Chapter 3

DBR M12 MultiCarrier Site Installation

This chapter details installation procedures relating to the DBR M12 MultiCarrier Site.

3.1 Pre-Installation Tasks

Before installing the DBR M12 MultiCarrier Site, you must obtain the following:

- Appropriate cables
- On-Premises Software Hub (OPSH)
- Provisioning and Configuration Agent (PCA)
- Unified Network Configurator (UNC)
- IP and Domain Name Service (DNS) information
- Appropriate credentials

3.1.1 Preparing the Equipment for Installation

Process:

1. Prepare the site to comply with the Motorola Solutions requirements and specifications for the equipment, as listed in the Motorola Solutions *Standards and Guidelines for Communication Sites* manual. The base radio may be installed in a suitable, restricted access, indoor enclosure in any location suitable for electronic communications equipment. Other codes and guidelines that may apply to the location must also be met. See General Safety Precautions on page 65.
2. Inspect and inventory all racks, cabinets, cables, and other equipment with a Motorola Solutions representative to ensure that the order is complete. See General Installation Standards and Guidelines on page 72.
3. Various tools are used to install and service the equipment. If information is needed regarding where to obtain any of the equipment and tools listed, contact the Centralized Managed Support Operations (CMSO). For a list of general recommended tools for installing and servicing the hardware, see Installation/Troubleshooting Tools on page 78.
4. Install all equipment by using the site drawings and other documents provided by the Field Engineer.

   Use the installation standards and guidelines for placing and installing equipment.
5. Properly ground all the racks and cabinets to protect against ground faults, electrical surges, and lightning.
6. Connect all necessary cables within a rack and between the racks for system interconnection.
7. Run a preliminary check of a site before applying power.
8. For a list of items you need access to before installing the software, see Installation/Troubleshooting Tools on page 78.

3.2

General Safety Precautions

FCC/ISED Compliance Guidelines

WARNING: Compliance with FCC/ISED guidelines for human exposure to Electromagnetic Energy (EME) at Transmitter Antenna sites generally requires that personnel working at a site must be aware of the potential for exposure to EME, and can exercise control of exposure by appropriate means, such as adhering to warning sign instructions, using standard operating procedures (work practices), wearing personal protective equipment, or limiting the duration of exposure. For more details and specific guidelines, see “Appendix A: Electromagnetic Energy Information” of the Motorola Solutions *Standards and Guidelines for Communication Sites* manual.

AVERTISSEMENT: Les directives de la FCC/ISDÉ en matière d’exposition humaine à l’énergie électromagnétique à proximité des antennes émettrices exigent en général que les personnes qui travaillent sur de tels sites soient conscientes du risque d’être exposées à l’énergie électromagnétique et de la possibilité de contrôler les risques d’exposition en respectant strictement les instructions figurant sur les panneaux d’avertissement, en se reportant aux procédures opérationnelles standard (pratiques de travail), en portant un équipement de protection individuelle ou en limitant le temps d’exposition. Pour plus de détails et des lignes directrices précises, consultez l’« Annexe A : Renseignements sur l’énergie électromagnétique » du manuel des normes et lignes directives relatives aux sites de communications de Motorola Solutions *Standards and Guidelines for Communication Sites*.

Notice to Users (Innovation, Science and Economic Development Canada Canada)

The operation of your Motorola Solutions radio is subject to the Radiocommunications Act and must comply with rules and regulations of the Federal Government's department of Industry Canada. Industry Canada requires that all operators using Private Land Mobile frequencies obtain a radio license before operating their equipment.

Installation guidelines for compliance with RF exposure regulations

This equipment must be installed and operated at a fixed location, in compliance with all applicable code requirements. The antenna installation must comply with all applicable building and safety codes. In order to ensure optimal communication performance and compliance with applicable RF exposure limits, it is recommended that the antenna is installed outside the building hosting this equipment, on the roof or on a tower if at all possible.

It is the licensee or site owner responsibility to establish an RF exposure safety program meeting the applicable regulatory requirements concerning RF exposure of working personnel and the general public, implementing actions such as site survey measurements and computational analysis, signage and barriers, site access restrictions, as needed.

Declaration of Compliance for the Use of Distress and Safety Frequencies

The radio equipment does not employ a modulation other than the internationally adopted modulation for maritime use when it operates on the distress and safety frequencies specified in RSS-182 Section 7.3.

General safety precautions during all phases of operation, service, and repair

Observe the following general safety precautions during all phases of operation, service, and repair of the equipment described in this manual. Follow the safety precautions listed and all other warnings and cautions necessary for the safe operation of all equipment.

Due to the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modifications of equipment.

NOTE: The installation process requires preparation and knowledge of the site before installation begins. Review installation procedures and precautions in the Motorola Solutions *Standards and Guidelines for Communication Sites* manual before performing any site or component installation.

Always follow all applicable safety procedures, such as Occupational Safety and Health Administration (OSHA) requirements, National Electrical Code (NEC) requirements, local code requirements, and safe working practices. Also, all personnel must practice good judgment. General safety precautions include the following:

- Read and follow all warning notices and instructions marked on the product or included in this manual before installing, servicing, or operating the equipment. Retain these safety instructions for future reference.
- If troubleshooting the equipment while power is on, be aware of the live circuits.
- Do not operate the radio transmitters unless all RF connectors are secure and all connectors are properly terminated.
- Ground all equipment properly in accordance with the Motorola Solutions *Standards and Guidelines for Communication Sites* manual and specified installation instructions for safe operation.
- Slots and openings in the cabinet are provided for ventilation. Do not block or cover openings that protect the devices from overheating.
- Only a qualified technician familiar with similar electronic equipment should service equipment.
- Some equipment components can become hot during operation. Turn off all power to the equipment and wait until sufficiently cool before touching.
- Maintain emergency first aid kits at the site.
- Direct personnel to call in with their travel routes to help ensure their safety while traveling between remote sites.
- Institute a communications routine during certain higher risk procedures where the on-site technician continually updates management or safety personnel of the progress so that help can be dispatched if needed.
- Never store combustible materials in or near equipment racks. The combination of combustible material, heat, and electrical energy increases the risk of a fire safety hazard.
- Equipment installed at the site meeting the requirements of a "restricted access location," per UL 62368-1, is defined as follows: "Access can only be gained by service persons. Access to the equipment is by using a tool or lock and key, or other means of security, and is controlled by the authority responsible for the location."

BURN HAZARD: The metal housing of the product may become extremely hot. Use caution when working around the equipment.

Figure 41: Warning Label on Hot Modules

WARNING: DC input voltage must be no higher than 60 VDC. This maximum voltage includes consideration of the battery charging "float voltage" associated with the intended supply system, regardless of the marked power rating of the equipment. Failure to follow this guideline may result in electric shock.
AVERTISSEMENT: La tension d'entrée CC ne doit pas être supérieure à 60 V CC. Cette tension maximale tient compte de la « tension flottante » de charge de la batterie associée au système d'alimentation prévu, quelle que soit la puissance nominale indiquée sur l'équipement. Le non-respect de cette directive peut entraîner une décharge électrique.

BURN HAZARD: Disconnect power in the cabinet to prevent injury while disconnecting and connecting antennas.

CAUTION:
All Tx and Rx RF cables outer shields must be grounded per Motorola Solutions *Standards and Guidelines for Communication Sites* manual requirements.

All Tx and Rx RF cables must be connected to a surge protection device according to the Motorola Solutions *Standards and Guidelines for Communication Sites* manual. Do not connect Tx and Rx RF cables directly to an outside antenna.

AVERTISSEMENT: Tous les blindages extérieurs des câbles RF d'émission et de réception doivent être mis à la terre conformément au manuel des normes et lignes directives relatives aux sites de communications de Motorola Solutions. Tous les câbles RF d'émission et de réception doivent être connectés à un dispositif de protection contre les surtensions conformément au manuel des normes et lignes directives relatives aux sites de communications de Motorola Solutions (*Standards and Guidelines for Communication Sites*). Ne connectez pas les câbles RF d'émission et de réception directement sur une antenne extérieure.

IMPORTANT: All equipment must be serviced by Motorola Solutions-trained personnel.

3.2.1
RF Site Devices Supplemental Safety Installation Requirements

The Supplemental Safety and Installation Requirements include the following:

- The RF site device must be installed in a suitable, in-building enclosure. A restricted access location is required when installing this equipment into the end system.
- The device can be outfitted with a Class 1 power supply component. This component is equipped with an appliance inlet for connecting to an AC input.
- This device contains a distributed DC power system with DC input terminals that meet SELV DC circuit requirements.
- When installing the equipment, all requirements of relevant standards and local electrical codes must be fulfilled.
- The maximum operating ambient temperature of this equipment is 60 °C. The maximum operating altitude is 5000 meters above sea level.
  The maximum altitude for full performance of the optionally installed router is 3000 meters above sea level.

For more information, see Specifications for DBR M12 MultiCarrier Site for Integrated Voice and Data (700/800 MHz) on page 48.

- The 48 VDC system output to the Multi-Carrier Power Amplifier (MCPA) and DSC 8500 is at an energy hazard level (exceeds 240 VA). When installing into the end system, care must be taken so as not to touch the output wires.
- When the device is used in a DC system, the DC power supply must be located in the same building as the device, and it must meet the requirements of a SELV circuit.

3.2.2
DC Mains Grounding Connections

CAUTION: This equipment is designed to permit the connection of the grounded conductor of the DC supply circuit to the grounding conductor at the equipment. If this connection is made, you must meet all following conditions:

- Connect this equipment directly to the DC supply system grounding electrode conductor or to a bonding jumper from a grounding terminal bar or bus in which the DC supply system grounding electrode conductor is connected.
- Locate this equipment in the same immediate area (such as adjacent cabinets) as any other equipment that has a connection between the grounded conductor of the same DC supply circuit and the grounding conductor (and also the point of grounding of the DC system). Do not ground the DC system elsewhere.
- Locate the DC supply source within the same premises as the equipment.
- Do not install switching or disconnecting devices in the grounded circuit conductor between the DC source and the point of connection of the grounding electrode conductor.

AVERTISSEMENT: Cet équipement est conçu pour permettre la connexion du conducteur de terre du circuit d'alimentation CC au conducteur de terre de l'équipement. Si cette connexion est établie, vous devez respecter toutes les conditions suivantes :

- Connectez cet équipement directement au conducteur de l'électrode de terre du système d'alimentation CC ou à un cavalier de liaison à partir d'un bornier ou d'un bus de terre auquel le conducteur d'électrode de terre du système d'alimentation CC est connecté.
- Placez cet équipement dans la même zone immédiate (comme dans des armoires adjacentes) que tout autre équipement doté d'une connexion entre le conducteur de terre du même circuit d'alimentation CC et le conducteur de terre (et également le point de mise à la terre du système CC). Ne mettez le circuit CC à la terre à aucun autre endroit.
- Localisez la source d'alimentation CC dans les mêmes locaux que l'équipement.
- N'installez pas de dispositifs de commutation ou de déconnexion dans le conducteur de terre entre la source d'alimentation CC et le point de connexion du conducteur d'électrode de terre.

3.2.2.1
Disconnect Device Permanently Connected

Incorporate a readily accessible disconnect device (circuit breaker or switch) in the building installation wiring.

3.2.2.2
Multiple Power Sources

WARNING: Disconnect all Power before servicing. Multiple power sources may be present. Failure to do so may cause property damage, personal injury or death.
AVERTISSEMENT: Débranchez toute alimentation avant l'entretien. Plusieurs sources d'alimentation peuvent être présentes. Ne pas le faire peut entraîner des dommages matériels, des blessures ou la mort.

3.2.2.3
Connection to Primary Power

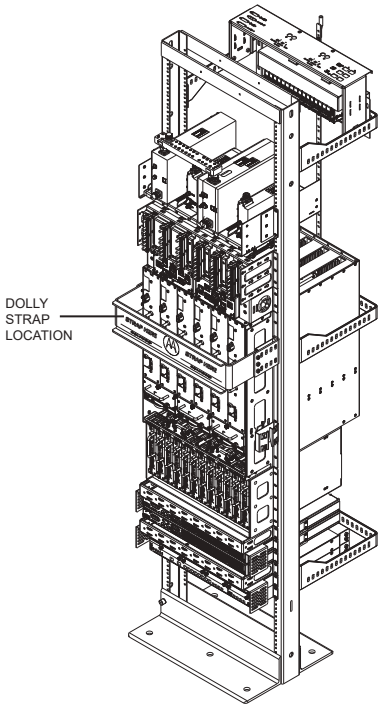
For supply connections, use wires suitable for at least 75 °C.

3.2.2.4
Replaceable Batteries

WARNING: Risk of Explosion if you replace the battery with an incorrect type. Dispose of used batteries according to the instructions.

3.2.3
Rack Transportation Strap Bar

Figure 42: Rack Transportation Strap Location



If you transport the rack on a hand truck or dolly, you should use the rack strap bar as the location for securing the straps.

You must remove the rack strap bar after the rack is transported to the site. There are six M6 screws that attach the bar to the rack brackets. The six M6 screws can be removed with a driver with a T30 bit. You cannot remove the brackets that the rack strap bar is attached to, they are used for cable management.

WARNING: When securing the rack by using the strap bar do not tilt the rack forward or side to side more than 15 degrees.
AVERTISSEMENT: Lorsque vous fixez un bâti à l'aide de la barre de sangle, n'inclinez pas le bâti vers l'avant ou d'un côté à l'autre à plus de 15 degrés d'inclinaison.

3.2.4
Maintenance Requiring Two People

Identify maintenance actions that require two people to perform the repair. Two people are required when:

- A repair has the risk of injury that would require one person to perform first aid or call for emergency support. An example is work around high-voltage sources. If an accident occurs to one person, another person may be required to remove power and call for emergency aid.
- Heavy lifting is involved. Use the National Institute of Occupational Safety and Health (NIOSH) lifting equation to determine whether one or two persons are required to lift a system component when it must be removed and replaced in its rack.

3.2.5
Equipment Racks

Lift equipment racks without the use of lifting equipment only when sufficient personnel are available to ensure that regulations covering health and safety are not breached. Use an appropriately powered mechanical lifting apparatus for moving and lifting the equipment racks. In addition to these points, comply with any local regulations that govern the use of lifting equipment.

WARNING: Crush Hazard could result in death, personal injury, or equipment damage. Equipment racks can weigh up to 360 kg (800 lb).
AVERTISSEMENT: Le risque d'écrasement peut entraîner la mort, des blessures ou des dommages matériels. Les bâtis d'équipement peuvent peser jusqu'à 360 kg (800 lb).

3.2.5.1
Lifting Equipment Racks Horizontally

In some cases, equipment racks are shipped in the horizontal position. Use the appropriate lifting apparatus to lift the racks upright. Comply with all applicable health and safety regulations, and any other regulations applicable to lifting heavy equipment.

WARNING: Crush Hazard could result in death, personal injury, or equipment damage.
Do not use the eyenuts mounted on the top of the rack to lift the rack upright from a horizontal position. The eyenuts are not designed to lift horizontally and could fail resulting in damage to the equipment or injury to personnel.

AVERTISSEMENT: Le risque d'écrasement peut entraîner la mort, des blessures ou des dommages matériels. N'utilisez pas les écrous à œil montés sur le dessus du bâti pour soulever le bâti à la verticale depuis une position horizontale. Les écrous à œil ne sont pas conçus pour lever un objet horizontalement et pourraient se briser, entraînant des dommages à l'équipement ou des blessures au personnel.

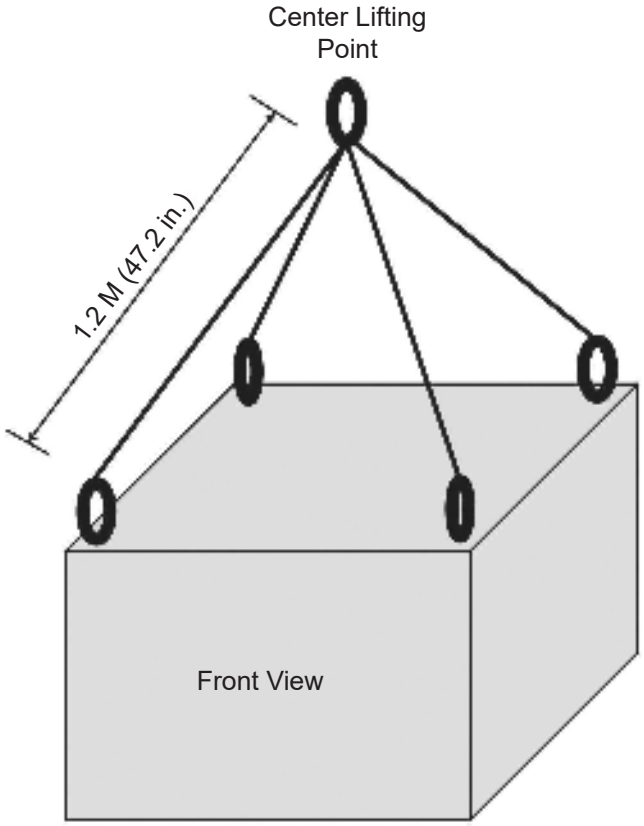
3.2.5.2
Lifting Equipment Racks Vertically

Some equipment racks have four M10 eyenuts mounted in the top of the rack. Use these eyenuts to lift the equipment rack vertically. Before using these eyenuts, visually check them and the rack hardware for any damage that may have occurred during shipping.

WARNING: Do not use the eyenuts if damage is apparent. Contact the Centralized Managed Support Operations (CMSO) for replacements.
AVERTISSEMENT: N'utilisez pas les écrous à œil si des dommages sont apparents. Communiquez avec le Centre des opérations de soutien centralisé Centralized Managed Support Operations (CMSO) pour les remplacements.

Use all four eyenuts when lifting the equipment rack. The minimum distance from each eyenut to the lifting point is 1.2 meters (47.2 in). Using a shorter length than specified could cause the eyenuts to fail. The figure below shows the minimum lengths and proper lifting angles using the eyenuts.

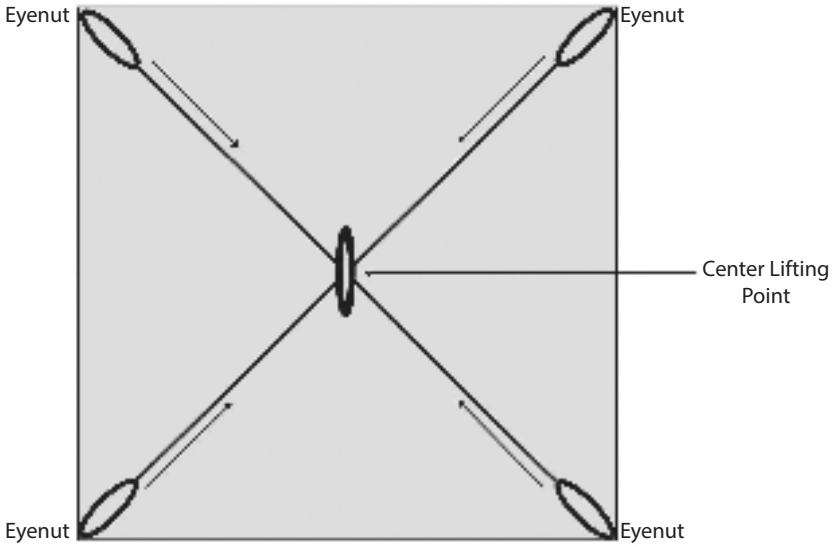
Figure 43: Lengths and Angles for Lifting Using the Eyenuts



If eyenuts are removed or become loose, install them properly before lifting the equipment rack. Tighten the eyenuts and bolt assembly by hand. Correct eyenut tightness and alignment are crucial to ensure that the eyenut assembly performs to its intended lifting capacity. Align the eyenuts to point towards the center lifting point of the cabinet and tightened to between 90 to 120 in-lb torque.

The figure below shows the proper alignment of the eyenuts.

Figure 44: Proper Alignment of the Eyenuts



3.3

General Installation Standards and Guidelines

This section provides several guidelines to ensure a quality install. Review these guidelines before unpacking and installing the system. Additionally, review the installation information in the Motorola Solutions Standards and Guidelines for Communication Sites manual for more details, including:

- Equipment installation
- Antenna installation

Review the installation information specific for the DBR M12 MultiCarrier Site. See DBR M12 MultiCarrier Site Installation on page 64.

3.3.1

Site Preparation Overview

Perform the activities listed in this table to ensure proper site preparation. The table references specific chapters in the Motorola Solutions *Standards and Guidelines for Communication Sites* manual for more information.

Table 17: Activities for Site Preparation

Activity	Description of Activity	Chapter Reference
Review the site plan.	• Prevents potential on-site and off-site interference by local trunked systems. • Minimizes cable lengths. • Determines the location of telecom equipment.	• "Site Design and Development"

Activity	Description of Activity	Chapter Reference
Determine site access and security.	Outlines of site access and security measures.	• "Site Design and Development"
Review safety considerations.	Outlines general, installation, and environmental safety guidelines and requirements and OSHA-related considerations.	• "Communications Site Building Design and Installation"
Schedule installation of telephone service.	Ensures options and functions of on-site, two-way communications for personnel safety and maintenance.	• "Communications Site Building Design and Installation"
Review grounding specifications.	Ensures that the site meets or exceeds the Quality Audit Checklist in Appendix F as well as the Power and Grounding Checklist in Appendix D.	• “Grounding (Earthing) Electrode System Testing/Verification” • “R56 Compliance Checklist”
Schedule installation of site power.	Covers grounding, power sources, and surge protection.	• "External Grounding (Earthing)" • "Internal Grounding (Earthing)" • "Power Sources" • "Surge Protective Devices"

3.3.2
Equipment Inspection and Inventory Recommendations

Ensure to fulfill the following general equipment inspection and inventory recommendations:

- Take an inventory of all equipment with a Motorola Solutions representative to ensure that the order is complete.
- Carefully inspect all equipment and accessories to verify that they are in good condition.
- Promptly report any damaged or missing items to a Motorola Solutions representative.

CAUTION: Do not tamper with factory configuration settings for these devices. These settings include software configuration, firmware release, password, and physical connections. Motorola Solutions has configured and connected these devices to meet specific performance requirements. Tampering with these devices may result in unpredictable system performance or catastrophic failure.

3.3.3
Placement and Spacing Recommendations

Proper spacing of equipment is essential for ease of maintenance and safety of personnel. Spacing requirements have been established to meet the National Fire Protection Associations (NFPA) code, and the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) standards. Adhere to

any local regulations that apply to the installation.

RISK OF FIRE: Install only on concrete or other non-combustible surface.
RISQUE D'INCENDIE: Installer uniquement sur du béton ou toute autre surface non combustible.

Placing Equipment Recommendations

- Place each rack on a firm, level, and stable surface, and bolt the racks together.
- Use the proper mounting hardware and shims to prevent rack movement. See the *Standards and Guidelines for Communication Sites* manual.
- Use strain relief when installing and positioning cables and cords to help ensure that no interruption of service occurs.
- Provide an appropriate amount of space around all components to allow for proper air flow, cooling, and safe access to equipment.
- Locate the site racks and other equipment with enough spacing to allow access for service.
- Locate the system in an area free of dust, smoke, and electrostatic discharge (ESD).
- Equipment that is not part of the defined product configurations should not be added to the rack. Extraneous hardware may compromise thermal performance by raising the temperature or impeding airflow.
- External cables coming into the racks must not significantly reduce airflow.
- For grounding racks information, see the *Standards and Guidelines for Communication Sites* manual.

Detailed Spacing Recommendations

Cabinets and racks allow equipment to be added to a site. Always consider room for expansion when setting up a site. Cabinets or racks may be installed next to each other or to other equipment. However, provide all cabinets and racks with sufficient floor space to permit access for installation and service.

Front access:

- At least 2 ft floor access in front of the cabinet or rack.

Side and rear access:

- At least 2 ft floor access at the rear of the cabinet or rack.
- At least 2 ft access on at least one side of the cabinet or rack, plus 6 inches at the rear of the cabinet or rack.

For details on space requirements, see the *Standards and Guidelines for Communication Sites* manual.

3.3.4 Cabinet Bracing Recommendations

Use all supplied bracing hardware when installing a rack or cabinet, and secure all equipment within a rack or cabinet.

If additional equipment is installed, see the system design document the field engineer provided, or consult the Motorola Solutions Field Representative.

Subsystem cabinets are self-supporting structures. In areas subject to seismic activity, additional bracing of the cabinet may be required to prevent it from tipping. However, the bracing hardware must be locally procured. No specific procedures are provided within this manual for bracing cabinets in active seismic areas.

See the Motorola Solutions *Standards and Guidelines for Communication Sites* manual for details on seismic conditions.

3.3.5
Mounting Cabinets or Racks to a Floor

Perform the following steps to properly install a cabinet or open rack within a site building. Secure the cabinets and racks to the floor for optimum stability. This procedure is written so that the cabinet or rack is moved only once.

Procedure:

1. Carefully mark the mounting holes with a pencil, as indicated on the appropriate cabinet or rack footprint.
2. Drill the marked mounting holes to the appropriate depth of the mounting hardware with a hammer drill and bit.
3. Insert an anchor into the drilled hole. If necessary, tap the anchor into place using a hammer.
4. For cabinets, adjust leveling feet until the mounting plate solidly touches the floor.
5. Carefully move the cabinet or rack into the position indicated by the holes in the floor.

   WARNING: Equipment cabinets and racks are heavy and may tip. Use extreme caution when moving. Lift from top eyenuts with the appropriate apparatus, or secure the cabinet or rack from tipping if lifting from the bottom. Failure to do so could result in death or serious injury or equipment damage.
   AVERTISSEMENT: Les armoires et les bâtis d'équipement sont lourds et peuvent basculer. Soyez extrêmement prudent lorsque vous les déplacez. Soulevez-les à partir des écrous à œil supérieurs avec l'appareil approprié ou prévenez le basculement de l'armoire ou du bâti si vous le soulevez par le bas. Ne pas le faire pourrait entraîner la mort, des blessures graves ou des dommages matériels.
6. Adjust and level the cabinet or rack as necessary to position the cabinet mounting holes with the pre-drilled holes.
7. Secure the cabinet or rack to the site floor with the locally procured mounting hardware.

   IMPORTANT: If securing a rack to a concrete floor, use 1/2-inch grade 8 bolts with anchors, for a cabinet use 5/16-inch grade 8 bolts with anchors.
8. For cabinets, adjust leveling feet until they touch the mounting surface.

3.3.6
Bonding and Grounding Requirements

Cabinets and racks include a Rack Grounding Bar (RGB) with the capacity to terminate numerous ground wires, which are associated with internal metallic or fiber optic cables and external grounding to power company equipment.

Attach equipment added to the cabinet or rack to the ground bar using solid or stranded 6 AWG copper wire.

The RGB uses dual-hole lugs to terminate ground wires. The minimum number of dual-hole attachments is system-dependent and specified by your organization. This bar provides electrical continuity between all bonds and ground wire with a current-carrying capacity equal to or exceeding that of a 6 AWG copper wire.

See the Motorola Solutions *Standards and Guidelines for Communication Sites* manual for more information on proper bonding and ground at a site.

3.3.7
Cabling Requirements

Diagrams for cabling are typically included in the system-specific configuration documentation Motorola Solutions provides.

Also see the Motorola Solutions *Standards and Guidelines for Communication Sites* manual for cabling standards.

IMPORTANT: System certification was completed using shielded cables. To prevent emission problems, use only shielded cables. Do not substitute other cable types.

- Position the equipment to avoid excessive tension on cables and connectors. Cables must be loose with absolutely no stress on the connectors. Careful cable routing and securing the cables with tie wraps (or other devices) is one way to provide this protection. Set up preventive maintenance loops.
- Dress the cables neatly using cable ties. Do not tighten the cable ties until you are sure that the required service length and bend radius requirements are met. Leave cable ties loose enough to allow adjustment.
- Verify that all cables are properly labeled to match system-specific configuration documentation Motorola Solutions provided.
- Ensure that cables do not exceed the minimum bend radius as outlined in the Motorola Solutions manual for cabling standards.

CAUTION: Use only Category 5e Shielded Twisted Pair (or higher) for cabling Ethernet connections. Motorola Solutions has engineered this system to meet specific performance requirements. Using other cabling and connectors may result in unpredictable system performance or catastrophic failure.
AVERTISSEMENT: Utilisez uniquement une paire torsadée blindée de catégorie 5e (ou supérieure) pour le câblage des connexions Ethernet. Motorola Solutions a conçu ce système pour répondre à des exigences de rendement particulières. Utiliser d'autres câblages et connecteurs peut entraîner une performance imprévisible du système ou une panne catastrophique.

For more information on cabling guidelines, see the documentation supplied with components from each equipment manufacturer.

3.3.8
Power Guidelines and Requirements

For information on providing electrical service, power budgeting, selecting batteries, and other topics for supplying power at the site, see the Motorola Solutions *Standards and Guidelines for Communication Sites* manual.

Perform electrical installation work in accordance with the current edition of the NFPA 70 and local building codes. Where required, use a qualified and licensed electrician for all electrical installations.

NOTE: In the event of a power supply failure, the AUX BUS connection configuration prevents transceivers in the chassis with the failed power supply from going offline. When the failed Power Supply is replaced, the lower transceiver card in the chassis resets automatically. The reset is needed for the transceiver to recognize the new Power Supply. Similarly, if the AC and/or DC input to the Power Supply is removed and then reconnected, the same reset scenario occurs.

3.3.8.1
AC Power Guidelines and Requirements

The Motorola Solutions *Standards and Guidelines for Communication Sites* manual defines the guidelines and requirements for cabinets and racks which house equipment that requires AC power input.

Some of the guidelines and requirements are as follows:

- The cabinet or rack is designed to accept 120/240 V, single-phase power with an amperage service size as required by the electronic equipment.
- Cabinets and racks powered by commercial power must be equipped with a Nationally Recognized Test Laboratory (NRTL) certified power distribution module that contains a main circuit breaker, or individual circuit breakers of the correct size as required for the electronic equipment, or as specified by your organization.
- A decal showing an electrical schematic of the power wiring is affixed to the inside surface of the cabinet.
- All AC power equipment and electrical components must conform to National Electrical Manufacturers Association (NEMA) and National Electrical Code (NEC). The AC power equipment must also be listed by an NRTL.
- A surge arrestor, designed to protect equipment systems from a 120/240 V service and load center, is placed on the power feed ahead of all individual load center circuit breakers. This gapless arrestor must be listed by an NRTL for the purpose intended.
- Selection of a surge arrestor is based on the susceptibility of the equipment powered by the electrical service, with margin provided for locally generated disturbances. See ANSI/IEEE C62.41 (21) for more details.
- At least one 120 VAC, 15 A duplex convenience outlet equipped with Ground Fault Interrupter (GFI) protection must be provided in the electronic equipment compartment.

CAUTION: Do not use surge/transient suppressors without careful and expert power system analysis.
AVERTISSEMENT: N’utilisez pas de suppresseurs de surtensions/surtensions transitoires sans faire faire une analyse minutieuse du système d’alimentation par un expert.

TIP: Redundant devices could be terminated on different AC main phases so that a single phase failure does not result in a power loss for both devices.

3.3.9
Electrostatic Discharge Recommendations

Electronic components, such as circuit boards and memory modules, can be sensitive to Electrostatic Discharge (ESD).

Use an antistatic wrist strap and a conductive foam pad when installing or upgrading the system.

If an ESD station is not available, wear an antistatic wrist strap. Wrap the strap around the wrist and attach the ground end (usually a piece of copper foil or an alligator clip) to an electrical ground. An electrical ground can be a piece of metal that literally runs into the ground (such as an unpainted metal pipe), or the metal part of a grounded electrical appliance. An appliance is grounded if it has a three-prong plug and is plugged into a three-prong grounded outlet.

NOTE: Do **not** use a computer as a ground, because it is not plugged in during installation.

3.3.10
FCC Requirements

Radio frequency (RF) transmitters installed at sites within the US must be in compliance with the following FCC regulations:

- The station licensee is responsible for the proper operation of the station at all times and is expected to provide observations, servicing, and maintenance as often as may be necessary to ensure proper operation.
- The transmitter ERP must not exceed the maximum power specified on the current station authorization.

- The frequency of the transmitter must be checked during initial installation of the transmitter, when replacing modules, or when making adjustments that affect the carrier frequency or modulation characteristics.

3.3.11
Networking Tools

Use the following networking tools for installing and servicing the network:

- Fluke® OneTouch Assistant LAN tester
- NiMH rechargeable battery for Fluke
- Serialtest® software with the ComProbe® and SerialBERT option

3.3.12
Installation/Troubleshooting Tools

If information is needed regarding where to obtain any of the equipment and tools listed, contact the Centralized Managed Support Operations (CMSO).

General Tools

Use the following general tools to install, optimize, and service equipment in the system:

- 150 MHz 4 Channel Digital Storage Oscilloscope
- Transmission Test Set (TIMS Set)
- Aeroflex 3900 Series Service Monitor or equivalent
- 50 Ohm Terminated Load
- Digital Multimeter (DMM)
- Terminal Emulation Software
- Serial Cable
  - USB to RS232 serial adapter/converter
  - DB-9 Straight through serial cable - F/M
  - DB-9 to RJ45 Modular Adapter - F/F
    RJ45 (pinout: 4 = Rx, 7 = Tx, 8 = Ground)

    DB-9 (pinout: 2 = Rx, 3 = Tx, 5 = Ground)
  - RJ45 to RJ45 cable - M/M
- RS-232 Cables with Connectors
- Punch Block Impact Tool
- MODAPT – RJ-45 Breakout Box
- Remote RJ-11/ RJ-45 Cable Tester (1200 ft length maximum)
- PC Cable Tester (RG-58, 59, 62, BNC, RJ-45, RJ-11, DB-9, DB-15, DB-25 connectors)
- ESD field service kit
- Amprobe Instruments GP-1 Earth Tester
- AEMC 3730 Clamp-on Ground Resistance Tester

Rack Tools

Use the following tools to install, optimize, and service the equipment:

- Aeroflex 3900 Series Service Monitor with P25 Options installed (plus Time Division Multiple Access (TDMA) option, as required)
- Service laptop with Windows 10 operating system
- Hardware Requirements:
  - 1 GHz or higher Pentium grade processor
  - 2 GB RAM processor memory (recommended for Windows 10)
  - 300 MB minimum free hard disk space (for a Typical Installation, including Help Text and Software Download Manager)
  - 100 MB minimum free hard disk space (for a Compact Installation)
  - Peripherals:
    - Microsoft Windows supported mouse or trackball
    - Microsoft Windows supported serial port for product communication
    - Microsoft Windows supported Ethernet port for product communication
    - Microsoft Windows supported printer port for report printing
- Ethernet cable
- Antenna tester
- 50 Ohm terminated load
- Rohde & Schwarz NRT-Z14 Directional Power Sensor, 25-1000 GHz, 0.1-120 W. Recommended for all uses when a service monitor is not available.

Networking Tools

- Fluke® OneTouch Assistant LAN tester
- NiMH rechargeable battery for Fluke
- Serialtest® software with the ComProbe® and SerialBERT option

3.3.13
Technical Support for Installation

Technical support is available from the site-specific documents the Field Engineer or Motorola Solutions Field Representative provided for the system, Centralized Managed Support Operations (CMSO), or qualified subcontractors.

- Centralized Managed Support Operations (CMSO) can help technicians and engineers resolve system problems and ensure that warranty requirements are met. Check your contract for specific warranty information.
- The Motorola Solutions System Service Subcontractor Assessment program ensures that service people contracted by Motorola Solutions meet strict minimum requirements before they can work on any system. For more information on this program, contact the Motorola Solutions representative.

3.3.13.1
Site-Specific Information

When Motorola Solutions stages a system, the Field Engineer assigned to the system creates all site-specific system documentation to document how the system was staged.

Site-specific information includes the following:

- Site design drawings showing the location of racks, cabinets, cable trays, and other components
- Rack drawings showing the location of the equipment in each rack
- Cable matrix in a table format that shows each cable and its connections
- Interconnect wiring diagrams to show the cable connections between devices
- Pre-programmed parameters of each site component
- Templates used to program each device
- All firmware and software revisions of each site component
- Test data from each device that requires operational verification
- Optimization requirements and settings of each electrical path
- Acceptance Test Plan for the site components

NOTE: Maintain this site-specific information to reflect the current site configuration and layout for the system.

3.4
Power Connections

This section covers topics on connecting power cables to the DBR M12 Site and the power distribution module, calculating the length of wire for various gauges, and mounting the battery temperature sensor.

3.4.1
DC Power Connection Wire Gauge Calculations for Integrated Voice and Data

Since the power supply disconnects itself from the DC input when it senses that DC voltage has dropped to 42 VDC, it is important to minimize the voltage drop in the DC power supply loop (the total length of the 48 VDC hot wire and the DC return wire) to no more than 1 V total. Minimizing the voltage drop ensures that the maximum energy is removed from the battery before disconnecting the power supply from the DC input line.

A DBR M12 MultiCarrier Site rack/cabinet configured with a single 2-3 N - way combiner bank, with 6 carriers at rated RF output, can consume up to 2400W. This equates to 44A of current when operating from a 54 V source (nominal 48 VDC system). As the voltage decreases (due to the standby battery discharging) the current increases proportionally (since the base radio appears to be a constant power load). At the low voltage disconnect point (42 V for a nominal 48 VDC system), the current is up to 57 A. If a single pair of 2 AWG wires is used to connect the battery to the junction panel, the maximum length of a single conductor is 17m (55 ft). Use of smaller gauge wire would reduce the length of a single conductor, depending on the resistance of the wire. To determine the maximum length of wire for wire other than 2 AWG, you can refer to the following relationship:

- Length (meter/feet) = V/I/R

where:

- V = voltage drop in one leg of the loop (max = 0.5 V)

- I = current drawn by the base radio during DC operation
- R = resistance of the wire being considered (in Ohms per meter/foot)

For common wire sizes for an IV&D site, the maximum distances apply.

Table 18: DC Power Connection Wire Gauge Maximum Distances for an IV&D Site

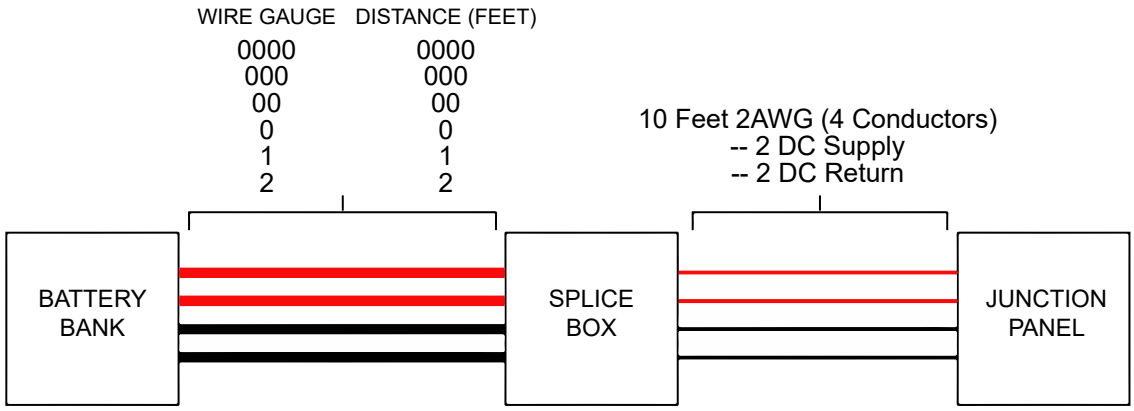
AWG	Resistance (ohm/1000 ft)	Maximum Distance (for 57 A)
1	0.1239	21m (70 ft)
2	0.1563	17m (55 ft)
4	0.2485	11m (35 ft)
6	0.3951	7m (23 ft)

In some installations, local codes may require the installation of wire heavier than 2 AWG. In these situations, a local splice box can be used to reduce the incoming wire to the 2 AWG needed for connection to the input terminal box. The splice box should be as close as possible to the junction panel.

If two pairs of 2 AWG wire are used to connect the DBR M12 MultiCarrier Site to the battery bank, the maximum distance from the battery to the junction panel would be 110 ft. If longer distances are required, a splice box must be included in the DC distribution. In that event, the following diagram provides guidance regarding the maximum distance permitted for various wire gauges available. These values are based on a splice box located 10 ft from the junction panel. If the splice box is more than 10 ft from the junction panel, the allowable distance between the splice box and the battery bank is shorter.

NOTE: Each DC input termination is rated for a maximum of 65 A.

Figure 45: Wire Gauge and Distance Guide



3.4.2

Connecting Power to an AC Power Source

WARNING: Shock hazard. The DBR M12 MultiCarrier Site contains dangerous voltages which can cause severe electrical shock or damage to equipment. You must disable power to the system before servicing this part.
AVERTISSEMENT: Risque d'électrocution. Le site DBR M12 MultiCarrier contient des tensions dangereuses qui peuvent provoquer une décharge électrique grave ou des dommages à l'équipement. Vous devez couper l'alimentation du système avant l'entretien de cette pièce.

The DBR M12 MultiCarrier Site AC Power Supply (T8926A) requires 20A receptacles due to the power rating of its AC/DC power supply modules. A separate circuit breaker for each power cord is needed to ensure that not more than one AC/DC power supply module loses power when a breaker is tripped or opened.

All AC power breakers, wiring and receptacles must comply with the installation guidelines specified in *Standards and Guidelines for Communication Sites*.

The DBR M12 MultiCarrier Site AC Power Supply can be ordered with one of the following power connection options:

- 1.8m (6 ft) NEMA 5–20 to IEC C19 Power Cord
- 3.7m (12 ft) NEMA 5–20 to IEC C19 Power Cord
- Connector Field Kit that provides 1 loose IEC C19 connector for the equipment end and the field. You must provide the proper length cable and region specific plug.

Procedure:

1. Remove the power cords from the loose shipment accessories.
2. Assemble the two snap-on EMI Ferrite suppressors (HZ000947A01) to each line cord, as close to the C19 connector as possible.
3. Insert the C19 connectors into the frame power chassis in the receptacles aligned to the two Power Supply Units (PSU).
4. To retain the cable from accidental removal, place the cable retention clip over the strain relief of the C19 connector of the power cord, and squeeze it.
5. To apply power, connect the NEMA 5–20 plugs into a compatible wall receptacle.

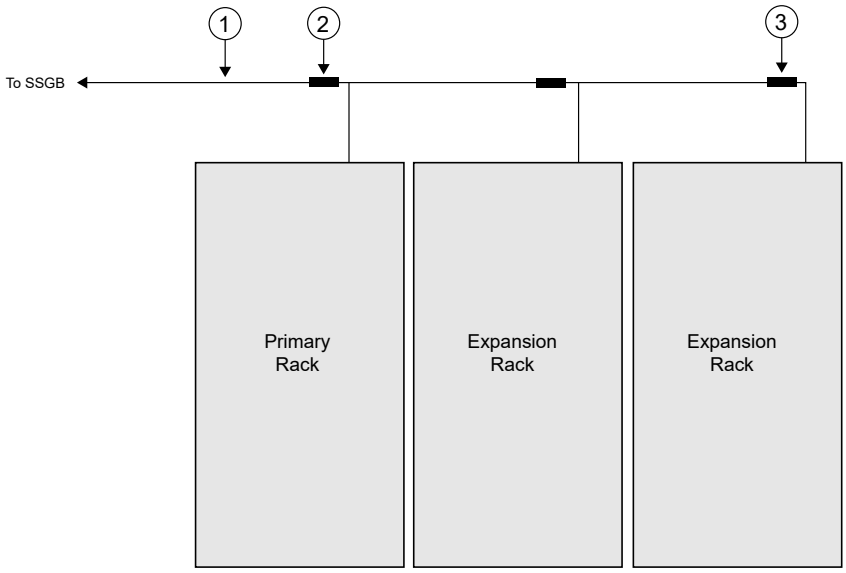
3.5 Grounding

Detailed grounding information is beyond the scope of this manual. See the Motorola Solutions *Standards and Guidelines for Communication Sites* manual for detailed information about grounding and lightning protection.

IMPORTANT: Ground the battery system, either positive or negative, at the battery. The DC input (battery charger output) of the power supply is floating with respect to earth ground. The power supply can therefore be used in either positive ground or negative ground DC systems. The appropriate terminal (+ or -) of the DC system should be connected to protective earth at the battery.
These instructions assume that all telephone lines, antenna cables, and AC or DC power cables have been properly grounded and lightning-protected.

When rack installations have a primary rack and one or more expansion racks, all these racks must be connected to the same Sub System Ground Bus Bar (SSGB) (and no other rack connected to the SSGB). Grounding ensures that surge events do not produce ground potential differences that affect signals between the racks.

Figure 46: Rack Grounding



Annotation	Description
1	Ground BUS Conductor
2	Irreversible Crimp Connector or Split Bolt
3	Route Conductors Toward Ground BUS and SSGB

3.6

Junction Panel Connections

The junction panel for the DBR M12 MultiCarrier Site cabinet/rack provides locations for all the non-RF connections to external devices. Cables provided by Motorola Solutions include the specific connectors for the junction panel on one end and the subsystem equipment on the other end.

NOTE: All RF connections to the DBR M12 MultiCarrier Site cabinet/rack are facilitated directly at the RF connectors of the Tx post filter(s), Preselctor(s) and RMC.

Figure 47: Cabinet Junction Panel

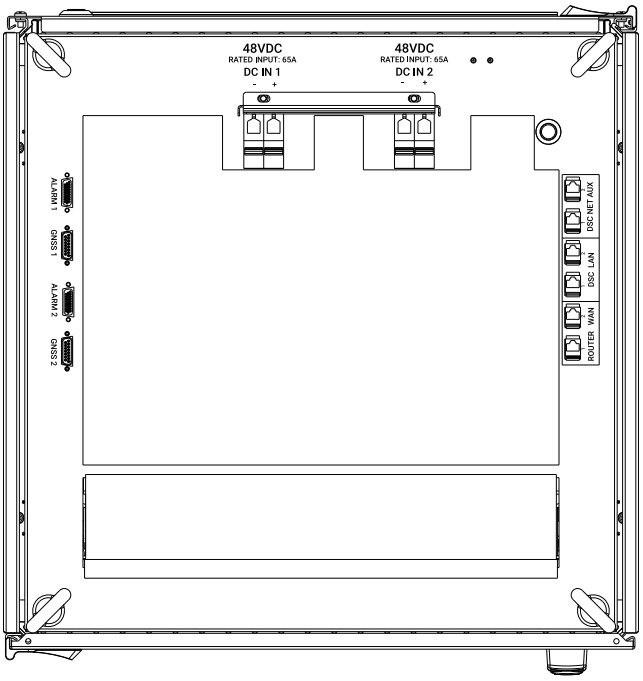


Figure 48: Rack Junction Panel Network Connections

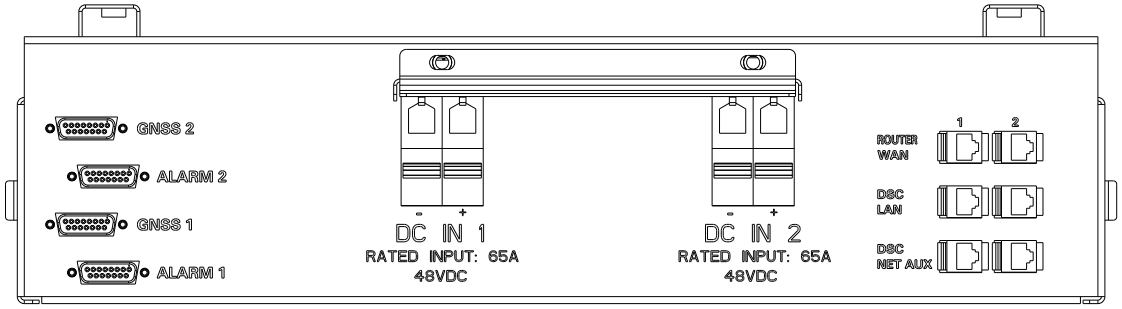
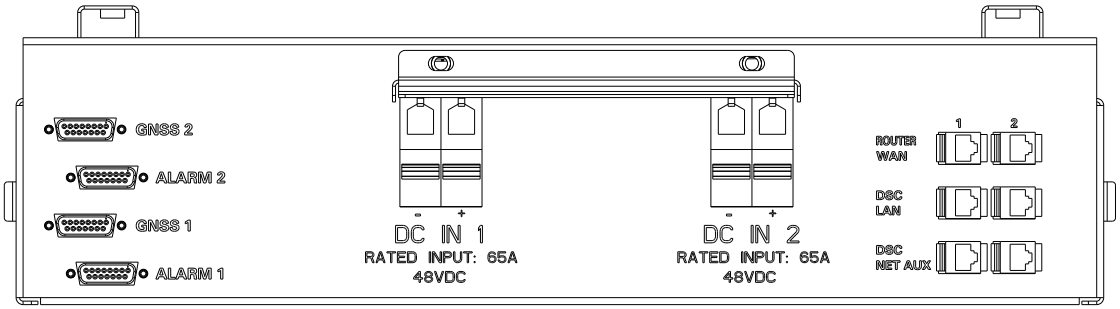


Table 19: Junction Panel Connections Description

Connection	Description
GNSS 1/2	Primary and redundant GNSS Antenna
ALARM 1/2	General-purpose input/output (GPIO) for the primary and redundant DSC 8500
DC IN 1/2	48VDC Power
DSC Net Aux	Net Aux connection for DSC 8500 1 and DSC 8500 2
DSC LAN	Site DSC 8500 to DSC 8500 connections
Router WAN	Edge Router connections

3.6.1
DSC 8500 Network Connections

Figure 49: Junction Panel Network Connections



When installing the DBR M12 MultiCarrier Site, you must ensure that the correct network connections are made at the top of the rack. The connections may differ, depending on whether it is a primary rack or one of the expansion racks. For the connections, you must use Cat5e or higher network cables.

NOTE: The maximum length of network cables connected to the DSC 8500 is 75 meters.

The following table provides information about the configuration.

Table 20: Top of Rack Site Controller Network Connections Configuration

Site Type	Primary DSC LAN 1	Primary DSC LAN 2	Expansion 1 DSC LAN 1	Expansion 1 DSC LAN 2	Expansion 2 DSC LAN 1	Expansion 2 DSC LAN 2
1 Primary	Primary DSC LAN 2	–	–	–	–	–
1 Primary 1 Expansion	Expansion 1 DSC LAN 2	Expansion 1 DSC LAN 1	Primary DSC LAN 2	Primary DSC LAN 1	–	–
1 Primary 2 Expansion	Expansion 2 DSC LAN 2	Expansion 1 DSC LAN 1	Primary DSC LAN 2	Expansion 2 DSC LAN 1	Expansion 1 DSC LAN 2	Primary DSC LAN 1

3.6.2
Optional AC Power Supply Unit Back Panel Connections

Figure 50: AC Power Supply Unit Rear View

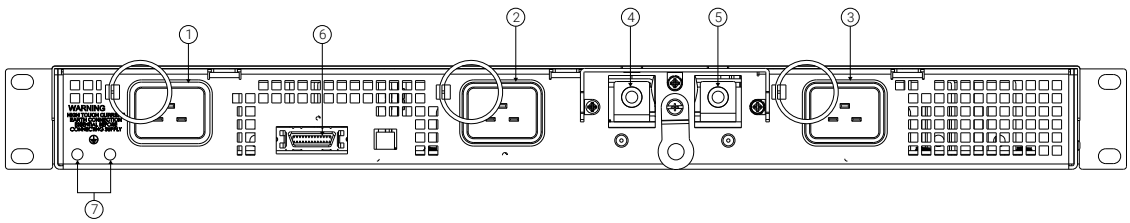


Table 21: Optional AC Power Supply Unit Rear Connections

Annotation	Designator	Description
1	J1	AC input connector
2	J2	AC input connector
3	J3	AC input connector
4	-	DC output
5	+	DC output
6	J16	PSU alarm
7	GND SYMB	Ground studs

3.7

RMC Attenuation Configuration

To adjust the RF gain for the different configuration, you can set the attenuation level applied to receivers from the DIP switches on the front of the Site RMC modules.

Figure 51: Site RMC

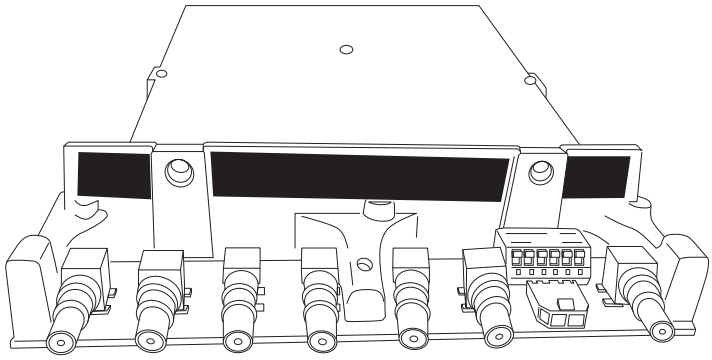
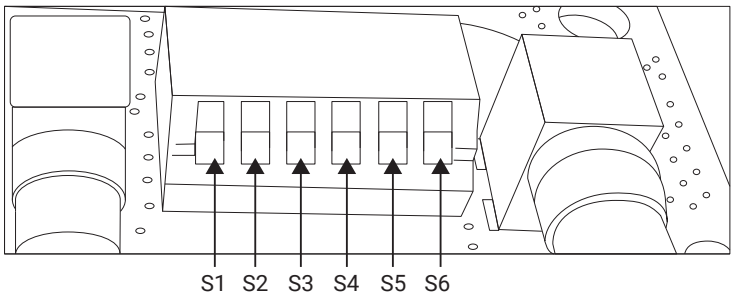


Figure 52: Site RMC DIP Switches



Annotation	Description
S1 – S5	Used to set the binary system dB attenuation values.
S6	Used to set RMC in normal mode or amp bypass mode.

dB Attenuation Values Configuration

The following figures, illustrate how the DIP switch positions (0 and 1) create a binary system for setting dB attenuation values for normal mode.

You can configure the software settings to correspond to the dip switch settings in the Provisioning and Configuration Agent (PCA), by navigating to **Services** → **RFDS Configuration Rx Path**.

For standard setting for systems without an Rx top amplifier system, see Figure 53: RMC DIP Switch Example - 0 dB on page 87.

For standard setting for systems with an Rx top amplifier system, see Figure 63: RMC Dip Switch Example - 10 dB on page 89.

Figure 53: RMC DIP Switch Example - 0 dB

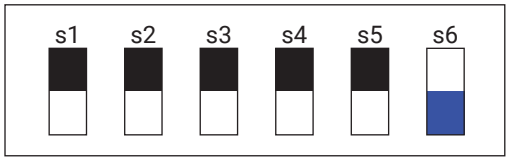


Figure 54: RMC DIP Switch Example - 1 dB

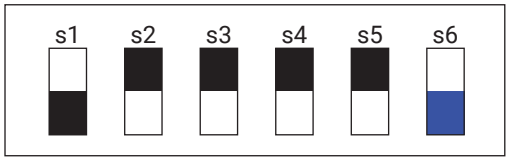


Figure 55: RMC DIP Switch Example - 2 dB

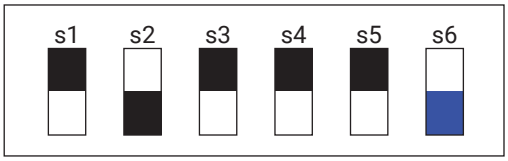


Figure 56: RMC DIP Switch Example - 3 dB

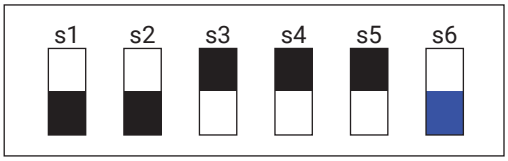


Figure 57: RMC DIP Switch Example - 4 dB

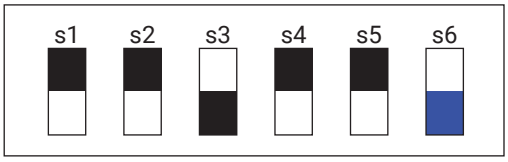


Figure 58: RMC DIP Switch Example - 5 dB

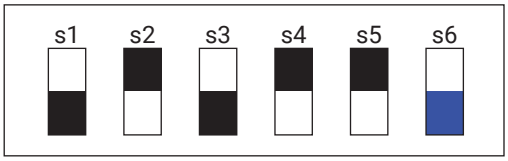


Figure 59: RMC DIP Switch Example - 6 dB

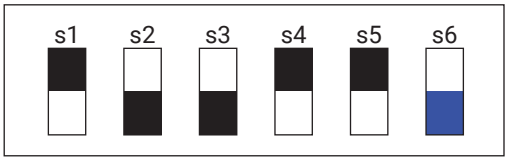


Figure 60: RMC DIP Switch Example - 7 dB

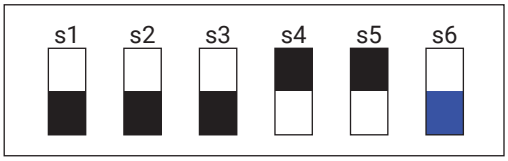


Figure 61: RMC DIP Switch Example - 8 dB

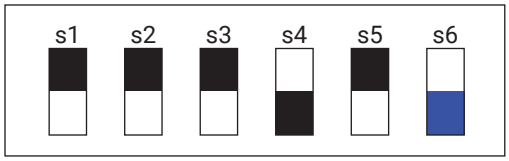


Figure 62: RMC DIP Switch Example - 9 dB

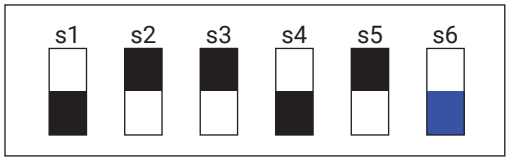


Figure 63: RMC Dip Switch Example - 10 dB

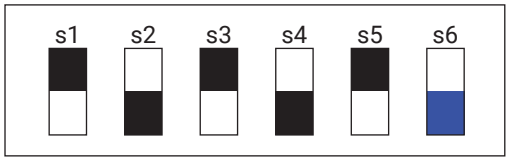


Figure 64: RMC Dip Switch Example - 11 dB

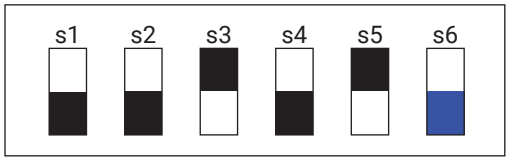


Figure 65: RMC Dip Switch Example - 12 dB

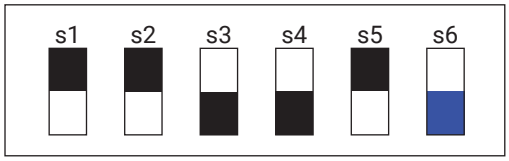


Figure 66: RMC Dip Switch Example - 13 dB

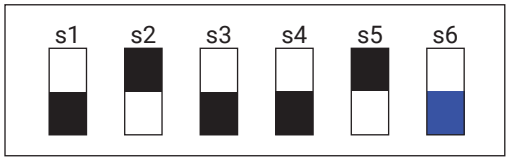


Figure 67: RMC Dip Switch Example - 14 dB

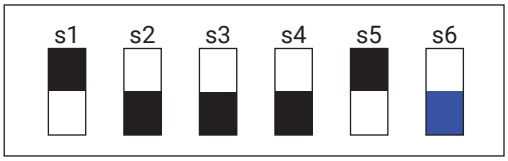


Figure 68: RMC Dip Switch Example - 15 dB

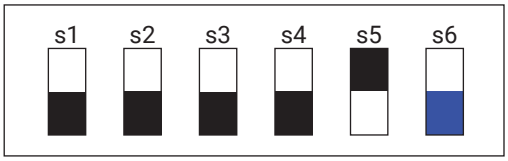


Figure 69: RMC Dip Switch Example - 16 dB

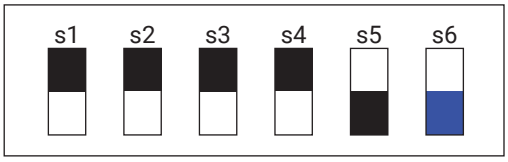


Figure 70: RMC Dip Switch Example - 17 dB

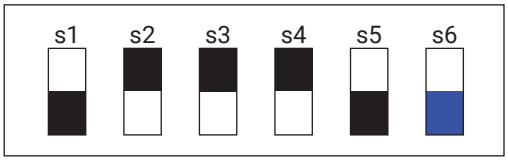


Figure 71: RMC Dip Switch Example - 18 dB

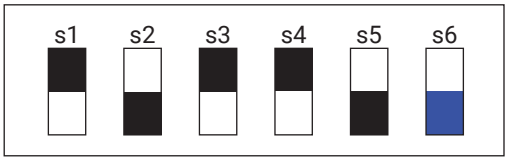


Figure 72: RMC Dip Switch Example - 19 dB

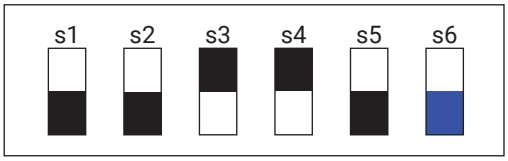


Figure 73: RMC Dip Switch Example - 20 dB

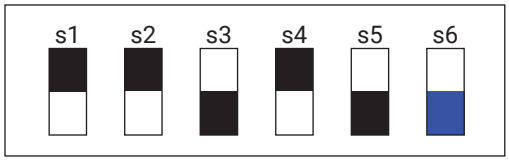


Figure 74: RMC Dip Switch Example - 21 dB

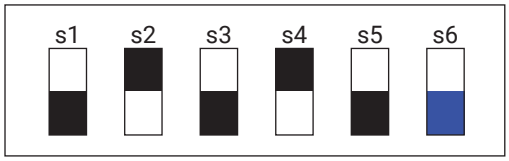


Figure 75: RMC Dip Switch Example - 22 dB

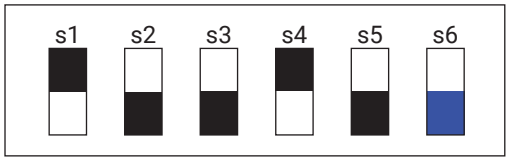


Figure 76: RMC Dip Switch Example - 23 dB

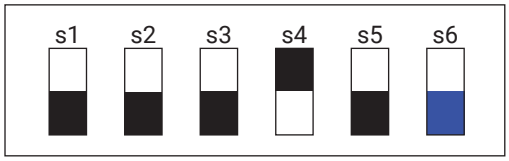


Figure 77: RMC Dip Switch Example - 24 dB

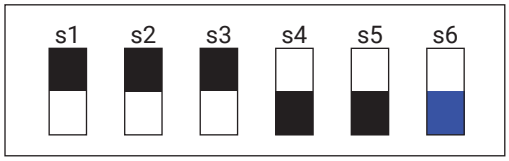


Figure 78: RMC Dip Switch Example - 25 dB

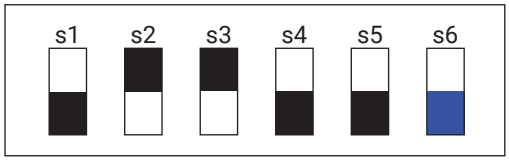


Figure 79: RMC Dip Switch Example - 26 dB

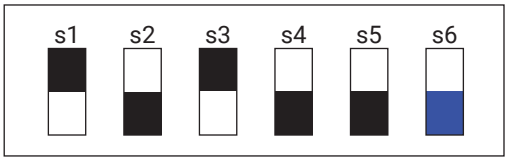


Figure 80: RMC Dip Switch Example - 27 dB

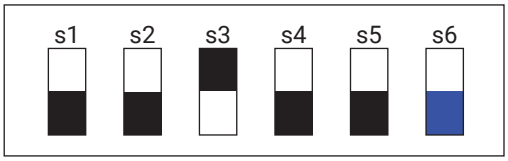


Figure 81: RMC Dip Switch Example - 28 dB

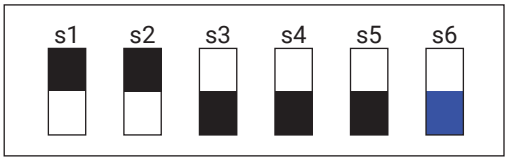


Figure 82: RMC Dip Switch Example - 29 dB

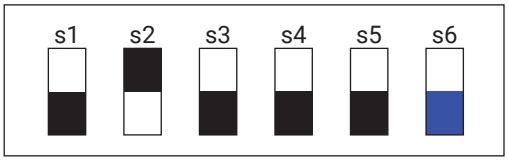


Figure 83: RMC Dip Switch Example - 30 dB

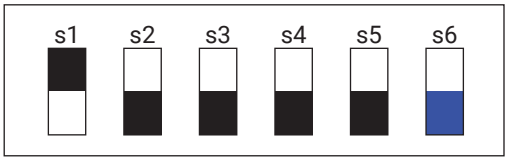
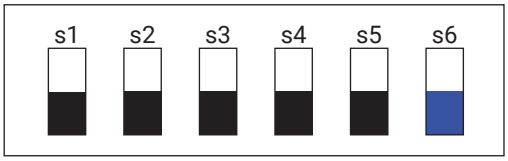
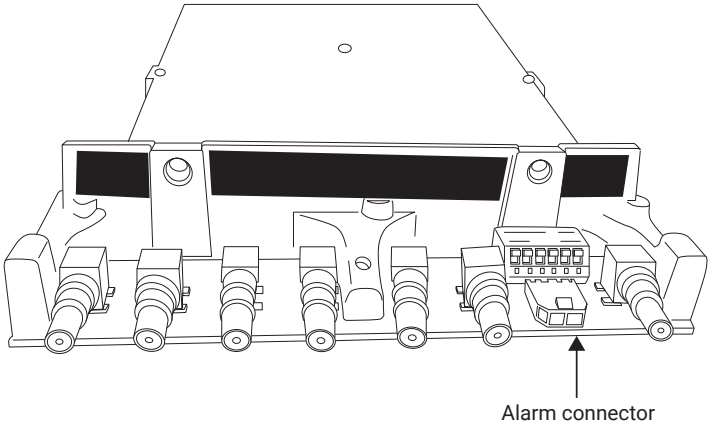


Figure 84: RMC Dip Switch Example - 31 dB



Site RMC Alarm

Figure 85: Site RMC Alarm Connector Location



The Site RMC provides an alarm indication when the relay contact between pins 1 and 2 of the alarm connector is open.

You can connect the Site RMC alarm relay to the DSC 8500 auxiliary inputs to monitor the RMC alarm.

NOTE: It is strongly recommend that you connect/configure the alarm output of the site RMC to an alarm input of either the DSC 8500 or the MC EDGE to be alerted by a reduced or complete loss of inbound coverage.

6. Update DNS records on Active Directory environment by entering the following commands:
   a. `cd "C:\Program Files\Motorola\AstroDC\DNS\scripts"`
   b. `.\SetMigrationPath.ps1`
   c. `.\PerformMigration.ps1 -default -type ldif -primaryDCOnly`
   d. `.\DeleteGenDNSData.ps1`
7. Verify that the scripts are completed successfully.
   The last line should contain `"Exit with 0"` string.
8. Close the **PowerShell** console.
9. Unmount the DC Plugin `iso` image from the virtual CD/DVD drive of the Domain Controller.
10. Restart the DNS service by performing the following actions:
    a. From **Start**, click **Search**.
    b. Type `"dnsmgmt.msc"` and press ENTER.
    c. In the DNS Manager console, right click the Domain Controller name (Z001DC01 for example) and select **All Tasks** → **Restart**.
    d. Wait ten minutes to ensure that the service restarted and completed reloading of DNS Zones.

7.7 Configuring the DBR M12 Trunking RF Site

Prerequisites:
Obtain:

- Service laptop or the Network Management (NM) Client
- IP address or the host name of the DSC 8500. See Logon Information on page 106.
- Credentials for the **System Infrastructure Administrator** account

Procedure:

1. In the address bar of a web browser, enter one of the following:
   - `https://<DSC_IP_address>`
   - `https://<DSC_host_name>`
2. Log on to the PCA as the **System Infrastructure Administrator**.
3. Configure the system. See Configuring the System on page 120.
4. Configure the band plan. See Configuring the Band Plan on page 121.
5. Configure the zone. See Configuring the Zone on page 122.
6. Configure the site. See Configuring the Site on page 123.
7. Configure the channels. See Configuring the Channels on page 127.
8. Select the **Pending Changes** tab.
9. Apply the changes by clicking **Apply**.

7.7.1

Configuring the System

Procedure:

1. From the **Configuration** drop-down list, select **System**.
2. In the **System list** view, select the system entry and click  .
3. In the **Edit System** view, provide appropriate values according to your system configuration.
   For information on the system parameters, see System on page 120.
4. Click **Submit**.

7.7.1.1

System

Table 26: ASR System Field Descriptions

Field	Description	Range	Default
WACN ID	This field is used to assign a unique ID to the network in a Wide Area Communications Network (WACN) system where this site controller is located. Hexadecimal range of values is 00001 through FFFFE with 00001 as the default value.	1..FFFFE	1
System ID	This field is used to assign a unique system ID for the communications system where this site controller is located. The possible range of hexadecimal values is 001 (the default) through FFE.	1..FFE	1
Active Band Plan ID	ID of the Band Plan that is currently active.	1..20	1
Active Band Plan Name	This field is used to enter a name or alias (up to 32 alphanumeric characters) for the current active band plan.	size (1 .. 255) List of allowed characters: Blank space, A-Z, a-z, 0-9, !#$()*+-_./\;:<>=?[]^~`	""

Table 27: Subsite System Field Descriptions

Field	Description	Range	Default
WACN ID	This field is used to assign a unique ID to the network in a Wide Area Communications Network (WACN) system where this site controller is located. Hexadecimal range of values is 00001 through FFFFE with 00001 as the default value.	1..FFFFE	1
System ID	This field is used to assign a unique system ID for the communications system where this site controller is located. The	1..FFE	1

Field	Description	Range	Default
	possible range of hexadecimal values is 001 (the default) through FFE.		

7.7.2
Configuring the Band Plan

Procedure:

1. From the **Configuration** drop-down list, select **Band Plan**.
2. In the **Band Plan list** view, select the entry you want to configure and click  .
3. In the **Edit Band Plan** view, perform the following actions:
   a. From the **Identifier Enabled** drop-down list, select **Enable**.
   b. Provide appropriate values according to you system configuration.

   For information on the band plan parameters, see ASR Trunking Site Band Plan on page 121.
4. Click **Submit**.

7.7.2.1
ASR Trunking Site Band Plan

Table 28: ASR Trunking Site Band Plan Field Descriptions

Field Name	Description	Range	Default	Units
Band Plan ID Index	Band Plan ID index into frequency band plan table.	1-16	1 - Default for 1st instance of Band Plans.	N/A
Identifier Enabled	Flag to indicate if the frequency band plan table entry is valid or not.	Enable, Disable	Enable - Default for 1st instance of Band Plans.	N/A
Channel Type	This field specifies the channel type of the band plan entry, either FDMA or TDMA.	FDMA, TDMA	FDMA	N/A
Base Frequency [MHz]	Base frequency which corresponds to a band plan element. Used to calculate the channel number of a specific channel.	132.00000..940.99375	851.00625 Default for 1st instance of Band Plans.	MHz
Channel Spacing [kHz]	It is the frequency spacing used by the frequency band plan element. Frequency difference between consecutive channel numbers. (i.e. If channel 1 is 800 MHz, channel 2's frequency would be equal to 800 MHz + Channel Spacing). The Tx/Rx Offset must be divisible by Channel Spacing when fre-	2.5 ..127.5	6.25 - Default for 1st instance of Band Plans.	kHz

Field Name	Description	Range	Default	Units
	quencies are less than or equal to 524MHz.			
TX/RX Offset [kHz]	Frequency difference between the set of transmit frequencies and the set of receive frequencies. The actual range on the user screen is -64 MHz to 64 MHz.	-64MHz to 64Mhz	-45MHz	MHz
Receive Channel Bandwidth [kHz]	Channel bandwidth of the receiver. **NOTE:** This value is not utilized by any existing SC devices. This range is not enforced by the SC, but rather by the manager devices.	12.5	12.5 - Default for 1st instance of Band Plans.	kHz

7.7.3
Configuring the Zone

Procedure:

1. From the **Configuration** drop-down list, select **Zone**.
2. In the **Zone list** view, select the zone entry and click  .
3. In the **Edit Zone** view, provide appropriate values according to your system configuration.

   For information on the zone parameters, see Zone on page 122.
4. Click **Submit**.

7.7.3.1
Zone

Table 29: ASR Trunking Site Zone Field Descriptions

Field	Description	Range	Default	Units
Zone ID	This is the Zone ID which uniquely identifies the zone in which this site resides.	1..7	1	N/A
ZC IP Address 1	The IP address for the first ZC IP address in Primary Core.	N/A	N/A	N/A
ZC IP Address 2	The IP address for the second ZC IP address in Primary Core.	N/A	N/A	N/A
DSR Voice and Mobility Capability	Parameter to enable or disable DSR Voice and Mobility Capability for the site.	enabled, disabled	disabled	N/A

Field	Description	Range	Default	Units
Backup ZC IP Address 1	The IP address for the first ZC IP address in Backup Core.	N/A	N/A	N/A
Backup ZC IP Address 2	The IP address for the second ZC IP address in Backup Core.	N/A	N/A	N/A
Tsub Capable	This parameter configures a site for Tsub fallback operation (i.e., enables a site controller to link up with the Tsub ZC).	enabled, disabled	enabled	N/A
Tsub ZC IP Address 1	NIC1 IP address of the Tsub Zone Controller; needed for SC to establish connectivity to the Tsub ZC when operating in Tsub mode.	N/A	0.0.0.0	N/A
Tsub ZC IP Address 2	NIC2 IP address of the Tsub Zone Controller; needed for SC to establish connectivity to the Tsub ZC when operating in Tsub mode.	N/A	0.0.0.0	N/A
Grant Timeout Timer [msec]	This field is used to set the time period for which an assigned voice channel remains active after access to the channel is granted to a subscriber. If this timer expires before subscriber activity is received, the controller terminates the call.	400... 6500 msec	1000	msec
Fade Timeout Timer [msec]	This field is used to set the time period for which an assigned voice channel remains active without channel activity. If the timeout period expires without detecting activity, the channel is deassigned.	100... 6300 msec	1900	msec

7.7.4
Configuring the Site

Procedure:

1. From the **Configuration** drop-down list, select **Site**.
2. In the **Site list** view, select the site entry and click  .
3. In the **Edit Site** view, provide appropriate values according to your system configuration.

   For information on the site parameters, see Site on page 124.
4. Click **Submit**.

7.7.4.1

Site

Table 30: ASR Trunking Site – Site Field Description

Field Name	Description	Range	Default	Units
Site ID	This identifies the site. **NOTE:** The various types of Site Controllers have different system requirements for the Site ID range.	1..150	1	N/A
Site Name	This is the user name given to the site.	size (0 .. 16) List of allowed characters: Blank space A-Z a-z 0-9 !#$ ()*+-./\;:<>=? []^~`	N/A	N/A
Link Debounce Timer [sec]	This timer defines the period of time in seconds between attempts to bring the site link backup. **NOTE:** Changing the value of the Link Debounce Timer field from its default value of 3 seconds may affect the site recovery time in a system configured for Dynamic System Resilience (DSR).	3 - 120	3	seconds
Trunking Recovery Timeout Time [sec]	The amount of time that the site waits to enter a trunking state after it has the resources to do so.	1..99	5	seconds
Site Trunking Indication Holdoff Time [sec]	Delays the report of site trunking to subscribers in the site to 'debounce' any temporary transitions to site trunking.	0..129	0	seconds
Priority Monitoring During Site Trunking	This parameter enables or disables Priority Monitor Override, when enabled it allows all talkgroups to be priority monitor capable in Site Trunking.	Enable, Disable	Disable	N/A
Channel Access Holdoff Timer [sec]	Value used to determine how long a subscriber should hold off before registering with the	0..60	12	minutes

Field Name	Description	Range	Default	Units
	system or performing a location update under failure conditions.			
In-Call User Alert Enable	This specifies whether the In-Call User Alert feature is enabled.	Enabled, Disable	Disable	N/A
Site Call Load Capacity Override	This parameter determines if the current Site Call Load Capacity should be fixed based on number of explicit channels or 'overridden' by a user-specified value. ● Enabled - Site Call Load Call Capacity is user-specified. ● Disable - Site Load Capacity must be configured according to number of explicit channels (refer to help in Site Load Capacity for settings)	Enabled, Disable	Disable	N/A
Site Call Load Capacity	This parameter defines the maximum limit of the number of simultaneous calls (both voice and data) handled by the site. If the Site Load Capacity Override is enabled the user can configure; if disabled by the prime site the parameter must be configured as follows: (# Explicit Chans -> Site Load Capacity) (0->36), (1->24), (2->22), (3->18), (4->16), (5->14), (6 or more -> 12)	10..36	36	N/A
BSI Interval [min]	This parameter specifies the interval of time for when the Base Station Identifier in analog Morse code is transmitted.	10 | 12 | 14 | 16 | 18 | 20 | 25 | 30 | 40 | 50 | 60	30	minutes
Minimum Repeaters to Trunk	This parameter specifies the minimum number of repeaters required to trunk.	2..28	2	N/A
Zone Core Link Minimum Jitter Buffer [msec]	Specifies the minimum outbound audio jitter buffer time to account for network jitter on the arriving XIS packets.	15, 30, 45, 60, 75		msec
UTC-TAI Value	Specifies current UTC Time and TAI Time offset.	-120...0	-37	seconds

Field Name	Description	Range	Default	Units
Site Type	Read only field, that specifies Site type, defined during installation procedure.	ASR_SITE	ASR_SITE	N/A
Actual Access Code Index	Indicates the Access Code Index value currently active in the station.	(0..15)	0	N/A
Control Channel Slot Time	Defines the length of time allotted to microslots required for each control channel message packet.	1..40	6	microslots
Packet Data Channel Slot Time	Specifies the packet data channel slot time for the displayed channel.	1..40	10	microslots
Astro Fade Tolerance	Sets the number of missed frame syncs that are counted in a row before a call is terminated.	1..3	3	N/A

Table 31: Subsite – Site Field Description

Field Name	Description	Range	Default	Units
Site ID	This identifies the site. **NOTE:** The various types of Site Controllers have different system requirements for the Site ID range.	1..150	1	N/A
Site Name	This is the user name given to the site.	size (0 .. 16) List of allowed characters: Blank space A-Z a-z 0-9 !#$ ()*+-./\;:<>=? []^~`	N/A	N/A
UTC-TAI Value	Specifies current UTC Time and TAI Time offset.	-120...0	-37	seconds
Site Type	Read only field, that specifies subsite type, defined during installation procedure.	SUBSITE	SUBSITE	N/A
Actual Access Code Index	Indicates the Access Code Index value currently active in the station.	(0..15)	0	N/A
Control Channel Slot Time	Defines the length of time allotted to microslots required for each control channel message packet	1..40	6	microslots

Field Name	Description	Range	Default	Units
Packet Data Channel Slot Time	Specifies the packet data channel slot time for the displayed channel.	1..40	10	microslots
Astro Fade Tolerance	Sets the number of missed frame syncs that are counted in a row before a call is terminated.	1..3	3	N/A

7.7.5
Configuring the Channels

Procedure:

1. From the **Configuration** drop-down list, select **Channel**.
2. In the **Channel list** view, select the entry you want to configure and click  .
3. In the **Edit Channel** view, perform the following actions:
   a. From the **Common Channel Config State** drop-down list, select **configured**.
   b. Provide appropriate values according to you system configuration.

   For information on the channel parameters, see Channel on page 127.
4. Click **Submit**.

7.7.5.1
Channel

Table 32: Channel Field Descriptions

Field	Description	Range	Default
Channel Number	The Channel Number is the ID of the Channel in the system.	1..28	1
Common Channel Config State	This field is used to indicate if this channel is configured for use in the site.	configured, unconfigured	unconfigured
ASTRO Classic Data Capable	This field specifies whether the channel is capable of supporting P25 Classic Data.	Enable, Disable	Enable
Reserved Access Data Capable	Specifies whether the channel is capable of supporting Enhanced Data. Setting this parameter to **Yes** enables the channel to be configured for Enhanced Data.	Yes, No	No
DFB Capable	This field is used to select whether the channel has the capability to use the Dynamic Frequency Blocking feature. When DFB capability is set, the channel cannot transmit control, voice, BSI, or failsoft information when the site is operating in site trunking mode. If the site	Enable, Disable	Disable

Field	Description	Range	Default
	is operating in wide-area trunking mode, the channel can transmit voice information when assigned by the zone controller. This channel is enabled to use the Dynamic Frequency Blocking feature. **1.** When this field is enabled, the following fields are disabled and read only: ● BSI Capable ● Failsoft Capable ● Control Channel Capable (for channels 1 to 4 only) **2.** When this field is disabled: this channel cannot use the Dynamic Frequency Blocking feature.		
BSI Capable	This is the capability for a channel to transmit Base Station Identifier in the analog Morse code. Values: ● enabled - indicates this channel can transmit the analog BSI. When this field is enabled, the following fields are disabled and are read-only: ○ DFB Capable ○ Control Channel Capable (for channels 1 to 4 only) ● disabled - indicates this channel cannot be assigned to transmit the analog BSI.	Enable, Disable	Disable
BSI Callsign	BSI_Callsign is the base station identification signal. This is the assign radio call sign issued for the system by the local licensing authority. This call sign is used in the analog Morse code identifications sent over the air when BSI_capable is enabled. The first 8 characters are also sent over the control channel as part of the MOT_BSI_GRANT control channel message each time the analog BSI is initiated. The first 8 characters are also sent in digital format over the channels when assigned for voice or data.	size (0 .. 20) any uppercase letter or number	""
Failsoft Capable	This field is used to select whether this channel is capable of entering the site failsoft mode when the simulcast subsystem cannot support site trunking. The site failsoft feature is a fall-back mechanism that allows the comparator to oper-	Enable, Disable	Enable

Field	Description	Range	Default
	ate in a standalone state. Enabled (default) - indicates the comparator can enter site failsoft mode if the subsystem cannot support site trunking. Disabled - indicates the comparator cannot enter site failsoft mode.		
Control Channel Capable	For IVD, this field specifies whether or not the channel is capable of being the Control Channel. Only channels 1-4 can be set as control channel capable.	Enable, Disable	Disable
Control Channel Preference Level	This field is used to rank the channels that are enabled as control channel capable. This ranking determines the order the channels are used as a control channel at the site. The range is 1 through 4 with a preference level of 1 as the highest rank and 4 as the lowest preference level.	1-4	4
Protected Capable	This is the capability that protects the channel from being assigned a call unless it is the only channel available.	Enable, Disable	Disable
Voice Capable	This is the capability for a channel to be used for voice: ● enabled - indicates this channel can be assigned as a voice channel. ● disabled - indicates this channel cannot be assigned as a voice channel.	Enable, Disable	Enable
Sub-Band	This field is used to determine if this channel has the capability to be assigned to sub-band frequencies.	Enable, Disable	Enable
Channel Access Type	This attribute indicates whether the channel is: ● FDMAonly ● Dynamic Channel ● TDMAonly TDMA Only value indicates 2 slot TDMA operability of the channel.	FDMAonly/DynamicChannel/TDMAonly	FDMAonly
TX Channel Frequency [MHz]	This is the RF Frequency that the Base Radio will transmit.	132..174 380..524 762.00625..775.99375 851.00625..869.99375 935.00625..940.99375	132000000 Hz

Field	Description	Range	Default
RX Channel Frequency [MHz]	This field allows you to enter the receive frequency for this channel. **NOTE:** VHF: (132000000..174000000) UHF: (380000000..524000000) 700 MHz: (792006250..805993750) 800 MHz: (806006250..824993750) 900 MHz: (896006250..901993750) Dependency: The Rx Frequency must be even divisible by 5000 or 6250 Hz for UHF/700 MHz/ 800MHz/900MHz and by 2500 or 3125 Hz for VHF. The following VHF Rx Frequencies are also allowed: 154371250.00 Hz 154463750.00 Hz 154471250.00 Hz 154478750.00 Hz 169172000.00 Hz 169807000.00 Hz 173203750.00 Hz 173396250.00 Hz 173435700.00 Hz The Rx Frequency must be within the Rx Minimum Frequency and Rx Maximum Frequency and between the limits listed in the Range above. In the 700 MHz or 800 MHz band, for IV&D, the frequency ranges starts 6250 Hz above the lower limit and end 6250 below the upper limit.	132..174 380..524 792.00625..805.99375 806.00625..824.99375 896.00625..901.99375	132000000 Hz
Channel Assignment Type	The type of assignment CAI packet to be used for this channel. In explicit, both Rx and Tx OTA channel numbers are included in the CAI packet. In implicit, there is only one OTA channel number and a Tx/Rx Offset is applied to the Tx Frequency to determine the Rx Frequency.	Implicit, Explicit	Implicit
FDMA Tx Band Plan Element	Identifier for the band plan element. This identifies the band plan element used by the channel, encoded as the highest 4	1-16	1

Field	Description	Range	Default
	bits of the Txchannel number (Tx channel number of SU) in the CAI packets.		
TDMA Tx Band Plan Element	Identifier for the band plan element. This identifies the band plan element used by the channel, encoded as the highest 4 bits of the Tx channel number (Tx channel number of SU) in the CAI packets. **NOTE:** Applies for Phase 2.	1..16	3
FDMA Rx Band Plan Element	Band identifier for the element. This identifies the band plan element used by the channel, encoded as the highest 4 bits of the Rx channel number (Rx channel number of SU) in the CAI packets.	1-16	1
TDMA Rx Band Plan Element	Identifier for the band plan element. This identifies the band plan element used by the channel, encoded as the highest 4 bits of the Rx channel number (Rx channel number of SU) in the CAI packets. **NOTE:** Applies for Phase 2.	1..16	3
Service Mode	Indicates if field personnel can steer a serviceability talk group to this channel when marked for serviceability testing. Indicates if field personnel can do BER/out bound test pattern tests for coverage testing.	Enable, Disable	Disable
Enhanced Data Max Wait [subslots]	Indicates the number of subslots over which an Enhanced Data subscriber is to randomize their first Random Access Reservation Request for a given packet data message(s).	1 – 8	4
FDMA Tx Modulation Type	Specifies the modulation type for this station transmitter.	ASTRO CAI LSM, ASTRO C4FM	ASTRO C4FM
Serviceability Fault Reporting	Specifies whether the box sends the serviceability air interface fault notifications to the Network Manager.	Enable, Disable	Disable
Tx Power Out Requested [W]	Specifies the desired output power from the transmitter.	2..44	2W
Phase 2 Tx Power Out Requested [W]	Specifies the desired output power from the transmitter.	2..44	2W
Illegal Carrier Determination	Specifies whether illegal carrier is enabled.	Enabled, Disabled	Enabled
RF Threshold (Illegal Carrier Level) [dBm]	Specifies the dBm level above which the received signal is considered to be an il-	-124..-50	-90

Field	Description	Range	Default
	legal carrier if this station is not assigned to a call.		
Threshold Timer (Carrier Malfunction Time)	Selects the length of time (in seconds) a carrier must exceed the illegal carrier threshold on an unassigned channel before the controller removes the channel from system use.	1..254	50
Rx Dual Branch Receiver Operations	Enables or disables diversity receive.	Enable, Disable	Disable
Rx Branch Imbalance Delta [dB]	Specifies Signal Quality Estimate (SQE) delta in dB(s) between multiple receiver branches used for failure detection.	3..12	5
Rx Branch Imbalance Time to Failure	Specifies Signal Quality Estimate (SQE) time (in seconds) to failure when Signal Quality Delta difference between branches is met or exceeded.	(0,30..1200)	120

7.7.6
Configuring the Subsite

Procedure:

1. From the **Configuration** drop-down list, select **Subsite**.
2. In the **Subsite list** view, select the entry you want to configure and click  .
3. In the **Edit Subsite** view, perform the following actions:
   a. From the **Subsite Configuration** drop-down list, select **configured**.
   b. Provide appropriate values according to you system configuration.

   For information on the subsite parameters, see Subsite on page 132.
4. Click **Submit**.

7.7.6.1
Subsite

Table 33: Subsite Field Description

Field Name	Description	Range	Default	Units
Subsite ID	This identifies the Subsite. **NOTE:** The various types of subsite controllers have different system requirements for the site ID range.	1..64	1	N/A

Centralized Managed Support Operations (CMSO) administrators are allowed to request the deletion of managed resources.

Procedure:

1. In the **Navigation View** panel, click the **Network Database** node.
2. In the **Network Database** view, right-click a manager resource row and select **Delete Object and Traces**.
3. In the confirmation dialog box, click **Yes**.
4. In the **Deletion Status** dialog box, click **View Job Status**.

   A separate job is initiated for each deletion request. The status of the request appears in the **Job Status View** window.
5. In the **Job Status View** window, verify the deletion status.

   If you delete a single network, the network name appears in the **Target** column in the **Job Status View** window. If you delete multiple networks, **Multiple nodes** message appears in the **Target** column.

   If the job status is **Success** or **Completed**, the managed resource or node and the alarms associated with it are also deleted. Events are not deleted, as events are part of the history and they are deleted only when the database is reinitialized.
6. If the **Warning Discovery in progress** dialog box appears, to the view active jobs that are related to the object being deleted, click **Open Job View**.

   Once a managed resource is deleted, you cannot restore its alarms.

8.18 Setting the Transmitter Power

You can perform this procedure to set or verify the transmitter power during the commissioning of an RF site.

Prerequisites:
Obtain the service monitor.

Procedure:

1. Connect the service monitor to the -30 dB sample port of the Tx post filter with enough additional attenuation to protect the service monitor or the external power meter.

   NOTE: When you select **additional attenuation**, all of the DBR M12 MultiCarrier Site carriers can be keyed.
2. In the **Configuration/Channel** menu, set the transmitter power for all channels to the desired top of rack output level.
3. In the **Services/Requested State** menu, perform one of the following actions:
   - For ASR sites, disable all channels.
   - For subsites, disable all RF modems.
4. In the **Services/RF Channel Status** menu, perform the following actions:
   a. Select the desired channel.
   b. Ensure that **Real Time Session** is enabled.
   c. Start the V.52 FDMA test pattern.
   d. Ensure that the other channels are not transmitting.

5. In the **Configuration/Channel** menu, adjust the transmitter power of the desired channel to the desired accuracy as measured by the service monitor or external power meter in step 1.
6. Terminate the test pattern launched in step 4c.

   The top of the rack power, as measured by the service monitor or external power meter, should indicate that the carrier of the channel of interest is de-keyed.
7. For the rest of the channels, repeat step 4 to step 6.
8. In the **Services/Requested State** menu, set the site to the desired state.
9. In the **Services/RFDS Configuration** menu, key all of the enabled channels at once and save their composite power as a benchmark.

   You can compare the saved composite power benchmark with the future transmitter power out tests.