmode>} {MINRSSI=<minrssi>} {RSSI=<rssi>} {ID=<id>} {SHAPE=<shape>} {ROT=<rot>} {LAT=<lat>} {LON=<lon>} {XDIM=<xdim>} {YDIM=<ydim>} {COUNT=<count>} {CMD=<cmd>}

Description:

Access Level: Administrator

Optional Arguments:

    CLEAR

    SHOW

    MODE=<mode> *Read Only.*

NORMAL	Normal Operation
IN	Forced In-Yard
OUT	Forced Out-Of-Yard

    COORDMODE=<coordmode> *Read Only.*

CCM	Centralized Coordination Mode
DCM	Distributed Coordination Mode

    MINRSSI=<minrssi> *Read/ Write* for all users, starting at Administrator. Minimum in-yard RSSI value in dBm.

Acceptable value range (8bits integer): -128 to 127

    RSSI=<rssi> *Read Only.* Current yard RSSI value in dBm

Acceptable value range (8bits integer): -128 to 127

    ID=<id> *Read Only.* Current yard ID

Acceptable value range (8bits integer): -128 to 127

    SHAPE=<shape> *Read Only.*

    ELLIPSE   Ellipse

    ROT=<rot> *Read Only.* Yard Shape Rotate Degrees

Acceptable value range: X.XXXXX Degrees

    LAT=<lat> *Read Only.* Yard Latitude Degrees

Acceptable value range: X.XXXXX Degrees

    LON=<lon> *Read Only.* Yard Longtitude Degrees

Acceptable value range: X.XXXXX Degrees

XDIM=\<xdim\> *Read Only*.Yard Shape X Dimension miles

Acceptable value range: X.XXXXX Miles

YDIM=\<ydim\> *Read Only*.Yard Shape Y-Dimension miles

Acceptable value range: X.XXXXX Miles

COUNT=\<count\> *Read Only*. Number of cached yard info

Acceptable value range (8bits integer): -128 to 127

CMD=\<cmd\> If set to 0, the command executes normally. If **\<cmd\>** is set to 1, the command reports all settings in a format that may be copied into a configuration script.

4   Access Point Menu Interface

The COM1 console of the access point can be accessed using a serial terminal emulator program such as HyperTerminal, Putty, or ucon. The default settings are: baud rate 19200, no parity, 8 data bits, and 1 stop bit. The pins for this port are listed in section 2.1.2. In some cases, this port is used for binary data and is not escapable to the login prompt. In this case, you can watch the boot sequence of the Access Point using a terminal emulator. During this sequence, the IP address of the unit is reported. Once you have identified the IP address, you can access the menu via Telnet. To begin using the AP menu, login with the administrator user name and password.

4.1 Login Screen

Availability: Repeater and LCU
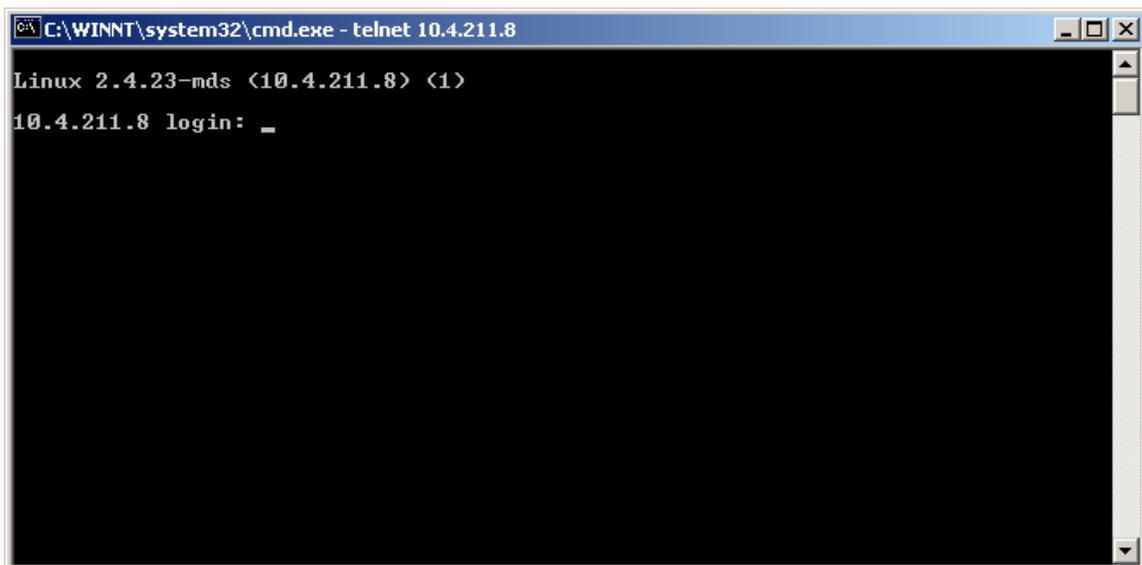
4.2 Starting Information Screen

Availability: Repeater and LCU

```
C:\WINNT\system32\cmd.exe - telnet 10.4.211.8                              _ □ ×
                              MDS entraNET 220
                         Starting Information Screen
    -===================================================================-

                 Device Name          10625 10.4.211.8

                 IP Address           10.4.211.8

                 Device Status        Operational

                 Location             MDS Engineering Lab

                 Serial Number        1246772

                 Uptime               29 days, 02 hours

                 Current Firmware     3.2.3

                 Current User         admin




                 Press 'G' to go to Main Menu
```

4.3 Main Menu

The Main Menu is the entryway to all customer-definable features. The radio Device Name appears at the top of this and all other screens as a reminder of the unit that is being interrogated.

Starting Information Screen –G Main Menu
Availability: Repeater and LCU

```
C:\WINNT\system32\cmd.exe - telnet 10.4.211.8                              _ □ ×
                            10625 10.4.211.8
                               Main Menu
    -===================================================================-

        A) Starting Information Screen      E) Statistics / Logging

        B) Network Configuration            F) Device Information

        C) System Configuration             G) Maintenance / Tools

        D) Security Configuration








                 Select a letter to configure an item, 'Q' to exit menu
```

Parameter	Description	Values
A) Starting Information Screen	Select this item to return to the Starting Information Screen.	

B) Network Configuration	Tools to configure the transceiver data network layer.	
C) System Configuration	Tools to configure the Repeater System.	
D) Security Configuration	Tools to configure the transceiver security services.	
E) Statistics / Logging	Tools to measure the radio and data layer network performance.	
F) Device Information	Top-level customer-specific and definable parameters, such as the date, time, console baud rate, and device name information.	
G) Maintenance / Tools	Tools for upgrading and selecting firmware images and configuration files, and applying Authorization Keys to change radio capabilities.	

4.3.1 Network Configuration Menu

Main menu – B) Network Configuration:
Availability: Repeater and LCU
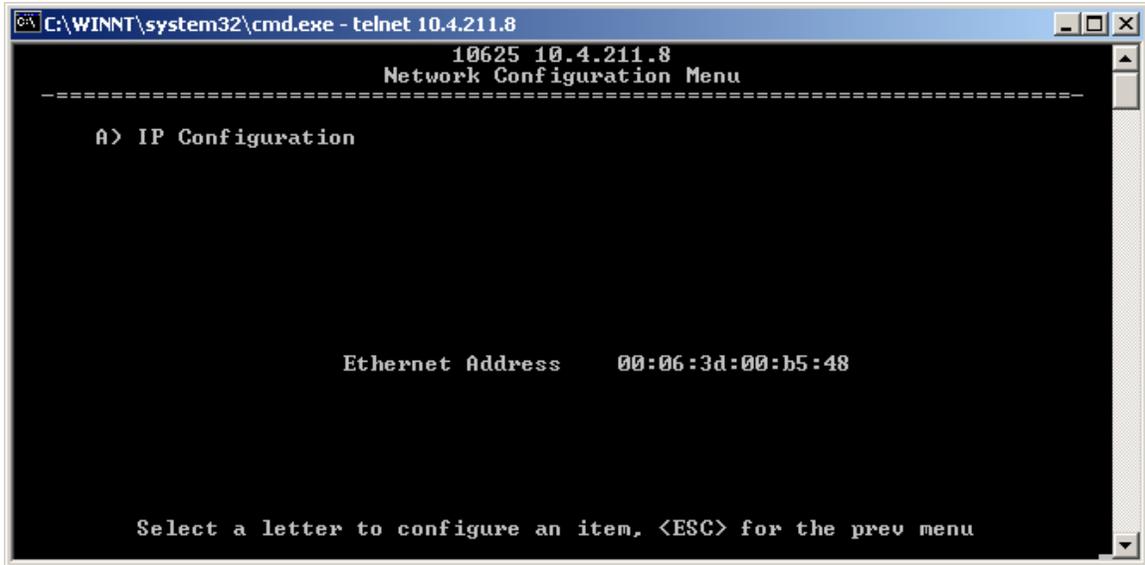
Parameter	Description	Values
A) IP Configuration	Access the menu to display and modify the unit's IP address, netmask, and gateway addresses.	

4.3.1.1 IP Configuration Menu

The unit uses a local IP address to support remote management and backhaul services.

CAUTION: Changes to any of the following parameters while communicating over the network (LAN or over-the-air) may cause a loss of communication with the unit being configured. Communication will need to be re-established using the new IP address.

Main menu – B) Network Configuration – A) IP Configuration:
Availability: Repeater and LCU
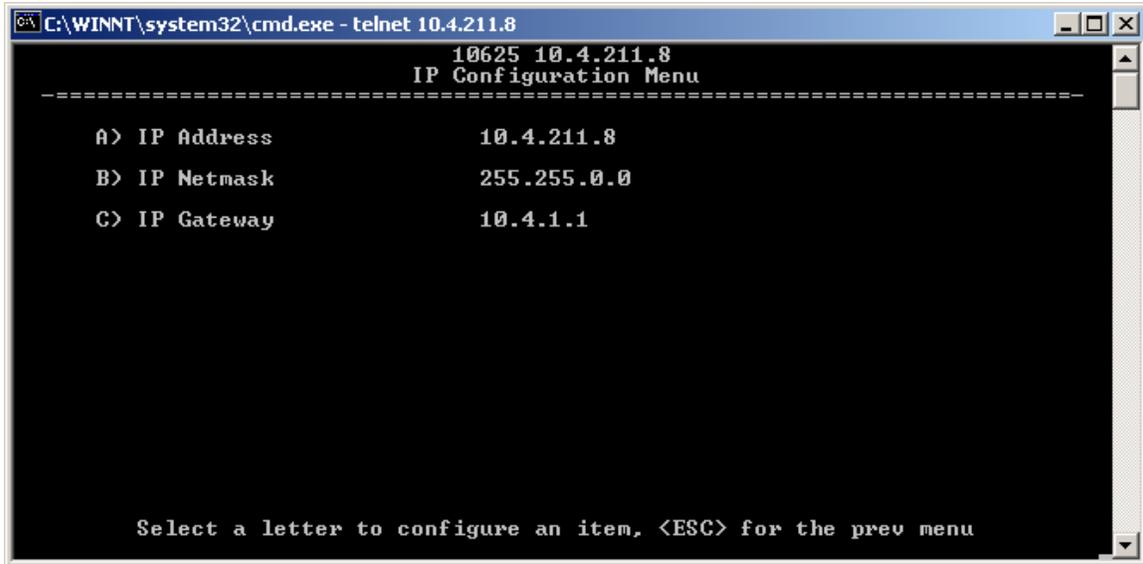
Parameter	Description	Values
A) IP Address	Essential for connectivity to the unit via the LAN port and to handle backhaul over IP. Enter any valid IP address that will be unique within the network.	Any valid IP address; *192.168.1.1*
B) IP Netmask	The IPv4 local subnet mask.	X.X.X.X (X=1-254); *255.255.0.0*
C) IP Gateway	The IPv4 gateway used to access nodes outside of the unit's subnet. This field is unnecessary if all devices are on the same subnet.	X.X.X.X (X=1-254); *0.0.0.0*

4.3.2 System Configuration Menu

Main menu – C) System Configuration
Availability: LCU version

Parameter	Description	Values
A) System Mode	Toggle between the operating mode for this AP: "LCU" for use aboard a locomotive with attachment to a GPS receiver and an MDS entraNET 220 Packaged Radio Module, "Maintenance Bay" for use in a Kiosk for OCU Radio upgrade and test, or "Repeater" for use in a repeater with attachment to one transmitter and two receiver Packaged Radio Modules.	LCU, Repeater, Maintenance Bay; *Repeater*
B) BSP Logging	BSP Logging menu	

Main menu – C) System Configuration:
Availability: Repeater version

Parameter	Description	Values
A) System Mode	Toggle between the operating mode for this AP: "LCU" for use aboard a locomotive with attachment to a GPS receiver and an MDS entraNET 220 Packaged Radio Module, "Maintenance Bay" for use in a Kiosk for OCU Radio upgrade and test, or "Repeater" for use in a repeater with attachment to one transmitter and two receiver Packaged Radio Modules.	LCU, Repeater, Maintenance Bay; *Repeater*
B) External PA Status	Enable or disable the External Power Amplifier	enabled, disabled; *disabled*
C) Diversity Remote	Enable or disable diversity remote on COM1	enabled, disabled; *disabled*
D) Force Tx Key	Key the transmitter continuously on the current auxiliary transmit frequency.	Normal, Forced; *Normal*

4.3.2.1 BSP Logging Menu

Main menu – C) System Configuration – B) BSP Logging (LCU) or F) BSP Logging (Repeater).
Availability: Repeater and LCU

Parameter	Description	Values
A) BSP Logging	Enable logging of BSP messages to remote server	enabled, disabled; *disabled*
B) BSP Log Server	IP address of BSP message server	Any valid IP address; *0.0.0.0*
C) BSP Log Server Port	IP port for BSP message server	0-65535; *0*

4.3.2.2 Frequency Configuration Menu

Main menu – C) System Configuration – E) Frequency Configuration
Availability: Repeater only

Parameter	Description	Values
A) Active Channel	The active transmit and receive frequency pair	B/M Freq #1, B/M Freq #2, B/M Freq #3, B/M Freq #4; *B/M Freq #1*
B) B Frequency #1	The Base Frequency on Channel #1	216.006250-221.993750; *220.106250*
G) M Frequency #1	The Mobile Frequency on Channel #1	216.006250-221.993750; *221.106250*
C) B Frequency #2	The Base Frequency on Channel #2	216.006250-221.993750; *220.118750*
H) M Frequency #2	The Mobile Frequency on Channel #2	216.006250-221.993750; *221.118750*
D) B Frequency #3	The Base Frequency on Channel #3	216.006250-221.993750; *0*
E) B Frequency #4	The Base Frequency on Channel #4	216.006250-221.993750; *0*
F) Aux Tx Frequency	The Auxiliary Transmit Frequency	216.006250-222.000000; *223.600000*
K) Aux Rx Frequency	The Auxiliary Receive Frequency	216.006250-222.000000; *223.600000*

4.3.2.3 Backhaul Configuration Menu

Main menu – C) System Configuration – G) Backhaul Configuration
Availability: Repeater only

```
C:\WINNT\system32\cmd.exe - telnet 10.4.211.8                          _ □ ×
                           10625 10.4.211.8
                      Backhaul Configuration Menu
    -=================================================================-

       A) RCS IP Address        127.0.0.1

       B) RCS IP Port           39990

       C) Ignore Sequence Errors    enabled

       D) Ignore Radio Alarms       enabled

       E) Watchdog IP Address   0.0.0.0

       F) Watchdog IP Port      0

       G) Routing RSSI Limit    0 dBm




      Select a letter to configure an item, <ESC> for the prev menu
```
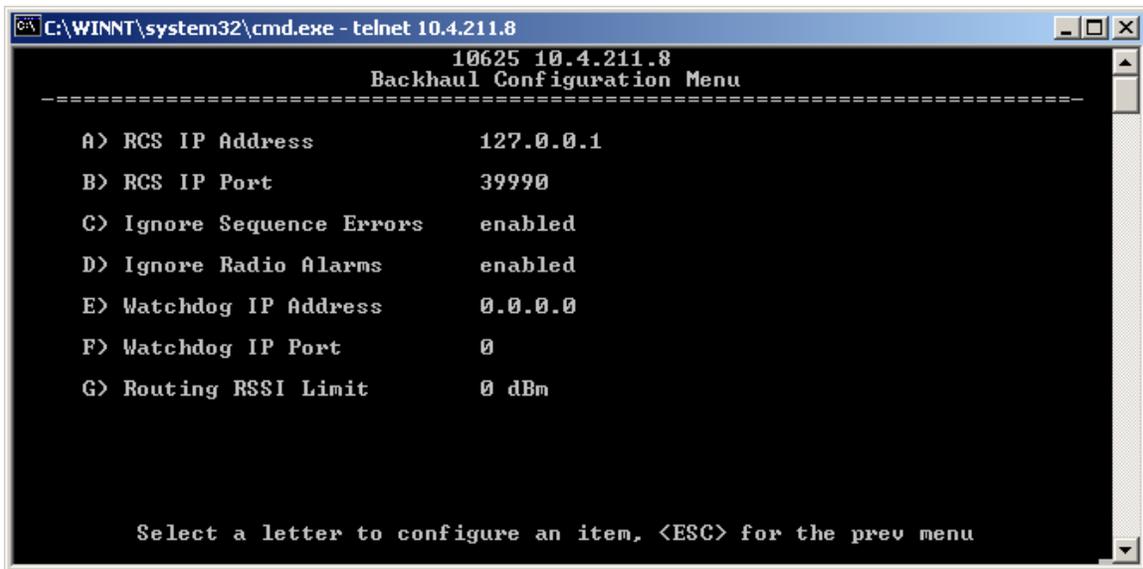
Parameter	Description	Values
A) RCS IP Address	IP address used to talk to the Repeater Coordination Server	Any valid IP address; *127.0.0.1*
B) RCS IP Port	IP port used to talk to the Repeater Coordination Server	0-65535; *39990*

C) Ignore Sequence Errors	Ignore sequence errors. If enabled, traffic flows normally even in the presence of backhaul sequence number errors. If disabled, traffic is not permitted unless sequence numbers are as expected.	enabled, disabled; *enabled*
D) Ignore Radio Alarms	Ignore Radio Alarms. If enabled, traffic flows normally even in the presence of radio alarms on the attached transmitter or receivers. If disabled, traffic is not permitted unless there are no radio alarms.	enabled, disabled; *enabled*
E) Watchdog IP Address	IP address for the watchdog server to which periodic heartbeat messages are sent.	Any valid IP address; *0.0.0.0*
F) Watchdog IP Port	IP port for watchdog server.	0-65535; *0*
G) Routing RSSI Limit	Limit used when determining which repeater to route the next message to. Normally, messages for a given RCL unit (LCU, OCUA, or OCUB) are sent via the repeater that heard the unit the strongest during the last second. If the RSSI limit is set to a value besides – 120 and 0, the routing logic will instead use the repeater with the strongest RSSI *less than* the limit.	-128-0; *0*

4.3.2.4 Yard Configuration Menu

The Yard that is serviced within the same repeater community (repeaters all using the same RCS) is represented by an oval shaped area. This screen is where the geographic location, size and shape of this oval are specified.

Main menu – C) System Configuration – H) Yard Configuration
Availability: Repeater only

Parameter	Description	Values
A) Repeater Yard ID	The fixed yard ID used by the repeater	1-15; *0*
B) Yard Latitude	The latitude of the yard center	-90.0000000-90.0000000; *0.0000000*
C) Yard Longitude	The longitude of the yard center	-90.0000000-90.0000000; *0.0000000*

D) Yard Rotation	The degrees of rotation about the yard center	0.000, 5.625, 11.250, 16.875, 22.500, 28.125, 33.750, 39.375, 45.000, 50.625, 56.250, 61.875, 67.500, 73.125, 78.750, 84.375; *0.000*
E) Yard X Diameter	The X diameter of the yard in miles	1.000000000, 1.005013881, 1.038892703, 1.128915711, 1.301690951, 1.583418004, 2.000000000, 2.577107281, 3.340218650, 4.314650297, 5.525577218, 6.998049706, 8.757006443, 10.827285137, 13.233631341, 16.000705871; *1.000000000*
F) Yard Y Diameter	The Y diameter of the yard in miles	1.000000000, 1.005013881, 1.038892703, 1.128915711, 1.301690951, 1.583418004, 2.000000000, 2.577107281, 3.340218650, 4.314650297, 5.525577218, 6.998049706, 8.757006443, 10.827285137, 13.233631341, 16.000705871; *1.000000000*

4.3.2.5 Slot Group Configuration Menu

The repeater system employs 15 time slot groups within which RCL systems may enter the infrastructure. This menu allows the repeater to block certain time slot groups from accepting RCL systems.

Main menu – C) System Configuration – I) Slot Group Configuration
Availability: Repeater only

```
C:\WINNT\system32\cmd.exe - telnet 10.4.211.8                          _ □ ×
                          10625 10.4.211.8
                     Slot Group Configuration Menu
 -===========================================================================-

    A) Slot Group 0 Status    enabled      I) Slot Group 8 Status    enabled

    B) Slot Group 1 Status    enabled      J) Slot Group 9 Status    enabled

    C) Slot Group 2 Status    enabled      K) Slot Group 10 Status   enabled

    D) Slot Group 3 Status    enabled      L) Slot Group 11 Status   enabled

    E) Slot Group 4 Status    enabled      M) Slot Group 12 Status   enabled

    F) Slot Group 5 Status    enabled      N) Slot Group 13 Status   enabled

    G) Slot Group 6 Status    enabled      O) Slot Group 14 Status   enabled

    H) Slot Group 7 Status    enabled



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

Parameter	Description	Values
A – O) Slot Group X Status	The status of Slot group X	enabled, disabled; *enabled*

4.3.3 Security Configuration Menu

Main menu – D) Security Configuration
Availability: Repeater and LCU

```
C:\WINNT\system32\cmd.exe - telnet 10.4.211.8                          _ □ ×
                          10625 10.4.211.8
                    Security Configuration Menu
 -===========================================================================-

    A) HTTP Access              enabled

    B) Telnet Access            enabled

    C) HTTP Auth Mode           Basic Auth

    D) User Passwords








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

Parameter	Description	Values
A) HTTP Access	Allows remote access through HTTP (a Web browser) on Port 80.	enabled, disabled; *enabled*
B) Telnet Access	Allows remote access through Telnet sessions on Port 23.	enabled, disabled; *enabled*

| C) HTTP Auth Mode | Select the security mode or level of log-in using an HTTP browser. Disabling HTTP Access prevents access through HTTP. HTTP Security Mode is functional if HTTP Access is enabled. | Basic Auth, MD5 Digest; *Basic Auth* |
| D) User Passwords | Administrative password for this unit. Used at log-in via the COM1 Port, Telnet session, and Web browser session. | |

4.3.3.1 *User Passwords Menu*

Main menu – D) Security Configuration – D) User Passwords:
Availability: Repeater and LCU
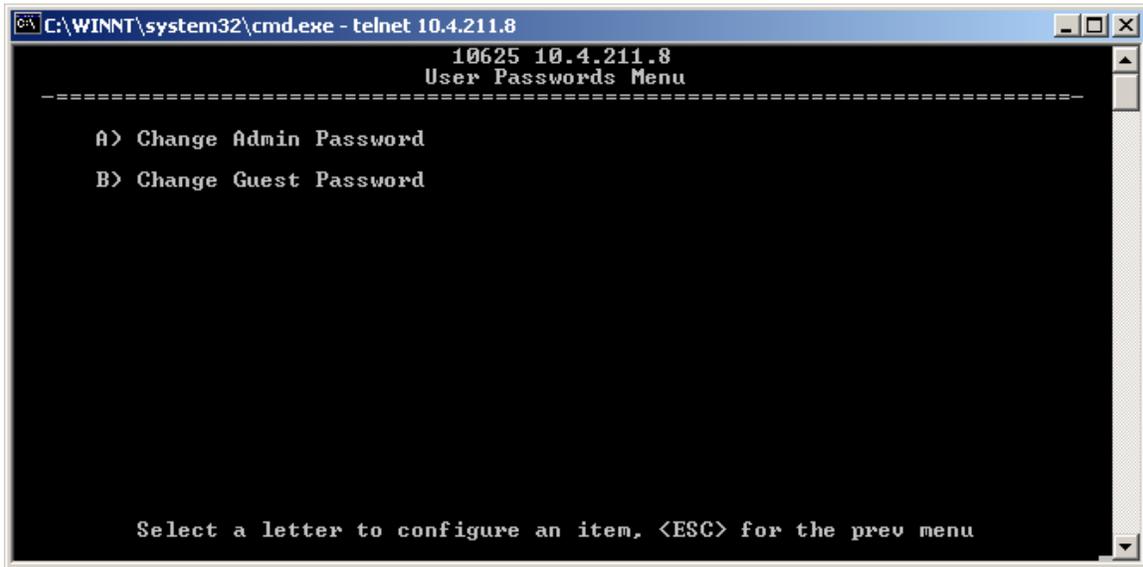
Parameter	Description	Values
A) Change Admin Password	Change Admin Password. Passwords are case sensitive; can be mixed case	1–8 alphanumeric characters; *admin*
B) Change Guest Password	Change Guest Password. Passwords are case sensitive; can be mixed case	1–8 alphanumeric characters; *guest*

4.3.4 Statistics / Logging Menu

Main menu – E) Statistics / Logging:
Availability: LCU version
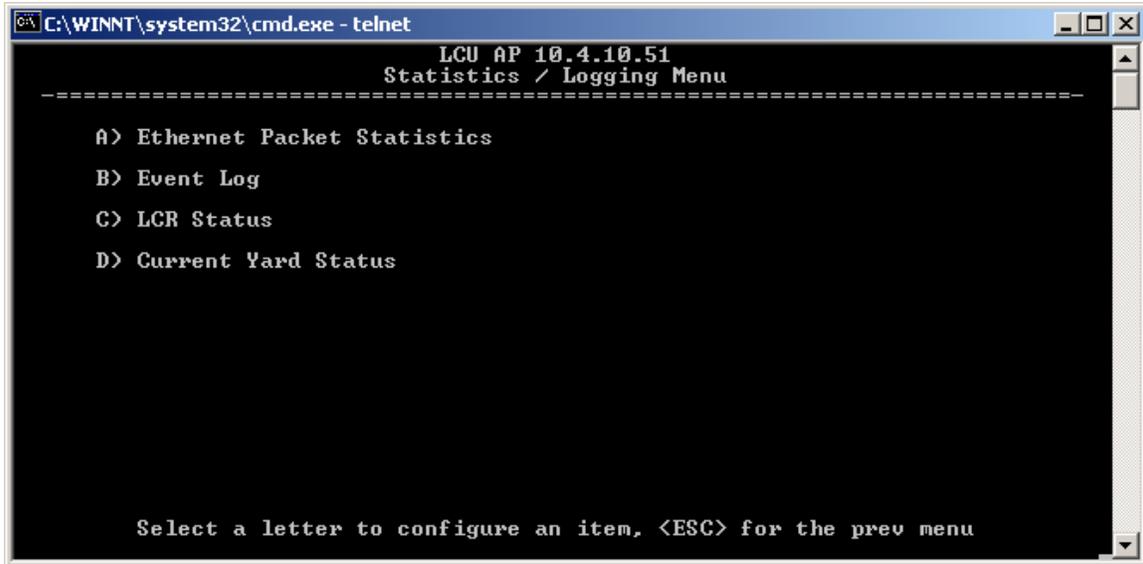
Parameter	Description	Values
A) Ethernet Packet Statistics	The Ethernet Packet Statistics menu	
B) Event Log	The Event Log menu	
C) LCR Status	The LCR Status menu	
D) Current Yard Status	The Current Yard Status menu	

Main menu – E) Statistics / Logging:
Availability: Repeater version
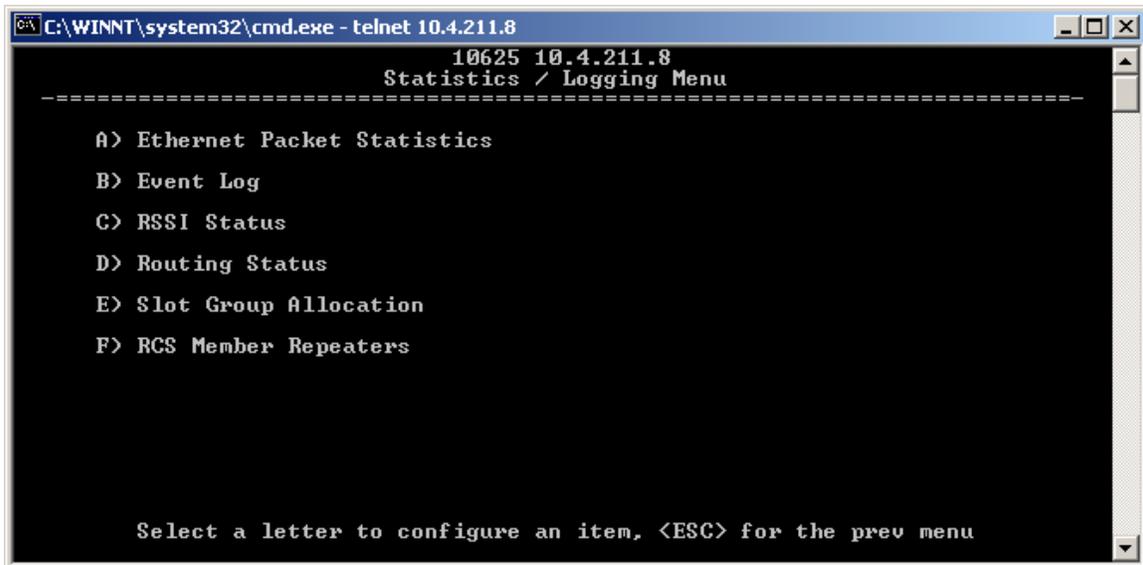
Parameter	Description	Values
A) Ethernet Packet Statistics	The Ethernet Packet Statistics menu	
B) Event Log	The Event Log menu	
C) RSSI Status	The RSSI Status menu	
D) Routing Status	The Routing Status menu	
E) Slot Group Allocation	The Slot Group Allocation menu	

Parameter	Description	Values
F) RCS Member Repeaters	The RCS Member Repeaters menu	

4.3.4.1 Ethernet Packet Statistics Menu

The *Ethernet/Wireless Packet Statistics* screen shows vital data on packets and bytes sent or received, and errors detected. The screen is updated about every three seconds.

Main menu – E) Statistics / Logging – A) Ethernet Packet Statistics:
Availability: Repeater and LCU
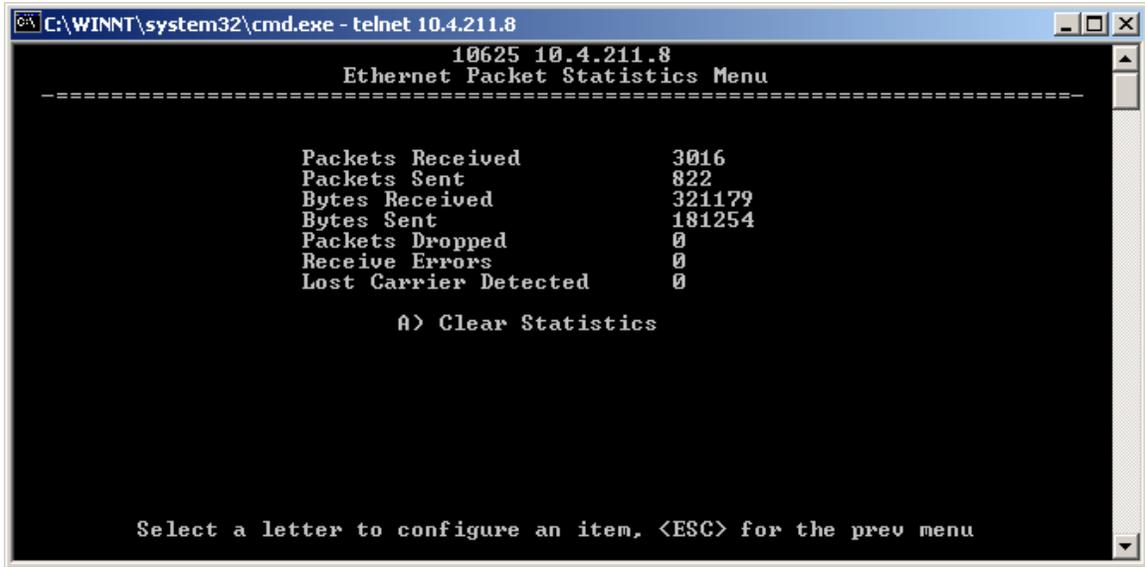
Parameter	Description	Values
Packets Received	Packets received through the Ethernet port of the transceiver.	0, …
Packets Sent	Packets send through the Ethernet port of the transceiver	0, …
Bytes Received	Data bytes received by this radio.	0, …
Bytes Sent	Data bytes sent by this radio	0, …
Packets Dropped	Received packets dropped from a lack of buffers	0, …
Receive Errors	Packets discarded after more than five retries	0, …
Lost Carrier Detected	Number of times the carrier signal on the Ethernet port has been missing. This count increase significantly when the Ethernet cable is inserted or removed	0, …
A) Clear Statistics	Resets the statistics counter.	y, n

4.3.4.2 Event Log Menu

The microprocessor within the transceiver monitors many operational parameters and logs them. Some events result from a condition that prevents the normal operation of the unit. These "critical" events cause the unit to enter an "alarmed" state, within which the POWER LED blinks, until the condition is corrected. All events are stored in the Event Log, which holds about 5,000 entries.

Time and Date Stamping
The events stored in the Event Log are time stamped using the time and date. You must manually enter the date and time at the AP. An internal battery backs up the manually set time and date clock.

Main menu – E) Statistics / Logging – B) Event Log:
Availability: Repeater and LCU

```
C:\WINNT\system32\cmd.exe - telnet 10.4.211.8                    _ □ X
                        10625 10.4.211.8
                         Event Log Menu
 -===============================================================-

      A) Current Alarms

      B) View Event Log

      C) Clear Event Log

      D) Send Event Log

      E) Event Log Host Address       0.0.0.0

      F) Event Log Filename           eventlog.txt

      G) TFTP Timeout                 10 sec

      H) Syslog Server Address        10.2.150.69



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

Parameter	Description	Values
A) Current Alarms	Lists events that have caused the unit to enter the alarmed state.	
B) View Event Log	Lists events stored in the current log.	
C) Clear Event Log	Purges the log of all stored events.	
D) Send Event Log	Initiates TFTP transfer of the Event Log in a plain text (ASCII) file to a TFTP server on the connected LAN.	y, n
E) Event Log Host Address	IP address of the computer on which the TFTP server resides.	Any valid IP address; *0.0.0.0*
F) Event Log Filename	Name to be given to the Event Log file sent to the TFTP server for archiving.	Any 40-char alphanumeric string; *<blank>*
G) TFTP Timeout	Number of seconds the TFTP server waits for a packet ACK (acknowledgment) from the transceiver before suspending the file transfer.	10-120; *30*

H) Syslog Server Address	The radio can also pass log messages to a SYSLOG server as they occur. Use this field to enter the IP address of this server.	Any valid IP address; *127.0.0.1*

4.3.4.2.1 Current Alarms Menu

Main menu – E) Statistics / Logging – B) Event Log – A) Current Alarms:
Availability: Repeater and LCU
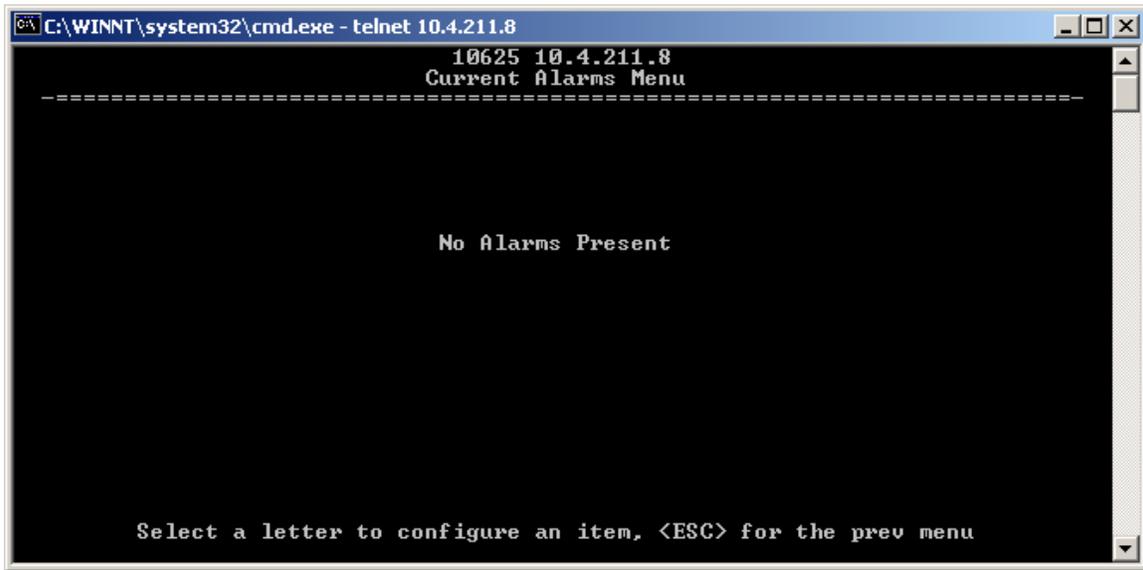
4.3.4.2.2 View Event Log Menu

Main menu – E) Statistics / Logging – B) Event Log – B) View Event Log:
Availability: Repeater and LCU
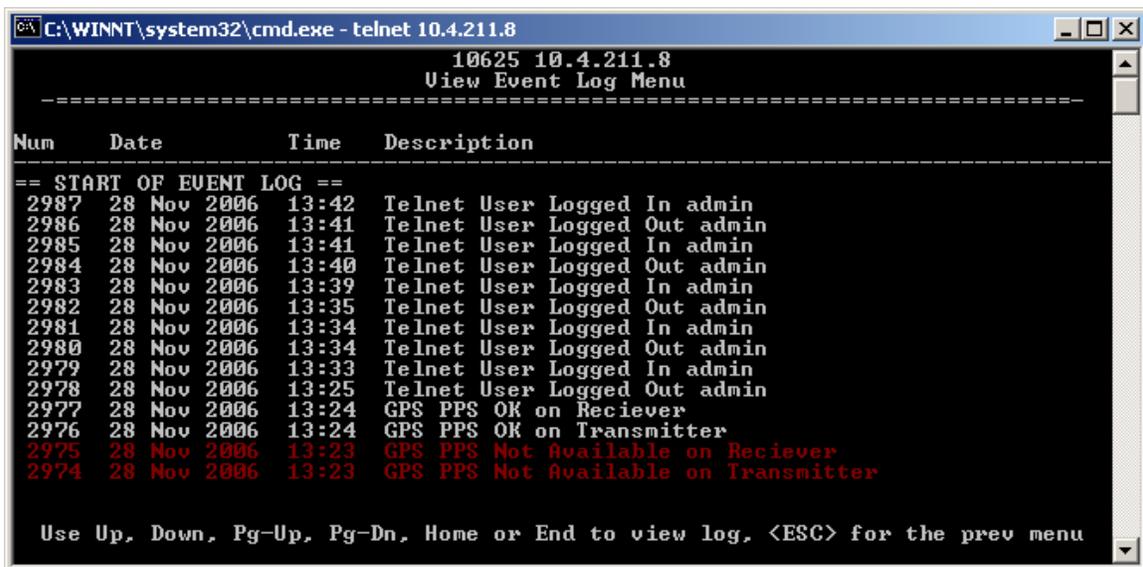
4.3.5 LCU AP Statistics / Logging Menus

4.3.5.1 *LCR Status Menu*

Main menu – E) Statistics / Logging – C) LCR Status:
Availability: LCU only

```
C:\WINNT\system32\cmd.exe - telnet                                    _ □ ✗
                          LCU AP 10.4.10.51
                          LCR Status Menu
   -=================================================================-

      Current Coordination Mode        CCM

      GPS Fix Quality                  Fix

      GPS Number of Satellites         4

      GPS Latitude                     43.5000000 degrees

      GPS Longitude                    -77.3833313 degrees

      Number of Yards                  0

      Yard RSSI Threshold              -120




      Select a letter to configure an item, <ESC> for the prev menu
```
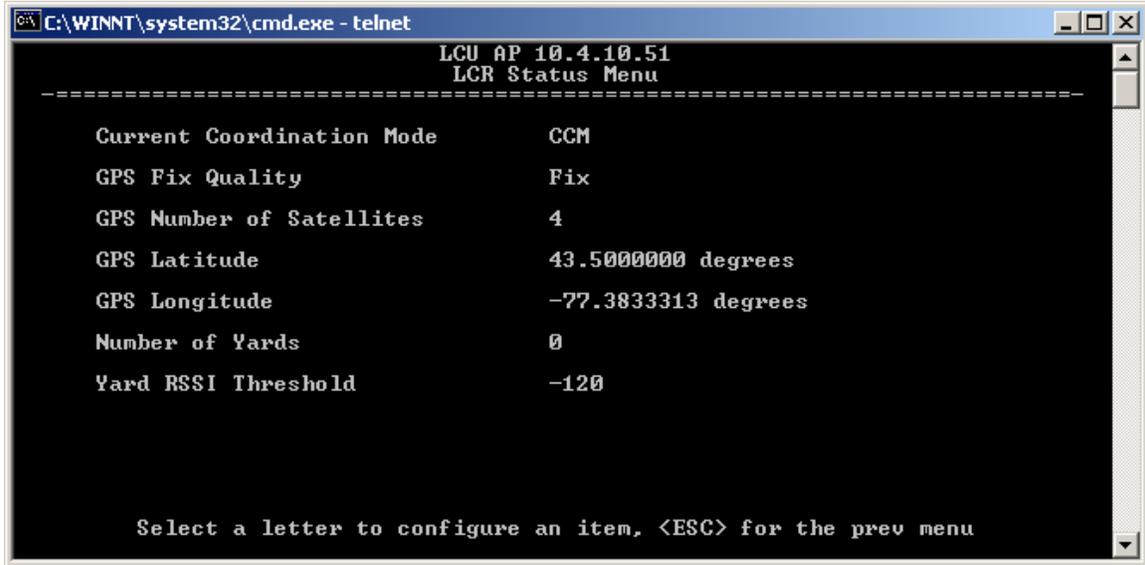
Parameter	Description	Values
Current Coordination Mode	The LCU and OCU radios operate together in Distributed Coordination Mode (DCM) when outside repeater range, and in Centralized Coordination Mode (CCM) when within repeater coverage.	DCM, CCM; DCM
GPS Fix Quality	In order to consider position and time data from the GPS receiver, it must have a fix. This field displays the current GPS status.	Fix, No Fix; No Fix
GPS Number of Satellites	Displays the number of satellites in view of the GPS receiver	0-12; 0
GPS Latitude	Displays positive numbers for North Latitude and negative numbers for South Latitude	-90 to +90; 0
GPS Longitude	Displays positive numbers for West Longitude and negative numbers for East Longitude	-180 to +180; 0
Number of Yards	The LCU Radio acquires information about yards over the air. This field displays how many yards have been identified.	0-15; 0
Yard RSSI Threshold	The RCL system will only enter infrastructure mode when the LCU Radio hears the yard with an RSSI above this threshold.	-120, …, 0; -120

4.3.5.2 *Current Yard Status Menu*

If the LCU is operating in Centralized Coordination Mode, the Repeater Community geometry is displayed in this menu.

Main menu – E) Statistics / Logging – D) Current Yard Status:
Availability: LCU only

```
C:\WINNT\system32\cmd.exe - telnet
                        LCU AP 10.4.10.51
                     Current Yard Status Menu
   -=================================================================-

      Repeater Yard ID    0

      Yard RSSI           -120

      Yard Latitude       0.0000000 degrees

      Yard Longitude      0.0000000 degrees

      Yard Rotation       0.000 degrees

      Yard X Diameter     1.000000000 miles

      Yard Y Diameter     1.000000000 miles

      Yard Shape          Ellipse



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

Parameter	Description	Values
A) Repeater Yard ID	The fixed yard ID used by the repeater	1-15; *0*
B) Yard Latitude	The latitude of the yard center	-90.0000000-90.0000000; *0.0000000*
C) Yard Longitude	The longitude of the yard center	-90.0000000-90.0000000; *0.0000000*
D) Yard Rotation	The degrees of rotation about the yard center	0.000, 5.625, 11.250, 16.875, 22.500, 28.125, 33.750, 39.375, 45.000, 50.625, 56.250, 61.875, 67.500, 73.125, 78.750, 84.375; *0.000*
E) Yard X Diameter	The X diameter of the yard in miles	1.000000000, 1.005013881, 1.038892703, 1.128915711, 1.301690951, 1.583418004, 2.000000000, 2.577107281, 3.340218650, 4.314650297, 5.525577218, 6.998049706, 8.757006443, 10.827285137, 13.233631341, 16.000705871; *1.000000000*

| F) Yard Y Diameter | The Y diameter of the yard in miles | 1.000000000,
1.005013881,
1.038892703,
1.128915711,
1.301690951,
1.583418004,
2.000000000,
2.577107281,
3.340218650,
4.314650297,
5.525577218,
6.998049706,
8.757006443,
10.827285137,
13.233631341,
16.000705871;
1.000000000 |

4.3.6 Repeater AP Statistics / Logging Menus

4.3.6.1 *RSSI Status Menu*

This screen displays the received signal strength in dBm on the main and diversity receiver of the Repeater for each RCL unit (LCU, OCUA, and OCUB) in each repeater time slot (0-14).

Main menu – E) Statistics / Logging – C) RSSI Status:
Availability: Repeater only
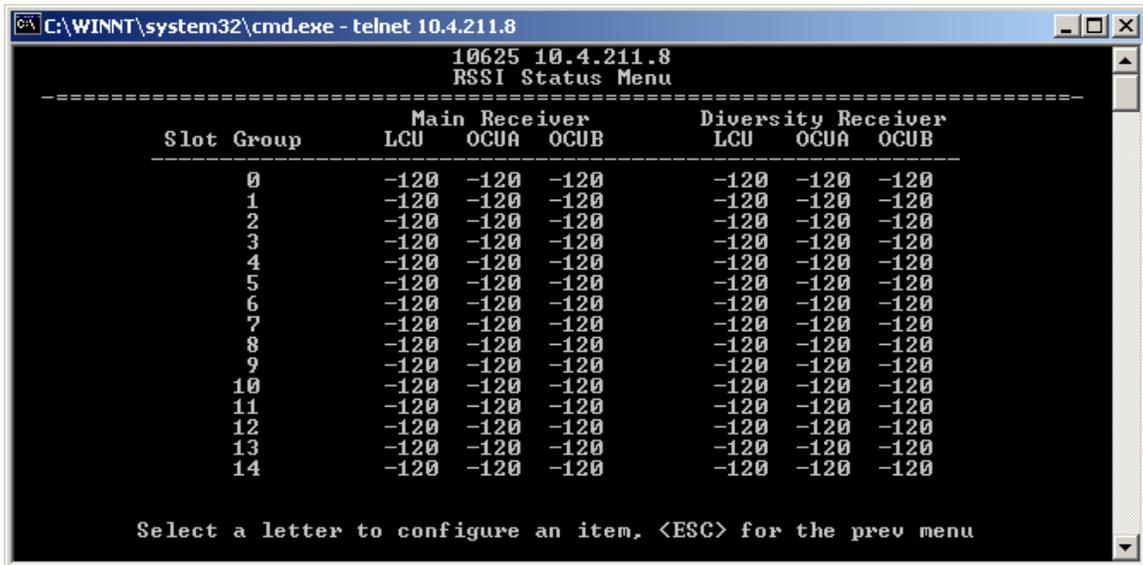
4.3.6.2 *Routing Status Menu*

This screen displays the favored route (Repeater IP address) and Received Signal Strength in dBm for each of the RCL units within repeater coordination.

Main menu – E) Statistics / Logging – D) Routing Status:
Availability: Repeater only

```
C:\WINNT\system32\cmd.exe - telnet 10.4.211.8                        _ □ X
                            10625 10.4.211.8
                          Routing Status Menu
 -========================================================================-
  Slot      LCU        LCU        OCUA       OCUA       OCUB       OCUB
  Group   Repeater IP  RSSI    Repeater IP  RSSI    Repeater IP  RSSI
 --------------------------------------------------------------------------
     0    127.0.0.1    -120     127.0.0.1   -120     127.0.0.1   -120
     1    127.0.0.1    -120     127.0.0.1   -120     127.0.0.1   -120
     2    127.0.0.1    -120     127.0.0.1   -120     127.0.0.1   -120
     3    127.0.0.1    -120     127.0.0.1   -120     127.0.0.1   -120
     4    127.0.0.1    -120     127.0.0.1   -120     127.0.0.1   -120
     5    127.0.0.1    -120     127.0.0.1   -120     127.0.0.1   -120
     6    127.0.0.1    -120     127.0.0.1   -120     127.0.0.1   -120
     7    127.0.0.1    -120     127.0.0.1   -120     127.0.0.1   -120
     8    127.0.0.1    -120     127.0.0.1   -120     127.0.0.1   -120
     9    127.0.0.1    -120     127.0.0.1   -120     127.0.0.1   -120
    10    127.0.0.1    -120     127.0.0.1   -120     127.0.0.1   -120
    11    127.0.0.1    -120     127.0.0.1   -120     127.0.0.1   -120
    12    127.0.0.1    -120     127.0.0.1   -120     127.0.0.1   -120
    13    127.0.0.1    -120     127.0.0.1   -120     127.0.0.1   -120
    14    127.0.0.1    -120     127.0.0.1   -120     127.0.0.1   -120


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

4.3.6.3 Slot Group Allocation Menu

This display shows the unit address by time slot for each RCL unit (LCU, OCUA, OCUB) within coordination.

Main menu – E) Statistics / Logging – E) Slot Group Allocation:
Availability: Repeater only

```
C:\WINNT\system32\cmd.exe - telnet 10.4.211.8                        _ □ X
                            10625 10.4.211.8
                       Slot Group Allocation Menu
 -========================================================================-
  Slot      LCU        LCU        OCUA       OCUA       OCUB       OCUB
  Group   Address      RSSI     Address     RSSI     Address     RSSI
 --------------------------------------------------------------------------
     0       0         -120        0        -120        0        -120
     1       0         -120        0        -120        0        -120
     2       0         -120        0        -120        0        -120
     3       0         -120        0        -120        0        -120
     4       0         -120        0        -120        0        -120
     5       0         -120        0        -120        0        -120
     6       0         -120        0        -120        0        -120
     7       0         -120        0        -120        0        -120
     8       0         -120        0        -120        0        -120
     9       0         -120        0        -120        0        -120
    10       0         -120        0        -120        0        -120
    11       0         -120        0        -120        0        -120
    12       0         -120        0        -120        0        -120
    13       0         -120        0        -120        0        -120
    14       0         -120        0        -120        0        -120


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

4.3.6.4 RCS Member Repeaters Menu

This screen shows the IP addresses and time last heard for each Repeater within the community.

Main menu – E) Statistics / Logging – F) RCS Member Repeaters:
Availability: Repeater only
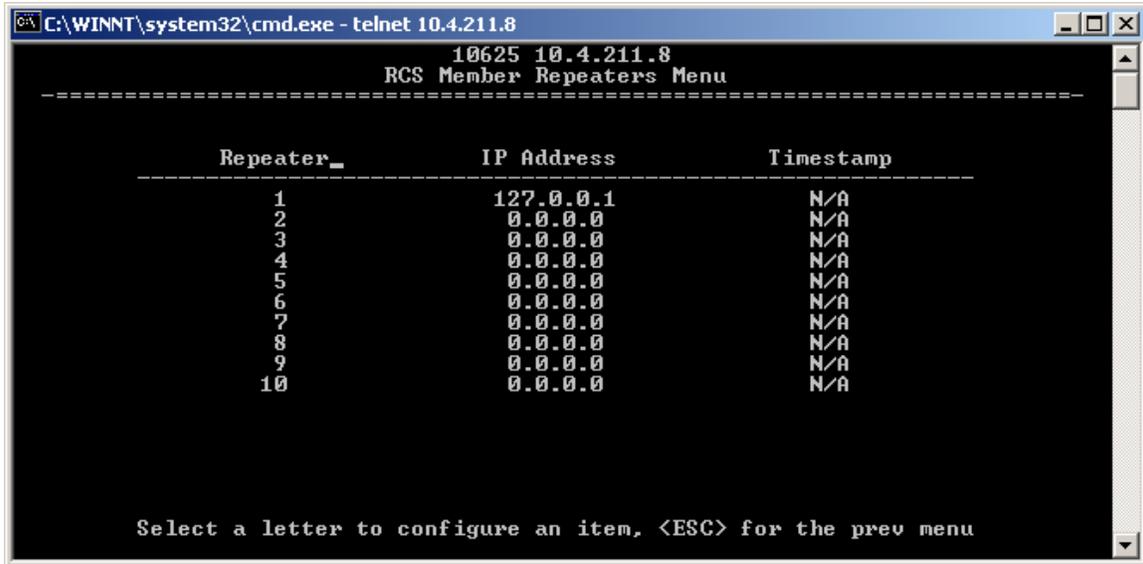
4.3.7 Device Information Menu

The *Device Information* menu displays basic administrative data on the unit to which you are connected. It also provides a date and time display, Console Baud Rate setting, and customer-specific parameters under the Device Names selection.

Main menu – F) Device Information:
Availability: Repeater and LCU
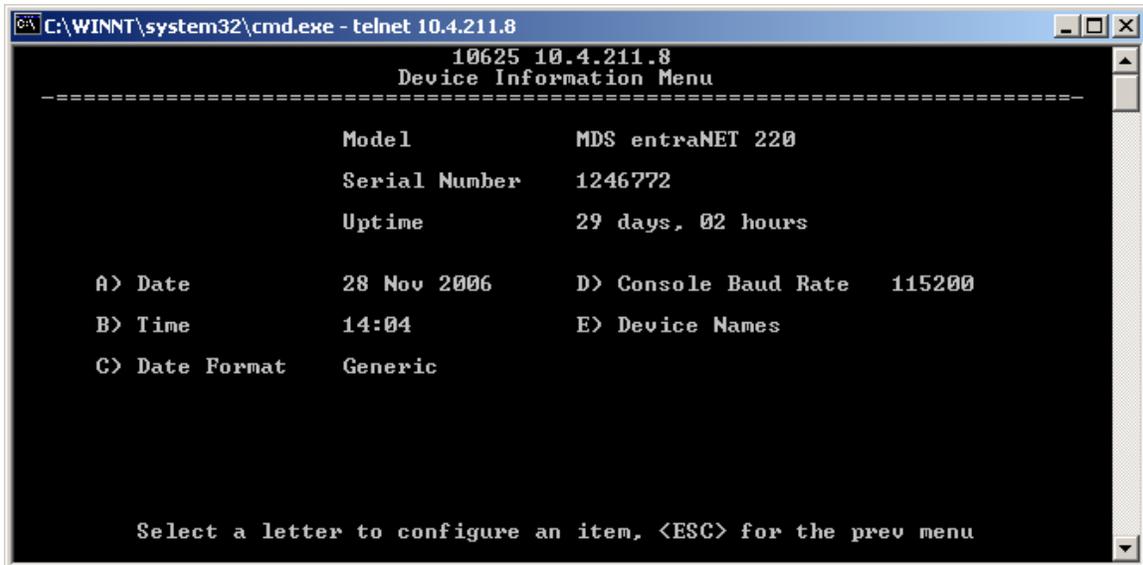
Parameter	Description	Values
Model	Model type of the connected unit	MDS entraNET 220
Serial Number	The serial number of the Access Point.	0-9999999
Uptime	The elapsed time since the last unit reboot.	
A) Date	Current date being used for the transceiver logs (customer settable).	X Y Z (X=1-31, Y=Month abbr, Z=4 digit year); Blank

B) Time	Current time of day (customer settable). Setting: HH:MM	X:Y (X=0-23, Y=0-59); Blank
C) Date Format	Select a presentation format: • Generic = dd Mmm yyyy • European = dd-mm-yyyy • U.S.A. = mm-dd-yyyy	Generic, US, European; Generic
D) Console Baud Rate	Allows setting the console baud rate to match the connected terminal.	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200; 19200
E) Device Names	The Device Name, contact, location, and description fields for each unit can be used to record whatever communications-specific information is useful to your organization; the information appears on this screen only.	

NOTE: The date and time are maintained by an internal battery module, which is not customer serviceable.

4.3.7.1 Device Names Menu

Main menu – F) Device Information – E) Device Names:
Availability: Repeater and LCU

```
C:\WINNT\system32\cmd.exe - telnet 10.4.211.8                    _ □ X
                         10625 10.4.211.8
                         Device Names Menu
 -=============================================================-

    A> Device Name            10625 10.4.211.8

    B> Contact

    C> Location               MDS Engineering Lab

    D> Description




         Select a letter to configure an item, <ESC> for the prev menu
```
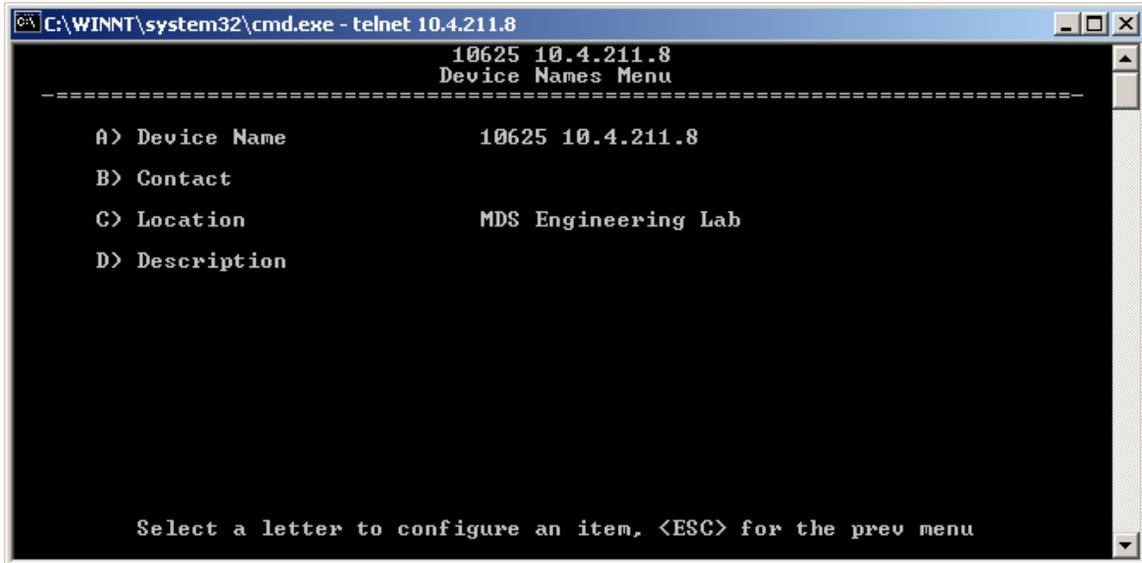
Parameter	Description	Values
A) Device Name	Device Name, used by the transceiver as the realm name for network security and menu headings.	Any 40-char alphanumeric string; Blank
B) Contact	Contact information for the administration of this device.	Any 40-char alphanumeric string; Blank
C) Location	The physical location of this device	Any 40-char alphanumeric string; Blank
D) Description	A description of this product	Any 40-char alphanumeric string; Blank

4.3.8 Maintenance / Tools Menu

In the course of operating your network, you may want to take advantage of product improvements, and to read and archive the configuration of your individual transceivers. The *Maintenance Menu* provides several tools to make this possible. This section provides detailed information on how to use these services.

Key maintenance tasks are:
- Reprogramming— Managing and selecting the radio operating system firmware resources.
- Configuration Scripts—Saving and importing data files containing radio operating parameters or settings.
- PING Utility—Diagnostic tool to test network connectivity
- Authorization Codes (Keys)—Alter the radio capabilities by enabling the built-in resources via purchased keys.

Main menu – G) Maintenance / Tools:
Availability: Repeater and LCU

```
C:\WINNT\system32\cmd.exe - telnet 10.4.211.8                          _ □ X
                           10625 10.4.211.8
                      Maintenance / Tools Menu
    -==================================================================-

        A) Reprograming

        B) Configuration Scripts

        C) Ping Utility

        D) Authorization Codes









        Select a letter to configure an item, <ESC> for the prev menu
```
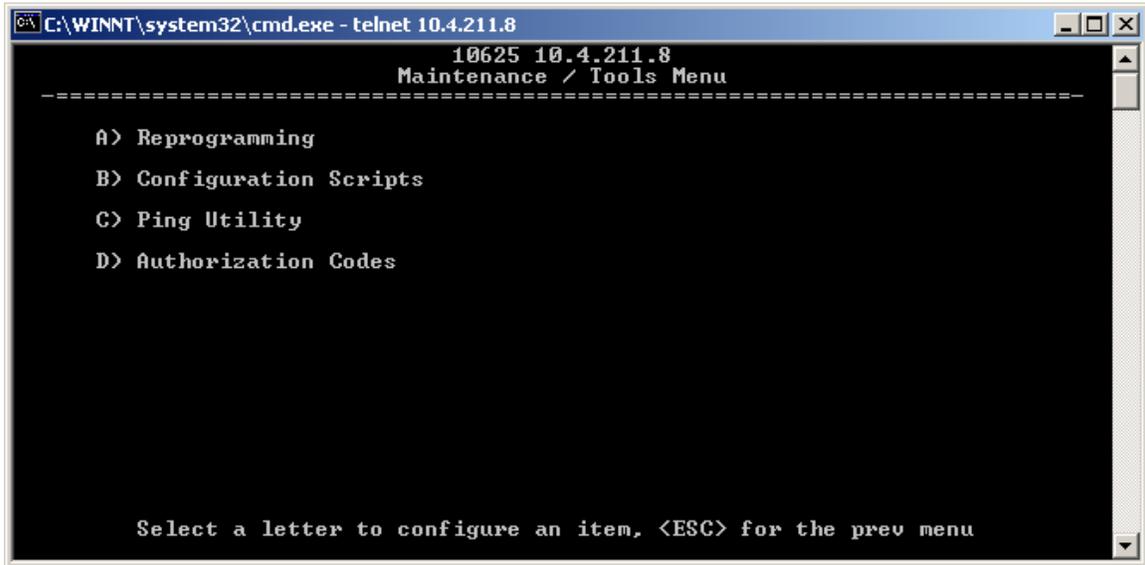
Parameter	Description	Values
A) Reprogramming	Managing and selecting the radio operating system firmware resources.	
B) Configuration Scripts	Saving and importing data files containing radio operating parameters or settings.	
C) Ping Utility	Diagnostic tool to test network connectivity	
D) Authorization Codes	Alter the radio capabilities by enabling the built-in resources via purchased keys.	

4.3.8.1 Reprogramming Menu

The AP has two copies of the firmware (microprocessor code) used for the operating system and applications. One copy is active and the second one is standing by, ready to be used. Using the *Reprogramming Menu*, you can upload a new release into the inactive position and place it in service whenever you desire.

Main menu – G) Maintenance / Tools – A) Reprogramming:
Availability: Repeater and LCU

```
C:\WINNT\system32\cmd.exe - telnet 10.4.211.8                          _ □ ×
                         10625 10.4.211.8
                        Reprogramming Menu
   -===============================================================-

      A) TFTP Host Address    10.2.150.69

      B) Firmware Filename     sln-3_2_3.mpk

      C) TFTP Timeout         10 sec

      D) Retrieve File

      E) Image Verify

      F) Image Copy

      G) Reboot Device

         Current Firmware     Image 1: 3.2.3
                              Image 2: 3.2.3   (active)



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

Parameter	Description	Values
A) TFTP Host Address	IP address of the host computer from which to get the file.	Any valid IP address; 127.0.0.1
B) Firmware Filename	Name of file to be received from the TFTP server. Verify that this string corresponds to the TFTP directory location. May require a sub-directory; for example: firmware/sln-3_2_4.mpk.	Any 40-char alphanumeric string; blank; *firmware.mpk*
C) TFTP Timeout	Time in seconds the TFTP server waits for a packet ACK (acknowledgment) from the unit before suspending the file transfer.	10-120; 30
D) Retrieve File	Initiate the file transfer from the TFTP server. The received image is placed into the inactive firmware position in the transceiver non-volatile memory.	y, n
E) Image Verify	Initiate integrity verification of the firmware file held in the unit.	1, 2
F) Image Copy	Copying the active firmware into the inactive image.	y, n
G) Reboot Device	Restart the unit. Use this command to toggle between firmware images.	1, 2
Current Firmware	Shows the current firmware revision level.	0.0.0

4.3.8.2 Configuration Scripts Menu

If you plan to have more than a few transceivers in your network, you may want to use the Configuration Script feature to configure similar radios from a common set of parameters. Over 50 customer settings that optimize the network are saved in a configuration file (text file). However, only a few essential parameters need to be reviewed and altered to use the file with another transceiver.

A configuration file makes it easy to apply your unique settings to any transceiver(s) you wish. Configuration files also provide you with a tool to restore parameters to a known working set, in the event that a parameter is improperly set and performance is affected.

Main menu – G) Maintenance / Tools – B) Configuration Scripts:
Availability: Repeater and LCU

Parameter	Description	Values
A) TFTP Host Address	IP address of the computer on which the TFTP server resides	Any valid IP address; *127.0.0.1*
B) Config Filename	Name of the file containing the configuration profile to be transferred to or from the TFTP server. The configuration information is in ASCII format. May require a sub-directory; for example: config/eNET_220_Repeater.txt.	Any 40-char alphanumeric string; blank; *cfgscript.txt*
C) TFTP Timeout	Time in seconds the TFTP server waits for a packet ACK (acknowledgment) from the unit before suspending the file transfer.	10-120; *30*
D) Retrieve File	Initiate the file transfer of the configuration file from the TFTP server into the unit.	y, n
E) Send File	Initiate the file transfer from the current configuration file to the TFTP server.	y, n

4.3.8.3 *Ping Utility Menu*

The *Ping Utility Menu* is used to verify IP connectivity with LAN nodes.

Main menu – G) Maintenance / Tools – C) Ping Utility:
Availability: Repeater and LCU

Parameter	Description	Values
A) Address to Ping	Address to send a Ping.	Any valid IP address; *127.0.0.1*
B) Count	Number of Ping packets to be sent.	0-999999999; *4*
C) Packet SIze	Size in bytes of each Ping data packet.	0-65535; *32*
D) Ping	Start sending PING packets to address shown on screen. The process can be stopped at any time by pressing Ctrl-C on the PC keyboard. The screen then displays a detailed report of PING activity. Press any key after viewing the results to return to this menu.	

4.3.8.4 Authorization Codes Menu

Main menu – G) Maintenance / Tools – D) Authorization Codes:
Availability: Repeater and LCU
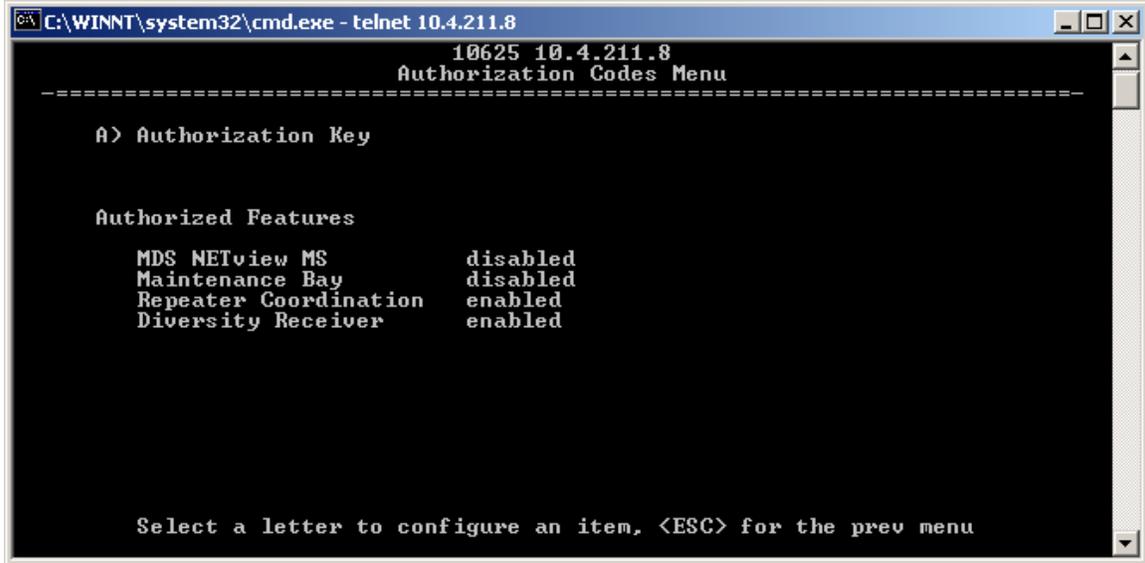
Parameter	Description	Values
A) Authorization Key	Accept an Authorization Key into the transceiver non-volatile memory.	Any 40-char alphanumeric string; *Blank*
Authorized Features	(for display only)—Presents a list of authorized features. At the time of publication, available features include MDS NETview MS, Maintenance Bay use, multi-repeater coordination, and Diversity Receiver use.	

5   Troubleshooting

Here are some tips to help resolve issues when operating the RCL220.

Symptom	Possible Cause
Radio is alarmed (PWR LED is flashing)	Check the alarm list accessible from the Starting Information Screen.
Alarm: GPS PPS Not Available	Radio is not receiving a PPS.
Alarm: GPS Signal Inverted	Although a PPS has been detected, it is in the ACTIVE state for more than a half of a second. Try switching the PPS Polarity setting on the GPS Configuration Menu.
Alarm: NMEA Data – Invalid	The radio is not receiving valid NMEA GGA Sentences. Verify that the NMEA Baud rate is set correctly and verify that the GPS is outputting ASCII GGA sentences (and no others, if possible).

Alarm: OTA Sync Lost	The radio has lost over the air synchronization because it is no longer receiving wireless beacons from a packaged radio.

6 Change Log

Version	Date	Author	Changes
1	12/31/2014	T. Mayo	• Initial release for RCL220
2	01/07/2015	T. Mayo	• Added reference to the DB-25 adapter kit instruction sheet.