GE MDS RCL220 Manual
P/N 05-XXXXA01
Version 3
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<th>Description</th>
<th>Page</th>
</tr>
</thead>
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<td>66</td>
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<td></td>
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<td>79</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Antenna Gain vs. Minimum Safety Distance</th>
<th>(Based upon a 4.26% Duty Cycle, 0 dB Feedline Loss)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uncontrolled Environment Exposure limits</td>
<td></td>
</tr>
<tr>
<td>Fixed/Mobile Antenna Gain</td>
<td></td>
</tr>
<tr>
<td>0-6 dBi</td>
<td></td>
</tr>
<tr>
<td>6-10 dBi</td>
<td></td>
</tr>
<tr>
<td>10-16.5 dBi</td>
<td></td>
</tr>
<tr>
<td>Minimum RF Safety Distance</td>
<td></td>
</tr>
<tr>
<td>0.4 meters</td>
<td></td>
</tr>
<tr>
<td>0.7 meters</td>
<td></td>
</tr>
<tr>
<td>1.6 meters</td>
<td></td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>MDS Radio Unit</th>
<th>Used for OCU</th>
<th>Used for LCU</th>
<th>Used for Repeater</th>
</tr>
</thead>
<tbody>
<tr>
<td>entraNET 220 OEM Radio Module</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>entraNET 220 Packaged Radio Module</td>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Access Point</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

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.
 entraNET 220
OEM
Radio Module
(ORM)

RCL Vendor OCU
Controller

COM2

Figure 2 entraNET 220 OCU Unit Block Diagram

enteNET 220
Packaged
Radio Module
(PRM)

GPS Timing Receiver

COM2 (RS-232 or 422)

RCL Vendor LCU
Controller

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.

![Access Point Image]

**Figure 4 Access Point**

![Access Point (Top View) Image]

**Figure 5 Access Point (Top View)**

![Access Point (Front View) Image]

**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.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PC_USB_+5V</td>
<td>+5 VDC</td>
</tr>
<tr>
<td>2</td>
<td>USBD-</td>
<td>USB Data Minus</td>
</tr>
<tr>
<td>3</td>
<td>USBD+</td>
<td>USB Data Plus</td>
</tr>
<tr>
<td>4</td>
<td>GROUND</td>
<td>Ground</td>
</tr>
</tbody>
</table>

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.

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

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.
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.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal Name</th>
<th>Direction with respect to MDS Equipment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (L)</td>
<td>PWR</td>
<td>Input</td>
<td>10 to 30 VDC input, 125 mA at 13.8 VDC</td>
</tr>
<tr>
<td>2</td>
<td>GROUND</td>
<td>Input</td>
<td>Power return.</td>
</tr>
</tbody>
</table>

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)
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.
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.

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

2.2.3 RF Connector

The RF Connector is a straight mount 50 Ohm SMB jack.
2.3 *ennaNET 220 Packaged Radio Module*

In the LCU, one *ennaNET 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.

![ennaNET 220 Packaged Radio Module](image)

*Figure 15 ennaNET 220 Packaged Radio Module*

![ennaNET 220 Packaged Radio Module (Top View)](image)

*Figure 16 ennaNET 220 Packaged Radio Module (Top View)*

![ennaNET 220 Packaged Radio Module (Front View)](image)

*Figure 17 ennaNET 220 Packaged Radio Module (Front 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.

<table>
<thead>
<tr>
<th>New DB-25 Pin</th>
<th>Signal</th>
<th>Previous PRM Connector</th>
<th>Previous PRM Pin</th>
<th>Direction WRT MDS Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>COM3_DCD</td>
<td>N/A</td>
<td>N/A</td>
<td>Input</td>
</tr>
<tr>
<td>2</td>
<td>COM2_TXD/TXD</td>
<td>J3 (COM2)</td>
<td>6</td>
<td>Input</td>
</tr>
<tr>
<td>3</td>
<td>COM2_RXD/RXD</td>
<td>J3 (COM2)</td>
<td>5</td>
<td>Output</td>
</tr>
<tr>
<td>4</td>
<td>COM2_RTS/TXD</td>
<td>J3 (COM2)</td>
<td>8</td>
<td>Input</td>
</tr>
<tr>
<td>5</td>
<td>COM2_CTS</td>
<td>J3 (COM2)</td>
<td>7</td>
<td>Output</td>
</tr>
<tr>
<td>6</td>
<td>COM3_TXD</td>
<td>N/A</td>
<td>N/A</td>
<td>Output</td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
<td>J3 (COM2)</td>
<td>4</td>
<td>Input/Output</td>
</tr>
<tr>
<td>8</td>
<td>COM2_DCD/RXD</td>
<td>J3 (COM2)</td>
<td>2</td>
<td>Output</td>
</tr>
</tbody>
</table>
### 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.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal Name</th>
<th>Direction with respect to MDS Equipment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (L)</td>
<td>PWR</td>
<td>Input</td>
<td>6 to 30 VDC input, 800 mA at 13.8 VDC</td>
</tr>
<tr>
<td>21</td>
<td>GROUND</td>
<td>Input</td>
<td>Power return.</td>
</tr>
</tbody>
</table>

* 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
```
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.

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**

<table>
<thead>
<tr>
<th>Com Port</th>
<th>COM15</th>
<th>User Name</th>
<th>admin</th>
<th>Password</th>
<th>*****</th>
</tr>
</thead>
</table>

**Browse Package:** C:\Users\220023498\Downloads\slim-comd-3_9_34.mpk

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

**Get Configuration:** C:\Users\220023498\Downloads\lor_config.txt

**Set Configuration:**

VER DSREV=3.7.4  
VER M5REV=3.5.2  
VER IMAGE=1  
VER DSPSW=3.7.4 200d20  
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
entraNET> COM1 FORMAT=3N1
FORMAT=3 char bits, no parity, 1 stop bits

entraNET> COM2 DEFAULT=CONSOLE
DEFAULT=Com2 defaults to Command-line mode

entraNET> COM2 MODE=CONSOLE
MODE=Com2 in Command-line mode

entraNET>

COM2 LEVELS=RS232 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.

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:
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:
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:
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:

![Poller Application](image)

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.
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

<table>
<thead>
<tr>
<th>Set</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASIC</td>
<td>Basic generic features set</td>
</tr>
<tr>
<td>1</td>
<td>Company features set #1</td>
</tr>
<tr>
<td>2</td>
<td>Company features set #2</td>
</tr>
<tr>
<td>3</td>
<td>Company features set #3</td>
</tr>
<tr>
<td>4</td>
<td>Company features set #4</td>
</tr>
<tr>
<td>5</td>
<td>Company features set #5</td>
</tr>
<tr>
<td>6</td>
<td>Company features set #6</td>
</tr>
</tbody>
</table>

**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 Administrator. 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=**<var>fix</var>  Read Only.

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

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

Acceptable value range: 0 - ????

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

Acceptable value range: X.XXXXX Degrees

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

Acceptable value range: X.XXXXX Degrees

**CMD=**<var>cmd</var>  If set to 0, the command executes normally. If <var>cmd</var> 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

<table>
<thead>
<tr>
<th>ALL</th>
<th>All images</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOOT</td>
<td>Bootloader Image</td>
</tr>
<tr>
<td>APP1</td>
<td>App 1 Image</td>
</tr>
<tr>
<td>APP2</td>
<td>App 2 Image</td>
</tr>
<tr>
<td>DSP1</td>
<td>DSP 1 Image</td>
</tr>
<tr>
<td>DSP2</td>
<td>DSP 2 Image</td>
</tr>
<tr>
<td>MCU1</td>
<td>MCU 1 Image</td>
</tr>
<tr>
<td>MCU2</td>
<td>MCU 2 Image</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>COM1_RECEIVE</th>
<th>Accept reprogramming over the local serial port</th>
</tr>
</thead>
<tbody>
<tr>
<td>RADIO.Receive</td>
<td>Request reprogramming over the air</td>
</tr>
<tr>
<td>RADIO_SEND</td>
<td>Serve reprogramming requests over the air</td>
</tr>
<tr>
<td>COM1_SENDTEST</td>
<td>Initiate reprogramming over the local serial port</td>
</tr>
</tbody>
</table>

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

Acceptable value range: 0 - ????

IMAGENUM=Read Only. The image index.

STATUS= Read Only.
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>} {ROUPTIMEOUT=<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:

COMMITHANS 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 Administrator. 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=<lastmfreq3>} {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.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONE</td>
<td>Normal mode</td>
</tr>
<tr>
<td>SLEEP</td>
<td>Sleep enabled</td>
</tr>
<tr>
<td>SHUTDOWN</td>
<td>Shutdown enabled</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Wake</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTR</td>
<td>Wake under DTR signal control</td>
</tr>
<tr>
<td>DATA</td>
<td>Wake up on data</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Sense</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW</td>
<td>DTR Active LOW</td>
</tr>
</tbody>
</table>
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-nnnnnAnn)

| 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-nnnnnAnn)

| 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.
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 (8 bits integer): -128 to 127

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

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

ID=<id> Read Only. Current yard ID

Acceptable value range (8 bits 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 Longitude 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

![Telnet login screen](image)
4.2 Starting Information Screen

Availability: Repeater and LCU

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>A) Starting Information Screen</td>
<td>Select this item to return to the Starting Information Screen.</td>
<td></td>
</tr>
<tr>
<td>Tools</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>B) Network Configuration</td>
<td>Tools to configure the transceiver data network layer.</td>
<td></td>
</tr>
<tr>
<td>C) System Configuration</td>
<td>Tools to configure the Repeater System.</td>
<td></td>
</tr>
<tr>
<td>D) Security Configuration</td>
<td>Tools to configure the transceiver security services.</td>
<td></td>
</tr>
<tr>
<td>E) Statistics / Logging</td>
<td>Tools to measure the radio and data layer network performance.</td>
<td></td>
</tr>
<tr>
<td>F) Device Information</td>
<td>Top-level customer-specific and definable parameters, such as the date, time, console baud rate, and device name information.</td>
<td></td>
</tr>
</tbody>
</table>
4.3.1 Network Configuration Menu

Main menu – BI Network Configuration:
Availability: Repeater and LCU

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 – BI Network Configuration – AI 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

![System Configuration Menu](image)

### 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**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>A) BSP Logging</td>
<td>Enable logging of BSP messages to remote server</td>
<td>enabled, disabled; disabled</td>
</tr>
<tr>
<td>B) BSP Log Server</td>
<td>IP address of BSP message server</td>
<td>Any valid IP address; 0.0.0.0</td>
</tr>
<tr>
<td>C) BSP Log Server Port</td>
<td>IP port for BSP message server</td>
<td>0-65535; 0</td>
</tr>
</tbody>
</table>

### 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; 220.106250
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; 220.118750
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

![Backhaul Configuration Menu](image_url)

### 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 – HI) Yard Configuration
Availability: Repeater only

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>A) Repeater Yard ID</td>
<td>The fixed yard ID used by the repeater</td>
<td>1-15; 0</td>
</tr>
<tr>
<td>B) Yard Latitude</td>
<td>The latitude of the yard center</td>
<td>-90.0000000-90.0000000; 0.0000000</td>
</tr>
<tr>
<td>C) Yard Longitude</td>
<td>The longitude of the yard center</td>
<td>-90.0000000-90.0000000; 0.0000000</td>
</tr>
<tr>
<td>D) Yard Rotation</td>
<td>The degrees of rotation about the yard center</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>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, 90.000</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>E) Yard X Diameter</th>
<th>The X diameter of the yard in miles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>F) Yard Y Diameter</th>
<th>The Y diameter of the yard in miles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>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</td>
</tr>
</tbody>
</table>

### 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
### Parameter Description Values

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>A – O) Slot Group X Status</td>
<td>The status of Slot group X</td>
<td>enabled, disabled; enabled</td>
</tr>
</tbody>
</table>

#### 4.3.3 Security Configuration Menu

Main menu – D) Security Configuration

Availability: Repeater and LCU

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>A) HTTP Access</td>
<td>Allows remote access through HTTP (a Web browser) on Port 80.</td>
<td>enabled, disabled; enabled</td>
</tr>
<tr>
<td>B) Telnet Access</td>
<td>Allows remote access through Telnet sessions on Port 23.</td>
<td>enabled, disabled; enabled</td>
</tr>
</tbody>
</table>
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.

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>A) Change Admin Password</td>
<td>Change Admin Password. Passwords are case sensitive; can be mixed case</td>
<td>1–8 alphanumeric characters; admin</td>
</tr>
<tr>
<td>B) Change Guest Password</td>
<td>Change Guest Password. Passwords are case sensitive; can be mixed case</td>
<td>1–8 alphanumeric characters; guest</td>
</tr>
</tbody>
</table>

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
F) RSS Group Repeater
**Parameter Description Values**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>F) RCS Member Repeaters</td>
<td>The RCS Member Repeaters menu</td>
<td></td>
</tr>
</tbody>
</table>

### 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

![Ethernet Packet Statistics Menu](image)

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packets Received</td>
<td>Packets received through the Ethernet port of the transceiver.</td>
<td>0, ...</td>
</tr>
<tr>
<td>Packets Sent</td>
<td>Packets sent through the Ethernet port of the transceiver</td>
<td>0, ...</td>
</tr>
<tr>
<td>Bytes Received</td>
<td>Data bytes received by this radio.</td>
<td>0, ...</td>
</tr>
<tr>
<td>Bytes Sent</td>
<td>Data bytes sent by this radio.</td>
<td>0, ...</td>
</tr>
<tr>
<td>Packets Dropped</td>
<td>Received packets dropped from a lack of buffers</td>
<td>0, ...</td>
</tr>
<tr>
<td>Receive Errors</td>
<td>Packets discarded after more than five retries</td>
<td>0, ...</td>
</tr>
<tr>
<td>Lost Carrier Detected</td>
<td>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</td>
<td>0, ...</td>
</tr>
<tr>
<td>A) Clear Statistics</td>
<td>Resets the statistics counter.</td>
<td>y, n</td>
</tr>
</tbody>
</table>
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

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

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

![Current Alarms Menu](image)

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

![View Event Log Menu](image)
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

![LCR Status Menu](image)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Coordination Mode</td>
<td>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.</td>
<td>DCM, CCM; DCM</td>
</tr>
<tr>
<td>GPS Fix Quality</td>
<td>In order to consider position and time data from the GPS receiver, it must have a fix. This field displays the current GPS status.</td>
<td>Fix, No Fix; No Fix</td>
</tr>
<tr>
<td>GPS Number of Satellites</td>
<td>Displays the number of satellites in view of the GPS receiver</td>
<td>0-12; 0</td>
</tr>
<tr>
<td>GPS Latitude</td>
<td>Displays positive numbers for North Latitude and negative numbers for South Latitude</td>
<td>-90 to +90; 0</td>
</tr>
<tr>
<td>GPS Longitude</td>
<td>Displays positive numbers for West Longitude and negative numbers for East Longitude</td>
<td>-180 to +180; 0</td>
</tr>
<tr>
<td>Number of Yards</td>
<td>The LCU Radio acquires information about yards over the air. This field displays how many yards have been identified.</td>
<td>0-15; 0</td>
</tr>
<tr>
<td>Yard RSSI Threshold</td>
<td>The RCL system will only enter infrastructure mode when the LCU Radio hears the yard with an RSSI above this threshold.</td>
<td>-120, ..., 0; -120</td>
</tr>
</tbody>
</table>

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
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>A) Repeater Yard ID</td>
<td>The fixed yard ID used by the repeater</td>
<td>1-15; 0</td>
</tr>
<tr>
<td>B) Yard Latitude</td>
<td>The latitude of the yard center</td>
<td>-90.0000000-90.0000000; 0.0000000</td>
</tr>
<tr>
<td>C) Yard Longitude</td>
<td>The longitude of the yard center</td>
<td>-90.0000000-90.0000000; 0.0000000</td>
</tr>
<tr>
<td>D) Yard Rotation</td>
<td>The degrees of rotation about the yard center</td>
<td>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</td>
</tr>
<tr>
<td>E) Yard X Diameter</td>
<td>The X diameter of the yard in miles</td>
<td>1.0000000000, 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</td>
</tr>
</tbody>
</table>
### 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**

![RSSI Status Menu](image)

#### 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**

<table>
<thead>
<tr>
<th>Slot Group</th>
<th>Main Receiver LCU</th>
<th>OCUA</th>
<th>OCUB</th>
<th>Diversity Receiver LCU</th>
<th>OCUA</th>
<th>OCUB</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
</tr>
<tr>
<td>1</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
</tr>
<tr>
<td>2</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
</tr>
<tr>
<td>3</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
</tr>
<tr>
<td>4</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
</tr>
<tr>
<td>5</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
</tr>
<tr>
<td>6</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
</tr>
<tr>
<td>7</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
</tr>
<tr>
<td>8</td>
<td>-120</td>
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<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
</tr>
<tr>
<td>9</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
</tr>
<tr>
<td>10</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
</tr>
<tr>
<td>11</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
</tr>
<tr>
<td>12</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
</tr>
<tr>
<td>13</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
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<tr>
<td>14</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
<td>-120</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Model type of the connected unit</td>
<td>MDS entraNET 220</td>
</tr>
<tr>
<td>Serial Number</td>
<td>The serial number of the Access Point.</td>
<td>0-9999999</td>
</tr>
<tr>
<td>Uptime</td>
<td>The elapsed time since the last unit reboot.</td>
<td></td>
</tr>
<tr>
<td>A) Date</td>
<td>Current date being used for the transceiver logs (customer settable).</td>
<td>X Y Z (X=1-31, Y=Month abbr, Z=4 digit year); Blank</td>
</tr>
<tr>
<td>B) Time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C) Date Format</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Select a letter to configure an item, <ESC> for the prev menu.
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>B) Time</strong></td>
<td>Current time of day (customer settable). Setting: HH:MM</td>
<td>XY (X=0-23, Y=0-59); Blank</td>
</tr>
</tbody>
</table>
| **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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>A) Device Name</td>
<td>Device Name, used by the transceiver as the realm name for network security and menu headings.</td>
<td>Any 40-char alphanumeric string; Blank</td>
</tr>
<tr>
<td>B) Contact</td>
<td>Contact information for the administration of this device.</td>
<td>Any 40-char alphanumeric string; Blank</td>
</tr>
<tr>
<td>C) Location</td>
<td>The physical location of this device</td>
<td>Any 40-char alphanumeric string; Blank</td>
</tr>
<tr>
<td>D) Description</td>
<td>A description of this product</td>
<td>Any 40-char alphanumeric string; Blank</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>A) Reprogramming</td>
<td>Managing and selecting the radio operating system firmware resources.</td>
<td></td>
</tr>
<tr>
<td>B) Configuration Scripts</td>
<td>Saving and importing data files containing radio operating parameters or settings.</td>
<td></td>
</tr>
<tr>
<td>C) Ping Utility</td>
<td>Diagnostic tool to test network connectivity</td>
<td></td>
</tr>
<tr>
<td>D) Authorization Codes</td>
<td>Alter the radio capabilities by enabling the built-in resources via purchased keys.</td>
<td></td>
</tr>
</tbody>
</table>

### 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
### 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_3.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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>A) TFTP Host Address</td>
<td>IP address of the computer on which the TFTP server resides</td>
<td>Any valid IP address; 127.0.0.1</td>
</tr>
<tr>
<td>B) Config Filename</td>
<td>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.</td>
<td>Any 40-char alphanumeric string; blank; cfgscript.txt</td>
</tr>
<tr>
<td>C) TFTP Timeout</td>
<td>Time in seconds the TFTP server waits for a packet ACK (acknowledgment) from the unit before suspending the file transfer.</td>
<td>10-120; 30</td>
</tr>
<tr>
<td>D) Retrieve File</td>
<td>Initiate the file transfer of the configuration file from the TFTP server into the unit.</td>
<td>y, n</td>
</tr>
<tr>
<td>E) Send File</td>
<td>Initiate the file transfer from the current configuration file to the TFTP server.</td>
<td>y, n</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>A) Authorization Key</td>
<td>Accept an Authorization Key into the transceiver non-volatile memory.</td>
<td>Any 40-char alphanumeric string; Blank</td>
</tr>
<tr>
<td>Authorized Features</td>
<td>(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.</td>
<td></td>
</tr>
</tbody>
</table>

5 Troubleshooting

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

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio is alarmed (PWR LED is flashing)</td>
<td>Check the alarm list accessible from the Starting Information Screen.</td>
</tr>
<tr>
<td>Alarm: GPS PPS Not Available</td>
<td>Radio is not receiving a PPS.</td>
</tr>
<tr>
<td>Alarm: GPS Signal Inverted</td>
<td>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.</td>
</tr>
<tr>
<td>Alarm: NMEA Data – Invalid</td>
<td>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).</td>
</tr>
<tr>
<td>Alarm: OTA Sync Lost</td>
<td>The radio has lost over the air synchronization because it is no longer receiving wireless beacons from a packaged radio.</td>
</tr>
</tbody>
</table>
# Change Log

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