RadioFrame Networks

MC-Series System Installation & Testing

April 19, 2005

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998-4001-00 Rev C

Service Information

This equipment complies with part 15 of the FCC Rules. Operation is subject to the two following conditions: This device may not cause harmful interference, and this device must accept any interference received, including interference that may cause undesired operation. This equipment has been tested and found to comply with the limits pursuant to part 90.691 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

Notices

These installation standards have been prepared to provide Nextel Communications with general standards necessary to ensure that installed RadioFrame Networks equipment operates in accordance with the design parameters in the owned or leased buildings of Nextel Communications and its customers, and to make certain equipment is installed safely and efficiently.

RadioFrame Networks reserves the right to revise this document for any reason, including, but not limited to, conformity with standards promulgated by various governmental or regulatory agencies, utilization of advances in the state of the technical arts, or to reflect changes in the design of equipment, techniques, or procedures described or referred to herein.

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Throughout this publication, the terms RadioFrame Networks, RadioFrame and RFN signify RadioFrame Networks, Inc., and Nextel signifies Nextel Communications.

MC-Series System Installation & Testing

Contents

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1 Introduction

This MC-Series System Installation & Testing manual provides an overview of the RadioFrame Networks Microcell (MC-Series) System and describes standards for installing, modifying and maintaining RadioFrame Networks equipment at Nextel and Nextel customer sites. All specifications and requirements pertain to MC-Series System equipment required in Nextel iDEN (integrated Digital Enhanced Network) installations. RadioFrame Networks recommends reading the entire manual before attempting to install or operate RadioFrame Networks equipment.

1.1 Record of Revisions

Issue	Date	Effect on		Reason for Revision
		Page	Para	
A	Nov 2004	All		Reorganize document; add content
B	Dec 2004	All		Update content
C	Feb 2005	All		Update content

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This document is posted as a .pdf file on the RadioFrame Networks web site at:

http://www.radioframenetworks.com/support/

1.2 References

In addition to this manual, the following technical manuals are related to the MC-Series System and may be needed for installation or maintenance.

- Generation 3 Site Controller System Manual, Motorola, 68P80801E30-O
- iDEN OMC-R Configuration Management Parameters Technical Manual, 68P80802E10
- Channel Service Unit (CSU) manufacturer's documentation
- Cabinet manufacturer's documentation (shipped with MC-Series System)
- Power supply and battery manufacturer's installation and maintenance documentation
- Distributed Antenna System (DAS) manufacturer's documentation

- General Dynamics R2660 Series Communications System Analyzer Operators Manual, 68-P35270C001 Rev F
- Quality Standards—Fixed Network Equipment (FNE) Installation Manual (R56), Motorola, R56 current edition
- National Electrical Code (NEC), current edition
- National Fire Protection Associations (NFPA) Code 70
- ASTM (American Society For Testing and Materials) 488-90
- Bellcore Technical Specifications 1089, GR-63-CORE

1.3 General Safety Information

Read all the notices in this section prior to installing or using the MC-Series System or any of its components.

1.3.1 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 RFN 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 100kΩ.
- 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.

1.3.2 Safety Warnings


Warning!

Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if uncertain that suitable grounding is available.


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, to comply with FCC RF exposure compliance requirements, the antenna(s) used for this transmitter must be fixed-mounted with at least 25 cm separation distance from any person. 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

1.3.3 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.

1.4 Repair and Technical Support

RadioFrame Networks provides technical support services to Nextel for the installation, operation and maintenance of RadioFrame Networks equipment. For iSC-3 or T1 related questions, please contact Nextel.

1.4.1 Before calling...

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

- Location of the MC-Series System
- MC-Series System software version
- Symptoms of the problem
- If an alarm was generated, the alarm information from the **Alarm Log** in System Manager
- Date the problem was first noticed
- If the problem can be reproduced

- What causes the problem to occur
- Any unusual circumstances contributing to the problem (i.e., loss of power)

1.4.2 Technical Support

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

(US) 1-800-328-0847

1.4.3 Field Replaceable Unit (FRU) Policy

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

NOTE: Do not attempt to repair RFN equipment and components in the field.

NOTE: Always use a static grounding wrist strap before handling any chassis or RadioBlade.

- Include the serial numbers of the affected equipment.
- Give a clear return address, including:
  - contact person,
  - phone number, and an
  - alternate contact person and phone number (if possible).
- Securely package the FRU in its original shipping carton, if available. Otherwise, package in a static protection bag in a well-padded carton.

Refer to section 8.6 FRU Replacement Procedures for replacing any of the following equipment. For equipment not supplied by RadioFrame Networks, follow standard Nextel policies and procedures for FRU replacement.

Table 1 MC-Series System FRUs

P/N	Description
176-0840-xx	800 MHz MC Series iDEN 2-Port RadioBlade (RB) Transceiver
176-0870-xx	800 MHz RF Shelf
176-0535-xx	RadioBlade Transceiver Shelf (RBS)
176-0800-xx	MC-15 Airlink Interface Chassis (AIC)
176-0900-xx	MC-15 BTS Interface Chassis (BIC)
176-7570-xx	Base Processing Card (BPC)
176-7550-xx	Base Processing Card (BPC) with SPAM
176-7540-xx	Common RadioFrame Interface Card (CRIC)

P/N	Description
176-7562-xx	Ethernet Rear Transition Module (ERTM)
176-7510-xx	Signal Processing Array Module (SPAM)
176-0820-xx	CRTC
176-7502-xx	4U Chassis
176-0600-xx	PDU
176-1219-xx	Fan Tray w/Fans for 4U Chassis
176-0011-xx	Fan for RBS, RF Shelf, AIC & BIC

2 System Description

The MC-Series System is a stand-alone microcell base transceiver station (BTS) that provides radio communication links between the land network and mobile subscriber units in an integrated Dispatch Enhanced Network (iDEN). The MC-Series System interfaces with the Mobile Switching Office (MSO) via a standard T1 interface. This link also provides the Operations and Maintenance Center (OMC) with alarm information, and enables the OMC to remotely control and configure system operations via a standard site datafill.

The MC-Series System contains both RadioFrame Networks' and non-RFN equipment enclosed in a single 19” equipment cabinet. The MC-Series System, or MC-15, is a three-sector configuration that supplies five full-duplex iDEN carriers per sector with the option to upgrade to 24 channels total. In the future, this platform will allow further upgrades to 36 BRs.

The MC-Series System is shipped ready to install and configure. The customer provides all non-RFN hardware, T1 connectivity, datafill (network provisioning), antenna system, GPS (as required by iSC), electrical supply and the necessary permitting.

Figure 1 The MC-Series System cabinet

2.1 MC-Series System Configuration

The MC-Series System can be configured to have 1, 2, or 3 sectors. The single sector, or omni configuration can have up to 20 BRs. In multi-sector configurations, the BRs must be assigned to sectors in groups of 8. For a 3-sector system the maximum number of BRs per sector is 8. For a 2-sector configuration one of the sectors can have up to 16 BRs, while the other sector can have up to 8, providing a maximum capacity of 24 BRs in a 2- or 3-sector configuration.

The MC-Series System includes the following RadioFrame Networks hardware:

- BTS Interface Chassis (BIC) is the interface to the iSC and routes Ethernet traffic for up to three sectors.
- Airlink Interface Chassis (AIC) performs the digital receive and transmit function for each RadioBlade (RB) and provides the common timing source for each RBS.
- RadioBlade Shelf (RBS) enables up to 24 RadioBlade® transceivers. A second RBS is required to provide diversity through “receive only” RadioBlade transceivers.
- iDEN 2-port RadioBlade transceivers (RBs) insert into slots in the RBS; each RB corresponds to one iDEN BR.
- RF Shelf provides Rx-Tx amplification, filtering, and distribution between the RBSs and external equipment.
- Power Distribution Unit (PDU) distributes DC power and provides overcurrent protection to each component in the MC-Series System cabinet.

The MC-Series System includes the following non-RadioFrame Networks hardware:

- ISC-3s: two integrated Site Controllers (iSC 3s) for redundancy
- Environmental Alarm System (EAS) provides additional external alarming as required.
- Channel Service Unit (CSU) single-rack unit, high multi-purpose cross-connect, with the ability to aggregate multiple types of traffic onto a single T1 for backhaul to the MSO.
- DC power source.

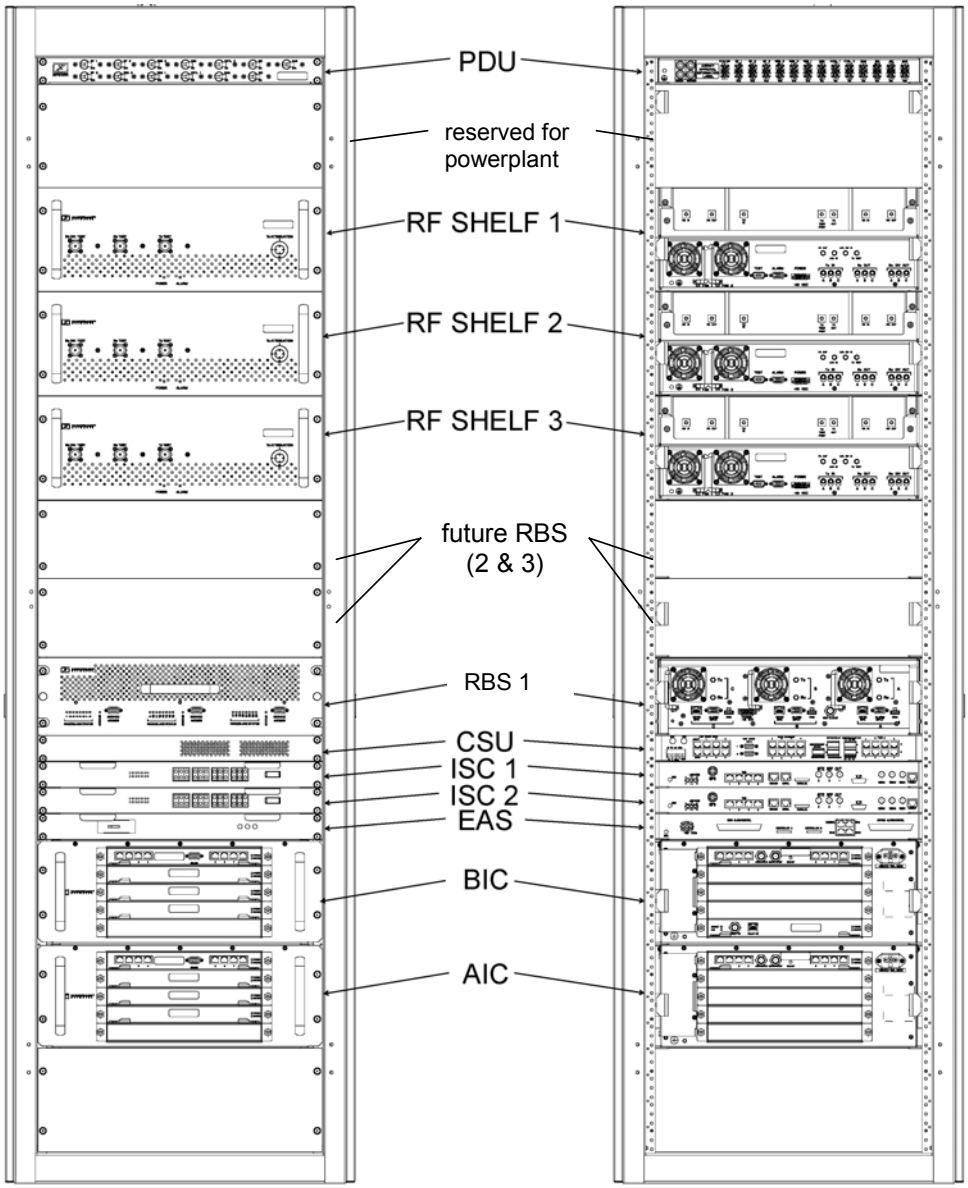


Figure 2 MC-Series System 3-sector configuration

2.2 RadioFrame Networks Hardware

RadioFrame Networks hardware receives layer 3 control messages (control, voice, packet data, SNMP, etc.) from the iSC, and converts them into layer 2 PDUs (Protocol Data Units) that are sent every 15mSec (received every 7.5 mSec). Then the AIC converts the layer 2 PDUs into raw layer 1 BaseBand I/Q samples that are sent/received every 7.5 mSec.

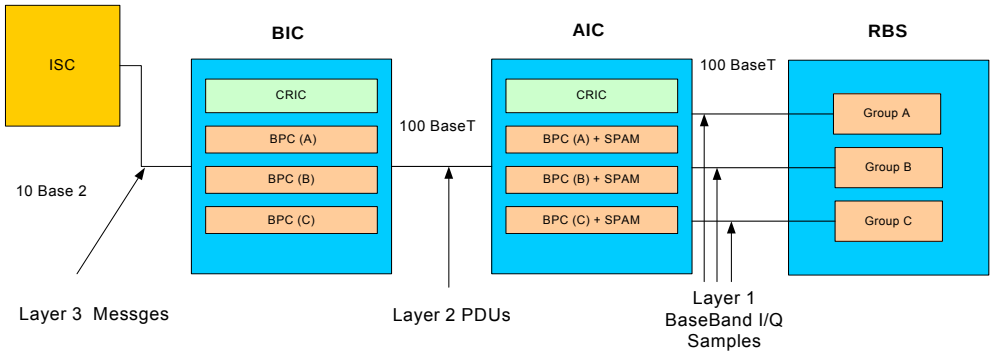


Figure 3 MC-Series System functional diagram

2.2.1 BTS Interface Chassis (BIC)

The BTS Interface Chassis (BIC) interfaces to the iSC and provides all Base Radio management functionality, including timing, converts iSC layer 3 messaging to layer 2 packets, and converts 1PPS 5MHz clock to packet-delivered timing. Within the BIC chassis are four assemblies (see the following illustrations):

- BIC Common RadioFrame Interface Card (CRIC)
- BTS Processing Card (BPC)—up to three BPCs per system, one BPC per sector, deployed in front slots 2, 3, and 4
- Ethernet Rear Transition Module (ERTM)
- Coax-to-RJ45 Transceiver Card (CRTC)

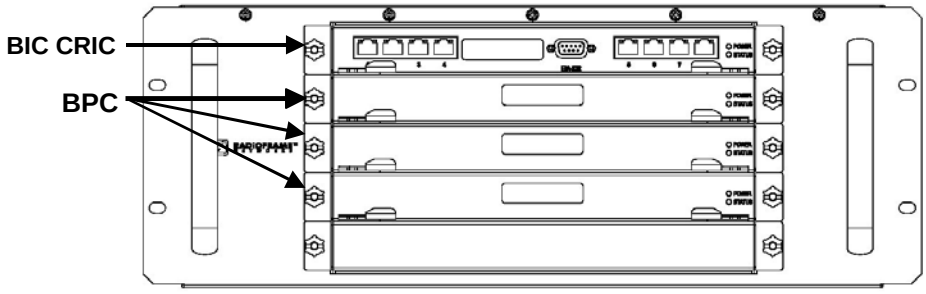


Figure 4 BIC front view

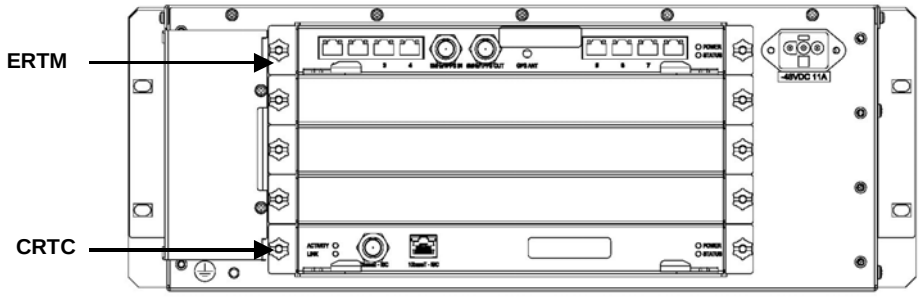


Figure 5 BIC rear view

2.2.1.1 BIC CRIC

The BIC Common RadioFrame Interface Card (CRIC) is located in the top front slot of the BIC. The BIC CRIC provides the Ethernet switch fabric to route packets to/from the AIC and hosts a microprocessor that serves as the primary controller of BPCs for system management purposes. The BIC CRIC has a serial port for local serial access, and eight 10/100BaseT Ethernet ports. Currently, ports 1 through 7 are not used; only port 8 is used for local Ethernet access.

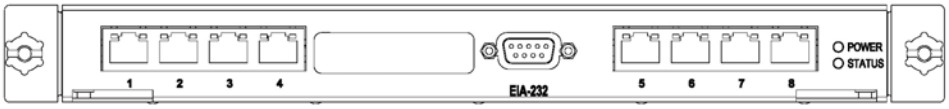


Figure 6 BIC CRIC ports and indicators

2.2.1.2 BPC

Three BTS Processing Cards (BPCs) are located in BIC front slot positions 2, 3, and 4. The BPC hosts a microprocessor to perform iDEN voice management and is responsible for layer 2 call processing.

Figure 7 BPC indicators

2.2.1.3 ERTM

The Ethernet Rear Transition Module (ERTM) is located in the top rear slot of the BIC. The ERTM interfaces to the CRIC via eight RMII ports in the chassis midplane. The ERTM provides Ethernet connectivity between the BIC and AIC as well as a connection to the CRTC.

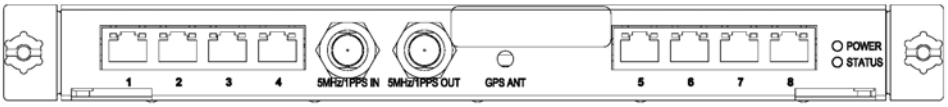


Figure 8 ERTM ports and indicators

2.2.1.4 CRTC

The Coax-to-RJ45 Transceiver Card (CRTC) is located in the bottom rear slot of the BIC. The CRTC provides conversion of the 10-base 2 connection at the iSC to a 10-base T connection in the BIC.

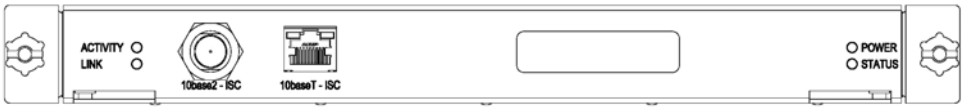


Figure 9 CRTC ports and indicators

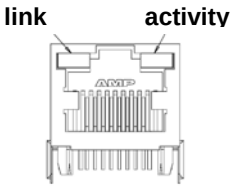
2.2.1.5 BIC Ports

Card	Port	Description
BIC CRIC	Ports 1-7 (RJ45)	not currently used
	Port 8 (R-45)	Nextel technician local Ethernet access
	EIA-232 9-pin serial port	Nextel technician local serial access
BPC	N/A	N/A
ERTM	Port 1 (RJ45)	CRTC Port 10BaseT
	Ports 2-7 (RJ45)	AIC ERTM port 4
	Port 8 (RJ45)	Remote Ethernet connectivity (DNX-1u Ethernet)
	5MHz/1PPS IN	iSC-3 5MHz/1PPS port
	5MHz/1PPs OUT	not currently used (no terminator required)
	GPS ANT	not currently used
CRTC	10Base2 – iSC	ISC-3 10Base2 port
	10BaseT – iSC	BIC ERTM port 1

2.2.1.6 BIC Indicators

Each card installed in the BIC has a **Power** and a **Status** LED. In addition, each RJ45 port has an Ethernet **link** LED that indicates connectivity and an Ethernet **activity** LED that indicates Ethernet traffic.

LED	Indication
Power	Indicates power is applied to card
Status	Indicates timing synchronization



2.2.2 Airlink Interface Chassis (AIC)

The Airlink Interface Chassis (AIC) provides layer 1 (I & Q samples) and layer 2 processing of call data, including routing of packet data to RadioBlades in RBS, as well as timing to the RBS. Within the AIC chassis are three assemblies:

- AIC Common RadioFrame Interface Card (CRIC)
- BTS Processing Card + Signal Processing Array Module (BPC+SPAM)—three BPC+SPAM per AIC in front slots 2, 3, and 4
- Ethernet Rear Transition Module (ERTM)

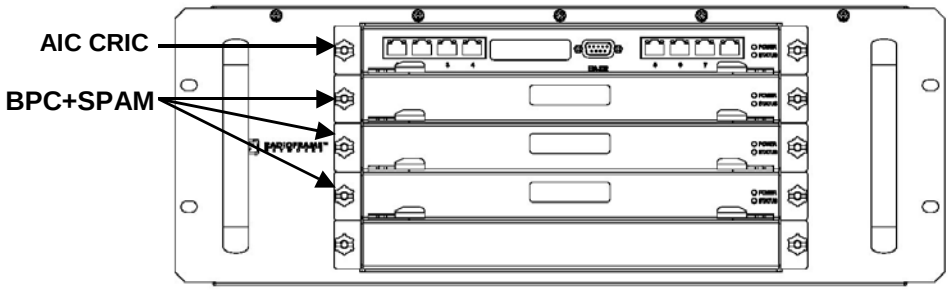


Figure 10 AIC front view

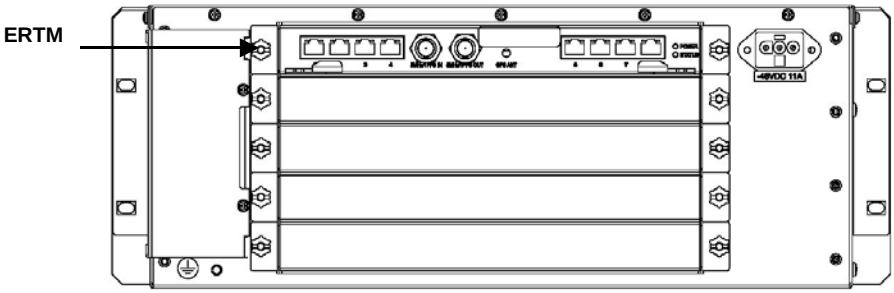


Figure 11 AIC rear view

2.2.2.1 AIC CRIC

The AIC Common RadioFrame Interface Card (CRIC) provides the Ethernet switch fabric to route packets to/from the RBS. The AIC CRIC hosts a microprocessor as the primary controller of BPC+SPAMs. The AIC CRIC has a serial port for local serial access, and eight 10/100BaseT Ethernet ports that are currently not used.

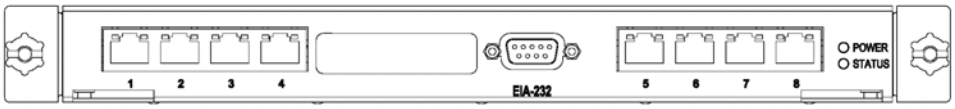


Figure 12 AIC CRIC ports and indicators

2.2.2.2 BPC+SPAM

BTS Processing Card + Signal Processing Array Module (BPC+SPAMs) are DSP modules that control the transfer of voice I/Q samples to/from the RBS. BPC+SPAMs perform all necessary functions of radio link formatting, coding, timing, error control and framing: Voice Control Procedure (VCP), Associated Control Procedure (ACP), Slot Interchange Procedure (SIP) and Random Access Protocol (RAP).

Figure 13 BPC+SPAM indicators

2.2.2.3 ERTM

The Ethernet Rear Transition Module (ERTM), located in a rear slot of the AIC, interfaces to the CRIC via eight RMII ports in the chassis midplane. The ERTM provides Ethernet connectivity between the AIC and RBS.

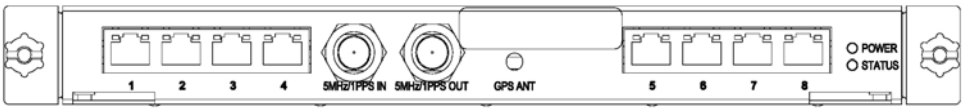


Figure 14 ERTM ports and indicators

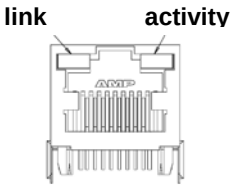
2.2.2.4 AIC Ports

Card	Port	Description
AIC CRIC	Ports 1-8 (RJ45)	not currently used
	EIA-232 9-pin serial port	Nextel technician local serial access
BPC+SPAM	N/A	N/A
ERTM	Ports 1-3 (RJ45)	RBS port 10/100 RFN, A, B, and C respectively
	Ports 4 (RJ45)	BIC ERTM port 2
	5MHz/1PPs IN	not currently used (no terminator required)
	5MHz/1PPs OUT	not currently used (no terminator required)
	GPS ANT	not currently used

2.2.2.5 AIC Indicators

Each card installed in the BIC has a **Power** and a **Status** LED. In addition, each RJ45 port has an Ethernet **link** LED that indicates connectivity and an Ethernet **activity** LED that indicates Ethernet traffic.

LED	Indication
Power	Indicates power is applied to card
Status	Indicates timing synchronization



2.2.3 RadioBlade Shelf (RBS)

The RadioBlade Shelf (RBS) houses the iDEN 2-port RadioBlade transceivers, the RadioBlade transceiver “backplane”, and RF combiner and splitter assemblies. The whole assembly is housed in a pullout shelf to facilitate field replacement of the RadioBlade transceivers.

The RBS is divided logically into three sets of eight slots. Each set of slots is referred to as a group—A, B, and C—numbered from left to right when facing the front of the unit. The groups share redundant DC-DC converters. The slot connectors on the RBS provide the control and data interface to each RadioBlade transceiver. Each group interfaces with the AIC via a separate 100BaseT Ethernet connection. In addition, a serial console port and status LEDs for each group are routed to the front panel of the RBS.

RF combining is also accomplished on a per group basis. Integrated into the RBS are 1:8 power splitters for the Rx path and 8:1 power combiners for the Tx path.

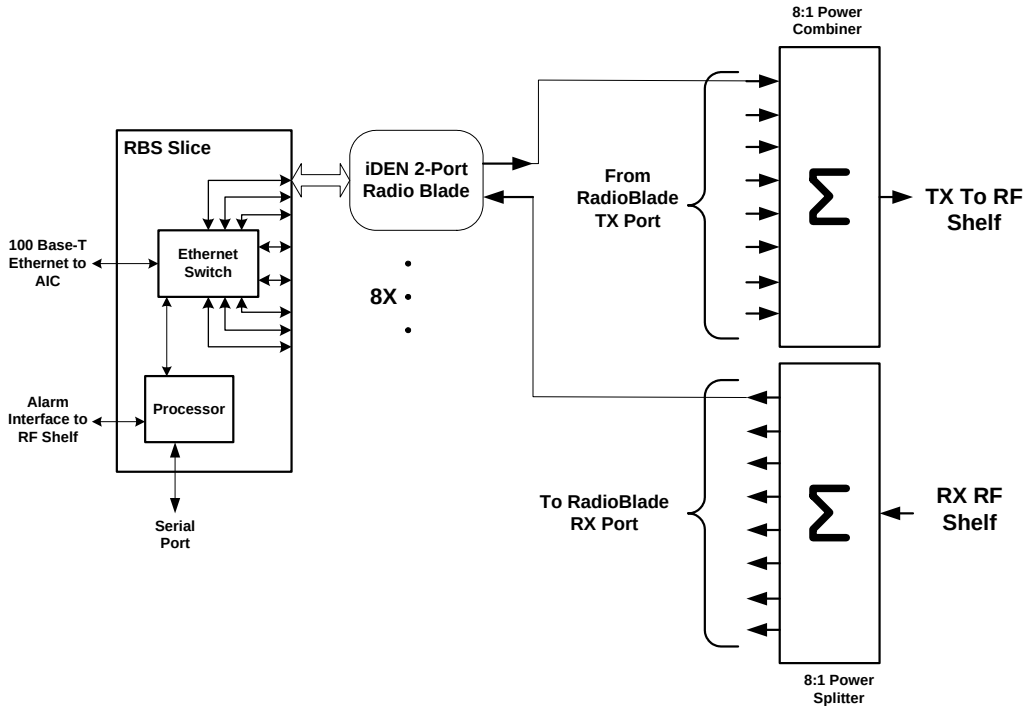


Figure 15 RBS group functional diagram

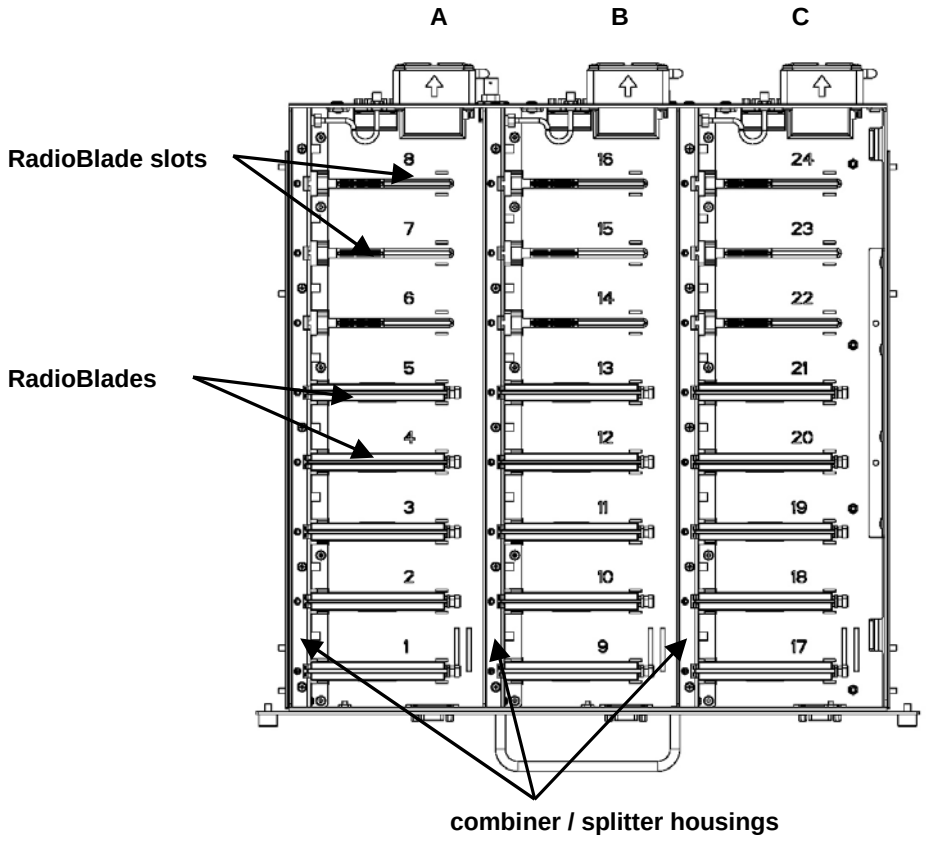


Figure 16 RBS interior, top down view

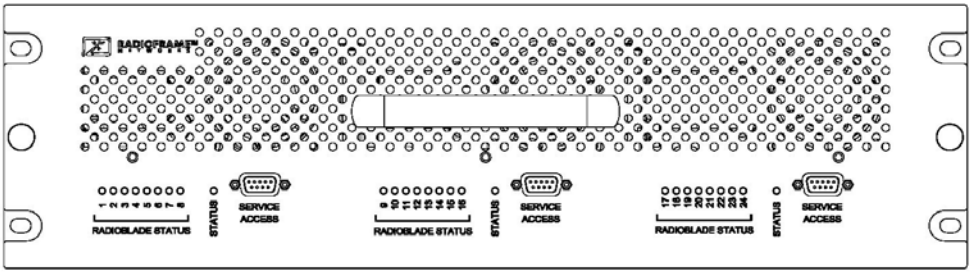


Figure 17 RBS front view

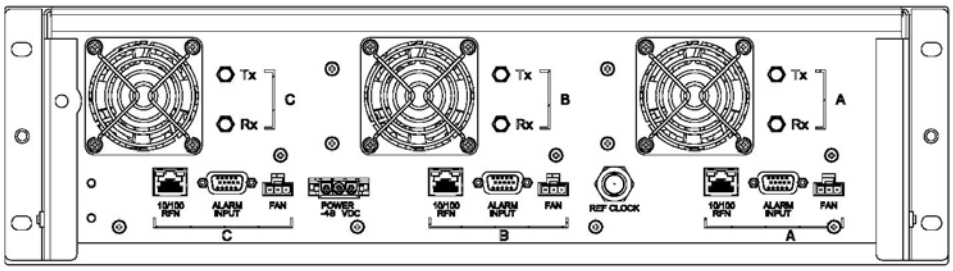


Figure 18 RBS rear view

2.2.3.1 RBS Ports

Front Ports	Description
SERVICE ACCESS (A, B, C)	Nextel technician local serial access
Rear Ports	**Description**
Tx / Rx (A, B, C)	Input and output for RF Shelf (wiring depends on system configuration)
Fan (A, B, C)	Power connector
ALARM INPUT (A, B, C)	ALARM serial port on the back of RF Shelf 1, RF Shelf 2, and RF Shelf 3 (respectively); provides contact closure input from RF Shelf
10/100 RFN (A, B, C)	100Base-T Ethernet from AIC ERTM Ethernet ports 1, 2, and 3 (respectively)
REF CLOCK	not currently used

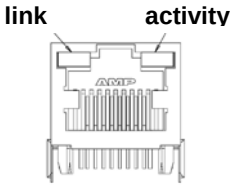
2.2.3.2 RBS Indicators

The front of the RBS has the following LED indicators:

- **STATUS** indicator for each group—A, B, and C
- **RADIOBLADE STATUS** indicators, one for each RadioBlade slot in the RBS. LEDs are arranged by group (8 per group A, B, and C) and are numbered consecutively from left to right 1 through 24 (A: 1 through 7; B: 8 through16; and C: 17 through 24).

Each RJ45 port (rear only) has an Ethernet **link** LED that indicates connectivity and an Ethernet **activity** LED that indicates Ethernet traffic.

LED	Indication
STATUS	Indicates timing synchronization for group
RADIOBLADE STATUS	Indicates status of RB: green = operational; red = alarm condition; not lit = RB not present



2.2.4 iDEN 2-port RadioBlade Transceivers (RadioBlades or RBs)

Each iDEN 2-port RadioBlade transceiver is equivalent to a Motorola Base Radio. Up to 24 RadioBlades are installed into the RadioBlade Shelf. Each RadioBlade has an edge connector to interface with the slot connector in the RBS. This edge connector provides all data interfaces and clock inputs to the RadioBlade. The RF interface employs two SMA connectors, one for transmit and the other for receive.

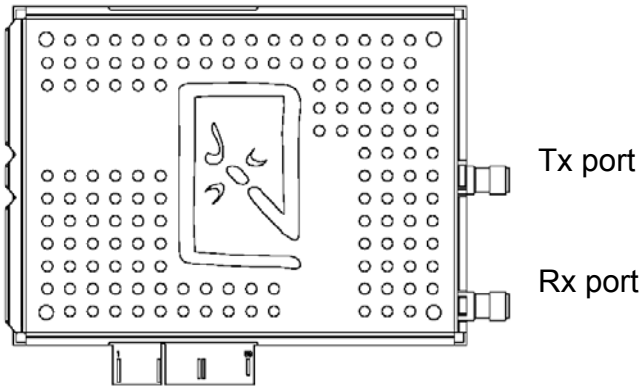


Figure 19 iDEN 2-port RadioBlade transceiver

2.2.5 RF Shelf

The MC-Series System provides one RF shelf per sector. The RF shelf contains amplifiers, filters, redundant DC-DC converters, and fans to provide cooling to the power amplifiers (PAs).

The transmit chain includes a variable attenuator for adjusting the Tx power output at the top of the cabinet, a multi-channel linear power amplifier (PA), a band pass filter, and a sampling port. The Tx sampling port provides approximately top of the rack (TOR) minus 20 dB output power. The Tx power output at the top of the rack can be varied by changing the datafill and adjusting the Tx attenuator setting on the front of the RF shelf (refer to section 7.10 TOR Tx Measurement Procedure for more information).

The PA is sized to allow sufficient linearity and gain such that a minimum of 10 dBm per carrier (up to 20 carriers) can be achieved at the top of the rack. The sampling port signal is brought out to the front of the RF shelf to provide monitoring and testing of the transmit path.

The receive path contains a band pass filter, low noise amplifier (LNA) and a sampling port. As with the Tx sampling port, the Rx sampling port is brought out to the front panel of the RF shelf. The Rx sampling port provides approximately top of the rack (TOR) minus 20 dB output power.

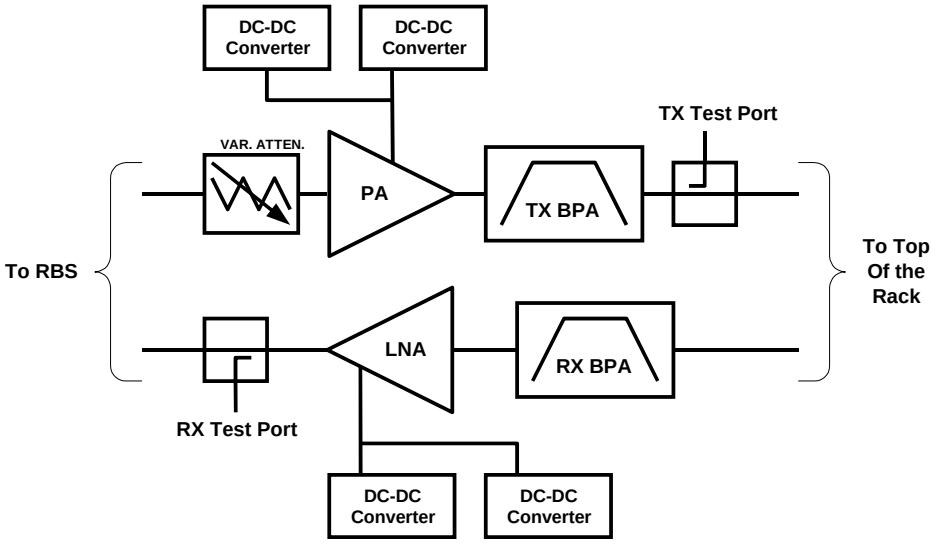


Figure 20 RF Shelf functional diagram

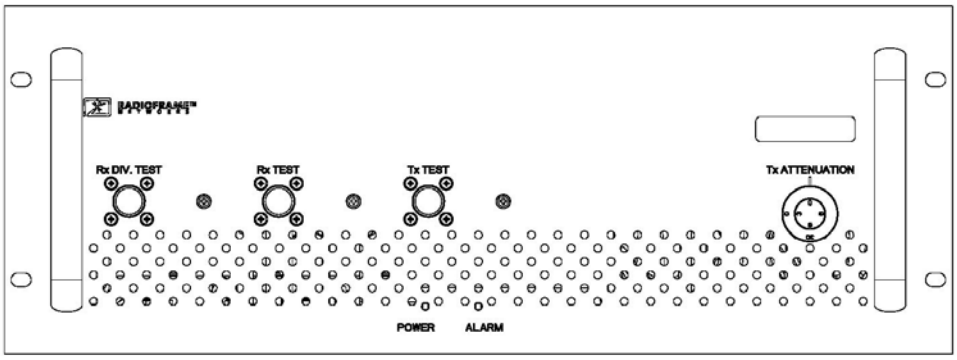


Figure 21 RF Shelf front view

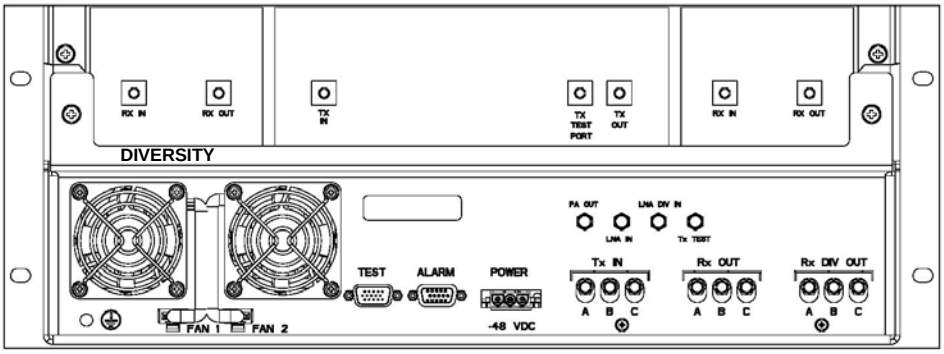


Figure 22 RF Shelf rear view

2.2.5.1 RF Shelf Ports

Front Ports	Description
Rx DIV TEST	TOR plus 3 dB plus/minus 2 dB
Rx TEST	TOR plus 3 dB plus/minus 2 dB
Tx TEST	TOR minus 20 dB
Tx ATTENUATION	TOR Tx out attenuation adjustment

Rear Ports	Description
RX IN DIVERSITY	Connects to TOR Rx 1 Diversity
RX OUT DIVERSITY	Connects to RF Shelf LNA DIV IN
TX IN	Connects to RF Shelf PA OUT
TX TEST PORT	Connects to RF Shelf Tx Test
TX OUT	Connects to TOR Tx 1
RX IN	Connects to TOR Rx 1
RX OUT	Connects to RF Shelf LNA IN
FAN 1	Connects to RF Shelf fan
FAN 2	Connects to RF Shelf fan
TEST	Nextel technician local serial access
ALARM	Nextel technician local serial access
PA OUT	Connects to RF Shelf TX IN
LNA IN	Connects to RF Shelf RX OUT
LNA DIV IN	Connects to RF Shelf Rx DIV OUT
Tx TEST	Connects to RF Shelf TX TEST PORT
Tx IN A, B, C	Connects to RBS Tx (A, B, and C, respectively)
Rx OUT A, B, C	Connects to RBS Rx (A, B, and C, respectively)
Rx DIV OUT A, B, C	Not currently used

2.2.5.2 RF Shelf Indicators

The RF Shelf has **Power** and **Alarm** LEDs on the front of the unit.

LED	Indication
Power	Indicates power is applied to card
Alarm	Indicates timing synchronization

2.2.6 Power Distribution Unit

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

Table 2 PDU Circuit Breaker Overview

Breaker Amps	Quantity
10	7
6	2
3	4

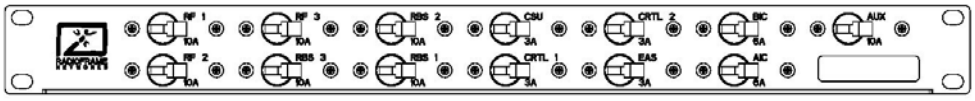


Figure 23 PDU front view

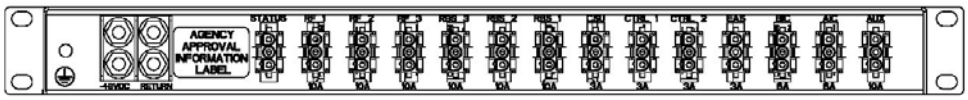


Figure 24 PDU rear view

2.2.7 Cabinet

The MC-Series System cabinet is an APW Pioneer Seismic Series standard 19” equipment cabinet with vented, lockable side panels, lockable front and rear doors, and a computer shelf on the inside of the front door. The cabinet is rated for seismic zone 4 and operates in an environment of 0° to +40° C ambient. External RF connectors are flush with the top of the cabinet in a recessed bulkhead. For more information, refer to the cabinet manufacturer’s documentation shipped with the MC-Series System.

2.3 System Manager Software

The MC-Series System is managed and configured via RadioFrame Network's System Manager, a Web-based graphical management system, which is accessible via any IP-based connection. System Manager provides Operations personnel with remote access and control, including configuration, alarm monitoring, triage/troubleshooting and system statistical reporting. All RFN MC-Series Systems include System Manager as standard equipment. Core System Manager functions include:

- Software Download (both locally and remotely)
- X.733 Alarming
- Configuration Management
- Diagnostics and Troubleshooting
- Call Statistics and Uptime
- RF Performance Metrics (e.g., Uplink SQE, Noise Floor, etc.)
- Test and Maintenance (e.g., automated BER testing)

2.4 Non-RFN Hardware

Non-RFN hardware for the MC-Series System must be procured and then installed in order for the MC-Series System to be complete.

2.4.1 integrated Site Controller (iSC-3)

The MC-Series System includes a pair of redundant integrated Site Controllers, or iSC-3s, which are connected to the macro network through a Channel Service Unit (CSU). The connection between the iSC and the MC-Series System is via two coaxial interfaces. The first is a 10base-2 Ethernet connection to provide data communications. This connection is made directly to the MC-Series System and does not require an external media converter. The second connection is a 1 pps reference for system timing.

For more information about the iSC-3, refer to the Motorola document *Gen 3 Site Controller System Manual, 68P80801E30-O*.

2.4.2 Environmental Alarm System (EAS)

The Environmental Alarm System (EAS) provides a central location for site alarm signal processing. The EAS monitors site environmental conditions, including AC power, smoke alarms, intrusion alarms, antenna tower lights, etc.

Each of the site alarm contacts are normally closed and connected to the EAS through a 50-pin Champ cable that connects to a punch block. All alarm contact pairs must be dry (isolated from ground). Most alarm connections are inputs. Outputs provide a dry relay closure rated at 0.5 Amps, 30 Vrms or 60 Vdc, 10VA max.

Plan to implement EAS alarm blocks, wiring, and sensors as required depending on the installation:

- If the MC-Series System cabinet is deployed as a standalone unit (i.e., as the only cabinet in the area), plan to provide standard Nextel facility environmental sensors, wiring, and connections. Plan to install the EAS alarm blocks on the Telco board on the wall of the space where the MC-Series System cabinet is located, and locate the high-temperature and low-temperature sensors there. Plan to provide conduit or other wire routing from a door sensor, HVAC units (if separate HVAC units are installed for the installation), and AC power failure / surge arrestor failure sensors.
- If the MC-Series System cabinet is deployed as one of a group of cabinets (i.e., in an RF “hotel”), plan to provide standard Nextel facility environmental sensors, wiring, and connections for *one* of the cabinets. The alarm facilities for the other cabinets will generally *not* be used. For the cabinets with unused alarms, plan to strap all alarm inputs with 24AWG solid-conductor wire (e.g., wire from a Category 5 cable). Plan to extend the 25-pair alarm cables with pre-connectorized 25-pair extension cables as needed to allow the alarm blocks to reach the wall space where they are to be mounted. *Do not* plan to leave the alarm blocks in the cabinets or otherwise not mounted.
- If the alarm block must be installed within the MC-Series cabinet, mount as shown in the following photograph.

For more information about the iSC-3, refer to the Motorola document *Gen 3 Site Controller System Manual, 68P80801E30-O*.

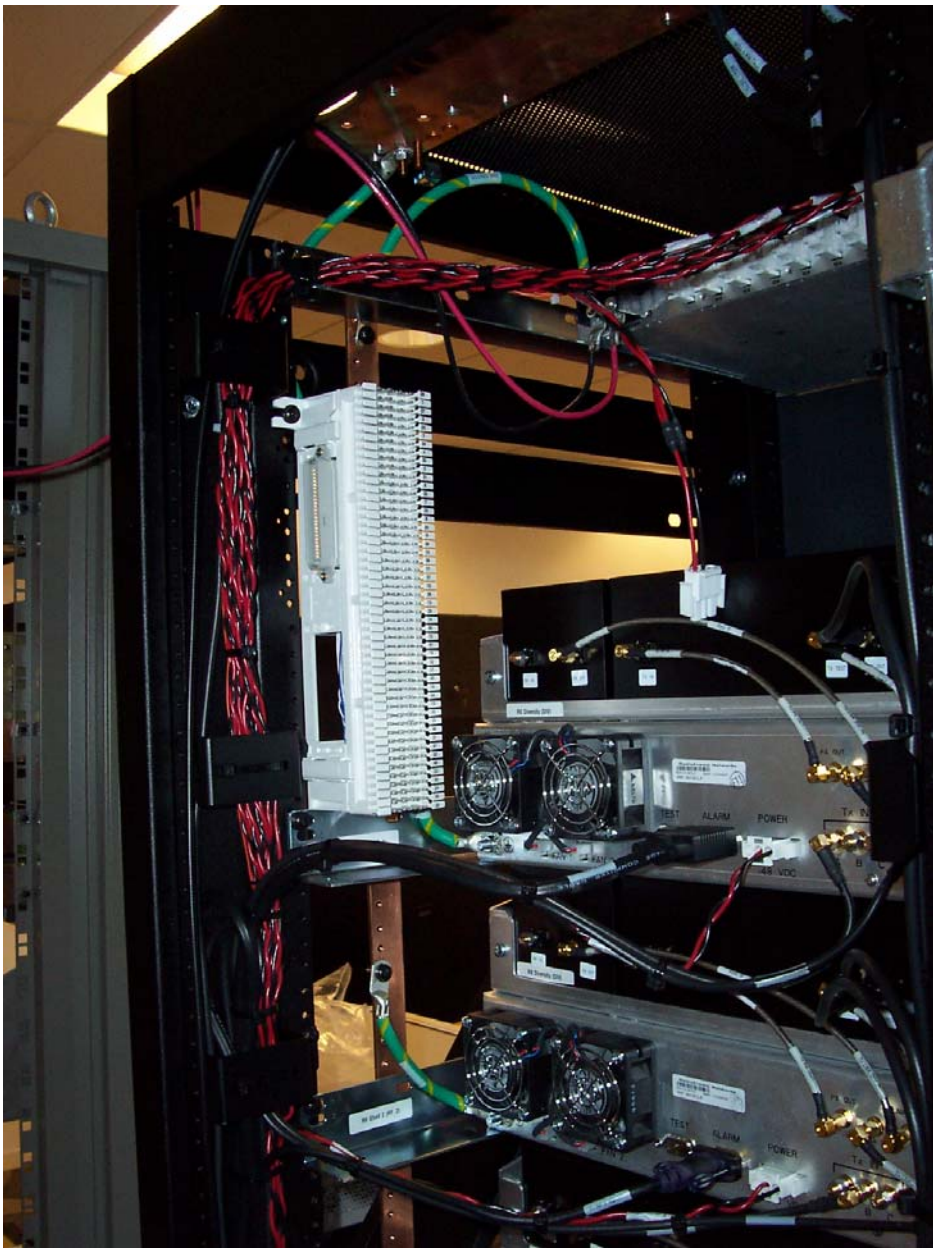


Figure 25 Punch block location within the MC-Series rack.

2.4.3 Channel Service Unit (CSU)

The Channel Service Unit (CSU) provides the T1 connection between the iSC-3 and the telephone company that provides the T1 line. The CSU provides surge protection to the T1 line and loop-back testing for the telephone company.

For more information about the CSU, refer to the manufacturer's documentation.

2.4.4 GPS Antenna System

The Global Positioning System (GPS) antenna provides GPS signals to the iSC-3, which constructs the timing reference for the MC-Series System hardware. One GPS antenna with a dedicated 50ohm coax is required for each iSC-3.

2.4.5 Powerplant

The MC-Series System cabinet is powered by a nominal –48VDC powerplant supplied by the customer. The powerplant may be installed in the cabinet or used externally. The cabinet is shipped with a Power Distribution Unit (PDU) installed in the cabinet. The PDU contains circuit breakers that provide overcurrent protection for MC-Series loads.

2.5 Specifications

2.5.1 Dimensions

Supplier	Component	Equipment Dimensions			
		Width	Depth	Height	
RadioFrame Networks	cabinet	23.5”	25.5”	79”	42U
	BIC	19”	13”	7”	4U
	AIC	19”	13”	7”	4U
	RBS	19”	13”	7”	4U
	RF Shelf	19”	13”	7”	4U
	PDU	19”	10”	1.75”	1U
Non-RFN	iSC-3	19”	9”	1.75”	1U
	EAS	19”	15”	1.75”	1U
	CSU	19”	12.5”	1.75”	1U

2.5.2 Weight

Supplier	Component	Weight
RadioFrame Networks	cabinet	579 lbs (shipped) 611 lbs (fully loaded)
	BIC	22 lbs
	AIC	22 lbs
	RBS	60 lbs (24 RBs)
	RF Shelf	165 lbs (55 lbs each)
	PDU	10 lbs
Non-RFN	iSC-3	16 lbs (8 lbs each)
	EAS	6 lbs
	CSU	10 lbs

2.5.3 Floor Loading

Supplier	Component	Floor Loading
RadioFrame Networks	cabinet	200 lbs per sq ft (includes 25% safety factor)

2.5.4 Power Requirements

Supplier	Component	Power
RadioFrame Networks	BIC	-42 to -56 VDC
	AIC	-42 to -56 VDC
	RBS	-42 to -56 VDC
	RF Shelf	-42 to -56 VDC
	PDU	-42 to -56 VDC
Non-RFN	iSC-3	-40 to -60 VDC
	EAS	-40 to -60 VDC
	CSU	-40 to -60 VDC

2.5.5 Power Consumption*

Assembly	Qty	Power[W] Per Assembly	Total Power[W]	Current[A] @ -48Vdc
RF Shelf	3	68.0	216.0	4.4

Assembly	Qty	Power[W] Per Assembly	Total Power[W]	Current[A] @ -48Vdc
RBS (24 RadioBlades)	1	67.2	67.2	1.4
BIC	1	110.0	110.0	2.3
AIC	1	115.2	115.2	2.4
ISC	2	24	48.0	1.0
EAS	1	19.2	19.2	0.4
CSU	1	40	40	0.8
		TOTAL	**615.6**	**12.7**

* Panduit termination lugs are required for installation.

2.5.6 Grounding*

Supplier	Component	Ground Resistance (ohms)
RadioFrame Networks	cabinet	

* Termination lugs are required for installation.

2.5.7 Environment

Parameter	Condition	Value			Unit
		Min	Typ	Max	
Ambient Temperature	Normal operation	0	27	40	°C
	Storage	-40		+70	°C
Humidity	Normal operation relative, non-condensing	10		90	%
	Storage, non-condensing	5		90	%
Altitude	Relative to mean sea level.	-60		1800	m
Shock		40			G
Vibration	Level 4 earthquake; meets or exceeds GR-63-CORE Earthquake Environment NEBS requirements	99.9			% pass
UL Pollution	Degree 3	99.9			% pass
Transport Vibration	NSTA, ISTA compliant	99.9			% pass

2.5.8 Heat Load

Supplier	Component	BTUs per Hour
RadioFrame Networks	BIC	340
	AIC	340
	RBS	320
	RF Shelf	680
	PDU	0
Non-RFN	iSC-3	140
	EAS	170
	CSU	17

2.5.9 RF Performance

The MC-Series System will meet the emissions mask requirements per FCC Part 90, section 90.691.

2.5.9.1 Frequency of Operation

Band	Receive Frequency (MHz)	Transmit Frequency (MHz)
800E	806.0125 to 824.9875	851.0125 to 869.9875

2.5.9.2 Transmitter Performance Summary

Parameter	[1]Condition	Value			Unit
		Min	Typ	Max	
[2]Tx Output Power per carrier (maximum)	Typical output power	+8.0	+10	+12	dBm
Tx Power Output Range per carrier		-20		+10	dBm
Tx Output Power Variation	-20dBm ≤ Pout ≤ +10 dBm 851.0125 ≤ f ≤ 869.9875 MHz	-2.0		2.0	dB
Transmit port VSWR	Referenced to a 50 ohm impedance			2:1	-
Downlink Signal Quality Estimator (SQE)	Average value	30			dB
Occupied bandwidth	Per carrier		18.5		kHz
RF Frequency Tolerance (TX)	Average frequency			± 50	Hz

Note 1: Unless otherwise stated, all values are referenced to the top of the rack.

Note 2: At maximum rated RF output power, all spurious and harmonic emissions should be at the noise floor. No combination of IM products or any other spurious emissions generated in the transmitting equipment should exceed the underlying noise floor in the operating band. Also, the Tx output power level is a function of the datafill parameters as well as the RF shelf attenuator setting.

2.5.9.3 Receiver Performance Summary

Parameter	[1]Condition	Value		Unit
		Min	Max	
Rx Input Level	2% BER	-106	-36	dBm
	Absolute Maximum where no damage occurs		+10	dBm
Residual BER	Input signal of –80 dBm		0.1	%
Input IP3	Single channel input	+10		dBm
Adjacent Channel Selectivity*	Quad-channel input	-32		dBc
[2]IMD Immunity	P_{rx} = -103 dBm, BER<2% Δf_1 = ± 1 MHz Δf_2 = ± 2 MHz		-50	dBm

Note 1: Unless otherwise stated, all values are referenced to the top of the rack.
Note 2: Two-tone test Δf_1 is a CW interferer, Δf_2 is an iDEN modulated interferer; refer to RFN test document.

2.5.9.4 Transmit Filter Specification

Parameter	[1]Condition	Value		Unit
		Min	Max	
Pass Band		851.0125	869.9875	MHz
Pass Band Insertion Loss	Referenced to a 50 ohm impedance		2.0	dB
Pass Band Ripple	Referenced to a 50 ohm impedance	-0.5	+0.5	dB
Stop Band Attenuation	Referenced to a 50 ohm impedance	-60		dBc

Note 1: Unless otherwise stated, all values are referenced to the top of the rack.
Refer to Appendix E for filter curve.

2.5.9.5 Receive Filter Specifications

Parameter	[1]Condition	Value		Unit
		Min	Max	
Pass Band		806.0125	824.9875	MHz
Pass Band Insertion Loss	Referenced to a 50 ohm impedance		1.0	dB

Parameter	[1]Condition	Value		Unit
		Min	Max	
Pass Band Ripple	Referenced to a 50 ohm impedance	-0.5	+0.5	dB
Stop Band Attenuation	Referenced to a 50 ohm impedance	-60		dBc

Note 1: Unless otherwise stated, all values are referenced to the top of the rack.

Refer to Appendix E for filter curve.

3 Pre-Installation

This section provides pre-installation information for the MC-Series System at a Nextel site. Prior to installation, prepare the site with all associated antennas, phone lines, and other related site equipment.

3.1 Site Planning

For each of the ensuing site planning subsections, complete the following:

a. Identify work to be completed by Nextel technicians and outside contractors.

b. Create a list of materials to be used by Nextel technicians in completing the work.

c. Create statements of work (SOWs) for work to be completed by outside contractors.

3.1.1 Space Requirements

Establish the following specifications to meet National Fire Protection Associations (NFPA) Code and American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) standards. Any local regulations, as applicable, shall also be adhered to.

- Ceiling height shall be at least 8'6” above a finished floor to allow enough space for the height of the cabinet and cable access at the top of the cabinet.
- Door dimensions shall be at least 3' wide and 6'8” high to allow equipment access.
- 36 in. shall be maintained in front of electrical panel boards (NFPA 70, Article 110-26).
- 36 in. aisle shall be maintained in front of the MC-Series System cabinet.
- 30 in. aisle shall be maintained in back of the MC-Series System cabinet.
- No additional space is required on cabinet sides.
- 4' x 4' wall space shall be provided for termination of T1, alarm blocks, environmental sensors, and the master ground bar.
- Rack space for associated hardware, such as a DAS system or an outside powerplant, may be required.
- If battery backup is not provided by the facility owner, include space for an auxiliary backup battery rack. Refer to Nextel standards for sizing and placement.
- As required, install overhead cable tray to support cables to and from the MC-Series System cabinet per the National Electric Code (NEC), which states: neither the ceiling grid nor its supports may be used to support cable tray or wiring.

3.1.2 Floor Loading

Refer to section 2.5.3 Floor Loading for specifications.

3.1.3 Anchoring

Anchor the MC-Series System cabinet to the floor using suitable anchors (Hilti or equal). Do not mount the MC-Series System cabinet on casters.

3.1.4 Seismic Zone Installation

All RadioFrame Networks equipment is seismically rated to withstand vibrations of a Level 4 earthquake. The property owner is responsible for any damage to RFN equipment due to building or cabinet structures that are not rated to withstand vibrations of a Level 4 earthquake, or not secured to withstand vibrations of a Zone 4 earthquake.

Ensure that a certified architect specializing in earthquake-resistant installation provides seismic designs and recommendations in areas where the potential loss of the site may outweigh associated costs of earthquake-resistant design. PE stamped drawings shall be provided before the installation proceeds.

3.1.5 Cooling of Equipment

Ensure that the location provides sufficient cooling for the MC-Series System cabinet. Refer to section 2.5.8 Heat Load for BTUs generated by the MC-Series System.

3.1.6 Power

Ensure that a DC power source is available that can supply full power requirements for both the MC-Series System cabinet and all ancillary equipment for the installation. This power source may be a bulk DC power source, an internally mounted DC powerplant, or an external DC powerplant. For internal or external DC powerplants, backup batteries may or may not be required, depending on whether or not the powerplant is driven from a UPS (Uninterruptible Power Supply). Refer to Nextel standards for DC power design.

Any installation of AC power conductors shall be done by a licensed, bonded, and insured electrician. Follow standard Nextel design practices for AC and DC power circuits including any required AC surge protection. Identify any contract labor and materials required.

Refer to section 2.5 Specifications for DC power requirements. Plan to use termination lugs. Required crimp tool is CT-1700.

3.1.7 Grounding

The MC-Series System cabinet must be grounded to either a defined equipment grounding system in a Nextel facility or to the building grounding electrode in a customer facility. Plan to install a grounding system for the MC-Series System cabinet and ancillary hardware. Refer to Chapter 7 and Appendix C of Motorola R56, as modified by Nextel, for grounding standards. The Master Ground Bar (MGB) will be installed on the wall on the telco board. Plan to use termination lugs. Required crimp tool is CT-1700.

3.1.8 GPS Antennas

Refer to the Motorola *Gen 3 Site Controller System Manual, 68P80801E30-O* document and Nextel standards for GPS antenna design and installation. Per the NEC (1) any cabling run through an air plenum shall be plenum-rated, and (2) cabling is not to be laid on or suspended from any ceiling grid or attached to the grid supports. Identify any contract labor and materials required.

3.1.9 T1 Service

Install T1 cabling from the point of demarcation to the MC-Series System cabinet, and providing UL497B surge protection for the T1 circuit involved. Use standard Nextel-approved surge arrestors for the T1 circuit. Per the NEC (1) any cabling run through an air plenum shall be plenum-rated, and (2) cabling is not to be laid on or suspended from any ceiling grid or attached to the grid supports. Identify any contract labor and materials required to extend the T1 service from the demarcation point to the MC-Series System Cabinet. For ease of maintenance, RadioFrame Networks recommends locating the demarcation point (SmartJack) in the same space as the MC-Series System cabinet.

Refer to the Motorola *Gen 3 Site Controller System Manual, 68P80801E30-O* document and Nextel standards for T1 design and installation.

3.1.10 Alarm Blocks

Various alarms or sensors are installed within the Nextel site building. All alarm wiring terminates at the Environmental Alarm System (EAS) location within the cabinet. All alarm wires shall be tagged and labeled with the appropriate alarm item. All contacts will be normally closed, dry, and isolated from ground. Alarm wire will be neatly run and secured using nylon cable ties/clamps every three feet to walls and existing cable tray. All alarm wiring shall be two-wire, 22 AWG.

3.1.10.1 Environmental Alarm System (EAS)

Plan to implement EAS alarm blocks, wiring, and sensors as required depending on the the installation:

If the MC-Series System cabinet is deployed as a standalone unit (i.e., as the only cabinet in the area), plan to provide standard Nextel facility environmental sensors, wiring, and connections. Plan to install the EAS alarm blocks on the Telco board on the wall of the space where the MC-Series System cabinet is located, and locate the high-temperature and low-temperature sensors there. Plan to provide conduit or other wire routing from a door sensor, HVAC units (if separate HVAC units are installed for the installation), and AC power failure / surge arrestor failure sensors.

If the MC-Series System cabinet is deployed as one of a group of cabinets (i.e., in an RF “hotel”), plan to provide standard Nextel facility environmental sensors, wiring, and connections for *one* of the cabinets. The alarm facilities for the other cabinets will generally *not* be used. For the cabinets with unused alarms, plan to strap all alarm inputs with 24AWG solid-conductor wire (e.g., wire from a Category 5 cable). Plan to extend the 25-pair alarm cables with pre-connectorized 25-pair extension cables as needed to allow the alarm blocks to reach the wall space where they are to be mounted. *Do not* plan to leave the alarm blocks in the cabinets or otherwise not mounted.

3.2 Scheduling / Logistics

a. Procure all non-RFN hardware. Refer to Nextel documentation for procurement of iSC-3s, EAS, and CSU.
b. Procure the materials identified in 3.1 required by Nextel technicians to complete the installation.
c. Initiate the contracts necessary to engage outside contractors to complete the installation work necessary, including any design or engineering work necessary for seismic areas. As noted previously, any installation requiring seismic certification requires a formal design and installation package from an architect skilled in this area.
d. Follow standard Nextel RF Operations and Site Development procedures for scheduling (a) all installation activity and (b) all necessary datafill work.

Planning should now be complete for the following tasks:

- Securing the MC-Series System cabinet to the mounting surface
- Installing AC or DC power cabling and DC powerplant
- Installing grounding
- Installing T1 cabling
- Installing a GPS antenna system
- Installing facility alarms
- Adding HVAC

3.3 MC-Series System Installation Kit

RadioFrame Networks provides the following materials in an installation kit shipped with the MC-Series System:

Qty	Item	Usage
2	GPS surge arrestors, 2.4 GHz bulkhead N-type, inline	TOR
2	RG58/U, 1 meter coax cable, BNC M to BNC M	BIC to iSC
2	LMR-195-PVC, 84” cable, N-type	iSC to GPS at TOR
20	10/32 Philips thread cutting screw	mounting non-RFN HW in rack
4	Lifting eyelet bolt	cabinet installation
1	Non-disposable ESD wrist strap	ESD prevention
1	Cabinet manufacturer’s installation manual	mounting cabinet
4	SMA terminators	spares for RF shelf reconfigurations

3.4 iDEN Configuration

The MC-Series System supports WiDEN (Quad BRs) and the use of four adjacent channels and remote control of these settings. Plan to set up the MC-Series System according to the base radio (BR) parameters specified in the site datafill for the site, including cabinet, position, and Quad. Corresponding parameters will be set using the System Manager iDEN Configuration page during system set up (section 5.5). For more information about site datafill parameter settings, refer to the *iDEN OMC-R Configuration Management Parameters Technical Manual*, 68P80802E10.

3.4.1 Cabinet and Position Settings

Each RadioBlade in the MC-Series System operates as a BR. The system ships with default cabinet and position settings that must be changed during system set up to match the site datafill BR settings. The iSC then sets up each RadioBlade (BR) with a specific carrier.

3.4.2 Quad BRs

Within the RadioBlade Shelf (RBS), RadioBlades are arranged in three groups of up to 8 RadioBlades. A maximum of one quad BR can be configured in each group. To do this, determine the cabinet/position settings, if any, to be assigned the quad BR from the parameters in the datafill. If a quad BR is selected, four RadioBlades from that group will be assigned to a single BR, leaving the remaining four RadioBlades to be used as EBRCs. When configuring a quad BR in the datafill (for use in the MC-Series), the number of carriers must be equal to four.

The MC-Series System also supports EBRCs configured with adjacent channels. Instead of configuring a quad BR in the datafill, configure four EBRCs using four adjacent channels (each adjacent BR is assigned a separate cabinet/position).

3.4.3 Sectorization

In an omni (single-sector) configuration, all BRs are assigned to the same sector. In a 2- or 3-sector configuration, each group (A, B, and C) may be assigned to a different sector. In this case, all RadioBlades within the group must be assigned to the same sector—multiple sectors cannot be assigned within the same group.

4 Installation

4.1 Site Inspection

Following all construction work, both exterior and interior, the site and facility shall be in a suitable condition for the installation of communications equipment.

In general, the following considerations need to be observed: list section 3.1 items except T1

- Facility is secured with lockable doors.
- HVAC
- Grounding
- Interior of facility shall be free of excessive dust.
- All refuse related to the installation tasks shall be removed.

Consideration should be exercised when laying out a site to allow primarily for all code requirements for spacing, and then the most efficient use of space. Special attention shall be given to future expansion with regard to cable runway heights, electrical outlet placement, and equipment placement.

4.2 Receipt of Equipment

The MC-Series System is provided pre-installed in a standard 79” tall, 19” wide EIA- compliant cabinet with the following equipment:

- BIC (BTS Interface Chassis)
- AIC (Airlink Interface Chassis)
- RBS (RadioBlade Shelf)
- RF Shelf (3 each)
- PDU (Power Distribution Unit)
- MC-Series System Installation Kit

4.2.1 Equipment Inspection

Inspect the equipment immediately upon receipt. If obvious damage has occurred to the shipping container before unpacking, contact the shipping agent. Ask that a representative of the shipping company be present while the equipment is unpacked.

Check for the following:

- loose or damaged equipment in the pre-installed cabinet
- dents, scratches, or other damage on all sides of each component

If any equipment is damaged, contact the shipping company immediately, then a Nextel representative.

4.2.2 Equipment Inventory

Check all MC-Series System equipment against the itemized packing list to ensure receipt of all equipment. If available, check the sales order with the packing list to account for all equipment ordered. Contact the Nextel representative to report missing items and for additional information.

4.3 Mounting the MC-Series System Cabinet

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


Warning!

Always use two or more persons whenever moving a cabinet. A fully configured equipment cabinet weighs approximately 800 lbs (360 kg).

4.4 Mounting Non-RFN Equipment in the MC-Series System Cabinet

This section describes procedures for mounting the following non-RFN equipment in the MC-Series System cabinet:

- iSC-3 (two)
- EAS
- CSU


Warning!

Any equipment installed in the MC-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.

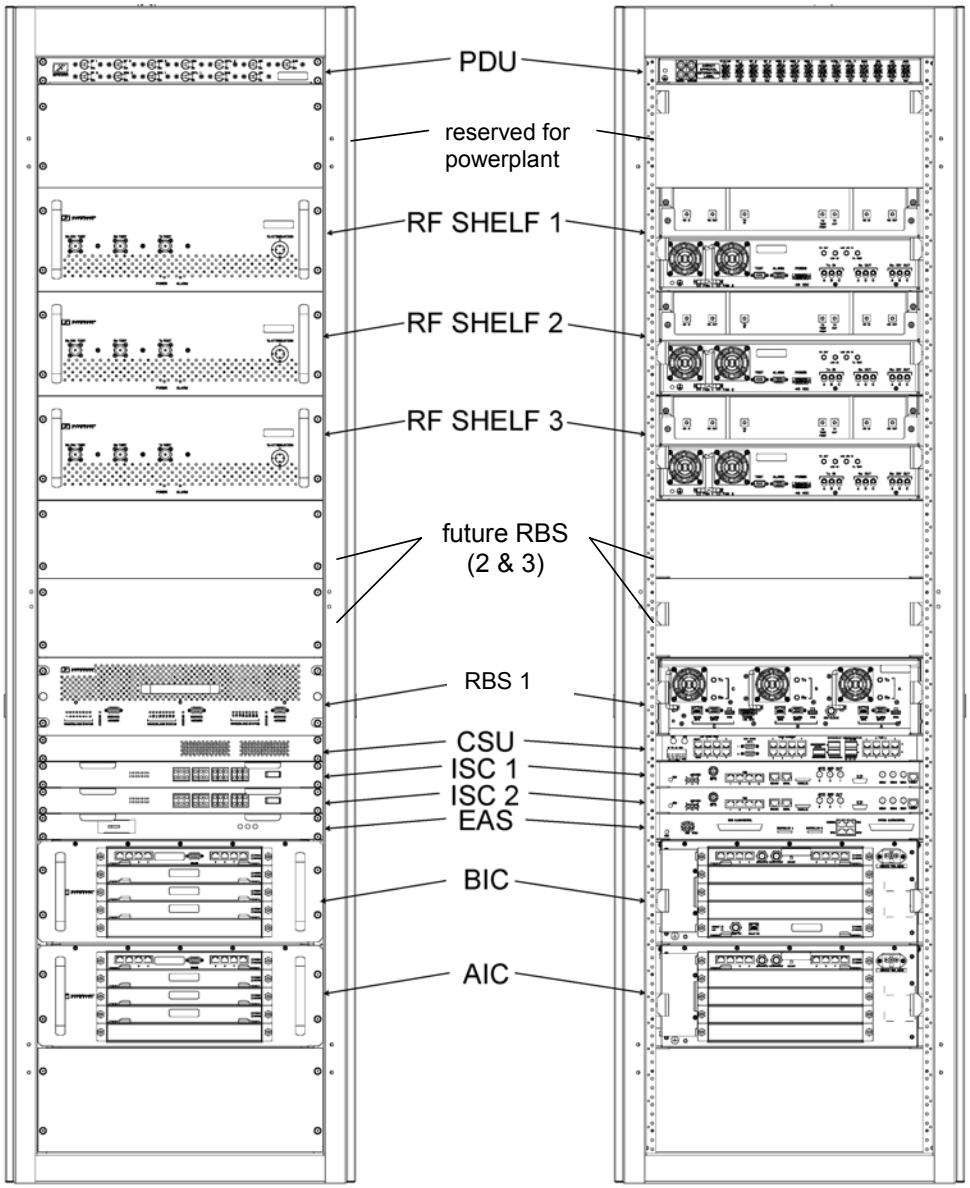


Figure 26 MC-Series System rack locations for non-RFN hardware

4.4.1 iSC-3s

1 While supporting the iSC-3, slide the iSC-3 into the cabinet mounting position.

Mount the iSC-3 in the location shown in the cabinet illustration earlier in this section. If necessary, install side rails in the mounting position in the rack.

2 Secure the iSC-3 to the cabinet mounting rails using the four mounting screws provided with the unit. Tighten the screws to 4.5 Nm (40 in-lb).

3 Connect the RFN-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 iSC-3, and ensure the connection is tight.

4 Connect the RFN-provided power cable (P/N 820-0613-50; PDU-CTRL_1 to ISC1) between the iSC-3 power and the CTRL circuit breaker on the PDU (CTRL 1 for the primary iSC and CTRL 2 for the secondary iSC).

5 Repeat steps 1 through 4 to mount the secondary iSC-3 (cable labels will show ISC2 instead of ISC1).

6 Connect the two iSC-3s according to Nextel's installation procedure.

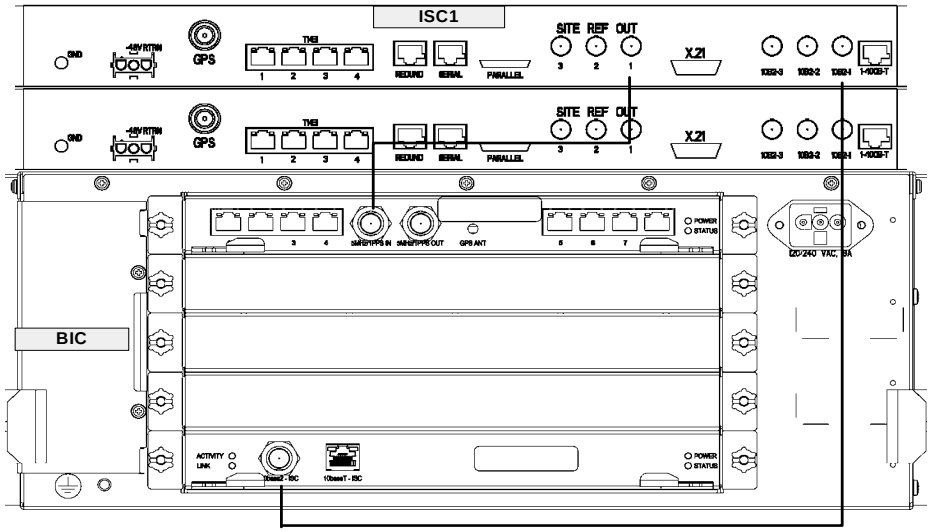
7 Using the RFN-provided coax cable (P/N 111-0001-02; BIC-ERTM 5MHz IN to ISC1 REF OUT-1), connect the primary iSC-3 port **SITE REF OUT 1** to the BIC ERTM port **5MHz IN**.

8 Terminate the two remaining SITE REF OUT ports on the primary iSC-3, and terminate all three SITE REF OUT ports on the secondary iSC-3.

9 Using the RFN-provided coax cable (P/N 111-0001-02; BIC-CRTC to ISC1 REF OUT-1), connect the primary iSC-3 port **10B2-1** to the BIC CRTC port **10Base2 ISC**.

10 Terminate the two remaining iSC-3 10B2 ports on the primary iSC-3, and terminate all three 10B2 ports on the secondary iSC-3.

For complete cabling information, refer to Appendix C Cabling Diagrams: 3-Sector Configuration.



4.4.2 EAS

1 While supporting the EAS, slide the EAS into the cabinet mounting position.

Mount the EAS in the location shown in the cabinet illustration earlier in this section.

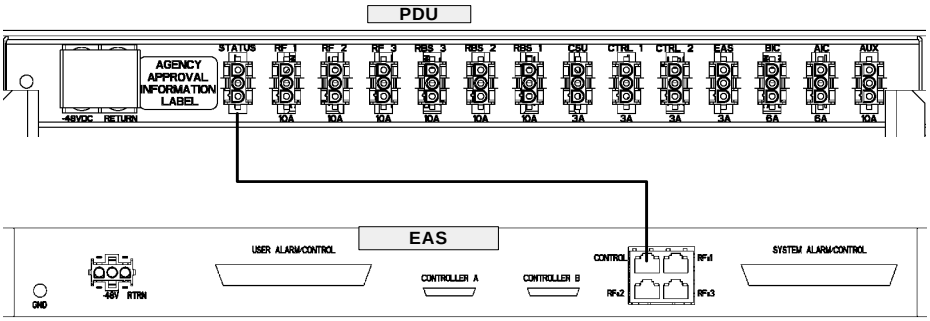
2 Secure the EAS to the cabinet mounting rails using the four mounting screws provided with the unit. Tighten the screws to 4.5 Nm (40 in-lb).

3 Connect the RFN-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.

4 Connect the RFN-provided power cable (P/N 820-0616-50; EAS to PDU-EAS) between the EAS power and the EAS circuit breaker on the PDU.

5 Connect EAS to each iSC-3 according to Nextel's installation procedure.

6 Connect the RFN-provided contact closure alarm wires from the **CONTROL** port on the EAS (RJ45) to the **STATUS** connectors on the PDU (Molex).



For complete cabling information, refer to Appendix C Cabling Diagrams: 3-Sector Configuration.

4.4.3 CSU

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.

Mount the CSU in the location shown in the cabinet illustration earlier in this section. As necessary, follow the equipment manufacturer's installation procedure for mounting the CSU in a 19" standard EIA-compliant rack.

3 Connect the RFN-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.

4 Connect the RFN-provided power cable (P/N 820-0615-50; CSU to PDU-CSU) to the CSU power.

5 Connect the other end of the power cable to the circuit breaker on the PDU.

6 Connect the CSU to each iSC-3 according to Nextel's installation procedure.

For complete cabling information, refer to Appendix C Cabling Diagrams: 3-Sector Configuration.

4.5 Mounting Auxiliary Equipment

Follow Nextel's procedures for mounting the following auxiliary equipment:

- Powerplant
- Backboard
- Surge arrestors
- Alarm blocks
- Environmental sensors

4.6 Cabinet-to-Site Cabling

Follow Nextel'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 the following illustration for top of the rack connections.

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

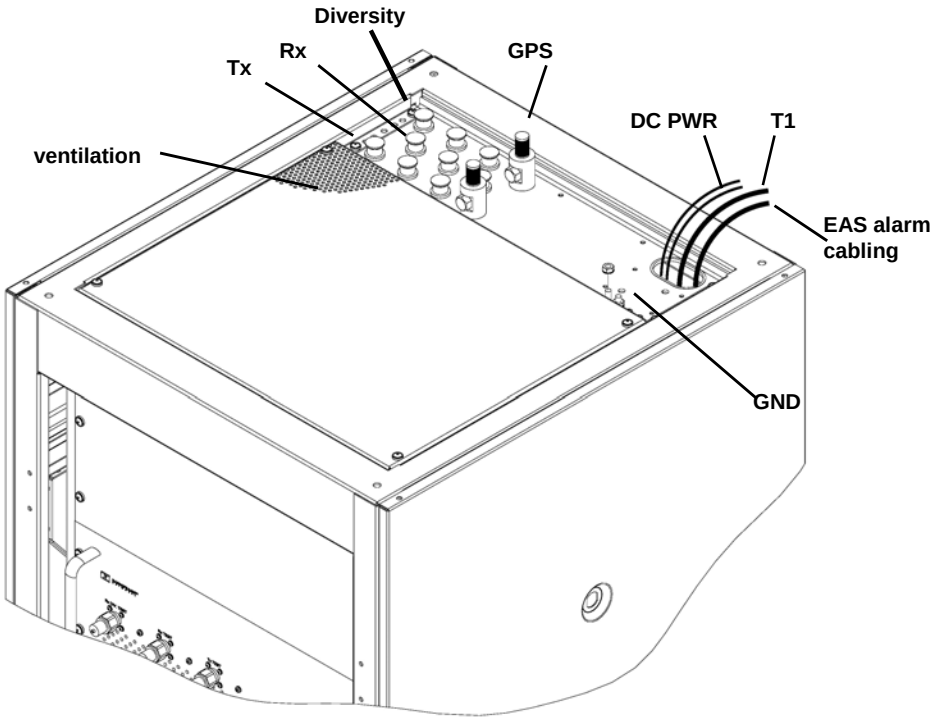


Figure 27 Top of the rack (TOR) cabling and equipment

4.6.1 Grounding

1 Ground the cabinet ground bar to the site according to Nextel's installation instructions using 6 and 8 gauge lugs.

2 Connect the site ground to the ground at the top of the rack according to Nextel's installation procedures (see the previous diagram for ground location at the top of the rack).

4.6.2 T1

1 Follow Nextel's procedure for routing the site T1 cable through the top of the cabinet as shown in the previous diagram.

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

4.6.3 GPS Surge Arrestor

Follow Nextel's procedure for installing GPS equipment at the site. Then complete the following procedure:

1 Install the two RFN-provided GPS surge arrestors at the top of the rack as shown in the previous diagram.

NOTE: Make sure the element on the side of the surge arrestor is accessible, depending on the site configuration.

2 Connect the cable from GPS surge arrestor to the primary iSC-3, rear port **GPS**. (P/N820-0620-00; GPS-ISC to GPS_1 TOR).

3 Connect the cable from the second GPS surge arrestor to the secondary iSC-3, rear port **GPS** (P/N820-0620-00; GPS-ISC to GPS_2 TOR).

4 Connect each GPS surge arrestor to the GPS antenna coax according to Nextel's installation procedures.

4.6.4 EAS Alarm Cabling

1 Follow Nextel's procedure for routing the two 50-pair alarm cables through the top of the cabinet, as shown in the previous (top-of-the-rack) illustration.

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.

4.6.5 RF (Tx / Rx / Rx diversity)

The MC-Series System cabinet provides the following RF loads at the top of the rack for connection to the site RF distribution system:

- Tx 1, Tx 2, Tx 3
- Rx 1, Rx 2, Rx 3
- DIV 1, DIV 2, DIV 3

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

4.6.6 Power


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 Connect the powerplant to the PDU using two lugs. Crimp tool needed: CT-1700.

4.7 Intra-cabinet Cabling

All intra-cabinet cabling will be complete prior to shipment. The standard shipped configuration is 3-sector without diversity. If the required intra-cabinet cabling configuration differs from the shipped configuration, for example from 3-sector to omni or 2-sector configurations, refer to section 8.3 Adding a Sector and section 8.4 Removing a Sector for procedures on how to re-wire the MC-Series System cabinet.

5 Final Checkout and Commissioning

The procedures in this chapter describe procedures for conducting final checkout for each portion of the MC-Series System. This chapter's describes procedures for:

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

5.1 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 6.3 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 System. At a minimum, the laptop must be loaded with the following fully functional equipment (or equivalent):
  - Pentium II / 233MHz (Pentium III / 500 MHz recommended, or better)
  - 128MB of memory (256MB recommended)
  - 10GB hard drive (64MB disk drive space minimum available for software)
  - 12x (or faster) CD-ROM (USB memory stick with 64MB recommended)
  - Windows 98 (Windows 2000 Professional or better recommended)
  - Internet Explorer 5.5 (no Mozilla)
- One Ethernet port and one 9-pin serial port
- 6-foot CAT5 (or 5e/6) Ethernet cable (EIA/TIA 568B) to connect to the BIC CRIC
- Straight-through, male-to-female serial cable (DB9/RS232)
- 50 ohm 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 RFN 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)

5.2 Checkout Procedures


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 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 RadioBlades according to the site configuration. Refer to section 7.9.1 Replacing an iDEN 2-Port RadioBlade Transceiver.

4 Verify that cabling matches the site configuration.

Refer to Appendix C “Cabling Diagrams: 3-Sector Configuration”. For any other configuration, refer to section 8.2 Adding a Sector and section 8.3 Removing a sector.

5 Install 50 ohm 2W terminators on all used Tx / Rx / Diversity ports on the top of the cabinet.

6 Verify that there is DC power at the supply terminals on the PDU and that the polarity is correct. Refer to 2.5 Specifications for more information.

5.3 Initial Powering Procedure

1 Verify that all breakers in the PDU are in the OFF position.

2 Ensure that the power switches on the iSCs and the EAS are all in the OFF position.

3 Using the breakers on the PDU, turn up the equipment by completing the following steps, and verifying that each component is operational before proceeding to the next step.

4 Using the breaker on the PDU and the power switch on the front of the primary iSC-3, turn up the **primary iSC-3**, 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*.

5 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*.

6 Using the breaker on the PDU and the power switch on the front of the secondary iSC-3, turn up the **secondary iSC-3**, and 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**.

Configure the CSU according the manufacturer's documentation and Nextel standards.

8 Using the breaker on the PDU, turn up the **BIC**, **AIC**, and **RBS 1**, and then verify that all three components are operational before proceeding.

Wait approximately 3 minutes for the following indicators:

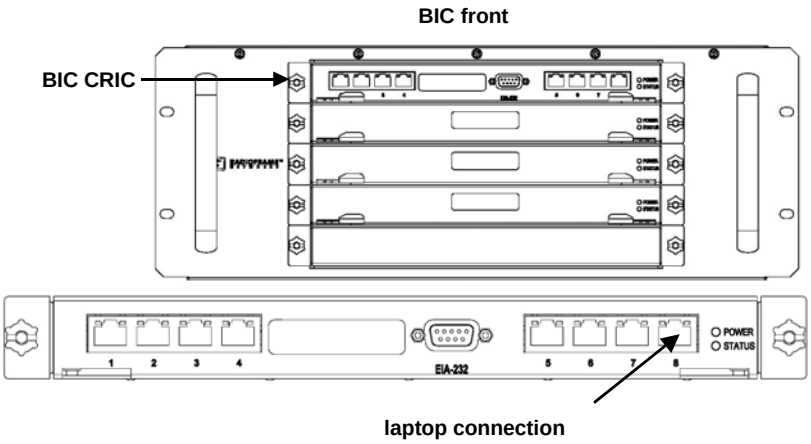
- RBS: The STATUS LED for each group will light green in this order: A, B, and then C.
- RBS: The RADIOBLADE STATUS LEDs will light red and then green for each present RadioBlade. If no RB is present, the LED will not light. To verify the contents of the RBS, pull out the shelf (powering off is not required) and inspect the RadioBlades and their respective status LEDs. Reinsert the RBS. 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 rack (see the following illustration).
- BIC CRIC and AIC CRIC: The POWER and STATUS LEDs will light red and then green. All other BIC and AIC card LEDs will light green.

9 Using the breaker on the PDU, turn up **RF Shelf 1, RF Shelf 2,** and **RF Shelf 3** and then verify that each RF shelf is operational before proceeding.

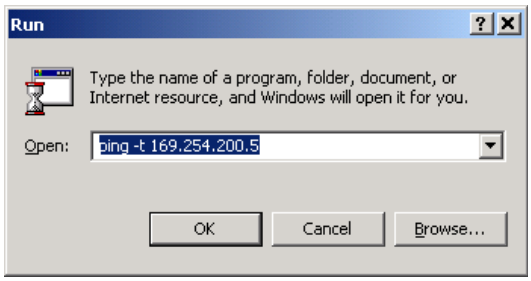
The POWER and ALARM LEDs on the front of each RF shelf will light green.

5.4 System Setup

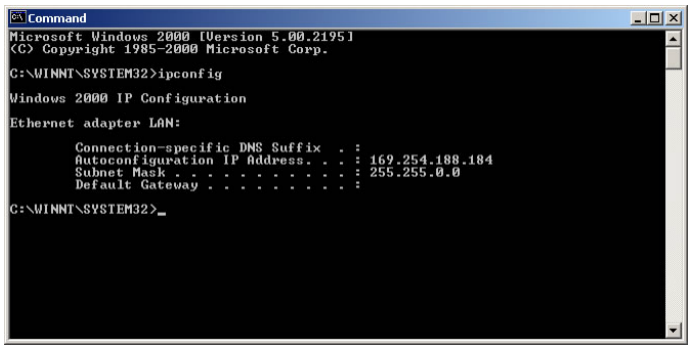
1 Connect the laptop to port 8 of the BIC CRIC using an Ethernet (CAT5) cable.



2 From the laptop, ping the External IP Address of the MC-Series System (169.254.200.5).



If replies are returned from the ping, continue to Step 3. Otherwise, open a command prompt window and enter: **ipconfig**. Verify that the IP address of the laptop is zero config.



If it is not, at the command prompt enter the command **setExtIpAddr**:

```
-> setExtIpAddr
Current Ext IP Addr = 0.0.0.0
Set New External IP Addr
0-
```

Change the IP address by typing the following information shown in bold. Type the new value, and press Return. The next line will appear. To leave a value as shown, press Return.

```
0- 169
0- 254
0- 200
0- 5
New Ext IP Addr = 169.254.200.5
Set New subnet Mask 0xFFFF0000 – 0xFFFF0000
New subnet Mask = 0xFFFF0000
Current Ext IP Addr = 0.0.0.0
Set New External Gateway Addr
```

Change the system as follows:

```
0 – 169
0 - 254
0 – 0
0 - 1
```

If the change is successful, the following information will appear:

```
New Ext Gateway Addr = 169.254.0.1
Unable to remove existing address
External IP Address = 169.254.200.5
value = 0 = 0x0
```

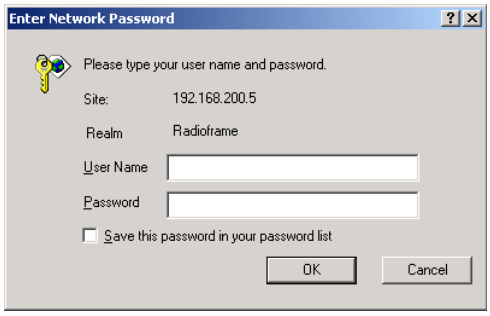
3 Start System Manager.
Launch a browser session and enter the MC-Series System IP address: http://169.254.200.5. The System Manager Home page appears, which contains five tabs to select from:

- *Home*—displays a welcome banner and a link for setting up users and changing the MC-Series System password.
- *System Configuration*—depicts the status of the BIC, AIC, and RBS.
- *Alarms*—displays alarm information.
- *Performance Monitoring*—displays real-time performance information.

- *Diagnostics*—provides tools for testing.
- *Support*—displays support information, including online help.

4 Log in to System Manager.

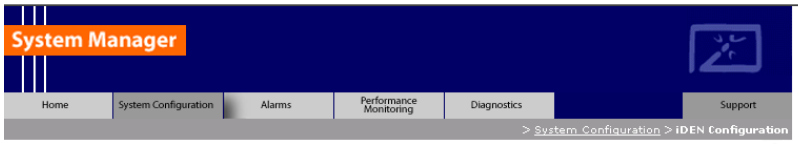
Select the System Configuration tab to display the login window. For **User Name**, type **Sysadmin** (case sensitive). For **Password**, type **Radioframe** (case sensitive), and then select **OK**. To change the password, refer to Appendix G: System Manager.



5 Select the **iDEN Configuration** link at the bottom of the System Configuration page, and verify that the MC-Series System iDEN cabinet/position and quad BR configuration matches the site datafill.

Change the BR cabinet and position on the iDEN Configuration page to match the site datafill. Assign quad BRs as required by the site datafill (only one quad BR per group). For more information, refer to section 3.4 iDEN Configuration.

NOTE: If the number of BR instances in the Site datafill is less than the number of BR instances (cabinet and positions entered on the iDEN Configuration page) *and* the number of RadioBlades installed in the group, the alarm EXT BR RESET will be triggered. RadioBlades register and seek out a cabinet and position from System Manager; if one is not available, they go into a standby mode and wait for an empty cabinet and position.



iDEN Configuration

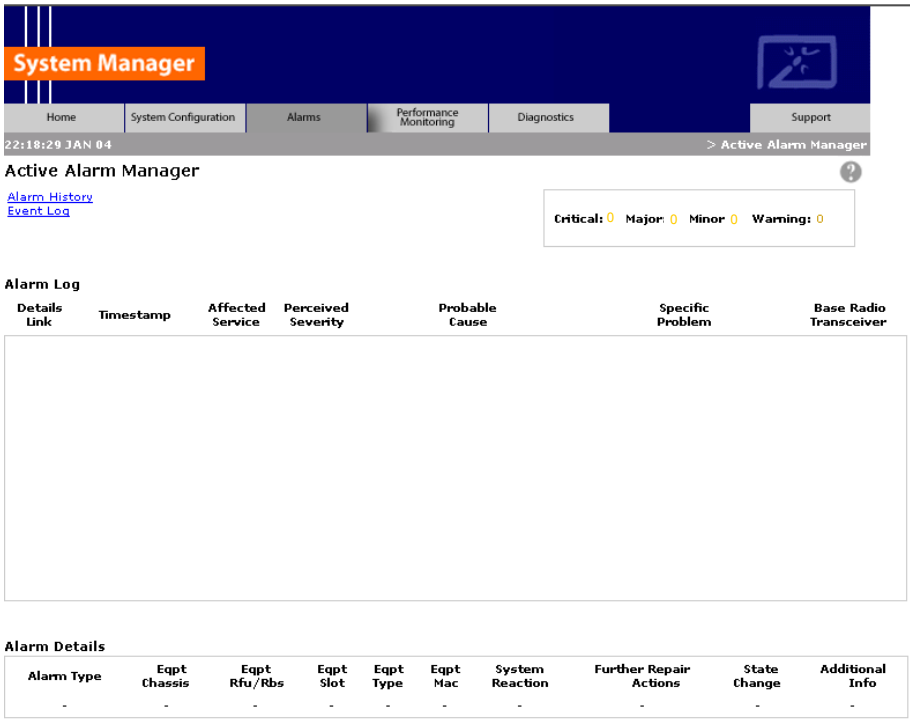
Cabinet / Position Configuration

BR Instance	Cabinet	Position	Quad	BR Instance	Cabinet	Position	Quad	BR Instance	Cabinet	Position	Quad
1	3	1	☐	9	2	1	☐	17	1	1	☐
2	3	2	☐	10	2	2	☐	18	1	2	☐
3	3	3	☐	11	2	3	☐	19	1	3	☐
4	3	4	☐	12	2	4	☐	20	1	4	☐
5	3	5	☑	13	2	5	☐	21	1	5	☐
6			☐	14	2	6	☐	22	1	6	☐
7			☐	15			☐	23			☐
8			☐	16			☐	24			☐

Save Changes

6 Select the **Alarm** tab and review the **Active Alarm Manager** for any active alarms.

If the **Alarm Log** is empty, the system may still be loading (it takes approximately 3 minutes for the system startup to complete). Any RF shelf alarms remaining after startup may be ignored for now. For more information, refer to section 7.2.2 System Manager Alarms.



7 Set the output power of the first BR according to site requirements.

Connect the General Dynamics R2660 Series Communication System Analyzer to the top of the rack Tx OUT 1. 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.

For specifications, refer to section 2.5.9.2 Transmitter Performance Summary. The default is +0 dBm per carrier, assuming that the datafill parameter ***defaultTxPower*** is set to 9.0. Either adjust the datafill parameter (refer to section 6.3.6 defaultTxPower = 9.0.) or adjust the **Tx ATTENUATION** knob on the front of the RF shelf. The outside knob adjusts in 10 dB increments and the inside knob adjusts in 1 dB increments, up to 50 dB maximum.

NOTE: The default output power is displayed on the front of each RF shelf.

8 Measure the SQE and frequency error for the control channel to see if they are within specifications.

9 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 (refer to section 2.5.9.2 Transmitter Performance Summary).

10 Repeat steps 6, 7 and 8 for each sector.

11 Review the **Active Alarm Manager** for any un-cleared alarms.

Refer to section 7.4 System Manager Alarms for more information.

5.5 Connect the MC-Series System to the Third-party RF Distribution System

1 All MC-Series System elements can remain powered during removal of or connection to other equipment.

2 Refer to the third-party RF Distribution System manufacturer's power procedures.

3 Measure the composite output from the Tx 1, Tx 2, and Tx 3 connectors at the top of the cabinet using a digital RF power meter.

4 Use the variable Tx ATTENUATION knob on the front panel of each RF shelf to adjust the composite output of each sector to accommodate the power budget of the DAS.

The outside knob adjusts in 10 dB increments, and the inside knob adjusts in 1 dB increments, up to 50 dB maximum.

NOTE: The variable attenuators only impact the RF downlink. If large values of attenuation are required, consider adding external attenuation to the uplink of the Rx port to maintain link balance.

5 Make sure the Nextel-provided coax jumpers have been swept.

6 Connect the jumpers between Tx 1 and DAS RF IN, and then connect the jumpers between Rx 1 and DAS RF OUT.

Connect the jumpers to the DAS commensurate with the sector coverage area and hub locations per Nextel design.

7 Measure the output at the DAS remote unit(s) to verify power budget accuracy.

5.6 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 F Functionality Test Procedures for procedures to conduct functionality testing.

Note: MC-Series does not support 6:1 VSELP calls or Circuit Switched data.

6 Datafill Parameters & Optimization Procedures

The MC-Series System is designed to be 100% compatible with the Motorola EBRC and QUAD Base Radios. However, due to architecture differences between the two systems, not all datafill parameters apply equally to the MC-Series System.

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

1. Parameters that RFN does not support.
2. Parameters that have no effect on the RFN system.
3. Parameters that RFN supports, but which need to be setup differently than what is typically setup for a Motorola Base Radio.
4. MIBs
5. Optimization procedures.

6.1 Unsupported Datafill Parameters

The following datafill parameters are currently not supported.

6.1.1 steThresholdMode

This parameter has three different purposes:

1. Setting to zero allows the EBTS to automatically determine the STE threshold based on history of inbound transmissions.
2. Setting to maximum value of 250 essentially disables the use of STE filtering.
3. A manual override exists by setting the parameter in the range of 1 to 249. The default value is set to 250.

The release notes indicate that this should only be used when sites are separated by more than 35 miles.

6.1.2 brPwrReducModeAcg

This parameter is used to enable/disable the Power Reduction feature on a per-BR basis. The default value is set to 'ON' and it is on-line changeable.

The MC-Series System currently does not use this feature since the system uses considerably less power than an EBRC.

6.1.3 brAddBuffering

This parameter adjusts the amount of buffering applied to all outbound voice packets prior to sending to the ISC. The default setting is 0, which corresponds to 45 mSec of buffering.

6.2 Parameters that Do Not Apply to the MC-Series System

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

6.2.1 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 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.

6.2.2 maxTx

No Information available. RFN does not use this value.

6.3 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.

6.3.1 bcchInterleave = 4

This parameter defines how far apart the BCCH slots are spaced in the PCCH. RFN recommends this value so as to maximize the number of outbound CCCH messages that are possible with the system.

6.3.2 pcchInterleave = 6

This parameter defines how far apart the PCCH slots are spaced. This must be set to 6 if the bcchInterleave is set to 4.

6.3.3 PCC = -65 (may change)

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). The default value should be calculated in accordance with Motorola guidance detailed in the Datafill Parameter Guide. It should be noted that in cases in which the Mobile subscribers are near the antenna source (downlink limited), the handsets could transmit at a much lower level than is the case with a Macro site. Lowering this parameter forces the mobile to operate at fairly low TX level thus conserving battery life. In cases where the MC-Series is connected to a fiber 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.

6.3.4 Pto = 20 (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. Although the actual Pto of the MC-Series System is less than 20, RFN recommends this value since it is the minimum settable value for this parameter bringing it as close as possible to the actual value.

6.3.5 rxTxGain = 10

This parameter is the difference in gain between the receiver and transmit antenna paths expressed in dB. The MC-Series System does not use this parameter directly, and the true rxTxGain is actually 0dB. RFN recommends this setting to help offset the Pto value when used in making handover calculations.

6.3.6 defaultTxPower = 9.0 (refer to release notes for range information)

This is the average output power of the PA, measured at the RF connector of the BR. For the MC-Series System, this parameter can be used to adjust the output power of the system. The MC-Series 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. This value can be set from 1.3 (watts) to 70 (watts), however, Quad BRs configured for 4 channels cannot exceed 10.5 (watts). Therefore, the recommended range is limited to 8.4 through 9.5, which allows a power adjustment range of 11.5 dB.

The transmit power out at the top of the rack (TOR) is dependent on the site datafill as well as the attenuator settings on the RF Shelves. Each RF Shelf has a default attenuator setting, calibrated at the time of manufacture and labeled on the front of the RF Shelf, that provides 0 dBm TOR output power per carrier when the datafill ***defaultTxPower*** value is set to 9.0.

The ***defaultTxPower*** parameter can take on values between 5 and 75. However, only a range of these values will result in an actual power output change in the MC-Series System. The following table summarizes the mapping between the ***defaultTxPower*** value and the TOR transmit power per carrier, for a given RF Shelf attenuator setting.

Table 3 TOR output power is based on the DefaultTxPower and the Attenuator setting

DefaultTxPower Setting (datafill parameter)	Tx Attenuator Setting (dB)	Top of the Rack (TOR) Output Power (dBm)
9.5 and higher	TxAtten	+5
	TxAtten - 5	+10
9.0 (default)	TxAtten	+0
	TxAtten - 10	+10
8.9	TxAtten	-1
	TxAtten - 10	+9
8.4 and lower	TxAtten	-6
	TxAtten - 10	+4

6.3.7 cellPtiMax = 5 (B-Series)

The maximum power an MS is allowed to transmit in a particular cell. For Pico and Micro-Cell applications in which the mobile subscribers are most likely near the antenna source, the MS can transmit at a relatively low level. To conserve battery life, we recommend the lowest power setting.

6.3.8 handoverClass

This parameter indicates for each neighbor cell, whether the neighbor cell should be considered for handover. RFN recommends the following values for systems that are used within a building. These values maximize the likelihood that the call will stay on the in-building system, thus offloading the subscribers from any local macro cell.

a. macro neighbor in RFN list = 1

b. RFN on macro neighbor list = 3

c. RFN on RFN neighbor list = 2

It is also recommended that the RFN sectors isolated to upper floors of buildings do not contain macros in their neighbor list.

6.3.9 reconnectionClass

Indicates for each neighbor cell, whether the cell should be considered for reconnection. Reconnection is mobility management during a dispatch call. RFN recommends the following values for systems that are used within a building. These values maximize the likelihood that the call will stay on the in-building system, thus off-loading the subscribers from any local macro cell.

a. macro neighbor in RFN list = 1

b. RFN on macro neighbor list = 3

c. RFN on RFN neighbor list = 2

6.3.10 hdvrCINROutboundHysteresis = 8

The outbound C/I+N hysteresis, in dB, for evaluating handover candidates. This is a typical value.

6.3.11 hdvrCINRInboundThreshold = 19

The inbound C/I+N threshold, in dB, for handover and evaluating handover candidates. RFN recommends this value for increasing the likelihood of the call staying within the RFN cell.

6.3.12 hdvrCINRInboundHysteresis = 8

The inbound C/I+N hysteresis, in dB, for evaluating handover candidates. This is a typical value.

6.3.13 hdvrCINROutboundThreshold = 6

The outbound C/I+N threshold on the serving cell for handover and for evaluating handover candidates. RFN recommend this value for increasing the likelihood of the call staying within the RFN cell.

6.3.14 brBrBand = 2 (800 MHz)

Specifies the operating band of the System. RFN currently supports the 800Mhz band.

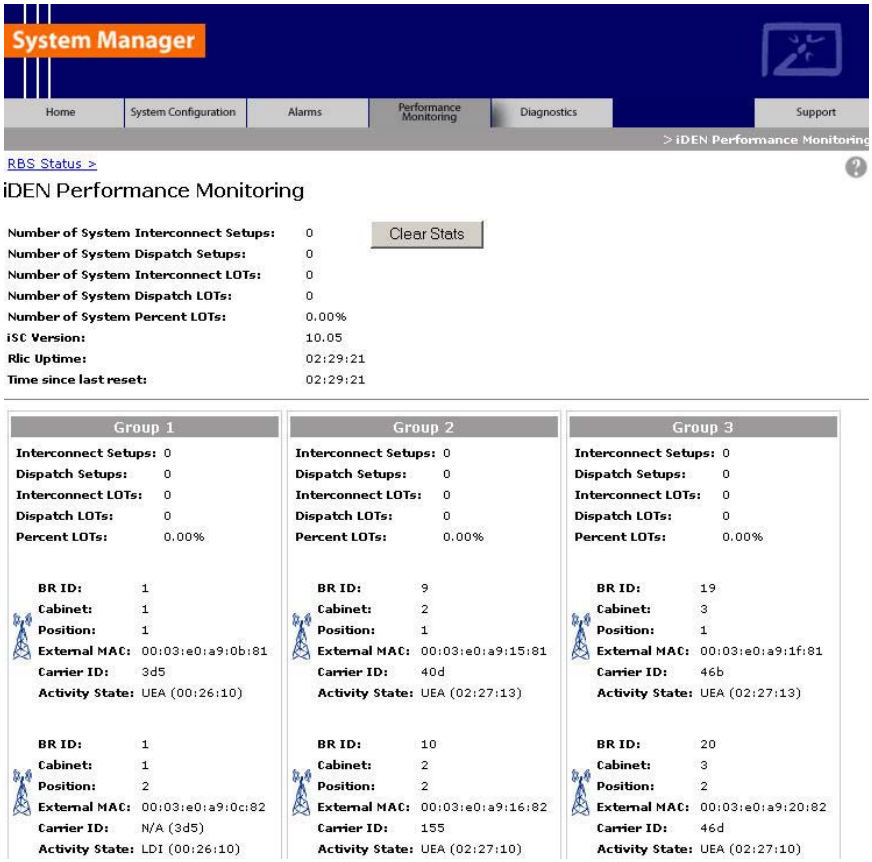
6.4 MIB Disparity

The following SNMP MIB (Management Information Base) statistics variables return incorrect information. The variables are set correctly except where noted.

- cabinetId and postionId
- fneFailThreshold
- maxTxWindow
- assignedChannelBr
- addBufferingBr (not used)
- ccExtension
- pwrReducModeBr (not used)
- numPrapCollision
- carrierIndex
- dcapCount
- sdgcPagingRequestTx
- sdgcGrantTx

6.5 Local Performance Monitoring

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

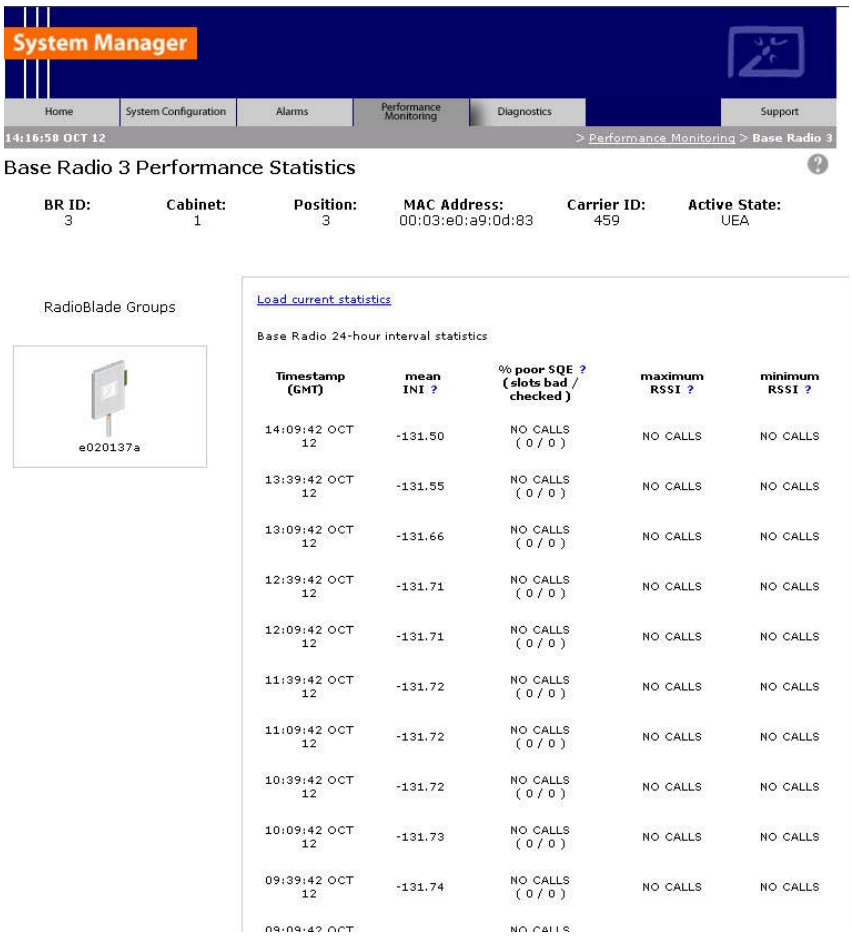


2 Select a BR icon to display the **Base Radio Performance Statistics** page.

3 Verify that the **mean INI** is within normal range (-120 to –130 dBm).

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.



7 Scheduled and Unscheduled Maintenance

A report of the MC-Series 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-RFN hardware, refer to the equipment manufacturer's documentation for maintenance information and procedures. For the iSC-3s 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.

7.1 Annual Maintenance

Conduct the following **annual maintenance**:

- Visually inspect all equipment in the MC-Series System cabinet for loose or foreign items and for visible damage.
- Verify all site configuration cabling is correct (refer to Appendix C and D Cabling Diagrams)
- Conduct the BER test on each RadioBlade transceiver (refer to Appendix H BER Test Procedure).
- Conduct the TOR Tx measurement (RF output measurement) on each transmitter (refer to section 7.10)

7.2 Troubleshooting Guidelines

Technicians should conduct the following troubleshooting steps in order:

1 Visually inspect for fault indication (LEDs). Refer to section 7.3.

2 Inspect the Alarm Manager, and follow alarm resolution procedures. Refer to sections 7.4, 7.5, and 7.6.

3 Contact the RFN Technical Assistance Center at: (800) 328-0847. Also, refer to section 1.4 Repair and Technical Support

4 Complete and save the serial log upload of cards. Refer to section 7.7

5 Refer to section 7.9, Field Replaceable Units (FRU) as required.

7.3 Fault Indications

This section provides fault indications for the following RadioFrame Networks components only: BIC, AIC, RBS, and RF Shelf. For all non-RFN equipment, refer to Nextel's or the manufacturer's documentation.

7.3.1 BIC

LED	Indication	Condition	Corrective action
	not lit	no power to BIC	▪ Verify that BIC circuit breaker on PDU is ON. ▪ Check power connection to PDU. ▪ Measure power input, and compare with tolerances listed in section 2 “Specifications”. ▪ 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 BIC (see “POWER” above)
	red *CRIC only*	▪ bootup not complete	▪ Allow three minutes (approx.) for bootup to complete.
		▪ timing not synchronized	▪ Verify that the GPS LED on iSC-3 is green. ▪ Verify that the cable is connected from BIC ERTM port 5MHz/1PPS IN to iSC-3 port 5MHz/1PPS. ▪ Contact the TAC: (800) 328-0847
	red *any card*	PLLs are not locked	▪ Verify that the STATUS LED on the BIC 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 Ethernet connection between BIC and AIC. ▪ Contact the TAC: (800) 328-0847

7.3.2 AIC

LED	Indication	Condition	Corrective action
POWER	green	normal condition	none

LED	Indication	Condition	Corrective action
	not lit	no power to AIC	▪ Verify that AIC circuit breaker on PDU is ON. ▪ Check power connection to PDU. ▪ Measure power input, and compare with tolerances listed in section 2 “Specifications”. ▪ 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 AIC (see “POWER” above)
	red	PLLs are not locked	▪ Verify that the STATUS LED on the BIC 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 Ethernet connection between BIC and AIC. ▪ Contact the TAC: (800) 328-0847

7.3.3 RBS

LED	Indication	Condition	Corrective action
STATUS	green	normal condition	none
	not lit	no power to RBS	▪ Verify that RBS circuit breaker on PDU is ON. ▪ Check power connection to PDU. ▪ Measure power input, and compare with tolerances listed in section 2 “Specifications”. ▪ Verify that the power source is operational. ▪ Contact the TAC: (800) 328-0847

LED	Indication	Condition	Corrective action
	red	▪ timing is not synchronized to the group (A, B, or C) ▪ Board unable to boot	▪ Power cycle the RBS using the circuit breaker on the PDU. ▪ Contact the TAC: (800) 328-0847
RADIOBLADE STATUS	green	RB present and operational	none
	not lit	▪ RB not present	▪ none
		▪ RB present	▪ Reseat RB.
	red	RB is in error state	▪ Reseat RB. ▪ If still red, replace RB.

7.3.4 RF Shelf

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 listed in section 2 “Specifications”. ▪ 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

7.4 System Manager Alarms

The MC-Series 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 iSC-3. All alarms passed to the OMC use the Nextel Alarm Code 35009, which uses the event description “Unable to key BR”.

This section describes:

- How to view alarms in System Manager,
- OMC alarm code and severity levels,
- System Manager alarms sent to the OMC, and
- System Manager alarms and resolution procedures

7.4.1 Viewing System Manager Alarms

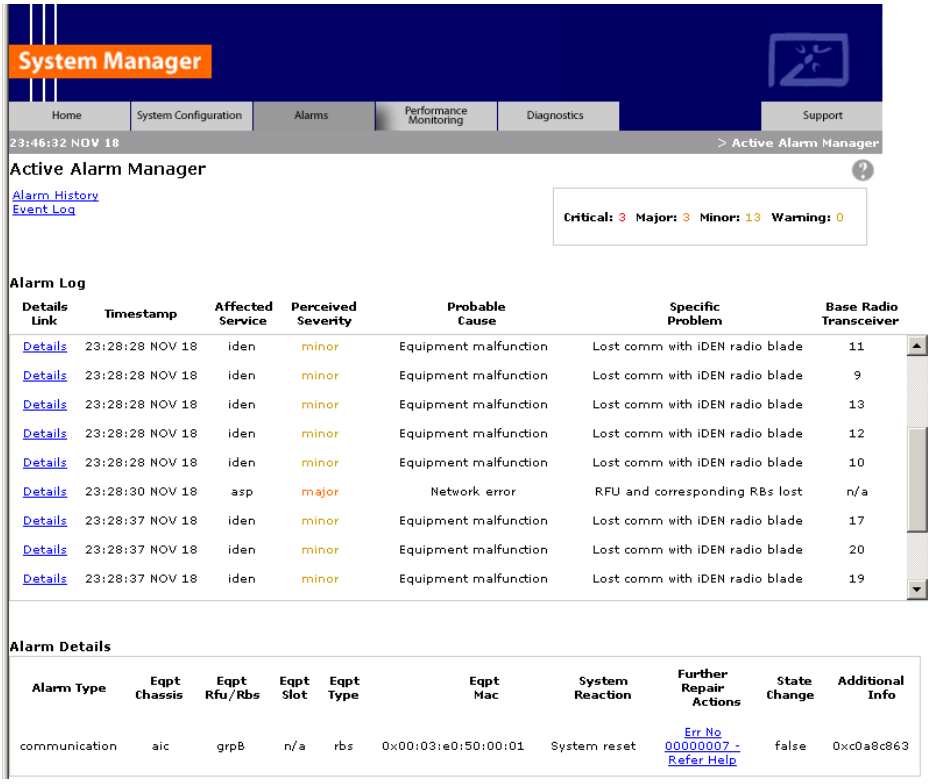
1 Select the **Alarms** tab in System Manager to display the **Active Alarm Manager**.

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 the following illustration). 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

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 ▪ rfn: 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 more 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 following information:

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: bic or aic
Eqpt Rfu/Rbs	Affected RBS group: grp A, grp B, or grp C
Eqpt Slot	Affected chassis slot: BIC (1-5), AIC (1-5), or RBS (1-24)
Eqpt Type	▪ rfn: unknown ▪ rlic: BIC CRIC ▪ bpc: BPC or BPC+SPAM ▪ ric: AIC CRIC

Alarm Details Field	Description
	▪ rbs: RBS ▪ idenrb: RadioBlade
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

7.4.2 OMC Alarm Code

All RFS MC-Series alarms sent to the OMC use the Nextel Alarm Code 35009 (see the following table). The Event Description for this alarm is 'Unable to key BR'.

Event	Description
Nextel 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

Event	Description
	▪ Duration Threshold=10
Action	▪ Create trouble ticket. ▪ Contact Field Technician. ▪ TS/BR

7.4.3 System Manager Alarms Sent to the OMC

The table below lists System Manager alarms that are sent to the OMC, the OMC alarm message, and the severity of the alarm.

OMC Alarm	System Manager Alarm	Severity
BOARD DISABLED 1.2.3.4	PEER LOSS	CRITICAL
COVERAGE HOLE	COVERAGE HOLE	MAJOR
EXCESS RESETS	EXCESS RESETS	CRITICAL
ISC VER MISMATCH	ISC VER MISMATCH	MAJOR
NO SPAM IN APC	APC NO SPAM	CRITICAL
RADIO BLADE LOST	IDENRB LOSS	MINOR
RB ASSOC ERROR	RB ASSOC ERROR	MAJOR
RF SHELF 1, 2, or 3	RF SHELF MINOR	MINOR
STARTUP FAIL	STARTUP FAIL	MINOR
TEMPERATURE CRITICAL	TEMPERATURE CRITICAL	CRITICAL
TEMPERATURE MAJOR	TEMPERATURE MAJOR	MAJOR

7.4.4 System Manager Alarms

This section lists MC-Series System alarms numerically by alarm ID (0x01, 0x02, etc.) with the alarm description as the title of the subsection. These alarms are based on the X.733 conventions for telecommunications equipment. For more information about field descriptions, refer to section 7.4.1 Viewing System Manager Alarms.

The service can be (asp – platform, iden- iden application, wlan – wireless application). The cause refers to 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 the system manager will provide additional information with respect to the board, slot number, mac address, equipment type etc. is available in System Manager.

7.4.4.1 Alarm Overflow error

ID: 0001

Service: asp

Severity minor

Cause: Underlying Resource Unavailable

System Reaction: Alarms Were Discarded

Additional Info: None

Repair Action: This condition results from an error in the alarm manager handler in which there is no longer enough space for the alarms. If this situation happens, most likely there is a catastrophic failure that needs to be addressed first. Review previous alarms for root cause.

Note: This alarm does not have a clear.

7.4.4.2 Target Initialization Error

ID: 0002

Service: asp

Severity critical

Cause: Underlying Resource Unavailable

System Reaction: Equipment goes in Disabled State

Additional Info: None

Repair Action: The system was unable to load the software properly for the following reasons.

A) Proper SW version has not been loaded onto the board. Check SW revision and/or re-load SW.

B) Reset Board

C) Board loader failing. Replace Board

7.4.4.3 Task Abnormally Terminated

ID: 0003

Service: asp

Severity major

Cause: S/W Program Abnormally Terminated

System Reaction: System Reset including RLIC

Additional Info: First 4 ASCII Text characters of the task that suspended

Repair Action: System should recover on its own. However, this alarm should be reported to RFN for further investigation. Check corresponding board for any connection problems.

Note: This alarm does not have a clear.

7.4.4.4 Task Abnormally Terminated

ID: 0004

Service: asp

Severity: major

Cause: S/W Program Abnormally Terminated

System Reaction: System Reset except for RLIC

Additional Info: First 4 ASCII Text characters of the task that suspended

Repair Action: System should recover on its own. However, this alarm should be reported to RFN for further investigation. Check corresponding board for any connection problems.

7.4.4.5 Spinning task starving system

ID: 0005

Service: asp

Severity: major

Cause: Application Subsystem Failure

System Reaction: System Reset

Additional Info: None

Repair Action: Check corresponding board for any flash corruption. System should recover on its own. However, this alarm should be reported to RFN for further investigation. Collect target serial logs.

7.4.4.6 Lost communication with target

ID: 0007

Service: asp

Severity: critical

Cause: Remote Node Transmission Error

System Reaction: System Reset

Additional Info: Peer IP Address

Repair Action: This is a result of lost communication with a target board. Check the corresponding board for improper insertion, faulty cables, improperly inserted cable.

7.4.4.7 5 MHz clock signal not present

ID: 0008

Service: asp

Severity: critical

Cause: Loss of Signal

System Reaction: No Action Taken

Additional Info: None

Repair Action: This is a result of lost clock signal from the ISC if it is an RLIC or a timing error if it is a RIC. If the alarm came from the RLIC, check the ISC clock connection. If the alarm came from a RIC, check the Ethernet cabling between RIC and RLIC. Check GPS light on ISC.

If clear follows soon after set (generally 6 seconds)

- if not too frequent ignore it. Could be an intermittent network error.
- If frequent or periodic, check for bad cable connections. Try a different Ethernet port.

7.4.4.8 Phase lock loops not locked

ID: 0009

Service: asp

Severity: critical

Cause: Timing Problem

System Reaction: All BR's will lock. Trap sent to ISC.

Additional Info: None

Repair Action: If it is the RLIC check for noisy or missing ISC clock. This alarm will always be generated as the system is coming up. If there is no clear after 20 minutes, replace board. Check GPS light on ISC.

7.4.4.9 DSPs failed to load

ID: 0010

Service: asp

Severity: critical

Cause: Equipment Malfunction

System Reaction: No Action taken

Additional Info: None

Repair Action: Verify that the DSP SW loads exist on the system. Try re-downloading the software. Reseat SPAM. Replace Board.

Note: This alarm does not clear.

7.4.4.10 DSP host port interface failed

ID: 0011

Service: asp

Severity: major

Cause: Equipment Malfunction

System Reaction: If errors exceed threshold, DSP is reset.

Additional Info: DSP Core (1 – 12)

Repair Action: Can ignore if infrequent. Reseat SPAM in BPC (APC). Replace SPAM or Replace BPC (APC).

7.4.4.11 Too many resets within window

ID: 0012

Service: asp

Severity: major

Cause: Application Subsystem Failure

System Reaction: All BRs locked, system held in a disabled state

Additional Info: None

Repair Action: This is a result of more than 4 system resets within a 30 minute period. Investigate cause of system resets from previous alarms. Requires a commanded reset to restore.

Note: This alarm does not clear.

7.4.4.12 System Reset

ID: 0013

Service: asp

Severity: warning

Cause: Application Subsystem Failure

System Reaction: System Reset

Additional Info: None

Repair Action: This is the result of an alarm that causes a system reset. The purpose of this alarm is to create a placeholder in the alarm log to indicate that a system reset had taken place. Investigate root cause from previous alarms.

7.4.4.13 1 of 2 cooling fans has failed

ID: 0014

Service: asp

Severity: minor

Cause: Equipment Malfunction

System Reaction: No Action Taken

Additional Info: Fan number (1 or 2)

Repair Action: Inspect chassis fans for proper operation.

7.4.4.14 Temperature problem detected

ID: 0015

Service: asp

Severity: warning

Cause: Temperature Unacceptable (Warning)

System Reaction: None

Additional Info: None

Repair Action: Alarm will be generated if temperature exceeds a set threshold and will clear below a set threshold. Inspect Unit environment.

7.4.4.15 Temperature problem detected

ID: 0017

Service: asp

Severity: major

Cause: Temperature Unacceptable (Major)

System Reaction: None

Additional Info: None

Repair Action: Alarm will be generated if temperature exceeds 49 C and will clear below 46 C. Inspect Unit environment.

7.4.4.16 Temperature problem detected

ID: 0018

Service: asp

Severity: critical

Cause: Temperature Unacceptable (Critical)

System Reaction: System Reset

Additional Info: None

Repair Action: Alarm will be generated if temperature exceeds 52 C and will clear below 49 C. Inspect Unit environment.

7.4.4.17 Target booted wrong partition

ID: 0019

Service: asp

Severity: warning

Cause: Corrupt Data

System Reaction: No Action Taken

Additional Info: None

Repair Action: Check for Correct Version of SW on each partition. Re-download software.

7.4.4.18 Application version mismatch

ID: 0020

Service: asp

Severity: warning

Cause: Configuration Customization Error

System Reaction: No Action Taken

Additional Info: None

Repair Action: Check for correct version of SW on each partition.

7.4.4.19 No SPAM detected in APC

ID: 0023

Service: asp

Severity: major

Cause: Equipment Malfunction

System Reaction: BR will not be allowed to go UEA

Additional Info: None

Repair Action: Verify that the BPC (APC) has a SPAM and that it is the correct capacity. Reseat the SPAM or Replace. Replace BPC (APC).

7.4.4.20 Unknown device in RFU slot

ID: 0027

Service: asp

Severity: minor

Cause: Configuration Customization Error

System Reaction: No Action Taken

Additional Info: RFU/RBS group slot number

Repair Action: Inspect the RBS/RFU for unusual hardware. Reseat card in question otherwise replace card in RBS/RFU.

7.4.4.21 User invoked system reset

ID: 0028

Service: asp

Severity: warning

Cause: User Intervention

System Reaction: System Reset

Additional Info: None

Repair Action: System was reset from System Manager, no action necessary. This alarm is used as a place holder in the history alarm log.

Note: This alarm has no clear.

7.4.4.22 User invoked alarm history clr

ID: 0029

Service: asp

Severity: warning

Cause: User Intervention

System Reaction: Alarm history log cleared

Additional Info: None

Repair Action: Alarm history log was cleared from System Manager, no action necessary. This alarm is a used as a place holder in the history alarm log.

Note: There will be no OMC alarm sent for this.

7.4.4.23 Out of assignable IP addresses

ID: 0033

Service: asp

Severity: major

Cause: Underlying Resource Unavailable

System Reaction: No Action Taken

Additional Info: None

Repair Action: Internal error most likely due to improper system configuration. Confirm proper setup of each component. Report Error to RFN.

7.4.4.24 Software Baselining Server Problem

ID: 0037

Service: asp

Severity: warning

Cause: Underlying Resource Unavailable

System Reaction: No action taken

Additional Info: None

Repair Action: Re-download the software load lineup to the RLIC and reset system. This alarm should only occur after a software download and a reset to that partition.

7.4.4.25 RF Shelf External Alarm Major

ID: 0038

Service: asp

Severity: Major

Cause: Equipment Malfunction

System Reaction: No action taken

Additional Info: RBS Group Number

Repair Action: Replace the RF shelf reporting the alarm. Connect serially to the RF shelf to further isolate the specific failure.

7.4.4.26 RF Shelf External Alarm Minor

ID: 0039

Service: asp

Severity: Minor

Cause: Equipment Malfunction

System Reaction: No action taken

Additional Info: RBS Group number

Repair Action: Replace the defective fan on the back of the RF shelf unit.

7.4.4.27 LAPD connection to ISC failed

ID: 4097

Service: iden

Severity: critical

Cause: Local Node Transmission Error

System Reaction: BR Disabled

Additional Info: minor state 1..15

Repair Action: Check connection to ISC. Check ISC status. Can also be caused by another RFN system sharing the same connection to the ISC if its BR's are configured the same.

7.4.4.28 Lost comm. With iDEN RadioBlade

ID: 4098

Service: iden

Severity: minor

Cause: Equipment Malfunction

System Reaction: RB moved to standby state. BR may be Disabled.

Additional Info: RB Index

Repair Action: This happens when the system is no longer able to communicate with the Radio Blade. Reseat RadioBlade, Move to different slot, check RBS/AIC connection. Replace RadioBlade.

7.4.4.29 APC failed to sync with NPC

ID: 4100

Service: iden

Severity: critical

Cause: Equipment Malfunction

System Reaction: System Reset

Additional Info: None

Repair Action: If alarm does not clear, check cabling between AIC and BIC. Replace BPC. This could be a result of a timing problem on the CRIC or backplane as well.

7.4.4.30 DSP Tx Packet Failed

ID: 4101

Service: iden

Severity: critical

Cause: Loss of Signal

System Reaction: System Reset

Additional Info: dsp index 1..16

Repair Action: Previously called DSP 1180 FLOODING. If happens at startup then check the RB and try power cycling RB or RFU. Ignore if happens infrequently. If alarm does not clear or alarm happens frequently,

- Reseat SPAM.
- Replace BPC

7.4.4.31 DSP Rx Packet Failed

ID: 4102

Service: iden

Severity: major

Cause: Loss of Signal

System Reaction: Reset RadioBlade

Additional Info: Radio Blade index

Repair Action: This problem is a result of the DSP not receiving packets from the RadioBlade. If this alarm does not clear itself or is happening frequently then replace the RadioBlade. If the problem still persists, replace SPAM and/or APC.

7.4.4.32 RB VGA Error

ID: 4103

Service: iden

Severity: minor

Cause: Degraded Signal

System Reaction: Reset RadioBlade

Additional Info: Radio Blade index

Repair Action: This is the result of the system detecting a RadioBlade reporting erroneous vga values. Replace RadioBlade.

7.4.4.33 Carrier Assignment failure

ID: 4104

Service: iden

Severity: major

Cause: Call Establishment Error

System Reaction: BR Disabled

Additional Info: Carrier Frequency

Repair Action: This is a result of an unusually high number of assignment failures from a particular Mobile on a particular BR. This is an indication of an RF problem with one of the RadioBlades. The debug field is the frequency of the carrier that would not allow assignment too. The event log will contain the RadioBlade index of the PCCH. This RadioBlade index will indicate the RBS, the frequency will be the carrier in that RBS. Replace the RadioBlade.

Note: This alarm does not have a clear

7.4.4.34 DSP reset threshold exceeded

ID: 4105

Service: iden

Severity: critical

Cause: Threshold Crossed

System Reaction: System Reset

Additional Info: dspId or 0xff for hpi error

Repair Action: Check preceding alarms as to the cause of the SPAM reset. Reseat SPAM, if problem persists, replace BPC.

7.4.4.35 Network memory shortage

ID: 4106

Service: iden

Severity: critical

Cause: Out of Memory

System Reaction: System Reset

Additional Info: cluster level

Repair Action: Internal problem with the network memory pool. Replace BPC.

7.4.4.36 Invalid RB Slot

ID: 4108

Service: iden

Severity: minor

Cause: Equipment Malfunction

System Reaction: Reset RadioBlade

Additional Info: None

Repair Action: Reseat RadioBlade. If problem still persists, replace RadioBlade or move to another slot. If problem still persists, replace RBS.

7.4.4.37 DSP Tx null PDU

ID: 4110

Service: iden

Severity: minor

Cause: Loss of Signal

System Reaction: SPAM Reset

Additional Info: APC Mac address

Repair Action: This is a result of the DSP sending incorrect data to the RadioBlade. Ignore if happening infrequently. Check for intermittent cable connections. Possibly a result of timing problems on the NPC.

7.4.4.38 Interference/Calibration

ID: 4111

Service: iden

Severity: minor

Cause: Degraded Signal

System Reaction: Reset RadioBlade

Additional Info: Radio Blade Index

Repair Action: This is a result of either an interference source or the RadioBlade is going out of Calibration. Lock or swap RadioBlades with that carrier. If the problem follows the carrier, most likely interference. If the problem follows the RadioBlade, most likely out-of-cal RadioBlade is the source.

Note: This alarm does not have a clear

7.4.4.39 RB Failed to synchronize

ID: 4112

Service: iden

Severity: minor

Cause: Timing Problem

System Reaction: SPAM Reset

Additional Info: None

Repair Action: After 3 attempts to re-synchronize the RadioBlade, this alarm is issued and the SPAM is reset. If problem persists, replace RadioBlade or replace SPAM.

Note: This alarm does not have a clear

7.4.4.40 RB Error state

ID: 4113

Service: iden

Severity: major

Cause: Equipment Malfunction

System Reaction: RadioBlade Locked

Additional Info: Radio Blade index

Repair Action: System failed to read EEPROM calibration data from the RadioBlade. Try a different slot/RFU or replace RadioBlade.

7.4.4.41 Tx DSP not responding

ID: 4115

Service: iden

Severity: major

Cause: Equipment Malfunction

System Reaction: SPAM Reset

Additional Info: dsp Id

Repair Action: Problem occurs if communication is lost to the Tx DSP. Reseat or replace SPAM. Replace BPC.

7.4.4.42 Rx DSP not responding

ID: 4116

Service: iden

Severity: major

Cause: Equipment Malfunction

System Reaction: SPAM Reset

Additional Info: dsp Id

Repair Action: Problem occurs if communication is lost to the Rx DSP. Reseat or replace SPAM. Replace BPC.

7.4.4.43 DSP unlock fail

ID: 4118

Service: iden

Severity: major

Cause: Equipment Malfunction

System Reaction: BR Disabled

Additional Info: None

Repair Action: Check version of the DSP SW.

Note: This alarm does not clear

7.4.4.44 Forward ISC version mismatch

ID: 4119

Service: iden

Severity: major

Cause: Version Mismatch

System Reaction: No Action Taken

Additional Info: ISC VER |or| RFN release version

Repair Action: This alarm occurs when the ISC version is newer than the current RFN SW version. Verify that the RFN SW version is correct and verify that the ISC version is correct.

Note: This alarm does not have a clear

7.4.4.45 Tx DSP transmit failed

ID: 4120

Service: iden

Severity: major

Cause: Loss of Signal

System Reaction: SPAM Reset

Additional Info: dsp id

Repair Action: Problem occurs when DSP stops sending data to RadioBlade. Reseat or Replace SPAM. Replace BPC.

7.4.4.46 Rx DSP Receive failed

ID: 4121

Service: iden

Severity: major

Cause: Loss of Signal

System Reaction: SPAM Reset

Additional Info: dsp id

Repair Action: Problem occurs when DSP stops receiving data from the RadioBlade. Reseat or Replace RadioBlade. Reseat or replace SPAM. Replace BPC.

7.4.4.47 RB initialization failure

ID: 4122

Service: iden

Severity: major

Cause: Equipment Malfunction

System Reaction: System Reset

Additional Info: Radio Blade Index

Repair Action: RadioBlade failed to Initialize after 3 reset attempts. Replace RadioBlade and report to RFN for further investigation.

Note: This alarm does not have a clear

7.4.4.48 RB initialization error

ID: 4123

Service: iden

Severity: major

Cause: Configuration Customization Error

System Reaction: Force RadioBlade to Register

Additional Info: Radio Blade Index

Repair Action: Problem with RadioBlade setting up with wrong address.

7.4.4.49 Internal BR Reset

ID: 4124

Service: iden

Severity: major

Cause: Communications Protocol Error

System Reaction: Reset BR

Additional Info: reason code

Repair Action: An internal system error resulted in an individual Base Radio needing to be reset. Contact RFN for further investigation.

Reason Codes:
2 – AIC/BPC down
3 – BIC/BPC down
4 – Excess CCCH Messages
5 – Peer Loss
6 – RB Loss
7 – Sync Fail
8 – Excess Resets

7.4.4.50 Excessive RB PLL errors

ID: 4125

Service: iden

Severity: major

Cause: Equipment Malfunction

System Reaction: Lock Radio Blade

Additional Info: PLL Type (1,2,3)

Repair Action: Reseat or replace radio blade.

7.4.4.51 Excessive RB Comm Error

ID: 4126

Service: iden

Severity: major

Cause: Equipment Malfunction
System Reaction: Lock Radio Blade
Additional Info: Comm Type
Repair Action: Reseat or replace radio blade

7.4.4.52 Excessive RB CRC Error

ID: 4127
Service: iden
Severity: major
Cause: Equipment Malfunction
System Reaction: Lock Radio Blade
Additional Info: None
Repair Action: Reseat or replace radio blade

7.5 RF Shelf Alarms and Test Ports

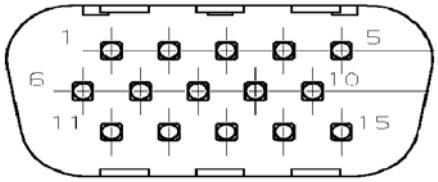
The RF shelf has two alarm/test ports. Both are DB-15 connectors located on the rear of the unit. One of these connectors is used for functional test at the time of manufacture and provides the alarm interface to the system. The other port provides diagnostics and monitoring of the RF shelf in an operational system.

7.5.1 RF Shelf Alarm Interface Port

The pinout for the RF shelf alarm interface connector is shown below. At present only the major and minor alarm pins are externally connected to the system. These alarm points are monitored by the MC-Series System through a direct connection to the RF shelf's corresponding RBS group alarm inputs.

Table 4 Alarm Interface Port Pinout

1	Major Alarm +
2	Major Alarm -
3	GND
4	Minor Alarm +
5	Minor Alarm -
6	GND
7	Test 15V
8	Test 18V
9	15V Prim. Control



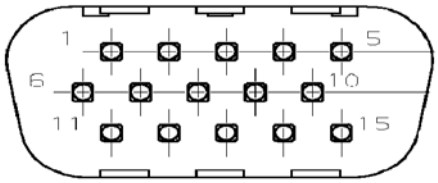
10	15V Sec. Control
11	28V Prim. Control
12	28V Sec. Control
13	Fan1 Control
14	Fan2 Control
15	NC

7.5.2 RF Shelf Diagnostic Port

The pinout for the RF shelf diagnostic port connector is shown below. In the event of an alarm, this connector provides access to more detailed information, since only major and minor alarm states for an RF shelf are recognized by the system.

Table 5 RF Shelf Diagnostic Port Pinout

1	15V Prim Alarm
2	15V Sec Alarm
3	28V Prim Alarm
4	28V Sec Alarm
5	Fan1 Alarm
6	Fan2 Alarm
7	not currently used
8	GND
9	Test PA Rev RF Power (Analog)
10	Test PA Fwd RF Power (Analog)
11	Test PA Base Temperature(Analog)
12	Test RF enable
13	LNA1 Alarm
14	LNA2 Alarm
15	PA VSWR Alarm



7.5.3 Alarm Descriptions

Within the RF shelf there are a number of failure mechanisms that will generate an alarm. However, since only two alarm inputs are available in each RBS group, the alarms within the RF

shelf must be AND'd together. The following table shows what constitutes a major alarm and what constitutes a minor alarm.

Minor Alarm	Major Alarm
SINGLE FAN FAILURE	LNA (RECEIVE PATH) ALARM
	LNA (DIVERSITY PATH) ALARM
	PA ALARM
	TWO FAN FAILURE
	TWO LNA POWER SUPPLY FAILURE
	TWO PA POWER SUPPLY FAILURE
	ONE PA POWER SUPPLY FAILURE
	ONE LNA POWER SUPPLY FAILURE

7.6 RadioBlade Alarm Handling

The iDEN RadioBlades track various faults and report those to the RadioBlade controller. These faults are monitored and if the rate at which these faults occur surpasses a threshold, the blade is locked. The RB will generate these faults as the result of normal actions such as re-syncing the blade, locking and unlocking the RB 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 tracks the following faults:

i. PLL1 Errors – The Phase Lock Loop #1 went out of lock.
ii. PLL2 Errors – The Phase Lock Loop #2 went out of lock.
iii. PLL3 Errors – The Phase Lock Loop #3 went out of lock.
iv. Tx Underrun – RB did not receive a packet in time to transmit.
v. Tx Overflow – RB received too many packets to transmit.
vi. Rx OverFlow – Sample buffer overflowed.
vii. Slot mismatch – Received packets were not consecutive.
viii. CRC errors – Received Ethernet packets had CRC errors.

If a RadioBlade 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. The following table lists the number of faults and the fault period for an alarm to be generated.

Alarm	Bounce Threshold (counts)	Duration Threshold (minutes)
PLL 1	75	12
PLL 2	75	12

Alarm	Bounce Threshold (counts)	Duration Threshold (minutes)
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

Figure 28 RadioBlade fault Bounce and Duration for alarm generation**.**

In addition to the above-mentioned errors, if the system loses communication with a RadioBlade 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.

7.6.1 RadioBlade Policies

The RadioBlade locking policy is the action taken by the system whenever it has determined that the RadioBlade should no longer be allowed to go active. This could be the result of an alarm, insertion, removal, or the user specifically locking the RadioBlade.

In general, if a blade is taken out of service and a standby RB is available, then that RB will go into service. If no standby RB is available then the BR will be locked.

7.6.1.1 Standby Blade

A Standby Blade is an extra RadioBlade 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 RadioBlades for each RBS Group than Base Radios configured in the iDEN configuration page.

In all the conditions described below if RBs are present in a RBS that are in a hot standby state, then locking the RB due to alarms, removal of a RB or administratively locking RBs, will result in the hot Standby RB to be assigned to the BR that de-registered the locked RB.

7.6.1.2 Locking policy for RB with Errors

If the Radioblade generates enough faults such that it crosses the bounce and duration for that particular error, an alarm will be generated. The RadioBlade controller then notifies the associated BR, which then locks the RB.

If we determine there is a faulty RB in the system (i.e., RadioBlades that are generating errors), we prevent them from coming up after a commanded reset/system reset, but the operator could manually unlock the RB at which point the RB would be assigned to a BR (Note: this would not prevent the system from locking it again if an excessive error condition occurs).

7.6.1.3 Removal of RB:

When a RB is physically removed an event is generated in the System Manager Event Log notifying the user about the RB removal. The RB controller will then de-register the RB from the BR, which will result in locking the BR. A RB Insert event is generated when the RadioBlade is inserted into the RBS.

7.6.1.4 Administratively locking a RB

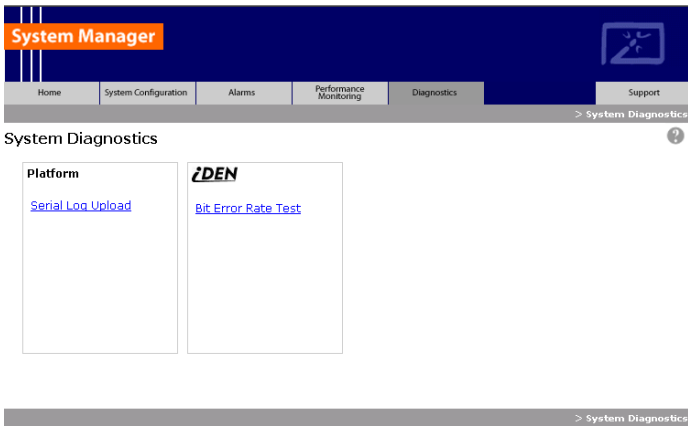
Administratively locking a RadioBlade is when the RadioBlade lock icon on the RB Status page is changed to lock. The following rules apply to this action.

1. If a locked RB is replaced, the new RB will be considered unlocked upon insertion. The locking applies to a particular RB and not a particular Slot.
2. The locked RadioBlade will be preserved through a system reset.
3. RadioBlades 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 the locked RadioBlade and the particular policy will to go back into the disabled state again.

7.7 Serial Log Upload Procedure

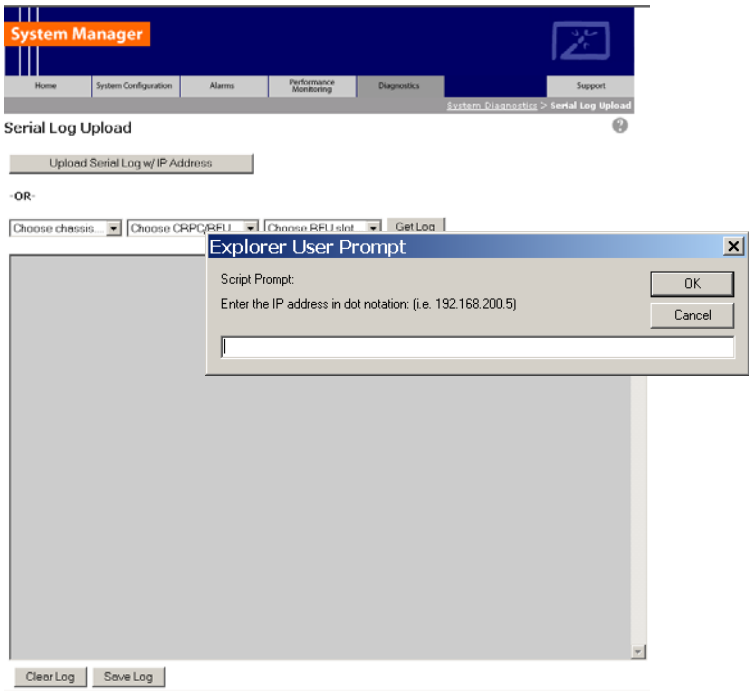
Complete this procedure before disconnecting and removing the BIC, AIC, RBS or an RF shelf from the MC-Series System rack, or at the direction of RadioFrame Networks technical support.

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



2 Select the **Upload Serial Log w/ IP Address** button, and in the pop-up window, enter the IP address of the component, and the select **OK**. Refer to Appendix B: Default IP Addresses.

Alternately, the component can be selected from the dropdown 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:

7.8 Power Down Procedure

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

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

- BIC
- AIC
- RBS 1 (RBS 2 and RBS 3 if present)
- RF Shelf 1, RF Shelf 2, and RF Shelf 3

- CSU
- Secondary iSC-3; then ensure that the power switch on the front of the unit is in the OFF position
- EAS; then ensure that the power switch on the front of the unit is in the OFF position
- Primary iSC-3; then ensure that the power switch on the front of the unit is in the OFF position

7.9 Field Replaceable Unit (FRU) Procedures

The MC-Series System has been designed so that Field Repairable Units (FRUs) can be replaced to restore normal system operation as quickly as possible. The following table lists RadioFrame Networks FRUs. For equipment not supplied by RadioFrame Networks, follow standard Nextel policies and procedures for FRU replacement. For more information, refer to section 1.4.3 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

Refer to section 1.4 Repair and Technical Support for more information.

Table 6 MC-Series System FRUs

P/N	Description
176-0840-xx	800 MHz MC Series iDEN 2-Port RadioBlade (RB) Transceiver
176-0870-xx	800 MHz RF Shelf
176-0535-xx	RadioBlade Transceiver Shelf (RBS)
176-0800-xx	MC-15 Airlink Interface Chassis (AIC)
176-0900-xx	MC-15 BTS Interface Chassis (BIC)
176-7570-xx	Base Processing Card (BPC)
176-7550-xx	Base Processing Card (BPC) with SPAM
176-7540-xx	Common RadioFrame Interface Card (CRIC)
176-7562-xx	Ethernet Rear Transition Module (ERTM)
176-7510-xx	Signal Processing Array Module (SPAM)
176-0820-xx	CRTC
176-7502-xx	4U Chassis
176-0600-xx	PDU
176-1219-xx	Fan Tray w/Fans for 4U Chassis
176-0011-xx	Fan for RBS, RF Shelf, AIC & BIC

7.9.1 RF Shelf

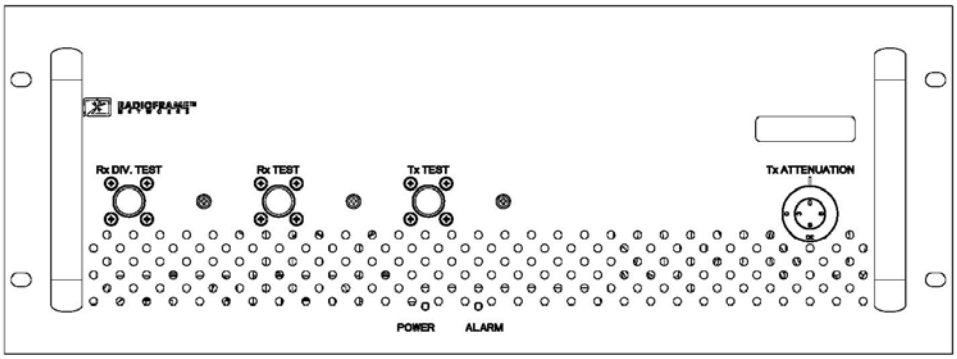


Figure 29 RF Shelf front view

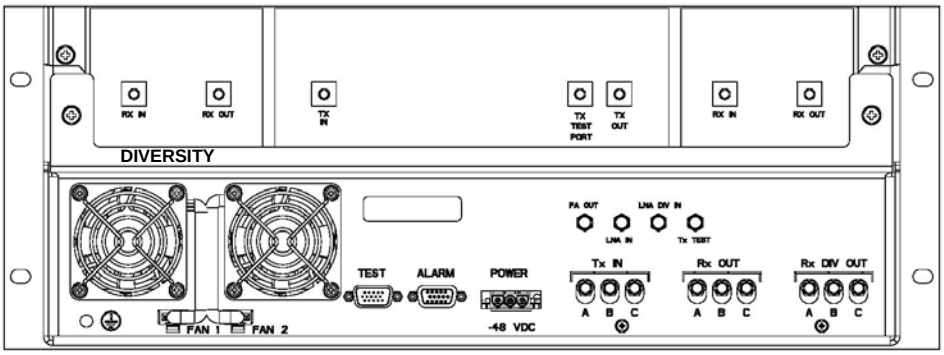


Figure 30 RF Shelf rear view

7.9.1.1 RF Shelf Replacement Procedure

1 Power down RFN equipment in the following order using circuit breakers on the PDU:

- BIC
- AIC
- RBS 1 (power down RBS 2 and RBS 3 if they are present)
- RF shelf 1, 2, and 3

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

Refer to Appendix C Cabling Diagrams: 3-Sector Configuration and Appendix D Cabling Diagrams: Omni Configuration.

For **RF Shelf 1**, disconnect the following cabling from the rear of RF Shelf 1:

Index	Part Number	Disconnect From	To	Type
P_1	820-0616-10	RF Shelf 1: power	PDU: RF 1	power
G_3	820-0609-00	RF Shelf 1: ground	GND BAR	ground
RF_1	820-0611-20	RF Shelf 1: Tx IN A	RBS 1: Tx A	RF cable
RF_4	820-0611-20	RF Shelf 1: Rx OUT A	RBS 1: Rx A	RF cable
RF_9	820-0610-30	RF Shelf 1: TX OUT	TOR: Tx 1	RF cable
RF_10	820-0610-30	RF Shelf 1: RX IN	TOR: Rx 1	RF cable
AL_1	820-0607-00	RF Shelf 1: ALARM	RBS: ALARM INPUT A	serial

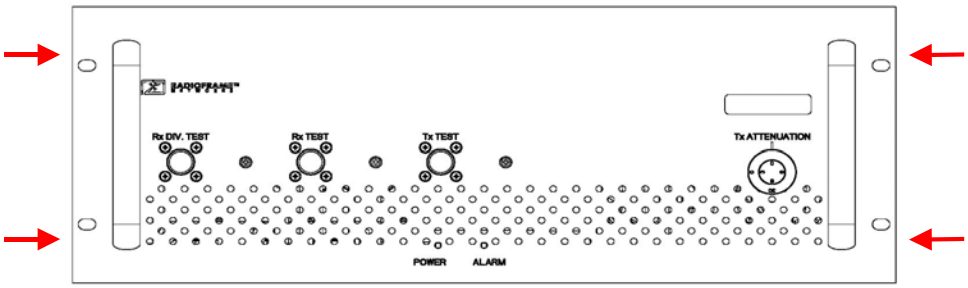
For **RF Shelf 2**, disconnect the following cabling from the rear of RF Shelf 2:

Index	Part Number	Disconnect From	To	Type
P_2	820-0616-10	RF Shelf 2: power	PDU: RF 2	power
G_4	820-0609-00	RF Shelf 2: ground	GND BAR	ground
RF_2	820-0611-20	RF Shelf 2: Tx IN B	RBS 1: Tx B	RF cable
RF_5	820-0611-20	RF Shelf 2: Rx OUT B	RBS 1: Rx B	RF cable
RF_15	820-0610-30	RF Shelf 2: TX OUT	TOR: Tx 2	RF cable
RF_16	820-0610-30	RF Shelf 2: RX IN	TOR: Rx 2	RF cable
AL_2	820-0607-00	RF Shelf 2: ALARM	RBS: ALARM INPUT B	serial

For **RF Shelf 3**, disconnect the following cabling from the rear of RF Shelf 3:

Index	Part Number	Disconnect From	To	Type
P_3	820-0616-10	RF Shelf 3: power	PDU: RF 3	power
G_5	820-0609-00	RF Shelf 3: ground	GND BAR	ground
RF_1	820-0611-20	RF Shelf 3: Tx IN C	RBS 1: Tx C	RF cable
RF_4	820-0611-20	RF Shelf 3: Rx OUT C	RBS 1: Rx C	RF cable
RF_9	820-0610-30	RF Shelf 3: TX OUT	TOR: Tx 3	RF cable
RF_10	820-0610-30	RF Shelf 3: RX IN	TOR: Rx 3	RF cable
AL_1	820-0607-00	RF Shelf 3: ALARM	RBS: ALARM INPUT C	serial

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



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 as defined in Step 2.

Use the SMA torque wrench for all SMA connectors.

6 Using the breakers on the PDU, turn up the BIC, AIC, and RBS 1 (and RBS 2 and RBS 3 if present), and then verify that the components are operational before proceeding.

7 Wait approximately 3 minutes for the following indicators:

- RBS: The STATUS LED for each group will light green in this order: A, B, and then C.
- RBS: The RADIOBLADE STATUS LEDs will light red and then green for each present RadioBlade. If no RB is present, the LED will not light. To verify the contents of the RBS, pull out the shelf (powering off is not required) and inspect the RadioBlades and their respective status LEDs. Reinsert the RBS. 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 rack (see the following illustration).
- BIC CRIC and AIC CRIC: The POWER and STATUS LEDs will light red and then green. All other BIC and AIC card LEDs will light green.

8 Using the breaker on the PDU, turn up **RF Shelf 1, RF Shelf 2,** and **RF Shelf 3** and verify that each RF shelf is operational before proceeding. The POWER and ALARM LEDs on the front of the RF Shelf will light green.

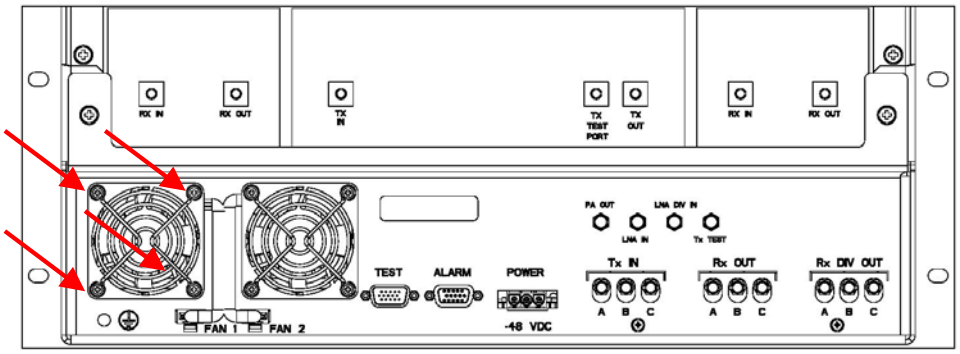
9 Refer to sections 5.4, 5.5 and 5.6 for configuration and verification.

7.9.1.2 Replacing a Fan in the RBS or an 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 Remove the four fan mounting screws.



4 Replace the fan.

5 Install the four fan mounting screws.

NOTE: Install the finger guard so that the space is aligned vertically.

6 Connect the fan power cable.

7 Verify that the fan is working.

7.9.2 Replacing a Chassis: BIC, AIC, or RBS

7.9.2.1 BIC

1 Power down RFN equipment in the following order using circuit breakers on the PDU:

- BIC
- AIC
- RBS 1 (power down RBS 2 and RBS 3 if they are present)
- RF Shelves 1,2 and 3

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

Refer to Appendix C Cabling Diagrams: 3-Sector Configuration and Appendix D Cabling Diagrams: Omni Configuration.

For the **BIC**, disconnect the following cabling from the rear of the BIC only:

Index	Part Number	Disconnect From	To	Type
P_11	820-0614-00	BIC: power	PDU: BIC	power
G_13	820-0609-00	BIC: ground	GND BAR	ground
DAT_4*	111-0565-00	BIC: ERTM PORT 1	BIC: CRTC 10baseT - ISC	UTP
DAT_5	111-0565-00	BIC: ERTM PORT 2	AIC: ERTM PORT 4	UTP

Index	Part Number	Disconnect From	To	Type
DAT_6	111-0001-02	BIC: CRTC 10base2 - ISC	ISC 1: 10B2-1	COAX
CLK_1	111-0001-02	BIC: ERTM 5MHz/1PPS IN	ISC 1: SITE REF OUT 1	COAX

* Remove both ends of this cable and keep it for the replacement BIC.

3 Remove the chassis from the rack, and package it for shipment.

4 Remove the 4 front mounting screws from the front of the unit (shown with arrows).

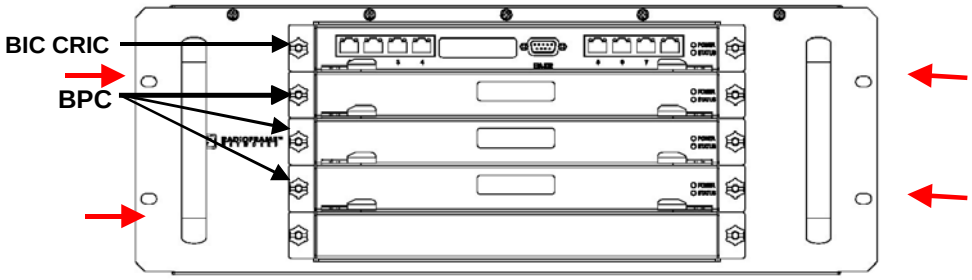


Figure 31 Front view of BIC

5 Mount the replacement chassis.

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

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

Use the SMA torque wrench for all SMA connectors.

7 Using the breakers on the PDU, turn up the **BIC**, **AIC**, and **RBS 1** (and RBS 2 and RBS 3 if present), and then verify that the components are operational before proceeding.

Wait approximately 3 minutes for the following indicators:

- RBS: The STATUS LED for each group will light green in this order: A, B, and then C.
- RBS: The RADIOBLADE STATUS LEDs will light red and then green for each present RadioBlade. If no RB is present, the LED will not light. To verify the contents of the RBS, pull out the shelf (powering off is not required) and inspect the RadioBlades and their respective status LEDs. Reinsert the RBS. 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 rack (see the following illustration).
- BIC CRIC and AIC CRIC: The POWER and STATUS LEDs will light red and then green. All other BIC and AIC card LEDs will light green.

8 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 light green.

9 Complete the procedures in sections 5.4, 5.5 and 5.6.

7.9.2.2 AIC

1 Power down RFN equipment in the following order using circuit breakers on the PDU:

- BIC
- AIC
- RBS 1 (power down RBS 2 and RBS 3 if they are present)
- RF Shelves 1,2 and 3

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

Refer to Appendix C Cabling Diagrams: 3-Sector Configuration and Appendix D Cabling Diagrams: Omni Configuration.

For the **AIC**, disconnect the following cabling from the rear of the AIC only:

Index	Part Number	Disconnect From	To	Type
P_12	820-0614-10	AIC: power	PDU: AIC	power
G_13	820-0609-00	AIC: ground	GND BAR	ground
DAT_1	111-0566-00	AIC: ERTM PORT 1	RBS 1: 10/100 RFN A	UTP
DAT_2	111-0566-00	AIC: ERTM PORT 2	RBS 1: 10/100 RFN B	UTP
DAT_3	111-0566-00	AIC: ERTM PORT 3	RBS 1: 10/100 RFN C	UTP
DAT_5	111-0565-00	AIC: ERTM PORT 4	BIC: ERTM PORT 2	UTP

3 Remove the chassis from the rack, and package it for shipment.

4 Remove the 4 front mounting screws (shown with arrows).

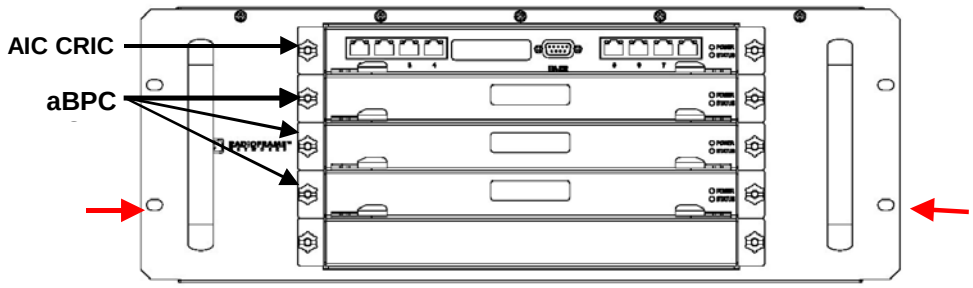


Figure 32 Front view of AIC

5 Mount the replacement chassis.

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

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

Use the SMA torque wrench for all SMA connectors.

7 Using the breakers on the PDU, turn up the **BIC**, **AIC**, and **RBS 1** (and RBS 2 and RBS 3 if present), and then verify that the components are operational before proceeding.

Wait approximately 3 minutes for the following indicators:

- RBS: The STATUS LED for each group will light green in this order: A, B, and then C.
- RBS: The RADIOBLADE STATUS LEDs will light red and then green for each present RadioBlade. If no RB is present, the LED will not light. To verify the contents of the RBS, pull out the shelf (powering off is not required) and inspect the RadioBlades and their respective status LEDs. Reinsert the RBS. 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 rack (see the following illustration).
- BIC CRIC and AIC CRIC: The POWER and STATUS LEDs will light red and then green. All other BIC and AIC card LEDs will light green.

8 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 light green.

9 Complete the procedures in sections 5.4, 5.5 and 5.6.

7.9.2.3 RBS 1 (power down RBS 2 and RBS 3 if they are present)

1 Power down RFN equipment in the following order using circuit breakers on the PDU:

- BIC
- AIC
- RBS 1 (power down RBS 2 and RBS 3 if they are present)
- RF Shelves 1,2 and 3

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

For **RBS 1**, disconnect the following cabling from the rear of the RBS 1 only:

NOTE: If RBS 2 and RBS 3 are present, refer to Appendix C Cabling Diagrams: 3-Sector Configuration and Appendix D Cabling Diagrams: Omni Configuration.

Index	Part Number	Disconnect From	To	Type
P_6	820-0616-50	RBS 1: power	PDU: RBS 1	power
G_8	820-0609-00	RBS 1: ground	GND BAR	ground
RF_1	820-0611-20	RBS 1: Tx A	RF Shelf 1: Tx IN A	RF cable

Index	Part Number	Disconnect From	To	Type
RF_4	820-0611-20	RBS 1: Rx A	RF Shelf 1: Rx OUT A	RF cable
AL_1	820-0607-00	RBS: ALARM INPUT A	RF Shelf 1: ALARM	serial
DAT_1	111-0566-00	RBS 1: 10/100 RFN A	AIC: ERTM PORT 1	UTP
RF_2	820-0611-20	RBS 1: Tx B	RF Shelf 2: Tx IN B	RF cable
RF_5	820-0611-20	RBS 1: Rx B	RF Shelf 2: Rx OUT B	RF cable
AL_2	820-0607-00	RBS: ALARM INPUT B	RF Shelf 2: ALARM	serial
DAT_2	111-0566-00	RBS 1: 10/100 RFN B	AIC: ERTM PORT 2	UTP
RF_3	820-0611-20	RBS 1: Tx C	RF Shelf 3: Tx IN C	RF cable
RF_6	820-0611-20	RBS 1: Rx C	RF Shelf 3: Rx OUT C	RF cable
AL_3	820-0607-00	RBS: ALARM INPUT C	RF Shelf 3: ALARM	serial
DAT_3	111-0566-00	RBS 1: 10/100 RFN C	AIC: ERTM PORT 3	UTP

3 Remove the 4 front mounting screws, remove the chassis from the rack, and then package it for shipment.

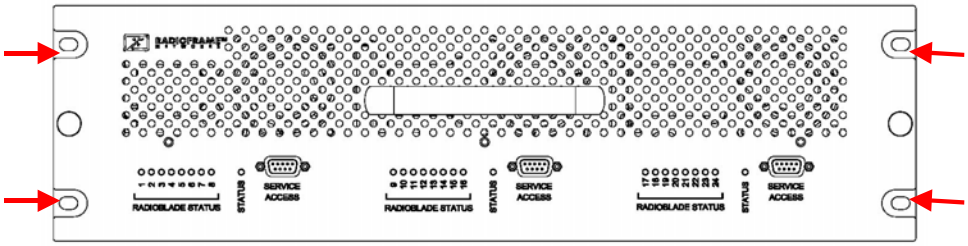


Figure 33 Front view of RBS

4 Mount the replacement chassis.

While supporting the chassis, slide the chassis into the cabinet mounting position. Secure the chassis 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 as defined in Step 2.

Use the SMA torque wrench for all SMA connectors.

6 Using the breakers on the PDU, turn up the **BIC**, **AIC**, and **RBS 1** (and RBS 2 and RBS 3 if present), and then verify that the components are operational before proceeding.

Wait approximately 3 minutes for the following indicators:

- RBS: The STATUS LED for each group will light green in this order: A, B, and then C.
- RBS: The RADIOBLADE STATUS LEDs will light red and then green for each present RadioBlade. If no RB is present, the LED will not light. To verify the contents of the RBS, pull out the shelf (powering off is not required) and inspect the RadioBlades and their

respective status LEDs. Reinsert the RBS. 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 rack (see the following illustration).

- BIC CRIC and AIC CRIC: The POWER and STATUS LEDs will light red and then green. All other BIC and AIC card LEDs will light 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 light green.

8 Complete the procedures in sections 5.4, 5.5 and 5.6.

7.9.3 BIC/AIC– FRU Replacement Procedure

BEFORE REPLACING ANY CARD (board) in the BIC or AIC, power down RFN equipment in the following order using circuit breakers on the PDU:

- BIC
- AIC
- RBS 1 (power down RBS 2 and RBS 3 if they are present)
- RF Shelves 1, 2 and 3

7.9.3.1 Replacing the CRIC (BIC or AIC)

1 Before replacing any card (board) in the BIC or AIC, power down RFN equipment in the following order using circuit breakers on the PDU:

- BIC
- AIC
- RBS 1 (power down RBS 2 and RBS 3 if they are present)
- RF Shelves 1, 2 and 3

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 BIC or AIC, remove the CRIC that is to be replaced, following these guidelines:

- Loosen the blue knurled knobs on both sides of the board.
- Pull firmly on the tabs located on the bottom of the CRIC.
- 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 the following illustration, and follow these guidelines:

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

- Do not mount the board in any orientation other than that specified in the diagram.
- Insert the board straight into the chassis unit so as not to damage any components contained on the board.
- Press firmly to seat the board into the connectors within the chassis unit.
- 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.

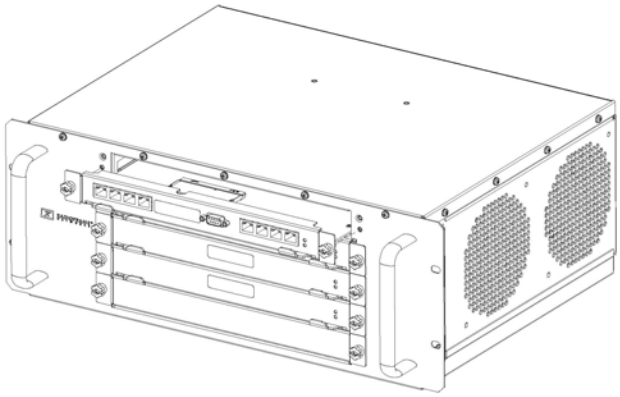


Figure 34 Replacing the CRIC in the BIC or AIC.

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

6 Using the breakers on the PDU, turn up the **BIC**, **AIC**, and **RBS 1** (and RBS 2 and RBS 3 if present), and then verify that the components are operational before proceeding.

Wait approximately 3 minutes for the following indicators:

- RBS: The STATUS LED for each group will light green in this order: A, B, and then C.
- RBS: The RADIOBLADE STATUS LEDs will light red and then green for each present RadioBlade. If no RB is present, the LED will not light. To verify the contents of the RBS, pull out the shelf (powering off is not required) and inspect the RadioBlades and their respective status LEDs. Reinsert the RBS. 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 rack (see the following illustration).
- BIC CRIC and AIC CRIC: The POWER and STATUS LEDs will light red and then green. All other BIC and AIC card LEDs will light 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 light green.

8 FOR THE BIC CRIC ONLY: complete the procedures in sections 5.4, 5.5 and 5.6.

7.9.3.2 BPC (BIC) or BPC+SPAM (AIC)

1 Before replacing any card (board) in the BIC or AIC, power down RFN equipment in the following order using circuit breakers on the PDU:

- BIC
- AIC
- RBS 1 (power down RBS 2 and RBS 3 if they are present)
- RF Shelves 1, 2 and 3

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:

- Loosen the blue knurled knobs on both sides of the board.
- Pull firmly on the tabs located on the bottom of the BPC you are replacing.
- 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 the following illustration, and follow these guidelines:

- Do not jam the board in any way while inserting it.
- Do not mount the board in any orientation other than that specified in the diagram.
- Insert the board straight into the chassis unit so as not to damage any components contained on the board.
- Press firmly to seat the board into the connectors within the chassis unit.
- 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.

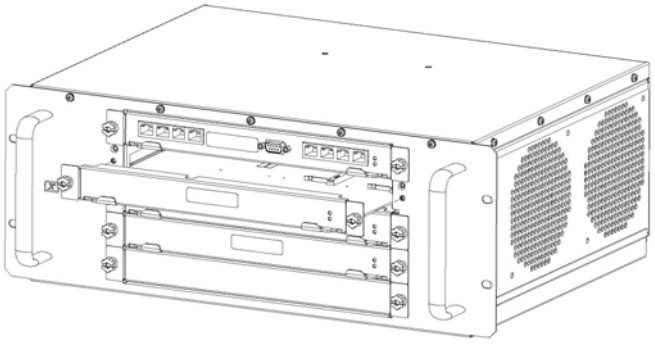


Figure 35 Replacing the BPC in the BIC or the BPC+SPAM in the AIC.

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

6 Using the breakers on the PDU, turn up the **BIC**, **AIC**, and **RBS 1** (and RBS 2 and RBS 3 if present), and then verify that the components are operational before proceeding.

Wait approximately 3 minutes for the following indicators:

- RBS: The STATUS LED for each group will light green in this order: A, B, and then C.
- RBS: The RADIOBLADE STATUS LEDs will light red and then green for each present RadioBlade. If no RB is present, the LED will not light. To verify the contents of the RBS, pull out the shelf (powering off is not required) and inspect the RadioBlades and their respective status LEDs. Reinsert the RBS. 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 rack (see the following illustration).
- BIC CRIC and AIC CRIC: The POWER and STATUS LEDs will light red and then green. All other BIC and AIC card LEDs will light 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 light green.

7.9.3.3 ERTM

1 Before replacing any card (board) in the BIC or AIC, power down RFN equipment in the following order using circuit breakers on the PDU:

- BIC
- AIC
- RBS 1 (power down RBS 2 and RBS 3 if they are present)
- RF Shelves 1, 2 and 3

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.

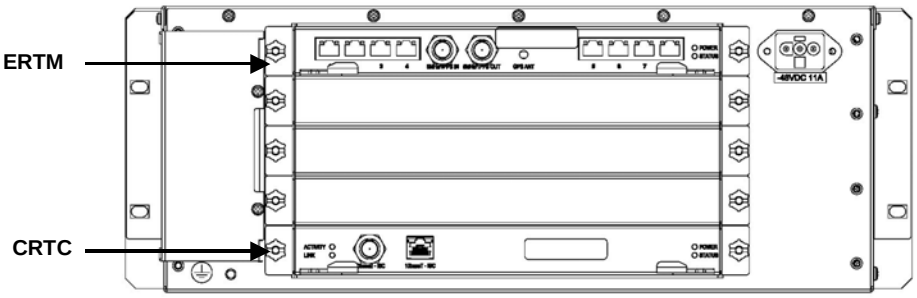
3 Facing the rear of the BIC or AIC, remove the ERTM that is to be replaced following these guidelines:

- Loosen the blue knurled knobs on both sides of the board.
- Pull firmly on the tabs located on the bottom of the ERTM you are replacing.
- 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 the following illustration, and follow these guidelines:

- Do not jam the board in any way while inserting it.
- Do not mount the board in any orientation other than that specified in the diagram.
- Insert the board straight into the chassis unit so as not to damage any components contained on the board.
- Press firmly to seat the board into the connectors within the chassis unit.

- 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 36 Rear of BIC (ERTM and CRTC) and AIC (ERTM only).

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

6 Using the breakers on the PDU, turn up the **BIC**, **AIC**, and **RBS 1** (and RBS 2 and RBS 3 if present), and then verify that the components are operational before proceeding.

Wait approximately 3 minutes for the following indicators:

- RBS: The STATUS LED for each group will light green in this order: A, B, and then C.
- RBS: The RADIOBLADE STATUS LEDs will light red and then green for each present RadioBlade. If no RB is present, the LED will not light. To verify the contents of the RBS, pull out the shelf (powering off is not required) and inspect the RadioBlades and their respective status LEDs. Reinsert the RBS. 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 rack (see the following illustration).
- BIC CRIC and AIC CRIC: The POWER and STATUS LEDs will light red and then green. All other BIC and AIC card LEDs will light 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 light green.

7.9.3.4 CRTC

1 Before replacing any card (board) in the BIC, power down RFN equipment in the following order using circuit breakers on the PDU:

- BIC
- AIC

- RBS 1 (power down RBS 2 and RBS 3 if they are present)
- RF Shelves 1, 2 and 3

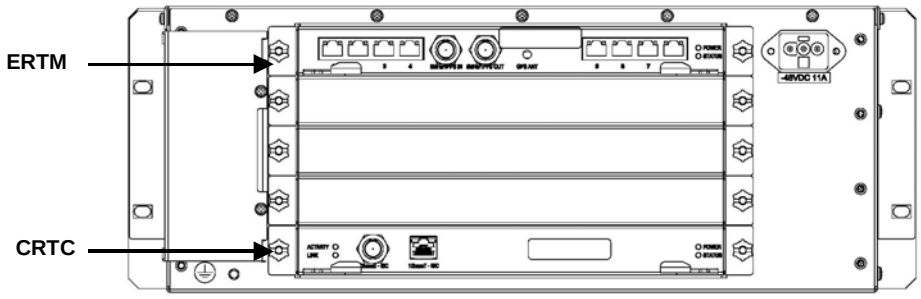
2 Always use a static grounding wrist strap before handling any board—*do not* attach the wrist strap to any painted surface on the chassis unit.

3 Facing the rear of the BIC, remove the CRTC following these guidelines:

- Loosen the blue knurled knobs on both sides of the board.
- Pull firmly on the tabs located on the bottom of the CRTC.
- 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 the following illustration, and follow these guidelines:

- Do not jam the board in any way while inserting it.
- Do not mount the board in any orientation other than that specified in the diagram.
- Insert the board straight into the chassis unit so as not to damage any components contained on the board.
- Press firmly to seat the board into the connectors within the chassis unit.
- 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 **BIC**, **AIC**, and **RBS 1** (and RBS 2 and RBS 3 if present), and then verify that the components are operational before proceeding.

Wait approximately 3 minutes for the following indicators:

- RBS: The STATUS LED for each group will light green in this order: A, B, and then C.
- RBS: The RADIOBLADE STATUS LEDs will light red and then green for each present RadioBlade. If no RB is present, the LED will not light. To verify the contents of the RBS, pull out the shelf (powering off is not required) and inspect the RadioBlades and their respective status LEDs. Reinsert the RBS. 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 rack (see the following illustration).

- BIC CRIC and AIC CRIC: The POWER and STATUS LEDs will light red and then green. All other BIC and AIC card LEDs will light 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 light green.

7.9.4 RadioBlade Replacement

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

Each RadioBlade is shipped wrapped in antistatic packaging, along with a lockdown strap and screw for securing the RB in the RadioBlade Shelf (RBS).

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

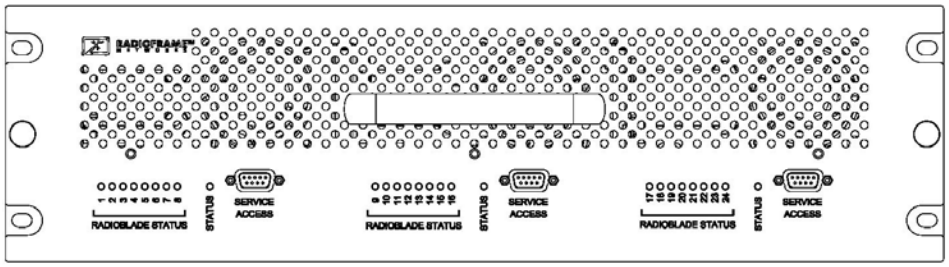


Figure 37 Front view of the RadioBlade Shelf (RBS)

7.9.4.1 2-port Single Ch 800 RB

1 Take the RadioBlade out of service by locking it (refer to the procedure in Appendix G, section G.4 Locking and Unlocking a RadioBlade).

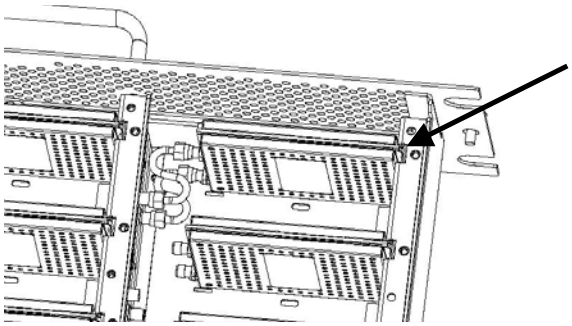
The RBS is divided into three groups (A, B, and C) from left to right. Slots in each group are numbered as follows, from front to back:

- Group A: slots 1 through 8
- Group B: slots 9 through 16
- Group C: slots 17 through 24

2 Pull out the RBS using the handle on the front of the unit.

3 Remove the RadioBlade that is to be replaced (see the following illustration).

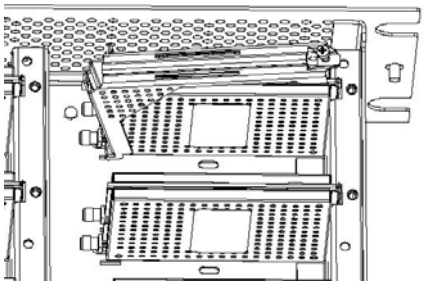
Using the SMA torque wrench, disconnect the Rx and Tx cables from the RadioBlade. Then, loosen the screw of the lockdown strap covering the RadioBlade, and remove the strap and screw and place them aside. Then gently lift and remove the RB from the slot in the RBS backplane. Place the RB in anti-static packaging for shipment.



4 Un-package the replacement RadioBlade to be inserted into the RBS.

5 Insert the RadioBlade into the specified slot in the RBS until the connector seats firmly into the backplane of the RBS.

6 Place the lockdown strap over the RadioBlade by inserting the two feet on the strap into the slots on the RBS backplane, and then hand tighten the screw into place.



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

8 Re-insert the RBS 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 rack (see the following illustration).

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

10 Unlock the RadioBlade.

On the RadioBlade Statistics page, the **State** of the RadioBlade will change from 2 (locked) to 11 (unlocked).

7.9.4.2 Multi Ch 900 RB

TBD

7.9.4.3 Multi Ch 800 RB

TBD

7.9.5 Power Distribution Unit

The Power Distribution Unit (PDU) receives DC input and supplies power via dedicated circuit breakers to each component in the MC-Series 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 rack, and then package it for shipment.

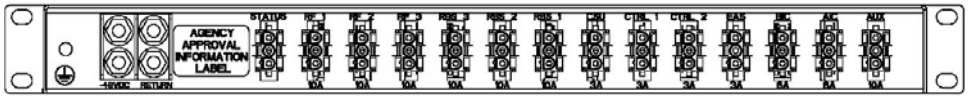


Figure 38 PDU Rear view

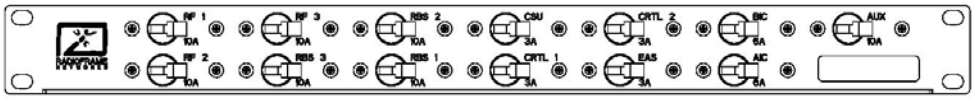


Figure 39 PDU rear view

6. Mount the replacement PDU.

   While supporting the PDU, slide it into the cabinet mounting position. Secure the PDU to the cabinet mounting rails using the four mounting screws provided with the unit. Tighten the screws to 4.5 Nm (40 in-lb).
7. Reconnect all power connections to the back of the PDU.
8. Follow Power supply and battery manufacturer's installation and maintenance documentation to install power to PDU.
9. Using the breakers on the PDU, turn up the **BIC**, **AIC**, and **RBS 1** (and RBS 2 and RBS 3 if present), and then verify that the components are operational before proceeding.

   Wait approximately 3 minutes for the following indicators:

   - RBS: The STATUS LED for each group will light green in this order: A, B, and then C.

- RBS: The RADIOBLADE STATUS LEDs will light red and then green for each present RadioBlade. If no RB is present, the LED will not light. To verify the contents of the RBS, pull out the shelf (powering off is not required) and inspect the RadioBlades and their respective status LEDs. Reinsert the RBS. 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 rack (see the following illustration).
- BIC CRIC and AIC CRIC: The POWER and STATUS LEDs will light red and then green. All other BIC and AIC card LEDs will light green.

10 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 light green.

11 Complete the procedures in sections 5.4, 5.5 and 5.6.

7.10 TOR Tx Measurement Procedure

1 Measure the output from the Tx 1, Tx 2, and Tx 3 connectors at the top of the cabinet using a digital RF power meter.

NOTE: Test only the Tx 1 connector in an omni configuration.

2 Adjust the power budget of the DAS using the variable TX ATTENUATION knobs on the front panel of each RF Shelf.

The outside knob adjusts in 10 dB increments, and the inside knob adjusts in 1 dB increments, up to 50 db maximum.

NOTE: The variable attenuators only impact the RF downlink. If large values of attenuation are required, consider adding external attenuation to the uplink of the Rx port to maintain link balance.

3 Make sure the Nextel-provided coax jumpers have been swept.

4 Connect the jumpers between the TOR Tx 1 and DAS RF IN, and then connect the jumpers between the TOR Rx 1 and DAS RF OUT.

In a sectored MC-Series System, connect the jumpers to the DAS commensurate with the sector coverage area and hub locations per Nextel design.

5 Measure the output at the DAS remote unit(s) to verify power budget accuracy.

8 System Configuration Changes

8.1 Upgrading MC-Series System Software

The MC-Series 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*. The following procedures describe how to upgrade MC-Series 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.

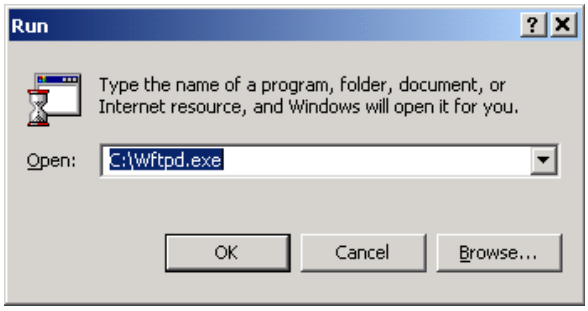
8.1.1 Download MC-Series System Software to the Laptop Computer

1 Download RFN_XXX, a self-extracting zip file from:

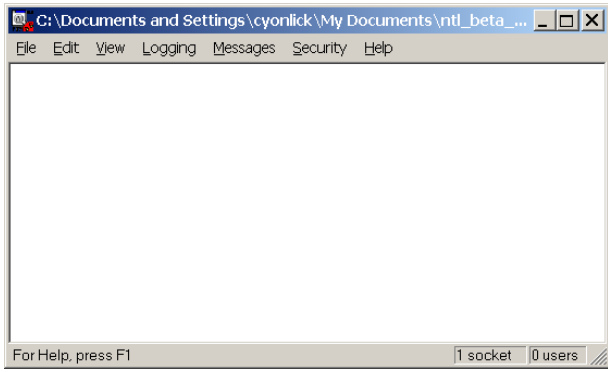
http://www.radioframenetworks.com/support/nextel/sw

Install/extract the zip file directly into the C:/ drive on the laptop. This also installs an FTP (file transfer protocol) server application (Wftpd.exe) and three directories: docs, platform, and iden. If Wftpd.exe is already installed on the laptop, skip to step .

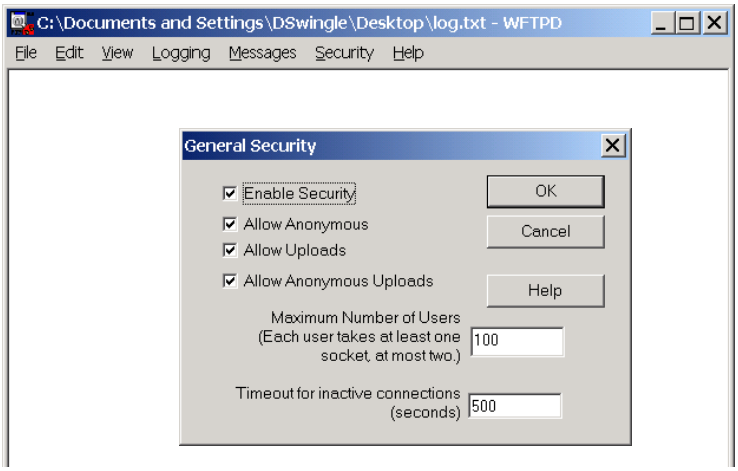
2 Open FTP Server – **START** menu ➔ **RUN** ➔ C:\Wftpd.exe.



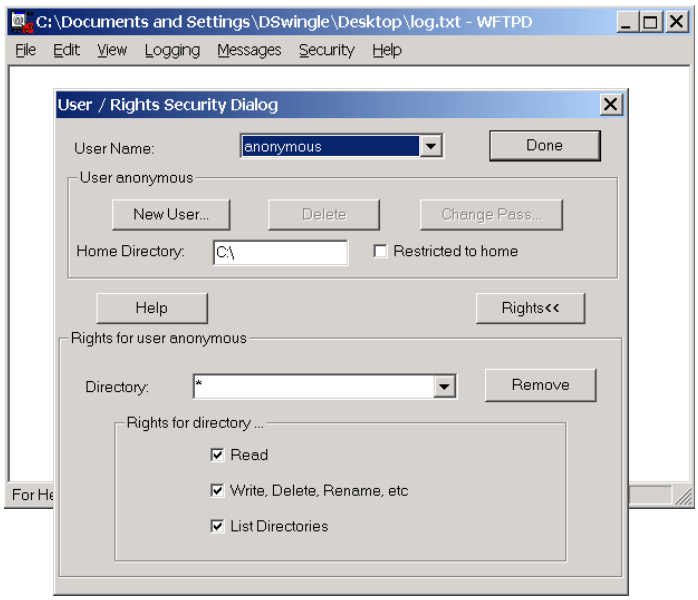
The following configuration is for Wfptd:



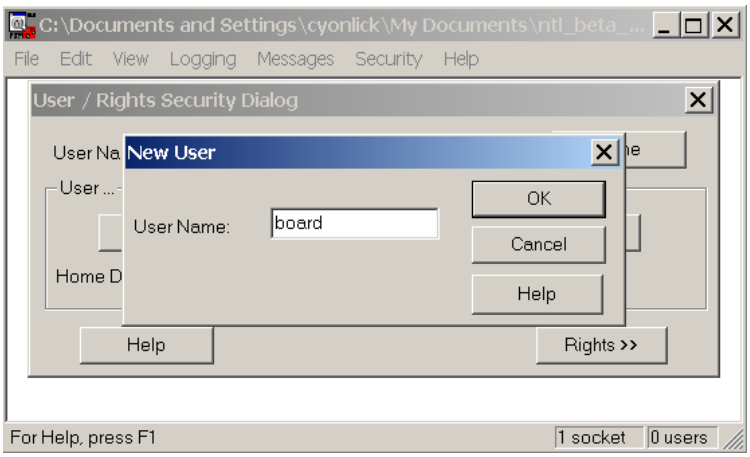
3 From the **Security menu**, select **General**, configure the General Security page as shown, and then select **OK**.



4 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 below.

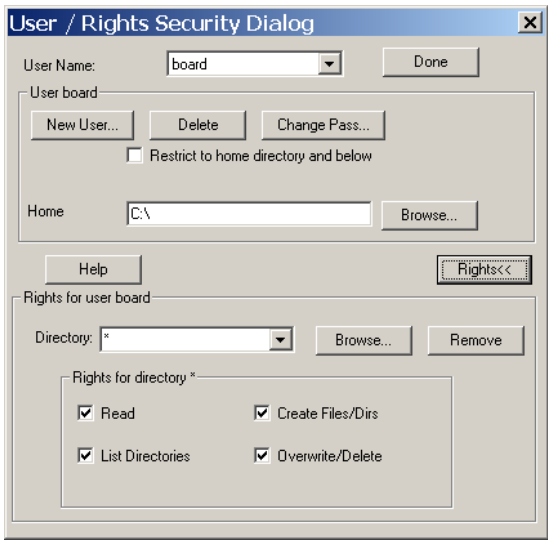


5 Select the **New User…** button, and then for **User Name** type **board** in the text box, and then select **OK**.



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

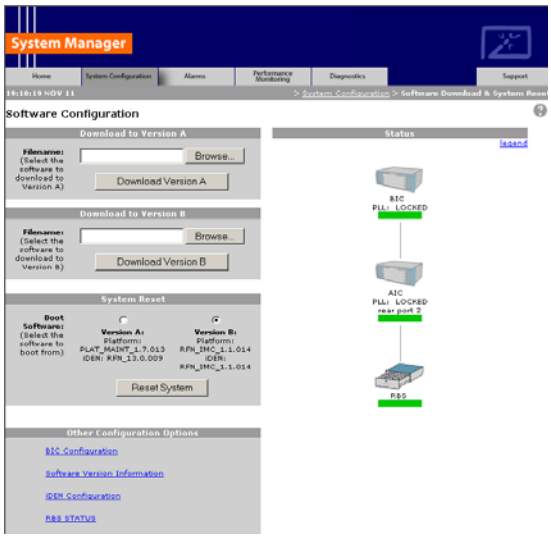
7 The User/Rights Security dialog box reappears, and the **User Name** is now set to **board**. Select the **Rights** button and verify that the settings are the same as shown below, and then select **Done**.



8.1.2 Install the MC-Series System Software Update

1 Connect the laptop to the MC-Series System, start System Manager, and log in (for complete instructions, refer to section 5.4 System Setup).

2 Select the **Software Download & System Reset** link on the System Configuration page.



3 Download **platform_download.txt** to the inactive partition.

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.

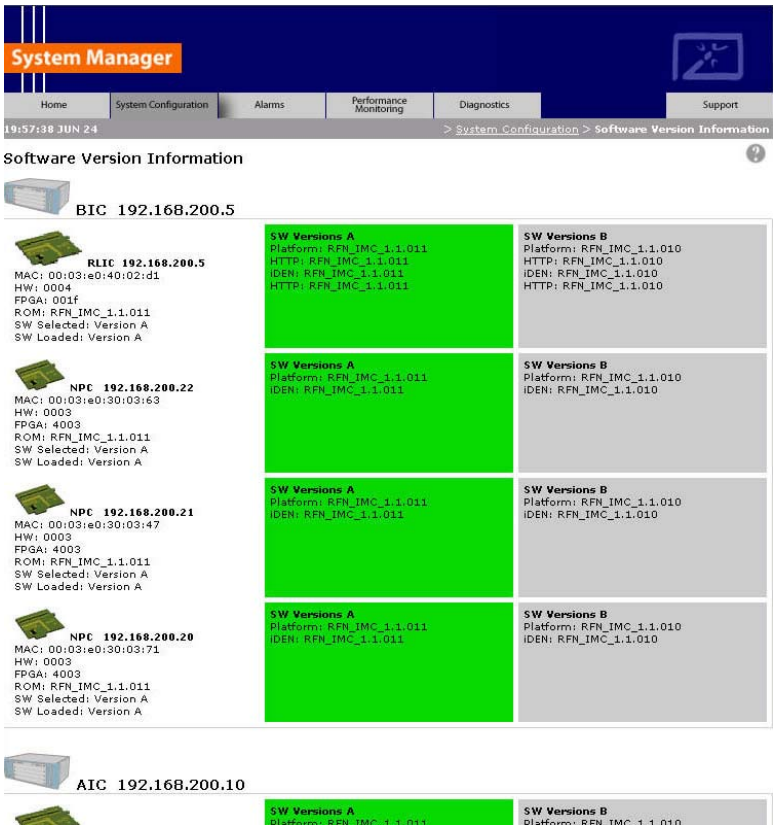
4 Download **iden_download.txt** to the inactive partition.

5 Under **System Reset**, select the inactive partition and then select the **Reset System** button.

Wait for the download to complete successfully, which may take several minutes.

8.1.3 Verify the Software Download

1 Select the **Software Version Information** link on the Software Configuration 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.

8.1.4 Reverting to the previous version of software

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

1. Select the **Software Download & System Reset** on the System Configuration page.
2. 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.

8.2 Adding or Removing RadioBlades

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

Each RadioBlade is shipped wrapped in antistatic packaging, along with a lockdown strap and screw for securing the RB in the RadioBlade Shelf (RBS).

Follow the procedure in section 7.7.1. Replacing an iDEN 2-Port RadioBlade Transceiver to add or remove a RadioBlade.

8.3 Adding a Sector

To add a sector to the MC-Series System, connect and power RF Shelf 2 or RF Shelf 3. To add one sector, connect and power RF Shelf 2. To add two sectors, connect and power RF Shelf 2 and RF Shelf 3. Refer to Appendix C Cabling Diagrams: 3-Sector Configuration.

1. Have the site configuration available.
2. In System Manager, display the iDEN Configuration page, and change the cabinet/positions (and quad BRs or adjacent channel assignments) as required for the new configuration (refer to the site datafill).
3. Power down all RFN equipment in the following order using circuit breakers on the PDU:
   - BIC
   - AIC
   - RBS 1 (RBS 2 and RBS 3 if present)
   - RF Shelf 1 (if present and powered, RF Shelf 2 or RF Shelf 3)
4. If a new RF shelf must be installed for the new configuration, mount it now.

   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 Remove the following terminations from the rear of each RF shelf to be added to the configuration:

- RF Shelf 2:Tx IN B and Rx OUT B
- RF Shelf 3:Tx IN C and Rx OUT C

6 Reconnect the following RF cables:

Index	Part Number	From	To	Type
RF_2	820-0611-20	RF Shelf 2: Tx IN B	RBS 1: Tx B	RF cable
RF_5	820-0611-20	RF Shelf 2: Rx OUT B	RBS 1: Rx B	RF cable
RF_3	820-0611-20	RF Shelf 3: Tx IN C	RBS 1: Tx C	RF cable
RF_6	820-0611-20	RF Shelf 3: Rx OUT C	RBS 1: Rx C	RF cable

7 Reconnect terminations to RF Shelf 1:

Index	Part Number	To	Notes
T2	820-0609-00	RF Shelf 1: Tx IN B	If adding RF Shelf 2
T4	820-0609-00	RF Shelf 1: Rx OUT B	If adding RF Shelf 2
T3	820-0609-00	RF Shelf 1: Tx IN C	If adding RF Shelf 3
T5	820-0609-00	RF Shelf 1: Rx OUT C	If adding RF Shelf 3

8 Remove the dust caps (RFN P/N: 546-0005-00) from cables RF_15 and RF_16 (RF Shelf 2) and/or RF_21, and RF_22 (RF Shelf 3).

9 Remove the dust caps (RFN P/N: 546-0003-00) from TOR Tx 2 and Rx 2 (RF Shelf 2) and/or TOR Tx 3 and Rx 3 (RF Shelf 3).

10 Reconnect the following RF cables:

Index	Part Number	From	To	Type
RF_15	820-0610-30	RF Shelf 2: TX OUT	TOR: Tx 2	RF cable
RF_16	820-0610-30	RF Shelf 2: RX IN	TOR: Rx 2	RF cable
RF_21	820-0610-30	RF Shelf 3: TX OUT	TOR: Tx 3	RF cable
RF_22	820-0610-30	RF Shelf 3: RX IN	TOR: Rx 3	RF cable

11 If the new configuration is two sectors only, RF Shelf 3 remains in the rack and **must remain unpowered**.

12 Push the new datafill load to the iSC.

13 Using the breakers on the PDU, turn up the **BIC**, **AIC**, and **RBS 1** (RBS 2 and RBS 3 if present), and then verify that the components are operational before proceeding.

Wait approximately 3 minutes for the following indicators:

- RBS: The STATUS LED for each group will light green in this order: A, B, and then C.
- RBS: The RADIOBLADE STATUS LEDs will light red and then green for each present RadioBlade. If no RB is present, the LED will not light. To verify the contents of the RBS, pull out the shelf (powering off is not required) and inspect the RadioBlades and their

respective status LEDs. Reinsert the RBS. 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 rack (see the following illustration).

- BIC CRIC and AIC CRIC: The POWER and STATUS LEDs will light red and then green. All other BIC and AIC card LEDs will light green.

14 Using the breaker on the PDU, turn up **RF Shelf 1** and **RF Shelf 2**.
Do not turn up RF Shelf 3. Verify that RF Shelf 1 and RF Shelf 2 are operational before proceeding.

The POWER and ALARM LEDs on the front of each RF shelf will light green.

15 Complete the procedure in section 7.8 TOR Tx Measurement Procedure.

8.4 Removing a Sector

To remove a sector from the MC-Series System, disconnect an RF shelf. To remove one sector, disconnect RF Shelf 3. To remove two sectors, disconnect both RF Shelf 2 and RF Shelf 3. Refer to Appendix C Cabling Diagrams: 3-Sector Configuration.

1 Have the site configuration available.

2 In System Manager, display the iDEN Configuration page, and change the cabinets and positions (and quad BRs or adjacent channel assignments) as required for the new configuration (refer to the site datafill).

3 Power down all RFN equipment in the following order using circuit breakers on the PDU:

- BIC
- AIC
- RBS 1 (RBS 2 and RBS 3 if present)
- RF shelf 1, 2, and 3

4 Remove the following terminations from RF Shelf 1:

- RF Shelf 2: Tx IN B and Rx OUT B
- RF Shelf 3: Tx IN C and Rx OUT C

5 Reconnect terminations to:

- RF Shelf 2: Tx IN B and Rx OUT B
- RF Shelf 3: Tx IN C and Rx OUT C

6 Reconnect the following RF cables to RF Shelf 1:

Index	Part Number	From	To	Type
RF_2	820-0611-20	RF Shelf 2: Tx IN B	RF Shelf 1: Tx IN B	RF cable
RF_5	820-0611-20	RF Shelf 2: Rx OUT B	RF Shelf 1: Rx OUT B	RF cable
RF_3	820-0611-20	RF Shelf 3: Tx IN C	RF Shelf 1: Tx IN C	RF cable
RF_6	820-0611-20	RF Shelf 3: Rx OUT C	RF Shelf 1: Rx OUT C	RF cable

7 Reconnect terminations to:

- RF Shelf 2: Tx IN B and Rx OUT B
- RF Shelf 3: Tx IN C and Rx OUT C

8 The disconnected RF shelf (or shelves) remain in the rack and must remain **unpowered**.

The following cables may remain as long the RF shelf remains unpowered:

Index	Part Number	From	To	Type
AL_2	820-0607-00	RF Shelf 2: ALARM	RBS: ALARM INPUT B	serial
RF_15	820-0610-30	RF Shelf 2: TX OUT	TOR: Tx 2	RF cable
RF_16	820-0610-30	RF Shelf 2: RX IN	TOR: Rx 2	RF cable
AL_3	820-0607-00	RF Shelf 3: ALARM	RBS: ALARM INPUT C	serial
RF_21	820-0610-30	RF Shelf 3: TX OUT	TOR: Tx 3	RF cable
RF_22	820-0610-30	RF Shelf 3: RX IN	TOR: Rx 3	RF cable

9 Place dust caps (RFN P/N: 546-0005-00) on cables (end not going to TOR):

- RF Shelf 2: RF_15 and RF_16
- RF Shelf 3: RF_21 and RF_22

10 Place dust caps (RFN P/N: 546-0003-00) on the TOR:

- RF Shelf 2: Tx 2 and Rx 2
- RF Shelf 3: Tx 3 and Rx 3

11 Push the new datafill load to the iSC.

12 Using the breakers on the PDU, turn up the **BIC**, **AIC**, and **RBS 1** (RBS 2 and RBS 3 if present), and then verify that the components are operational before proceeding.

- RBS: The STATUS LED for each group will light green in this order: A, B, and then C.
- RBS: The RADIOBLADE STATUS LEDs will light red and then green for each present RadioBlade. If no RB is present, the LED will not light. To verify the contents of the RBS, pull out the shelf (powering off is not required) and inspect the RadioBlades and their respective status LEDs. Reinsert the RBS. 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 rack (see the following illustration).
- BIC CRIC and AIC CRIC: The POWER and STATUS LEDs will light red and then green. All other BIC and AIC card LEDs will light green.

13 Using the breakers on the PDU, turn up **RF Shelf 1 only**. Do not turn up RF Shelf 2 and RF Shelf 3 unless part of the new configuration. Verify that RF Shelf 1 is operational before proceeding.

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

8.5 Parts and Suppliers

This 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 System.

8.5.1 Rack screws

8.5.2 Anchors

Hilti

8.5.3 Cables and Connectors

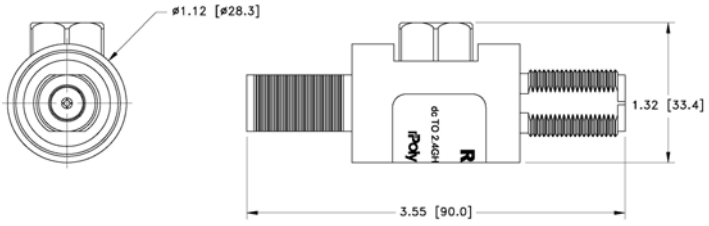
8.5.4 Matching Terminals for PDU and Ground

Select from the following list of termination lugs (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.

1.	LCD2-14A-Q	2 AWG	STRAIT	(QTY: 25 per pk.)
2.	LCD2-14AF-Q	6 AWG	STRAIT	(25/pk)
3.	LCD6-14A-L	2 AWG	RIGHT ANGLE	(50/pk)
4.	LCD6-14AF-L	6 AWG	RIGHT ANGLE	(50/pk)
5.	Crimp Tool needed: CT-1700			

8.5.5 GPS surge arrestor

PolyPhaser RGT Broadband DC Pass Protector



Current:	10Adc
Insertion Loss:	≤ 0.25dB
Freq. Range:	0-2400MHz
Mounting:	Bulkhead
Operating Voltage:	+/-60 Volts
Protected Side Connector:	N Female 50Ω
Replaceable Gas Tube:	Yes
Surge Side Connector:	N Female 50Ω
Throughput Energy:	≤ 2283µJ for 3kA @ 8/20µs Waveform
Turn-On Voltage:	+/-180 Volts
Unit Impedance:	50Ω
Voltage Standing Wave Ratio:	1.28 : 1
Weatherized:	Bellcore #TA-NWT-000487 Procedure 4.11, Wind Driven (120 mph) Rain Intrusion.

8.5.6 RF Feed Throughs (N-type connectors)

514-0001-99 Terminator, N-M w/ chain 2W 6GHz, 18db max VSWR @ 6GHz

S.M Electronics P/N: STN0610C

8.6 Available Field Replaceable Units (FRUs)

The MC-Series System has been designed so that Field Repairable Units (FRUs) can be replaced to restore normal system operation as quickly as possible. The following table lists RadioFrame Networks FRUs. For equipment not supplied by RadioFrame Networks, follow standard Nextel policies and procedures for FRU replacement. For more information, refer to section 1.4.3 Field Replaceable Unit (FRU) Policy.

Table 7 MC-Series System FRUs

P/N	Description
176-0840-xx	800 MHz MC Series iDEN 2-Port RadioBlade (RB) Transceiver
176-0870-xx	800 MHz RF Shelf
176-0535-xx	RadioBlade Transceiver Shelf (RBS)

P/N	Description
176-0800-xx	MC-15 Airlink Interface Chassis (AIC)
176-0900-xx	MC-15 BTS Interface Chassis (BIC)
176-7570-xx	Base Processing Card (BPC)
176-7550-xx	Base Processing Card (BPC) with SPAM
176-7540-xx	Common RadioFrame Interface Card (CRIC)
176-7562-xx	Ethernet Rear Transition Module (ERTM)
176-7510-xx	Signal Processing Array Module (SPAM)
176-0820-xx	CRTC
176-7502-xx	4U Chassis
176-0600-xx	PDU
176-1219-xx	Fan Tray w/Fans for 4U Chassis
176-0011-xx	Fan for RBS, RF Shelf, AIC & BIC

8.7 Spares

Nextel will purchase spare parts for the MC-Series System on an as-needed basis from RadioFrame Networks. At minimum, RadioFrame Networks will make available for purchase by Nextel, and Nextel will purchase, spare MC-Series System parts and components in the quantities set forth below:

Figure 40 1% onsite sparing of iDEN 2-port and multi-Channel RadioBlade transceivers (one minimum of each per site)

Figure 41 2% regional sparing of the following (one minimum per region):

- iDEN 2-port RadioBlade Transceiver
- iDEN Multi-Channel RadioBlade
- RF Shelf
- RBS
- AIC
- BIC

Unless otherwise agreed by RadioFrame Networks and Nextel, RadioFrame Networks will act as Nextel's depot for Regional Spares purchased by Nextel. Such Regional Spares will be owned by Nextel and will be shipped to the U.S. location designated by Nextel within one (1) business day following Nextel's request. Such spares will be shipped at Nextel's expense via overnight courier or other shipping method requested by Nextel.

A. Glossary

Acronym	Term	Description
10Base2		10Base2 is also known as Thin Ethernet. 10Base2 cables support transmission speeds up to 10 Mbits/second. The maximum distance per segment is 185 meters.
10BaseT		10BaseT is the most common form of Ethernet cabling. The cable is thinner and more flexible than the coaxial cable used for the 10Base2 standard. 10BaseT is also known as unshielded twisted-pair (UTP). 10BaseT cables support speeds up to 10 Mbps. The maximum distance per segment is 500 meters.
AIC	Airlink Interface Chassis	The central baseband processing unit for the MC-Series System, providing Rx/Tx airlink traffic to/from RBSs.
BIC	BTS Interface Chassis	The central network processing unit for the MC-Series System. Also central management entity for managing configuration and User Information.
BPC	BTS Processing Cards	Interface to the BIC CRIC for the bi-directional transfer of voice I and Q samples to/from RBS.
BPC+SPAM	BPC+SPAM	Interface to the AIC CRIC for the control of RBS components and the transfer of voice I/Q samples to/from RBS.
CRIC	Common RadioFrame Interface Card	In the BIC, provides Ethernet switching to/from the AIC, and serves as the primary controller of the BPCs. In the AIC, provides Ethernet switching to/from the AIC and the RBS, and serves as the primary controller of the BPC+SPAMs.
CRTC	Coax-to-RJ45 Transceiver Card	Provides 10base2 (coaxial television) conversion to 10baseT (RJ45). This card connects the 10base2 cable coming from the iSC to Port 1 of the BIC.
CSU	Channel Service Unit	The CSU provides the T1 connection between the iSC-3 and the telephone company that provides the T1 line.
EAS	Environmental Alarm System	The EAS provides a central location for site alarm signal processing. The EAS monitors environmental conditions of the site, including power, smoke alarms, and intrusion alarms.
EIA	Electronic Industries Alliance	The EIA organization establishes electronic interface standards.
ERTM	Ethernet Rear Transition Module	In the BIC, provides timing and data to the AIC. In the AIC, provides timing and data to the RBS.
ESD	Electrostatic Discharge	The dissipation of electricity, commonly known as a shock. ESD can destroy semiconductor products, even when the discharge is too small to be felt.
FRU	Field Replaceable Unit	Any unit (module, board, or card) that can be “hot-swapped”, that is, replaced with another unit while the power is connected to the item housing the unit.
GPS	Global Positioning System	A system that uses geostationary satellites to triangulate the position of a GPS receiver located on earth.
iDEN	integrated Digital Enhanced Network	Motorola's proprietary digital technology that combines the capabilities of a standard analog dispatch system with that of a cellular interconnect system. iDEN uses an advanced proprietary modulation technology consisting of a speech compression scheme enabling three or six communication paths over a single 25 kHz RF channel.

Acronym	Term	Description
iSC	integrated Site Controller	The controller and communications gateway between the MC-Series System and the Nextel central network. The iSC is required for all RadioFrame Networks iDEN installations.
MC-Series	MC-Series System	Digital Communication System for indoor wireless device users. The MC-Series System consists of several components: BIC, AIC, RBS and iDEN RadioBlades.
MIB	Management Information Base	A database of network performance information.
PDU	Power Distribution Unit	The panel used for distributing power to the units within the cabinet.
RB	RadioBlade	Provides the airlink interface for the iDEN standard.
RFN	RadioFrame Networks	Equipment designer and manufacturer of MC-Series System equipment.
RFS	RadioFrame System	See MC-Series.
RSSI	Received Signal Strength Indication	Strength of the received call signal, in dBm.
SELV	Safety Extra-Low Voltage	A secondary electrical circuit designed so that under normal and signal fault conditions, its voltages do not exceed a safe-value.
SPAM	Signal Processing Array Module	A connectorized card that plugs into the BPC to provide digital signal processing resources.
SQE	Signal Quality Estimate	An estimate of signal quality, based on the received signal strength and quality.
T1	Digital Transmission Rate 1	T1—A North American leased-line connection capable of carrying 1.544 megabits of data per second (Mbps). T1 lines are commonly used to connect networks, ISPs and others to the Internet. An E-1 line is the European equivalent to the North American T1. However, an E-1 line carries information at the rate of 2.048 Mbps instead of the 1.544 Mbps of a T1.
T568B		Wiring standard for MC-Series System CAT-5 cables. Denotes a specific order of the CAT-5 wires leading into the RJ-45 connector.
TAC	Technical Assistance Center	RadioFrame Networks customer support is available 24x7x365: 1-800-328-0847
TOR	Top of Rack	Used to refer to the top of the rack.

B. Default IP Addresses

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 System.

Device	Card Type	Chassis Slot/Port	IP Address	
Laptop	N/A	N/A	169. 254.200.	5
BIC	CRIC	Slot 0	192.168.200.	5
	BPC	Slot 1	192.168.200.	6
	BPC	Slot 2	192.168.200.	7
	BPC	Slot 3	192.168.200.	8
AIC	CRIC	Slot 0	192.168.200.	20
	APC	Slot 1	192.168.200.	21
	APC	Slot 2	192.168.200.	22
	APC	Slot 3	192.168.200.	23
RBS	backplane	Group 1	192.168.200.	98
		Group 2	192.168.200.	99
		Group 3	192.168.200.	100

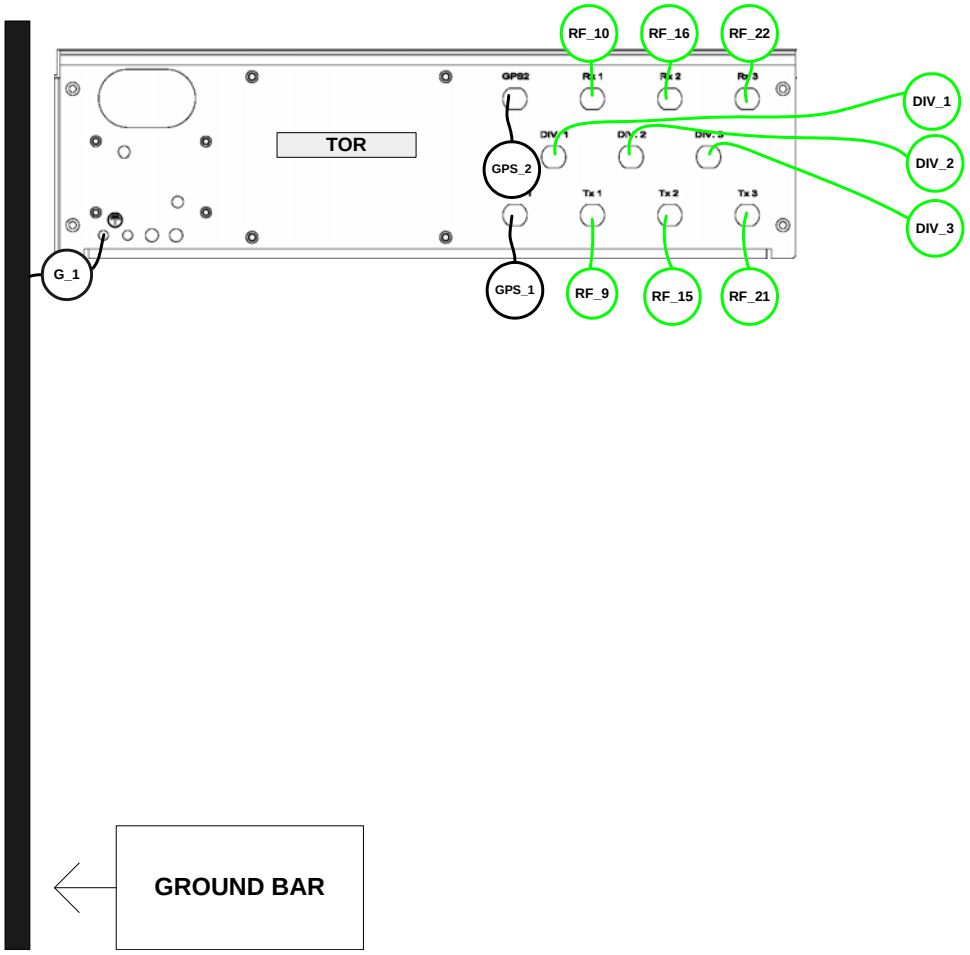
C. Cabling Diagrams: 3-Sector Configuration

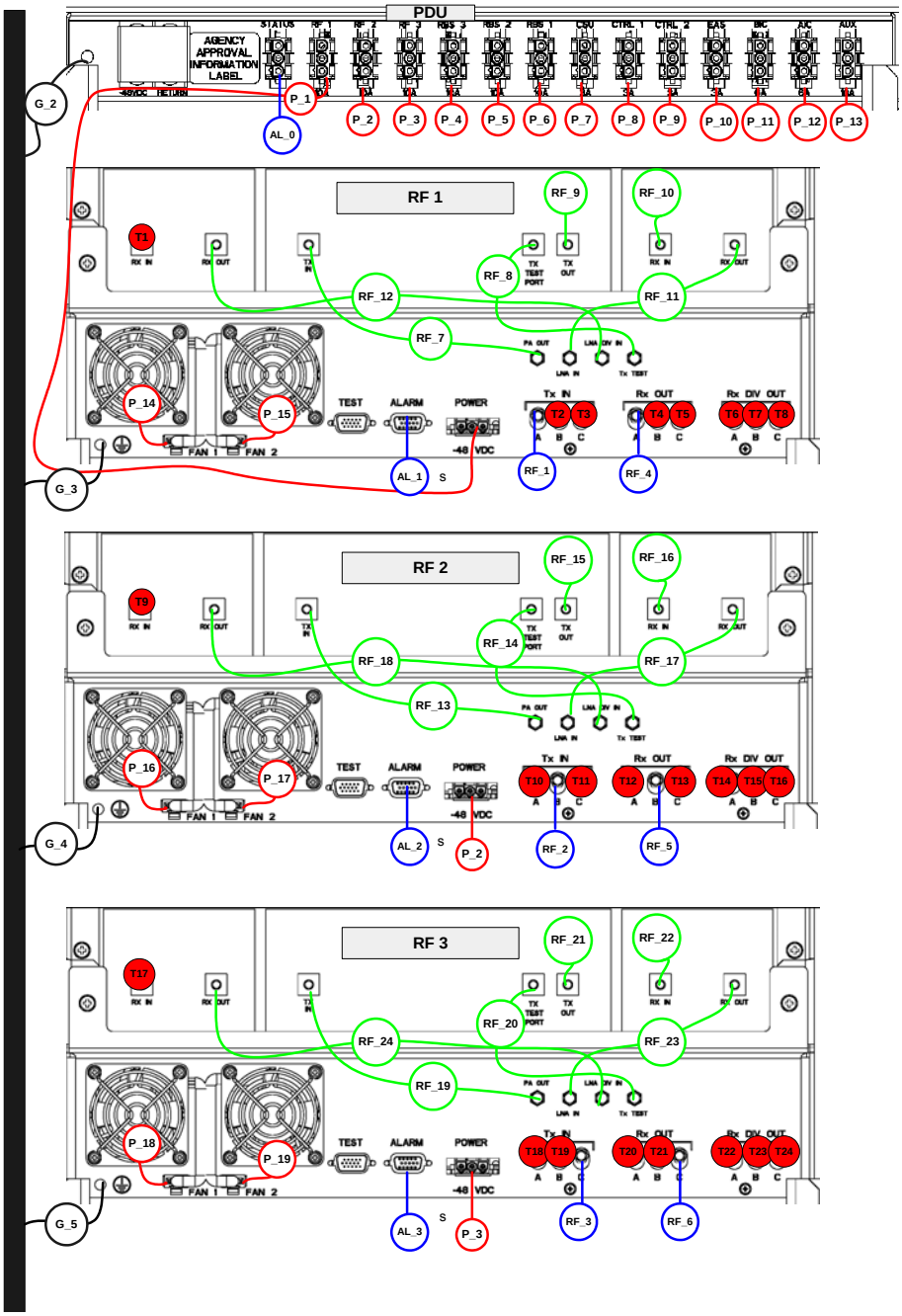
The following table is the index to the following three figures that show cabling for the standard 3-sector MC-Series System.

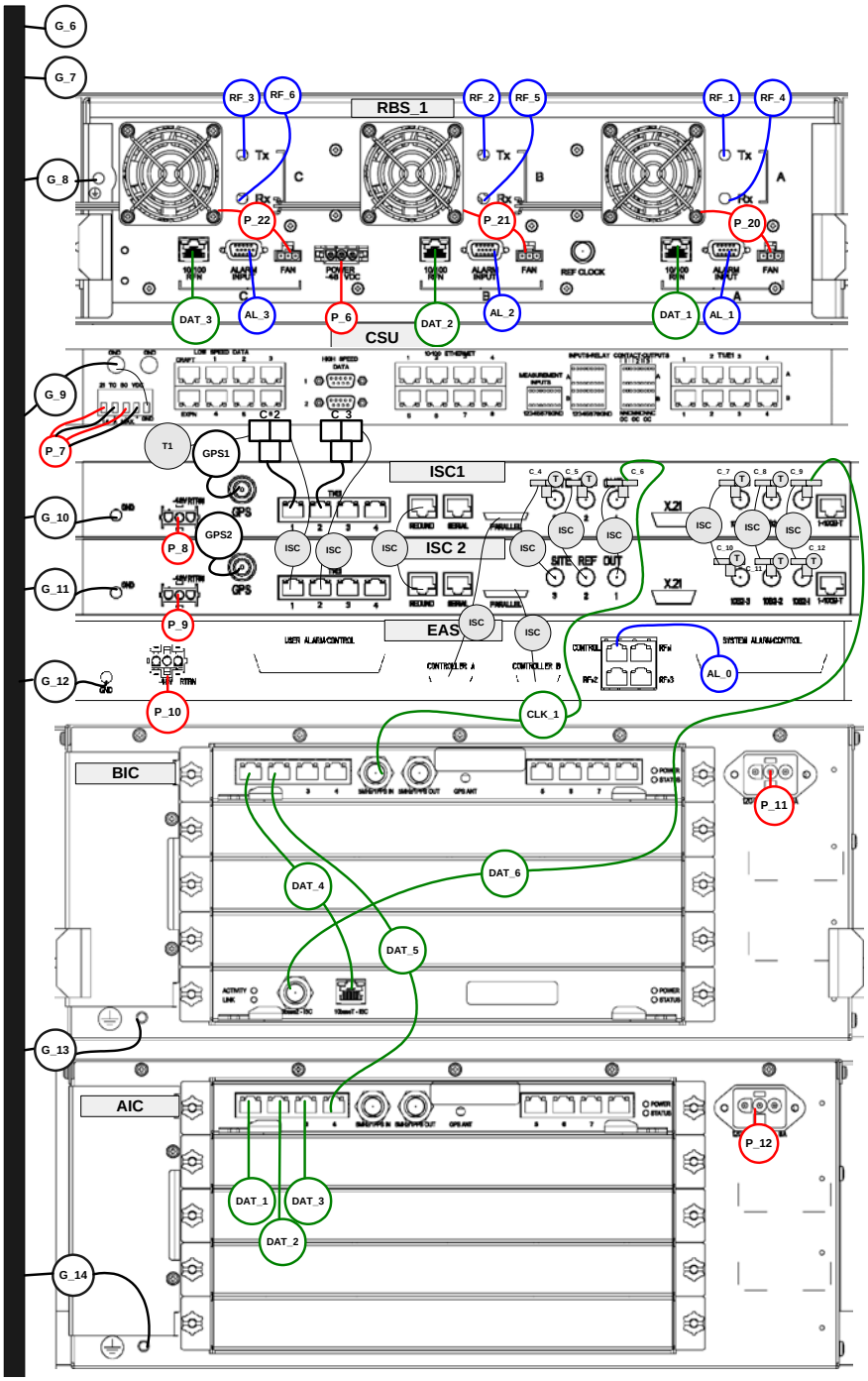
Power	Part Number	From	To	Notes
P_1	820-0616-10	PDU: RF 1	RF Shelf 1	Power
P_2	820-0616-10	PDU: RF 2	RF Shelf 2	Power
P_3	820-0616-20	PDU: RF 3	RF Shelf 3	Power
P_4	820-0616-30	PDU: RBS 3	RBS 3	Power: connected to PDU only
P_5	820-0616-30	PDU: RBS 2	RBS 2	Power: connected to PDU only
P_6	820-0616-50	PDU: RBS 1	RBS 1	Power
P_7	820-0615-50	PDU: CSU	CSU	Power
P_8	820-0613-50	PDU: CTRL 1	ISC 1	Power: primary iSC
P_9	820-0613-50	PDU: CTRL 2	ISC 2	Power: secondary iSC
P_10	820-0616-50	PDU: EAS	EAS	Power
P_11	820-0614-00	PDU: BIC	BIC	Power
P_12	820-0614-10	PDU: AIC	AIC	Power
P_13		PDU: AUX		Power: left unconnected
P_14	102-0011-04	RF Shelf 1: Fan 1	RF Shelf 1: FAN	Power
P_15	102-0011-04	RF Shelf 1: Fan 2	RF Shelf 1: FAN	Power
P_16	102-0011-04	RF Shelf 2: Fan 1	RF Shelf 2: FAN	Power
P_17	102-0011-04	RF Shelf 2: Fan 2	RF Shelf 2: FAN	Power
P_18	102-0011-04	RF Shelf 3: Fan 1	RF Shelf 3: FAN	Power
P_19	102-0011-04	RF Shelf 3: Fan 2	RF Shelf 3: FAN	Power
P_20	102-0011-04	RBS 1: Fan	RBS 1: FAN A	Power
P_21	102-0011-04	RBS 1: Fan	RBS 1: FAN B	Power
P_22	102-0011-04	RBS 1: Fan	RBS 1: FAN C	Power
Ground	**Part Number**	**From**	**To**	**Notes**
G_1	TBD	TOR	GND BAR	
G_2	820-0609-00	PDU	GND BAR	
G_3	820-0609-00	RF Shelf 1	GND BAR	
G_4	820-0609-00	RF Shelf 2	GND BAR	
G_5	820-0609-00	RF Shelf 3	GND BAR	
G_6	820-0609-00	RBS 3	GND BAR	connected only to GND BAR
G_7	820-0609-00	RBS 2	GND BAR	connected only to GND BAR
G_8	820-0609-00	RBS 1	GND BAR	
G_9	820-0609-10	CSU	GND BAR	
G_10	820-0609-10	ISC1	GND BAR	
G_11	820-0609-10	ISC2	GND BAR	
G_12	820-0609-10	EAS	GND BAR	
G_13	820-0609-00	BIC	GND BAR	
G_14	820-0609-00	AIC	GND BAR	

RF	Part Number	From	To	Notes
GPS_1	820-0620-00	ISC 1: GPS	TOR: GPS 1	RF CABLE
GPS_2	820-0620-00	ISC 2: GPS	TOR: GPS 2	RF CABLE
RF_1	820-0611-20	RF Shelf 1: Tx IN A	RBS 1: Tx A	RF CABLE
RF_2	820-0611-20	RF Shelf 2: Tx IN B	RBS 1: Tx B	RF CABLE
RF_3	820-0611-20	RF Shelf 3: Tx IN C	RBS 1: Tx C	RF CABLE
RF_4	820-0611-20	RF Shelf 1: Rx OUT A	RBS 1: Rx A	RF CABLE
RF_5	820-0611-20	RF Shelf 2: Rx OUT B	RBS 1: Rx B	RF CABLE
RF_6	820-0611-20	RF Shelf 3: Rx OUT C	RBS 1: Rx C	RF CABLE
RF_7	820-0600-10	RF Shelf 1: TX IN	RF Shelf 1: PA OUT	RF CABLE
RF_8	820-0600-00	RF Shelf 1: TX TEST PORT	RF Shelf 1: Tx TEST	RF CABLE
RF_9	820-0610-30	RF Shelf 1: TX OUT	TOR: Tx 1	RF CABLE
RF_10	820-0610-30	RF Shelf 1: RX IN	TOR: Rx 1	RF CABLE
RF_11	820-0600-10	RF Shelf 1: RX OUT	RF Shelf 1: LNA IN	RF CABLE
RF_12	820-0600-20	RF Shelf 1: RX OUT DIV	RF Shelf 1: LNA DIV IN	RF CABLE
RF_13	820-0600-10	RF Shelf 2: TX IN	RF Shelf 2: PA OUT	RF CABLE
RF_14	820-0600-00	RF Shelf 2: TX TEST PORT	RF Shelf 2: Tx TEST	RF CABLE
RF_15	820-0610-30	RF Shelf 2: TX OUT	TOR: Tx 2	RF CABLE
RF_16	820-0610-30	RF Shelf 2: RX IN	TOR: Rx 2	RF CABLE
RF_17	820-0600-10	RF Shelf 2: RX OUT	RF Shelf 2: LNA IN	RF CABLE
RF_18	820-0600-20	RF Shelf 2: RX OUT DIV	RF Shelf 2: LNA DIV IN	RF CABLE
RF_19	820-0600-10	RF Shelf 3: TX IN	RF Shelf 3: PA OUT	RF CABLE
RF_20	820-0600-00	RF Shelf 3: TX TEST PORT	RF Shelf 3: Tx TEST	RF CABLE
RF_21	820-0610-30	RF Shelf 3: TX OUT	TOR: Tx 3	RF CABLE
RF_22	820-0610-30	RF Shelf 3: RX IN	TOR: Rx 3	RF CABLE
RF_23	820-0600-10	RF Shelf 3: RX OUT	RF Shelf 3: LNA IN	RF CABLE
RF_24	820-0600-20	RF Shelf 3: RX OUT DIV	RF Shelf 3: LNA DIV IN	RF CABLE
DIV_1	820-0610-30	TOR: DIV 1	RF Shelf 1	connected only to TOR
DIV_2	820-0610-30	TOR: DIV 2	RF Shelf 2	connected only to TOR
DIV_3	820-0610-30	TOR: DIV 3	RF Shelf 3	connected only to TOR
RF Term.	**Part Number**	**From**	**To**	**Notes**
T1	514-0002-00	RF Shelf 1: RX IN DIV		RF Termination
T2	514-0002-00	RF Shelf 1: Tx IN B		RF Termination
T3	514-0002-00	RF Shelf 1: Tx IN C		RF Termination
T4	514-0002-00	RF Shelf 1: Rx OUT B		RF Termination
T5	514-0002-00	RF Shelf 1: Rx OUT C		RF Termination
T6	514-0002-00	RF Shelf 1: Rx DIV OUT A		RF Termination
T7	514-0002-00	RF Shelf 1: Rx DIV OUT B		RF Termination
T8	514-0002-00	RF Shelf 1: Rx DIV OUT C		RF Termination
T9	514-0002-00	RF Shelf 2: RX IN DIV		RF Termination
T10	514-0002-00	RF Shelf 2: Tx IN A		RF Termination
T11	514-0002-00	RF Shelf 2: Tx IN C		RF Termination

RF Term.	Part Number	From	To	Notes
T12	514-0002-00	RF Shelf 2: Rx OUT A		RF Termination
T13	514-0002-00	RF Shelf 2: Rx OUT C		RF Termination
T14	514-0002-00	RF Shelf 2: Rx DIV OUT A		RF Termination
T15	514-0002-00	RF Shelf 2: Rx DIV OUT B		RF Termination
T16	514-0002-00	RF Shelf 2: Rx DIV OUT C		RF Termination
T17	514-0002-00	RF Shelf 3: RX IN DIV		RF Termination
T18	514-0002-00	RF Shelf 3: Tx IN A		RF Termination
T19	514-0002-00	RF Shelf 3: Tx IN B		RF Termination
T20	514-0002-00	RF Shelf 3: Rx OUT A		RF Termination
T21	514-0002-00	RF Shelf 3: Rx OUT B		RF Termination
T22	514-0002-00	RF Shelf 3: Rx DIV OUT A		RF Termination
T23	514-0002-00	RF Shelf 3: Rx DIV OUT B		RF Termination
T24	514-0002-00	RF Shelf 3: Rx DIV OUT C		RF Termination
Alarm	**Part Number**	**From**	**To**	**Notes**
AL_0	TBD	PDU: STATUS	EAS: CONTROL	
AL_1	820-0607-00	RF Shelf 1: ALARM	RBS: ALARM INPUT A	Serial
AL_2	820-0607-00	RF Shelf 2: ALARM	RBS: ALARM INPUT B	Serial
AL_3	820-0607-00	RF Shelf 3: ALARM	RBS: ALARM INPUT C	Serial
RFN	**Part Number**	**From**	**To**	**Notes**
DAT_1	111-0566-00	RBS 1: 10/100 RFN A	AIC: ERTM PORT 1	UTP
DAT_2	111-0566-00	RBS 1: 10/100 RFN B	AIC: ERTM PORT 2	UTP
DAT_3	111-0566-00	RBS 1: 10/100 RFN C	AIC: ERTM PORT 3	UTP
DAT_4	111-0565-00	BIC: CRTC 10baseT - ISC	BIC: ERTM PORT 1	UTP
DAT_5	111-0565-00	BIC: ERTM PORT 2	AIC: ERTM PORT 4	UTP
DAT_6	111-0001-02	BIC: CRTC 10base2 - ISC	ISC 1: 10B2-1	COAX
CLK_1	111-0001-02	BIC: ERTM 5MHz/1PPS IN	ISC 1: SITE REF OUT 1	COAX


RF_10
RF_16
RF_22
DIV_1
DIV_2
DIV_3
TOR
GPS_2
GPS_1
G_1
RF_9
RF_15
RF_21
GROUND BAR


PDU
AGENCY APPROVAL INFORMATION LABEL
STATUS
-48VDC RETURN
G_2
P_1
AL_0
P_2
P_3
P_4
P_5
P_6
P_7
P_8
P_9
P_10
P_11
P_12
P_13
RF 1
RF_9
RF_10
T1
RF_8
RF_12
RF_11
RF_7
P_14
P_15
TEST
ALARM
POWER
Tx IN
Rx OUT
Rx DIV OUT
T2
T3
T4
T5
T6
T7
T8
FAN 1
FAN 2
-48 VDC
G_3
AL_1
S
RF_1
RF_4
RF 2
RF_15
RF_16
T9
RF_14
RF_18
RF_17
RF_13
P_16
P_17
T10
T11
T12
T13
T14
T15
T16
G_4
AL_2
P_2
RF_2
RF_5
RF 3
RF_21
RF_22
T17
RF_20
RF_24
RF_23
RF_19
P_18
P_19
T18
T19
T20
T21
T22
T23
T24
G_5
AL_3
P_3
RF_3
RF_6


G_6
G_7
G_8
G_9
P_7
G_10
P_8
G_11
P_9
G_12
P_10
RF_3
RF_6
RF_2
RF_5
RF_1
RF_4
RBS_1
P_22
P_21
P_20
DAT_3
AL_3
P_6
DAT_2
AL_2
DAT_1
AL_1
CSU
T1
GPS1
GPS2
C_2
C_3
ISC1
ISC 2
EAS
SITE REF OUT
AL_0
CLK_1
BIC
AIC
P_11
P_12
DAT_4
DAT_5
DAT_6
G_13
G_14
DAT_1
DAT_3
DAT_2

D. Cabling Diagrams: Omni Configuration

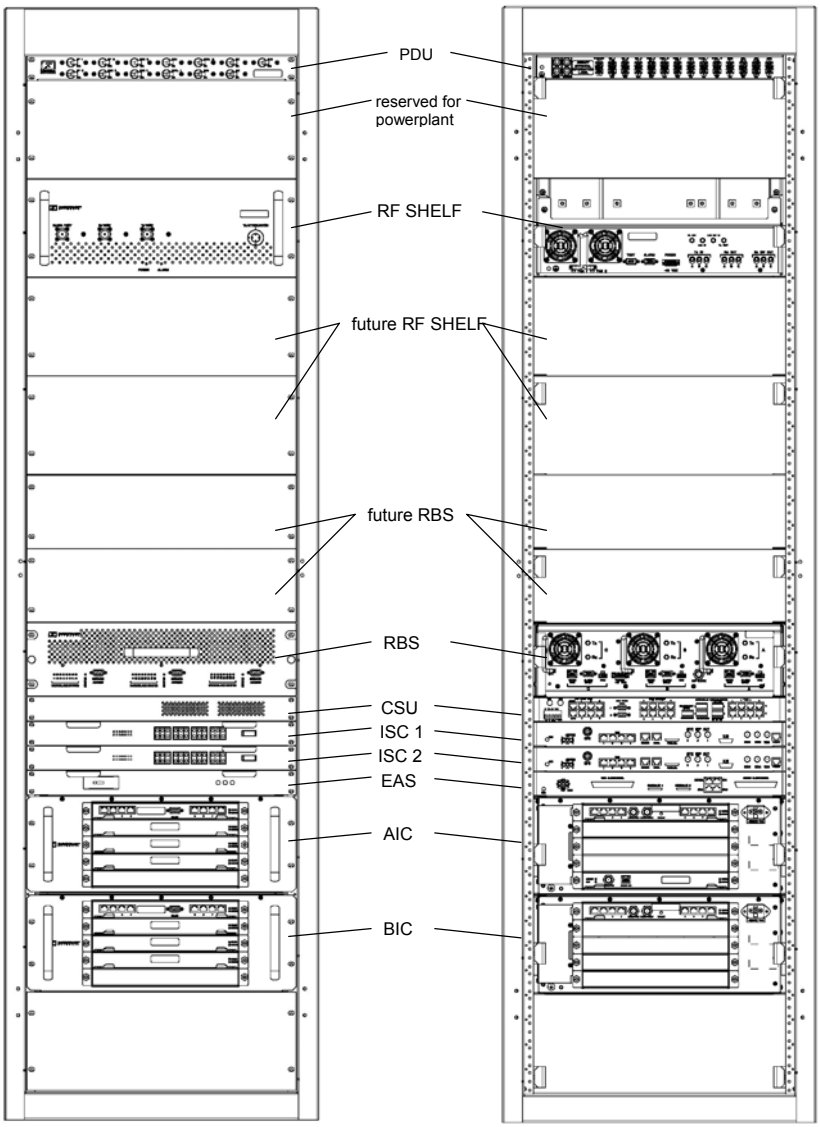
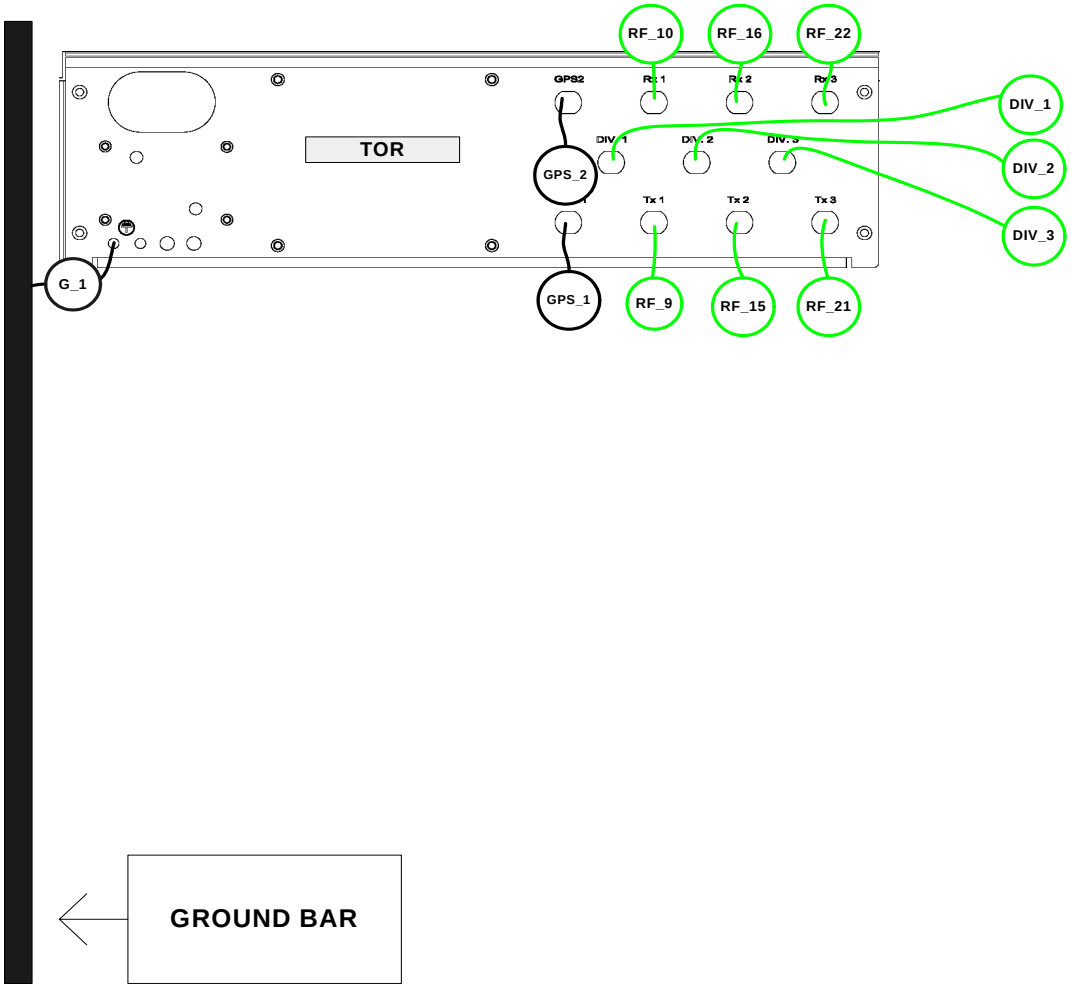


Figure 42 MC-Series System Omni Configuration

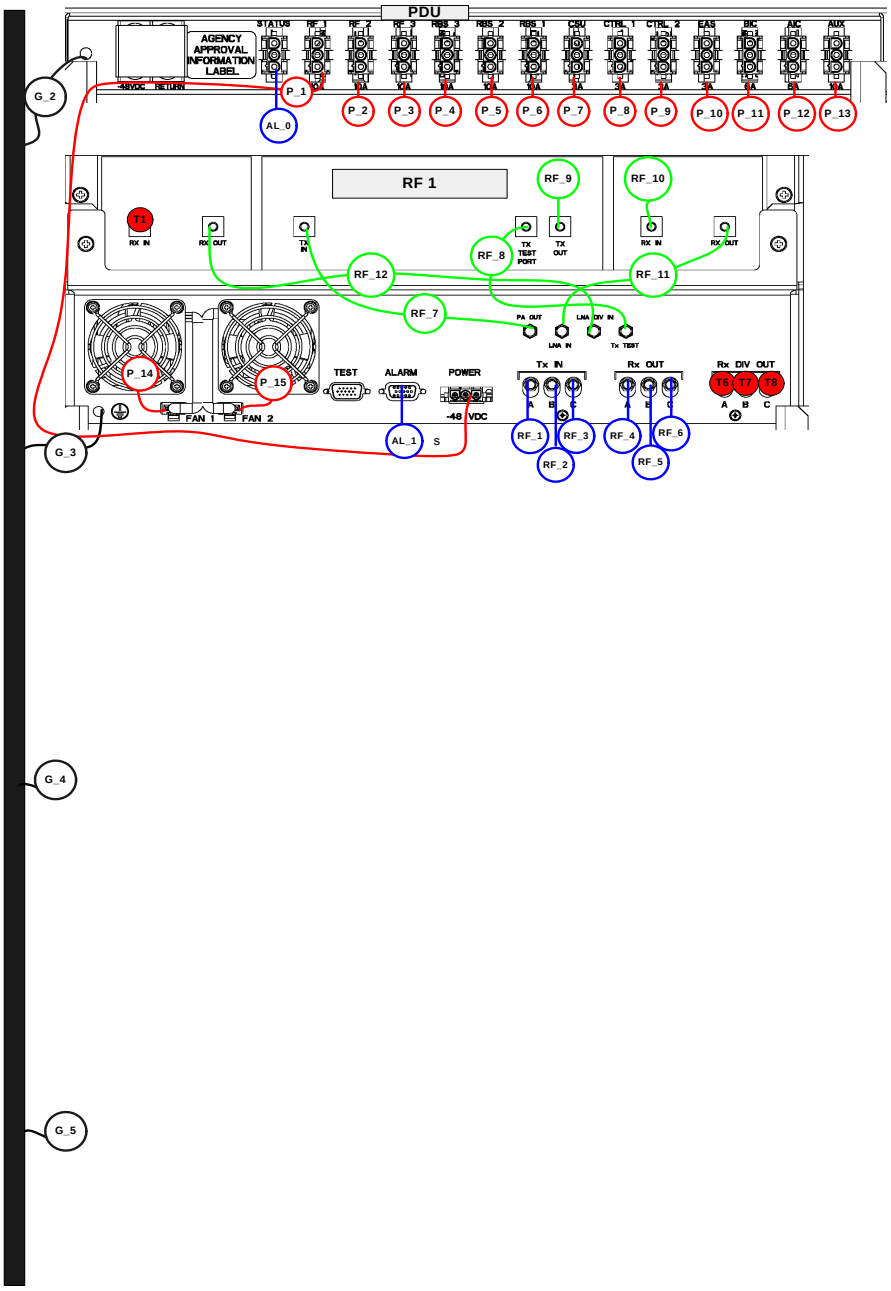
The following table is the index to the following three figures that show cabling for the standard omni MC-Series System.

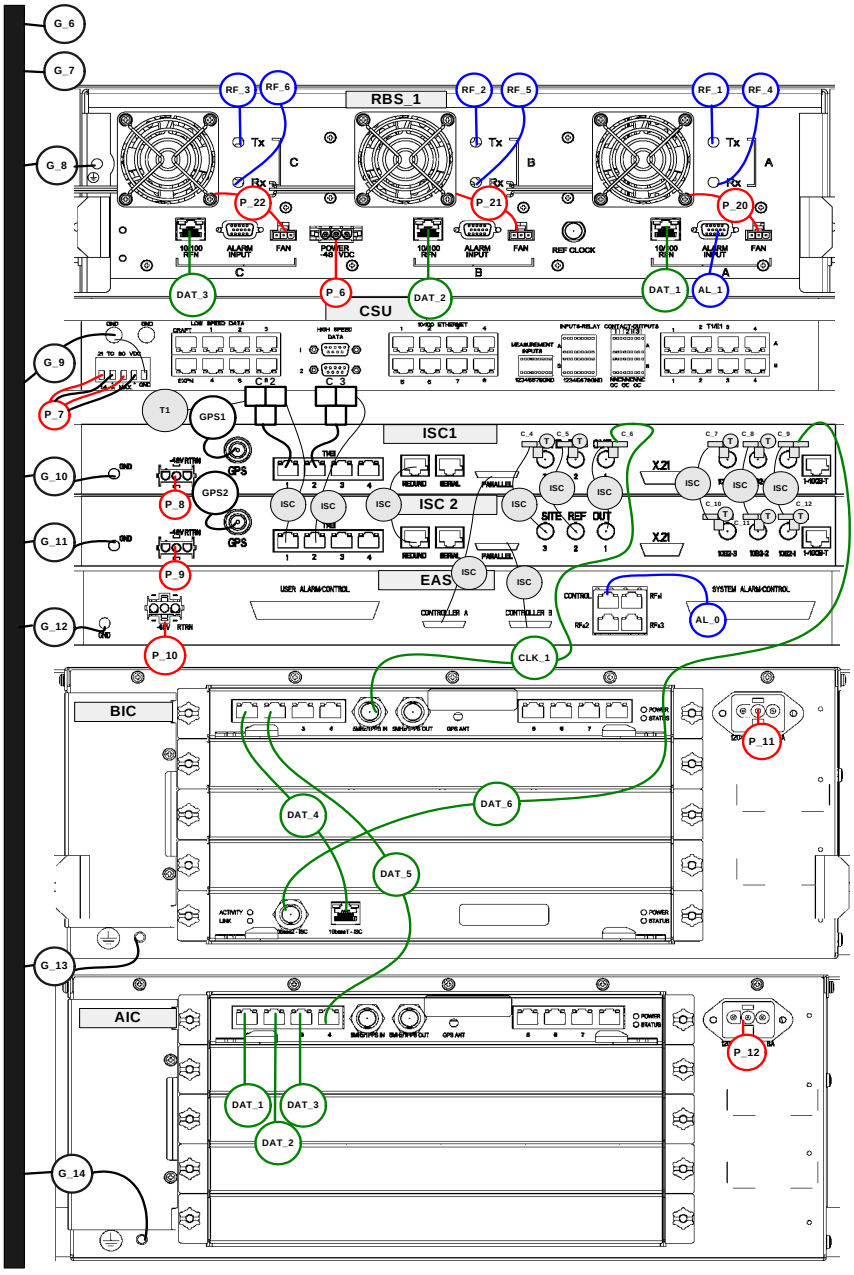
Power	Part Number	From	To	Notes
P_1	820-0616-10	PDU: RF 1	RF Shelf 1	Power
P_2	820-0616-10	PDU: RF 2	RF Shelf 2	Power: connected to PDU only
P_3	820-0616-20	PDU: RF 3	RF Shelf 3	Power: connected to PDU only
P_4	820-0616-30	PDU: RBS 3	RBS 3	Power: connected to PDU only
P_5	820-0616-30	PDU: RBS 2	RBS 2	Power: connected to PDU only
P_6	820-0616-50	PDU: RBS 1	RBS 1	Power
P_7	820-0615-50	PDU: CSU	CSU	Power
P_8	820-0613-50	PDU: CTRL 1	ISC 1	Power: primary iSC
P_9	820-0613-50	PDU: CTRL 2	ISC 2	Power: secondary iSC
P_10	820-0616-50	PDU: EAS	EAS	Power
P_11	820-0614-00	PDU: BIC	BIC	Power
P_12	820-0614-10	PDU: AIC	AIC	Power
P_13		PDU: AUX		Power: left unconnected
P_14	102-0011-04	RF Shelf 1: Fan 1	RF Shelf 1: FAN	Power
P_15	102-0011-04	RF Shelf 1: Fan 2	RF Shelf 1: FAN	Power
P_16	102-0011-04	RF Shelf 2: Fan 1	RF Shelf 2: FAN	Power: if present
P_17	102-0011-04	RF Shelf 2: Fan 2	RF Shelf 2: FAN	Power: if present
P_18	102-0011-04	RF Shelf 3: Fan 1	RF Shelf 3: FAN	Power: if present
P_19	102-0011-04	RF Shelf 3: Fan 2	RF Shelf 3: FAN	Power: if present
P_20	102-0011-04	RBS 1: Fan	RBS 1: FAN A	Power
P_21	102-0011-04	RBS 1: Fan	RBS 1: FAN B	Power
P_22	102-0011-04	RBS 1: Fan	RBS 1: FAN C	Power
Ground	**Part Number**	**From**	**To**	**Notes**
G_1	TBD	TOR	GND BAR	
G_2	820-0609-00	PDU	GND BAR	
G_3	820-0609-00	RF Shelf 1	GND BAR	
G_4	820-0609-00	RF Shelf 2	GND BAR	connected only to GND BAR
G_5	820-0609-00	RF Shelf 3	GND BAR	connected only to GND BAR
G_6	820-0609-00	RBS 3	GND BAR	connected only to GND BAR
G_7	820-0609-00	RBS 2	GND BAR	connected only to GND BAR
G_8	820-0609-00	RBS 1	GND BAR	
G_9	820-0609-10	CSU	GND BAR	
G_10	820-0609-10	ISC1	GND BAR	
G_11	820-0609-10	ISC2	GND BAR	
G_12	820-0609-10	EAS	GND BAR	
G_13	820-0609-00	BIC	GND BAR	
G_14	820-0609-00	AIC	GND BAR	

RF	Part Number	From	To	Notes
GPS_1	820-0620-00	ISC 1: GPS	TOR: GPS 1	RF CABLE
GPS_2	820-0620-00	ISC 2: GPS	TOR: GPS 2	RF CABLE
RF_1	820-0611-20	RF Shelf 1: Tx IN A	RBS 1: Tx A	RF CABLE
RF_2	820-0611-20	RF Shelf 1: Tx IN B	RBS 1: Tx B	RF CABLE
RF_3	820-0611-20	RF Shelf 1: Tx IN C	RBS 1: Tx C	RF CABLE
RF_4	820-0611-20	RF Shelf 1: Rx OUT A	RBS 1: Rx A	RF CABLE
RF_5	820-0611-20	RF Shelf 1: Rx OUT B	RBS 1: Rx B	RF CABLE
RF_6	820-0611-20	RF Shelf 1: Rx OUT C	RBS 1: Rx C	RF CABLE
RF_7	820-0600-10	RF Shelf 1: TX IN	RF Shelf 1: PA OUT	RF CABLE
RF_8	820-0600-00	RF Shelf 1: TX TEST PORT	RF Shelf 1: Tx TEST	RF CABLE
RF_9	820-0610-30	RF Shelf 1: TX OUT	TOR: Tx 1	RF CABLE
RF_10	820-0610-30	RF Shelf 1: RX IN	TOR: Rx 1	RF CABLE
RF_11	820-0600-10	RF Shelf 1: RX OUT	RF Shelf 1: LNA IN	RF CABLE
RF_12	820-0600-20	RF Shelf 1: RX OUT DIV	RF Shelf 1: LNA DIV IN	RF CABLE
RF_15	820-0610-30	RF Shelf 2: TX OUT	TOR: Tx 2	If present
RF_16	820-0610-30	RF Shelf 2: RX IN	TOR: Rx 2	If present
RF_21	820-0610-30	RF Shelf 3: TX OUT	TOR: Tx 3	If present
RF_22	820-0610-30	RF Shelf 3: RX IN	TOR: Rx 3	If present
DIV_1	820-0610-30	TOR: DIV 1	RF Shelf 1	connected only to TOR
DIV_2	820-0610-30	TOR: DIV 2	RF Shelf 2	connected only to TOR
DIV_3	820-0610-30	TOR: DIV 3	RF Shelf 3	connected only to TOR
RF Term.	**Part Number**	**From**	**To**	**Notes**
T1	514-0002-00	RF Shelf 1: RX IN DIV		RF Termination
T6	514-0002-00	RF Shelf 1: Rx DIV OUT A		RF Termination
T7	514-0002-00	RF Shelf 1: Rx DIV OUT B		RF Termination
T8	514-0002-00	RF Shelf 1: Rx DIV OUT C		RF Termination
Alarm	**Part Number**	**From**	**To**	**Notes**
AL_0	TBD	PDU: STATUS	EAS: CONTROL	
AL_1	820-0607-00	RF Shelf 1: ALARM	RBS: ALARM INPUT A	Serial
RFN	**Part Number**	**From**	**To**	**Notes**
DAT_1	111-0566-00	RBS 1: 10/100 RFN A	AIC: ERTM PORT 1	UTP
DAT_2	111-0566-00	RBS 1: 10/100 RFN B	AIC: ERTM PORT 2	UTP
DAT_3	111-0566-00	RBS 1: 10/100 RFN C	AIC: ERTM PORT 3	UTP
DAT_4	111-0565-00	BIC: CRTC 10baseT - ISC	BIC: ERTM PORT 1	UTP
DAT_5	111-0565-00	BIC: ERTM PORT 2	AIC: ERTM PORT 4	UTP
DAT_6	111-0001-02	BIC: CRTC 10base2 - ISC	ISC 1: 10B2-1	COAX
CLK_1	111-0001-02	BIC: ERTM 5MHz/1PPS IN	ISC 1: SITE REF OUT 1	COAX


RF_10
RF_16
RF_22
TOR
GPS_2
DIV_1
DIV_2
DIV_3
G_1
GPS_1
RF_9
RF_15
RF_21
GROUND BAR

Appendix D: Cabling Diagrams: Omni Configuration




G_6
G_7
G_8
G_9
P_7
G_10
G_11
P_9
G_12
P_10
G_13
G_14
RF_3
RF_6
RF_2
RF_5
RF_1
RF_4
RBS_1
Tx
Rx
C
B
A
P_22
P_21
P_20
REF CLOCK
DAT_3
P_6
DAT_2
DAT_1
AL_1
CSU
T1
GPS1
GPS2
GPS
P_8
ISC1
ISC 2
EAS
X21
SITE REF OUT
USER ALARM CONTROL
SYSTEM ALARM CONTROL
AL_0
CLK_1
BIC
AIC
P_11
P_12
DAT_4
DAT_5
DAT_6
DAT_1
DAT_3
DAT_2

E. Tx / Rx Curves

The TX filter frequency response is shown in the following illustration.

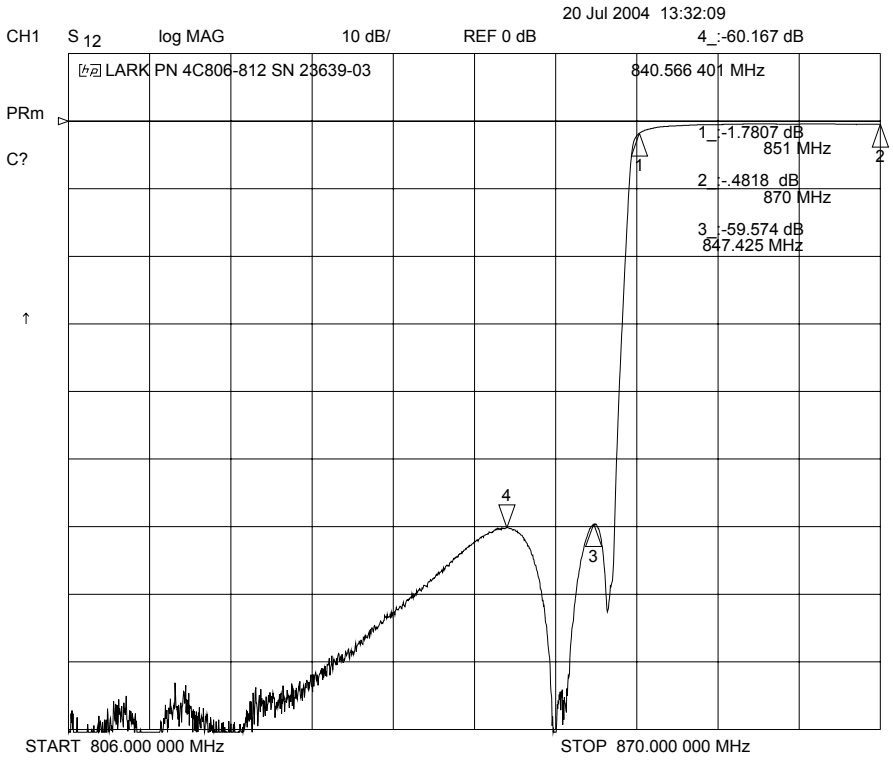


Figure 43 Transmit filter frequency response

The RX filter response is shown in the following illustration.

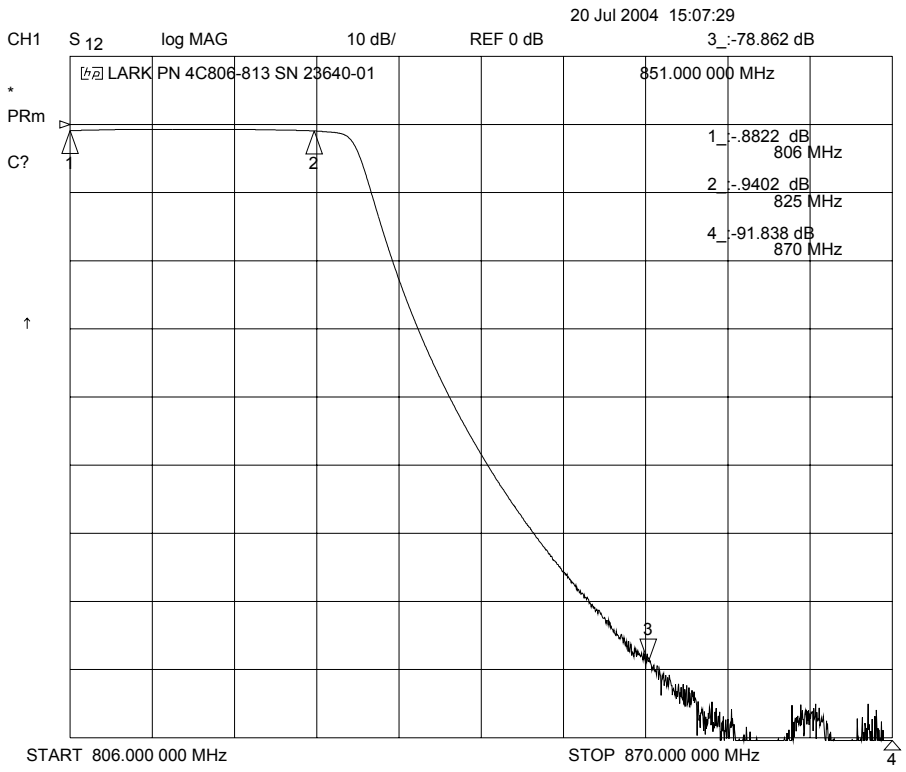


Figure 44 Receive filter frequency response

F. Functionality Test Procedures

F.1 Interconnect & Dispatch Setup & Voice Quality

Interconnect and Dispatch voice quality will be assessed by evaluating voice links as described in Tables 6, 7, and 8. RSSI and SQE measurements will be made via the handset. These tests are to be performed on a selected sample set of links.

Table 8 Interconnect Call Quality, Setup and Stability

Test #	MOP/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 9 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

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

Table 10 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

F.2 Packet Data Service Connection and Latency

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

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

Table 11 Packet Data Latency over the MC-Series System (Ping –n 100 –w 2000 xx.xxx.xxx.x)

Test #	Handset	Carrier #	RSSI (dbm)	SQE (dbm)	Ping (No. Echos)	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		

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

Table 12 Packet Data Latency over Motorola EBTS

Test #	Handset	Carrier #	RSSI (dbm)	SQE (dbm)	Ping (No. Echos)	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

F.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 links.

1. Navigate on a network connection to the Internet.
2. Enter http://www.nextel.com/ in the web browser.
3. On the Nextel home page, enter the 10-digit phone number of the test phone in the messaging field, which 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.

F.4 Handover and Cell Reselection

Handover and Cell Reselection shall be tested and verified that mobiles on the MC-Series System successfully handoff to the macro-cellular network during an interconnect call. These tests shall also verify that mobiles on the MC-Series System perform successful cell reselection when in an idle state. The following table presents the data to be collected for the handover and reselection tests.

Table 13 Handover & Idle Mode Reselection

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

F.5 Interconnect Connection Stability and SQE Performance

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

Table 14 Interconnect Connection Stability

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

F.6 Dispatch Connection Stability

To verify Dispatch connection stability, a Dispatch (private or group) call will be maintained for several minutes. The following table presents the data to be collected for each dispatch call.

Table 15 Dispatch Connection Stability

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

Dispatch #2						
						4
Dispatch #3						
						5

F.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.

Then, conduct the same procedure while walking the facility for approximately 15 minutes.

F.8 System Self-Recovery Test

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

1 Loss of T1

While the MC-Series System is operating, disconnect the T1 connection to the iSC-3 for one minute, and then reconnect it. Monitor the system recovery, and then validate the system by placing a successful call on each sector.

2 iSC-3 Power Loss

While the MC-Series System is operating, the iSC-3 shall be power cycled and system recovery will be monitored and validated by placing a successful call on each sector.

3 Loss of GPS

While the MC-Series System is operating, the GPS connection to the iSC-3 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.

4 New datafill download

System recovery will be verified by pushing a new datafill download to the iSC-3.

F.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 System.

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

While the MC-Series System is operating, disconnect any system component, from the BIC to the RBS, and monitor the OMC to verify that MC-Series System generates the ‘Unable to Key BR’ alarm.

The MC-Series System provides fault alarming and isolation within System Manager for individual components, which consists of detecting catastrophic faults that prevent an MC-Series System component from responding to a periodic “ping”. All fault alarms generated by the MC-Series

System are received at the OMC via the iSC. 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 8.5 Alarm Resolution Procedures):

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

G. System Manager

System Manager is the MC-Series System web-based interface. System Manager provides status, performance, and alarm information for the MC-Series 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 8.1 Upgrading 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:

Figure 45 Physical location
Figure 46 IP addresses
Figure 47 Port connections
Figure 48 Sector locations

G.1 Logging In to System Manager

1. Connect a laptop computer to port 8 of the BIC CRIC using an Ethernet (CAT5) cable.
2. Start System Manager by setting the IP address of the laptop to the same subnet that was setup in the system (default 192.168.200.5).

   The System Manager Home page appears which contains five tabs to select from to set up and monitor the RadioFrame System MC-Series:

   - *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 BIC, AIC, RBS, and RadioBlades.
   - *Alarms*—displays alarm information.
   - *Performance Monitoring*—displays real-time performance information.
   - *Diagnostics*—provides tools for testing.
   - *Support*—displays support information, including online help.

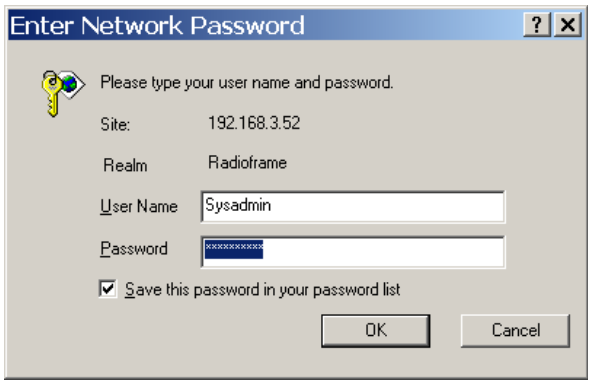
3 To log in, select any tab.

4 For **User Name**, type the MC-Series System user name.

5 For **Password**, type the MC-Series System password.

To save the password, check '**Save this password in your password list**' checkbox.

6 Select **OK**.



G.1 Changing the System Password

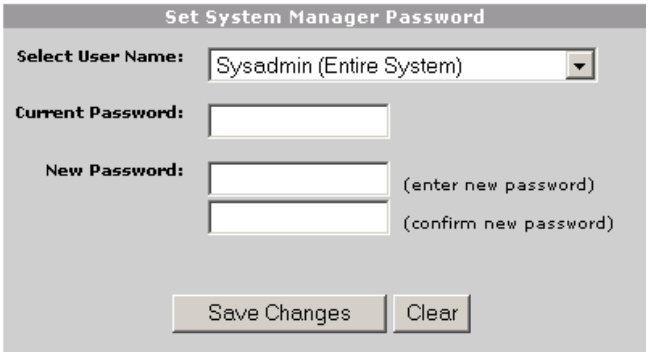
1 Select the **Home** tab, and then select the **User Provisioning** link.

2 For **Select User Name**, choose the appropriate system title from the dropdown menu.

Typically, choose Sysadmin (Entire System) unless instructed to do otherwise.

3 Type the **Current Password**.

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



G.2 Navigating the System Configuration

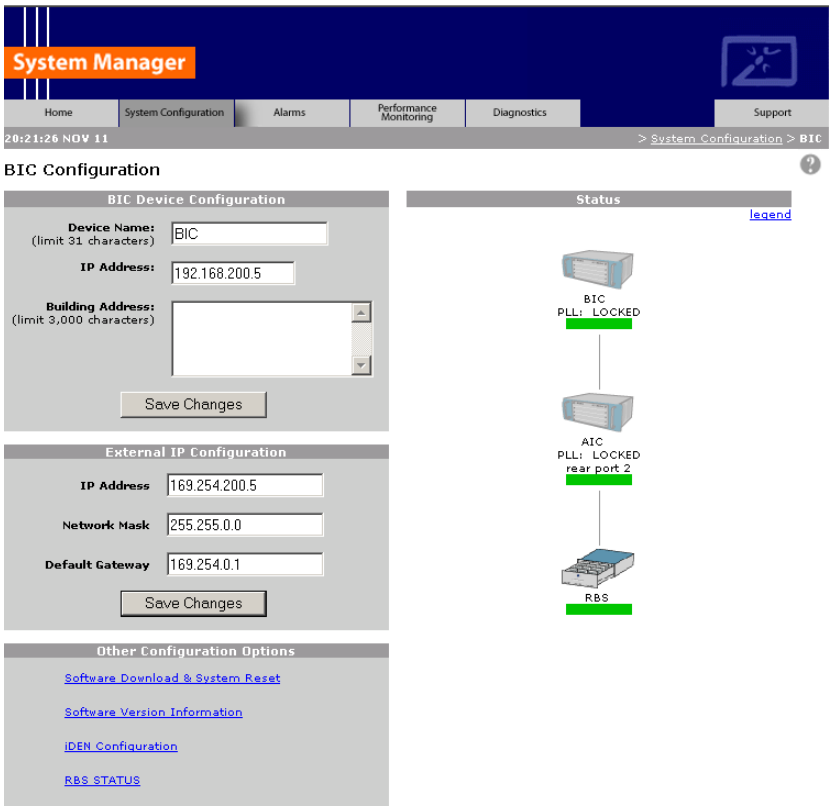
The System Configuration page displays icons depicting the AIC, BIC and the RBS (see the following illustration). The colored bar beneath each icon represents the status of that component:

Color	Status Indicator	Description
Green	Active	The component is installed, configured, and operational.
Yellow	Inactive	The component is installed, but has not been configured.
Red	Alarm	The component has returned an alarm condition. Refer to section 7 “Schedule and Unscheduled Maintenance” for specific alarm conditions.

1 To view configuration information for a component, select its icon.

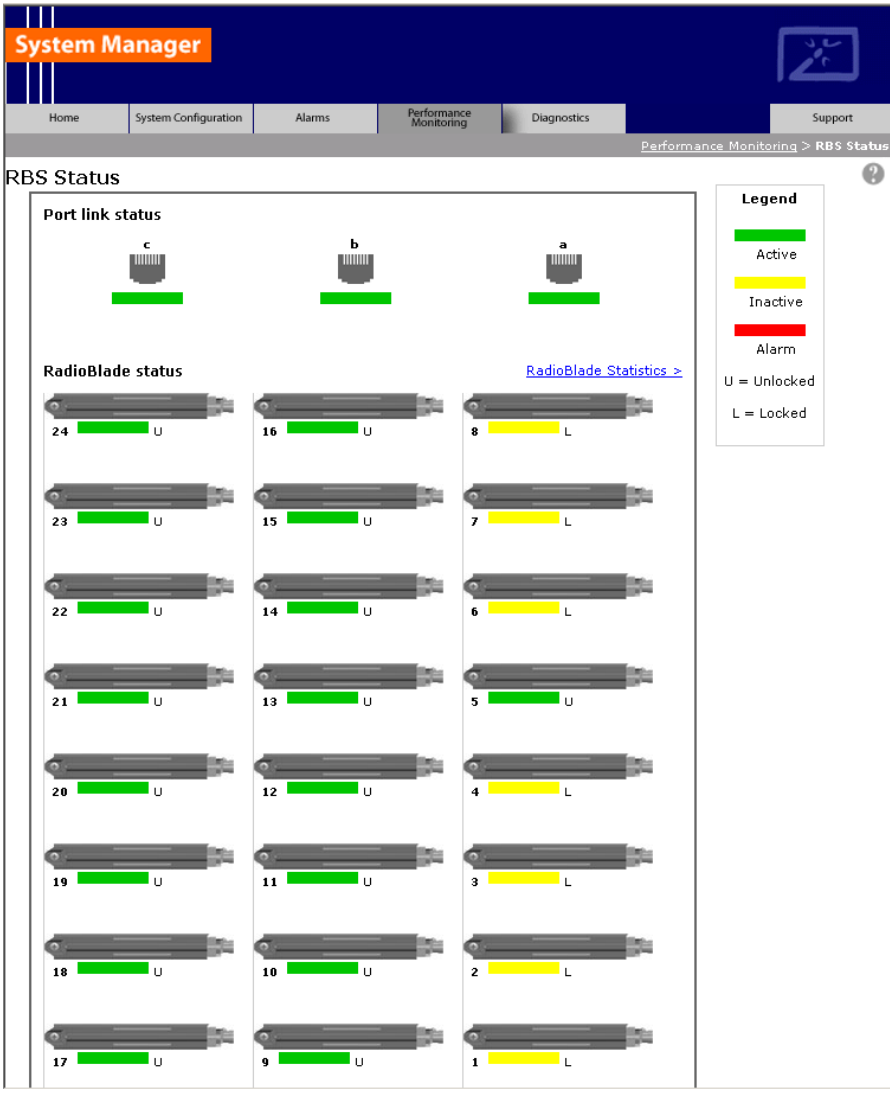
The component configuration page displays the device name, IP address, building address, and other pertinent information.

2 To return to a previous page, select the component pathname at the top of the tab (System Configuration>BIC>AIC…), or to return to the BIC configuration page, select the System Configuration tab at any time.



G.3 Viewing the Status of the RadioBlades

Select the **RBS STATUS** link at the bottom of the System Configuration page. The RBS Status page displays an icon for each RadioBlade installed in the RBS, and indicates the status of the RadioBlade and whether or not it is locked. At the top of the page are three icons representing the status of each group (A, B, and C) in the RBS.



G.4 Locking and Unlocking a RadioBlade

Select the RadioBlade icon or the **RadioBlade Statistics** link at the top of the RBS Status page. The RadioBlade Statistics page displays the following information for each iDEN RadioBlade:

Figure 49 RB Slot (1-24)
Figure 50 MAC Address
Figure 51 State
Figure 52 Carrier ID
Figure 53 BR ID
Figure 54 Cabinet
Figure 55 Position
Figure 56 Locked/Unlocked

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

RadioBlade Statistics

< RBS Status

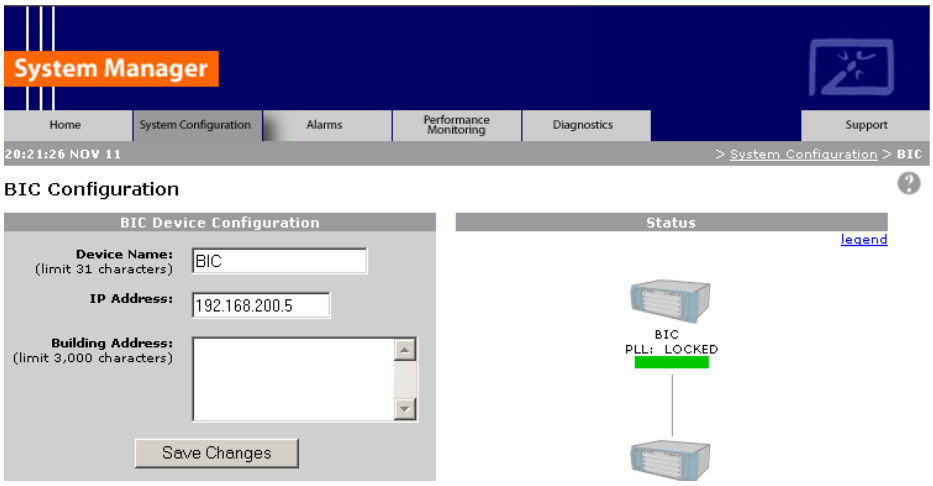
RB Slot	MAC Address	State	Carrier ID	BR ID	Cabinet	Position	Locked/ Unlocked
1	00:03:e0:20:1a:1a	5	N/A (0)	NOT ASSIGNED	0	0	
2	00:03:e0:20:1a:12	5	N/A (0)	NOT ASSIGNED	0	0	
3	00:03:e0:20:1a:19	5	N/A (0)	NOT ASSIGNED	0	0	
4	00:03:e0:20:1a:16	5	N/A (0)	NOT ASSIGNED	0	0	
5	00:03:e0:20:1a:13	11	3d5	1	1	1	
6	00:03:e0:20:1a:18	5	N/A (0)	NOT ASSIGNED	0	0	
7	00:03:e0:20:1a:17	5	N/A (0)	NOT ASSIGNED	0	0	
8	00:03:e0:20:1a:11	5	N/A (0)	NOT ASSIGNED	0	0	

RB Slot	MAC Address	State	Carrier ID	BR ID	Cabinet	Position	Locked/ Unlocked
9	00:03:e0:20:1a:20	11	495	16	5	2	
10	00:03:e0:20:1a:30	11	391	13	2	5	

G.5 Changing the Device Name, IP Address, or Building Location

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

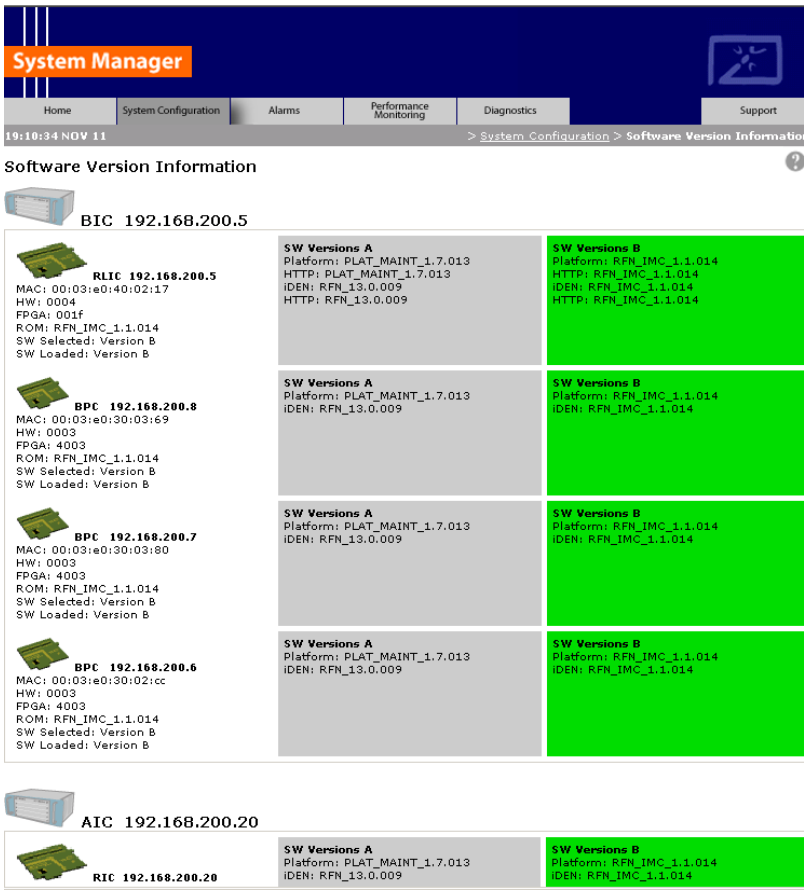
1. Select the icon of the component to be change.
2. For **Device Name**, enter up to 31 alphanumeric characters to uniquely identify the component.
3. The **IP Address** is assigned during the installation of the MC-Series System, and doesn't need to be changed.
4. For **Building Address**, enter up 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**.



G.6 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 System, and each board installed in each component. For each board the page lists:

Figure 57 MAC—the MAC address
Figure 58 HW—hardware version
Figure 59 FPGA—Field Programmable Gate Array version (manufacturer defined)
Figure 60 ROM—software loaded at time of shipment
Figure 61 SW Selected—currently selected software version, A or B
Figure 62 SW Loaded—currently loaded software version, A or B
Figure 63 SW Versions A—Software version loaded in partition A
Figure 64 SW Versions B—Software version loaded in partition B



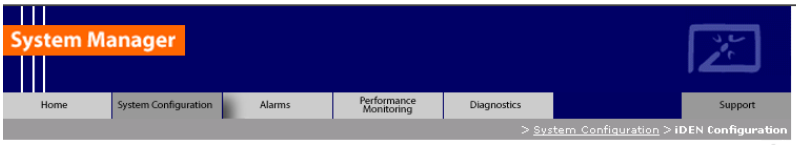
G.7 Changing the iDEN Configuration

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

   In the following illustration, one quad BR has been selected: **BR Instance 5** (cabinet/position 3/5) in the first group. In this example, BRs 5 through 8 make up the quad BR.
4. Select the **Save Changes** button to save the changes.



iDEN Configuration

Cabinet / Position Configuration

BR Instance	Cabinet	Position	Quad	BR Instance	Cabinet	Position	Quad	BR Instance	Cabinet	Position	Quad
1	3	1	☐	9	2	1	☐	17	1	1	☐
2	3	2	☐	10	2	2	☐	18	1	2	☐
3	3	3	☐	11	2	3	☐	19	1	3	☐
4	3	4	☐	12	2	4	☐	20	1	4	☐
5	3	5	☑	13	2	5	☐	21	1	5	☐
6			☐	14	2	6	☐	22	1	6	☐
7			☐	15			☐	23			☐
8			☐	16			☐	24			☐

Save Changes

H. BER Test Procedure

A Bit Error Rate (BER) diagnostic tool has been developed to report Receive (Rx) BER measurements from the MC-Series System via System Manager. A Motorola R2660 Communications Analyzer can be used as the source of the test signal for the MC-Series System during the BER test. This section describes the MC-Series System Rx BER diagnostic tool.

H.1 Equipment Connection/Setup

Set up the equipment to measure Rx BER as follows:

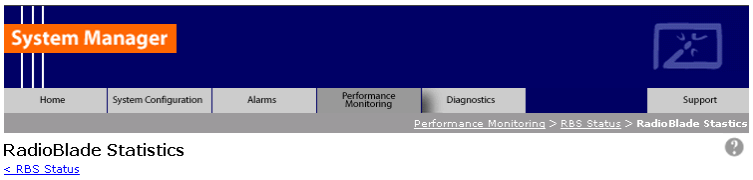
1 Connect a laptop to port 8 of the BIC CRIC using an Ethernet (CAT5) cable.

2 Start System Manager and log in.

Launch a browser session and then enter the MC-Series System IP address (http://169.254.200.5). Select the System Configuration tab to display the login window. For **User Name**, type Sysadmin (case sensitive), and for **Password** type Radioframe (case sensitive), and then select **OK**.

3 Display the RadioBlade Statistics page and record which RadioBlades are locked.

On the System Configuration page, select either the RBS icon or the RBS STATUS link to display the RBS Status page. Then select the RadioBlade Statistics link at the top of the RBS Configuration page. RadioBlades are listed by slot (1 through 24). If an RB is locked, the icon in the Locked/Unlocked column is closed. If the RB is unlocked, the lock is open.



RadioBlade Statistics

< RBS Status

RB Slot	MAC Address	State	Carrier ID	BR ID	Cabinet	Position	Locked/ Unlocked
1	00:03:e0:20:1a:1a	5	N/A (0)	NOT ASSIGNED	0	0	
2	00:03:e0:20:1a:12	5	N/A (0)	NOT ASSIGNED	0	0	
3	00:03:e0:20:1a:19	5	N/A (0)	NOT ASSIGNED	0	0	
4	00:03:e0:20:1a:16	5	N/A (0)	NOT ASSIGNED	0	0	
5	00:03:e0:20:1a:13	11	3d5	1	1	1	
6	00:03:e0:20:1a:18	5	N/A (0)	NOT ASSIGNED	0	0	
7	00:03:e0:20:1a:17	5	N/A (0)	NOT ASSIGNED	0	0	
8	00:03:e0:20:1a:11	5	N/A (0)	NOT ASSIGNED	0	0	

RB Slot	MAC Address	State	Carrier ID	BR ID	Cabinet	Position	Locked/ Unlocked
9	00:03:e0:20:1a:20	11	495	16	5	2	
10	00:03:e0:20:1a:30	11	391	13	2	5	

4 Lock any unlocked RadioBlades so that none of them are transmitting.

To lock a RadioBlade, select its open lock icon, and when prompted, select **Accept** to lock the RadioBlade.

5 Select the Performance Monitoring tab, and verify that all BRs show the **Activity State** LDI.

6 On the R2660, set the 10MHz STD toggle switch to INT and power it up.

7 Connect the TOR Rx port that is being tested to the RF IN/OUT or GEN OUT port on the R2660, depending on the desired test signal level.

8 Set the R2660 to generate an in-bound 1x6 test signal at the desired frequency and signal level into the Rx port that corresponds to the RadioBlade or group of RadioBlades to be tested.

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.

Then, start at –48 dBm and increase in 2 dB increments until the BER goes above 2%. The maximum input power should be greater than –36 dBm at 2% BER.

If either of these values is not attained, the RadioBlade has failed specifications and should be replaced.

H.2 BER Test Procedure

This procedure provides commands and responses to measure receiver BER.

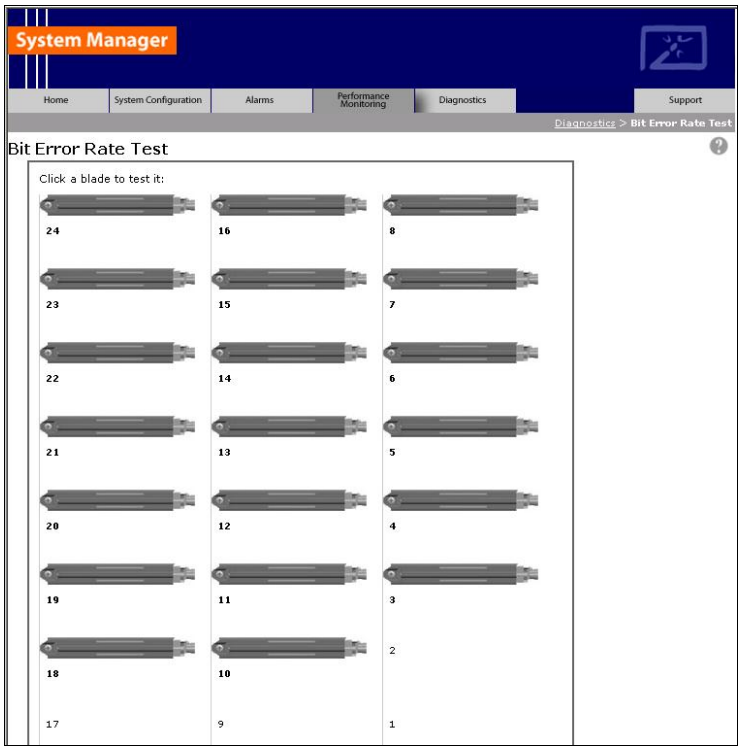
1 Display the RadioBlade Statistics page, and unlock the RadioBlade that is to be tested.

Select the RBS icon on the System Configuration page, and then select the RadioBlade Statistics link at the top of the RBS Status page. Determine which RadioBlade is to be tested, and then unlock it by selecting its lock icon so that it is opened (unlocked). Refresh the page every 30 seconds until the **State** of the RadioBlade has changed to '11', approximately 3 minutes.

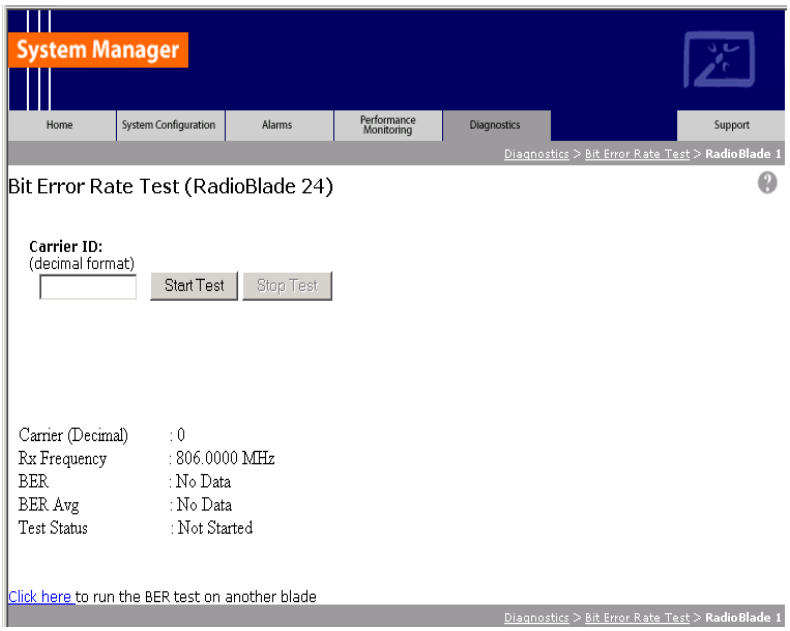
2 Select the Diagnostics tab, and then select **Bit Error Rate Test**.

3 On the Bit Error Rate Test page, select the RadioBlade that is to be tested.

The RadioBlade that is to be tested will show a green status bar—all other RadioBlade status icons will be yellow. The green RadioBlade is the one that was unlocked in Step 1.



4 For **Carrier ID**, enter the carrier ID (in decimal format) to which the R2660 is set, and then select the **Start Test** button.



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

6 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.

NOTE: 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.

NOTE: 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.

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

Display the RadioBlade Statistics page, and lock the RadioBlade by selecting its lock icon so that it is closed (locked). Refresh the page every 30 seconds until the **State** of the RadioBlade has changed to '2', approximately 3 minutes.

8 Repeat Steps 1 through 7 for each RadioBlade to be tested on this Rx port.

H.3 Equipment Disconnection

Disconnect equipment after completing the BER testing.

1. Disconnect the R2660 from the Rx port under test.
2. Display the RBS Status page, and verify that all RadioBlade status icons are green.
3. Disconnect the network cable from port 8 of the BIC CRIC.