RadioFrame Networks

MC-Series Outdoor Pole Mount Users Guide

for International iDEN Operators Forum (IIOF)

08/27/2007
998-5005-01 Rev X1

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MC-Series Outdoor Pole Mount

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For more information about this document, or to order additional copies, please contact:

RadioFrame Networks, Inc.
9461 Willows Road NE
Suite 100
Redmond, WA 98052
Attn: Technical Information Department

or E-mail your request to: support@RadioFrameNetworks.com

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Contents

Preface

Audience

This document is written for the technical staff who are standards for installing, modifying and maintaining RadioFrame Networks equipment at International iDEN Operators Forum (IIOF) customer sites. All specifications and requirements pertain to OPM Series System equipment operating in 800E band with medium power amplification, as required in some International iDEN Operators Forum (IIOF) integrated Digital Enhanced Network (iDEN) installations.

The user of this document should be proficient with the following:

- Motorola Generation 3 Site Controller System
- iDEN OMC-R Configuration Management procedures
- Channel Service Unit (CSU) manufacturer’s specifications
- Power supply and battery manufacturer's specifications
- General Dynamics R2660 Series Communications System Analyzer
- Fixed Network Equipment (FNE) Quality Standards
- National Electrical Code (NEC) standards
- National Fire Protection Associations (NFPA) Code 70
- ASTM (American Society For Testing and Materials)
- Bellcore Technical Specifications
- Electrostatic discharge (ESD) standards and procedures

Purpose

The purpose of this document is to provide an overview of the RadioFrame Networks equipment and describes standards for installing, modifying and maintaining RadioFrame Networks equipment at IIOF’s customer sites.

Scope

This document provides instructions fro installing and operating RadioFrame equipment.

Conventions

The following font and style conventions are used throughout this document.

Convention...	Used to Indicate...
Courier fixed-pitch font, non-bold	Filenames, pathnames, scripts, screen displays (shown boxed), and lines of code
Courier fixed-pitch font, bold	Text to be entered as instructed in a procedure
Italics/Underline	Menu options as they appear on the screen
ALL CAPITALS	Keyboard key names, such as ENTER or CTRL
The term *enter*	The user should type the information and press ENTER when completed
The term *type*	The user should type the information but *should not* press ENTER when completed

Chapter 1 Installation Process

Overview

This chapter describes connecting the RadioFrame and non-RadioFrame components within the enclosure.

Contents

1.1 Mounting the MC-Series OPM System Cabinet

Refer to the manufacturer's documentation (included with the OPM Series System Installation Kit) for installation procedures for mounting and securing the MC-Series OPM system Cabinet.

Warning!

Always use two or more persons whenever moving a Cabinet. A fully configured equipment Cabinet weighs approximately 350 lbs (159 kg).

This section describes procedures for mounting the following non-RadioFrame Networks equipment in the OPM Series System Cabinet:

- iSCIII
- EAS
- CSU

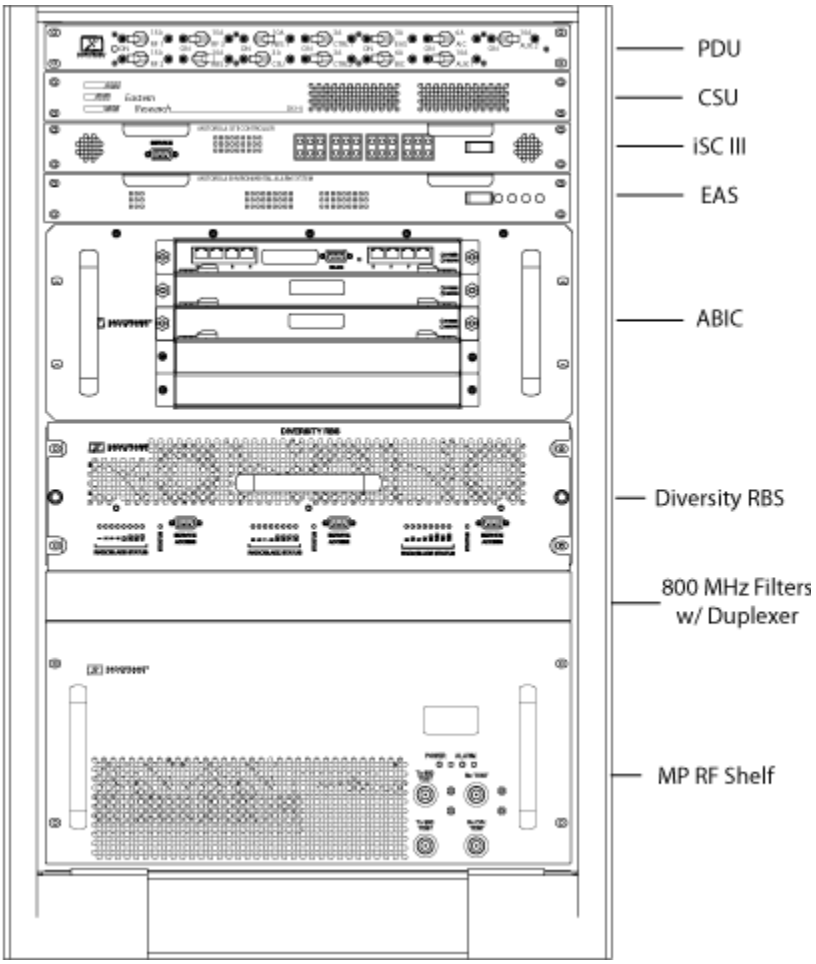
Warning!

Any equipment installed in the OPM Series System Cabinet shall be UL listed.

Warning!

User equipment that is installed shall not draw a combined current of more than 5 Amps. This combined total shall be determined from the marked current rating label of the equipment to be installed.

Figure 1.1 Locations of Non-RadioFrame Networks Hardware the OPM System Cabinet



1.1.1 iSCIII

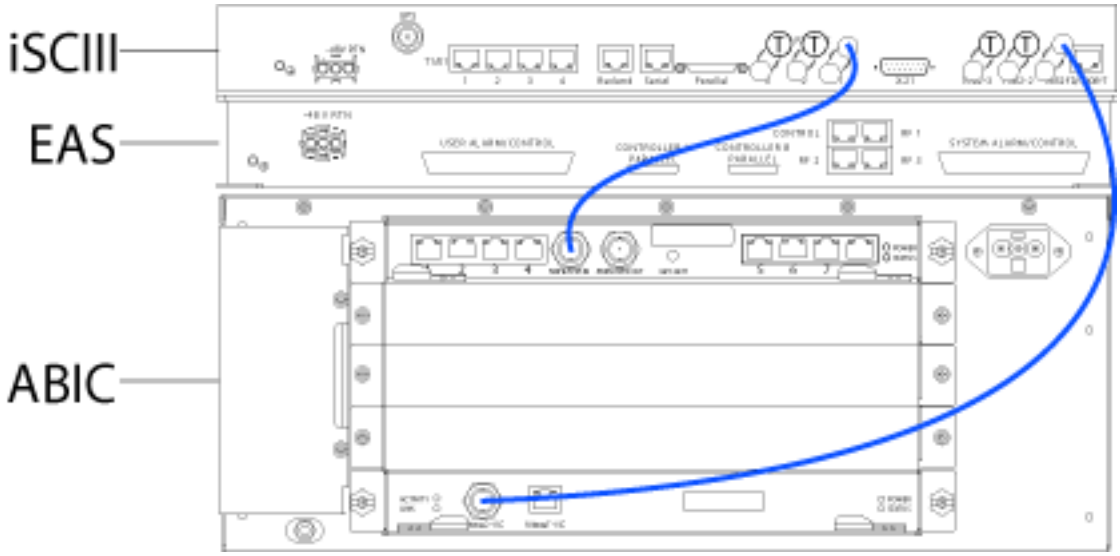
Note: The iSCIII does not come pre-installed with the OPM system. Therefore, follow this procedure to install the component.

1. While supporting the iSCIII, slide the iSCIII into the Cabinet mounting position.
2. Mount the iSCIII in the location shown in Figure 1.1. If necessary, install side rails in the mounting position in the Cabinet.
3. Secure the iSCIII to the Cabinet mounting rails using the four mounting screws provided with the unit. Tighten the screws to 4.5 Nm (40 in-lb).
4. Connect the RadioFrame Networks-provided ground cable (P/N 820-0609-10; ISC1 to GND BAR) between the Cabinet ground bar and the grounding lug on the rear of the iSCIII, and ensure the connection is tight.

5. Connect the RadioFrame Networks-provided power cable (P/N 820-0613-50; PDU-CTRL_1 to ISC1) between the iSCIII power and the CTRL1 circuit breaker on the PDU.
6. Connect the RadioFrame Networks-provided ground cable (P/N 820-0609-10; ISC1 to GND BAR) between the Cabinet ground bar and the grounding lug on the rear of the iSCIII, and ensure the connection is tight.
7. Connect the iSCIII according to IIOF's installation procedure.
8. Refer to Figure 1.2. Using the RadioFrame Networks-provided coax cable (P/N 111-0001-02;ABIC-ERTM 5 MHz IN to iSCIII REF OUT-1), connect the iSCIII port SITE REF OUT 1 [K] to the ABIC ERTM port 5 MHz IN [L].
9. Terminate the two remaining SITE REF OUT ports on the iSCIII.
10. Using the RadioFrame Networks-provided coax cable (PN 111-0001-02; ABIC-CRTC to iSC1 REF OUT-1), connect the iSCIII port 10B2-1 to CRTC port 10Base2 iSCIII.
11. Terminate the two remaining iSCIII 10B2 ports on the iSCIII.

Note: Figure 1.2 does not show all cabling. For complete cabling information, refer to Appendix C (OPM iDEN Microcell Cabinet Stack-Up Configuration).

Figure 1.2 Connections between the iSCIII and ABIC

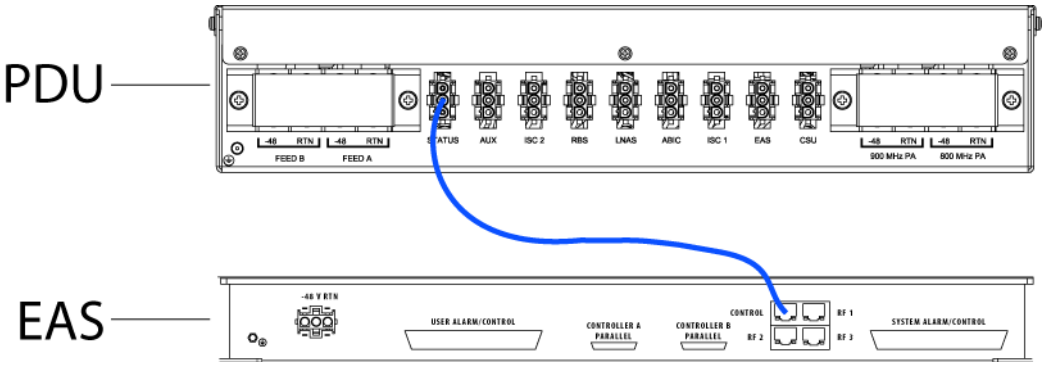


1.1.2 EAS

Note: You need to install an EAS. Therefore, follow this procedure:

1. While supporting the EAS, slide the EAS into the Cabinet mounting position.
2. Mount the EAS in the location shown in Figure 1.1.
3. Secure the EAS to the Cabinet mounting rails using the four mounting screws provided with the unit. Tighten the screws to 4.5 Nm (40 in-lb).
4. Connect the RadioFrame Networks-provided ground cable (P/N 820-0609-10; EAS to GND BAR) between the Cabinet ground bar and the grounding lug on the rear of the EAS, and ensure the connection is tight.
5. Connect the RadioFrame Networks-provided power cable (P/N 820-0616-50; EAS to PDU-EAS) between the EAS power and the EAS circuit breaker on the PDU.
6. Connect EAS to each iSCIII according to IIOF's installation procedure.
7. Refer to Figure 1.3. Connect the RadioFrame Networks-provided contact closure alarm wires from the CONTROL port on the EAS (RJ-45) to the STATUS connectors on the PDU (Molex).

Figure 1.3 Connection between EAS Control Port and PDU Status Connectors



Note: Figure 1.3 does not show all cabling. For complete cabling information, refer to Appendix C (OPM iDEN Microcell Cabinet Stack-Up Configuration).

1.1.3 CSU

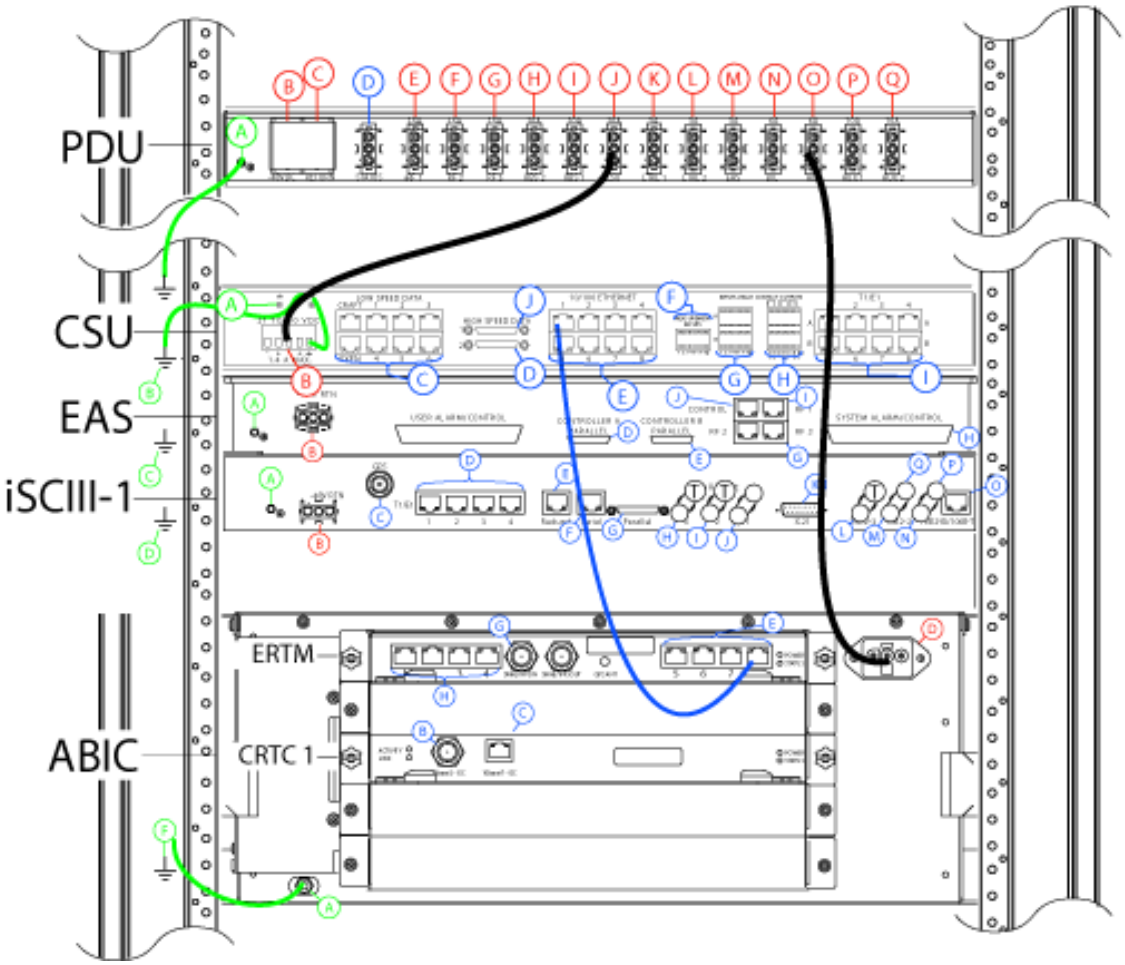
Note: You need to install an CSU. Therefore, follow this procedure:

Warning!

Always connect the power cable to the CSU ***before*** connecting the power cable to the PDU.

1. Remove the Cabinet mounting rails from the CSU mounting location.
2. While supporting the CSU, slide the CSU into the Cabinet mounting position.
3. Mount the CSU in the location shown in the Figure 1.1. As necessary, follow the equipment manufacturer's installation procedure for mounting the CSU.
4. Connect the RadioFrame Networks-provided ground cable (P/N 820-0609-10; CSU to GND BAR) between the Cabinet ground bar and the grounding lug on the rear of the CSU, and ensure the connection is tight.
5. Connect the RadioFrame Networks-provided power cable (P/N 820-0615-50; CSU to PDU-CSU) to the CSU power.
6. Connect the other end of the power cable to the circuit breaker on the PDU.
7. Connect the CSU to the iSCIII according to IIOF’s procedure.
8. Using a CAT-5 cable, connect 10/100 Ethernet port 1 on the CSU to port 8 on the ABIC ERTM for remote-management access.

Figure 1.4 Connection between CSU and ABIC



Note: Figure 1.4 does not show all of the cabling. For complete cabling information, refer to Appendix C (OPM iDEN Microcell Cabinet Stack-Up Configuration).

1.1.4 External RJ-45 Connector

Located on the side of the enclosure is a weatherproof connector connected to the CRIC via the front of the ABIC that allows local access to the Management system without opening the case. Refer to Figure 1.5.

Figure 1.5 Remote RJ-45 System Access from outside the Cabinet

1.2 Mounting Auxiliary Equipment

Follow vendor procedures for mounting the following auxiliary equipment:

- Powerplant
- Surge arrestors
- Environmental sensors

1.3 Cabinet-to-Site Cabling

Follow the IIOF's procedures for installing the following wiring at the site, and then complete the procedures in this section to complete the Cabinet-to-site cabling. See Table 1.1 for rear of the enclosure connections.

- Grounding
- T1
- GPS surge arrestors
- EAS alarm cabling
- RF (Tx / Rx and Rx diversity)
- Power
- Air Conditioning (Power)

1.3.1 Matching Terminals for PDU and Ground

Select from the list of termination lugs in Table 1.1 (listed is the smallest packaging size available); use two when connecting the powerplant to the PDU and one when connecting the PDU ground to the top of the bus bar.

Table 1.1 Power and Ground Lugs

P/N	AWG	Config.	Quantity (per Package)
LCD2-14A-Q	2	Straight	25
LCD2-14AF-Q	6	Straight	25
LCD6-14A-L	2	Right Angle	50
LCD6-14AF-L	6	Right Angle	50

Note: Crimp Tool needed: CT-1700

1.3.2 GPS surge arrestor

Table 1.2 shows the surge arrestor dimensions and performance specifications.

Figure 1.6 PolyPhaser RGT Broadband DC Pass Protector

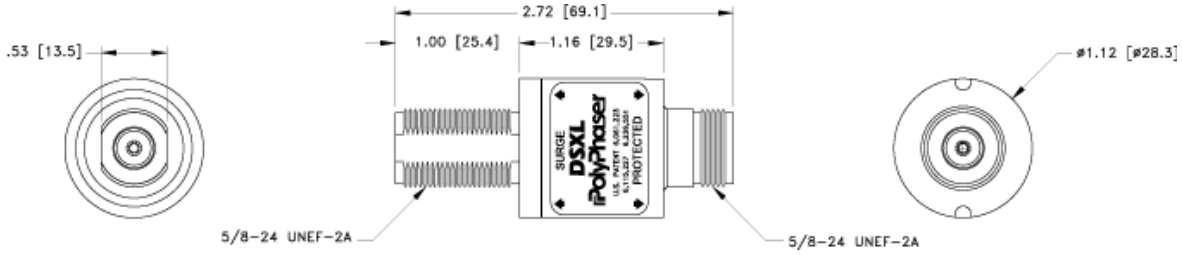


Table 1.2 DSXL PolyPhaser Specifications

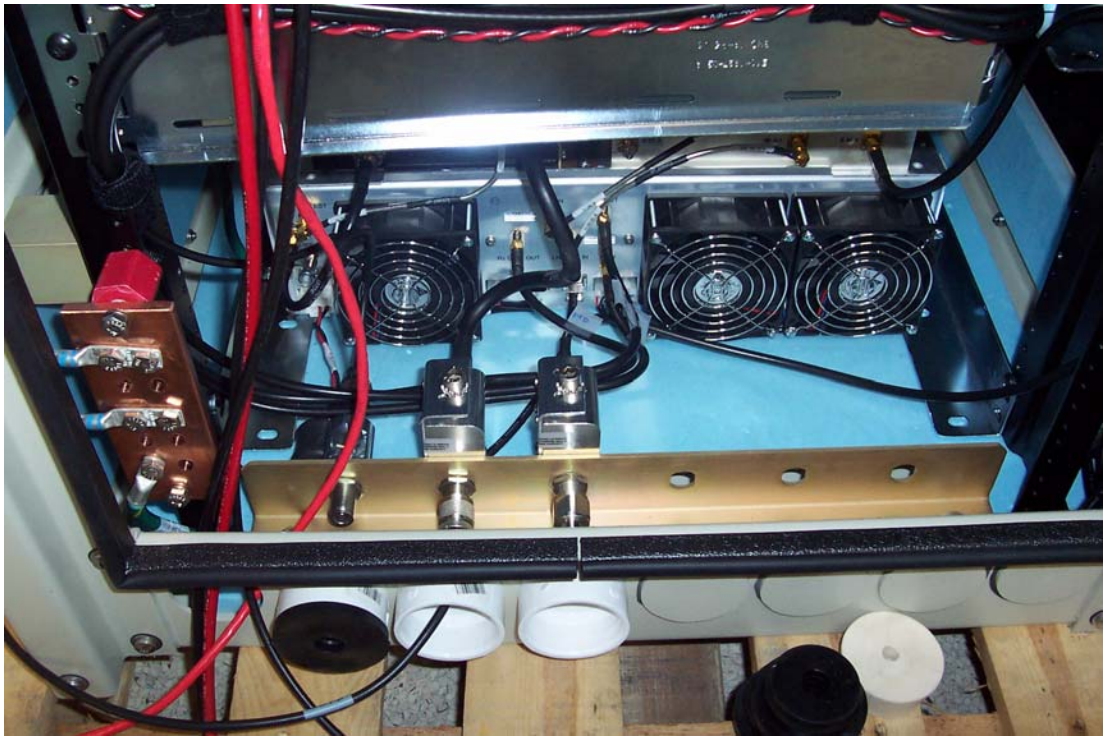
Application:	Bulkhead mount weatherproof when installed
Surge/Frequency/VSWR:	IEC 61000-4-5 8/20 µS waveform 20kA@800 MHz to 2.0 GHz@≤1.1:1 VSWR 18kA@800 MHz to 2.3 GHz@≤ 1.1:1 VSWR 18kA@700 MHz to 2.7 GHz@≤ 1.1:1 VSWR
Insertion Loss:	500W@920MHz (750W@50 ° C)
Continuous Power:	≤±3 V for 3kA@ 8/20 µS waveform
Let through Voltage:	≤±3 V for 3kA@8/20 µS waveform
Let Through Energy:	≤ 0.5 µJ for 3kA@8/20 µS waveform
Temperature:	-40 ° C to +85 ° C Storage/Operating
Vibration:	1G @ 5 to 100 Hz
Environmental:	Meets IEC 60529 IP65 Meets Bellcore #TA-NWT-000487 Procedure 4.11 Wind driven (120 mph/193 kph) Rain Intrusion Test

1.3.3 RF Feed-Throughs (N-type connectors)

Table 1.3 Specifications for N-Type Feed-Through Connectors

RadioFrame Networks P/N	Config. / Specs.	SM Electronics P/N
514-0001-99	Terminator, N-M w/ chain 2 W 6 GHz, 18 dB max VSWR @ 6 GHz	STN0610C

Figure 1.7 Top of Rack (TOR) Rear of the Cabinet, Bulkhead, Cabling and Equipment



1.3.4 Grounding

1 Ground the Cabinet ground bar to the site according to IIOF's installation instructions using 2-hole terminal lug. Type is Panduit 2-hole, P/N LCD6-14A, or equivalent. Required crimp tool is CT-1700.

2 Connect the site ground to the ground at the rear of the enclosure according to IIOF's installation procedures (see Figure 1.7 for ground location at the rear of the enclosure).

1.3.5 T1

1. Follow IIOF procedure for routing the site T1 cable through the rear of the enclosure as shown in Figure 1.7.

2. Connect the T1 cable to the CSU according to IIOF's installation instructions.

1.3.6 GPS Surge Arrestor

Note: The Surge Arrestor comes installed in the enclosure.

1. Connect each GPS surge arrestor to the GPS antenna coax according to IIOF's installation procedures.

1.3.7 EAS Alarm Cabling

1. Follow IIOF's procedure for routing the two 50-pair alarm cables through the rear of the Cabinet, as shown in Figure 1.7.
2. Connect the two 50-pair alarm cables to the back of the EAS:

   EAS: USER ALARM / CONTROL

   EAS: SYSTEM ALARM / CONTROL
3. Terminate the two 50-pair alarm cables to the two blocks on the backboard, making sure that each cable is connected to its specific block.

1.3.8 RF (Tx / Rx and Rx diversity)

The MC-Series OPM system Cabinet provides the following RF connectors at the rear of the enclosure for connection to the site RF distribution system:

- Tx / Rx
- Div1

Connect the female N-type connectors to the onsite RF distribution system (antenna, DAS, etc.).

1.3.9 Power

Verify that all breakers in the PDU are in the OFF position prior to proceeding. Leave them in the OFF position until instructed otherwise.

Warning

1. Connect the powerplant to the PDU using two (2) -hole terminal lugs. Type is Panduit 2-hole, P/N LCD6-14A, or equivalent. Crimp tool needed: CT-1700.

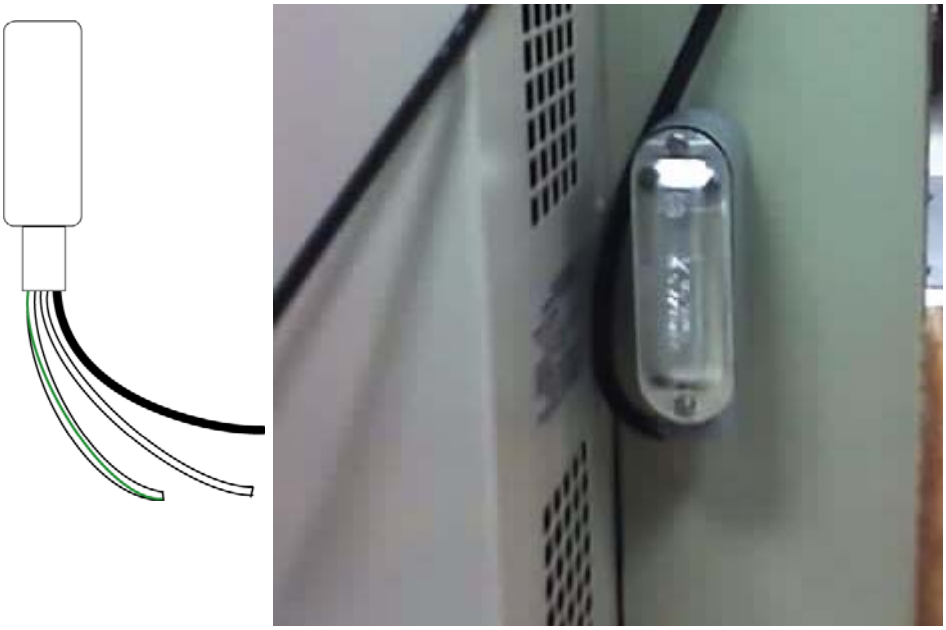
1.3.10 Air Conditioning

The enclosure's air conditioning (A/C) system is connected to the power supply via a three wire cable that is routed through a conduit on the side of the enclosure (Figure 1.8).

The A/C specifications appear in Table 1.4.

Note: The air conditioning unit requires 220 Volts AC.

Figure 1.8 A/C Power Connection



1. Wire the three wire connector accordingly, paying attention to wiring codes.

Table 1.4 A/C Specifications

Value	Measurement
230	Volts AC
Amps	4.3
Phase	1
Hz	60
Refrigerant	22
Amount	15 Oz.
Design Pressures	
Low side	260 psi
High side	335 psi
Nominal values	
Output	4,000 BTU
220	Volts
4.8	Amps
Hertz	50

Chapter 2 Initial Power-up

Overview

This chapter describes the initial power up of the system after the components have been installed and connected to all cabling.

Contents

2.1 Initial Powering Procedure

1. Verify that the AC power to the Air Conditioner (A/C) is on and the A/C is operating.
2. Verify that all breakers in the PDU are in the OFF position.
3. Ensure that the power switches on the iSCIII and the EAS are all in the OFF position.
4. Using the breakers on the PDU, turn up the equipment by completing the following steps, verifying that each component is operational before proceeding to the next step.
5. Using the breaker on the PDU and the power switch on the front of the iSCIII, turn up the iSCIII, and then verify that it is operational and that GPS lock has been established before proceeding. For more information, refer to the Motorola document Gen 3 Site Controller System Manual, 68P80801E30-O.
6. Using the breaker on the PDU and the power switch on the front of the EAS, turn up the EAS, and then verify that it is operational before proceeding. For more information, refer to the Motorola document Gen 3 Site Controller System Manual, 68P80801E30-O.
7. Using the breaker on the PDU, turn up the CSU.
8. Configure the CSU according to the manufacturer's documentation and IIOF's standards.
9. Using the breaker on the PDU, turn up the ABIC and DRBS, and then verify that both components are operational before proceeding.
10. Wait approximately 3 minutes for the following indications:

DRBS:

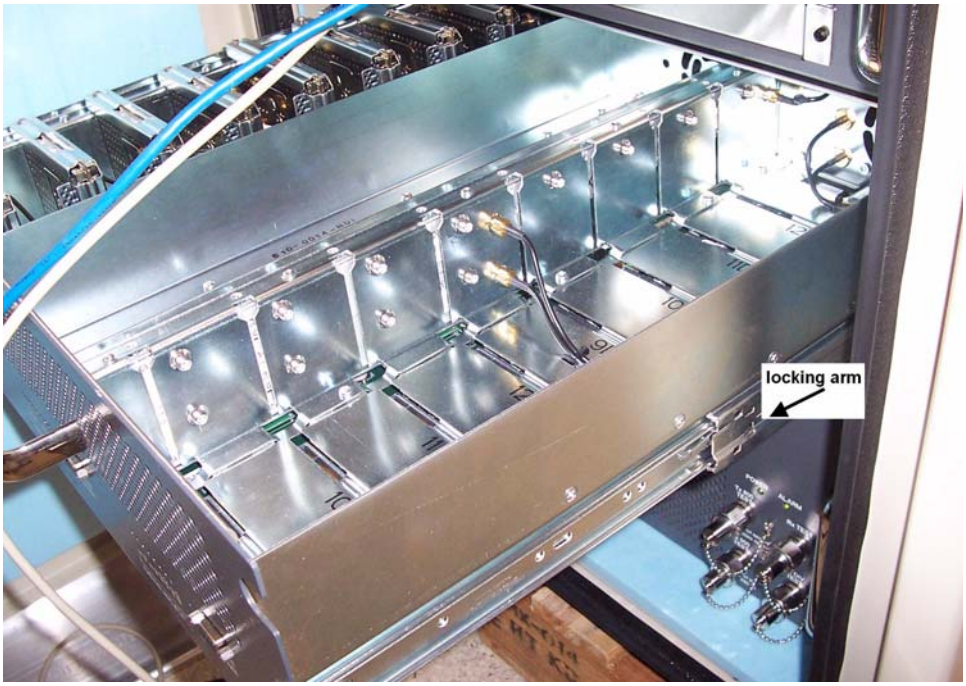
- The STATUS LED for each Group will turn green in this order: A then C.
- The RADIOBLADE TRANSCEIVER STATUS LEDs will turn red and then green for each present RadioBlade transceiver. If no RadioBlade transceiver is present, the LED will not light. To verify the contents of the DRBS, pull out the shelf (powering off is not required) and inspect the RadioBlade transceivers and their respective status LEDs. Referring to Figure 2.1, reinsert the DRBS. To do this, press up on one side rail locking arm and press down on the other side rail locking arm, and then push the unit into the Cabinet.

CRIC

- The POWER and STATUS LEDs will turn red and then green. All ABIC card LEDs will turn green.

11. Using the breaker on the PDU, turn up the RF Shelf and then verify that the RF Shelf is operational before proceeding. The POWER and ALARM LEDs on the front of the RF shelf will turn green.

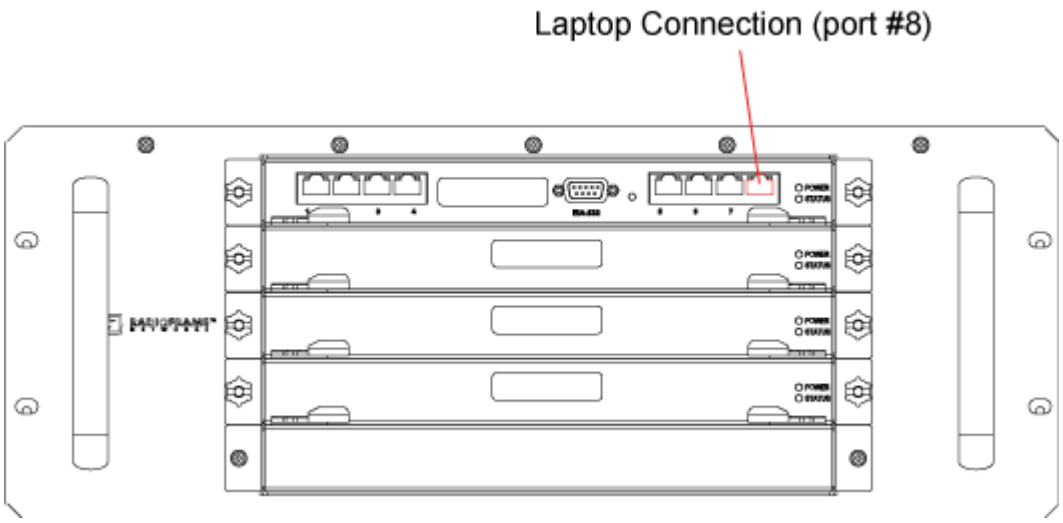
Figure 2.1 Location of DRBS Side Rail Locking Arms



2.2 System Setup

1. Connect the laptop to port 8 of the ABIC CRIC using an Ethernet (CAT-5) cable.

Figure 2.2 Location of ABIC CRIC Laptop Connection Port



2. Set the laptop IP address to 192.168.200.4 and turn on DHCP.
3. Start System Manager.
4. Launch a browser session and enter the MC-Series OPM system IP address: http://192.168.200.5. The System Manager Home page appears, which contains five tabs to select from:

Home

Displays a welcome banner and a link for setting up users and changing the MC-Series OPM System password.

System Configuration

Depicts the status of the ABIC and DRBS.

Alarms

Displays alarm information.

Performance Monitoring

Displays real-time performance information.

Diagnostics

Provides tools for testing.

Support

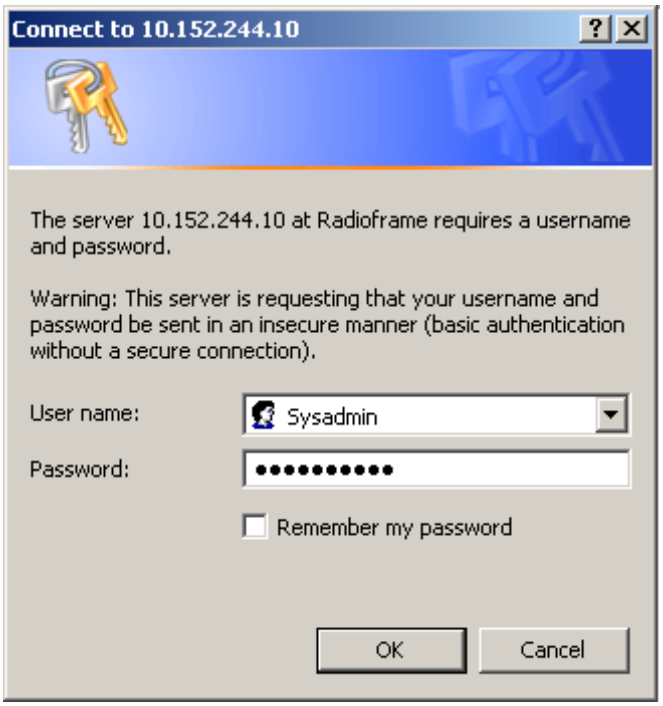
Displays support information, including online help.

Figure 2.3 System Manager Welcome Screen

5. Log in to System Manager.

6. Select the System Configuration tab to display the login window. For **User Name**, type **Sysadmin** (case sensitive). For **Password**, type **Radioframe** (case sensitive), and then select **OK**. To change the password, refer to section Changing the System Password “Changing the System Password”.

Figure 2.4 System Manager Log-in Window

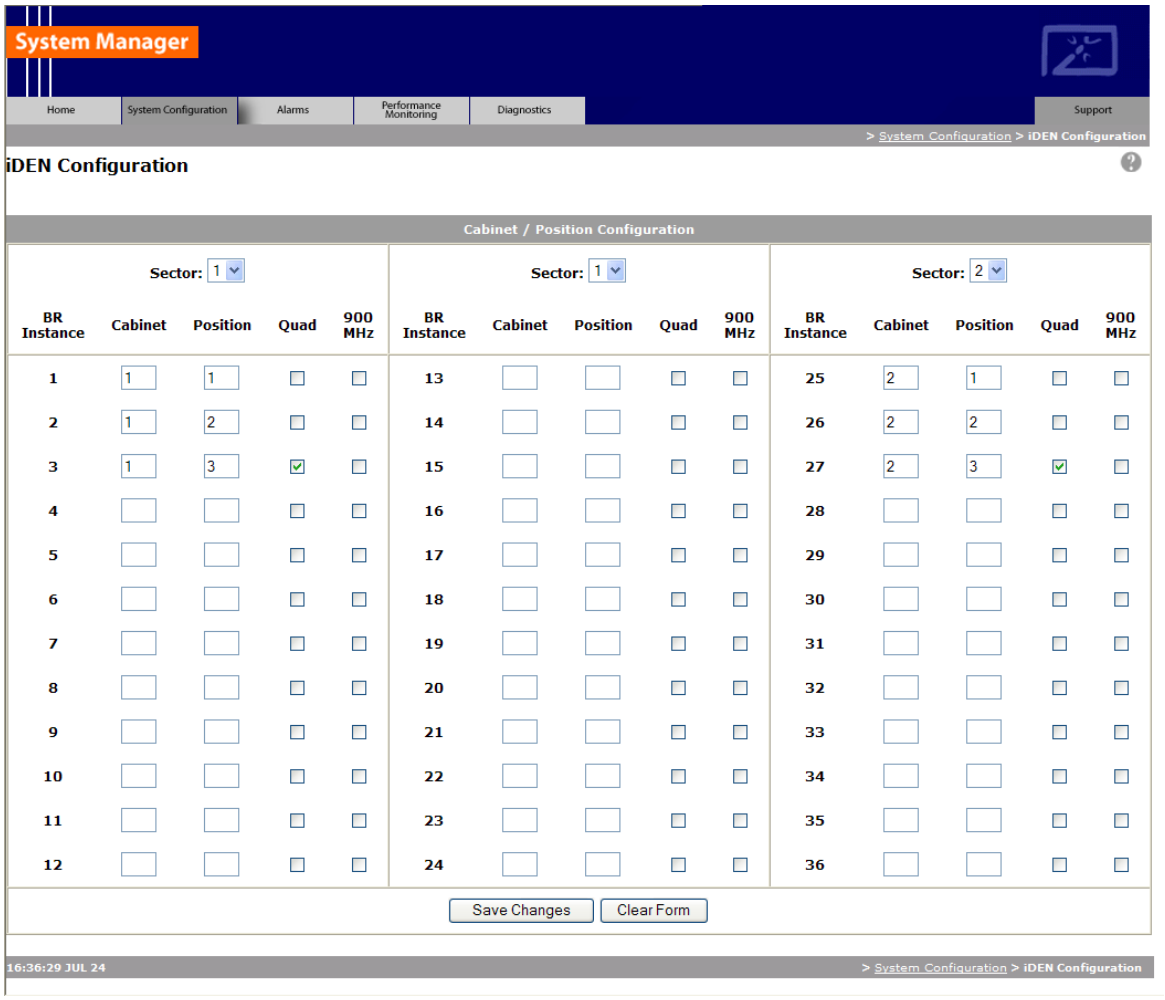


Note: Before proceeding to iDEN Configuration, it is a good idea to ensure that the MC-Series OPM software is the latest released version. Refer to section 2.6.1 .E. (Viewing Hardware and Software Versions).

7. Select the iDEN Configuration link at the bottom of the System Configuration page.

    a. On the iDEN Configuration page, make sure the configuration agrees with the site datafill and also the RF cabling. The sector assignments must match the cabling inn the rear of the enclosure. All cab/pos values must be associated with the appropriate sector. The MC-Series OPM System will attempt to register all BRs with the cab/pos values selected in this menu. An example configuration is shown in Figure 2.5. For more information.

Figure 2.5 iDEN Configuration Page



8. After iDEN configuration is updated (by clicking on Save Changes), a System Reset is required.

9. Go to the Performance Monitoring page (section Local Performance Monitoring "Local Performance Monitoring") and confirm that are BRs that were intended to be brought up are in the UEA state. If there are BRs that are not active, select the **Alarms** tab and review the **Active Alarm Manager** for any active alarms.

   For more information, refer to section 5.4.3 (System Manager Alarms).

10. Validate ToR output power or go to step 12 .

11. Connect the General Dynamics R2660 Series Communication System Analyzer to the rear of the enclosure Tx /Rx1. Then set up the R2660 for iDEN Base mode. Enter the control channel frequency for sector 1, and then measure the output power of that frequency.

Note: The default is +36 dBm per carrier, assuming that the datafill parameter defaultTxPower is set to 9.5. If necessary, adjust the datafill parameter (refer to section 2.3.5 (defaultTxPower)).

12. Measure the SQE and frequency error for the control channel to see if they are within specifications.
13. Verify that all BRs have the same output power.

    For each channel, enter the frequency into the R2660 and verify that the SQE, frequency error, and power level are all within specifications.
14. Repeat steps 7 through 13 as needed for each sector.
15. Review the **Active Alarm Manager** for any un-cleared alarms.

    Refer to the section (System Manager Alarms) for more information.

2.3 Management—Datafill, Configuration and Optimization

This section describes configuration techniques that affect the behavior of the MC-Series OPM system. The Datafill section covers the datafill parameters as they differ from the Motorola EBTS. Section System Manager, Configuration, and Optimization covers configuration options using System Manager, with sections Navigating System Manager and Configuring the MC-Series OPM System introducing basic operations and Optimization Procedures presenting optimization procedures.

The MC-Series OPM system is designed for compatibility with the Motorola EBRC and QUAD Base Radios (BRs). However, due to architecture differences between the two systems, not all datafill parameters apply equally to the MC-Series OPM system.

2.3.1 Datafill

This section describes only those datafill parameters that need to be taken into consideration when used with the MC-Series OPM system. Any datafill parameter not described here can be assumed to behave identically to the Motorola EBTS. This section includes:

- 2.3.2 (Parameters that Do Not Apply to the MC-Series OPM System) Parameters that have no effect on the MC-Series OPM system
- 2.3.3 (Recommended Datafill Parameters) Parameters that RadioFrame Networks supports, but which need to be setup differently from the typical setup for a Motorola BR

2.3.2 Parameters that Do Not Apply to the MC-Series OPM System

The following parameters have no effect on the MC-Series OPM system. There is no functional equivalent in the MC-Series OPM system, and as such the parameters can be ignored.

A. combinerType

This parameter specifies the type of combiner used to connect the cells Base Radios to the antenna. The options are hybrid and cavity. The MC-Series OPM system is similar to a cavity type combiner physically but it does not have the same frequency limitations as the cavity combiner that this parameter is used for.

2.3.3 Recommended Datafill Parameters

The following parameters need to be set differently than what is currently set with Motorola BR. These settings are not required but recommended for best operation.

A. PCC

The power control constant is broadcast on the BCCH and is used by the MS to calculate a target value for its transmit power. For Indoor Pico and Micro-Cell applications this value will vary depending upon the RF environment (i.e., if used outdoors the value will be quite different from an indoor scenario). For the MC-Series OPM system, the setting of this parameter depends on what is connected between the MC-Series OPM system and the antenna. The default value should be calculated in accordance with Motorola guidance detailed in the Datafill Parameter Guide. Lowering this parameter forces the mobile to operate at fairly low Tx level thus conserving battery life. In cases where the MC-Series OPM system is connected to a DAS, the gains and losses of the paths should be taken into consideration. Additionally the level of uplink interference should be considered when determining this value.

B. Pto (transmit power)

The Cells outbound transmit power referenced at the output of the RF Distribution System Antenna Port. It is used as a reference point value when computing the link budget of the system. RadioFrame Networks recommends that the value of this parameter be set appropriate to the TOR output power, which is determined by the defaultTxPower parameter (see below).

2.3.4 rxTxGain = 0

This parameter is the difference in gain between the receiver and transmit antenna paths expressed in dB. The MC-Series OPM system does not use this parameter directly.

2.3.5 defaultTxPower

Note: Refer to release notes for the proper range information.

This is the average output power of the PA, measured at the RF connector of the BR. For the MC-Series OPM system, this parameter can be used to adjust the output power of the system. The gain at the shelf is fixed and cannot be altered.

The MC-Series OPM system has a different range of output levels than a standard Motorola EBTS, and as such, these values will map to a different set of actual Tx output power levels. Refer to the Datafill Guide for the values and more information.

2.4 System Manager, Configuration, and Optimization

2.4.1 Navigating System Manager

A. Logging into System Manager

1. Connect a laptop computer to port 8 of the ABIC CRIC using an Ethernet (Cat-5) cable.
2. Start System Manager by typing the IP address of the MC-Series OPM System into Internet Explorer (default 192.168.200.5).
3. The System Manager Home page appears and displays five tabs to select from to set up and monitor the RadioFrame MC-Series OPM System.

Figure 2.6 System Manager Home Page

Home

Displays a welcome banner and a link for setting up users and changing the MC-Series system password.

System Configuration

Depicts the status of the ABIC, DRBS, and RadioBlade transceivers.

Alarms

Displays alarm information.

Performance Monitoring

Displays real-time performance information.

Diagnostics

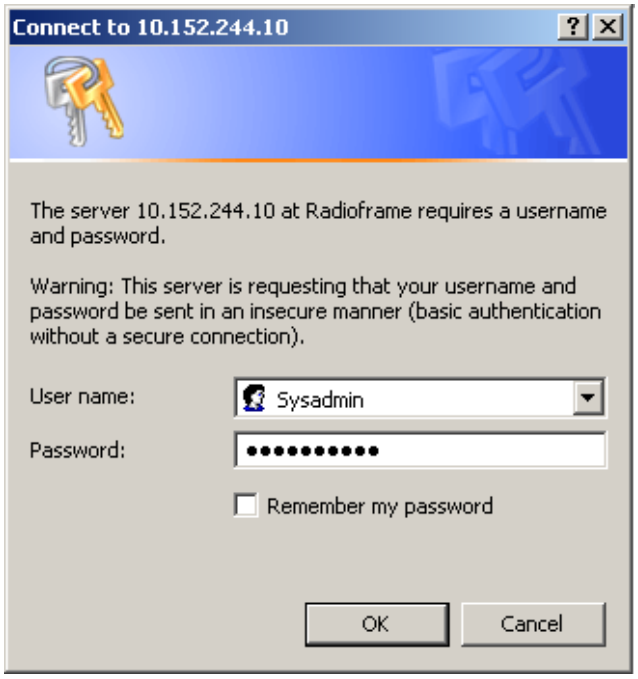
Provides tools for testing.

Support

Displays support information, including online help.

4. To log in, select any tab.
5. For **User Name**, type the MC-Series OPM System user name.
6. For **Password**, type the MC-Series OPM System password.
7. To save the password, check '**Save this password in your password list**' check box.
8. Select **OK**.

Figure 2.7 Network Password Pop-up Dialog Box

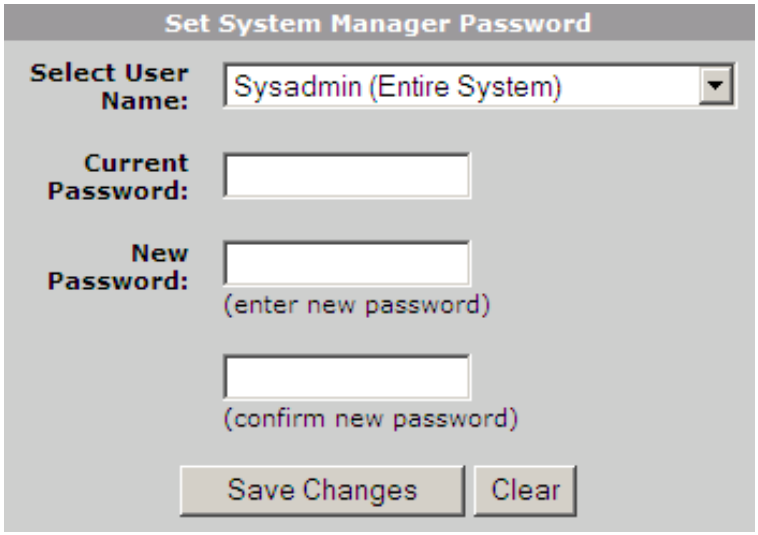


B. Changing the System Password

1. Select the Home tab, and then select the User Provisioning link.
2. For Select User Name, choose the appropriate system title from the drop-down menu.
3. Typically, choose Sysadmin (Entire System) unless instructed to do otherwise.

4. Type the Current Password.
5. Type the New Password and confirm it, then select Save Changes.

Figure 2.8 Set System Manager Password Dialog Box



2.5 Functionality Test

RadioFrame Networks recommends that a certification process be completed to ensure proper operational performance and to verify the integrity of the following services:

- Voice quality for 3:1 Interconnect Voice
- Voice quality for 6:1 Private Group Dispatch Voice
- Call setup reliability for 3:1 Interconnect Voice
- Call setup reliability for 6:1 Private and Group Dispatch Voice
- Call stability for all of the above voice services
- Connection quality, stability, delay and perceived throughput for the Packet Data service
- Connection setup reliability for Packet Data
- Idle SQE quality and variation
- Call up SQE quality and variation
- Short Message Service
- Handover and cell reselection
- Performance will also be validated by collecting at least one week of

performance statistical data

Refer to Appendix D (Functionality Test Procedures) for procedures to conduct functionality testing.

Note: MC-Series OPM system does not support Circuit-Switched data.

2.6 Configuring the MC-Series OPM System

2.6.1 Navigating the System Configuration

The System Configuration page displays icons depicting the ABIC and the DRBS (see Figure 2.1). The colored bar beneath each icon represents the status of that component as listed in Table 2.1.

Figure 2.9 ABIC Configuration Page Showing ABIC and DRBS Status

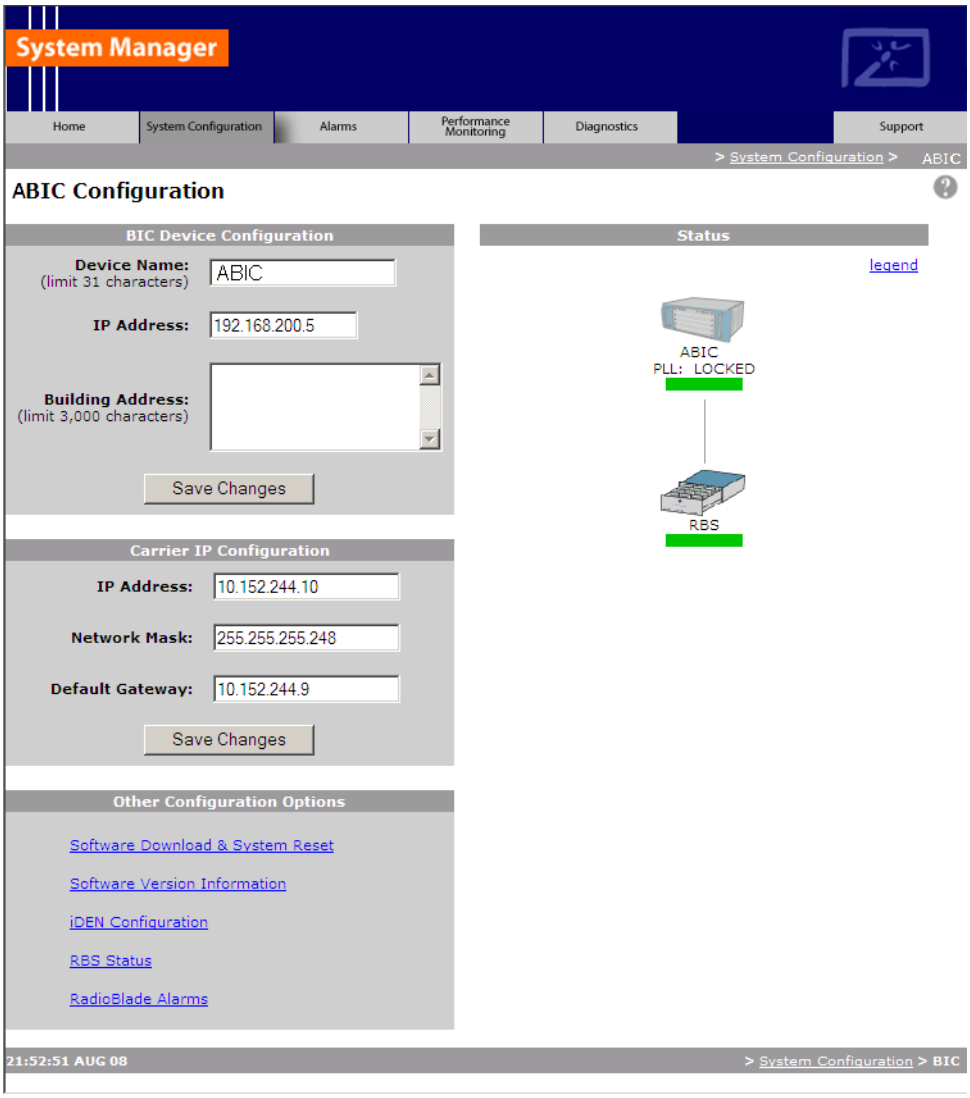


Table 2.1 Status Color Interpretations

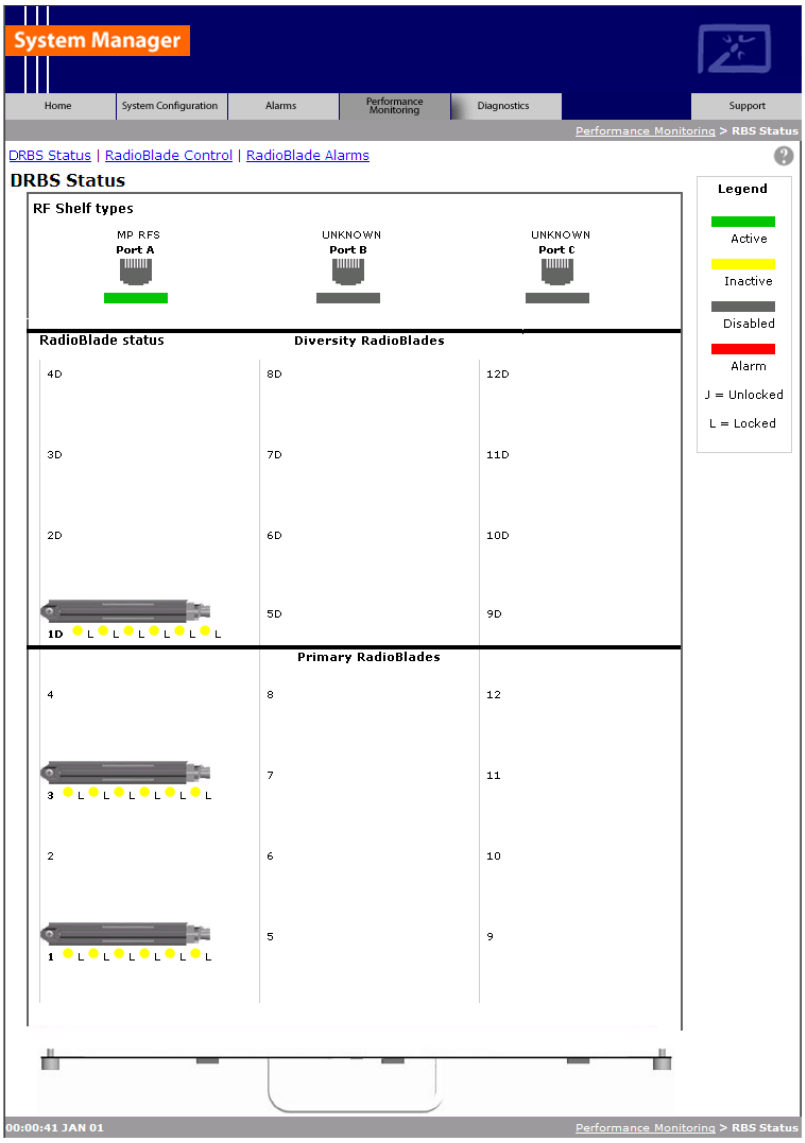
Color	Status Indicator	Description
Green	Active	The component is installed, configured and operational.
Yellow	Inactive	The component is installed but has not been configured.
Gray	Inactive	Unit not installed or Port disabled
Red	Alarm	The component has returned an alarm condition. Refer to 5.4.3 (System Manager Alarms) for specific alarm conditions.

1. To view configuration information for a component, select its icon.
2. The ABIC configuration page displays the device name, IP address, building address and other pertinent information.
3. To return to a previous page, select the component pathname at the top of the tab (System Configuration>ABIC…), or to return to the ABIC configuration page, select the System Configuration tab at any time.

A. Viewing the Status of the RadioBlade Transceivers

The DRBS Status, RadioBlade Alarms, and RadioBlade Control (formerly RadioBlade Statistics) pages show the MCRB. Select the **DRBS STATUS** link at the bottom of the System Configuration page. The DRBS Status page displays an icon for each RadioBlade transceiver installed in the DRBS, and indicates the status of the RadioBlade transceiver and whether or not it is locked. At the top of the page are three icons representing the status of each group (A and C) in the DRBS.

Figure 2.10 RadioBlade Status Page



B. Locking and Unlocking a RadioBlade Transceiver

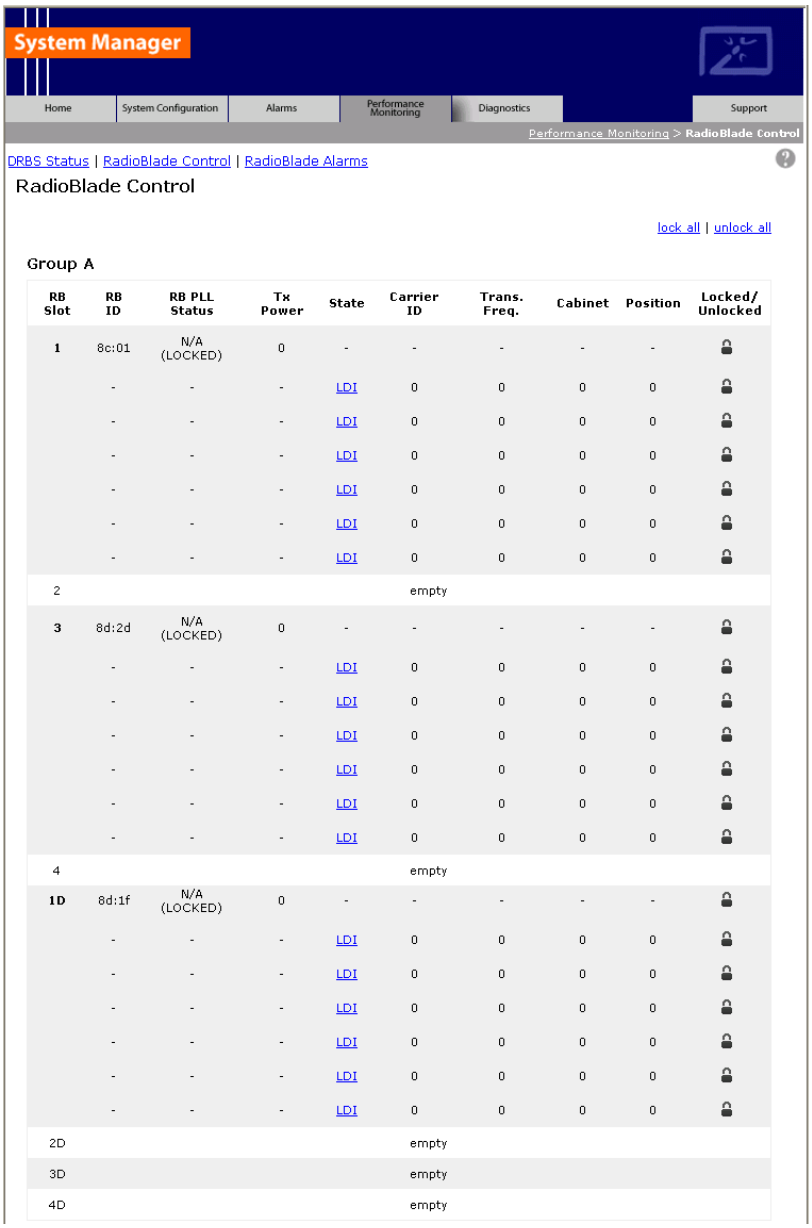
Select the RadioBlade transceiver icon or the RadioBlade Control link at the top of the DRBS Status page. The RadioBlade Control page displays the following information for each iDEN RadioBlade transceiver:

- RadioBlade transceiver Slot (1-24)
- RB ID
- State

- RB PLL Status
- Carrier ID
- Transmit Frequency
- Cabinet
- Position
- Locked/Unlocked

To lock or unlock a RadioBlade transceiver, select the icon in the Locked/Unlocked column.

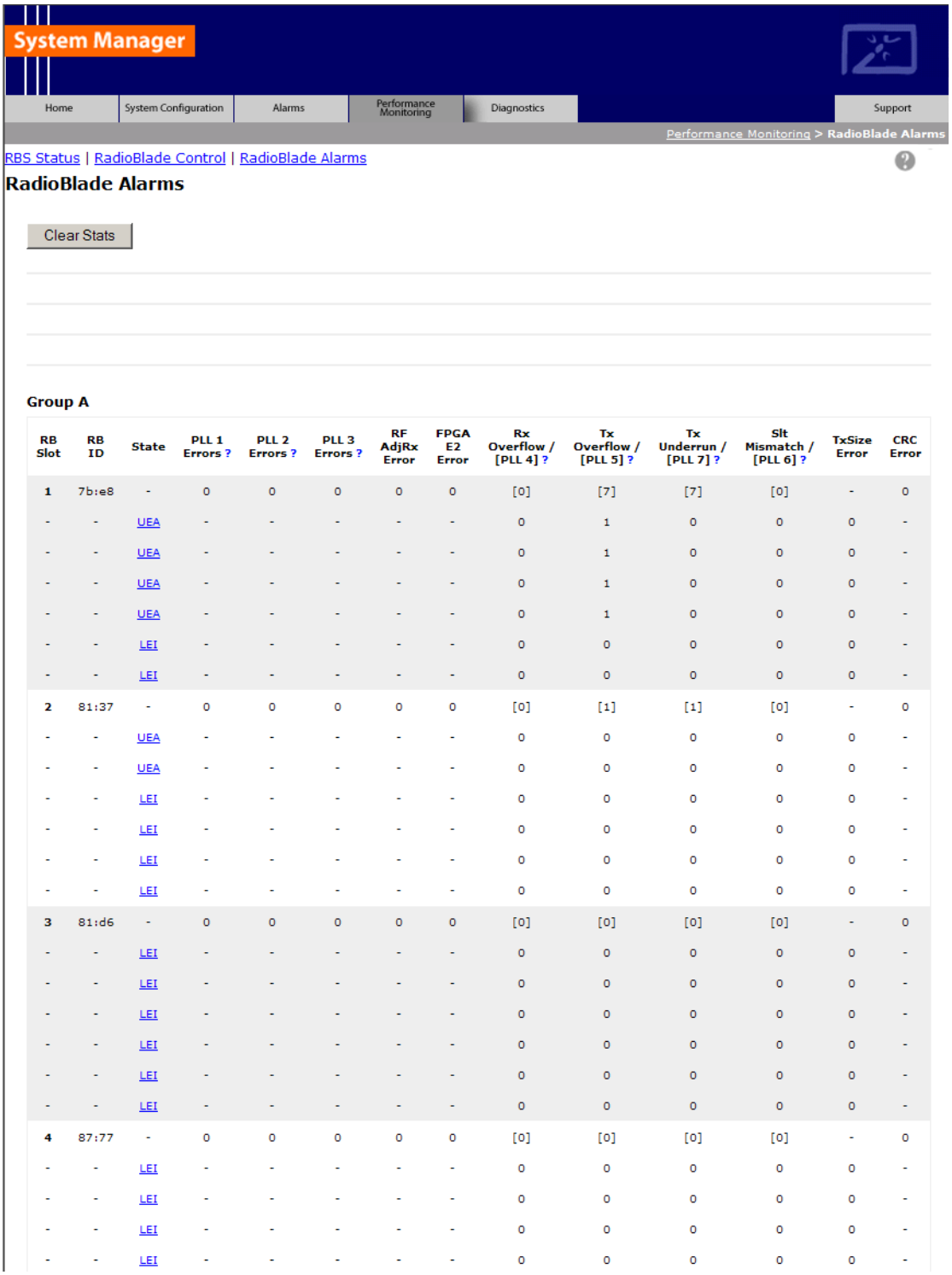
Figure 2.11 RadioBlade Control Page



C. RadioBlade Alarms Page

The RadioBlade Alarms Page displays information for RadioBlades either on a per-channel or per-blade basis, as appropriate for that type of alarm. This page is shown in Figure 2.12.

Figure 2.12 RadioBlade Alarms Page



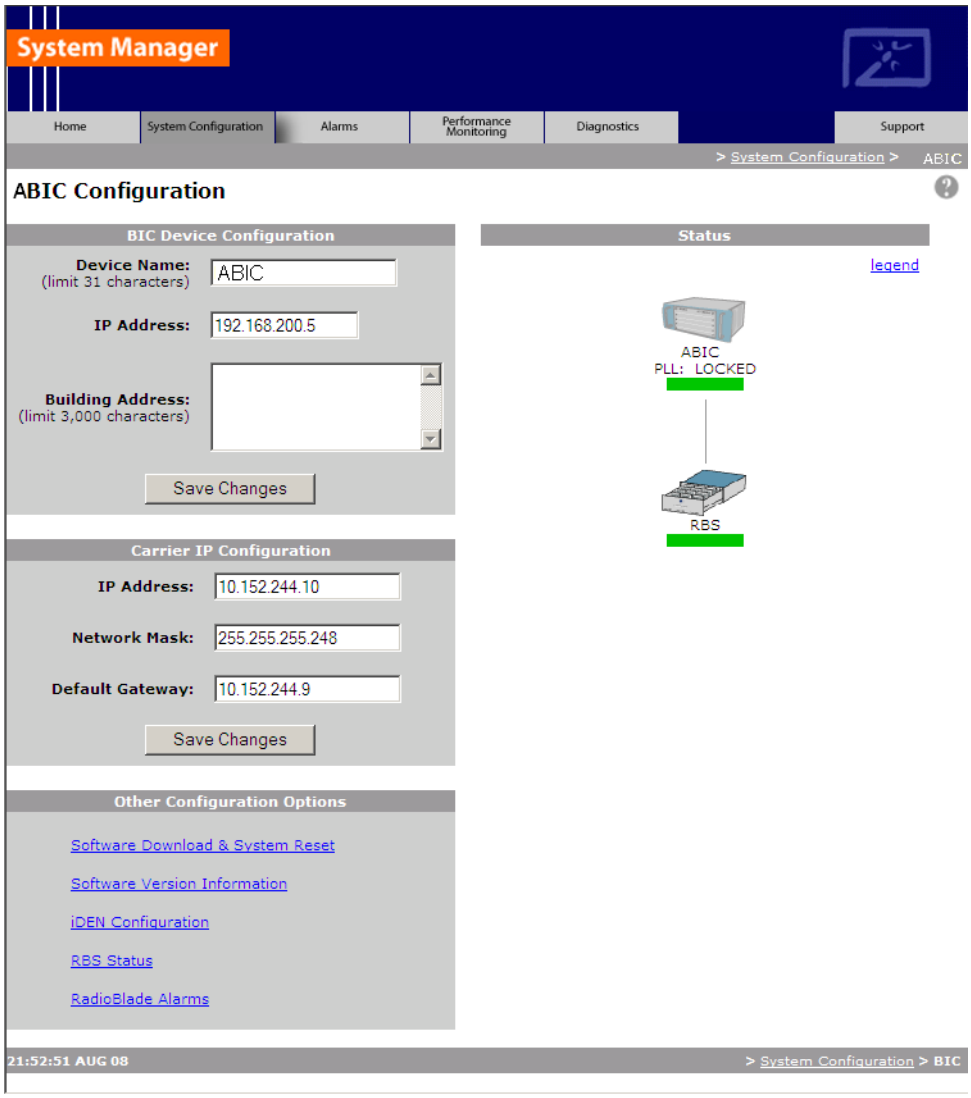
RB Slot	RB ID	State	PLL 1 Errors ?	PLL 2 Errors ?	PLL 3 Errors ?	RF AdjRx Error	FPGA E2 Error	Rx Overflow / [PLL 4] ?	Tx Overflow / [PLL 5] ?	Tx Underrun / [PLL 7] ?	Slt Mismatch / [PLL 6] ?	TxSize Error	CRC Error
1	7b:e8	-	0	0	0	0	0	[0]	[7]	[7]	[0]	-	0
-	-	UEA	-	-	-	-	-	0	1	0	0	0	-
-	-	UEA	-	-	-	-	-	0	1	0	0	0	-
-	-	UEA	-	-	-	-	-	0	1	0	0	0	-
-	-	UEA	-	-	-	-	-	0	1	0	0	0	-
-	-	LEI	-	-	-	-	-	0	0	0	0	0	-
-	-	LEI	-	-	-	-	-	0	0	0	0	0	-
2	81:37	-	0	0	0	0	0	[0]	[1]	[1]	[0]	-	0
-	-	UEA	-	-	-	-	-	0	0	0	0	0	-
-	-	UEA	-	-	-	-	-	0	0	0	0	0	-
-	-	LEI	-	-	-	-	-	0	0	0	0	0	-
-	-	LEI	-	-	-	-	-	0	0	0	0	0	-
-	-	LEI	-	-	-	-	-	0	0	0	0	0	-
-	-	LEI	-	-	-	-	-	0	0	0	0	0	-
3	81:d6	-	0	0	0	0	0	[0]	[0]	[0]	[0]	-	0
-	-	LEI	-	-	-	-	-	0	0	0	0	0	-
-	-	LEI	-	-	-	-	-	0	0	0	0	0	-
-	-	LEI	-	-	-	-	-	0	0	0	0	0	-
-	-	LEI	-	-	-	-	-	0	0	0	0	0	-
-	-	LEI	-	-	-	-	-	0	0	0	0	0	-
-	-	LEI	-	-	-	-	-	0	0	0	0	0	-
4	87:77	-	0	0	0	0	0	[0]	[0]	[0]	[0]	-	0
-	-	LEI	-	-	-	-	-	0	0	0	0	0	-
-	-	LEI	-	-	-	-	-	0	0	0	0	0	-
-	-	LEI	-	-	-	-	-	0	0	0	0	0	-
-	-	LEI	-	-	-	-	-	0	0	0	0	0	-

D. Changing the Device Name, IP Address or Building Location

The System Configuration page displays the configuration for the selected component (ABIC and DRBS) including the Device Name, IP Address, and Building Address—this information can be changed at any time. For the ABIC, this page also displays External IP Configuration, the information that systems outside the MC-Series OPM System use to recognize it, including the Default Gateway (the IP address of the CSU).

1. Select the icon of the component to be changed.
2. For Device Name, enter up to 31 alphanumeric characters to uniquely identify the component.
3. The IP Address is assigned during the installation of the MC-Series OPM System, and doesn't need to be changed.
4. For Building Address, enter up to 3,000 alphanumeric characters specifying the location of the component. Enter information such as the street address, mailing address, building and other site information, as well as the building floor, Telco closet and Cabinet location.
5. Select Save Changes.

Figure 2.13 System Configuration Page, ABIC Selected Component



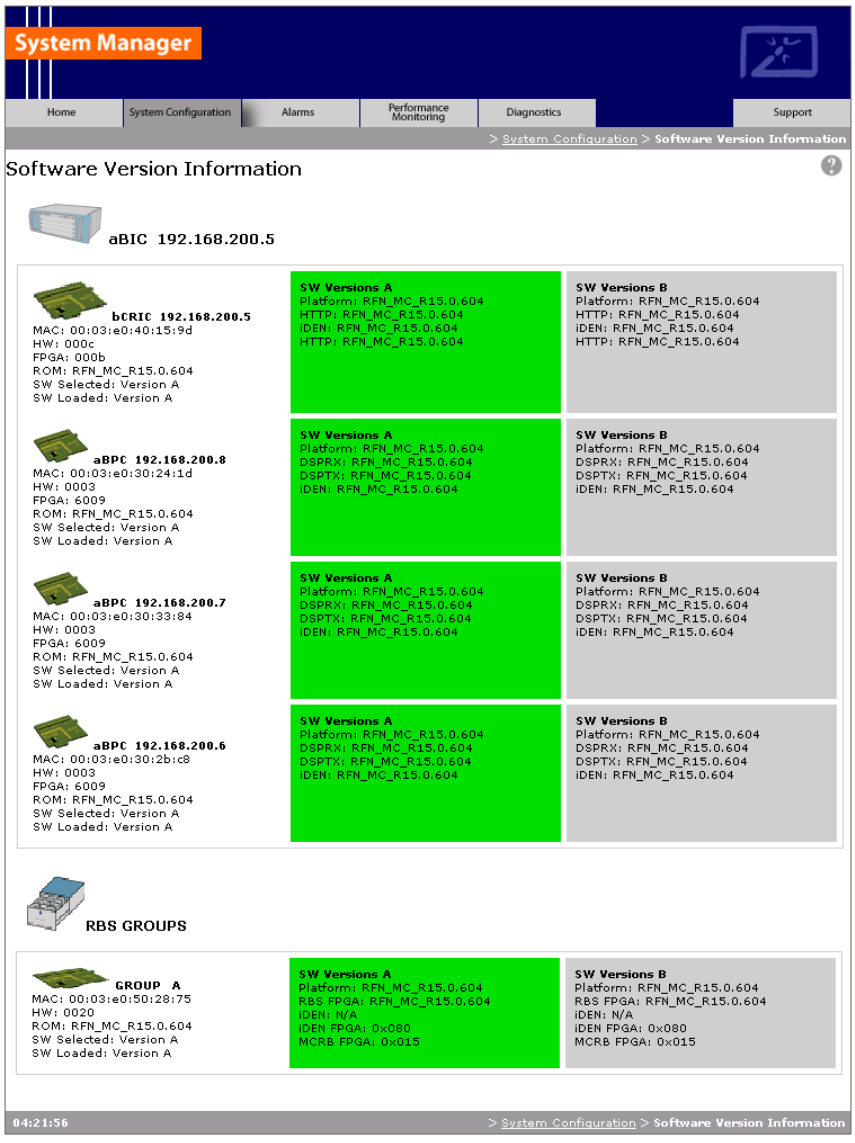
E. Viewing Hardware and Software Versions

Select the **Software Version Information** link on the System Configuration page. The Software Version Information page depicts each component in the MC-Series OPM System, and each board installed in each component. For each board the page lists:

- MAC—the MAC address
- HW—hardware version
- FPGA—Field Programmable Gate Array version (manufacturer defined)
- ROM—software loaded at time of shipment

- SW Selected—currently selected software version, A or B
- SW Loaded—currently loaded software version, A or B
- SW Versions A—Software version loaded in partition A
- SW Versions B—Software version loaded in partition B

Figure 2.14 Software Version Information Page



F. Changing the iDEN Configuration

The MC-Series OPM System operates as a series of base radios. Each RadioBlade transceiver in the MC-Series is assigned a BR ID and sector (1, 2 or 3). And, each BR in the MC-Series OPM System is assigned a default Cabinet position in the site datafill.

To change the default Cabinet position:

1 Select the **iDEN Configuration** link at the bottom of the System Configuration tab.

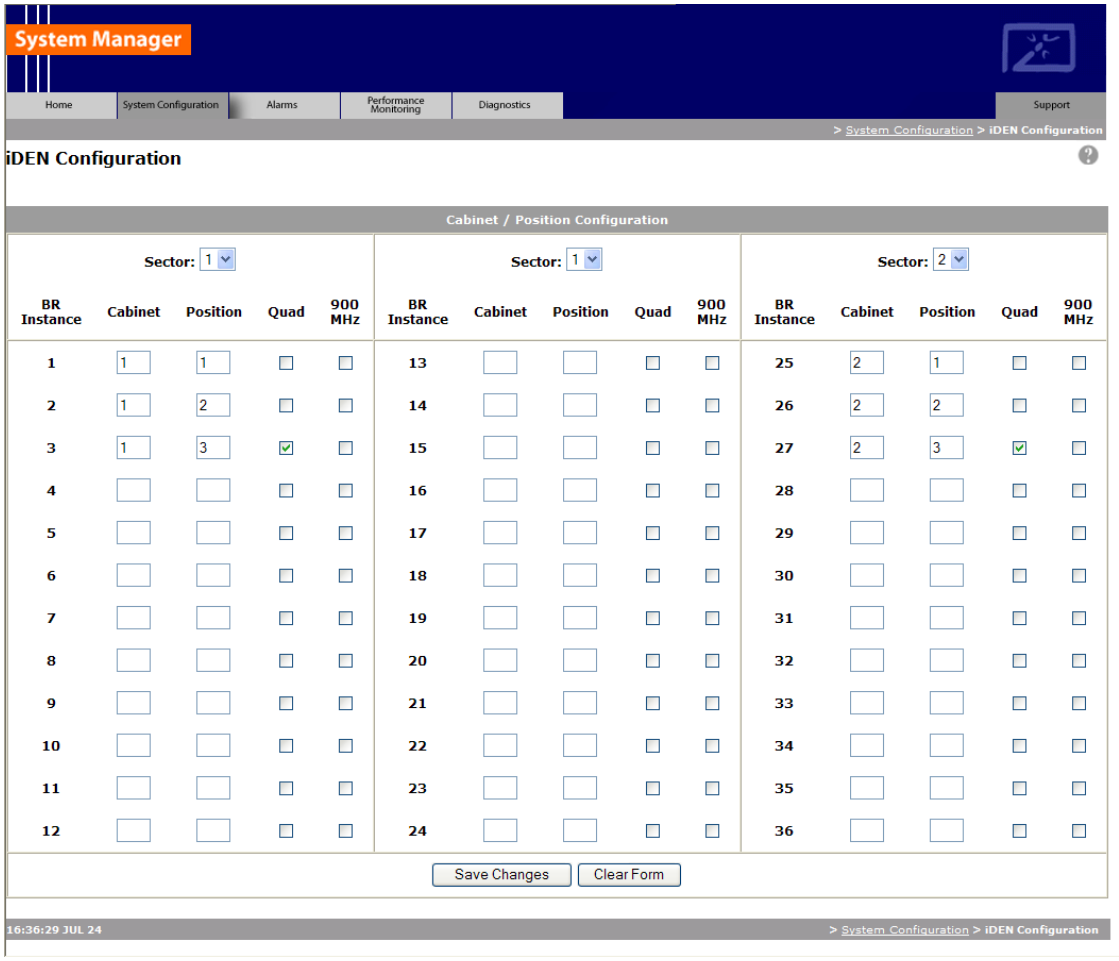
2 Enter the **Cabinet** and **Position** for the specified BR(s).

3 Select any **Quad BRs** (only one per group), according to site datafill parameters.

4 In Figure 2.15, one Quad BR has been selected: **BR Instance 5 Cabinet 3 Position 5**, in the first group. In this example, BRs 5 through 8 make up the Quad BR.

5 Select the **Save Changes** button to save the changes.

Figure 2.15 iDEN Configuration Page



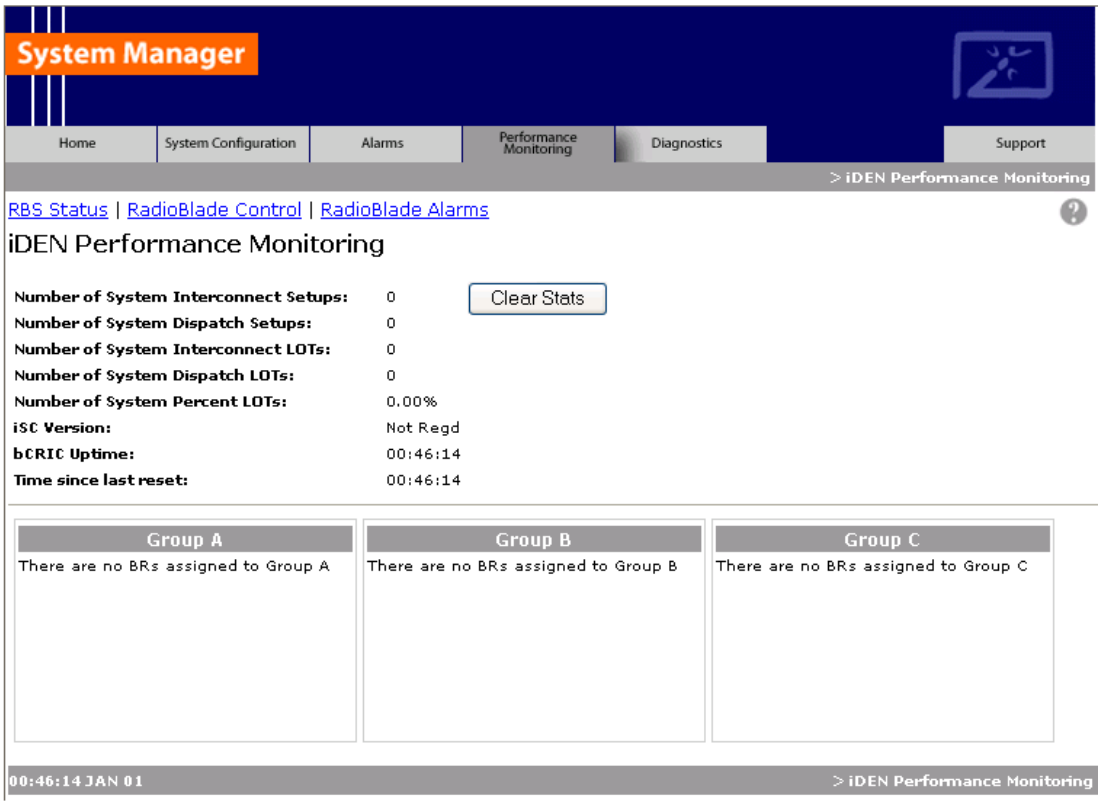
Note: The middle group (Sector 2) of the DRBS is not available for use in the system.

2.7 Optimization Procedures

2.7.1 Local Performance Monitoring

1. In System Manager, select the Performance Monitoring tab.

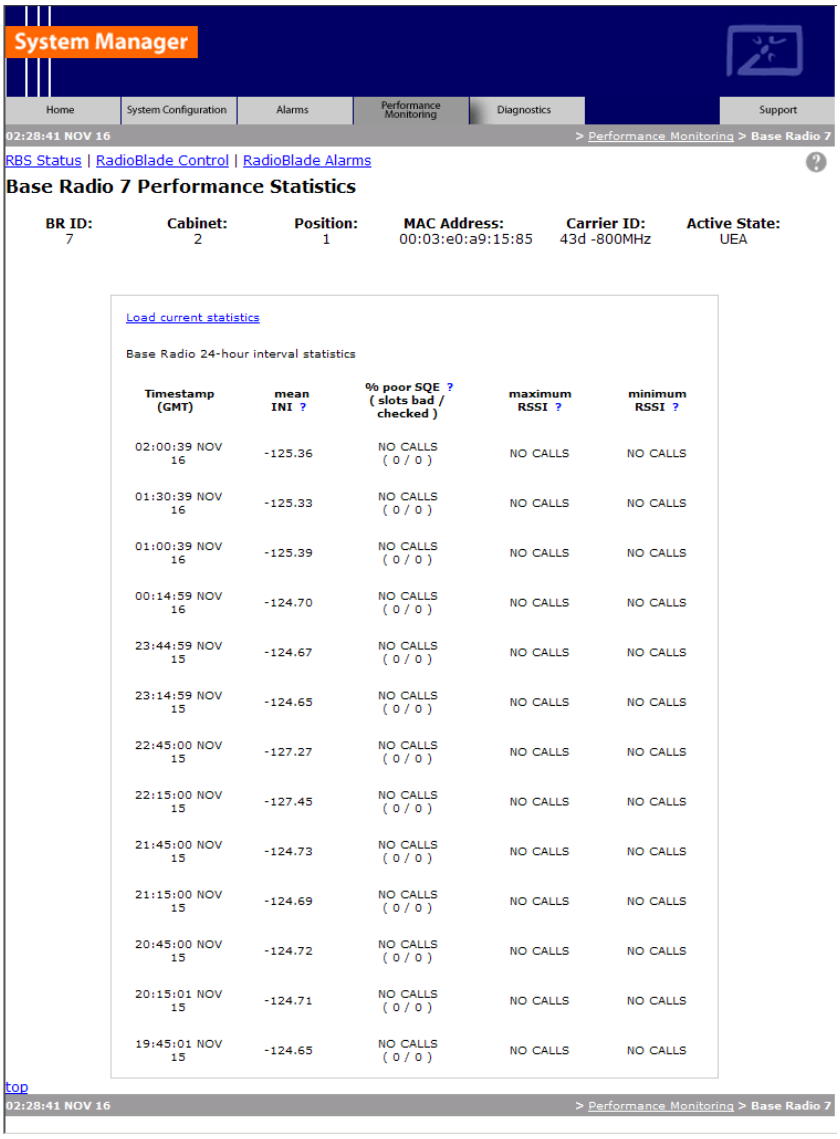
Figure 2.16 Operational Status—Performance Monitoring Page



Note: Group “B” is not supported on the OPM System

2. Select a BR icon to display the **Base Radio Performance Statistics** page.
3. Verify that the mean INI is within normal range (will vary depending on what is connected between TOR and the antenna).
4. Verify that the % poor SQE does not exceed 2% on a substantial number of packets (i.e., greater than 10,000 packets).
5. Repeat steps 2 through 4 for each BR in the system.

Figure 2.17 Base Radio Performance Statistics Page

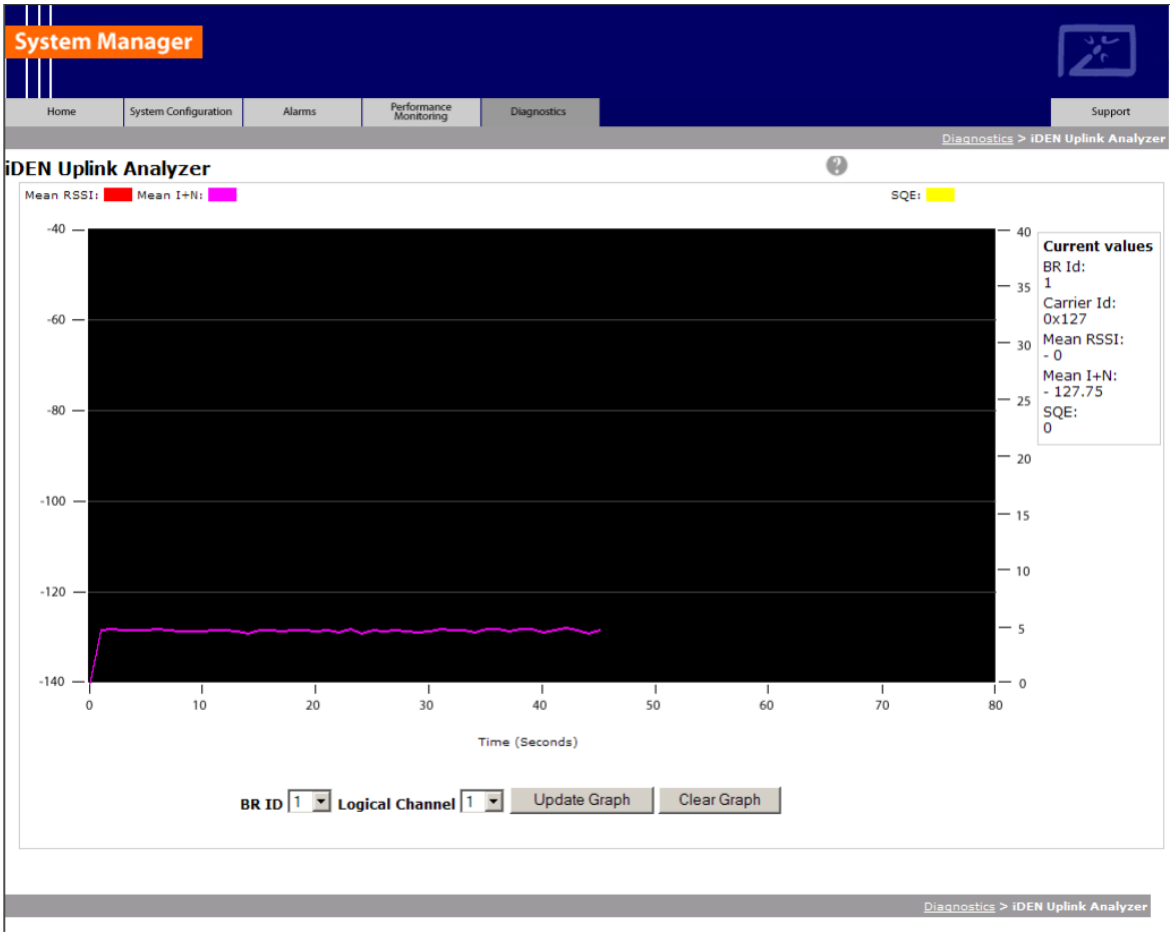


2.7.2 iDEN Uplink Analysis

RadioFrame Networks' iDEN Uplink Analysis Tool plots the Mean RSSI, Mean I+N and SQE for the last 80 seconds for the BR channel which has been selected. Figure 2.18 shows the System Manager page, accessible from the Diagnostics tab. The analyzer prints the following information:

- Mean RSSI (----- red): Average Received Signal Strength Indicator.
- Mean I+N (----- magenta): Average Interference Plus Noise.
- SQE (-----yellow): Signal Quality Estimate.

Figure 2.18 Uplink Analyzer Page



A. To use the Uplink Analysis Tool:

1. Select a radio and channel:

   a. Select the base radio from the BR ID menu. Select the channel from the Logical Channel menu.

   b. Click Update Graph to clear the screen and start a new graph with the new radio and channel.

   c. Click Clear Graph to reset the graph and start fresh with the current base radio and channel.

2. Reset the graph by clicking Clear Graph, and start fresh with the current base radio and channel.

Note: The Carrier ID is displayed in Hex for the BR chosen.

B. Voice Loopback Diagnostic Test

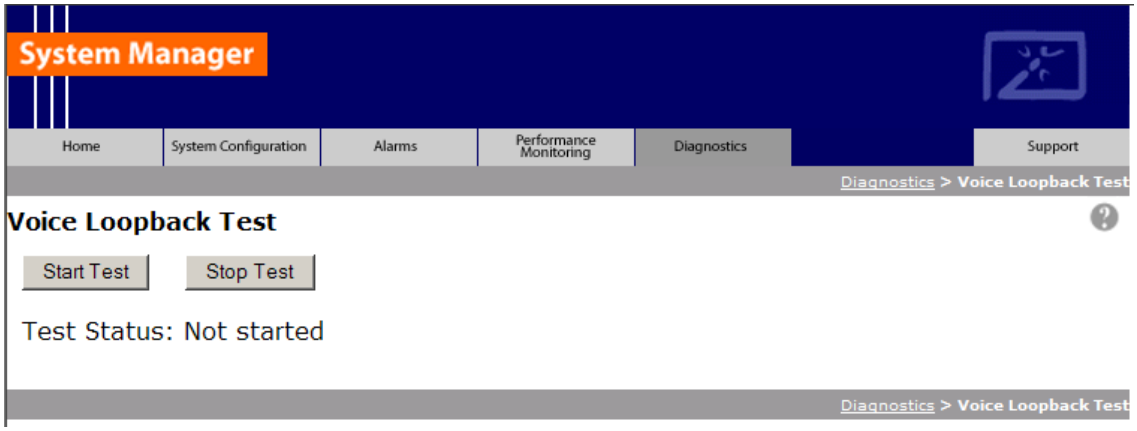
The Voice Loopback Diagnostic test provides the ability to loop all inbound voice traffic back out on the same logical channel for a given BR. This allows a person with a mobile to do uplink and downlink testing on a given BR without having to call someone else to monitor voice quality. The person on the Mobile simply speaks into the mobile and can hear his or her own voice.

Note: This test can also be used to isolate voice quality issue to the backhaul.

To use the Voice Loopback Test feature:

1. Click Start Test on the Voice Loopback Diagnostic Test Page to start the voice packet loopback. The first call, and only the first call, set up after Start Test is selected will be looped back. If a call other than the tester's happens to be set up after Start Test is selected and before the tester has the opportunity to set up the call, the other call will be looped back.

Figure 2.19 Voice Loopback Diagnostic Test Page



2. Speak into the handset, and listen to evaluate voice quality.
3. Click Stop Test to terminate the test.

   The loopback will persist on the selected BR until the Stop Test button is selected.

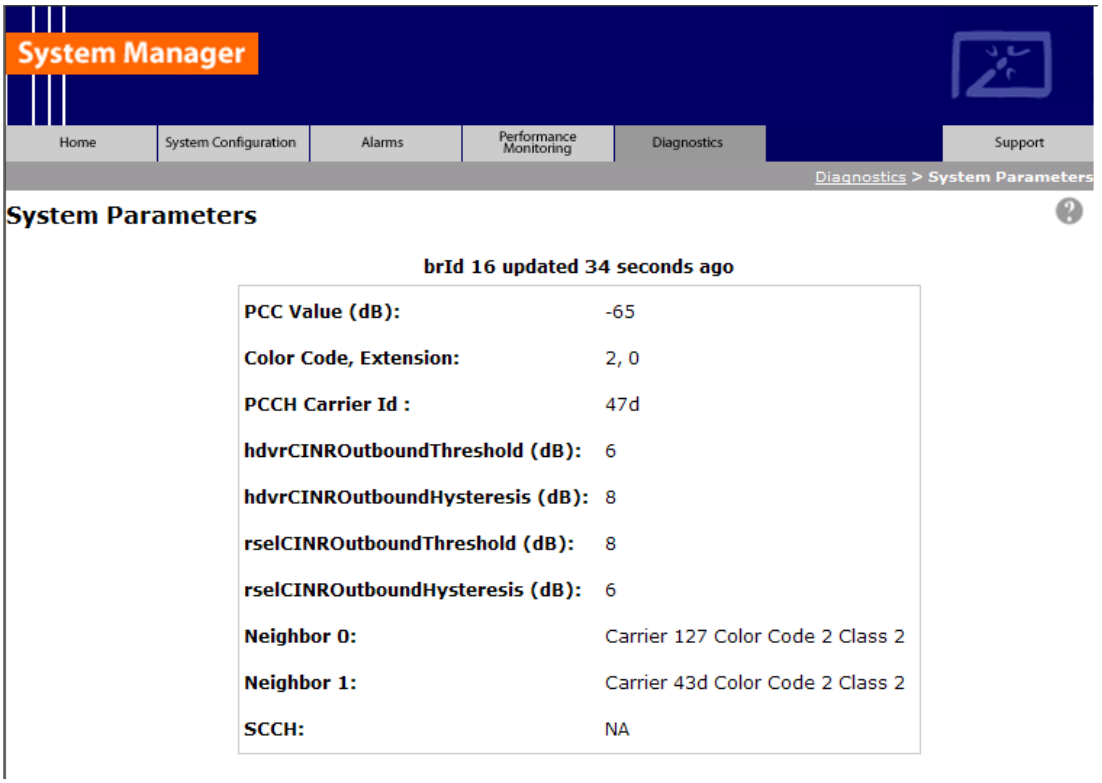
   The Test Status line will give a brief indication of the test state (Not Started; Waiting for Call Setup; Started).

C. System Parameter Information Page

The System Parameter Information Page displays the type 1 iDEN System Parameter Information that comes across the BCCH chain.

Note: Only a subset of the BCCH information is currently displayed.

Figure 2.20 System Parameter Information Page



Note: The datafill parameters "hdvrCINROutboundThreshold" and "rconCINROutboundThreshold" are modified in the iSCIII per the iDEN specification.

The value displayed as "rsel_threshold" in the System Parameter Information page reflects the observed BCCH value, which is the datafill value of "rconCINROutboundThreshold", offset by + 14 dB. The value displayed as "hdvr_threshold" is the datafill value "hdvrCINROutboundThreshold", offset by
+ 14 dB. For example, in the screen shot shown in Figure 2.20, the datafill value corresponding to "hdvr_threshold" would be equal to 6 (i.e., 6 +14 = 20).

System Manager is the MC-Series OPM System web-based interface. System Manager provides status, performance, and alarm information for the MC-Series OPM System and its components, as well as diagnostic tools and online help. When new releases of System Manager are provided, download the new release as described in section 3.1 (Upgrading MC-Series OPM System Software).

If any of the following information is changed in System Manager, also note those changes on the Equipment Inventory or site as-built documentation:

- Physical location
- IP addresses
- Port connections
- Sector locations

Chapter 3 System Configuration Changes

Overview

The MC-Series OPM system is shipped with the latest software installed. With each new software release, RadioFrame Networks provides its customers with the new software and accompanying information in the *RadioFrame Networks Customer Release Notes*.

Contents

3.1 Upgrading MC-Series OPM System Software

The following procedures describe how to upgrade MC-Series OPM System software. System Manager contains two separate partitions in which to install software: active and inactive. This provides the means to revert back to a previous version of system software if required.

3.1.1 Download MC-Series OPM System Software to the Laptop Computer

Note: If the laptop already contains the **docs**, **platform** and **iden** directories for the system software in the root, you may wish to delete these directories and all of their contents before downloading and extracting the latest system software. This way you can ensure a complete clean install.

Download the latest system software, a self-extracting zip file, from:

http://www.radioframenetworks.com/partners

1. Navigate to the IIOF's support pages. If you have not visited the RadioFrame Networks PartnerWeb site, you will be asked to register. Use your IIOF e-mail address and create a password.
2. Once your account is authenticated, install/extract the zip file directly into the C:/ drive on the laptop. The install creates three directories at the root level: docs, platform and iden.

3.1.2 Download FTP Server Software to the Laptop Computer

You will need an FTP server application running on the laptop computer. If one is already installed, you can skip to section 3.2 (Update the MC-Series OPM System Software). The following procedure installs a shareware program (Wftpd.exe) and configures it correctly. Use the method for your version of Windows.

A. Windows XP Method

Windows XP is capable of correctly configuring Wftpd.exe if you follow these steps.

1. Download Wftpd.exe, a self-extracting zip file, from:

   http://www.radioframenetworks.com/partners

   or from

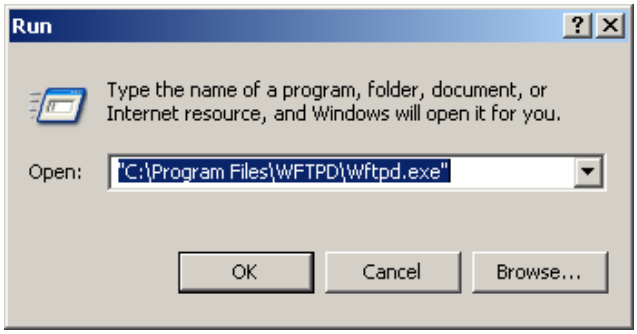
   http://www.wftpd.com/

2. Open the zip file with your archive/compress/extract utility (e.g., WinZip).
3. Extract to your Windows drive root directory (e.g., C:\).
4. From the Windows Start menu, select Run.

5. Click **Browse. . .** in the Run dialog box and browse to **C:\Program Files\WFTPD**
   (Windows XP should have placed the properly configured executable **Wftpd.exe** in **Program Files\WFTPD**. If you do not see it there, you need to follow the Windows 2000 configuration method.)

6. In the **Browse** dialog box, select the file **Wftpd.exe** and click **Open**.

Figure 3.1 Executing Wftpd from the Windows XP Laptop Run Dialog Box



7. Click **OK** in the Run dialog box to start WFTPD.

8. Check configuration as follows: Navigate to the **Security** menu and select **Users/Rights...** . In the **User/Rights Security** dialog box, select **board** from the **User Name** drop down list.

9. Now proceed to the section 3.2 (Update the MC-Series OPM System Software) to upgrade the system software.

B. Windows 2000 Method

1. Download Wftpd.exe, a self-extracting zip file, from:

   http://www.radioframenetworks.com/partners

   or from

   http://www.wftpd.com/

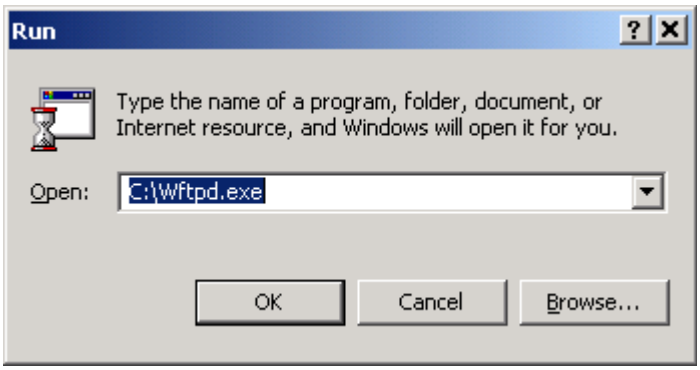
2. Open the zip file with your archive/compress/extract utility (e.g., WinZip).

3. Extract to your Windows drive root directory (e.g., C:\).

4. From the Windows Start menu, select **Run**.

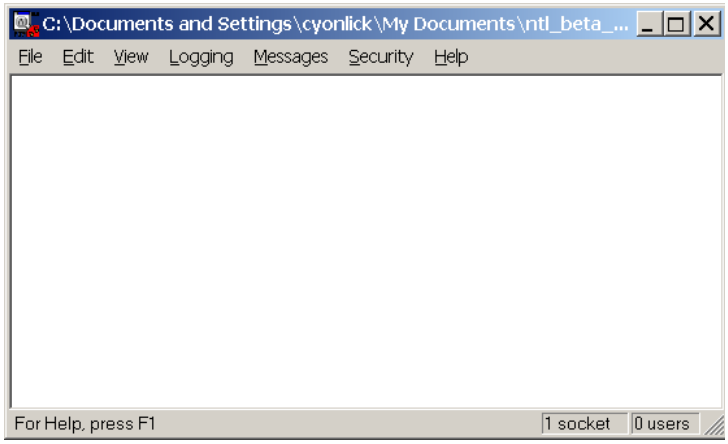
5. Open the FTP Server – enter **C:\Wftpd.exe** in the dialog box and click **OK**.

Figure 3.2 Executing Wftpd from the Windows 2000 Laptop Run Dialog Box



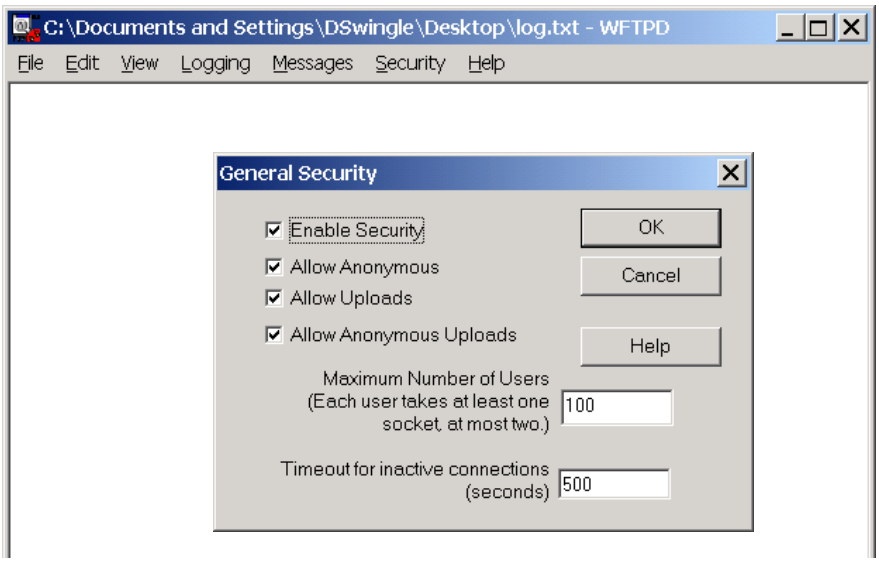
6. The configuration in Figure 3.3 is for Wfptd:

Figure 3.3 Wftptd Settings (Bottom of Screen Shot)



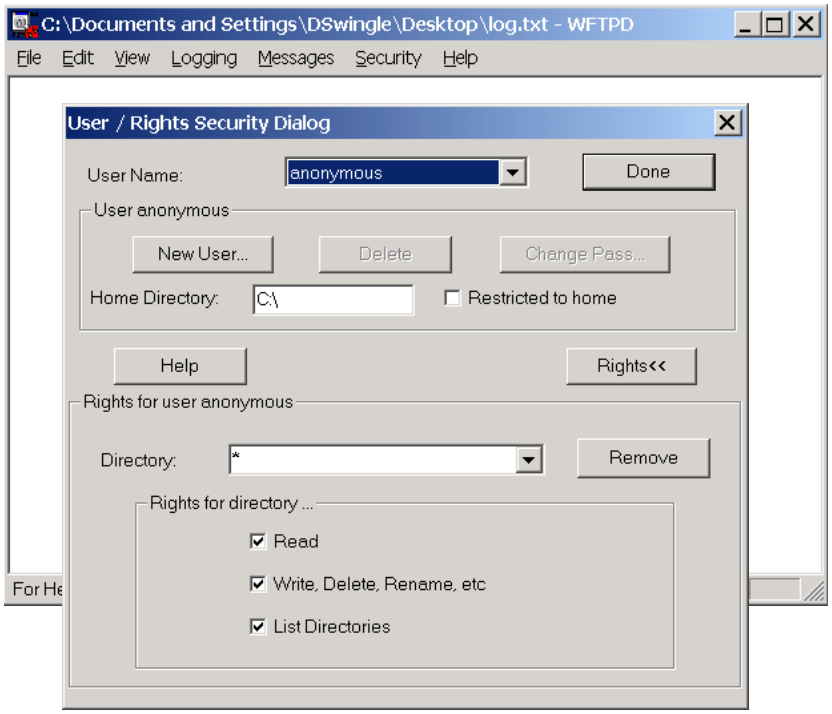
7. From the **Security menu**, select **General**, configure the **General Security** page as shown in Figure 3.4 and then select **OK**.

Figure 3.4 General Security Dialog Box Settings



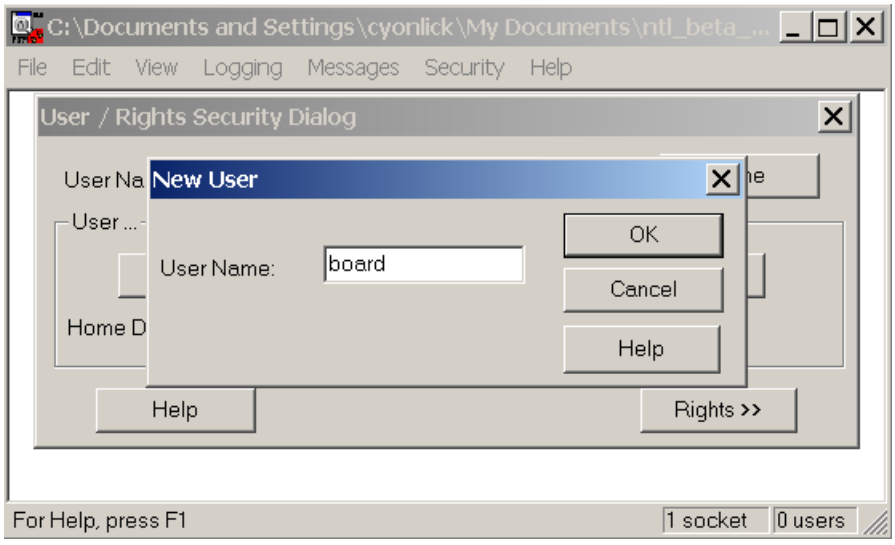
8. From the **Security menu**, select **User/rights**, and for **User Name** select **anonymous** from the drop down menu, and then select the **Rights<<** button and verify that the settings are the same as shown in Figure 3.5.

Figure 3.5 User / Rights Security Dialog Box Settings



9. Select the **New User…** button, and then for **User Name** type **board** in the text box, and then select **OK**.

Figure 3.6 New-User Name

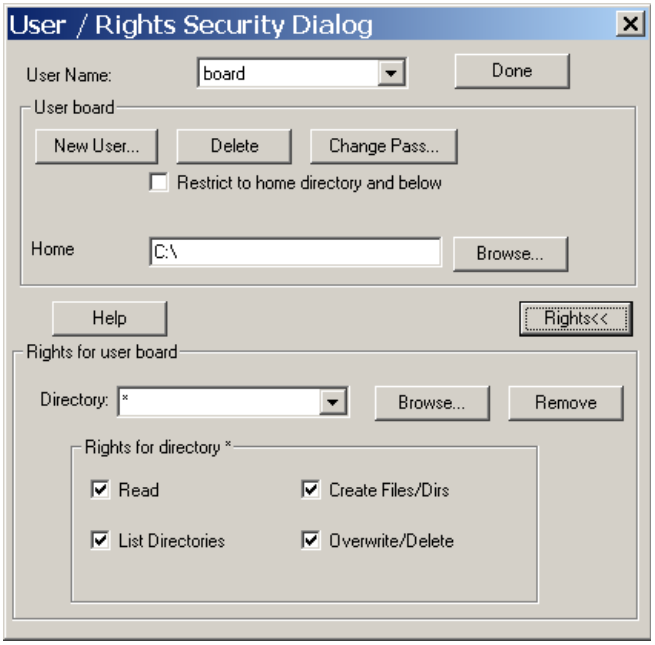


10. For **New Password** type **wind**, then retype **wind** in the **Verify Password** text box, and then select **OK**.

Figure 3.7 Password

11. The User/Rights Security dialog box reappears, and the **User Name** is now set to **board**. Select the **Rights** button and verify that the settings are the same as shown below, and then select **Done**.

Figure 3.8 User Name Set in User/Rights Security Dialog Box



12. Now proceed to the next section to upgrade the system software.

3.2 Update the MC-Series OPM System Software

The following procedure assumes that the MC-Series OPM System is currently running at least the RadioFrame Networks 15.0 release, and that the system is to be upgraded to the RadioFrame Networks MC 15.0 OPM load. If this is not the case, the system must first be upgraded to a version of RadioFrame Networks software that supports software baselining. For SW download scenarios involving other software upgrades or downgrades, please contact RadioFrame Networks Technical Support for specific instructions (1-800-328-0847).

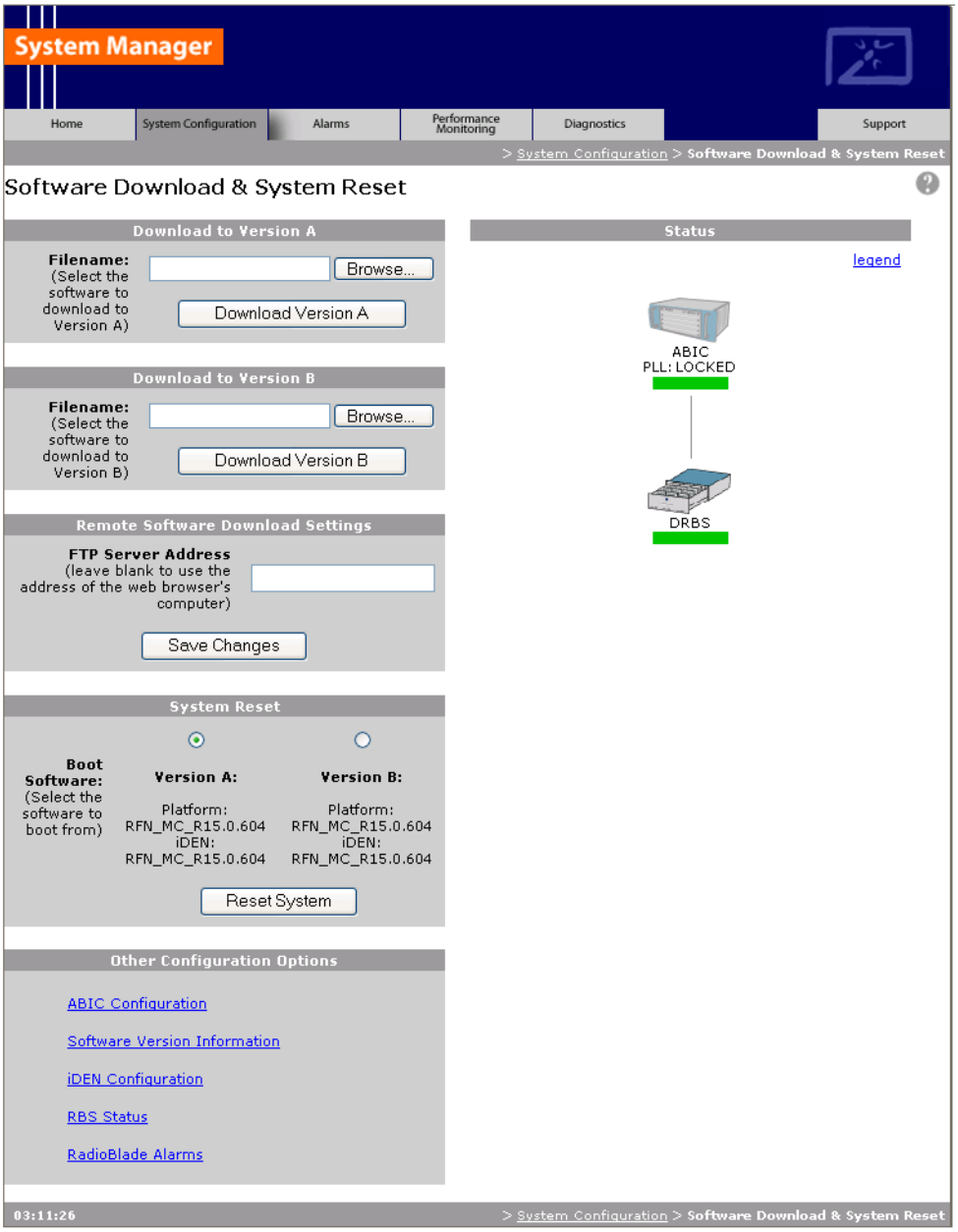
The procedure also assumes that the service laptop to be used for upgrading the system software contains the system software load extracted to the root directory and that the correctly configured FTP server is running on the laptop. If this software is not yet in place, please start at section 3.1.2 (Download FTP Server Software to the Laptop Computer).

1. Connect the laptop to the MC-Series OPM System, start System Manager, and log in (for complete instructions, refer to section 2.2 (System Setup)).

2. Navigate to the **Software Download & System Reset** page (Figure 3.9) by selecting the **System Configuration** tab and clicking on the **Software Download & System Reset** link.

Note: Before starting the download in step 3 , be sure to clear any FTP Server Address that shows up in the **Remote Software Download Settings** field. If you need to clear an address from this field, you must click the **Save Changes** button.

Figure 3.9 Download and Reset Links



Note: iDEN Cabinet/Sector Information is not preserved in a downgrade from a 15.0 MCRB release to any non-MCRB release. Care should be taken to record this information and re-enter it as necessary after a downgrade.

Note: In the following procedures, ffs0 is partition A; ffs1 is partition B.

3. Using the inactive partition—“Download Version A” or “Download Version B” in System Manager—navigate to the /platform/loads/MC-Series directory, and then run the download on the following two files (observe the Download Successful page; if a file fails, download it again):

   - rom_staging.txt
   - plat_staging.txt

   The inactive partition is the one that is not selected under System Reset (A or B). Browse for the file in the text box of the inactive partition, A or B, and then select the **Download to Version…** button.

4. Using the inactive partition

   a. “Download Version A” or “Download Version B” in System Manager.

   b. Navigate to the /iden2/loads/BplusMC-Series directory.

   c. Run the download on the following file (observe the Download Successful page; if it fails, repeat the download):

      - iden_staging.txt

   a. Reboot the system using System Manager to the new load and wait for the download to complete successfully, which may take several minutes. This release must also be downloaded to the other partition at this time.

5. Using the inactive partition

   a. “Download Version A” or “Download Version B” in System Manager.

   b. Navigate to the /platform/loads/MC-Series directory.

   c. Run the download on the following file (observe the Download Successful page; if it fails, repeat the download):

      - plat_staging.txt

6. Using the inactive partition

   a. “Download Version A” or “Download Version B” in System Manage.

   b. Navigate to the /iden2/loads/BplusMC-Series directory.

c. Run the download on the following file (observe the Download Successful page; if it fails, repeat the download):

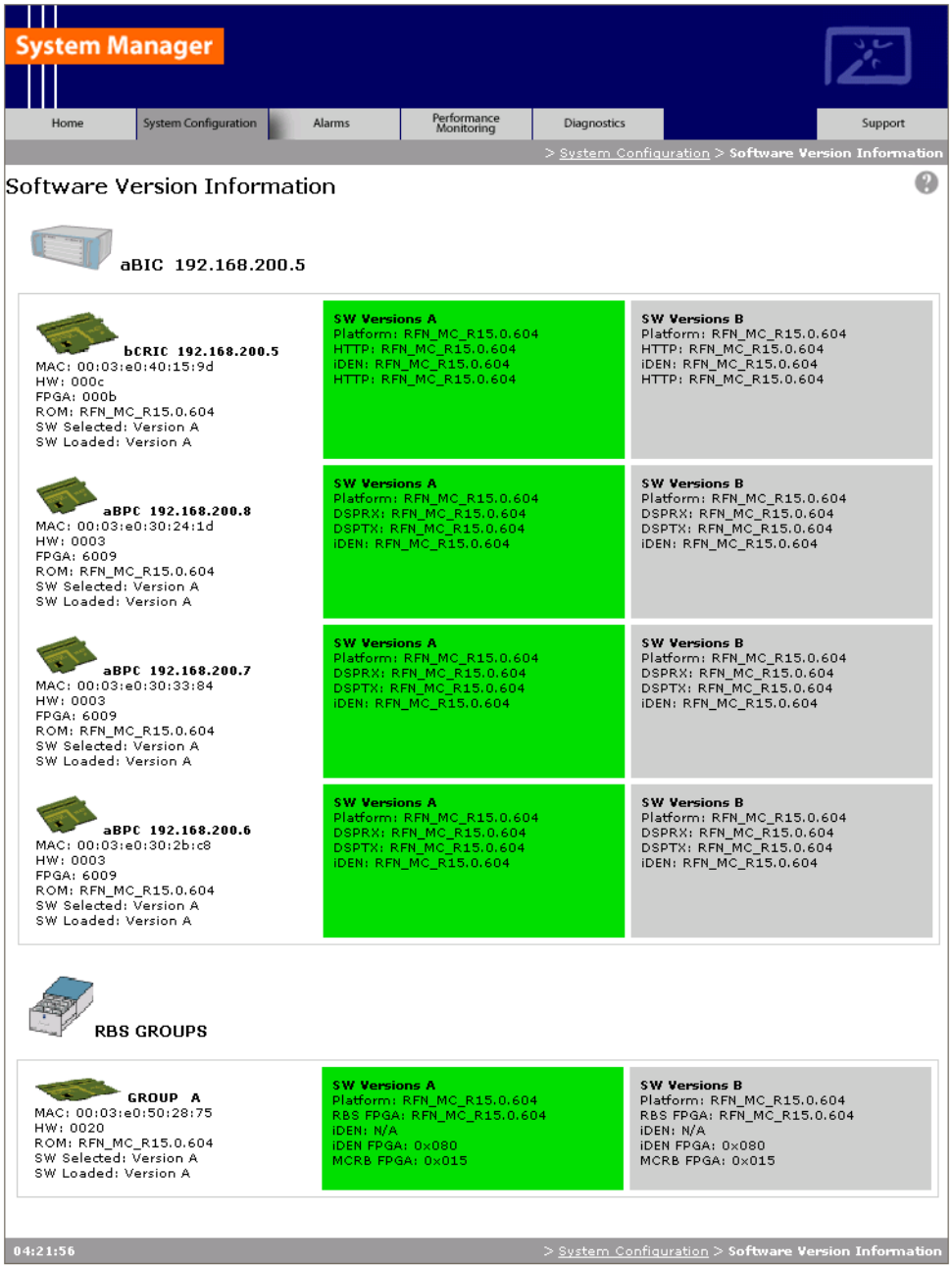
- iden_staging.txt

a. Reboot the system using System Manager to the new load and wait for the download to complete successfully, which may take several minutes.

3.2.1 Verify the Software Download

1. Select the Software Version Information link on the System Configuration page.

Figure 3.10 Software Version Information Page



2. Review the SW Versions A and SW Versions B to make sure the latest software is loaded in the correct partition.

3. Verify that the SW Selected and SW Loaded for each component in the system is correct.

3.3 Rollback to the previous version of software

Revert to a previous version of MC-Series OPM System software only if the upgrade fails.

1. Select the **Software Download & System Reset** link on the System Configuration page.
2. On the Software Download & System Reset page (Figure 3.9), under **System Reset**, select the inactive partition to revert to the previously loaded version of software.
3. Select the Reset System button.

   This reboot will take several minutes to complete. Wait for the system to come back, and then refresh the page or reopen the web browser to force the page to update.

3.4 Performing a System Reset

1. If necessary, connect the laptop to the MC-Series OPM System, start System Manager, and log in (for complete instructions, refer to section 2.2 (System Setup)).
2. Select the **Software Download & System Reset** on the System Configuration page.
3. On the Software Download & System Reset page (Figure 3.9), select the Reset System button.
4. Follow the procedure in section 6.6 to add or remove a RadioBlade transceiver.

Chapter 4 Final Checkout

Overview

The procedures in this chapter describe final checkout for each portion of the MC-Series OPM system.

Contents

4.1 Final Checkout procedures

This chapter describes procedures for:

- Prerequisites
- Checkout procedures
- Final checkout setup
- Initial power
- System setup
- System verification
- Functionality test

4.1.1 Prerequisites

Ensure that the following has taken place:

- The T1 is live and has been tested
- The datafill has been completed, including BR Cabinet and position assignments, and conforms to the recommended datafill shown in section 2.3.3 (Recommended Datafill Parameters).
- Site configuration is available
- All cabling and installation work has been completed and all punchlist items corrected

Required Tools:

- R2660 Series Communication System Analyzer
- Digital RF meter
- Laptop computer to bring up the MC-Series OPM System. At a minimum, the laptop must be loaded with the following fully functional equipment (or equivalent):
  - Pentium II / 233 MHz (Pentium III / 500 MHz recommended, or better)
  - 128 MB of memory (256 MB recommended)
  - 10 GB hard drive (64 MB disk drive space minimum available for software)
  - 12x (or faster) CD-ROM (USB memory stick with 64 MB recommended)
  - Windows 2000 Professional or better recommended
  - Internet Explorer 6.0 or later (not Mozilla Firefox)

- One Ethernet port and one 9-pin serial port
- 6-foot Cat-5 (or 5e/6) Ethernet cable (EIA/TIA 568B) to connect to the ABIC CRIC
- Straight-through, male-to-female serial cable (DB9/RS232)
- 50 ohm 2W terminating loads for all RF ports to be used according to the site configuration

Ensure that the following RadioFrame Networks software is available:

- CD ROM (backup)
- New versions can also be downloaded from RadioFrame Networks web site to the local root directory (C:/)

For local software downloads, have the following available on the laptop:

- FTP server software—WFTPD32 is shareware that can be downloaded from the following site: http://www.wftpd.com/
- Terminal emulation software (e.g., PROCOM)

4.1.2 Checkout Procedures

Caution!

Verify that all breakers in the PDU are in the OFF position prior to proceeding. Leave them in the OFF position until instructed otherwise.

1. Verify that all breakers in the PDU are in the OFF position prior to proceeding. Leave them in the OFF position until instructed otherwise.
2. Conduct a visual inspection of the cabling on the rear of the Cabinet verifying that all connections are in place, tight, and complete.
3. Add and remove RadioBlade transceivers according to the site configuration. Refer to section 6.7 (RadioBlade Transceiver Replacement).
4. Verify that cabling matches the site configuration.
5. Refer to Appendix C (OPM iDEN Microcell Cabinet Stack-Up Configuration).
6. Install 50 ohm 2 W terminators on all unused Tx / Rx / Rx Diversity ports on the rear of the enclosure.
7. Verify that there is DC power at the supply terminals on the PDU and that the polarity is correct.

Chapter 5 Troubleshooting the OPM System

Overview

This chapter provides maintenance and troubleshooting guidelines fro the OPM system.

Contents

5.1 Maintenance

A report of the MC-Series OPM system should be maintained and left on site. This report will provide metrics for possible concerns with individual components and/or the entire system. It is important that the technician performing the checks understand the equipment theory and operation. Review the documentation (references) prior to verification and performing service.

For non-RadioFrame Networks hardware, refer to the equipment manufacturer's documentation for maintenance information and procedures. For the iSCIII and the EAS, refer to the *Gen 3 Site Controller System Manual*, Motorola, 68P80801E30-O. For the CSU, refer to the manufacturer's documentation for preventive maintenance information.

5.1.1 Annual Maintenance

Conduct the following **annual maintenance**:

- Visually inspect all equipment in the MC-Series OPM system Cabinet for loose or foreign items and for visible damage.
- Verify site-configuration cabling is correct. Refer to cabling diagrams in Appendix C (OPM iDEN Microcell Cabinet Stack-Up Configuration).
- Conduct the BER test on each RadioBlade transceiver. Refer to Appendix F (BER Test Procedure).
- Conduct the TOR Tx measurement (RF output measurement) on each transmitter.

5.2 Troubleshooting Guidelines

Technicians should conduct the following troubleshooting steps in order:

1. Visually inspect for fault indication (LEDs).
2. Inspect the Alarm Manager, and follow alarm resolution procedures. Refer to the Alarm and Event Guide as well as sections 5.4 (Software Alerts) and 5.5 (RadioBlade Transceiver Alarm Handling) of this Implementation Guide.
3. Contact the RadioFrame Networks Technical Assistance Center at: (800) 328-0847. Also, refer to section Appendix H (Repair and Technical Support).
4. Complete and save the serial log upload if directed; refer to section 5.7 (Serial Log Upload Procedure).
5. Refer to sections 6.2 (Power Down Procedure) and 6.1 (Field Replaceable Units (FRUs)) as necessary.

5.3 Hardware Alerts

5.3.1 Fault Indications

This section provides fault indications for the following RadioFrame Networks components only: ABIC, DRBS and RF Shelf. For all non-RadioFrame Networks equipment, refer to IIOF's or the manufacturer's documentation.

5.3.2 ABIC Indicators

Table 5.1 ABIC LED Indications

LED	Indication	Condition	Corrective action
POWER	green	normal condition	none
	not lit	no power to ABIC	• Verify that ABIC circuit breaker on PDU is ON. • Check power connection to PDU. • Measure power input, and compare with tolerances. • Verify that the power source is operational. • Contact the TAC: (800) 328-0847
STATUS	green	normal condition	none
	not lit	card(s) not receiving power	• Verify power to ABIC (see “no power to ABIC” above)
	red CRIC only	bootup not complete	• Allow three minutes (approx.) for bootup to complete.
		timing not synchronized	• Verify that the GPS LED on iSCIII is green. • Verify that the cable is connected from ABIC ERTM port 5MHz/1PPS IN to iSCIII port 5MHz/1PPS. • Contact the TAC: (800) 328-0847
	red any card	PLLs are not locked	• Verify that the STATUS LED on the ABIC CRIC is green • Check the Alarm Manager for PLL LOCK alarm; wait 3 minutes for PLLs to lock; if they do not: • Verify integrity of the ABIC Ethernet connection. • Contact the TAC: (800) 328-0847

5.3.3 DRBS Indicators

Table 5.2 DRBS LED Indications

LED	Indication	Condition	Corrective action
STATUS	green	normal condition	none
	not lit	no power to DRBS	• Verify that DRBS circuit breaker on PDU is ON. • Check power connection to PDU. • Measure power input, and compare with tolerances. • Verify that the power source is operational. • Contact the TAC: (800) 328-0847
	red	timing is not synchronized to the group (A, B, or C) Board unable to boot	• Power cycle the DRBS using the circuit breaker on the PDU. • Contact the TAC: (800) 328-0847
RADIOBLADE TRANSCEIVER STATUS	green	RadioBlade transceiver present and operational	none
	not lit	RadioBlade transceiver not present	none
		RadioBlade transceiver present	• Reseat RadioBlade transceiver.
	red	RadioBlade transceiver is in error state	• Reseat RadioBlade transceiver. • If still red, replace RadioBlade transceiver.

5.3.4 OPM RF Shelf Indicators

Table 5.3 OPM RF Shelf LED Indications

LED	Indication	Condition	Corrective action
POWER	green	normal condition	none
	not lit	no power to RF shelf	• Verify that RF circuit breaker on PDU is ON. • Check power connection to PDU. • Measure power input, and compare with tolerances. • Verify that the power source is operational. • Contact the TAC: (800) 328-0847
ALARM	green	normal condition	• none
	not lit	not receiving power	• Verify power to RF Shelf (see "POWER" above).
	red	alarm condition	• Check the Alarm Manager for: RF SHELF MINOR, replace fan. RF SHELF MAJOR, replace RF shelf. • Contact the TAC: (800) 328-0847

5.4 Software Alerts

System Manager Alarms

The MC-Series OPM System provides fault alarming and isolation within System Manager for individual components, which consists of detecting catastrophic faults that prevent a component from responding to a periodic "ping". Depending on the severity, alarms are sent to the OMC via the iSCIII.

The Alarms/Events Reference Guide, included on the MC-Series CD and available on the RadioFrame Networks website, lists the alarms by ID code.

All alarms passed to the OMC use the IIOF Alarm Code 35009, which uses the event description "Unable to key BR".

5.4.1 Viewing System Manager Alarms

1. Select the Alarms tab in System Manager to display the Active Alarm Manager.

The Alarm Log displays active (un-cleared) alarms listed by date and time, and the Alarm Details window displays information about a single selected alarm (see Figure 5.1). A summary at the top of the page lists the current number of Critical, Major, Minor, and Warning alarms. Alarms that are no longer active are moved to the Alarm History Manager.

Note: If the Alarms page is empty, System Manager is still loading the page.

Non-alarm events are displayed in the Events Log. The initial Events Log lists all the alarms generated by RFS components. You can view a smaller list by selecting one of the Show links at the bottom of the page. Clicking the first link with a value of 20 in the box displays the first 20 alarms. You can enter any number in the field.

Figure 5.1 Alarm Log Page

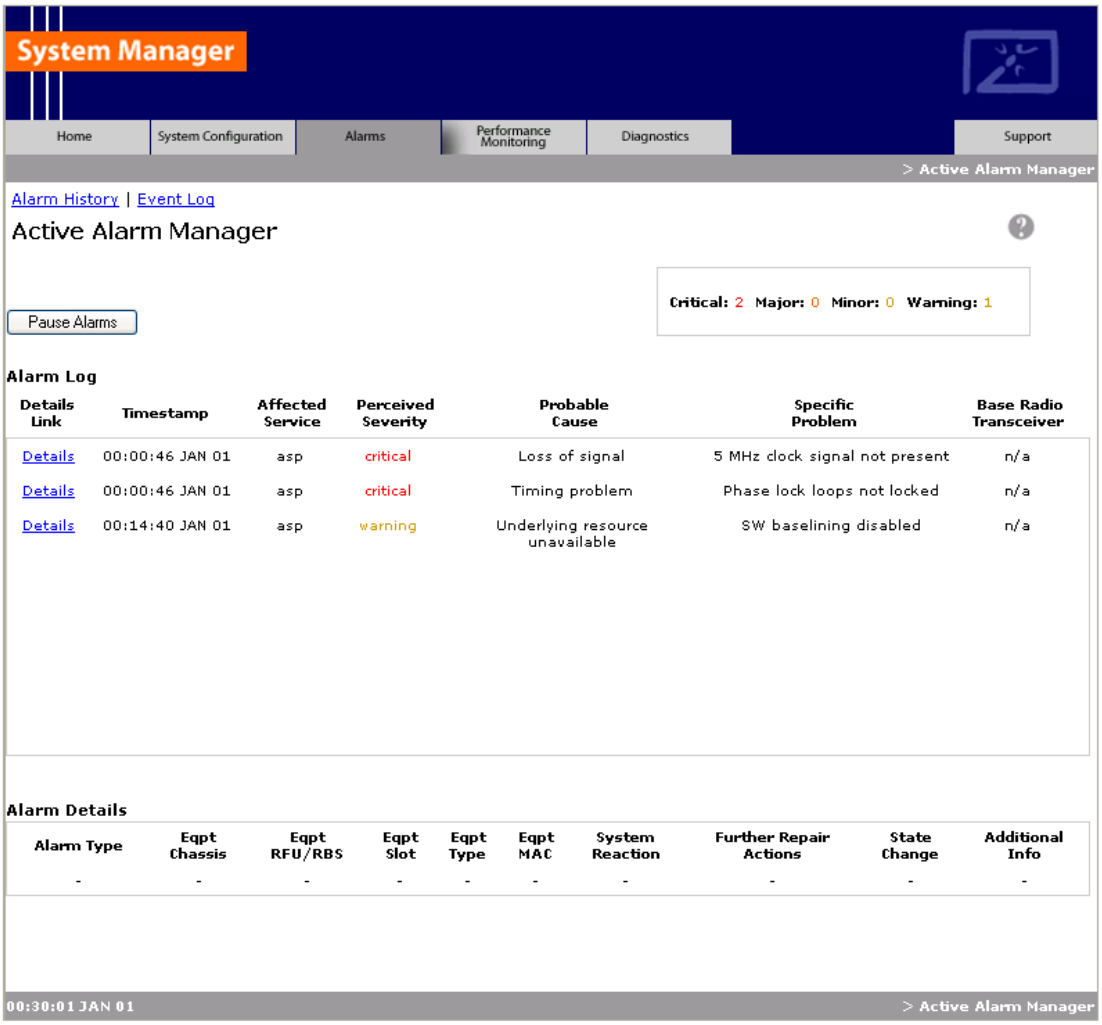


Table 5.4 Alarm Log Fields

Alarms Log Field	Description
Details	Displays details of the alarm in the Alarm Details window
Timestamp	Date and time alarm occurred (in Greenwich meantime-GMT)
Affected Service	iden: iDEN software only asp: platform software only RadioFrame Networks: All system software is affected (platform, iDEN)
Perceived Severity	cleared: A 'set' alarm has been cleared and moved to Alarm History critical: Service affecting failure; requires immediate attention major: Service affecting degradation; requires urgent attention minor: Non-service affecting condition; requires scheduled attention warning: Potential condition that may lead to a more serious alarm
Probable Cause	Describes what might have caused the alarm
Specific Problem	Describes the problem more specifically
Base RadioTransceiver	BR ID (1 through 32) or n/a for not applicable

2. To view details about a specific alarm, select the **Details** link next to the alarm. The **Alarm Details** window displays the information listed in Table 5.5.

Table 5.5 Alarm Details Fields

Alarm Details Field	Description
Alarm Type	Communication: failure to convey information Quality of service: signal degradation Processing error: software processing fault Equipment: equipment fault Environmental: condition with the equipment enclosure
Eqpt Chassis	Affected chassis: abic
Eqpt Rfu/Rbs	Affected DRBS group: grp A or grp C
Eqpt Slot	Affected chassis slot: ABIC (1-5) or DRBS (1-24)
Eqpt Type	RadioFrame Networks: unknown rlic: ABIC CRIC bpc: BPC or BPC+SPAM ric: ABIC CRIC rbs: DRBS idenrb: RadioBlade transceiver
Eqpt Mac	MAC address of the affected component
System Reaction	The action taken by the system as a result of the alarm
Further Repair Actions	Corrective action that should be taken as a result of the alarm
State Change	Not currently used (displays ‘false’ by default)
Additional Info	Miscellaneous 32-bit field

5.4.2 OMC Alarm Code

All RFS MC-Series alarms sent to the OMC use the IIOF Alarm Code 35009. Table 5.6 shows the properties for this alarm code. The Event Description for this alarm is 'Unable to key BR'.

Table 5.6 Alarm Code 35009 Properties

Event	Description
IIOF Alarm Code	35009
Event Type	CntrlBrd
Alarm Type	Equipment Failure
Actionable	Yes
Severity	Minor, Major or Critical
Bounce Threshold (x)	3
Bounce Threshold Minutes	30
Duration Threshold	10
Related Alarms	None
R & C	RC
Outage Y/N	S1_El CY
Event Description	Unable to key BR
Advisor	Site Service call
Comments	None
Alert Names	BREFCTLBD35009
Last updated	8/3/2001
Revision	
Change Notes	8/3/2001: per new EBTS rules baseline. Changed severity and threshold from GR1 to: Severity=minor BounceThreshold=3 Bounce Threshold Minutes=30 Duration Threshold=10
Action	Create trouble ticket. Contact Field Technician. TS/BR

iDEN Alarm Code 4133

The Pole Mount system also introduces a new iDEN alarm (4133). Table 5.7 shows the properties for this alarm code.

In an OPM system with greater than 6 carriers provisioned in a sector, the default TX power cannot exceed 9.2. It is necessary, therefore, to reconfigure the default TX power to a value of 9.2 or less.

If more than 6 carriers are provisioned in a single sector AND the defaultTxPower exceeds 9.2 on any of those BRs, then the maximum allowable TX Power will be de-rated for the BRs in that Sector as shown in Table 5.8.

Table 5.7 Alarm Code 4133 Properties

Event	Description
IIOF Alarm Code	4133
Event Type	iDEN
Severity	Major
Cause	Configuration Customization Error.
System reaction	Set the default TX power to 9.2.
Additional Info	Session ID
Repair Action	In a configuration where the number of carriers per sector exceed six, the default TX power can't exceed 9.2. Reconfigure the default TX power to a value of 9.2 or less.

Table 5.8 Maximum BR derated TxPower

MC-Series	Max # Of Carriers/ Sector	Max Power Output per Carrier @ 6 carriers with defaultTxPower set to 9.5	New de-rated Power at 9.2
OPM	12	2W	1W

5.4.3 System Manager Alarms

The document *Alarms/Events Reference Guide* lists MC-Series OPM System alarms numerically by alarm ID (0x01, 0x02, etc.).

MC-Series alarms are based on the X.733 conventions for telecommunications equipment. The alarms are grouped by service: either "asp" for platform faults or "iden" for iden application faults. The "cause" field contains the X.733 cause type. "System reaction" describes the action taken by the system as a result of this alarm, and "repair actions" provides details on what corrective action should be taken as a result of this alarm.

The Alarm details on the active alarm manager page of System Manager provides additional information with respect to the board, slot number, MAC address and equipment type.

5.5 RadioBlade Transceiver Alarm Handling

The iDEN RadioBlade transceivers Cabinet various faults and reports to the RadioBlade controller. These faults are monitored, and if the rate at which these faults occur surpasses a threshold, the RadioBlade transceiver (blade) is locked. The blade will generate these faults as the result of normal actions such as re-syncing the

blade, locking and unlocking the blade and locking and unlocking the BR. For these reasons, only if the blade continues to generate these faults under normal operating circumstances is an alarm generated.

The RadioBlade transceiver faults are listed in Table 5.9.

Table 5.9 Faults by the Transceiver

Fault	Description
PLL1 Errors	The Phase Lock Loop #1 went out of lock.
PLL2 Errors	The Phase Lock Loop #2 went out of lock.
PLL3 Errors	The Phase Lock Loop #3 went out of lock.
Tx Underrun	RadioBlade transceiver did not receive a packet in time to transmit.
Tx Overflow	RadioBlade transceiver received too many packets to transmit.
Rx OverFlow	Sample buffer overflowed.
Slot mismatch	Received packets were not consecutive.
CRC errors	Received Ethernet packets had CRC errors.

If a RadioBlade transceiver generates enough errors such that it crosses the Bounce and Duration threshold for that particular error, an alarm will be generated. This alarm will also cause the RadioBlade Locking Policy to lock that RadioBlade transceiver. Table 5.10 lists the fault count and fault period for an alarm to be generated.

Table 5.10 RadioBlade Transceiver Fault Thresholds for Alarm Generation

Alarm	Bounce Threshold (counts)	Duration Threshold (minutes)
PLL 1	75	12
PLL 2	75	12
PLL 3	50	12
Tx Underrun	40	12
Tx Overflow	40	12
Rx Overflow	40	12
Slot Mismatch	40	12
CRC Errors	20	12
Packet Size Errors	20	12

5.6 RadioBlade Troubleshooting

In addition to the above-mentioned errors, if the system loses communication with a RadioBlade transceiver or is unable to read the EEPROM from the blade, then that blade is put into an error state and if a standby blade is available it will switch over automatically.

5.6.1 RadioBlade Locking Policy

The RadioBlade locking policy defines the actions taken by the system when a determination is made that a RadioBlade transceiver should no longer be allowed to remain active. This could be the result of an alarm, insertion, removal or intervention (the user specifically locking the RadioBlade transceiver).

In general, the policy is that if a blade is taken out of service and a standby RadioBlade transceiver is available, then the standby RadioBlade transceiver will go into service. If no standby RadioBlade transceiver is available then the associated BR(s) will be locked. (For the Multi-Channel RadioBlade transceiver, the locking event locks all carriers.)

The RadioBlade locking policy is enabled by default and in effect at all times.

5.6.2 Standby Blade

A Standby Blade is an extra RadioBlade transceiver that is installed in the system but does not have a configured BR with which to register. To setup Standby Blades, make sure that there are more RadioBlade transceivers for each DRBS Group than Base Radios configured in the iDEN configuration page.

In all the conditions described below, if RadioBlade transceivers are present in the system that are in the hot-standby state, then locking the RadioBlade transceiver (due to alarms, removal of a RadioBlade transceiver or administratively locking RadioBlade transceivers) will result in the hot Standby Blade transceiver being assigned to the BR that de-registered the locked RadioBlade transceiver.

5.6.3 Locking Policy for RadioBlade Transceiver with Errors

If the RadioBlade transceiver generates enough faults such that it crosses the Bounce and Duration threshold for that particular error, an alarm will be generated. The RadioBlade controller then notifies the associated BR, which then locks the RadioBlade transceiver. This will result in disabling the BR.

If there is a faulty RadioBlade transceiver in the system (generating error alarms), it is prevented from coming up after a commanded reset/system reset, but the operator could manually unlock the RadioBlade transceiver, at which point the RadioBlade transceiver would be assigned to a BR. (This would not prevent the system from locking it again if an excessive error condition recurs).

A. Removal of RadioBlade Transceiver

When a RadioBlade transceiver is physically removed, an event is generated in the System Manager Event Log notifying the user about the RadioBlade transceiver removal. The RadioBlade controller will then de-register the RadioBlade transceiver from the BR(s), which will result in locking the BR(s).

A RadioBlade transceiver Insert event is generated when the RadioBlade transceiver is inserted into the system.

B. Administrative Locking of a RadioBlade Transceiver

By definition, administrative locking of a RadioBlade transceiver is in effect if the RadioBlade transceiver lock icon on the RadioBlade Transceiver Status page is changed to “locked”.

The Multi-Channel RadioBlade transceiver is treated as a unit (single RBID) with respect to administrative locking.

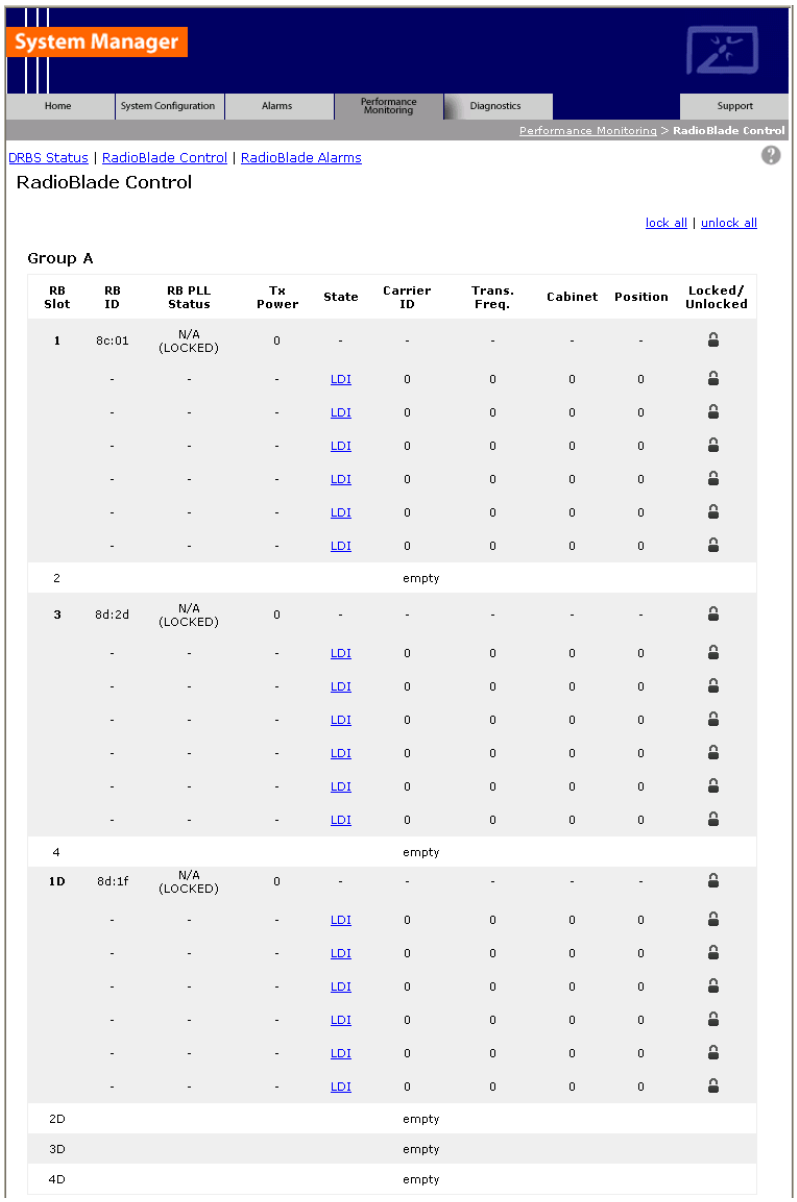
The following rules apply to locking a RadioBlade transceiver.

- The BR(s) associated with the administratively locked RadioBlade transceiver will go into a Disabled state. Only that RadioBlade transceiver will lock, and its icon will change to “locked”.
- If an administratively locked RadioBlade transceiver is replaced, the new RadioBlade transceiver will be considered unlocked upon insertion. (Administrative locking applies to a particular RadioBlade transceiver and not to a particular DRBS Slot).
- Upon unlocking an administratively locked RadioBlade transceiver, the BR that was previously disabled due to the locked state will go into the enabled state.

The lock policy will be preserved through a system reset. Locking of the RadioBlade transceiver will also be preserved through a system reset. Locking of RadioBlade transceivers in the disabled state will not be preserved through a system reset. However, after a system reset, those blades that were originally in the disabled state due to the effects of a) the locked RadioBlade transceiver and b) the locking policy will likely return to the disabled state.

The RadioBlade Control page of System Manager has a “Lock All / Unlock All” feature. Refer to Figure 5.2. With an MCRB, locking the top padlock as shown on the RadioBlade Control page will lock all carriers for that MCRB while selecting the padlock on the individual carrier will lock only that carrier.

Figure 5.2 System Lock All / Unlock All Feature

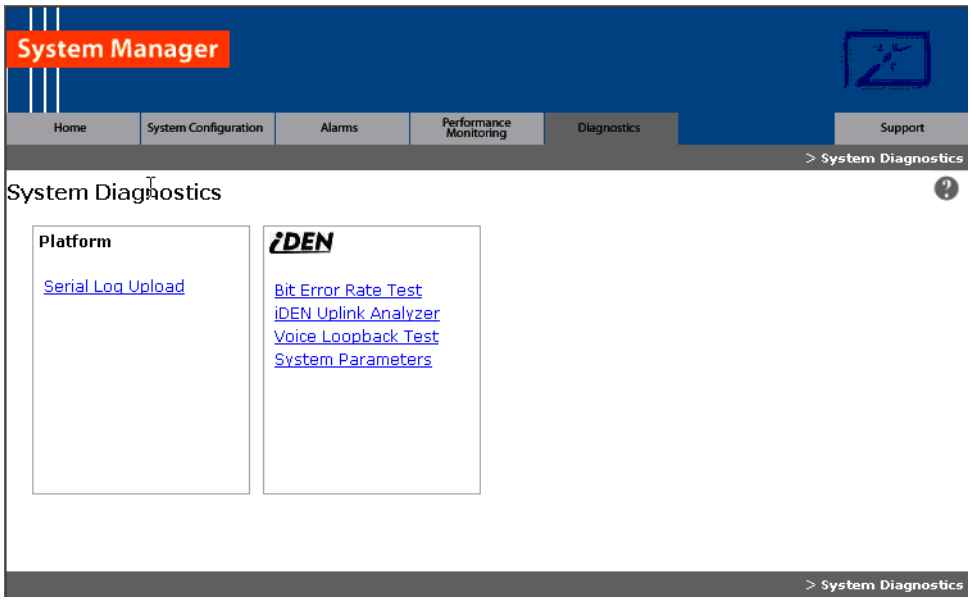


5.7 Serial Log Upload Procedure

Complete this procedure before disconnecting and removing the ABIC, DRBS or an RF shelf from the MC-Series OPM System Cabinet, or at the direction of RadioFrame Networks technical support.

1. Select the **Diagnostics** tab in System Manager, and then select the **Serial Log Upload** link.

Figure 5.3 Serial Log Upload Link, Diagnostics Tab



2. Select the **Upload Serial Log w/ IP Address** button, and in the pop-up window, enter the IP address of the component, and then select **OK**.

   Alternately, the component can be selected from the drop-down menus, though RadioFrame Networks recommends using the IP address method.

3. Copy the contents of the serial log window into a text file and save the text file.

4. Email the text file to the Technical Assistance Center at: support@radioframenetworks.com

Chapter 6 Field Replaceable Unit (FRU) Procedures

Overview

The MC-Series OPM System has been designed so that Field Replaceable Units (FRUs) can be replaced to restore normal system operation as quickly as possible. This chapter describes show to replace the FRU components.

Contents

6.1 Field Replaceable Units (FRUs)

The MC-Series OPM System has been designed so that Field Replaceable Units (FRUs) can be replaced to restore normal system operation as quickly as possible.

Refer to section Appendix H (Repair and Technical Support), Table 6.1, which lists RadioFrame Networks FRUs. Do not attempt to repair RadioFrame Networks equipment and components in the field. Be sure to read section 6.1.1 (Field Replaceable Unit (FRU) Policy).

For support of RadioFrame Networks equipment, contact the RadioFrame Networks Technical Assistance Center (TAC) at:

(US) 1-800-328-0847

For equipment not supplied by RadioFrame Networks, follow IIOF's policies and procedures for FRU replacement.

6.1.1 Field Replaceable Unit (FRU) Policy

The MC-Series OPM system has been designed so that Field Replaceable Units (FRUs) can be replaced to restore normal system operation as quickly as possible. RadioFrame Networks components are individually tested prior to shipment. If RadioFrame Networks equipment should require service or repair, note the following information, and then contact the RadioFrame Networks Technical Assistance Center at (800) 328-0847:

Note: Do not attempt to repair RadioFrame Networks equipment and components in the field.

Note: Always use a static grounding wrist strap before handling any chassis or RadioBlade® transceiver.

- Include the serial numbers of the affected equipment.
- Give a clear return address, including:
- Securely package the FRU in its original shipping carton, if available. Otherwise, package in a static protection bag in a well-padded carton.

Table 6.1 lists current FRU equipment for the MC-Series OPM System. For equipment not supplied by RadioFrame Networks, follow standard IIOF's policies and procedures for FRU replacement.

Table 6.1 FRU Table

RadioFrame Networks PM	Description
176-0610-XX	Power Distribution Unit (PDU)
176-1040-XX	Airlink/BTS Interface Chassis (ABIC)
176-7090-XX	OPM Rx Filter
176-1076-XX	OPM RF Shelf
176-1030-XX	Diversity RadioBlade Transceiver Shelf (DRBS)
176-0180-XX	Fan DRBS
176-1090-XX	800E Tx Filter
176-1223-01	**Outdoor Pole Mount Cabinet**
176-1219-XX	Fan Tray (w/fans) for an ABIC Chassis
176-0011-XX	Fan for DRBS and RF Shelf
176-7555-XX	Base Processing Card (BPC) w/(2) SPAM-HC
176-7540-XX	MC Common RadioFrame Interface Card (CRIC)
176-7562-XX	Ethernet Rear Transition Module (ERTM)
176-0820-CC	Coaxial RMII Transceiver Card (CRTC)
176-7502-XX	4U Chassis
176-0860-XX	MCRB iDEN FRU

6.1.2 Field Replaceable Units (FRUs), Parts and Extra Supplies

It is recommended that the IIOF purchase spares for the MC-Series OPM System and maintain inventories in Logistics Centers for ordering on an as-needed basis.

The MC-Series OPM system has been designed so that Field Replaceable Units (FRUs) can be replaced to restore normal system operation as quickly as possible. Refer to the previous section 6.1.1 and the FRU table, Table 6.1.

For equipment not supplied by RadioFrame Networks, such as the EAS, iSCIII, or CSU, follow standard IIOF policies and procedures for FRU replacement.

Note: The previous section contains recommended part numbers (P/N) and manufacturers of various hardware, tools and equipment used during the installation, operations and maintenance of the MC-Series OPM System.

6.2 Power Down Procedure

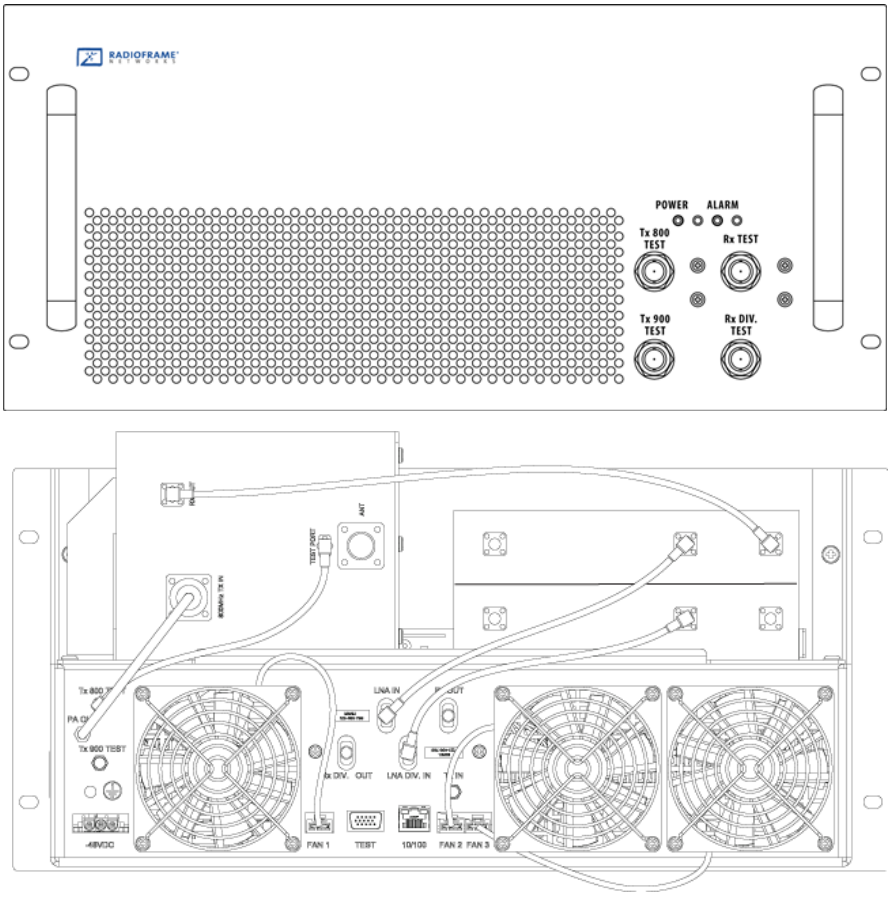
When powering down the entire MC-Series OPM System, follow these instructions.

Using the breakers on the PDU, power off equipment in the MC-Series OPM System Cabinet in the following order:

1. ABIC
2. DRBS
3. RF Shelf
4. CSU
5. EAS; then ensure that the power switch on the front of the unit is in the OFF position
6. iSCIII; then ensure that the power switch on the front of the unit is in the OFF position

6.3 OPM RF Shelf

Figure 6.1 RF Shelf Front and Rear View



6.3.1 RF Shelf Replacement Procedure

1. Power down RadioFrame Networks equipment in the following order using circuit breakers on the PDU:

    a. ABIC

    b. DRBS

    c. RF shelf

2. Disconnect cabling from the back of the chassis to be replaced.

    Refer to Appendix C (OPM iDEN Microcell Cabinet Stack-Up Configuration). Index letters are keyed to the figures in this appendix.

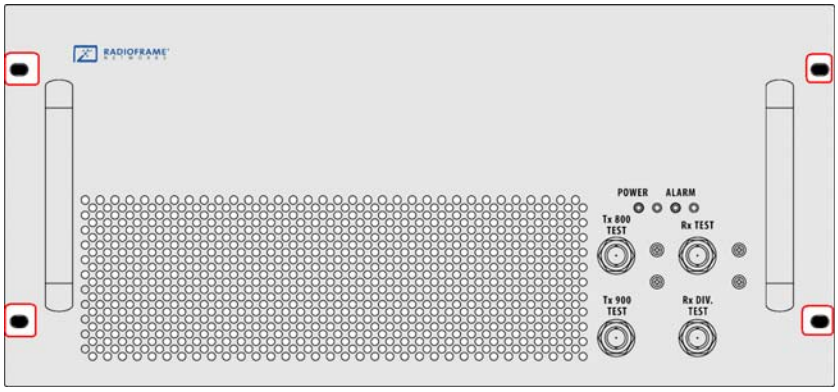
    a. Disconnect the cabling from the rear of **RF Shelf**. (Figure 6.1 is indexed to the cabling figures in Appendix C (OPM iDEN Microcell Cabinet Stack-Up Configuration).)

Table 6.2 Cables to Disconnect from Rear of RF Shelf (See NOTE)

Index	Disconnect From	To	Type
H	RF Shelf x: power	PDU: RF x	power
A	RF Shelf x: ground	GND BAR	ground
U-A	RF Shelf x: Tx IN A	DRBS 1: Tx A	RF cable
S-A	RF Shelf x: Rx OUT A	DRBS 1: Rx A	RF cable
L	RF Shelf x: TX 800E OUT	TOR: Tx 800E x	RF cable
I	RF Shelf x: RX 800E IN	TOR: RF 800E x	RF cable
T	RF Shelf x: ALARM	DRBS: ALARM INPUT A	serial

3. Remove the 4 front mounting screws and remove the RF shelf from the Cabinet, and then package it for shipment.

Figure 6.2 RF Shelf Mounting Screw Locations



4. Mount the replacement RF shelf.

   While supporting the RF shelf, slide it into the Cabinet mounting position. Secure the RF shelf to the Cabinet mounting rails using the four mounting screws provided with the unit. Tighten the screws to 4.5 Nm (40 in-lb).

5. Reconnect the cabling to the replacement chassis.

   Note: Use the SMA torque wrench for all SMA connectors.

6. Using the breakers on the PDU, turn up the ABIC and DRBS and then verify that the components are operational before proceeding.

7. Wait approximately 3 minutes for the following indicators:

DRBS:

- The STATUS LED for each group will turn green in this order: A and then C.
- The RADIOBLADE TRANSCEIVER STATUS LEDs will turn red and then green for each present RadioBlade transceiver. If no RadioBlade transceiver is present, the LED will not light. To verify the contents of the DRBS, pull out the shelf (powering off is not required) and inspect the RadioBlade transceivers and their respective status LEDs. Reinsert the DRBS. To do this, press up on one side rail locking arm and press down on the other side rail locking arm, and then push the unit into the Cabinet. For an illustration of the locking arms, refer to Figure 6.13.

ABIC CRIC:

The POWER and STATUS LEDs will turn red and then green. All other ABIC card LEDs will turn green.

8. Using the breaker on the PDU, turn up RF Shelf and verify that the RF shelf is operational before proceeding. The POWER and ALARM LEDs on the front of the RF Shelf will turn green.

9. Refer to sections 2.2 (System Setup) and Appendix D (Functionality Test Procedures) for configuration and verification.

6.3.2 Replacing a Fan in the RF Shelf

1. Verify which fan has failed (look at each fan and determine which fan(s) are not turning).

2. Disconnect power from the fan.

3. Unscrew the two Phillips screws shown in Figure Figure 6.3.

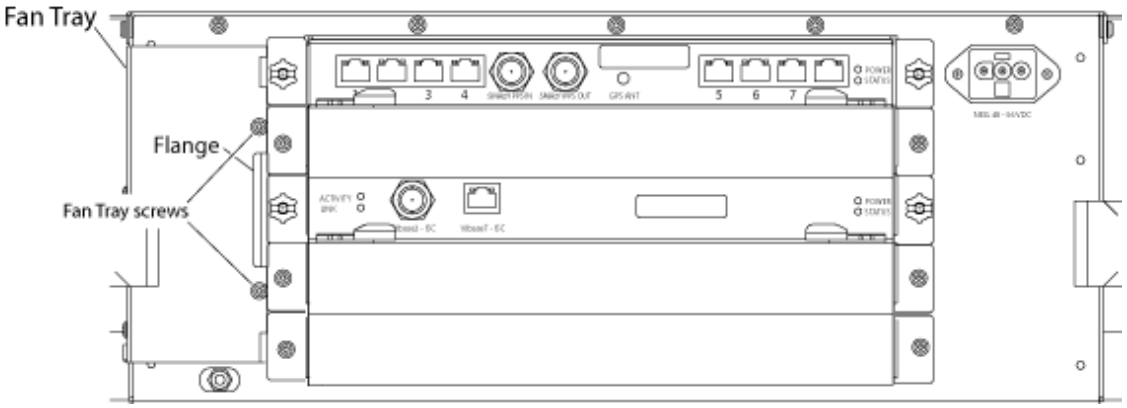
4. Slide out the fan tray by its flange.

5. Aligning the tabs on the bottom and top with the chassis, slide in the replacement tray pushing firmly to seat the power connector.

6. Fasten the tray in place with the Phillips screws.

7. Tighten to 10 in/lbs using a hand or electric torque driver to ensure that vibration does not loosen the tray.

Figure 6.3 Fan Mounting Screw Locations



8. Install the fan mounting screws.

9. Tighten to 10 in/lbs using a hand or electric torque driver to ensure that vibration does not loosen the tray.

10. Install the finger guard so that the space is aligned vertically.

11. Connect the fan power cable.

12. Verify that the fan is working.

6.4 Replacing a Chassis: ABIC or DRBS

6.4.1 ABIC

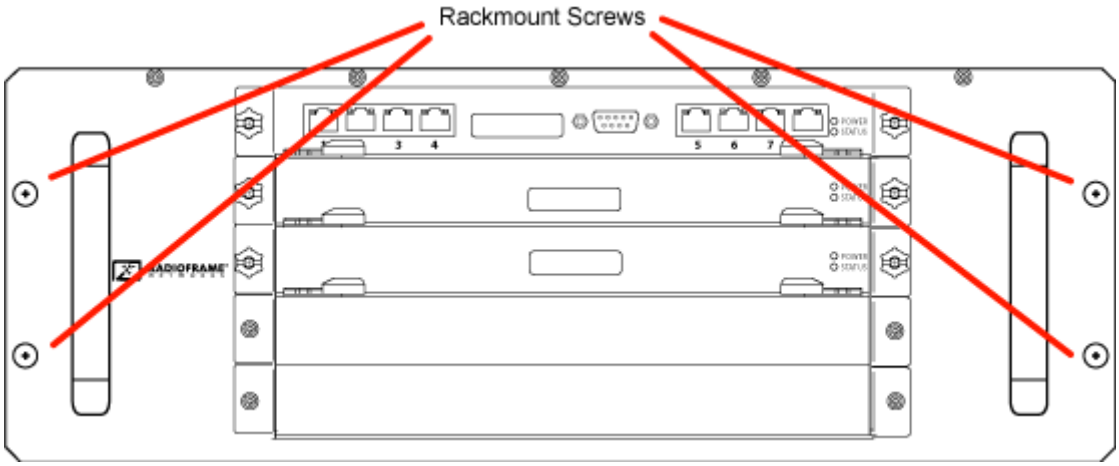
1. Power down RadioFrame Networks equipment in the following order using circuit breakers on the PDU:
   - ABIC
   - DRBS
   - RF Shelf
2. Disconnect cabling from the back of the chassis to be replaced. Refer to Appendix C (OPM iDEN Microcell Cabinet Stack-Up Configuration).
   a. For the ABIC, disconnect the cabling (from the rear of the ABIC only) listed in Table 6.3. (Table 6.3 is indexed to the cabling figures in Appendix C (OPM iDEN Microcell Cabinet Stack-Up Configuration).)

Table 6.3 Cables to be Disconnected from the ABIC (shown grayed out)

Index	Disconnect From	To	Type
D	ABIC: power	PDU: ABIC	power
A	ABIC: ground	GND BAR	ground
I-1	ABIC: ERTM PORT 1	ABIC: CRTC 10baseT - ISC	UTP
I-2	ABIC: ERTM PORT 2	ABIC: ERTM PORT 4	UTP
B	ABIC: CRTC 10base2 - ISC	ISC: 10B2-1	COAX (See Note)
C	ABIC: CRTC 10baseT - ISC	ABIC: ERTM PORT 1	UTP (See Note)
H	ABIC: ERTM 5MHz/1PPS IN	ISC: SITE REF OUT 1	COAX

3. Remove the 4 front mounting screws from the front of the unit (see Figure 6.4).
4. Remove the chassis from the Cabinet, and package it for shipment.

Figure 6.4 Front View of ABIC Showing Screw Locations



5. Mount the replacement chassis.
    a. While supporting the chassis, slide the chassis into the Cabinet mounting position.
    b. Secure the chassis to the Cabinet mounting rails using the four mounting screws provided with the unit.
    c. Tighten the screws to 4.5 Nm (40 in-lb).
6. Reconnect the cabling to the replacement chassis as defined in Step 2 .
7. Using the breakers on the PDU, turn up the ABIC and DRBS and then verify that the components are operational before proceeding.
    a. Wait approximately 3 minutes for the following indicators:

DRBS:

- The STATUS LED for each group will turn green in this order: A and then C.
- The RADIOBLADE TRANSCEIVER STATUS LEDs will turn red and then green for each present RadioBlade transceiver. If no RadioBlade transceiver is present, the LED will not light. To verify the contents of the DRBS, pull out the shelf (powering off is not required) and inspect the RadioBlade transceivers and their respective status LEDs. Reinsert the DRBS. To do this, press up on one side rail locking arm and press down on the other side rail locking arm, and then push the unit into the Cabinet. For an illustration of the locking arms, refer to Figure 6.13.

ABIC CRIC:

- The POWER and STATUS LEDs will turn red and then green. All other ABIC card LEDs will turn green.

8. Using the breaker on the PDU, turn up the RF Shelf and then verify it is operational before proceeding. The POWER and ALARM LEDs on the front of the RF Shelf will turn green.

9. Complete the procedures in sections 2.2 (System Setup) and Appendix D (Functionality Test Procedures).

6.4.2 DRBS

1. Power down RadioFrame Networks equipment in the following order using circuit breakers on the PDU:

   - ABIC
   - DRBS
   - RF Shelf

2. Disconnect cabling from the back of the DRBS to be replaced.

   Refer to Appendix C (OPM iDEN Microcell Cabinet Stack-Up Configuration).

   Note: Table 6.4 is indexed to the cabling figures in Appendix C (OPM iDEN Microcell Cabinet Stack-Up Configuration).)

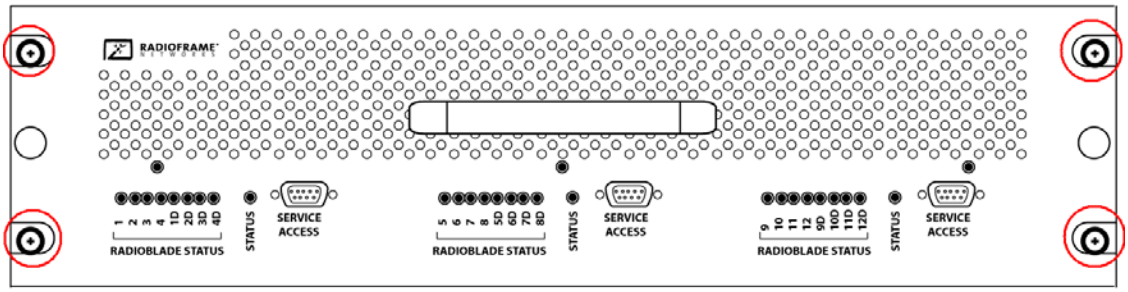
Table 6.4 Cables to be Disconnected from the Front of DRBS 1 (shown grayed out)

Index	Disconnect From	To	Type
E	DRBS: power	PDU: DRBS 1	power
A	DRBS: ground	GND BAR	ground
N	DRBS: Tx A	RF Shelf: Tx IN A	RF cable
M	DRBS: Rx A	RF Shelf: Rx OUT A	RF cable
K	DRBS: ALARM INPUT A	RF Shelf: ALARM	serial (See Note)
J	DRBS: 10/100 RadioFrame Networks A	ABIC: ERTM PORT 1	UTP
F	DRBS: 10/100 RadioFrame Networks B	ABIC: ERTM PORT 2	UTP
B	DRBS: 10/100 RadioFrame Networks C	ABIC: ERTM PORT 3	UTP

Note: The serial alarm cable (RF Shelf x ALARM to DRBS ALARM INPUT x) is not used with the OPM system. These cables may or may not be present.

3. Remove the 4 front mounting screws (see Figure 6.5), remove the chassis from the Cabinet, and then package it for shipment.

Figure 6.5 Front View of DRBS Showing Mounting Screws



4. Mount the replacement chassis.

   a. While supporting the chassis, slide the chassis into the Cabinet mounting position.

   b. Secure the chassis to the Cabinet mounting rails using the four mounting screws provided with the unit.

   c. Tighten the screws to 4.5 Nm (40 in-lb).

5. Reconnect the cabling to the replacement chassis as defined in Step 2 .

   Note: Use the SMA torque wrench for all SMA connectors.

6. Using the breakers on the PDU, turn up the ABIC and DRBS and then verify that the components are operational before proceeding.

   a. Wait approximately 3 minutes for the following indicators:

DRBS:

- The STATUS LED for each group will turn green in this order: A and then C.
- The RADIOBLADE TRANSCEIVER STATUS LEDs will turn red and then green for each present RadioBlade transceiver. If no RadioBlade transceiver is present, the LED will not light. To verify the contents of the DRBS, pull out the shelf (powering off is not required) and inspect the RadioBlade transceivers and their respective status LEDs. Reinsert the DRBS. To do this, press up on one side rail locking arm and press down on the other side rail locking arm, and then push the unit into the Cabinet. For an illustration of the locking arms, refer to Figure 6.13.

ABIC CRIC:

- The POWER and STATUS LEDs will turn red and then green. All other ABIC card LEDs will turn green.

7. Using the breaker on the PDU, turn up each RF Shelf and then verify that each RF Shelf is operational before proceeding.

   The POWER and ALARM LEDs on the front of the RF Shelf will turn green.

8. Complete the procedures in sections 2.2 (System Setup) and Appendix D (Functionality Test Procedures).

6.5 ABIC– FRU Replacement Procedure

 **IMPORTANT**	BEFORE REPLACING ANY CARD (board) in the ABIC, power down the RadioFrame Networks equipment in the following order using circuit breakers on the PDU: • ABIC • DRBS • RF Shelf

6.5.1 Replacing the CRIC

1. Before replacing any card (board) in the ABIC, power down RadioFrame Networks equipment in the following order using circuit breakers on the PDU:

   - ABIC
   - DRBS
   - RF Shelf

2. Always use a static grounding wrist strap before handling any board—do not attach the wrist strap to any painted surface on the chassis unit.

3. Facing the ABIC, remove the CRIC that is to be replaced, following these guidelines:

   a. Loosen the blue knurled knobs on both sides of the board.

   b. Pull firmly on the tabs located on the bottom of the CRIC.

   c. Gently slide the CRIC straight out and away from the chassis unit so as not to damage any components contained on the board.

4. Remove the replacement CRIC from its antistatic packaging and insert it into the chassis unit as shown in Figure 6.6, and follow these guidelines:

   a. Do not jam the board in any way while inserting it.

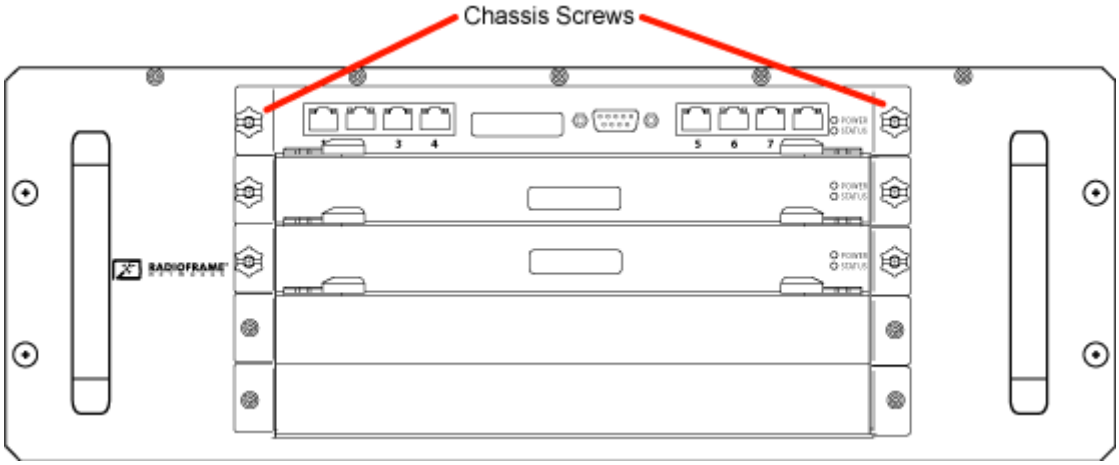
b. Do not mount the board in any orientation other than that specified in the diagram.

c. Insert the board straight into the chassis unit so as not to damage any components contained on the board.

d. Press firmly to seat the board into the connectors within the chassis unit.

e. Tighten the blue knurled knobs on each end of the board finger tight only—do not use a screwdriver to tighten the screws and do not over tighten.

Figure 6.6 Replacing the CRIC



5. Place the old board in the antistatic packaging for shipment.

6. Using the breakers on the PDU, turn up the ABIC and DRBS and then verify that the components are operational before proceeding.

   a. Wait approximately 3 minutes for the following indicators:

DRBS:

- The STATUS LED for each group will turn green in this order: A and then C.

  Note: Group “C” LED will only turn green if a second sector (in the expansion cabinet) has been configured.

- The RADIOBLADE TRANSCEIVER STATUS LEDs will turn red and then green for each present RadioBlade transceiver. If no RadioBlade transceiver is present, the LED will not light. To verify the contents of the DRBS, pull out the shelf (powering off is not required) and inspect the RadioBlade transceivers and their respective status LEDs. Reinsert the

DRBS. To do this, press up on one side rail locking arm and press down on the other side rail locking arm, and then push the unit into the Cabinet. For an illustration of the locking arms, refer to Figure 6.13.

ABIC CRIC

- The POWER and STATUS LEDs will turn red and then green. All other ABIC card LEDs will turn green.

7. Using the breaker on the PDU, turn up each RF Shelf and then verify that each RF Shelf is operational before proceeding.

   The POWER and ALARM LEDs on the front of the RF Shelf will turn green.

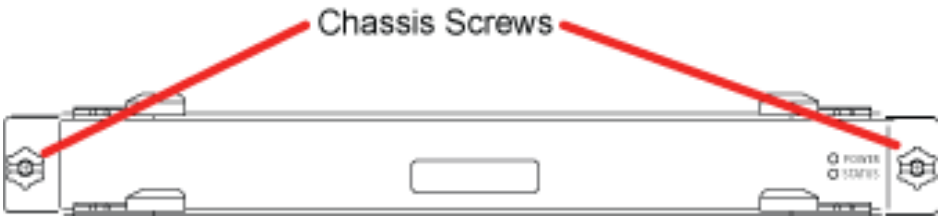
8. FOR THE ABIC CRIC ONLY: complete the procedures in sections 2.2 (System Setup) and Appendix D (Functionality Test Procedures).

6.5.2 BPC

1. Before replacing any card (board) in the ABIC, power down RadioFrame Networks equipment in the following order using circuit breakers on the PDU:
   - ABIC
   - DRBS
   - RF Shelves
2. Always use a static grounding wrist strap before handling any board—do not attach the wrist strap to any painted surface on the chassis unit.
3. Facing the chassis unit, remove the BPC that is to be replaced, or the blank faceplate, following these guidelines:
   a. Loosen the blue knurled knobs on both sides of the board.
   b. Pull firmly on the tabs located on the bottom of the BPC you are replacing.
   c. Gently slide the BPC straight out and away from the chassis unit so as not to damage any components contained on the board.
4. Remove the BPC from its antistatic packaging and insert it into the chassis unit as shown in Figure 6.7, and follow these guidelines:
   a. Do not jam the board in any way while inserting it.
   b. Do not mount the board in any orientation other than that specified in the diagram.
   c. Insert the board straight into the chassis unit so as not to damage any components contained on the board.
   d. Press firmly to seat the board into the connectors within the chassis unit.

e. Tighten the blue knurled knobs on each end of the board finger tight only—do not use a screwdriver to tighten the screws and do not over tighten.

Figure 6.7 Replacing the BPC



5. Place the old board in the antistatic packaging for shipment.
6. Using the breakers on the PDU, turn up the ABIC and DRBS and then verify that the components are operational before proceeding.
   a. Wait approximately 3 minutes for the following indicators:

DRBS:

- The STATUS LED for each group will turn green in this order: A and then C.
- The RADIOBLADE TRANSCEIVER STATUS LEDs will turn red and then green for each present RadioBlade transceiver. If no RadioBlade transceiver is present, the LED will not light. To verify the contents of the DRBS, pull out the shelf (powering off is not required) and inspect the RadioBlade transceivers and their respective status LEDs. Reinsert the DRBS. To do this, press up on one side rail locking arm and press down on the other side rail locking arm, and then push the unit into the Cabinet. For an illustration of the locking arms, refer to Figure 6.13.

ABIC CRIC

- The POWER and STATUS LEDs will turn red and then green. All other ABIC card LEDs will turn green.

7. Using the breaker on the PDU, turn up the RF Shelf and then verify it is operational before proceeding.

Note: The POWER and ALARM LEDs on the front of the RF Shelf will turn green.

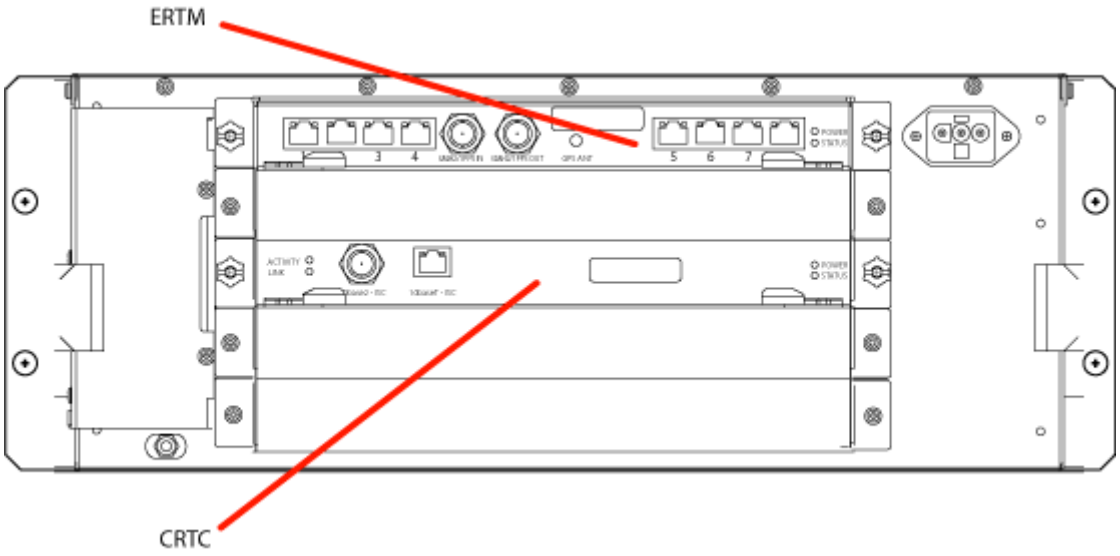
6.5.3 ERTM

1. Before replacing any card (board) in the ABIC, power down RadioFrame Networks equipment in the following order using circuit breakers on the PDU:

- ABIC
- DRBS
- RF Shelves

2. Always use a static grounding wrist strap before handling any board—do not attach the wrist strap to any painted surface on the chassis unit.
3. Facing the rear of the ABIC, remove the ERTM that is to be replaced following these guidelines:
    a. Loosen the blue knurled knobs on both sides of the board.
    b. Pull firmly on the tabs located on the bottom of the ERTM you are replacing.
    c. Gently slide the ERTM straight out and away from the chassis unit so as not to damage any components contained on the board.
4. Remove the ERTM from its antistatic packaging and insert it into the chassis unit as shown in 67, and follow these guidelines:
    a. Check that the ERTM switch is in the correct position for the application. The switch is located on the components side of the ERTM circuit board, near the connector labeled “POWER”. Appropriate settings are:
    A—for ERTM inserted in ABIC
    b. Do not jam the board in any way while inserting it.
    c. Do not mount the board in any orientation other than that specified in the diagram.
    d. Insert the board straight into the chassis unit so as not to damage any components contained on the board.
    e. Press firmly to seat the board into the connectors within the chassis unit.
    f. Tighten the blue knurled knobs on each end of the board finger tight only—do not use a screwdriver to tighten the screws and do not over tighten.

Figure 6.8 Rear of ABIC (ERTM and CRTC)



5. Place the old board in the antistatic packaging for shipment.
6. Using the breakers on the PDU, turn up the ABIC and DRBS and then verify that the components are operational before proceeding.
    a. Wait approximately 3 minutes for the following indicators:

DRBS:

- The STATUS LED for each group will turn green in this order: A and then C.
- The RADIOBLADE TRANSCEIVER STATUS LEDs will turn red and then green for each present RadioBlade transceiver. If no RadioBlade transceiver is present, the LED will not light. To verify the contents of the DRBS, pull out the shelf (powering off is not required) and inspect the RadioBlade transceivers and their respective status LEDs. Reinsert the DRBS. To do this, press up on one side rail locking arm and press down on the other side rail locking arm, and then push the unit into the Cabinet. For an illustration of the locking arms, refer to Figure 6.13.

ABIC CRIC

- The POWER and STATUS LEDs will turn red and then green. All other ABIC card LEDs will turn green.

7. Using the breaker on the PDU, turn up the RF Shelf and then verify it is operational before proceeding.

Note: The POWER and ALARM LEDs on the front of the RF Shelf will turn green.

6.5.4 CRTC

1. Before replacing any card (board) in the ABIC, power down RadioFrame Networks equipment in the following order using circuit breakers on the PDU:
   - ABIC
   - DRBS
   - RF Shelf
2. Always use a static grounding wrist strap before handling any board—do not attach the wrist strap to any painted surface on the chassis unit.
3. Facing the rear of the ABIC, remove the CRTC following these guidelines:
   a. Loosen the blue knurled knobs on both sides of the board.
   b. Pull firmly on the tabs located on the bottom of the CRTC.
   c. Gently slide the CRTC straight out and away from the chassis unit so as not to damage any components contained on the board.
4. Remove the CRTC from its antistatic packaging and insert it into the chassis unit as shown in Figure 6.8, and follow these guidelines:
   a. Do not jam the board in any way while inserting it.
   b. Do not mount the board in any orientation other than that specified in the diagram.
   c. Insert the board straight into the chassis unit so as not to damage any components contained on the board.
   d. Press firmly to seat the board into the connectors within the chassis unit.
   e. Tighten the blue knurled knobs on each end of the board finger tight only—do not use a screwdriver to tighten the screws and do not over tighten.
5. Place the old board in the antistatic packaging for shipment.
6. Using the breakers on the PDU, turn up the ABIC and DRBS and then verify that the components are operational before proceeding.
   a. Wait approximately 3 minutes for the following indicators:

DRBS:

- The STATUS LED for each group will turn green in this order: A and then C.

- The RADIOBLADE TRANSCEIVER STATUS LEDs will turn red and then green for each present RadioBlade transceiver. If no RadioBlade transceiver is present, the LED will not light. To verify the contents of the DRBS, pull out the shelf (powering off is not required) and inspect the RadioBlade transceivers and their respective status LEDs. Reinsert the DRBS. To do this, press up on one side rail locking arm and press down on the other side rail locking arm, and then push the unit into the Cabinet. For an illustration of the locking arms, refer to Figure 6.13.

ABIC CRIC:

- The POWER and STATUS LEDs will turn red and then green. All other ABIC card LEDs will turn green.

7. Using the breaker on the PDU, turn up each RF Shelf and then verify that each RF Shelf is operational before proceeding.

Note: The POWER and ALARM LEDs on the front of the RF Shelf will turn green.

6.6 Adding or Removing RadioBlade Transceivers

The MC-Series OPM system supports hot swapping of RadioBlade transceivers. This means that replacement of a RadioBlade transceiver can be done while the system is live and does not require a system reset. When RadioBlade transceivers are hot swapped no alarm is generated. Rather, a RadioBlade transceiver lock and unlock event is placed in the System Manager Event log.

Each RadioBlade transceiver is shipped wrapped in antistatic packaging, along with a lock-down strap and screw for securing the RadioBlade transceiver in the RadioBlade Shelf (DRBS).

Follow the procedure in Section 6.7 (RadioBlade Transceiver Replacement) to add or remove a RadioBlade transceiver.

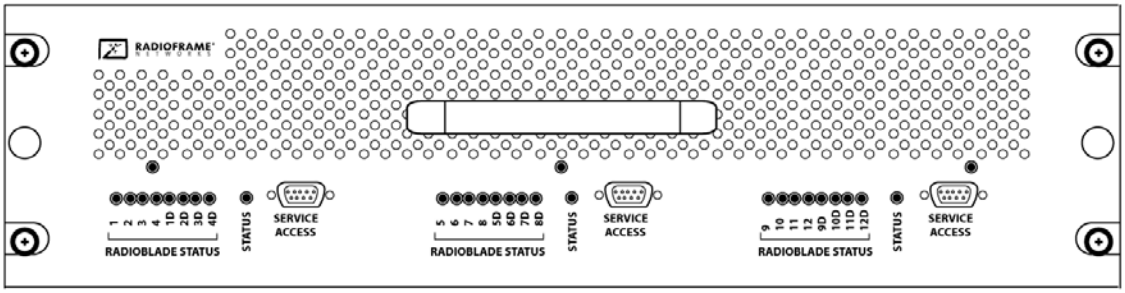
6.7 RadioBlade Transceiver Replacement

The MC-Series OPM System supports hot swapping of RadioBlade transceivers. This means replacement of a RadioBlade transceiver can be done while the system is live and does not require a system reset. When RadioBlade transceivers are hot swapped, no alarm is generated. Rather, a RadioBlade transceiver lock / unlock event is placed in the System-Manager Event Log.

Each RadioBlade transceiver is shipped wrapped in antistatic packaging, along with a lock-down strap and screw for securing the RadioBlade transceiver in the RadioBlade Shelf (DRBS).

Note: Use an SMA torque wrench (such as the Huber & Suhner 742-0-0-21 SMA torque wrench) for removing and installing RadioBlade transceivers.

Figure 6.9 Front View of the Diversity RadioBlade Shelf (DRBS)

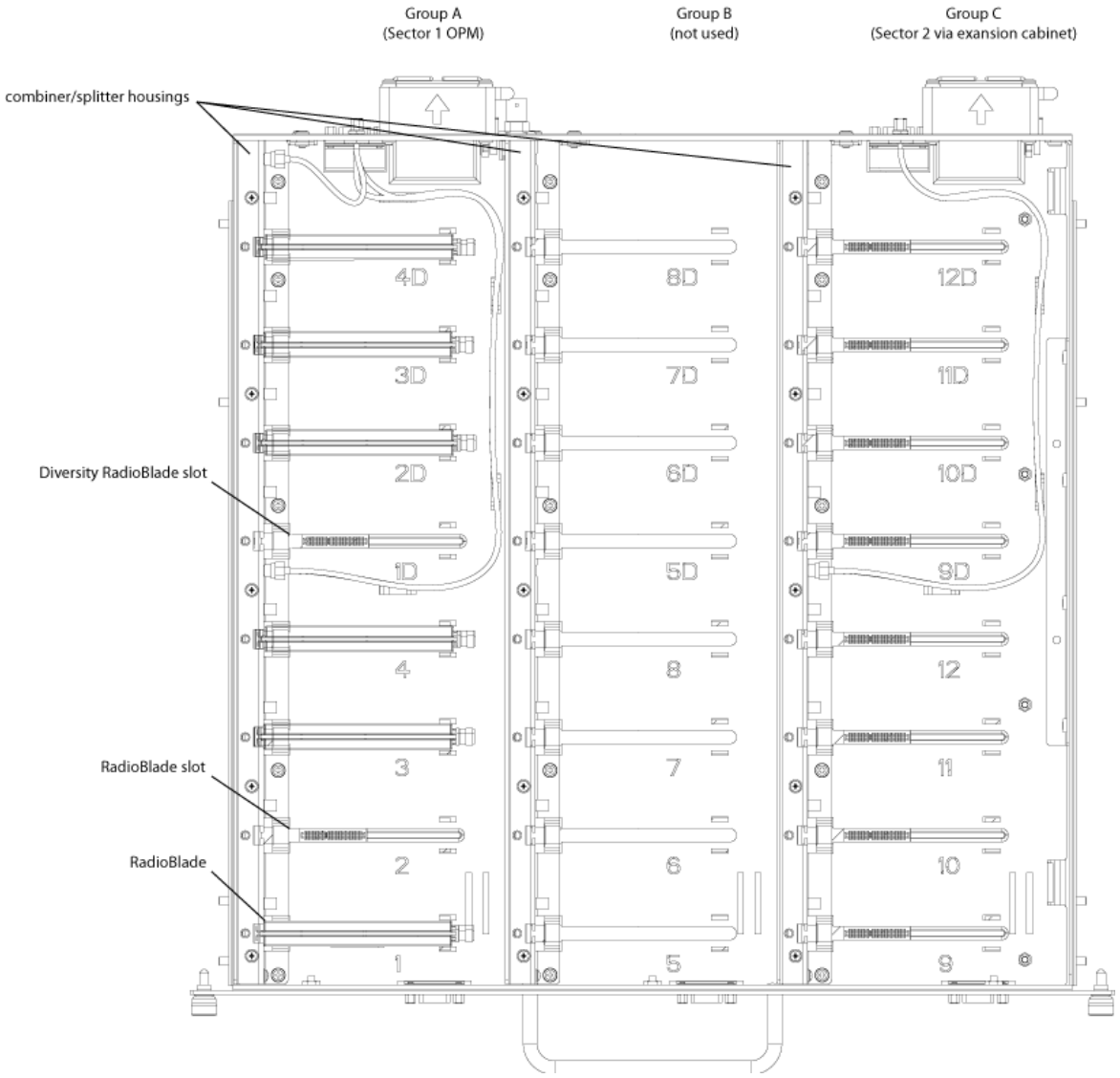


1. Take the RadioBlade transceiver out of service by locking it (refer to the procedure in section B. (Locking and Unlocking a RadioBlade Transceiver)).

   The DRBS is comprised of two groups (A and C) from left to right. Slots in each group are numbered as follows, from front to back:

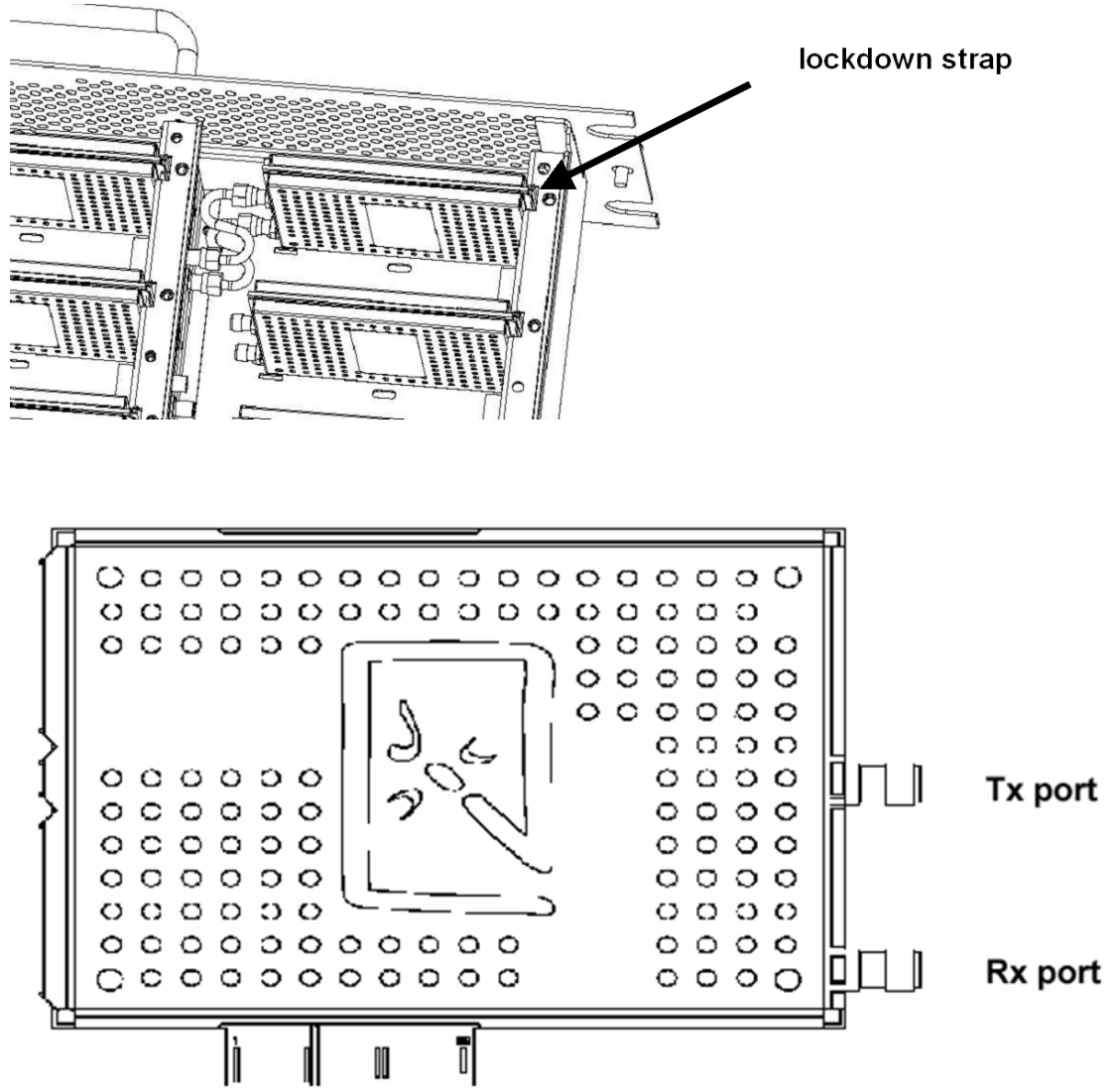
   - Group A: slots 1 through 8
   - Group C: slots 17 through 24

Figure 6.10 DRBS Slot Group Arrangement



2. Pull out the DRBS using the handle on the front of the unit.
3. Remove the RadioBlade transceiver that is to be replaced.
    a. Using the SMA torque wrench, disconnect the Rx and Tx cables from the RadioBlade transceiver.
    b. Loosen the screw of the lock-down strap covering the RadioBlade transceiver, and remove the strap and screw and place them aside.
    c. Gently lift and remove the RadioBlade transceiver from the slot in the DRBS backplane.
    d. Place the RadioBlade transceiver in anti-static packaging for shipment.

Figure 6.11 RadioBlade Transceiver in Place



4. Install the replacement RadioBlade.

    a. Un-package the replacement RadioBlade transceiver to be inserted into the DRBS.

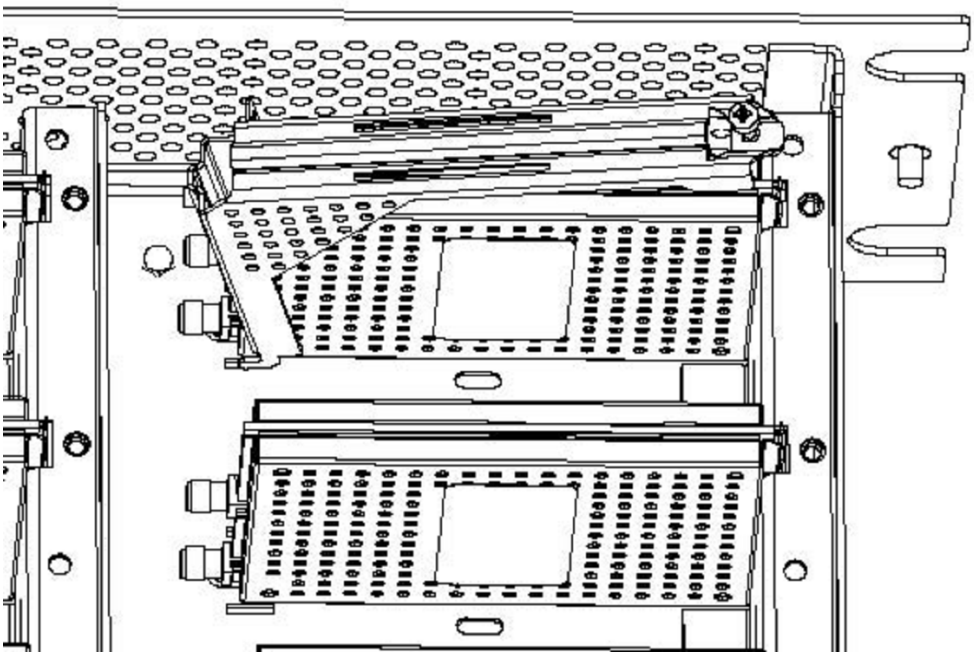
    b. Insert the RadioBlade transceiver into the specified slot in the DRBS until the connector seats firmly into the backplane of the DRBS.

c. Connect the Rx cable to the Rx port (the BOTTOM connector on the MCRB) and Tx cable to the Tx port (the TOP connector) on the MCRB.

Important:	Verify the connections are correct! Tx is the TOP connector on the MCRB; Rx is the BOTTOM connector on the MCRB.

d. Place the lock-down strap over the RadioBlade transceiver by inserting the two feet on the strap into the slots on the DRBS backplane, and then hand tighten the screw into place.

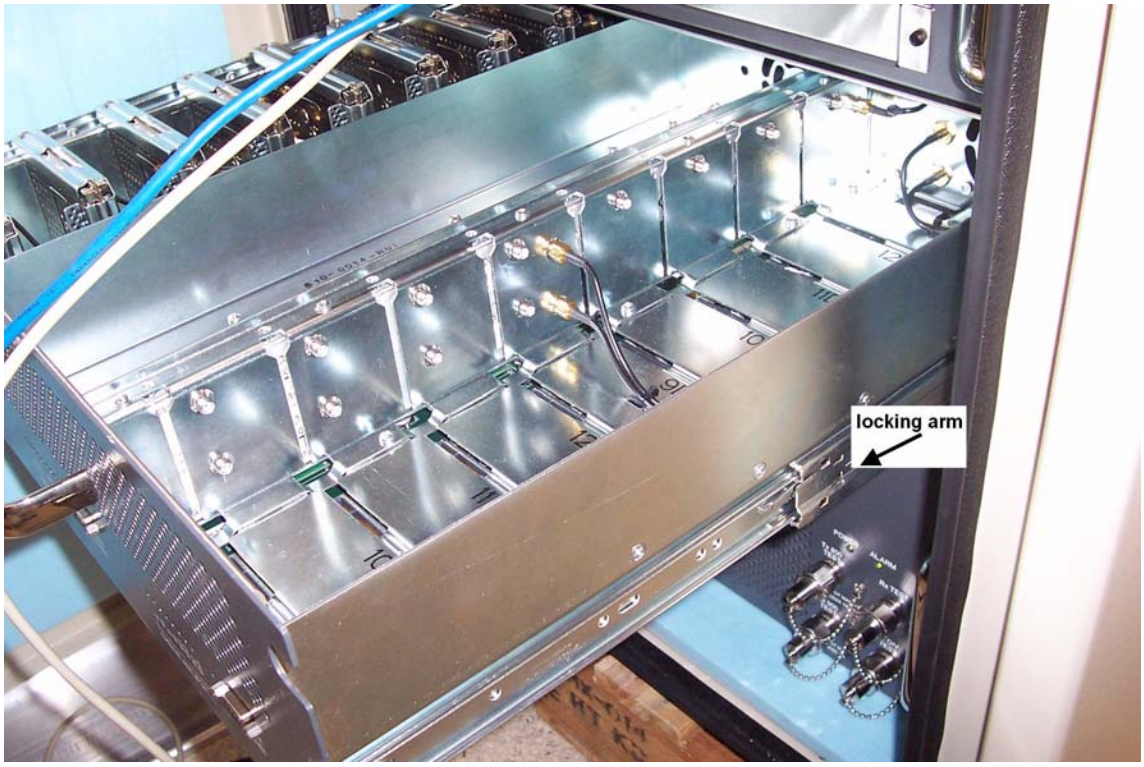
Figure 6.12 Seating the RadioBlade Transceiver



5. Connect the Rx and Tx cables to the correct ports on the RadioBlade transceiver, and use the SMA torque wrench to tighten.

6. Re-insert the DRBS into its chassis. To do this, press up on one side rail locking arm and press down on the other side-rail locking arm, and then push the unit into the Cabinet (see Figure 6.13).

Figure 6.13 RF Shelf Showing Side-Rail Locking Arm Locations



7. In System Manager, refresh the DRBS Status page until the RadioBlade transceiver icon status bar changes from red (not present) to yellow (present and locked). This will take approximately three minutes.

8. Unlock the RadioBlade transceiver.

Note: On the RadioBlade Transceiver Control page, the **State** of the RadioBlade transceiver will change from 2 (locked) to 11 (unlocked).

6.8 Power Distribution Unit (PDU)

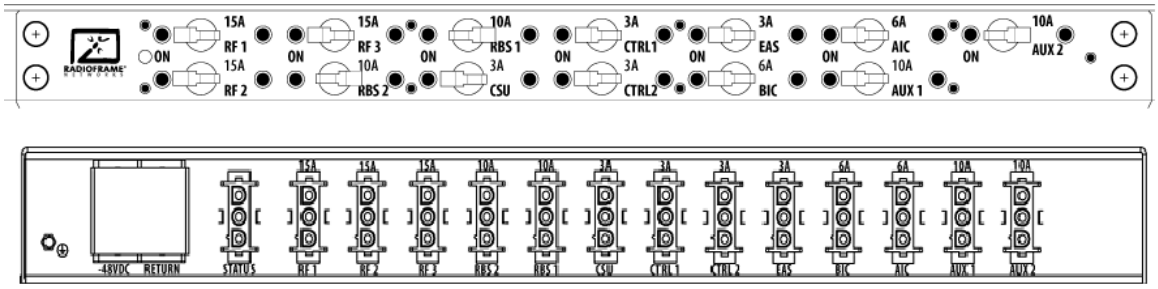
The Power Distribution Unit (PDU) receives DC input and supplies power via dedicated circuit breakers to each component in the MC-Series OPM System.

Each of the thirteen breakers has a three-position switch: ON, OFF or TRIPPED. The single alarm output connected to each breaker is normally closed and goes open when a breaker is tripped.

Warning!	Verify that all breakers in the PDU are in the OFF position prior to proceeding. Leave them in the OFF position until instructed otherwise.

1. Verify that all breakers are in the OFF position on the front of the PDU.
2. Follow the power supply and battery manufacturer's installation and maintenance documentation to remove power from the PDU.
3. Disconnect the powerplant from the PDU using the two lugs.
4. Remove all power connections from the back of the PDU.
5. Remove the 4 front mounting screws from the front of the PDU, and remove the PDU from the Cabinet, and then package it for shipment.

Figure 6.14 PDU Front and Rear View



6.8.1 PDU

Important	Before replacing the PDU verify the component is disconnected from the powerplant.

1. Replace the PDU component.
    a. While supporting the PDU, slide it into the Cabinet mounting position.

a. Secure the PDU to the Cabinet mounting rails using the four mounting screws provided with the unit.

b. Tighten the screws to 4.5 Nm (40 in-lb).

2. Reconnect all power connections to the back of the PDU.

3. Follow Power supply and battery manufacturer's installation and maintenance documentation to install power to PDU.

4. Using the breakers on the PDU, turn up the ABIC and DRBS and verify that the components are operational before proceeding.

   a. Wait approximately 3 minutes for the following indicators:

DRBS:

- The STATUS LED for each group will turn green in this order: A and then C.
- The RADIOBLADE TRANSCEIVER STATUS LEDs will turn red and then green for each present RadioBlade transceiver. If no RadioBlade transceiver is present, the LED will not light. To verify the contents of the DRBS, pull out the shelf (powering off is not required) and inspect the RadioBlade transceivers and their respective status LEDs. Reinsert the DRBS. To do this, press up on one side rail locking arm and press down on the other side rail locking arm, and then push the unit into the Cabinet. For an illustration of the locking arms, refer to Figure 6.13.

ABIC CRIC

- The POWER and STATUS LEDs will turn red and then green. All other ABIC card LEDs will turn green.

5. Using the breaker on the PDU, turn up each RF Shelf and then verify that each RF Shelf is operational before proceeding. The POWER and ALARM LEDs on the front of the RF Shelf will turn green.

6. Complete the procedures in sections 2.2 (System Setup) and Appendix D (Functionality Test Procedures).

Appendix A General Safety Information

A.1 Static Sensitive Precautions

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. It occurs when electronic printed circuit cards are improperly handled and can result in complete or intermittent failures.

- Prior to handling, shipping, and servicing equipment, always put on a conductive wrist strap connected to a grounding device to discharge any accumulated static charges. All RadioFrame Networks FRUs ship with a disposable anti-static wrist strap.

Warning!

Use extreme caution when wearing a conductive wrist strap near sources of high voltage. The low impedance provided by the wrist strap also increases the danger of lethal shock should accidental contact with high voltage sources occur.

- Place FRUs only on an anti-static mat when removed from the system. The conductive surface must be connected to ground through 100 k.
- Do not use non-conductive material for packaging FRUs for shipment or storage. Wrap all FRUs with anti-static (conductive) material. Replacement FRUs shipped from the factory are packaged in a conductive material.
- If possible, retain all original packing material for future use.

A.2 Safety Warnings

 **Warning!**	Use extreme caution when wearing a conductive wrist strap near sources of high voltage. The low impedance provided by the wrist strap also increases the danger of lethal shock should accidental contact with high voltage sources occur.
 **Warning!**	Ultimate disposal of this product should be handled according to all national laws and regulations.
 **Warning!**	The user is cautioned that changes or modifications made to the equipment that are not expressly approved by the party responsible for compliance, could void the user's authority to operate the equipment.
 **Warning!**	**To ensure FCC compliance of this equipment, it is the user's responsibility to obtain and use only shielded and grounded interface cables.**
 **Warning!**	FCC RF Exposure Compliance: FCC RF exposure compliance must be addressed at the time of licensing, as required by the responsible FCC Bureau(s), including antenna co-location requirements of §1.1307(b)(3). The applicable exposure limits, to demonstrate compliance, are specified in FCC Part 1.1310. Additionally, the installer of the antenna to be used with this transmitter may be required to perform an MPE evaluation and an Environmental Assessment (EA) of the location at the time of licensing per CFR 47 Part 1.1307. Fixed mounted antenna(s) that are co-located with other antenna(s) must satisfy the co-location requirements of Part 1.1307 for satisfying RF exposure compliance

A.3 Safety Warnings per Cabinet Mount Instructions

The following or similar Cabinet mount instructions are included with the installation instructions:

Reduced Air Flow

Installation of the equipment in the Cabinet should be such that the amount of air flow required for safe operation of the equipment is not compromised.

Mechanical Loading

Mounting of the equipment in the Cabinet should be such that a hazardous condition is not achieved due to uneven mechanical loading.

Circuit Overloading

Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

Reliable Earthing

Reliable earthing of Cabinet-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g., use of power strips).

A.4 Recommendations

- Do not work alone if potentially hazardous conditions exist.
- Never assume that power is disconnected from a circuit. Always check.
- Look carefully for possible hazards in the work area, such as moist floors, ungrounded extension cables, frayed power cords and missing safety grounds.

Appendix B IP Address Requirements

B.1 IP Address Requirements

The following table lists default IP addresses for RadioFrame Networks chassis boards, and the default IP address required for logging in to the MC-Series OPM System.

Table B.1 Address and Port Numbers for Chassis Boards

Device	Card Type	Chassis Slot/Port	IP Address	
Laptop	N/A	port 8	192.168.200.	253
ABIC	CRIC	Slot 0	192.168.200.	5
	BPC	Slot 1	192.168.200.	6
	BPC	Slot 2 (See Note)	192.168.200.	7
DRBS	backplane	Group 1	192.168.200.	98
	backplane	Group 3	192.168.200.	100

Note: There is only one BPC installed at the time of shipping. The second BPC, (in Slot #2) is only installed if configuring for a 2 sector site.

Appendix C OPM iDEN Microcell Cabinet Stack-Up Configuration

C.1 Cabinet Configuration

MC-Series OPM system cables are labeled with their terminuses at each end. They are routed, dressed and secured along the side of the system Cabinet.

This appendix gives representations of intra-Cabinet cabling for your reference. Table C.1 through Table C.9 list the connections for each component in the fully populated MC-Series OPM system. Figure C-1 through Figure C-9 show power, RF and data path connectivity for the system.

Cables are shown splayed for clarity. The tables, which provide references for all connections, are keyed to the figures by Index codes. Please note that the Index codes have significance only within this appendix and do not correspond to cable or port labeling. Some connections are indicated in the figures only by destination Index. This is done if cabling is very similar to connections shown, and additional lines would clutter the diagrams.

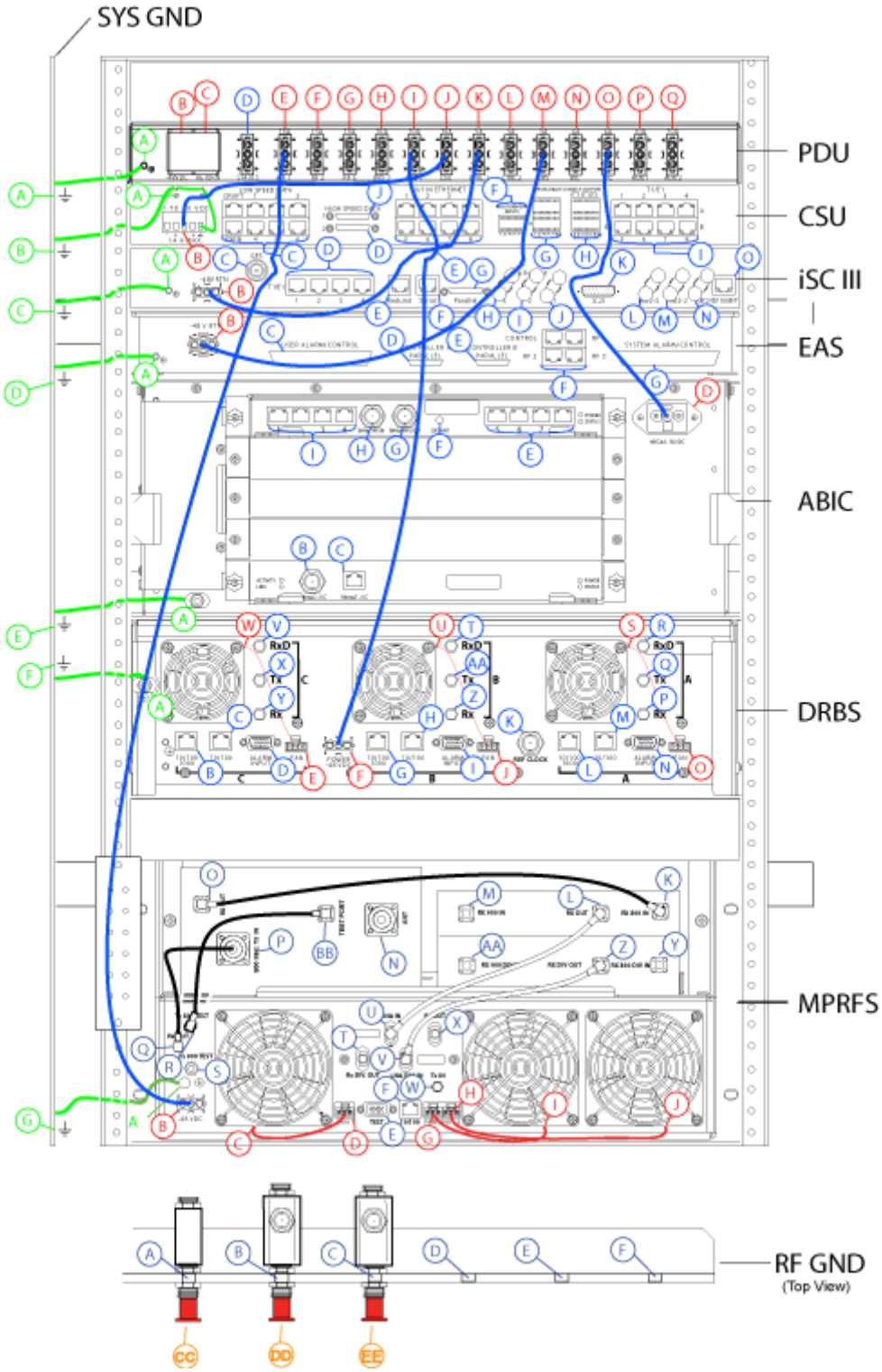
C.1.1 Power Cabling

Power and ground cabling for a fully populated system are illustrated in Table C.1.

Table C.1 Power Cabling, 1-Sector MC-Series OPM System

Power:				
Index	**Label**	**Index**	**Label**	**Notes**
A	GND	SYS GND BAR:A	--	Ground, power distribution unit
B	–48	--	--	Power in cable is customer supplied; lug is customer supplied—specified to be Panduit 2-hole, PN LCD6-14A, or equivalent
C	RTN			
D				Not Connected
PDU:E	RF	RFS:B	–48 VDC	Power, RF shelf
F				Not Connected
G				Not Connected
H				Not Connected
PDU:I	DRBS	DRBS:F	POWER	Power, RadioBlade shelf
PDU:J	CSU	CSU:B	--	Power, Channel Service Unit (CSU)
PDU:K	CTRL	iSCIII:B	–48 V	Power, integrated site controller (iSCIII)
L				Not Connected
PDU:M	EAS	EAS:B	–48 V	Power, environmental alarm system
				Not Connected
PDU:O	ABIC	ABIC:D	--	Power, Airlink / BTS interface chassis
P				Not Connected
Q				Not Connected

Figure C-1 Power and Ground Connections, MC-Series OPM System



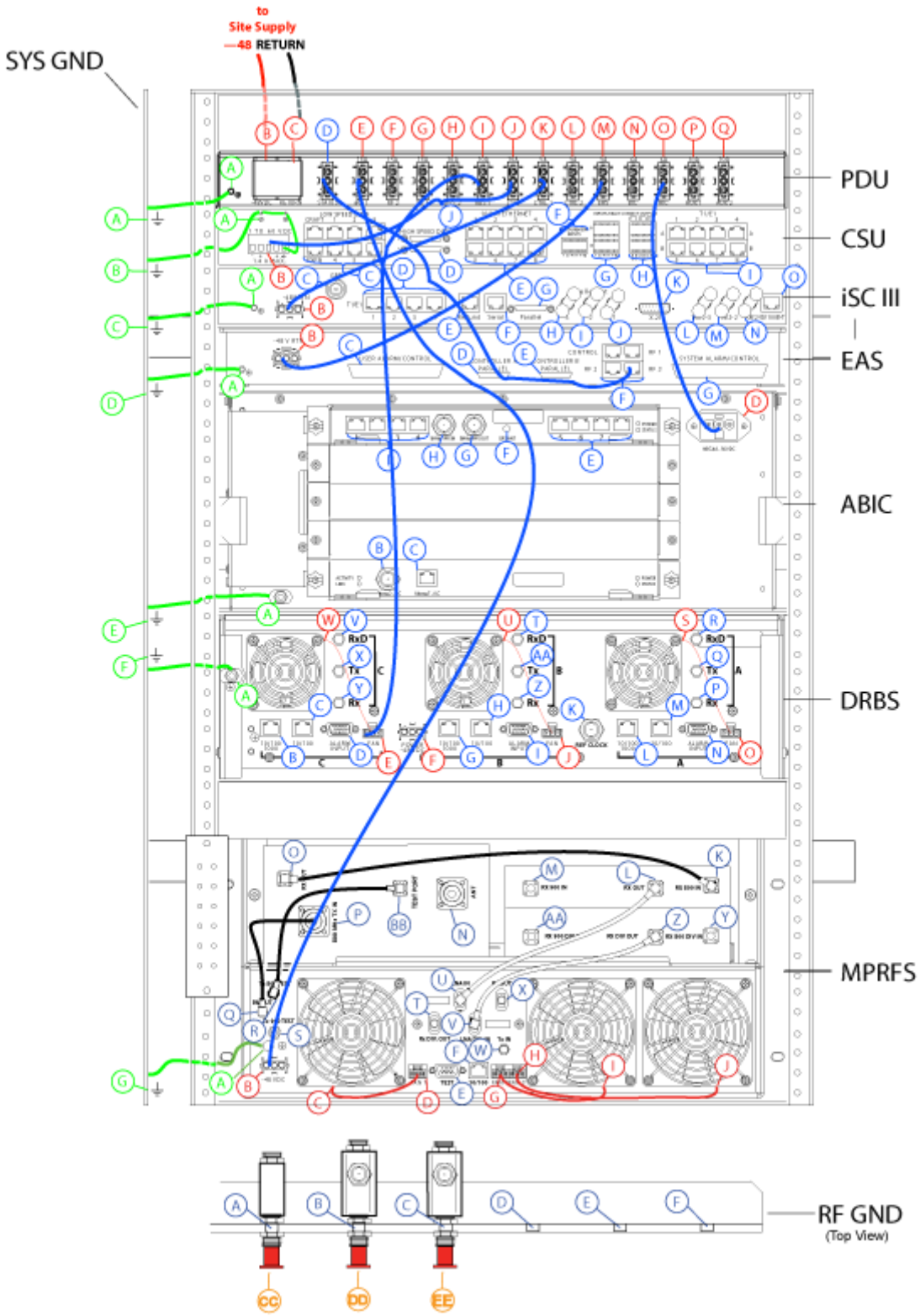
C.1.2 PDU Cabling

Table C.2 PDU Cabling, 1-Sector MC-Series OPM System

From PDU:		To		
Index	**Label**	**Index**	**Label**	**Notes**
A	GND	SYS GND BAR:A	--	Ground, power distribution unit
B	–48	--	--	Power in cable is customer supplied; lug is customer supplied—specified to be Panduit 2-hole, PN LCD6-14A, or equivalent
C	RTN			
D	STATUS	EAS:F4	CONTROL	Alarm feed, environmental alarm system
E	RF	RFS:B	–48 VDC	Power, RF shelf
F				Not connected
G				Not connected
H				Not connected
I	DRBS	DRBS:E	POWER	Power, RadioBlade shelf
J	CSU	CSU:B	--	Power, service unit
K	CTRL	iSCIII:B	–48 V	Power, integrated site controller
L				Not connected
M	EAS	EAS:B	–48 V	Power, environmental alarm system
N				Not connected
O	ABIC	ABIC:D	--	Power, airlink / BTS interface chassis
P				Not connected
Q				Not connected

* These ports are reserved for receive diversity option. Leave cables attached only to TOR and secured.

Figure C-2 PDU Cabling, 1-Sector MC-Series OPM System



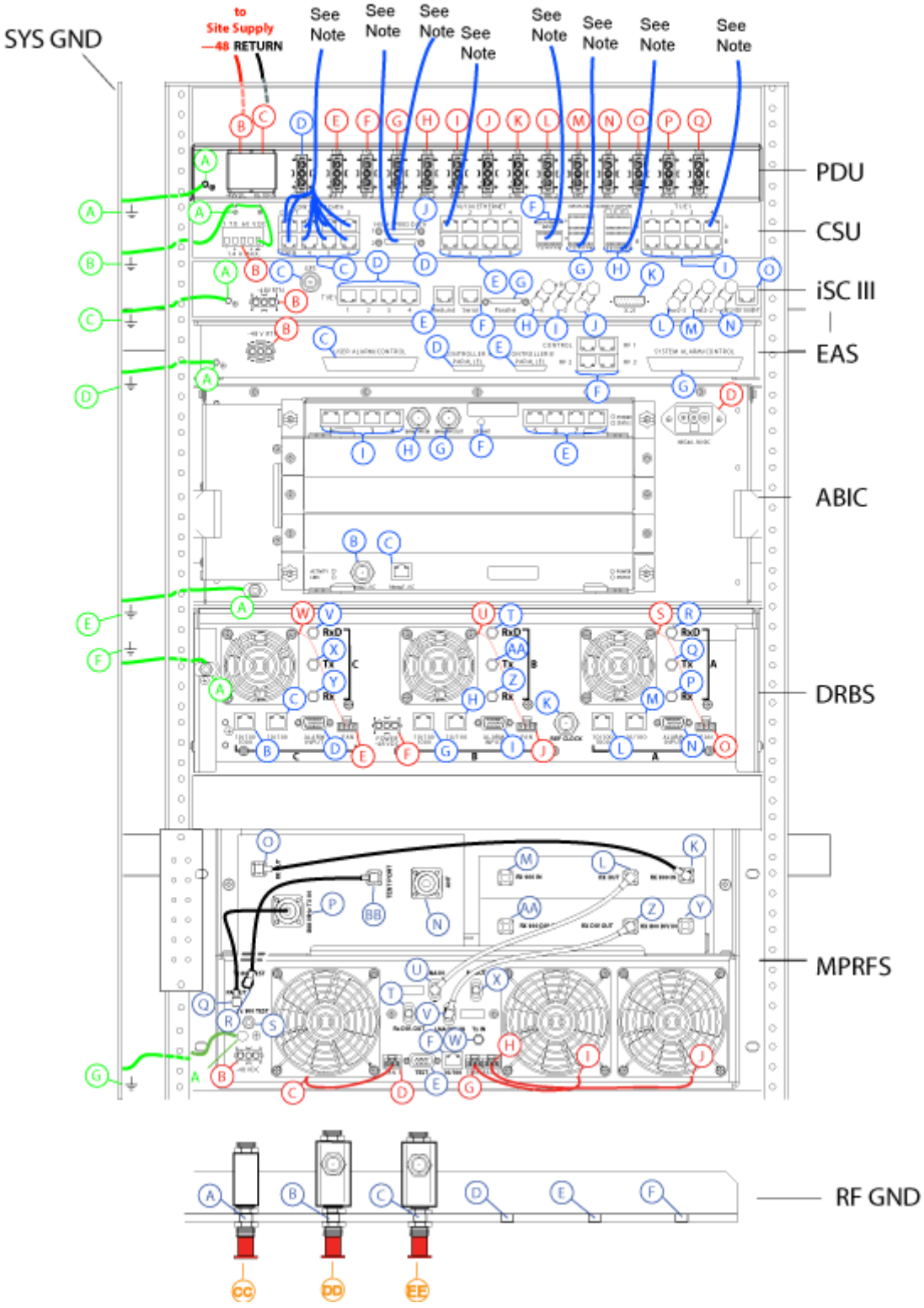
C.1.3 CSU Cabling

Table C.3 CSU Cabling, 1-Sector MC-Series OPM System

From CSU:		To		
Index	**Label**	**Index**	**Label**	**Notes**
A	GND	SYS GND BAR:B	--	Ground, CSU
B	–48 V	PDU:J	CSU	Power, CSU
C-1 to C-8	LOW SPEED DATA			See NOTE
D	HIGH SPEED DATA 2			See NOTE
E	10/100 ETHERNET			See NOTE
F	MEASUREMENT INPUTS			See NOTE
G	INPUTS/RELAY			See NOTE
H	CONTACT OUTPUTS			See NOTE
I	T1/E1			See NOTE
J	HIGH SPEED DATA 2			See NOTE

Note: Connections external to the MC-Series system are not shown. Configure the CSU according to the manufacturer's documentation and local standards.

Figure C-3 CSU Cabling, 1-Sector MC-Series OPM System



Note: Connections external to the MC-Series system

are not shown. Configure the CSU according to the manufacturer's documentation and local standards.

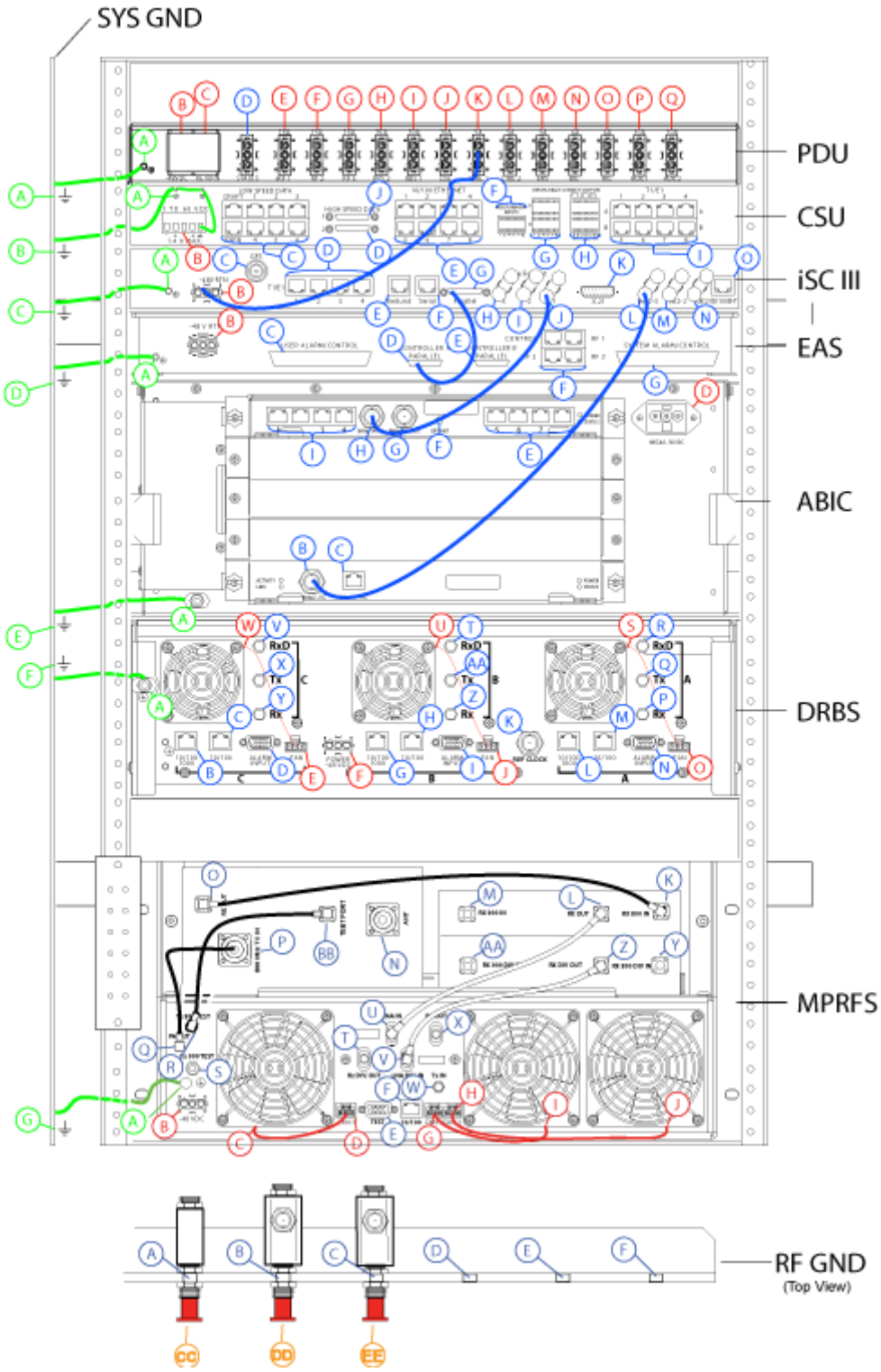
C.1.4 iSCIII Cabling

Table C.4 Cable Connections, iSCIII, OPM 1-Sector Configuration

From iSCIII:		To		
Index	**Label**	**Index**	**Label**	**Notes**
A	GND	SYS GND BAR:C	--	Ground, integrated site controller
B	–48 V	PDU:K	CTRL 1	Power, integrated site controller
C	GPS	RF GND:A /TOR:CC		RF, GPS, iSCIII, TOR GPS
D-1	T1/E1 1			See NOTE
D-2	T1/E1 2			See NOTE
D-3	T1/E1 3			Not connected
D-4	T1/E1 4			Not connected
E	REDUND			Not connected
F	SERIAL			Not connected
G	PARALLEL	EAS:D	CONTROLLER A	Management
H	SITE REF OUT 3			Terminated
I	SITE REF OUT 2			Terminated
J	SITE REF OUT 1	ABIC:H	5MHz1PPSIN	Reference timing
K	X.21			Not connected
L	10B2-3	ABIC:B	10base2 - iSCIII	Traffic path
M	10B2-2			Terminated
N	10B2-1			Terminated
O	10/100BT			Not connected

Note: Connections external to the MC-Series OPM System not shown. Configure the iSCIII according to the manufacturer's documentation and IIOF's standards.

Figure C-4 Cable Connections, iSCIII, OPM 1-Sector Configuration



Note: Connections external to the MC-Series OPM System not shown. Configure the iSCIII according to the manufacturer's documentation and IIOF's standards.

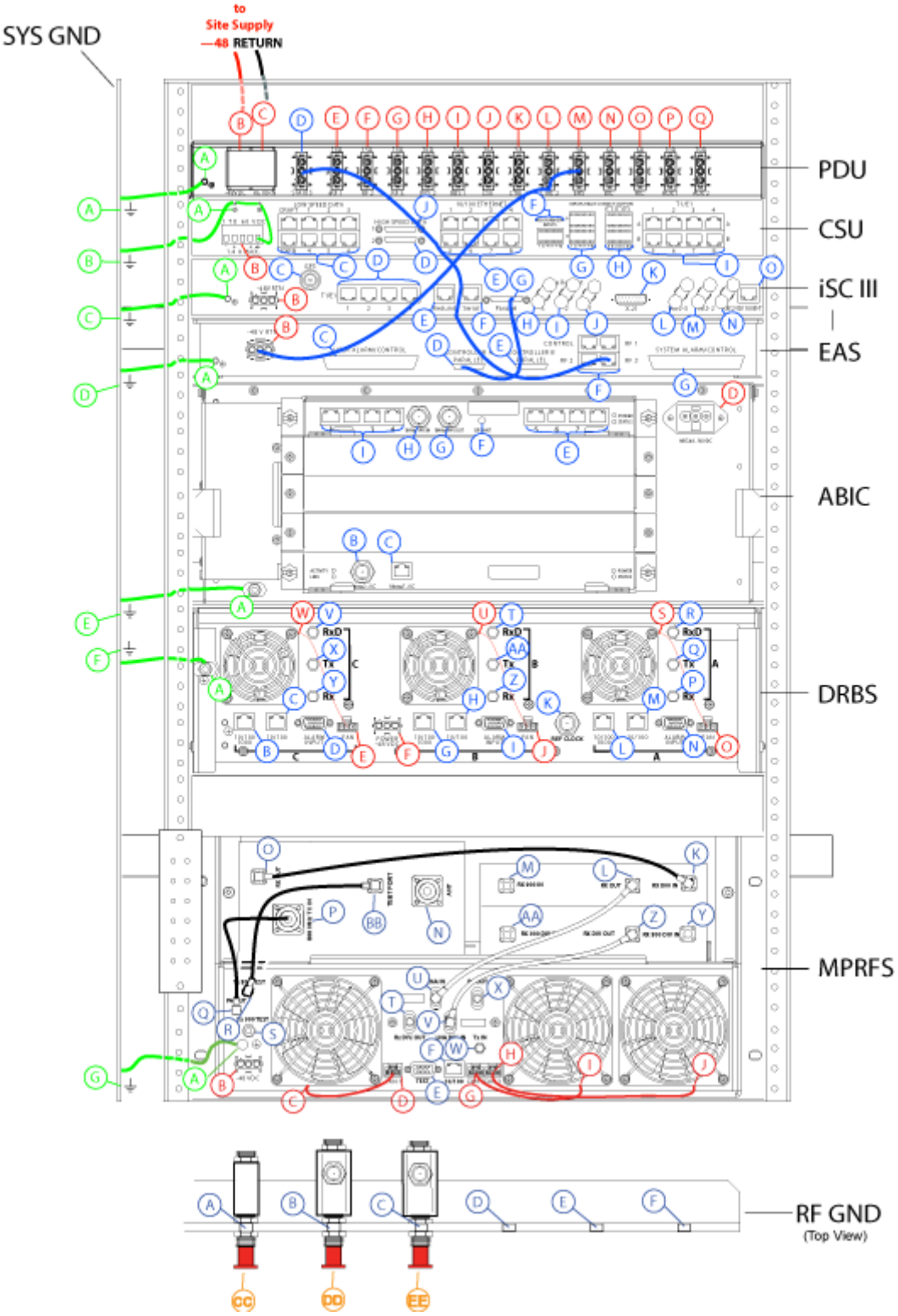
C.1.5 EAS Cabling

Table C.5 EAS Cabling, 1-Sector MC-Series OPM System

From EAS:		To		
Index	**Label**	**Index**	**Label**	**Notes**
A	GND	SYS GND BAR:D	--	Ground, environmental alarm system
B	–48 V	PDU:M	EAS	Power, environmental alarm system
C	USER ALARM / CONTROL			Not connected
D	CONTROLLER A	iSCIII:G	PARALLEL	(Motorola cable PN)
E	CONTROLLER B			Not connected
F1	RF 2			Not connected
F2	RF 3			Not connected
F3	RF 1			Not connected
F4	CONTROL	PDU:D	STATUS	Alarm, power distribution unit
G	SYSTEM ALARM/ CONTROL			Not connected

Note: Connections external to the MC-Series system not shown. Configure the EAS according to the manufacturer's documentation and local standards.

Figure C-5 EAS Cabling, 1-Sector MC-Series OPM System

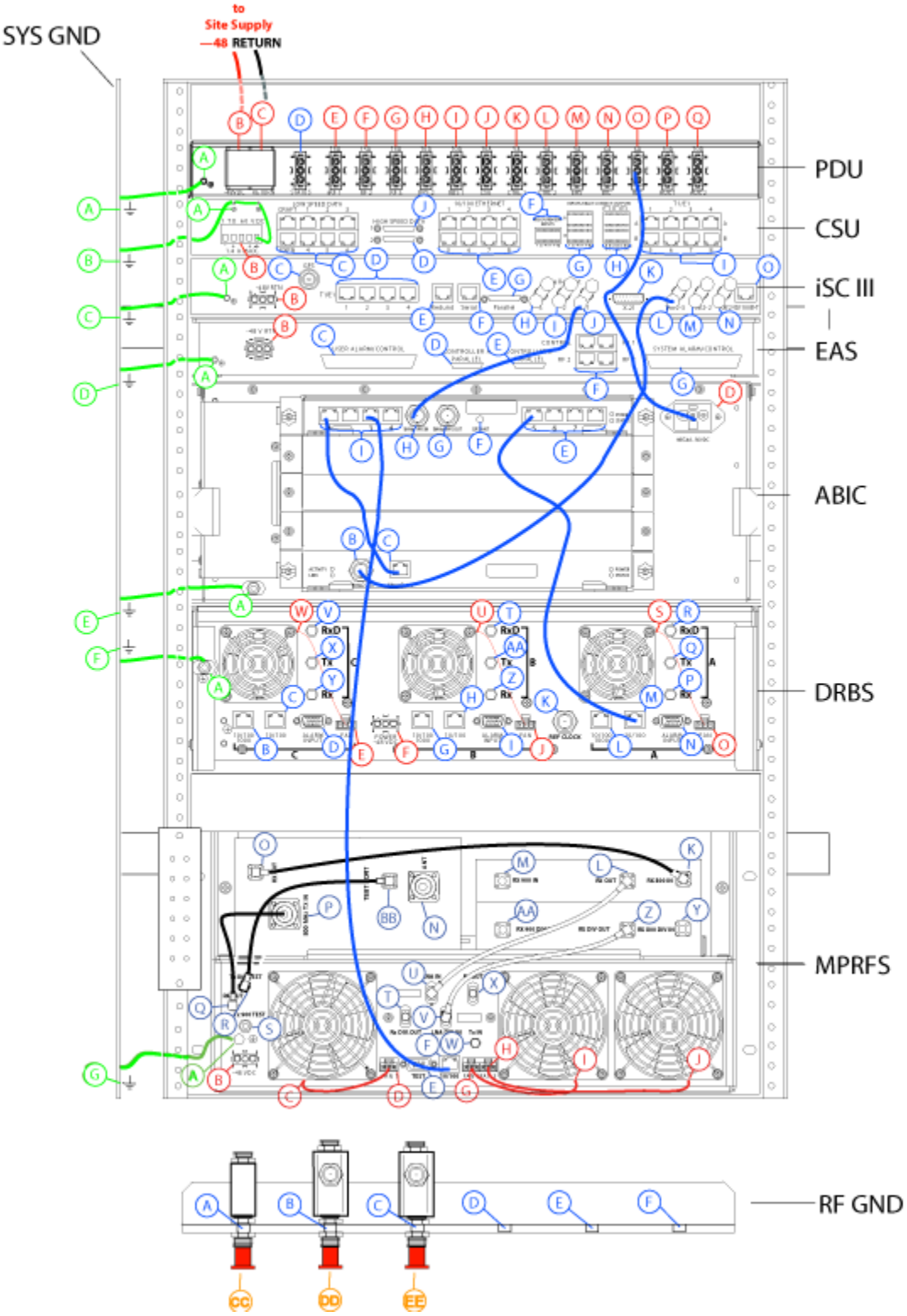


C.1.6 ABIC Cabling

Table C.6 ABIC Cabling, 1-Sector MC-Series OPM System

From ABIC:		To		
Index	**Label**	**Index**	**Label**	**Notes**
A	GND	SYS GND BAR:E	--	Ground, Air/BTS Interface Chassis
B	CRTC 10base2-ISC	iSCIII:L-2	10B2-3	10Base2 traffic path
C	CRTC 10baseT-ISC	ABIC:I-1	ERTM Port 1	10BaseT traffic path
D	NEG. 48 – 56 VDC	PDU:O	AIC	Input power from power distribution unit
E-8	ERTM PORT 8			Not connected
E-7	ERTM PORT 7			Not connected
E-6	ERTM PORT 6			Not connected
E-5	ERTM PORT 5	DRBS:M	10/100	Traffic path
F	GPS ANT			Not connected
G	5MHz/1PPSOUT			Not connected
H	5MHz/1PPSIN	iSCIII:J	Site Ref Out 1	Reference clock
I-4	ERTM PORT 4			Not connected
I-3	ERTM PORT 3	MPRFS:F	10/100	Traffic path
I-2	ERTM PORT 2			Not connected
I-1	ERTM PORT 1	ABIC:C	CRTC 10baseT - ISC	10BaseT traffic path

Figure C-6 ABIC Cabling, 1-Sector MC-Series OPM System



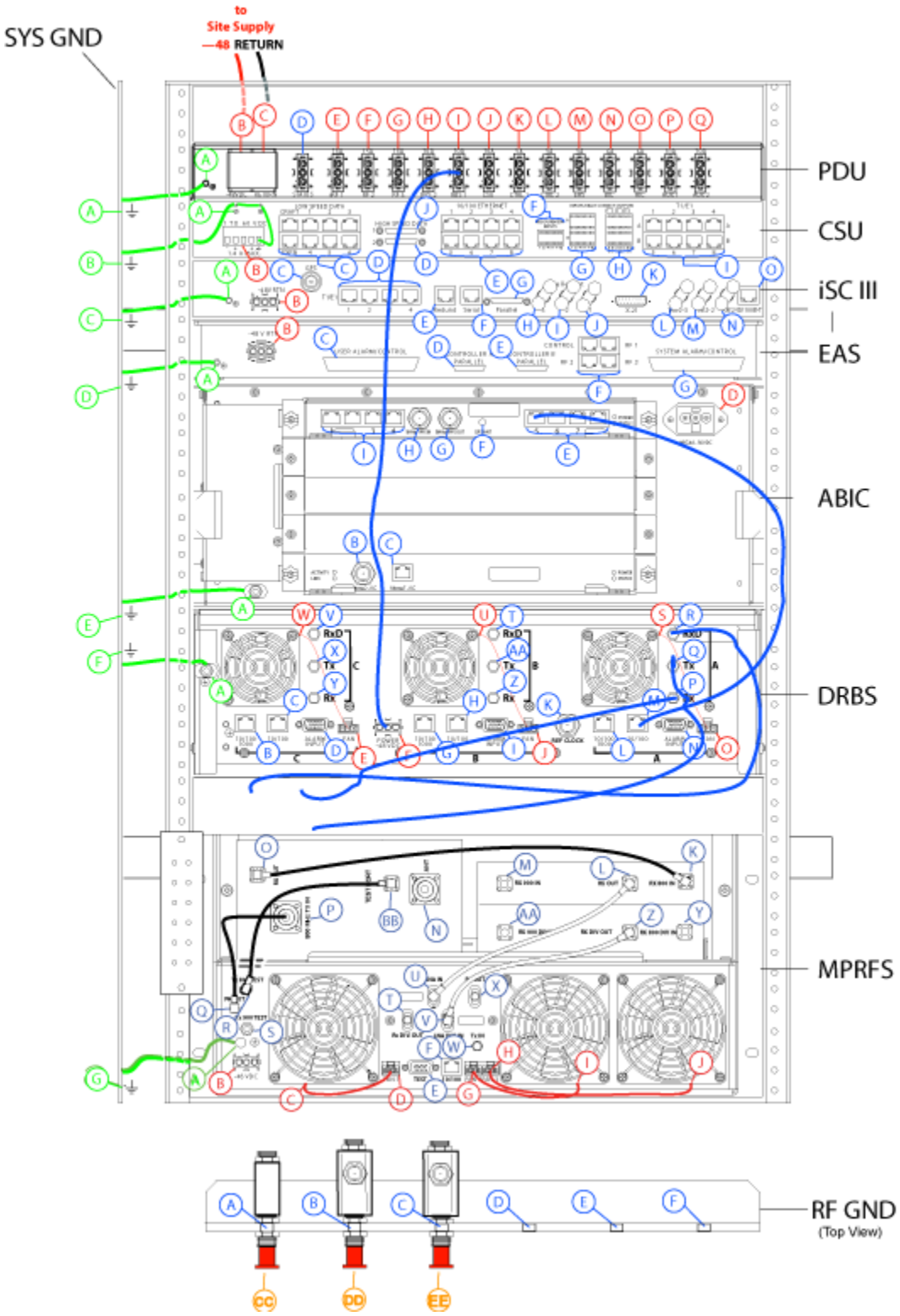
C.1.7 DRBS Cabling

Table C.7 RadioBlade Shelf Cabling, 1-Sector MC-Series OPM System

From DRBS:		To		
Index	**Label**	**Index**	**Label**	**Notes**
A	GND	SYS GND BAR:F	--	Ground, RadioBlade shelf
B	10/100/1000 C			Not connected
C	10/100 C			Not connected
D	ALARM INPUT C			Not connected
E	FAN C	DRBS:W	--	Power, RadioBlade shelf, fan C
F	POWER	PDU:I	DRBS	Input power
G	10/100/1000 B			Not connected
H	10/100 B			Not connected
I	ALARM INPUT B			Not connected
J	FAN B	DRBS:U	--	Power, RadioBlade shelf, fan B
K	REF CLOCK			Not connected
L	10/100/1000 A			Not connected
M	10/100 A	ABIC:E5	ERTM PORT 5	Traffic path, C
N	ALARM INPUT A			Not connected
O	FAN A	DRBS:S	--	Power, RadioBlade shelf, fan A
P	Rx A	RFS:X	Rx OUT	RF Rx
Q	Tx A	RFS:W	Tx IN	RF Tx
R	RxD A	RFS:T	Rx DIV. OUT	RF Rx diversity
S	--	DRBS:O	FAN A	Power, RadioBlade shelf, fan A
T	RxD B			Not connected
U	--	DRBS:J	FAN B	Power, RadioBlade shelf, fan B
V	RxD C			Not connected
W	--	DRBS:E	FAN C	Power, RadioBlade shelf, fan C
X	Tx C			Not connected
Y	Rx C			Not connected
Z	Rx B			Not connected
AA	Tx B			Not connected

Note: RF alarms are communicated via Ethernet from RF shelf.

Figure C-7 DRBS Cabling, 1-Sector MC-Series OPM System



C.1.8 RF Shelf Cabling

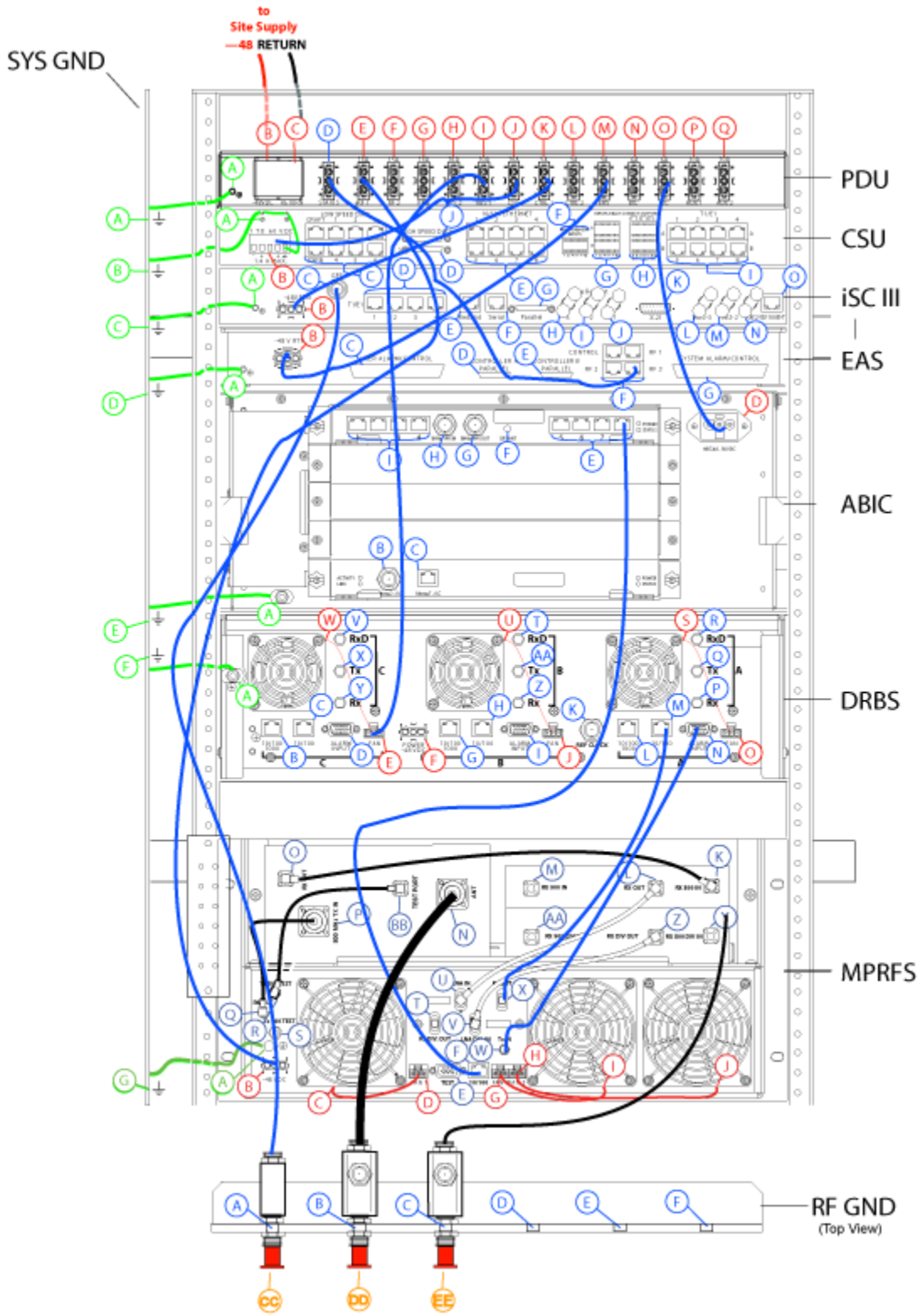
Table C.8 RF Shelf Cabling, 1-Sector MC-Series OPM System

From RFS:		To		
Index	**Label**	**Index**	**Label**	**Notes**
A	GND	Rack:B	--	Ground, RF shelf
B	–48 VDC	PDU:E	RFS	Power, RF shelf –48 VDC
C	--	RFS:D	FAN 1	Power, RF shelf, fan #1
D	FAN 1	RFS:C	--	Power, RF shelf, fan #1
E	TEST			Not connected.
F	10/100	BIC:E5	ERTM Port 5	RF shelf Status/Config. See NOTE [a]. See NOTE.[b]
G	FAN 2	RFS:I	--	Power, RF shelf, fan #2
H	FAN 3	RFS:J	--	Power, RF shelf, fan #3
I	--	RFS:G	--	Power, RF shelf, fan #2
J	--	RFS:H	--	Power, RF shelf, fan #3
K	Rx 800 IN	Tx Filter:O	Rx800	RF Rx 800, Tx Filter
L	Rx OUT	RFS:U	LNA IN	RxD, LNA Note[c]
M				Not connected
N	ANT	TOR:DD	Tx/Rx	TxF, ANT, TOR Note[d]
O	RX OUT	RFS:K	Rx 800 IN	TxF, RxD
P	Tx 800 Mhz IN	RFS:Q	PA OUT	TxF, LNA PA
Q	PA OUT	RFS:P	Tx 800 Mhz IN	LNA PA, TxF
R	Tx 800 TEST	RFS:BB	TEST Port	LNA, Test, TxF
S				Not Connected
T	Rx DIV OUT	--	--	Terminated, 50 ohm. See NOTE[e].
U	LNA IN	RFS:L	Rx OUT	RxD, LNA
V	LNA DIV IN	RFS:Z	Rx DIV OUT	LNA Diversity, RxD receive diversity
W	Tx IN	DRBS:Q	Tx A	LNA Tx, DRBS Grp A Tx. See NOTE[f].
X	Rx OUT	DRBS:R	Rx A	LNA Rx, DRBS Grp A Rx. See NOTE[d].
Y	Rx 800 IN	TOR:EE	Rx/DIV	RF Rx 800 diversity; connected only to TOR. See NOTE[d].
Z	Rx OUT	DRFS:**V**	LNA DIV IN	RxD, LNA diversity

a. The RF Shelf Status/Config segment is used in conjunction with MCRB.
b. This port is reserved for the receive diversity upgrade. Leave terminated in system without receive diversity.
c. RxD is the Rx Duplexer component.

d. TxF is the Tx Filter assembly.
e. This connector is reserved for the receive diversity upgrade. Leave cable disconnected.
f. This connector is reserved for the receive diversity upgrade. Leave cable disconnected.

Figure C-8 RF Shelf Cabling, 1-Sector MC-Series OPM System



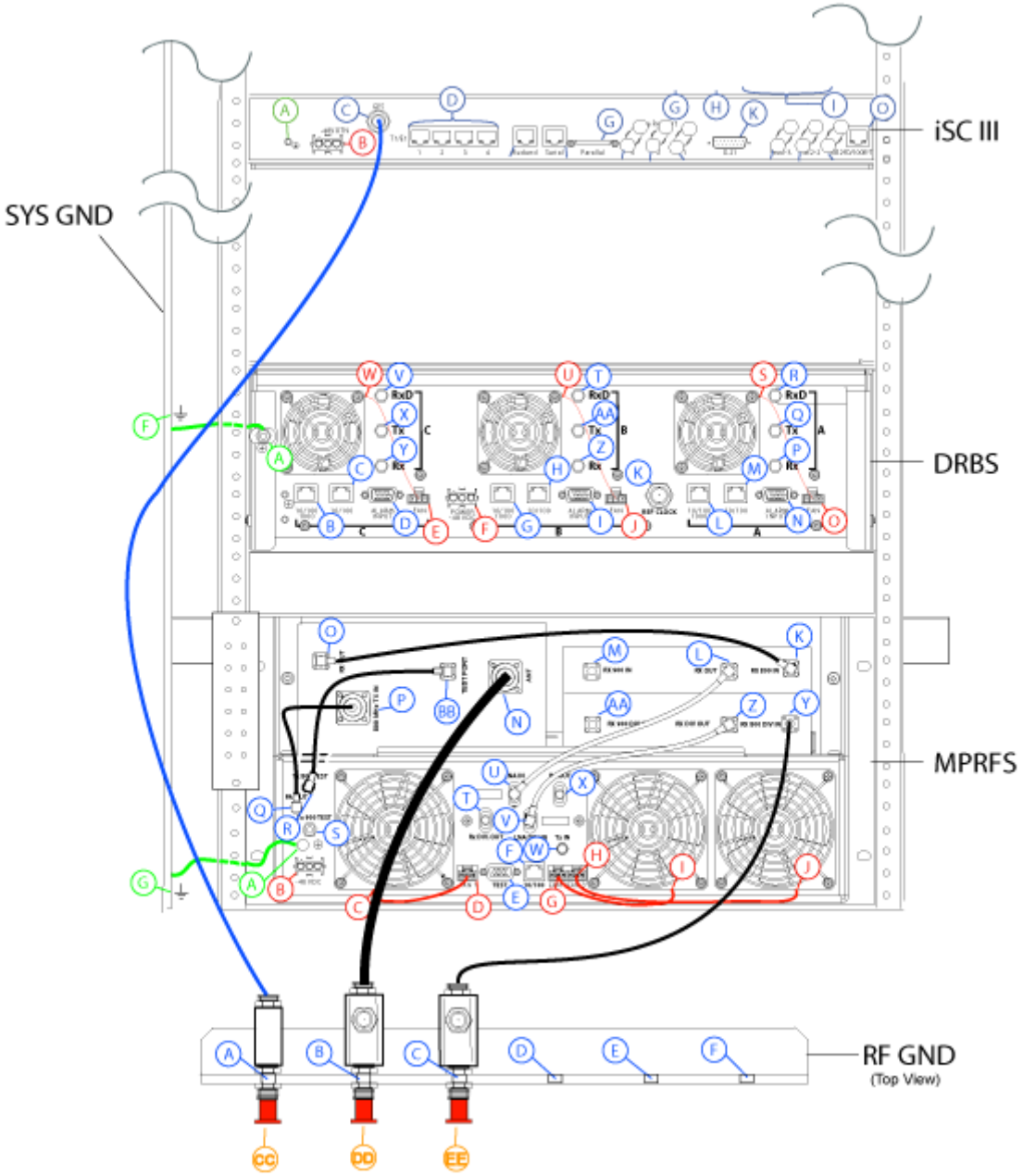
C.1.9 Top of Rack Cabling

Table C.9 TOR Cabling, Back of Cabinet, 1-Sector MC-Series OPM System

From RFS:		To		
Index	**Label**	**Index**	**Label**	**Notes**
CC	GPS	iSCIII:C	GPS	TOR, GPS
DD	Tx/Rx	RFS:ANT	ANT	TOR, Tx/Rx, TxF ANT
EE	Rx/DIV	RFS:Y	Rx 800 IN	RF RxD 800 diversity; connected only to TOR. See Note.

Note: Reserved for receive diversity option.

Figure C-9 TOR Cabling, 1-Sector MC-Series OPM System



Appendix D Functionality Test Procedures

D.1 Interconnect and Dispatch Setup and Voice Quality Testing

Interconnect and Dispatch voice quality will be assessed by evaluating voice links as described in Table D.1, Table D.2 and Table D.3. RSSI and SQE measurements will be made via the handset. These tests are to be performed on a selected sample set of links.

Table D.1 Interconnect Call Quality, Setup and Stability

Test #	MO/PSTN	Carrier #	RSSI (dBm)	SQE (dBm)	Quality (1-5)	Sector	Duration (Min)
1							2
2							2
3							2
4							2
5							2
	PSTN/MT						
1							2
2							2
3							2
4							2
5							2
	MO/MT						
1							2
2							2
3							2
4							2
5							2

Table D.2 Group Dispatch Call Quality, Setup and Stability

Test #	MO/MT	Carrier #	RSSI (dBm)	SQE (dBm)	Quality (1-5)	Sector	Duration (Min)
1							2
2							2
3							2
4							2
5							2
6							2
7							2
8							2
9							2
10							2

Table D.3 Private Dispatch Call Quality, Setup and Stability

Test #	MO/ MT	Carrier #	RSSI (dBm)	SQE (dBm)	Quality (1-5)	Sector	Duration (Min)
1							2:30
2							2:30
3							2:30
4							2:30
5							2:30
6							2:30
7							2:30
8							2:30
9							2:30
10							2:30

D.2 Packet Data Service Connection and Latency

The Packet Data service will be tested and verified on the MC-Series OPM System. Motorola's Packet Data Applet (laptop) will be used to connect to IIOF's Packet Data network over the MC-Series OPM System, using a tethered connection with a Motorola handset.

Several samples of PING requests will be sent to a router in IIOF's Packet Data network and average round trip times will be recorded to measure latency. Table D.4 presents the data to be collected for each ping using the MC-Series OPM System. These tests shall be performed using Windows 2000 OS, and the timeout for each ping reply shall be set to 2000 milliseconds.

Table D.4 Packet Data Latency OPM System (Ping –n 100 –w 2000 xx.xxx.xxx.x)

Test #	Handset	Carrier #	RSSI (dBm)	SQE (dBm)	Ping (No. Echoes)	Router (IP Address)	Avg. Round-Trip Time (mSec)	Packet Loss (%)
1					100	xxx.xxx.xxx.x		
2					100	xxx.xxx.xxx.x		
3					100	xxx.xxx.xxx.x		
4					100	xxx.xxx.xxx.x		
5					100	xxx.xxx.xxx.x		

Table D.5 presents (baseline) data collected for each ping using a Motorola Macrocell in order to average Round Trip time over the MC-Series OPM System versus over Motorola standard Base Station equipment.

Table D.5 Packet Data Latency over Motorola EBTS

Test #	Handset	Carrier #	RSSI (dBm)	SQE (dBm)	Ping (No. Echoes)	Router (IP Address)	Average Round-Trip Time (mSec)	Packet Loss (%)
1					100	xxx.xxx.xxx.x		0
2					100	xxx.xxx.xxx.x		0
3					100	xxx.xxx.xxx.x		0
4					100	xxx.xxx.xxx.x		0
5					100	xxx.xxx.xxx.x		0

D.3 Short Message Service

The Short Message Service (SMS) will be tested and verified by initiating the delivery of a voice mail notification to the handset via one of the iDEN RadioBlade transceiver links.

1. Navigate on a network connection to the Internet.
2. Enter the URL for the network operator in the web browser.
3. On the IIOF's home page, in the "Send a Text Message" box near the bottom, enter the 10-digit Nextel phone number of the test phone. The browser will display the mobile messaging page.
4. Enter a short text message into the field for message, and also enter a subject in the subject line.
5. Press the Send button. The message should appear on the test phone within a few minutes.

D.4 Handover and Cell Reselection

Handover and Cell Reselection verifies that mobiles on the MC-Series OPM System successfully handoff to the macro-cellular network during an interconnect call. These tests also verify that mobiles on the MC-Series OPM System perform successful cell reselection when in an idle state. Table D.6 presents the data to be collected for the handover and reselection tests.

Table D.6 Handover and Reselection Test Worksheet

Test #	Handover (Mobile #)	Carrier # from (HEX)	Carrier # to (HEX)
1			
2			
3			
	Cell Reselection (Mobile #)		
1			
2			
3			

D.5 Interconnect Connection Stability and SQE Performance

A single link for 3:1 Interconnect should be maintained for 30 minutes each. Table D.7 presents the data to be collected for each selected link. The iDEN Field Test Application (IFTA) is be used in “Single Cell” mode to observe the SQE performance and plotted over time.

Table D.7 Interconnect Connection Stability Worksheet

Interconnect #1	Carrier #	RSSI (dBm)	SQE (dB)	Sector	Duration (min)
					30
Interconnect #2					
					30
Interconnect #3					

D.6 Dispatch Connection Stability

To verify Dispatch connection stability, a Dispatch (private or group) call should be maintained for several minutes. Table D.8 presents the data to be collected for each dispatch call.

Table D.8 Dispatch Connection Stability Worksheet

Dispatch #1	Carrier #	RSSI (dB)	SQE (dB)	Sector	Quality (1-5)	Duration (min)
						3
Dispatch #2						
						4
Dispatch #3						
						5

D.7 Idle SQE Testing and Validation

Using the iFTA tool in “Single Cell” mode, record the idle RSSI and SQE values for the control channel for at least one hour per sector, while the mobile remains fixed.

D.8 System Self-Recovery Test

The following test is to determine the ability of the MC-Series OPM System to recover from various iSC-3 conditions.

Loss of T1

While the MC-Series OPM System is operating, disconnect the T1 connection to the iSCIII for one minute, and then reconnect it. Monitor the system recovery, and then validate the system by placing a successful call on each sector.

iSCIII Power Loss

While the MC-Series OPM System is operating, the iSCIII shall be power cycled and system recovery will be monitored and validated by placing a successful call on each sector.

Loss of GPS

While the MC-Series OPM System is operating, the GPS connection to the iSCIII will be disconnected until all Satellites are lost and then reconnected. System recovery will be monitored and validated by placing a successful call on each sector.

New datafill download

System recovery will be verified by pushing a new datafill download to the iSCIII.

D.9 Packet Data Stability and Throughput

The Packet Data stability and throughput to the Internet will be verified. A tethered Packet Data connection will be set up on a laptop and speed tested by using the www.bandwidthplace.com website. This continuous download of data stream will validate system stability and help to quantify user experience of Packet Data over the MC-Series OPM System.

D.10 Validation of 'Unable to Key BR' Alarm

While the MC-Series OPM System is operating, disconnect any system component, from the ABIC to the DRBS, and monitor the OMC to verify that MC-Series OPM System generates the "**Unable to Key BR**" alarm.

The MC-Series OPM System provides fault alarming and isolation within System Manager for individual components, which consists of detecting catastrophic faults that prevent an MC-Series OPM System component from responding to a periodic "ping". All fault alarms generated by the MC-Series OPM System are received at the OMC via the iSCIII. The "Unable to Key BR" alarm will appear at the OMC as minor, major or critical as follows (for more information about alarms, refer to section 2.2 (System Setup)):

Table D.9 "Unable to Key BR" Alarm Severity Indications

"Unable to Key BR" Alarm Severity	Indication
minor	An iDEN RadioBlade transceiver has failed.
major	An RF Shelf has failed.
critical	A card in a chassis unit has failed (except for the ABIC CRIC, which is responsible for returning the alarm information.)

Appendix E Tx / Rx Curves

E.1 800E Tx Filter Response

The 800E MHz Tx filter frequency response is shown below.

Figure E-1 800E Band Transmit Filter Frequency Response

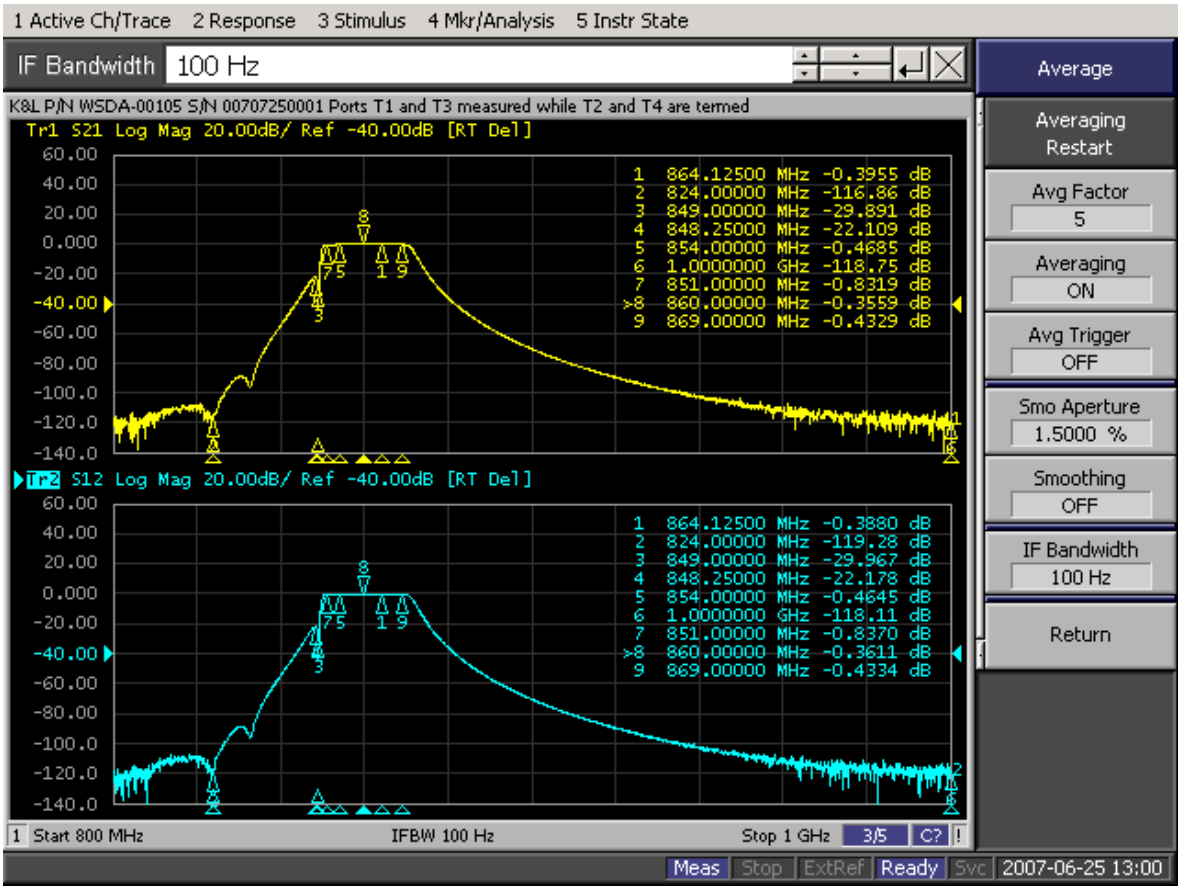
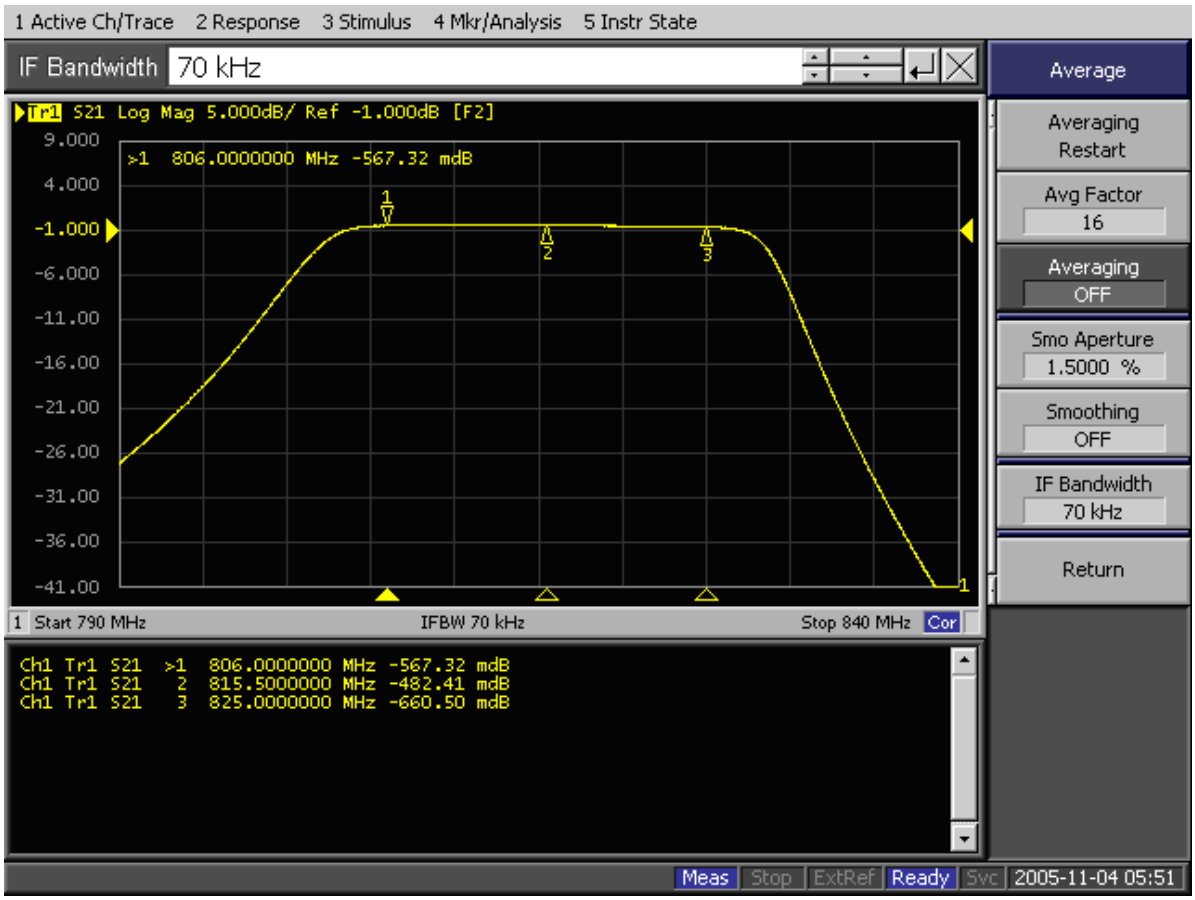


Figure E-2 800E Band Rx Filter Response



Appendix F BER Test Procedure

F.1 Bit Error Rate (BER) Diagnostic Test

The Bit Error Rate (BER) Diagnostic Test is used to execute BER tests of the MC-Series OPM System. The Diagnostic Test supports multi-channel RadioBlade (MCRB) transceivers in the 800E MHz band. BER testing gives a pass/fail determination for each blade and should be performed on all blades in the Diversity RadioBlade shelf (DRBS).

The most common testing scenario involves acceptance-test plan (ATP) execution during incoming inspection and commissioning. The MC-Series OPM System can be taken out of service for testing during a maintenance window. The RadioBlade transceivers can be locked as a group and then unlocked one-by-one for the BER tests.

F.2 Prerequisites for Testing

These procedures presume that the MC-Series OPM System is in place at its site of service and operational. Therefore, the prerequisites for operation will already have been satisfied:

- The T1 is live and has been tested.
- The datafill has been completed, including BR Cabinet and position assignments, and conforms to the recommended datafill.
- All site cabling and installation work has been completed and all punchlist items corrected.
- The system is powered and operational.
- The software is at least Revision 14.x.xxx.

In addition, the following conditions are required for BER testing:

- The BER test requires that the RadioBlade Shelf be connected to an ISC.

- The RadioBlade transceiver under test must be in the active state and unlocked (UEA).

F.3 Test Tool

- Signal generator (sig gen)

A Motorola R2660 Communications Analyzer can be used as the source of the test signal for the MC-Series OPM System during the BER test.

F.4 Testing Strategy

In the MC-Series OPM System as in the Motorola Enhanced Base Transceiver Station (EBTS), BRs are identified by Cabinet and position, with frequencies assigned in the datafill. BRs in the MC-Series are logical instances that map to physical RadioBlade transceivers. The MCRB transceivers can be mixed in a system (on a single DRBS) and the MCRB can operate in a Quad BR configuration. Like the EBTS, the MC-Series OPM System can be organized as a single sector (Omni), or as two or two sector site.

The basic BER testing strategy is to record the Base Radio (BR) and corresponding RadioBlade configuration of the MC-Series OPM System, and then test each blade across the power spectrum in its assigned range(s) of frequency.

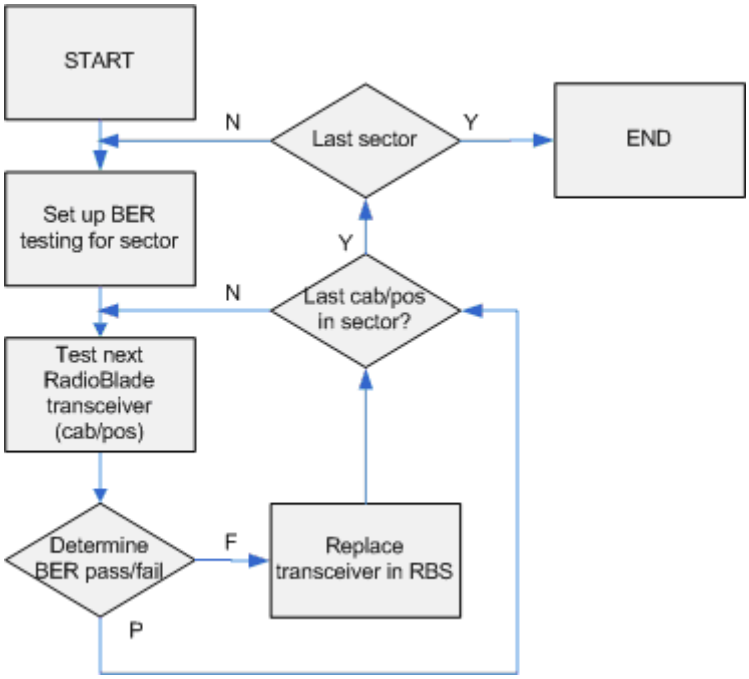
F.4.1 BER Test on an MCRB

Because the MCRB supports up to six carriers, the BR to RadioBlade transceiver ratio can range from one-to-one up to six-to-one. BER testing confirms the functionality of the blade hardware itself at selected frequencies and sensitivity levels, allowing you to check functionality specifically in the assigned ranges.

The MCRB can be viewed as a broadband RadioBlade transceiver in which up to six iDEN carriers are set up in a 1.25 MHz band centered at an optimal frequency. When testing an MCRB transceiver, the BER test start page allows an optional center carrier to be entered. By default, if only a carrier (no center carrier) is specified for the BER test, the test will be done at that specified carrier, with the band centered on the specified carrier. Entering both a carrier and a center carrier allows BER testing to be done at non-center carriers.

The procedures in this guide cover BER testing of the full complement of RadioBlade transceivers. The BER testing methodology proceeds from sector to sector, testing each Cabinet shelf and position in succession. Figure F-1 summarizes the process.

Figure F-1 BER Test Flow

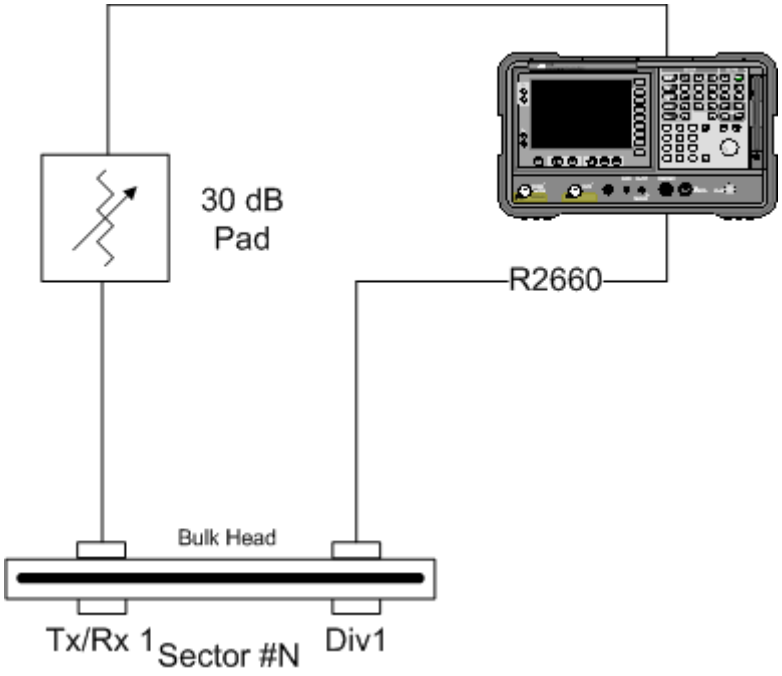


F.5 Equipment Connection/Setup

Set up the equipment to measure Rx BER as follows:

1. Connect a laptop to port 8 of the ABIC CRIC using an Ethernet (CAT-5) cable.
2. Boot the laptop, start System Manager and log in.
3. Launch a browser session and then enter the MC-Series OPM System IP address (http://192.168.200.5). Select the Performance Monitoring tab to display the login window. Type the User Name, (**Sysadmin**, case sensitive), and Password (**Radioframe**, case sensitive), and then select **OK**.
4. Connect Signal Generator to MC-Series OPM System

Figure F-2 Test Equipment Connection



F.5.1 Motorola R2660

1. On the R2660, set the 10 MHz STD toggle switch to INT and power it up.
2. Connect the TOR Rx port that is being tested (e.g., 800 Rx1 to test 800 MHz) to the RF IN/OUT or GEN OUT port on the R2660, depending on the desired test signal level.

   Note: Attenuate as required.

F.6 BER Test Procedure

Commonly, the BER test is performed during the process of commissioning an MC-Series OPM System, and the system has not yet been brought online. If the test is to be performed on a production system, the system must be taken out of service during a maintenance window.

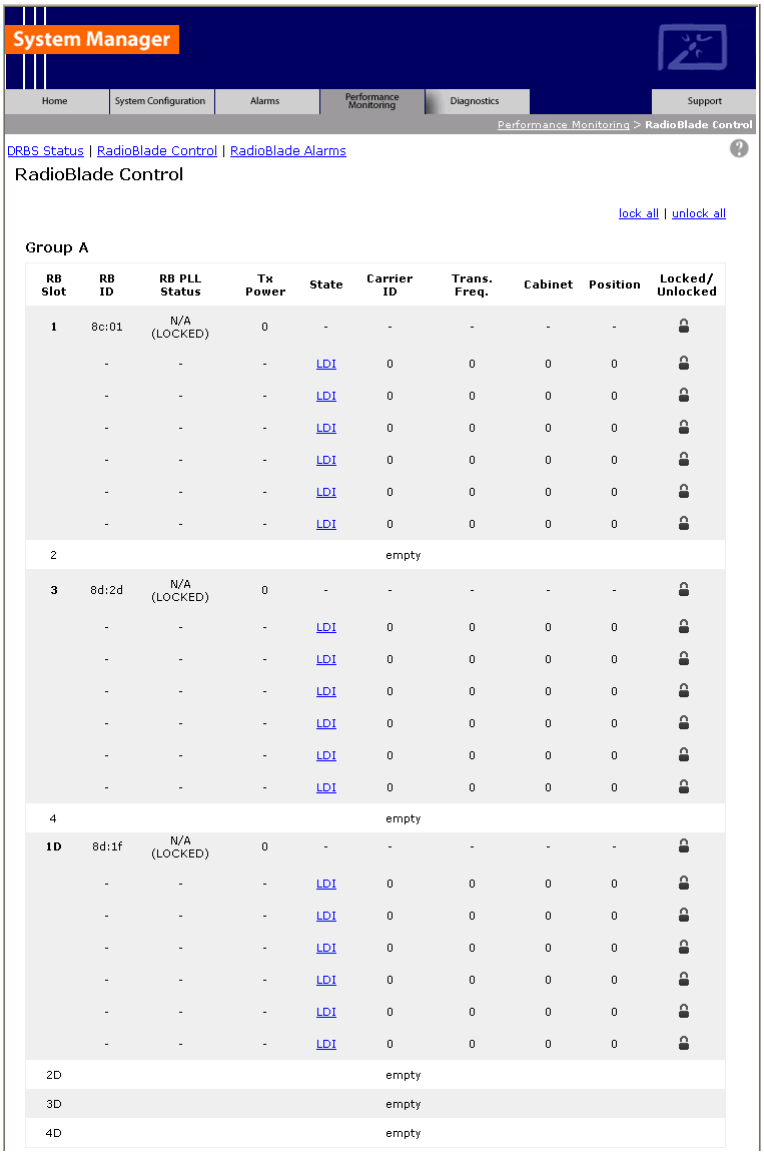
For your notes during the BER tests, there is a test notes master form, Table F.1, from which you can make copies. This form is useful both to organize your testing strategy and preserve the record of test results.

F.7 RadioBlade Transceiver Pre-Test

This section covers preparation for testing: determining the status of the RadioBlade transceivers in the system, taking the system out of service and preparing the blades and Sig Gen to run the tests. These steps presume that you are logged in to System Manager on the monitor laptop and that the Sig Gen is connected. Refer to F.5 (Equipment Connection/Setup).

1. Display the RadioBlade Control page (Figure F-3).
    a. To navigate to this page from the System Manager home page.
    b. Click the Performance Monitoring tab.
    c. Click the RadioBlade Control link at the top of the iDEN Performance Monitoring page.)

Figure F-3 RadioBlade Control Page



RadioBlade transceivers are listed on the RadioBlade Control page by slot number (1 through 24). If a RadioBlade transceiver is **administratively locked**, the icon in the **Locked/Unlocked** column is closed. If the RadioBlade transceiver is unlocked, the lock is open.

2. For reference in restoring the original system configuration, record in your notes which RadioBlade transceivers are administratively locked.

3. Lock any unlocked RadioBlade transceivers so that none of them is transmitting.

4. To lock a RadioBlade transceiver, select its open lock icon, and, when prompted, select **Accept**. Or you can use the **lock all** hot link to administratively lock all blades with one command.

F.7.1 RadioBlade Transceiver BER Test

This section covers the method to use to measure receiver BER and determine whether each RadioBlade transceiver passes. Testing is organized by sector to minimize the need to move the Sig Gen leads. Because you are testing an MC-Series OPM System that is not in service, you can simply leave the leads connected to the sector Rx port at TOR for the duration of the tests on that sector. The testing method follows a nested loop (summarized in F.4 (Testing Strategy)) until all blades either pass or fail. Once testing on a given RadioBlade transceiver has been completed (step 7) you repeat the test steps for the next transceiver. Once a given sector is completely tested, you move the leads to the next sector input port and repeat the test for each blade in the next sector.

1. Set the Motorola R2660 to generate an in-bound 1 x 6 test signal at the desired frequency and signal level into the Rx port that corresponds to the RadioBlade transceiver to be tested.

2. Determine the receive sensitivity threshold. Start at –120 dBm, and then increase in 2 dB increments until the BER drops below 2%. The receive sensitivity value should be less than –106 dBm at 2% BER.

3. Determine the max. level threshold. Start at –48 dBm and increase in 2 dB increments until the BER goes above 2%. The maximum input power should be greater than –40 dBm at 2% BER.

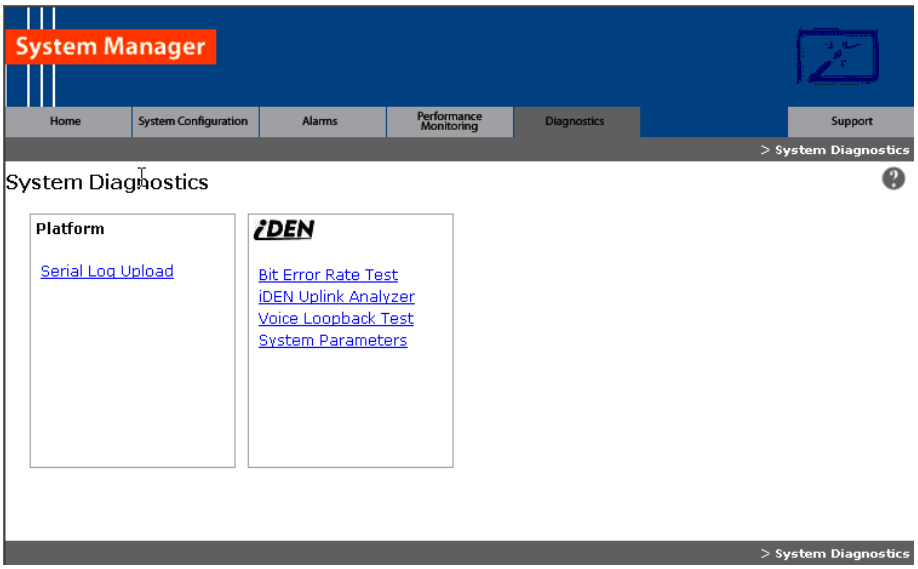
4. If either of the values called for in steps 2 and 3 is not attained, the RadioBlade transceiver has failed specifications and should be replaced.

5. Display the RadioBlade Control page (Figure F-3), and make sure the RadioBlade transceiver that is to be tested is not locked. If it is locked, unlock it.

6. If you are unlocking the blade, refresh the page every 30 seconds until the State of the RadioBlade transceiver has changed to ‘UEA’, approximately 3 minutes.

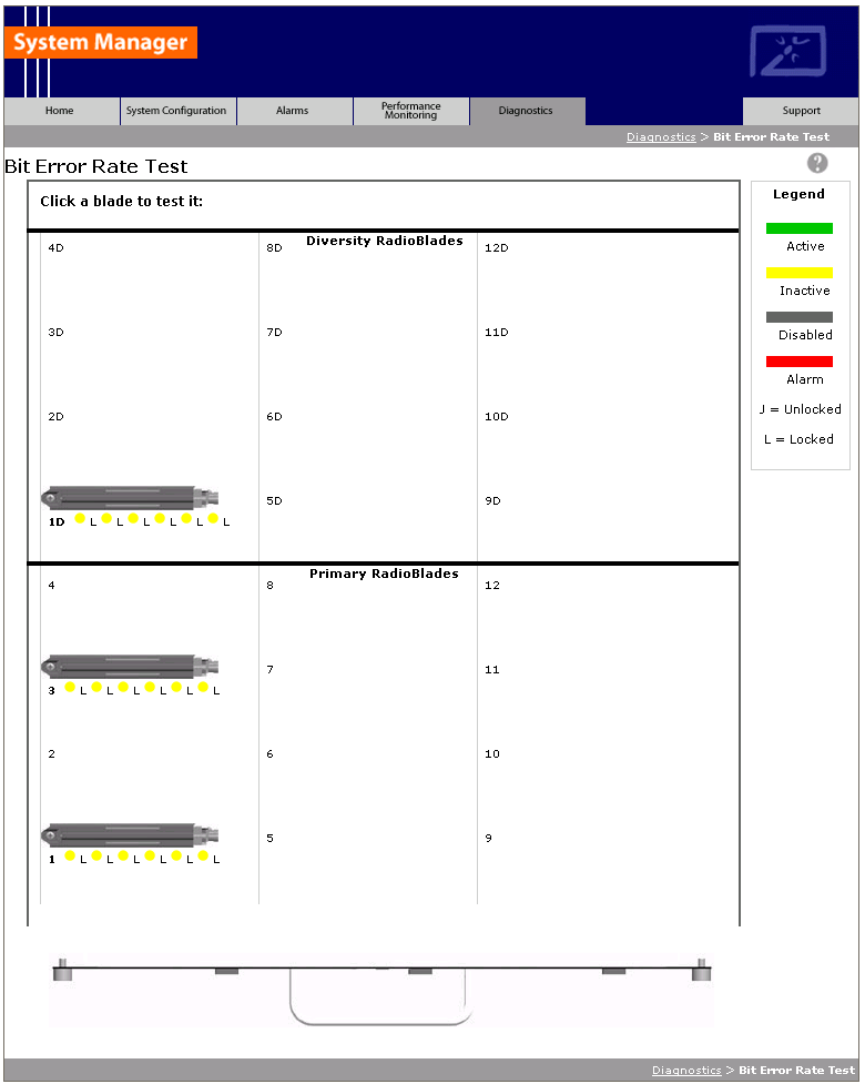
7. Select the Diagnostics tab (Figure F-4), and then select **Bit Error Rate Test**.

Figure F-4 System Diagnostics Page



8. On the **Bit Error Rate Test** page (Figure F-5), select the RadioBlade transceiver that is to be tested.

Figure F-5 Bit Error Rate Test Page



The **Start Test** page is formatted as shown in section F.3 explains the use of the center carrier in BR testing with the MCRB.

9. Optionally, if the blade you are testing is an MCRB, you can enter a **Center Carrier** (in decimal format); if no value is entered in this field, the band will be centered on the specified carrier. Enter the **Carrier ID** (in decimal format) to which the Sig Gen is set, and then select the **Start Test** button.

"BER Test on an MCRB" in section F.4 (Testing Strategy) explains the use of the center carrier in BR testing with the MCRB.

Figure F-6 Bit Error Rate Start Test Page

10. Verify that the displayed **Rx Frequency** matches the desired receive frequency.

11. Approximately every second, the page reports the current BER measurement (**BER**) and the running average of the ten latest BER measurements (**BER Avg**). Record these results, and then select the **Stop Test** button.

    a. If the warning “Test Signal Timing Out of Lock” appears, cycle power to the R2660 and set it up again to generate an in-bound 1x6 test signal at the desired frequency and signal level into the Rx port. It may take a few minutes for the R2660 test signal to stabilize.

b. If the only BER measurements reported are 50%, NO DATA, or both, verify that all procedure steps have been completed. If no problems are found, cycle power to the R2660 and set it up again to generate an in-bound 1x6 test signal at the desired frequency and signal level into the Rx port. It may take a few minutes for the R2660 test signal to stabilize. If there's still no change after cycling power to the R2660, select the **Stop Test** button.

12. When the BER test is complete, lock the RadioBlade transceiver that was under test.

13. Display the RadioBlade Control page, and lock the RadioBlade transceiver by selecting its lock icon so that it is closed (locked).

    a. Refresh the page every 30 seconds until the **State** of the RadioBlade transceiver has changed to '2'.

14. Repeat Steps 1 through 12 for each RadioBlade transceiver to be tested on this Rx port.

15. Move the test leads to the next sector at TOR when all desired blades in the current sector have been tested and repeat the procedure.

F.8 Equipment Disconnection

Note: Disconnect equipment after completing the BER testing.

1. Disconnect the R2660 from the Rx port under test.

2. Display the DRBS Status page, and verify that all RadioBlade transceiver status icons are green.

3. Disconnect the network cable from port 8 of the ABIC CRIC.

F.9 BER Test Notes Master

You can use this page to make copies of Table F.1 for use as a handy organizer and permanent record of the BER tests.

Table F.1 BER Test Notes Master

Sector/ Test Seq. #	BR		Freq./ Cent. Freq. (MHz)	Sensitivity Threshold (dBm)	Max. Level Threshold (dBm)	Locked/ Unlocked After Test?	Pass/Fail
	Cab.	Pos.					

Appendix G Dangerous RF Emissions Precautions

 **Warning!**	The MC-Series OPM System has been approved for antennas up to +20 dBi. At energy levels within the approved range, operation may present hazards to life and health. RF emission level is a function of the installation. Accordingly, it is the responsibility of the equipment owner, and not RadioFrame Networks, Inc., to apply signage to the site if it is required under 47 CFR 1.1310. Please carefully read and observe the following warnings!

This equipment is designed to generate and radiate radio frequency (RF) energy by means of an external antenna. When terminated into a non-radiating RF load, the base station equipment is certified to comply with Federal Communications Commission (FCC) regulations pertaining to human exposure to RF radiation in accordance with the FCC Rules Part 1 section 1.1310 as published in title 47 code of federal regulations and procedures established in TIA/EIA TSB92, Report on EME Evaluation for RF Cabinet Emissions Under FCC MPE Guidelines, Compliance to FCC regulations of the final installation should be assessed and take into account site specific characteristics such as type and location of antennas, as well as site accessibility of occupational personnel (controlled environment) and the general public (uncontrolled environment). This equipment should only be installed and maintained by trained technicians. Licensees of the FCC using this equipment are responsible for insuring that its installation and operation comply with FCC regulations Part 1 section 1.1310 as published in title 47 code of federal regulations. Whether a given installation meets FCC limits for human exposure to radio frequency radiation may depend not only on this equipment but also on whether the “environments” being assessed are being affected by radio frequency fields from other equipment, the effects of which may add to the level of exposure.

Accordingly, the overall exposure may be affected by radio frequency generating facilities that exist at the time the licensee’s equipment is being installed or even by equipment installed later. Therefore, the effects of any such facilities must be considered in site selection and in determining whether a particular installation

meets the FCC requirements. FCC OET Bulletin 65 provides materials to assist in making determinations if a given facility is compliant with the human exposure to RF radiation limits. Determining the compliance of transmitter sites of various complexities may be accomplished by means of computational methods. For more complex sites direct measurement of power density may be more expedient. Persons responsible for installation of this equipment are urged to consult the listed reference material to assist in determining whether a given installation complies with the applicable limits. In general the following guidelines should be observed when working in or around radio transmitter sites:

 **Warning!**	All personnel should have electromagnetic energy awareness training.

 **Warning!**	All personnel entering the site must be authorized.

 **Warning!**	Obey all posted signs.

 **Warning!**	Assume all antennas are active.

 **Warning!**	Before working on antennas, notify owners and disable appropriate transmitters.

 **Warning!**	Maintain minimum 3 feet clearance from all antennas.

 **Warning!**	Do not stop in front of antennas.

 **Warning!**	Use personal RF monitors while working near antennas.

 **Warning!**	Never operate transmitters without shields during normal operation.

 **Warning!**	Do not operate base station antennas in equipment rooms.

Appendix H Repair and Technical Support

H.1 RadioFrame Networks Support

RadioFrame Networks provides technical support services to IIOF for the installation, operation and maintenance of RadioFrame Networks equipment. For iSCIII or T1 related questions follow normal troubleshooting procedures.

Before calling...

Have the following information available prior to contacting RadioFrame Networks Technical Assistance Center (TAC) to minimize downtime:

1. Location of the MC-Series OPM System
2. MC-Series OPM System software version
3. Symptoms of the problem
4. If an alarm was generated, the alarm information from the **Alarm Log** in System Manager
5. Date the problem was first noticed
6. If the problem can be reproduced
7. What causes the problem to occur
8. Any unusual circumstances contributing to the problem (i.e., loss of power)

H.1.1 Technical Support

For support of RadioFrame Networks equipment, contact the RadioFrame Networks Technical Assistance Center (TAC) at:

(US) 1-800-328-0847
support@radioframenetworks.com

Glossary

Term	Definition
800E	Extended 800 MHz Band (800S+800U)
8PSK	8 Phase Shift Keying. Phased Shift Keying is a form of phase modulation using of a discrete number of states.
ARFCN	Absolute radio frequency channel number
auto-baselining	A CPE software download server (SWDLS) is used to upgrade a CPE to the required AGW software version before it is allowed to connect to its S-AGW.
Backhaul	Using the back channel on a bi-directional communications line
BER	Bit Error Rate
BNC	Bayonet Neil-Concelman (BNC) coaxial connector
BR	Base Radio
BTS	Base Transceiver Station
BTUs	British Thermal Units
CALEA	Communications Assistance for Law Enforcement Act
CAT5	Category 5 (Cable)
CE	Conformité Européenne
CLI	Client editor
CPE	Customer Premise Equipment
CRIC	Combined RF Front-End Interface Card (cf. BLIC—CRIC refers to the hardware implementation of the BTS LAN interface for the S-Series)
CSU	Channel Service Unit
DACS	Digital Access Carrier System
DAS	Distributed Antenna System
DLC	Digital Line Card
DSP	Digital Signal Processor
EBRC	Enhance Base Radio Controller
EFR	Enhanced Full Rate
EML	Element Management Layer
EMS	Executive Management System
ERTM	Ethernet Rear Transition Module. The ERTM provides Ethernet connectivity between the BCU and S-AGW Linux server (QTA).
ESD	Electro-static discharge
EVM	Error Vector Magnitude. The difference between the received coordinates (by phase and amplitude) and the intended position (e.g. the actual transmission).
FCC	Federal Communication Commission

FPGA	Field Programmable Gate Array
FNE	Fixed Network Equipment
FOA	First Office Application
FR	Full Rate
FRU	Field Replaceable Unit
GPL	General Public License. Software license specifically developed to maintain free access to a computer program even if changes or additions are made to the code.
GR	General Release
GUI	Graphical User Interface
HVAC	heating, ventilating, and air conditioning
Hz	Hertz
IEC	International Electrotechnical Commission
IM	Inter Modulation
INI	Interference and Noise Indicator
IP	Internet Protocol
ISP	Internet Service Provider
ISTA	International Safe Transit Association
LAN	Local Area Network
LMT	Local Management Terminal
MAC	Medium Access Control
MCRB	Multi-Channel RadioBlade
MDX	Media Dependent Interface
MDIX	Media Dependent Interface Crossover
MHz	Megahertz
MOP	Method of Procedure
MNO	Mobile Network Operators
MS	Mobile Station
MTBF	Mean Time Between Failures
NEBS	Network Equipment Building Systems
NSTA	National Security Telecommunications Advisory
OLCC	On Line Configuration Change
OMC	Operations and Management Centre
OML	Object Manipulation Language
OPM	Outdoor Pole Mount
PCCH	Primary Control Channel
PCM	Pulse-Code Modulation
PCU	Packet Control Unit
PDCH	Packet Data Channel. A general term used in GPRS to represent a GPRS control timeslot in place of conventional GSM circuit switching.
PDU	Power Distribution Unit

PLL	Phase Locked Loop
Provisioning	Term describing the providing of services to the user.
QoS	Quality of Service
RAN	Radio Access Network
RF	Radio Frequency
ROM	Read Only Memory
RMS	Root Mean Square
RSL	Request-and-Status Link
RSSI	Received Signal Strength Indicator
Rx	Receive
SCCH	Secondary Control Channel
SMA	Sub-miniature Version A
SNMP	Simple Network Management Protocol
SQE	Signal Quality Estimator
SR	Software Release
SSH	Secure Shell. Provides a secure channel between a local and a remote computer.
SWDL	Software Download
SWDLS	Software Download Server
TBD	To be determined
TCH	Traffic Channel
TDM	Time division multiplexing. Imbedding multiple data streams into a signal.
TEI	Terminal Endpoint Identifier
TMN	Telecommunications Management Network
TRD	Technical Requirements Document
TRX	Transceiver
Tx	Transmit
UL	Underwriters Laboratories
xDSL	Generic term for the various types of DSL/
xU	Standard unit of measure regarding the height of a computer or Cabinet enclosure. For example 4U is an enclosure seven inches tall.

Revision History

Feel free to use the Registration and Feedback format at the beginning of this document.

Submit comments and corrections to:

RadioFrame Networks, Inc.
Technical Information Department
9461 Willows Road NE, Suite 100
Redmond, WA 98052
Tel.: +1 800 328 0847 Fax: +1 425 278 2781

This document is also posted as a.pdf file on the RadioFrame Networks web site at:
http://www.radioframenetworks.com/partners

DATE	REV	DESCRIPTION
8/27/2007	X1	Develop first draft of the User guide.

Acknowledgments

Name	Position

Related Documentation

Document #	Rev	Document Title
998-4005-00	B	MC Series Medium Power Implementation Guide
935-0003-00	A	MC-Series Medium Power Feature Implementation Document (FID)
998-4012-03	A	MC-Series High-Power Dual-Band System Implementation Guide
998-5000-01	X4	Outdoor Pole Mount Implementation Guide

From: Technical Information

To: Reviewers

Re: MC-Series Outdoor Pole Mount Users Guide

Date: August 27, 2007

Initials	REVIEWER	COMMENTS