MovingMedia™ 2000

iCell All IP Radio Access Network Macro Pole Mount BTS Installation and Initial Configuration Guide

Release A.0

Part Number D01309

MovingMedia™ 2000

iCell All IP Radio Access Network Macro Pole Mount BTS
Release A.0
Installation and Initial Configuration Guide

Release A.0

Part Number D01309

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ABOUT THIS GUIDE

This Chapter contains an overview of this Guide, an overview of the iCell All IP Radio Access Network Macro Pole Mount BTS, lists Guide conventions, describes how to contact customer service, and provides information on related technical documentation.

This Guide is intended for those who must install and initially configure the Macro Pole Mount BTS.

This chapter includes:

Release notes are issued with some products. Visit our websites at **http://support.utstar.com.cn** *(China Service Center) and* **http://support.utstar.com***. (other Service Centers) If the information in the release notes differs from the information in this guide, follow the instructions in the release notes.*

iCell All IP Radio Access Network Macro Pole Mount BTS Overview

The iCell All IP Radio Access Network Macro Pole Mount BTS (Macro Pole Mount BTS) is a part of a CDMA2000© Radio Access Network. The Macro Pole Mount BTS is part of the MovingMedia™ 2000 system.

MovingMedia™ 2000 System Architecture

MovingMedia™ 2000 is an end-to-end, all-IP-based, wireless communication solution. MovingMedia™ 2000 system provides the mobility and media-control traditionally associated with a circuit-switched Mobile Switching Center (MSC), but in a packet-based environment.

The MovingMedia™ 2000 system is 2G and 3G capable, supporting cdmaOne and CDMA2000© 1x networks. By deploying the MovingMedia™ 2000 system in 2G and 3G environments, operators gain the efficiency inherent in packet-based networks, while building a network core capable of supporting 3G standards.

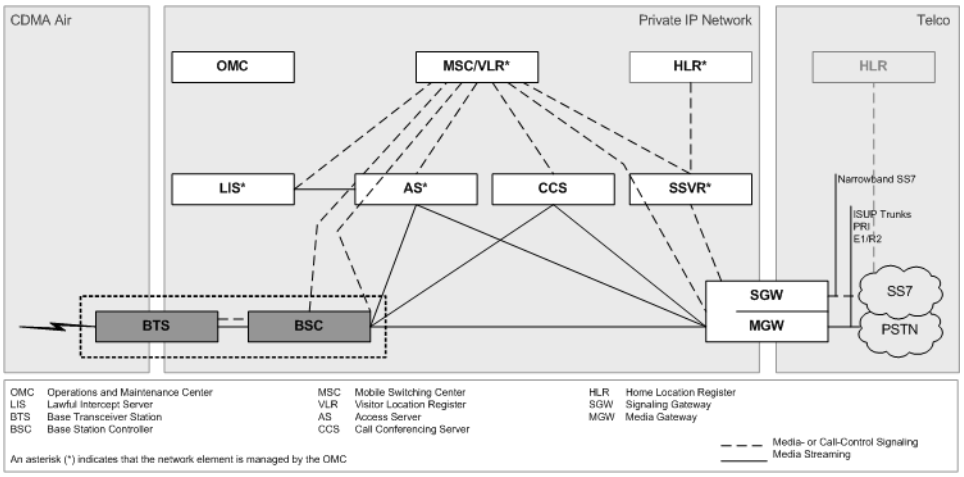
MovingMedia™ 2000 system benefits include:

- A network core that supports both voice and data traffic, eliminating the need to operate separate TDM and packet backbones.
- Distributed switching for efficient call-routing from endpoint to endpoint.
- Centralized control of distributed switching for cost-effective scalability, security, and ease of operation.
- Voice carried in native air-interface format across the packet core for maximum bandwidth efficiency, with Pulse Code Modulation (PCM) vocoding done by the Media Gateways at the network edge for Public Switched Telephone Network (PSTN) connectivity.
- Supports ANSI IS-41 requirements
- 3G architecture for CDMA2000© 1x
- 3G architecture for Evolution Data Optimized (EVDO).

The MovingMedia™ 2000 system enables the evolution to an all-IP network while delivering a reduced cost of construction and ownership compared to traditional TDM networks.

The high-level architecture of the MovingMedia™ 2000 system is shown in Figure 1. The Base Station Controller (BSC) and Base Transceiver Station (BTS) Network Elements are highlighted.

Figure 1 MovingMedia 2000 System Architecture



Core Voice Network Elements

The Network Elements in the Core Network (Voice) are:

- MovingMedia™ 2000 Mobile Switching Center (MSC)
- MovingMedia™ 2000 Signaling Server

- MovingMedia™ 2000 Access Server (MRF)
- MovingMedia™ 2000 Call Conferencing Server
- MovingMedia™ 2000 Lawful Intercept Server
- MovingMedia™ 2000 Home Location Register (HLR) Server
- MovingMedia™ 2000 Intelligent Media Gateway (IMG)
- MovingMedia™ 2000 Operation and Maintenance Center (OMC)

Core Data Network Elements

The Network Elements in the Core Network (Data) are:

- Total Control 800 Packet Data Serving Node (PDSN)
- Total Control 1000 Packet Data Serving Node (PDSN)
- Total Control 2000 Packet Data Serving Node (PDSN)
- Total Control Home Agent TC3100 (HA)
- Common Element Manager (CEM)

IP Radio Access Network Elements

- iCell Pico Base Transceiver Station
- iCell Macro Indoor Base Station Subsystem
- ICell Macro Pole Mount Base Transceiver Station

Base Station Subsystem

A BSC and the associated BTS are known collectively as a Base Station Subsystem (BSS).

Base Station Controller

The BSC manages call control and interconnections to the other network elements.

The BSC application is supported by an operating system that also provides platform services. While the BSC has several physical platforms, each physical platform runs the same BSC application and platform services.

The Macro Pole Mount BTS communicates with the BSC over an Ethernet (IP) connection. Soft BSC servers can be centralized at any convenient location.

This guide does not describe all BSC configurations, which vary based on network and operator requirements.

Macro Pole Mount BTS

The Macro Pole Mount BTS provides radio frequency (RF) connectivity for the BSC. The Macro Pole Mount BTS implements full BTS functionality, according to CDMA 2000 standards, plus some additional supporting components, such as the Ethernet controller, and GPS receiver with antenna.

Figure 2 External View of Macro Pole Mount BTS

A single Macro Pole Mount BTS supports 1FA/1S configuration and will provide 20 Watt output power. Also, additional sectors support can be provided by using Macro Pole Mount BTS sector expansion components. Multi-sector configuration is shown in Figure 3.

Figure 3 Macro Pole Mount BTS Multi-sector Configuration

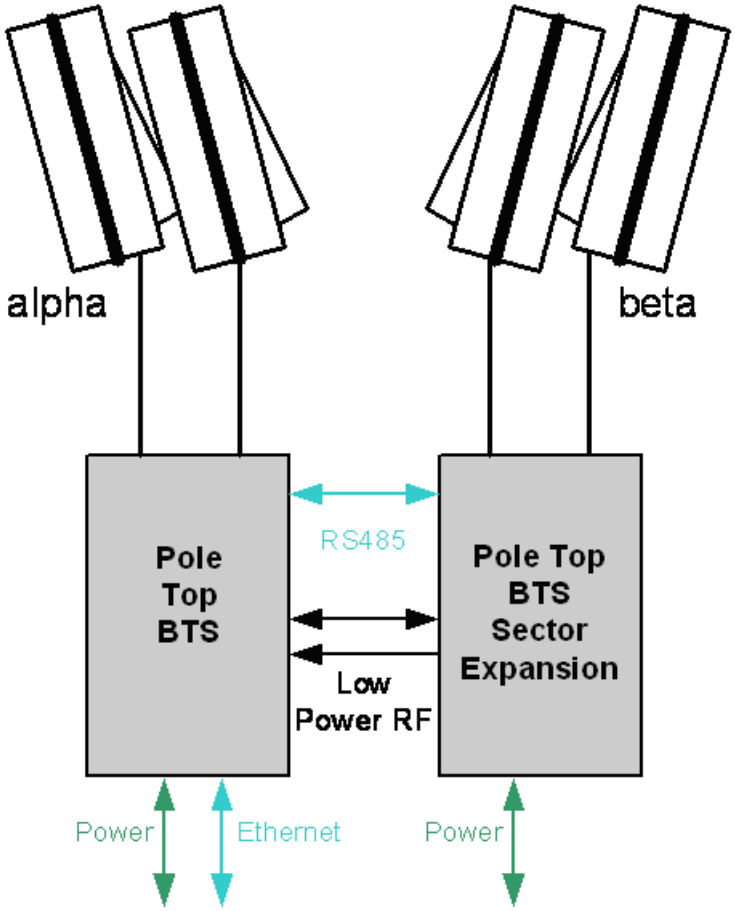


Table 1 Shows the basic Macro Pole Mount BTS configuration.

Table 1 Basic Macro Pole Mount BTS Configurations

FA	Sector	Macro Pole Mount BTS	Macro Pole Mount BTS Sector Expansion (
1	1	1	N/A
1	2	N/A	1
1	3	N/A	2

The Macro Pole Mount BTS is designed to support the following mounting options:

- Pole-mounted
  - Top, middle, or bottom

- Wall-mounted (indoor or outdoor).

The Macro Pole Mount BTS is equipped with lightning protection and designed to operate in a tough outdoor environment (refer to Chapter 3 for details).

Order of Tasks

This Macro Pole Mount BTS Installation and Initial Configuration Guide describes all of the tasks required to install and configure a Macro Pole Mount BTS. This guide has 4 main sections:

- Pre-Installation
- Installation
- Initial Configuration
- Installation Verification.

Follow the tasks in the order that they are presented to successfully install and configure the Macro Pole Mount BTS.

Pre-Installation Task Outline

Pre-installation tasks are tasks that can and should be done before the Macro Pole Mount BTS arrives on site.

Installation Task Outline

Installation tasks are tasks that are done after all pre-installation tasks are completed and the Macro Pole Mount BTS is onsite.

Initial Configuration Task Outline

Initial configuration tasks are tasks that are done after all installation tasks are completed.

Installation Verification Task Outline

Installation verification tasks are tasks that are done after all initial configuration tasks are completed.

Conventions

This guide may contain notices, figures, screen captures, and certain text conventions.

Notices

Table 2 lists notice icons used in this guide.

Table 2 Notice Icon Descriptions

Icon	Notice Type	Description
	Information Note	Information that contains important features or instructions but is not hazard-related.
	Caution or Warning	Cautions are preceded with the word **Caution**. This type of caution indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also alert against unsafe practices and potential program, data, system, or device damage. Warnings are preceded with the word **Warning**. This type of warning indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	Caution or Warning due to potential electrical hazard	Cautions due to potential electrical hazards are preceded with the word **Caution**. This type of caution indicates a potential electrical hazard. This hazard, if not avoided, may result in minor or moderate injury. It may also alert against unsafe practices and potential program, data, system, or device damage. Warnings due to potential electrical hazards are preceded with the word **Warning**. This type of warning indicates a potential electrical hazard. This hazard, if not avoided, could result in death or serious injury.
	ESD	Information that indicates proper grounding precautions are required before handling a product.

Figures and Screen Captures

This guide provides figures and screen captures as examples. These examples contain sample data. This data may vary from the actual data on an installed system.

Text

Table 3 lists text conventions in this guide.

Table 3 Text Convention Descriptions

Convention	Description
Text represented as a `screen display`	`This typeface` represents text that appears on a terminal screen, for example `login:`.
Text represented as **`user entry`**.	**`This typeface`** represents commands entered by the user, for example, **`cd $HOME`**.
Text represented as **menu**, **sub-menu**, **tab**, and **field names**	**This typeface** represents all menu, sub-menu, tab, and field names within procedures, for example: On the **File** menu, click **New**.
Text represented by <*variable*>	This typeface represents a required variable, for example: <*filename*>

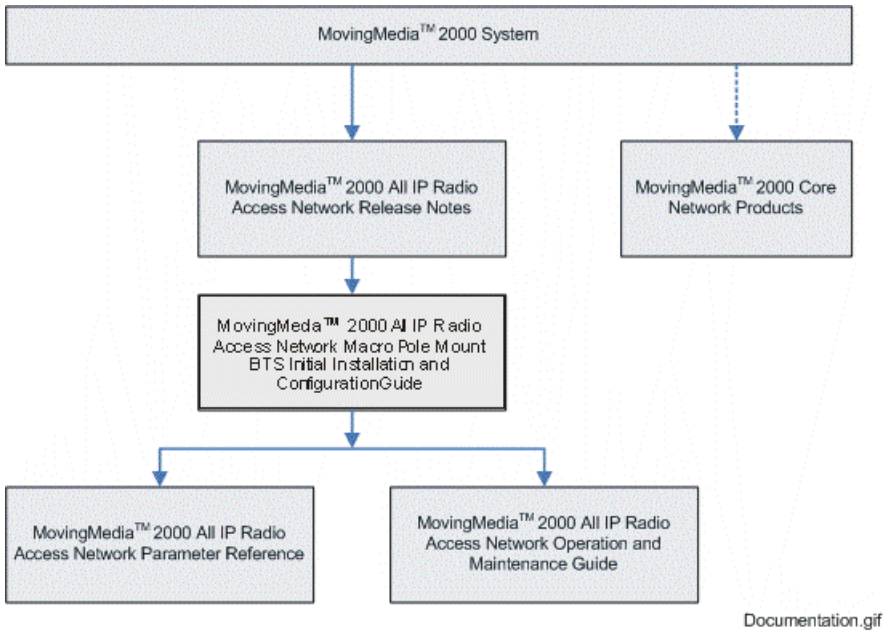
Related Documentation

The Macro Pole Mount BTS products are part of the MovingMedia™ 2000 product line for CDMA2000©. The Macro Pole Mount BTS documentation is part of the documentation for the entire MovingMedia™ 2000 product line.

The relationship of the Macro Pole Mount BTS documentation to other MovingMedia™ 2000 documentation is displayed in the Macro Pole Mount BTS document roadmap shown in Figure 4.

These documents contain additional information about the MovingMedia™ 2000 system in general, and in particular, how to install, provision, operate, and maintain the Macro Pole Mount BTS.

Figure 4 Document Roadmap



Access Network Documentation

The following documents contain information on how to install, operate, and maintain the Macro Pole Mount BTS.

- *MovingMedia 2000™ iCell All IP Radio Access Network Release Notes*
- *iCell All IP Radio Access Network Macro Pole Mount BTS Installation and Initial Configuration Guide*
- *MovingMedia 2000™ iCell All IP Radio Access Network Operation and Maintenance Guide*
- *iCell BSS Parameter Configuration Reference.*

Core Network Documentation

The following documents contain additional information about the MovingMedia™ 2000 system in general, and in particular, how to install, provision, operate, and maintain Network Elements in the Core Network.

- *MovingMedia™ 2000 System Overview*
- *MovingMedia™ 2000 Core Network Release Notes*
- *MovingMedia™ 2000 Mobile Switching Center Server Provisioning Guide*
- *MovingMedia™ 2000 Mobile Switching Center Server Operations and Maintenance Guide*
- *MovingMedia™ 2000 Home Location Register and Authentication Center Guide*
- *MovingMedia™ 2000 Signaling Server Application Guide*
- *MovingMedia™ 2000 Access Server (MRF) Guide*
- *MovingMedia™ 2000 Lawful Intercept Server Guide*
- *MovingMedia™ 2000 Call Conference Server Guide*
- *MovingMedia™ 2000 Operations and Maintenance Center Interface Guide*
- *MovingMedia™ 2000 cPCI System Guide*
- *MovingMedia™ 2000 Intelligent Media Gateway documentation set.*

Contacting Customer Service

For information about customer service, including support, training, code releases and updates, contracts, and documentation, visit our websites at **http://support.utstar.com.cn** (China Service Center) and **http://support.utstar.com** (other Service Centers).

Before contacting technical support, have this information available:

- Contract number
- Product information
  - Software and hardware versions
  - Serial numbers
- Problem description
  - Symptoms
  - Known causes
- Trouble locating and clearing attempts.

Obtaining Technical Assistance

UTStarcom maintains a strong global presence, operating Technical Response and Service Centers, in the US, Japan, India, China, Ireland, Mexico and Brazil. These centers are available for technical telephone support to entitled customers during normal business hours. After hours support is available to customers who purchase a premium Service Agreement.

Support Website The UTStarcom Support website provides a variety of tools to assist customers in resolving technical issues on UTStarcom products. The UTStarcom Support website is available 24 hours per day. Customer registration is required. Certain premium features require a valid Service Agreement.

Warranty Support

UTStarcom provides its customers warranty support per the terms of the UTStarcom Warranty Statement for their equipment. Customers who require warranty support should contact the UTStarcom Service Center that serves their territory.

Contact details for the China Service Center can be found at **http://support.utstar.com.cn**

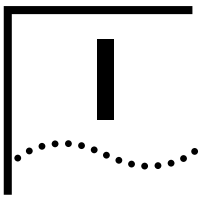
Contact details for all other Service Centers can be found at **http://support.utstar.com**

Contacting Technical Documentation

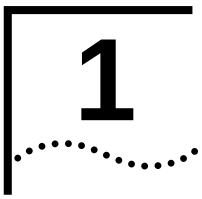
To provide comments on this documentation, send an e-mail to:

techdoc.feedback@utstar.com

Please include the name and part number of the guide being referenced. If applicable, provide the chapter and page number.



PRE-INSTALLATION



PREREQUISITES

About This Chapter

This chapter describes the prerequisites required to install the Macro Pole Mount BTS.

This chapter includes:

Installer Requirements

This section describes the installer personnel requirements. These include:

Skills and Knowledge

The installer of a Macro Pole Mount BTS should have general telecommunications and electrical circuit knowledge.

Supporting Documentation

This document provides all the necessary information to install, configure, integrate, and test a Macro Pole Mount BTS. No other documents are required.

The customer-specific network planning document (engineering specifications for the site and network) and the *MM2000 iCell All IP Radio Access Network Parameter Reference Guide* are required for configuration of CDMA2000© parameters after installation and initial configuration. The network planning document also provides the information necessary to complete the Network Planning Requirements.

The documents in the Macro Pole Mount BTS documentation set are listed in Related Documentation on page 17.

Hardware Requirements

This section outlines the hardware required to install the Macro Pole Mount BTS. The hardware includes:

- Miscellaneous Hand Tools
- Cables
- Recommended Test Equipment

Laptop

A laptop PC is required for the installation, configuration, verification, and network integration of the Macro Pole Mount BTS. The recommended requirements for the laptop are listed in Table 4.

Table 4 Test Client Requirements

Component	Minimum	Recommended
Operating System	Microsoft® Windows® XP Professional Edition	Microsoft® Windows® XP Professional Edition
CD ROM Drive	24X	48X
Serial Port	1	1
USB Port	1	1
Ethernet Port and Card	10/100	10/100

Mobile Phones

Two mobile phones are required for making loopback test calls in the Loopback Testing on page 96. A loopback test was performed prior to on-site delivery of the Macro Pole Mount BTS using factory settings. Table 5 lists the mobile models used for factory loopback testing.

Table 5 Supported Test Mobiles

Vendor	Model
UTStarcom	Audiovox 8900 (CDMA2000©)
Kyocera	

Other mobiles may be used for making loopback test calls.

Ensure that a suitable USB data cable is available for the mobile used in making loopback test calls.

Miscellaneous Hand Tools

The miscellaneous hand tools required for the installation of a Macro Pole Mount BTS are listed in Table 6.

Table 6 Tools Required for Installation

Tool	Phase
No 2 Phillips Screwdriver	Installation
Flat head screw driver	Installation
Wrench for Type N connectors	Installation
3/4inch wrench	Installation

Table 6 Tools Required for Installation

Tool	Phase
10 mm socket wrench	Installation
32mm open end wrench	Installation
Metal cutting hack saw	Installation
10 inch water pump pliers	Installation
Break Out Box	Required for on-site debug process (May be purchased separately)

Cables

Several cables and antennae are required throughout the installation, configuration, and verification process. Table 7 lists the cables required for the Macro Pole Mount BTS installation, configuration, and verification process.

Table 7 Required Cables and Antennae

Cable	Description
Cellular Sector Antennae	Main and Diversity sector antenna (20 Watt output)
Power Cable	Refer to Installation section for details
Ethernet Cable	CAT-5 Ethernet cable with 2 RJ-45 connector ends.
Console Serial Cable	Standard serial cable with 1 male DB-9 connector end and 1 female DB-9 connector end.
Break Out Box Data Cable (When Break Out Box used)	CAT-5 Ethernet cable with 2 RJ-45 connector ends. One for each sector expansion unit and one for Break Out Box. Refer to Figure 15.
RF Cables	Corrugated cables with N-type (male) connectors to connect sectors expansion BTS and external GPS antennae (if required).
Antenna cable	Corrugated RF cable with DIN 7/16 plug (male) connector. (50 ohm impedance, 3GHz minimum interface frequency and rated for minimum 50 Watt at 2GHz)
Grounding Cables	Refer to Macro Pole Mount BTS Grounding Requirements

Recommended Test Equipment

Two mobile phones are required for making test calls to verify Core Network integration. A voice test call and a data test call (if applicable) are made to verify the integration. The mobiles must have a subscriber profile in the HLR for voice calls and the AAA for data calls in order for the test calls to succeed.

The Operator (NOC personnel) should provision the test mobiles in the respective HLR and/or PDSN before test calls need to be made. This guide does not describe how to provision a subscriber in the HLR or the AAA server.

Additional recommended test equipment is listed in Table 8. The operator can use any other equipment that has the same capabilities as the recommended equipment.

Table 8 Recommended Test Equipment

Test Equipment	Description
Agilent E7495B	All-in-one wireless base station field testing box. Power meter and CDMA demodulation options required.
Power Meter	Used for measuring BTS/PA output power. The meter should be equipped with multiple slugs to be able to measure output power at various points in the BTS. The Bird THRULINE meter is recommended. Refer to http://www.bird-electronic.com/
Multimeter	Refer to http://www.fluke.com/ for a recommended multimeter.
100W Type N 40dB attenuator	Used for connecting the high power signal to the test equipment. Required for MCPA calibration.
Laptop	For Configuration and monitoring
RF Cables	To connect test equipment. (Same requirements as for RF Cables or Antenna cables from Table 7)
Two mobile phones	For test calls (Refer to Mobile Phones)

Software Requirements

The following software is recommended for installing the Macro Pole Mount BTS:

- Web browser:
  - Microsoft Internet Explorer version 6.0 or later
  - Firefox web browser version 2.0 or later - alternative web browser for accessing BSC/BTS configuration. It is also useful for capturing BSC/BTS logging.
- Text editor for viewing log and configuration files:
  - Wordpad is recommended for Microsoft Windows.
- Console software for console emulation and capturing logs into text files.
  - PuTTY (version 0.52 or later) is a versatile freeware console program available from: http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html
- Phone and network deployment diagnostics:
  - Use Qualcomm CAIT or Spirent UDM
  - Contact UTStarcom (refer to Contacting Customer Service) for acquisition of this software.

The test client should have all of the software installed as part of the minimum test client requirements (refer to Table 4 on page 24).

Tools CD ROM

A tools CD ROM may be available that contains the software tools necessary to install, configure, and test the Macro Pole Mount BTS. Table 9 lists the potential contents of the tools CD ROM.

Table 9 Tools CD ROM Contents

Software
Audiovox Phone Set
Kyocera Phone Set
SSH Telnet Client
PuTTY
Trimble Thunderbolt Monitor
Qualcomm CAIT or Spirent UDM

USB Drivers

The Loopback Testing phase requires a USB connection. Ensure that the test client has USB 2.0 drivers installed. Microsoft has USB 2.0 drivers available for Windows XP.

To check for a USB controller and 2.0 driver in Microsoft Windows XP:

1. Navigate to the Start menu and select **Control Panel > Administrative Tools > Computer Management**

   The *Computer Management* window is displayed.
2. Double-click **System Tools**.
3. Double-click **Device Manager** from the list of tools.
4. Double-click **Universal Serial Bus controllers**.

   A list of available USB controllers is displayed.
5. Select a USB controller from the list to view details on the controller and driver. Drivers can also be updated from this window.

Network Planning Requirements

This section describes the network planning that must be performed prior to installing the Macro Pole Mount BTS. This includes:

- Existing Core IP Network Requirements
- IP Address Assignment
- Hostname Assignment
- Password and Username Assignment
- BTS Site Information

Existing Core IP Network Requirements

The Macro Pole Mount BTS implements the Access Network part of a CDMA2000© system. The Access Network is integrated with an existing CDMA2000© Core Network. The Core Network and a private IP network must already be set up before the Access Network can be integrated with the Core Network (MSC and PDSN).

IP Address Assignment

The following IP addresses must be set up prior to installing the BTS:

- Test Client IP Addresses
- Access Network IP Addresses
- Core Network IP Addresses

Test Client IP Addresses

The test client is used to connect to the Network Elements, and must be on the same subnet. The required IP addressing information for the test client is listed in Table 10.

Table 10 Required IP Addressing for Test Client

Test Client
IP address 1
Subnet mask 1
Default gateway 1
IP address 2
Subnet mask 2
Default gateway 2

Access Network IP Addresses

The following tables list the IP addressing information required for the Access Network.

Table 11 Required IP Addressing for Ethernet Switch

Ethernet Switch
Switch IP Address
Subnet Mask
Default Gateway

Table 12 Required IP Addressing for BSC

BSC
BSC IP Address

Core Network IP Addresses

The following table list the IP addressing information required for Core Network integration (MSC/VLR and PDSN/HA).

Table 13 Required IP Addressing for Core Network

Core Network
MSC IP Address
PDSN IP Address

Hostname Assignment

Hostnames are optional but useful. Acquire the hostnames for the Macro Pole Mount BTS components if they are required for the configuration.

Password and Username Assignment

The Macro Pole Mount BTS components have default usernames and passwords configured. The BTS components can be assigned new site-specific usernames and passwords during installation and configuration, or new usernames and passwords can be configured later by the operator.

Table 14 lists the BSS components that require a username and password to connect. Have the site-specific usernames and passwords ready before installation begins so that login information can be changed to site-specific values.

Passwords must be changed. Site-specific values are required.

The usernames and passwords for the Core Network Elements (MSC, PDSN) are not set here, but must be available for connection during Core Network Integration.

Table 14 Login Configuration for Site

BSS Component	Default Username	Default Password
Ethernet Switch	en	`tel os`
BSC	`icell`	`icell`
BSC	`root`	tel os
BTS	`icell`	`icell`
BTS	root	tel os
MSC	`msc`	`ms c`

BTS Site Information

Some BTS site information is required if the BTS will be loaded with a configured GPS receiver. It is possible to load the BTS with a GPS receiver that has not yet been configured.

The GPS receiver uses GPS satellites. If the GPS receiver does not have the approximate or accurate BTS position (latitude and longitude) then it could take

several hours for the GPS receiver to lock onto the appropriate GPS satellites (there are 24 GPS satellites in operation).

Latitude is given in decimal degrees (+N, -S) and longitude in decimal degrees (+E, -W). For example, Vancouver, British Columbia, Canada has the following coordinates:

Latitude: 49.242604 N (deg min sec), Longitude: 123.099414 W (deg min sec).

2 SITE PREPARATION

About This Chapter

This chapter describes how to prepare a site for the installation of the Macro Pole Mount BTS.

This chapter includes:

- Site Planning
- Site Requirements

Site Planning

Site planning includes planning for:

- Required Personnel
- Required Documentation
- Site Planning Checklist

Required Personnel

The Macro Pole Mount BTS has specific structural, electrical, and telecommunications requirements. When selecting and preparing a site, specific personnel and documents must be available as resources for performing the procedures. The following sections describe these requirements.

Table 15 Personnel Requirements

Title	Job Description	Responsibilities
Installer	This person performs or oversees the physical installation of the equipment and ensures the installation procedures are properly followed.	Responsible for assuring the appropriate personnel and equipment are available and precise measurements and careful inspections are performed.
Site Manager/Facility Representative	This person should be familiar with the office facilities and know the engineering, telephone company, and network contacts.	Responsible for the physical site where the equipment is to be installed.
Technician	This person maintains the equipment once it is assembled and operational.	Responsible for performing the electrical and network connections.

Required Documentation

When preparing a site for installation of a Macro Pole Mount BTS, obtain this site-specific information:

- General site information
- Floor plans

- Power information (grounding and power-level data)
- Environmental document (heat, humidity tests)
- Site wiring lists
- Fire system data
- Security alarm system data

Site Planning Checklist

The following checklist is provided to assist in the site planning procedure. After completing the required steps, check them off, or refer back to this list, to ensure all site planning requirements are met:

- Reviewing Personnel Requirements
- Gathering Related Documentation
- Verifying Power
- Verifying the Grounding
- Verifying Fire Protection
- Verifying Alarms
- Verifying Site Conditions
- Verifying Temperature Control
- Reviewing Standard Macro Pole Mount BTS Location Specifications
- Reviewing Macro Pole Mount BTS Mounting Guidelines
- Preparing the Site for the Macro Pole Mount BTS.

Site Plans and Floor Plans

Generate a site plan and floor plan for equipment layout. The Macro Pole Mount BTS should be installed according to the clearances outlined in Space Requirements on page 40.

Site Requirements

This section includes:

DC Power Requirements

Applicable to DC version of Macro Pole Mount BTS only.

The Macro Pole Mount BTS can accept voltages within -36 to -72 VDC range and typically will be -48 VDC.

Each single Macro Pole Mount BTS or sector expander must be cabled with at least 500W capable DC power source and no smaller than 8 AWG armored power cable ready for connection to the Macro Pole Mount BTS.

To maintain the IP67 rating of the product, the power cable attached to the unit must provide a waterproof connection to the lightning protection unit (LPU).

The fitting supplied with the Macro Pole Mount BTS accepts a cable diameter in the range of 22 to 27 mm (0.880 to 1.065"). The cable must also be appropriately temperature rated. Acceptable cables include the following:

- TECK 90 XLPE 6 AWG/2 (-40C)

  http://www.nexans.ca/

  http://www.nexans.ca/egy/equip/teck90/1000v2c.html

AC Power Requirements

Applicable to AC version of Macro Pole Mount BTS only.

The Macro Pole Mount BTS can accept voltages within 90 to 260 VAC (50/60 Hz) range.

Each single Macro Pole Mount BTS or sector expander must be cabled with at least a 500W capable AC power source. and no smaller than 10 AWG armored cable, ready for connection to the Macro Pole Mount BTS.

To maintain the IP67 rating of the product, the power cable attached to the unit must provide a waterproof connection to the LPU.

The fitting supplied with the Macro Pole Mount BTS accepts a cable diameter in the range of 22 to 27 mm (0.880 to 1.065"). The cable must also be appropriately temperature rated. For reference, The fitting supplied with the Macro Pole Mount BTS accepts the following cable:

- TECK 90 XLPE 6 AWG/2 (-40C)

  http://www.nexans.ca/

Site External Grounding Requirements

External grounding requirements include:

- Site Grounding Responsibility
- Ground Rods
- AC Power Grounding
- Ground Testing

Site Grounding Responsibility

Grounding of the site is the responsibility of the customer. All grounding and power connections should be made according to local standards.

Ground Rods

Several factors affect external grounding. The major factor is the resistance of ground rods, which is directly related to soil resistivity in the immediate vicinity of the rod. The resistivity of the soil determines how many rods are needed and their dimensions.

Ground rods must be buried at the base of the structure, and at the AC service entrance and transmission line entry port. The rods must be composed of copper-clad, high-strength steel with minimum dimensions of 16 mm x 3.1 m (5/8 in. x 10 ft.).

The rods must be located at least 61 cm (2 ft.) from the edge of the foundation, and driven deeply enough that the top of the rod is below the frost line of the installation site.

AC Power Grounding

The AC power ground conductor must be bonded to the ground rod located at the service entrance. Ground lugs provided in all service entrance equipment must be bonded to the service ground conductor. The system ground and neutral must be bonded at one location only, as close as is practical to the service entrance. All service grounding must conform to the appropriate electrical codes.

Ground Testing

The external ground systems must be tested separately after installation, and each resistance to earth ground must be less than 5 ohms. Tests must be performed twice per year to ensure ground system integrity.

Macro Pole Mount BTS Grounding Requirements

Good internal grounding depends on several factors, the most significant of which is the halo ground. Using a halo ground provides maximum internal protection for the Macro Pole Mount BTS.

Macro Pole Mount BTS Ground

The Macro Pole Mount BTS and BTS sector expansion are equipped with a chassis ground connection point at the bottom of the cabinet (refer to Figure 5). This point should be connected to the top ground bar by #2 AWG wire (Figure 5).

Figure 5 Macro Pole Mount BTS Chassis Ground Connection

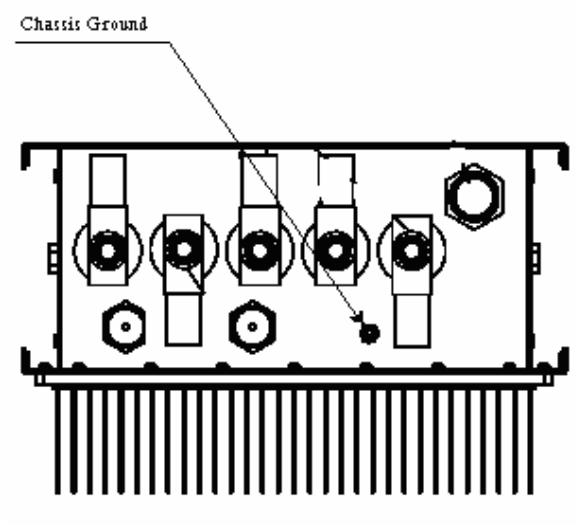


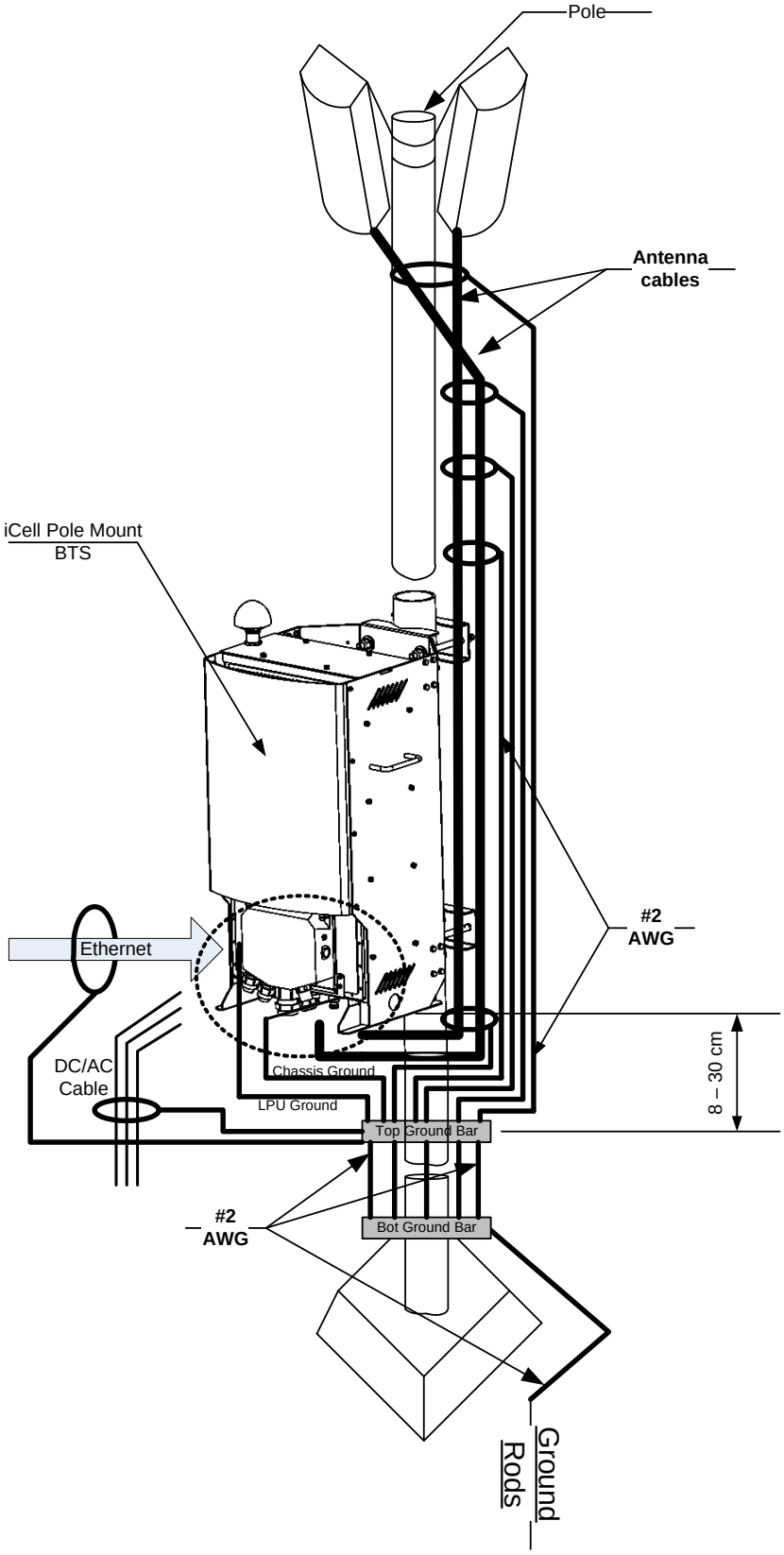
Figure 6 Example of a Macro Pole Mount BTS Grounding Scheme

Macro Pole Mount BTS Antenna Grounding

The Macro Pole Mount BTS can be connected to different antenna modules by rugged coaxial cables. Coaxial cables can create a significant transmission path during a lightning strike. Grounding cables to multiple points improves lightning protection on the system, also lowering additive radiation caused by lightning surge.

Refer to Figure 7 for an example of a Macro Pole Mount BTS grounding scheme.

Figure 7 Example of a Macro Pole Mount BTS Grounding Scheme

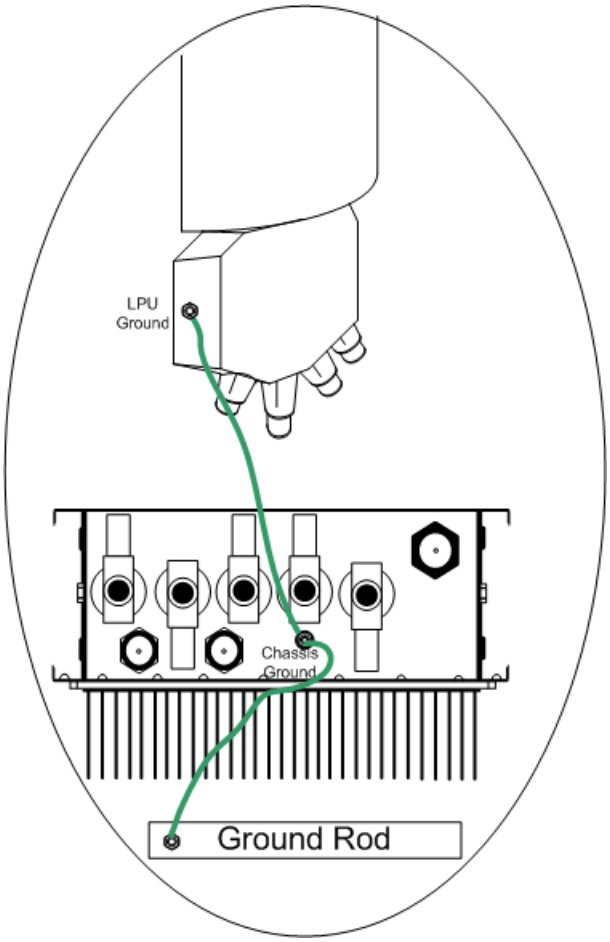


Connect the ground braid directly to the coaxial cable shield braid at multiple points. Connect all ground wires together at the top grounding bar.

Connect the banding point (between vertical and horizontal cable run) to the top ground bar with #2 AWG wire, using the minimum possible length of wire.

Refer to Figure 8 for the recommended Macro Pole Mount BTS grounding connection.

Figure 8 Recommended Macro Pole Mount BTS Grounding Connections



Ensure that the bottom ground bar is connected directly to the site ground ring using the minimum possible length of #2 AWG wires.

GPS Receiver Protection

The Macro Pole Mount BTS uses a GPS receiver, GPS antenna, and the GPS satellite system to maintain precise timing.

The Macro Pole Mount BTS case includes a GPS antenna, with a lightning protector, that is connected to the GPS RF input.

External (customer supplied) antenna can be attached to the GPS antenna input. In this case, the on-cabinet GPS coaxial cable should be disconnected.

The Macro Pole Mount BTS provides +5 VDC voltage at the GPS antenna input connector to power the external antenna. For a non-standard GPS antenna, make sure the voltage is sufficient for normal antenna operation and that the power consumption of the antenna does not exceed 275mW.

Warning:
A GPS antenna is an active antenna. Avoid a short circuit termination of the GPS antenna input on the Macro Pole Mount BTS case. If different voltage is used to feed an external GPS antenna, use the DC block module with external lightning protector to avoid back current leakage into the GPS antenna input.

Other Cable Grounding

All other cables such as telephone cables, data cables, and power cables should be protected by metal conduit with single-point ground connection to the top ground bar (refer to Figure 6).

The Macro Pole Mount BTS incorporates lightning protection on all incoming wires. External equipment (such as Ethernet switch, BSC or other) has to be lightning protected.

Cables between any two structures must be shielded and employ a messenger cable. The messenger cable must be bonded to the respective building ground at each corner. The shields must be bonded to the building ground at each corner.

Macro Pole Mount BTS Mounting Options

The Macro Pole Mount BTS comes with different installation kits.

Pole Mounting

The Macro Pole Mount BTS can be installed on steel, concrete, or wood poles with diameter from 12 to 30 cm (5 to 12 inches).

Refer to Chapter 3, Macro Pole Mount BTS Installation and Power Cabling, for the details.

Wall Mounting

The Macro Pole Mount BTS can be installed on wood, concrete, masonry, grout-filled-block, and hollow-block walls.

Refer to Chapter 3, Macro Pole Mount BTS Installation and Power Cabling, for the details.

Space Requirements

The Macro Pole Mount BTS requires both vertical clearance and area clearance.

Vertical Clearance

The Macro Pole Mount BTS requires a minimum clearance for cable connections at the bottom of the cabinet (LPU module).

The bottom of the LPU should be a minimum of 23cm (9 inch) above the top of any surface. The ½” Superflex jumper antenna cable has a turn radius of 1.25" / 32 mm and requires at least 9" / 230 mm for the bend.

Other antennae cables may have a larger turn radius requiring more vertical clearance.

The GPS receiver and antennae installed on the top of the Macro Pole Mount BTS unobstructed upward visibility for satellite acquisition. Do not install any solid metal constructions above the Macro Pole Mount BTS.

Area Clearance

Installing the Macro Pole Mount BTS requires a minimum clearance behind the cabinet. Ensure there is 60 cm (2 feet) clearance behind the pole to allow sufficient access for through-rod installation.(refer to Figure 10).

Proper installation also requires adequate mechanical clearance.

Figure 9 shows the minimum vertical clearances for the Macro Pole Mount BTS.

Figure 9 Minimum Vertical Clearances for the Macro Pole Mount BTS

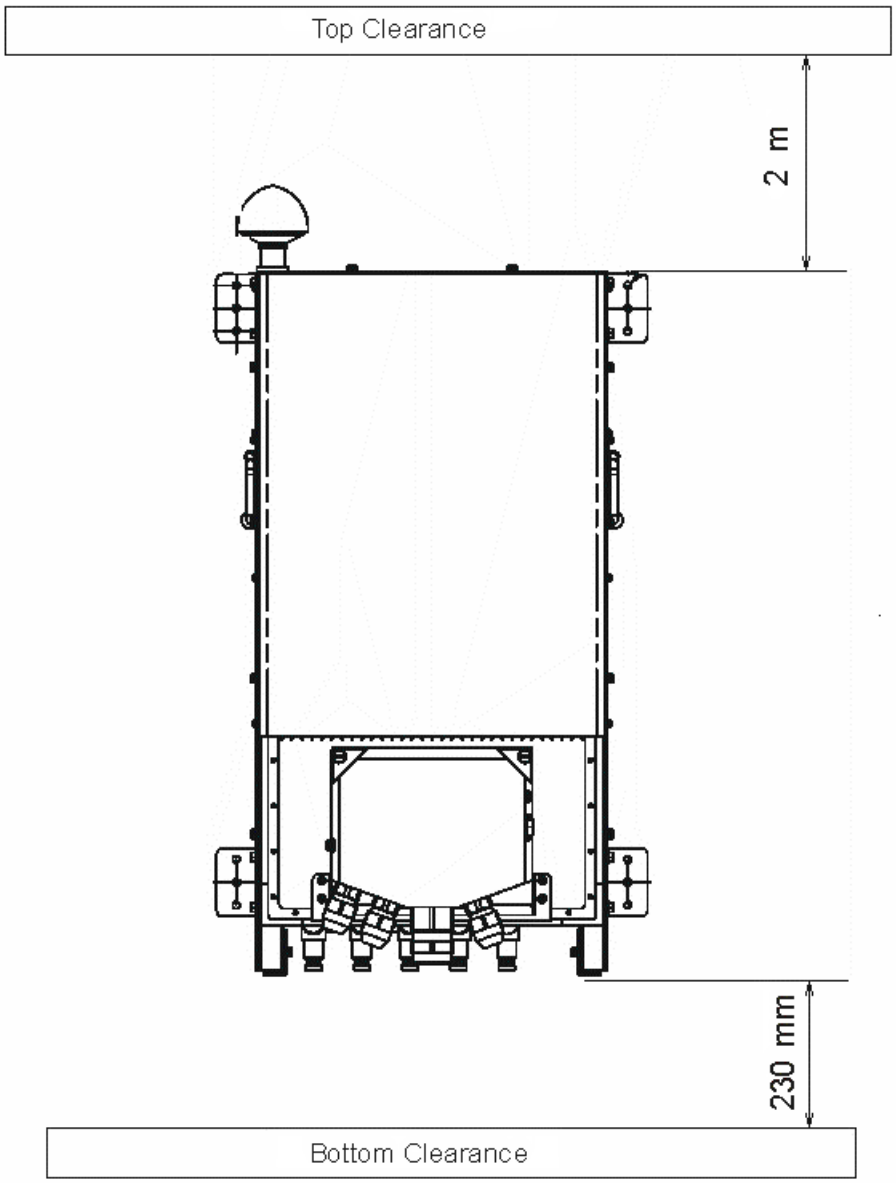
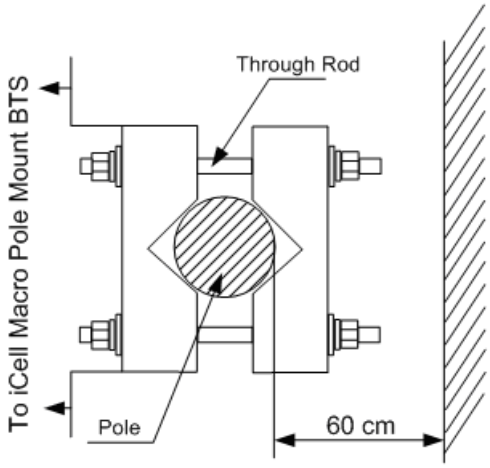


Figure 10 Installation Clearance for Macro Pole Mount BTS



Inspecting and Verifying Site Requirements

Inspect the Macro Pole Mount BTS installation site to verify the location meets the minimum requirements.

This section includes:

- Verifying Power
- Verifying Grounding
- Fire Protection
- Verifying Alarms
- Verifying Site Conditions

Verifying Power

Warning:
Power must be verified by qualified personnel.

To verify power, perform the following steps:

1. Check the external meter to verify that the power capacity is at full building capacity.
2. Verify the surge protectors are installed.
3. Verify that adequate DC or AC power environments are available. Refer to DC Power Requirements or AC Power Requirements. If the environment does not meet power requirements, contact the utility company or site manager.

Verifying Grounding

Warning:
Grounding must be verified by qualified personnel.

To verify grounding:

1. Verify the internal ground system has a low impedance path to ground to achieve a minimal potential difference between conductive structures within the site.
2. Verify the Master Ground Bar (MGB) is properly connected to the external ground.
3. Inspect the connections between the MGB and the external ground ring.
4. Verify all metallic phone lines (span lines, auto-dialup modem lines, leased span lines, and any other switched network or leased telephone lines) entering or leaving the site are equipped with a three-electrode gas tube protector.
5. Verify the ground side of the gas tubes are tied to the MGB.
6. Verify the battery racks are properly grounded to the MGB.

All ground cables should have a bend radius of 8 in (20 cm) or more.

Fire Protection

Install fixed fire suppression equipment. Possible types are:

- Halon gas system
- Carbon Dioxide (CO2) system
- Sprinkler system (UTStarcom recommends using "dry pipe" sprinkler systems that remove all power to a room before filling the overhead sprinklers with water.)

Warning:
In addition to the fixed fire suppression equipment, there should be at least two 5-lb ABC class portable fire extinguishers on the premises before equipment installation begins.

If there is no fire suppression equipment installed, contact the site manager or facility representative.

Verifying Alarms

Ensure any alarms are installed per site-specific documentation. These alarms may include:

- Vandalism
- Surface water
- Intrusion
- Fire
- Building temperatures (high and low)
- Any customer-specific options.

If no alarms are installed, contact the site manager or facility representative.

Verifying Site Conditions

The site must be clean and free of obstructions. Verify that:

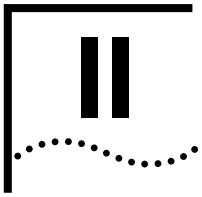
- There are no obstructions
- Any dust and/or water in the area is cleared away.

If site conditions do not comply, contact the site manager or facility representative.

Warning:
External cabling must be supported by cable racks not attached to the Macro Pole Mount BTS. If not independently supported the weight of the cabling may reduce the ability of the system to withstand Zone 4 Seismic activity.

If the installer is not responsible for correcting noted shortfalls, notify responsible individuals of any deficiencies and ensure the deficiencies are corrected before commencing installation.

Installation of ancillary equipment (for example: power supplies, cable racks, batteries) may be the responsibility of the installer.



INSTALLATION

3 MACRO POLE MOUNT BTS INSTALLATION AND POWER CABLING

About This Chapter

This chapter describes installation power cabling for the Macro Pole Mount BTS.

This chapter includes:

Macro Pole Mount BTS Installation

This section includes:

Mounting on a Pole

Figure 11 shows the outside dimensions of the Macro Pole Mount BTS and the accessories required for pole mounting installation.

Figure 11 Macro Pole Mount BTS Mounting Bracket Dimensions

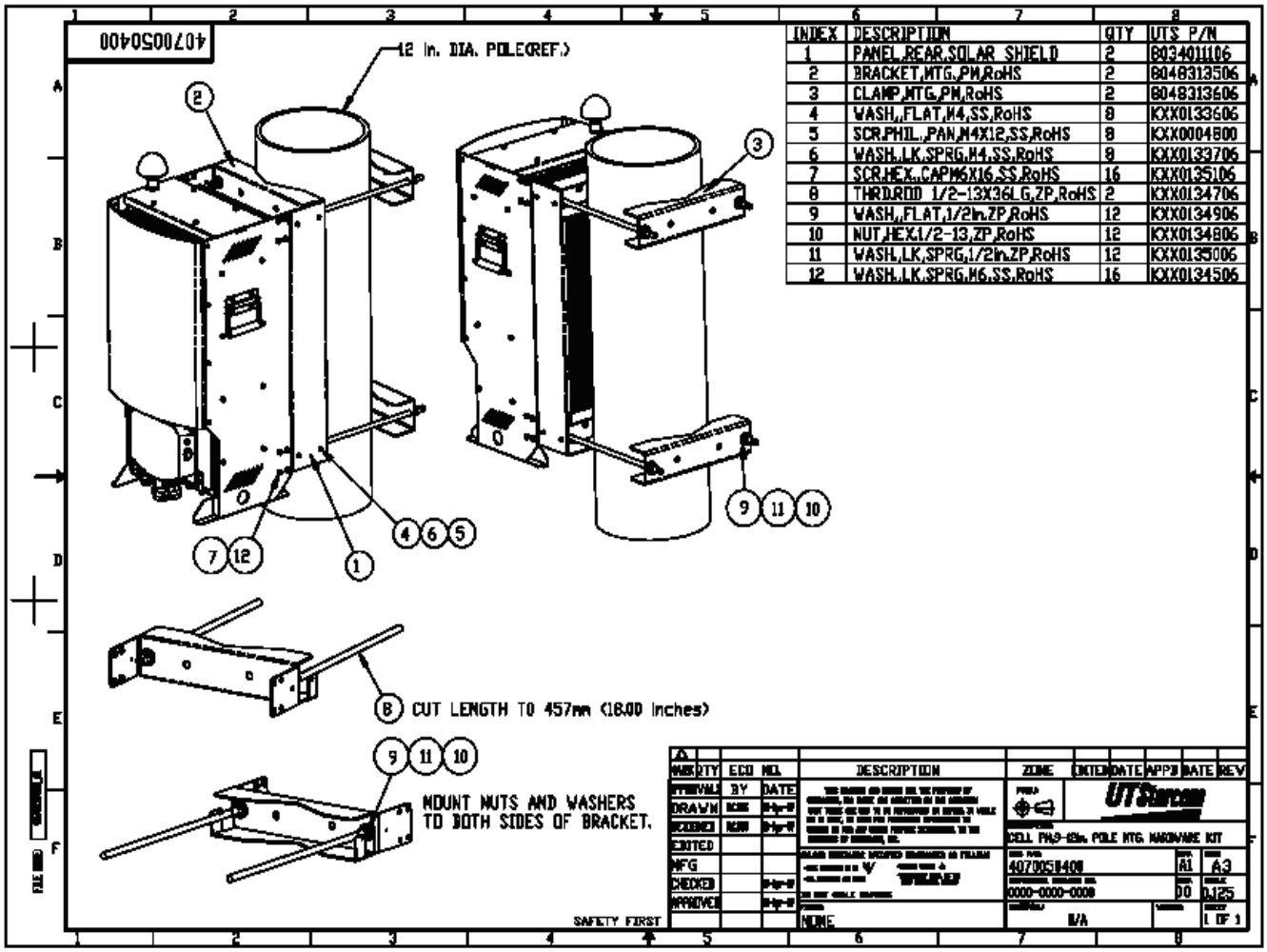


Table 16 lists complete Macro Pole Mount BTS mounting kit details.

Table 16 Macro Pole Mount BTS Mounting Kit Description

Index	Description	Quantity
1	Panel, Rear, Solar Shield	2
2	Bracket	2
3	Clamp	2
4	Washer, Flat, M4	8
5	Screw, Phillips, M4	8
6	Washer, Spring, M4	8
7	Screw, HEX, CAP M6	16
8	Through Rod, ½-13X36 LG	2
9	Washer, Flat, ½-inch	12
10	Nut, HEX, ½-13	12
11	Washer, Spring, ½-inch	12

Table 16 Macro Pole Mount BTS Mounting Kit Description

Index	Description	Quantity
12	Washer, Spring, M6	16

To mount the Macro Pole Mount BTS:

1. Adjust through rods (8) to the required length (Use metal cutting hack saw).
2. Install brackets (2) on Macro Pole Mount BTS cabinet. Use screws (7) and washers (12) to fasten brackets to the Macro Pole Mount BTS body.
3. Insert four through rods (8) into brackets holes and fasten it by using washer (9), washer (11) and nut (10).

The bracket (8) has two hole sets for different pole diameters. Use external holes pair for mounting poles with a diameter from 12 to 15 cm (5 to 6 inch). Use internal holes pair for mounting poles with a diameter from 15 to 31 cm (6 to 12 inch).

Tightening torque for ½-13 nuts on the threaded rods is subjective. Do not over tighten nuts. If over tightened the brackets will bend.

4. Attach solar shield panel (1) to the brackets (2) by using washer (4), screw (5) and washer (6).
5. Lift Macro Pole Mount BTS to the required height.
6. Attach clamps (3) and fasten them by using washer(9), nut (10) and washer (11).

Mounting on a Wall

Figure 12 shows the outside dimensions of the Macro Pole Mount BTS and accessories required for the wall-mounting installation.

Figure 12 BTS Wall Mounting

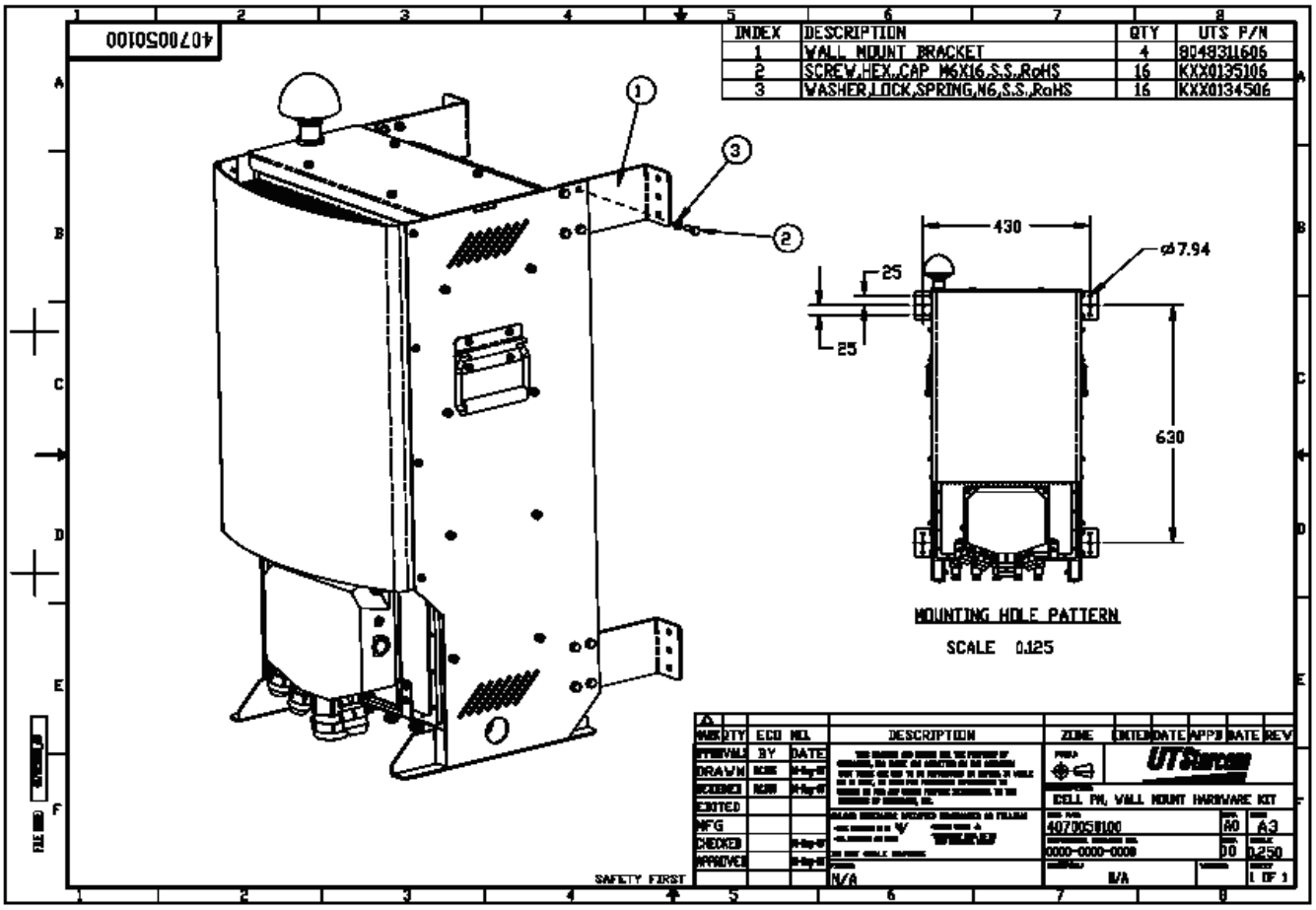


Figure 13 shows the mounting holes dimensions and location for the wall-mounting installation. These mounting hole centers apply to mounting on all wall types.

Figure 13 BTS Wall-Mounting Hole Pattern

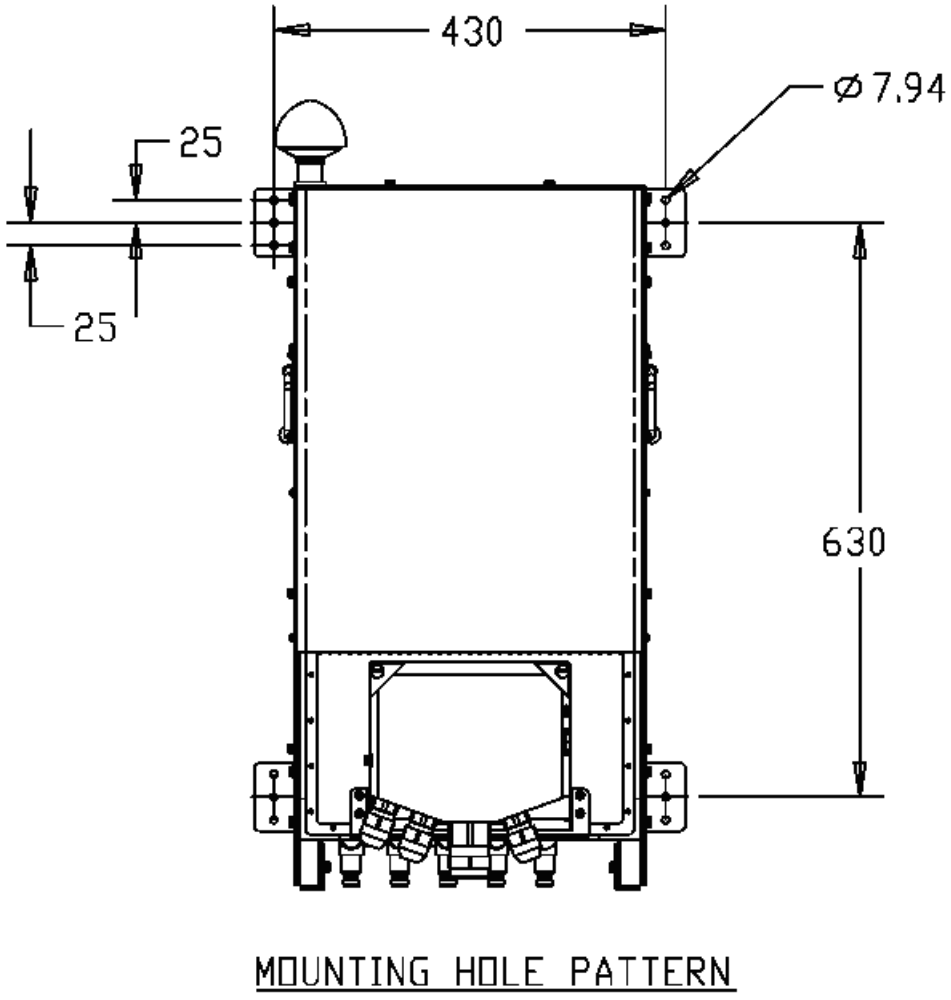


Table 17 lists BTS wall-mount kit details.

Table 17 BTS Wall-Mount Kit Description

Index	Description	Quantity
1	Wall mount bracket	2
2	Screw, HEX, Cap, M^	2
3	Washer, lock, Spring, M6	2

To mount the BTS on a wall:

1 Prepare wall-mounting anchors for BTS wall-mount installation (Use the mounting hole pattern shown in Figure 13).

a To mount on a wooden wall use:

- ¼-20 X 1-1/2" stainless steel lag bolts (4)
- Mounting hole pattern shown in Figure 13.

- 7/16 wrench to tighten screws.

b To mount on concrete, masonry, grout-filled block or hollow block use:

- Dynabolt sleeve anchors- hex head carbon steel zinc plating
- Mounting hole pattern shown in Figure 13
- Red Head p/n BLXHN1614.

2 Install brackets (1) on Macro Pole Mount BTS cabinet.

3 Use screw (2) and washer (3) to fasten brackets to Macro Pole Mount BTS body.

4 Lift Macro Pole Mount BTS to the required height

5 Fasten the screws to wall anchors.

Macro Pole Mount BTS Power Cabling

Before Connecting Power Cables

Warning:
Verify Macro Pole Mount BTS power supply version prior to wiring power cords.

Warning:
Power connections to the Macro Pole Mount BTS must comply with local safety codes.

Warning:
Power connections must be performed by qualified personnel only.

Verifying DC/AC Power

Each of the components in the Macro Pole Mount BTS draws power. There must be sufficient power supplied to the BTS to meet all power requirements.

Table 18 outlines the power requirements for various Macro Pole Mount BTS system configurations.

Table 18 DC Power Requirements

Configurations	One Sector	Two Sectors	Three Sectors
Total Power, W	500	1000	1500
Min recommended AWG wires DC	8	8	6
Min recommended AWG wires AC	10	10	8

The recommended voltage range is -42 VDC to -56 VDC or 90VAC to 240 VAC.

To reduce power loss, use the minimum length of power cord required to connect the power source to the Macro Pole Mount BTS and expanders. Calculate an actual power loss based on Table 8.

Example:

Equipment with current draw of 10.41A at 48V (10.41A x 48VDC = 500W) connected to the source by 100 meters long #8 AWG cable will lose:

10.41^2 x (2.060496/10) = 22.33 (W)

and lower voltage by:

10.41 x (2.060493/10) = 2.1 (V).

Since the Macro Pole Mount BTS optionally supports additional sectors, install cabling that allows for future expansion.

Table 19 lists the load carrying capacities of applicable wire gauge sizes.

The gauges are in American Wire Gauge (AWG). For metric wire gauge, the wire gauge is 10 times the wire diameter (in mm). For example, a 5mm wire is 50 gauge.

Table 19 Load Carrying Capacities

AWG Gauge	Diameter (Inch)	Diameter (mm)	Ohms (per 1000 ft)	Ohms (per km)	Maximum Amps (Power Transmission)
2	0.2576	6.54304	0.1563	0.512664	94
3	0.2294	5.82676	0.197	0.64616	75
4	0.2043	5.18922	0.2485	0.81508	60
5	0.1819	4.62026	0.3133	1.027624	47
6	0.162	4.1148	0.3951	1.295928	37
7	0.1443	3.66522	0.4982	1.634096	30
8	0.1285	3.2639	0.6282	2.060496	24
9	0.1144	2.90576	0.7921	2.598088	19
10	0.1019	2.58826	0.9989	3.276392	15

For DC/AC power to the Macro Pole Mount BTS, calculate the maximum amperes required in the Maximum Amps (Power Transmission) column and note the required wire gauge (AWG or metric). For example, above 37 amperes but below 47 amperes, use 5 AWG gauge cabling.

Cabling Power Supply

This section includes:

- Preparation
- Connecting Power Cables

Preparation

Preparing the Macro Pole Mount BTS for power supply includes:

- Stopping Power to the Macro Pole Mount BTS
- Preparing the LPU Module and Cables

Stopping Power to the Macro Pole Mount BTS

Warning:
Prior to this step, the power cabling to the Macro Pole Mount BTS must be completed as described in DC Power Requirements on page 35 and AC Power Requirements on page 35).

To stop power to the Macro Pole Mount BTS:

- Verify that the power to the DC cables has been turned off at the main breaker (an external breaker not supplied with the Macro Pole Mount BTS).

Preparing the LPU Module and Cables

Prepare the LPU module and power cables before attempting connection.

To prepare the LPU module and cables:

1. Back off the screws in the LPU for each required terminal.
2. Strip back the insulation on all power and ground cables to expose approximately 3/8" (9.5 mm).
3. Twist the strands of each stripped wire together, or solder the ends of each wire.

Connecting Power Cables

This section includes:

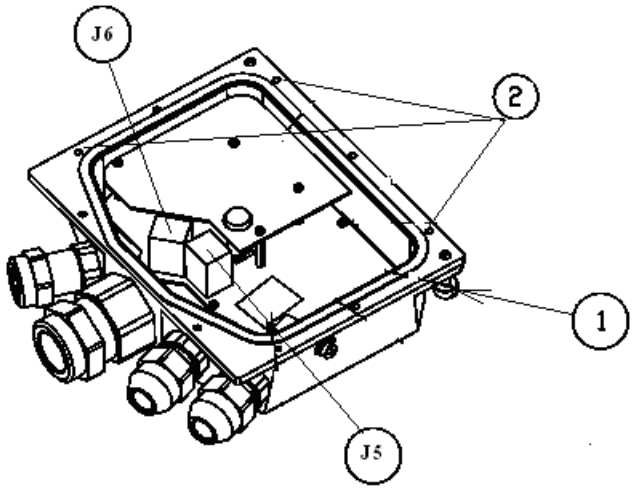
- LPU Box Assembly
- Connecting Cabinet Ground
- Connecting DC Cable
- Connecting AC Cable

LPU Box Assembly

Dismount the LPU from the main cabinet prior to connecting cables.

The LPU box assembly is shown in Figure 14.

Figure 14 LPU Box Assembly



1 Use flat screw driver to release bolts (1). (Refer to Figure 14)

2 The LPU should be dismounted before lifting the Macro Pole Mount BTS to its desired location.

3 Use #2 Phillips Screw driver to release screws (2) and open the top LPU cover.

Connecting Cabinet Ground

The LPU box assembly is shown in Figure 14.

To connect the cabinet ground:

1 Insert the stripped end of the earth GROUND wire into the earth ground terminal (J5-3 or J5-4) up to the insulation. The earth ground terminal is labeled GND.

2 Tighten the ground terminal screw until the cable is firmly secured.

Connecting DC Cable

The LPU box assembly is shown in Figure 14.

Connect the DC power cables after the ground has been connected.

To connect the DC cable:

1 Insert the stripped end of the RETURN wire into the J5-1 or J5-2 terminals up to the insulation. The RETURN terminal is labeled DC-48V.

2 Tighten the terminal screw until the cable is firmly secured.

3 Insert the stripped end of the POWER wire into the J6-1 or J6-2 terminals up to the insulation. The POWER terminal is labeled DC+48V.

4 Tighten the terminal screw until the cable is firmly secured.

5 Insert the stripped end of the neutral or unused wire (if any) into the J6-3 or J6-4 terminals up to the insulation. The unused terminal is labeled NTRL.

6 Tighten the terminal screw until the cable is firmly secured.

All DC power cables should terminate at the connectors J5 and J6 on the LPU Box (Do not leave unconnected wires). The LPU distributes DC power to the BTS components.

Connectors J5 and J6 are populated with two signals each (refer to on-board silk titles for details).

7 The pins J5-1 and J5-2 are connected together and should be wired with -48 VDC from power source.

8 The pins J5-3 and J5-4 are connected together and should be wired to GND line of power source.

9 The pins J6-1 and J6-2 are connected together and should be wired with +48 VDC from power source.

10 The pins J6-1 and J6-2 are connected together and should be wired with NTRL neutral line from power source or the spare line of power cable.

All the lines in the proceeding procedure are lightning protected.

Connecting AC Cable

The LPU box assembly is shown in Figure 14.

Connect the AC power cables after the ground has been connected.

To connect the AC cable:

1 Insert the stripped end of the Neutral wire into the J5-1 or J5-2 terminals up to the insulation. The RETURN terminal is labeled L2(N).

2 Tighten the terminal screw until the cable is firmly secured.

3 Insert the stripped end of the PHASE wire into the J6-1 or J6-2 terminals up to the insulation. The POWER terminal is labeled L1.

4 Tighten the terminal screw until the cable is firmly secured.

5 Insert the stripped end of the neutral or unused wire (if any) into the J6-3 or J6-4 terminals up to the insulation. The unused terminal is labeled Spare.

6 Tighten the terminal screw until the cable is firmly secured.

All AC power cables should terminate at the connectors J5 and J6 on the LPU Box (Do not leave unconnected wires). The LPU distributes DC power to the BTS components.

Connectors J5 and J6 populated with two signals each (refer to on-board silk titles for details).

7 The pins J5-1 and J5-2 are connected together and should be wired with L2(N) from power source.

8 The pins J5-3 and J5-4 are connected together and should be wired to GND line of power source.

9 The pins J6-1 and J6-2 are connected together and should be wired with L1 from power source.

10 The pins J6-1 and J6-2 are connected together and should be wired with Spare line from power source or the spare line of power cable.

All the lines in the proceeding procedure are lightning protected.

Connecting Other Cables

This section includes:

- Connecting Ethernet and Console Cables
- Installing Optional Sector Expansions

The BTS requires an ethernet connection to communicate with the BSC.

Configuration and monitoring processes require console cabling. Multi-sector installation also requires console cabling (Refer to Connecting Ethernet and Console Cables).

Connecting Ethernet and Console Cables

Figure 15 shows LPU board with Ethernet and two console connectors.

To connect the Ethernet and console cables:

1 Connect standard Category 5 Ethernet 10/100 cable (TIA/EIA-568-B) from Ethernet switch to LPU Ethernet RJ45 connector.

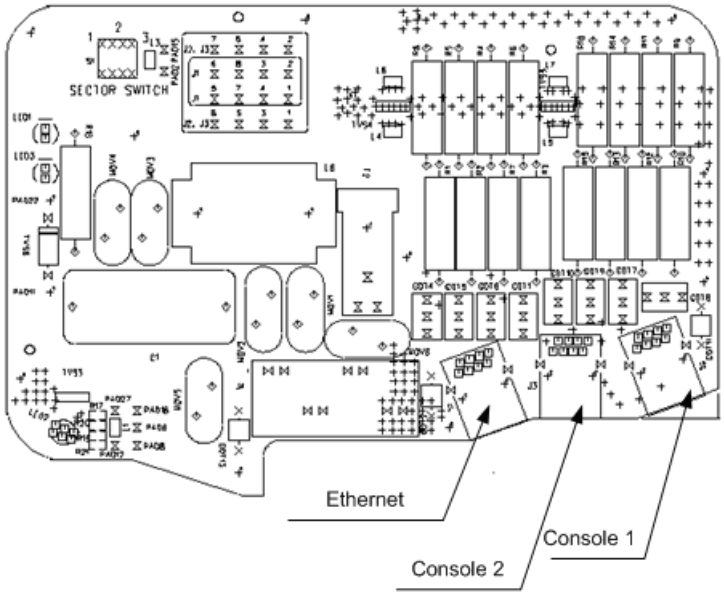
2 When a break out box is used, connect Category 5 Ethernet 10/100 cable from Console 1 connector (RJ45) on LPU board to break out box.

3 Both Ethernet and console cables must be routed within metal conduit with ground connection to the top ground bar.

To maintain the IP67 rating of the product, all incoming cables attached to the unit must provide a waterproof connection to the LPU.

The Ethernet and console fittings supplied with the Macro Pole Mount BTS accepts a cable diameter in the range of 10mm to 14mm (0.4 to 0.54").

Figure 15 Location of Ethernet and Console Connectors on the LPU

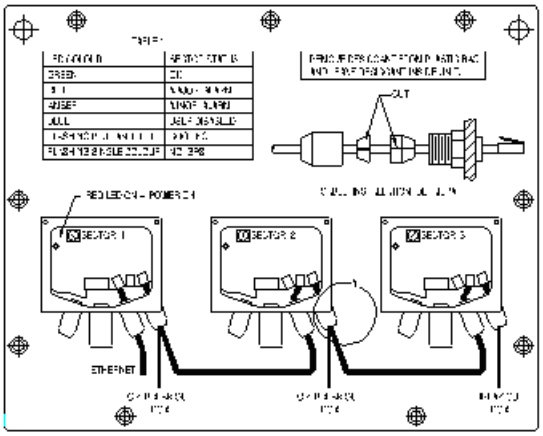


Installing Optional Sector Expansions

The Macro Pole Mount BTS can support up to 3 sectors by adding iCell sector expansion units.

Refer to Figures 13, 14, 15, and 16 for installation scheme.

Figure 16 Connecting Multi-sector Expansion Units (Ethernet and Console)



To connect iCell sector expansion units:

1. Stop the power to all sectors in the site.
2. For correct DC/AC cable wiring, refer to Connecting DC Cable on page 57, or Connecting AC Cable on page 58, as required.
3. Connect console cables as shown in Figure 16.

4 Connect RF cables as shown in Figure 17, Figure 18, and Figure 19.

Figure 17 Macro Pole Mount BTS (RF connection)

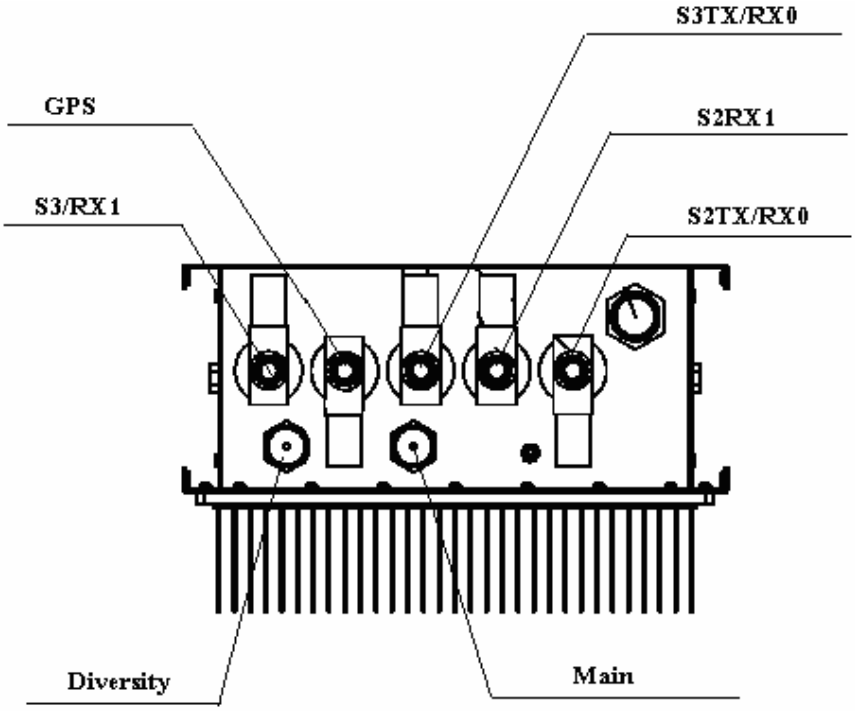


Figure 18 Macro Pole Mount BTS Sector Expansion (RF connection)

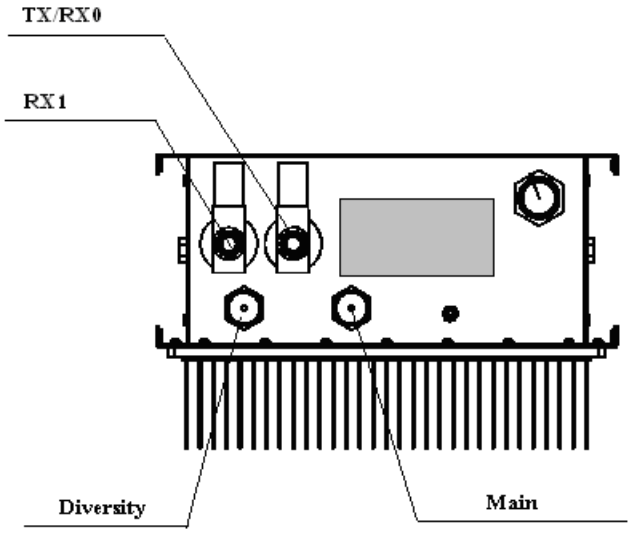
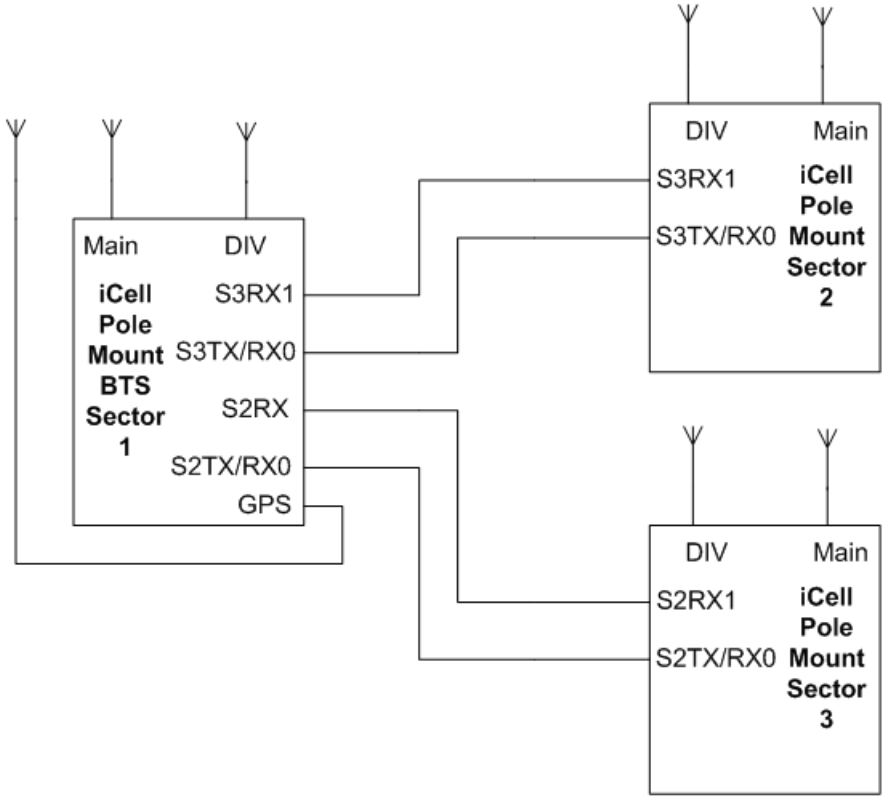


Figure 19 Macro Pole Mount BTS Multi-Sectors (RF connection)



4 TRANSMISSION, ANTENNA AND GPS CONNECTION GUIDELINES

About This Chapter

This chapter outlines guidelines for Voltage Standing Wave Ratio (VSWR), Return Loss, Insertion Loss, and Antenna and GPS connections.

This chapter includes:

VSWR Guidelines

This section discusses the importance of VSWR, antenna requirements, and issues related to measuring VSWR. This section includes:

About VSWR

Voltage Standing Wave Ratio (VSWR) is the ratio of maximum to minimum voltage in a standing wave pattern within a transmission line. VSWR measures the impedance mismatch between the transmission line and its load. The greater the mismatch the higher the VSWR. Minimum VSWR, where there is a perfect impedance match, is unity.

VSWR is important because when two different transmission lines are connected, there is a possibility of impedance mismatch. Impedance mismatch will cause a direct loss in the power budget.

When the impedance of the two connecting transmission lines do not match, a reflected wave is generated in the direction of the energy source. The voltage (wave form) on the transmission line is a combination of the initial wave (incident) and reflected wave.

Maximum power transfer across a connection is achieved when there is no impedance mismatch (VSWR is low).

Antenna Requirements

This guide does not describe how to install any GPS or RF antenna. This guide assumes that any GPS or RF antenna has already been installed according to manufacturers' specification.

The antenna should be resonant with the operating frequency so that its impedance matches the impedance of the transmission lines. Coaxial lines with 50 ohm impedance characteristics are universally used, The antenna should be designed to a 50 ohm terminal impedance.

Maximum power transmission over coaxial occurs when VSWR is unity (antenna impedance is 50 ohm). Many antennae are specified to operate with a VSWR lower than 1.5:1.

Measuring VSWR

Gain is the ratio of output power (voltage) to input power (voltage). Gain is usually expressed in dB. If the ratio is less than unity, the gain, expressed in dB, will be negative, indicating a loss between input and output.

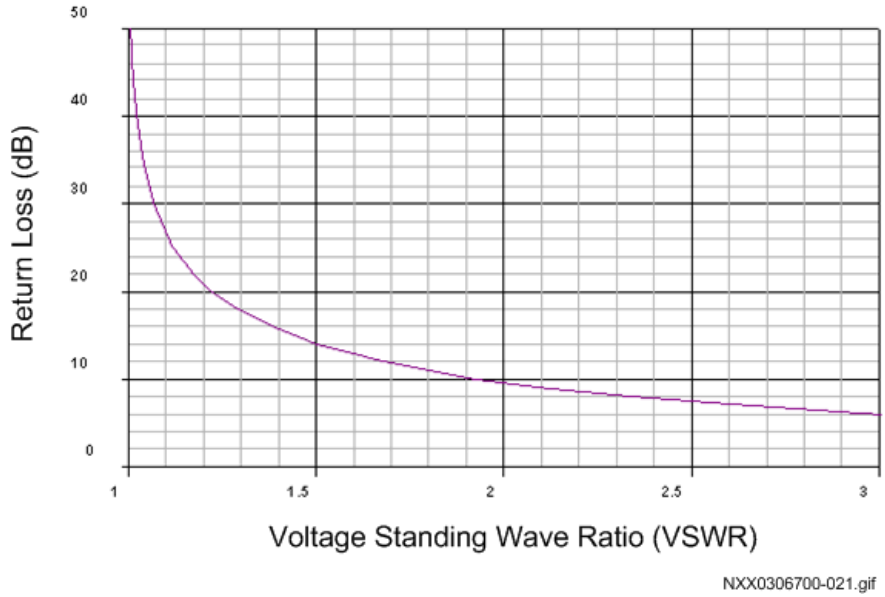
Gain cannot be easily measured in the field, but antenna VSWR can be measured at installation time.

The real (true) VSWR occurs at the antenna terminals, and VSWR should be measured at the bulkhead. The VSWR at the end of the transmission line will be lower than the real VSWR by the amount of attenuation (loss of signal power) in the line.

VSWR below 1.2 should be measured with a spectrum analyzer. VSWR above 1.2 can be calculated using return loss values (refer to Calculating Return Loss) and the appropriate table, or graph.

Figure 20 shows the Return Loss vs VSWR curve, which is useful for estimating VSWR above 1.2.

Figure 20 Return Loss vs VSWR Curve



Consulting a VSWR and Return Loss table will give precise VSWR for a known Return Loss value. Table 20 shows selected Return Loss and VSWR values, approximating the desired VSWR range for the antenna cabling.

Table 20 Selected Return Loss and VSWR Values

Return Loss (RL) dB	VSWR
13.98	1.50
14.26	1.48
14.56	1.46
14.88	1.44
15.21	1.42
15.56	1.40
15.94	1.38
16.33	1.36
16.75	1.34
17.21	1.32
17.69	1.30
18.22	1.28

Return Loss Guidelines

Return Loss is the ratio of the amplitude of the reflected wave to the amplitude of the incident wave, measured at the junction of a transmission line and a terminating impedance (or other discontinuity).

Return loss is a measure of the dissimilarity between impedances in metallic transmission lines and loads, or between refractive indices in optical fibers. Return loss is usually expressed in dB.

Calculating Return Loss

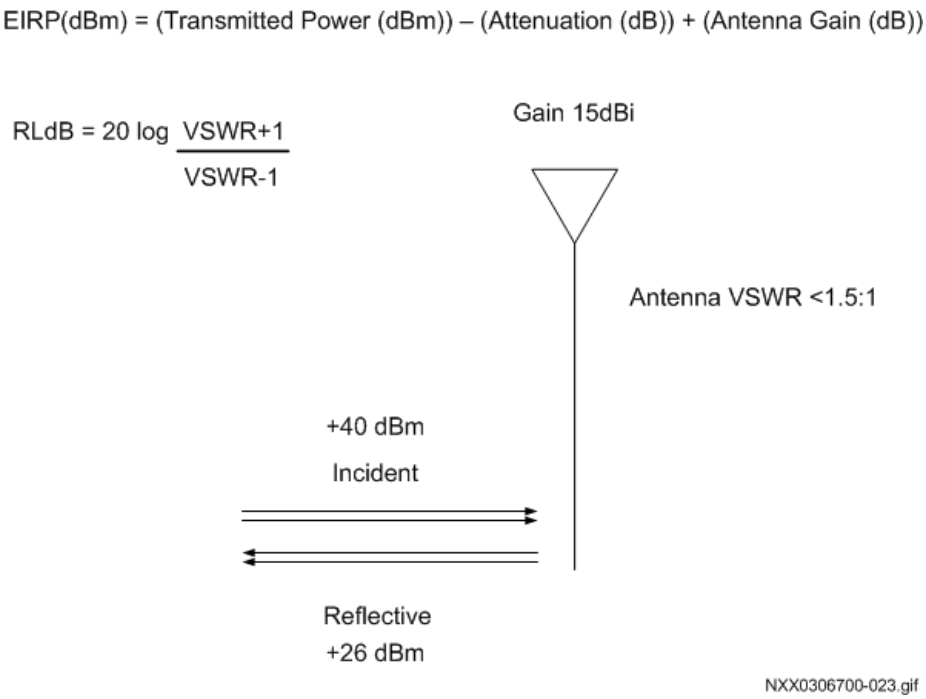
Return Loss calculations can be expressed in dBm or dBw. Decibels are used to express the ratio between two quantities. dBm uses a reference of 1mW and dBw uses a reference of 1W.

dBm = 10 log(power out / 1mW)

dBw = 10 log(power out / 1W)

A Return Loss (metallic transmission line) scenario is shown in Figure 21.

Figure 21 Return Loss Calculation Scenario



40dBm power (incident) is equivalent to 10 watts, and 26 dBm (reflective) is equivalent to 400mW.

Using the equation and values shown in Figure 21, Return Loss is calculated at 14dB.

The Effective Isotropically Radiated Power (EIRP) is used to estimate the service area of the transmitter, and to co-ordinate transmitters on the same frequency so that their coverage areas do not overlap.

Effective Isotropically Radiated Power (EIRP) is given by:
EIRP(dBm) = (Transmitted Power (dBm)) – (Attenuation (dB)) + (Antenna Gain (dB)).

Using the equation and values shown in Figure 21, EIRP is calculated at 39.8 dBm + antenna gain (decibels of gain of an antenna is expressed as dBi).

Insertion Loss Guidelines

Insertion Loss is the power loss resulting from the insertion of a device in a transmission line. Insertion Loss expressed as the reciprocal of the ratio of the signal power delivered to that part of the line before the device to the signal power delivered to that same part after the device. The inserted device is some type of connector.

Calculating Insertion Loss

Calculation of Insertion loss requires known incident and reflected power values. The incident power should be known and reflected power is calculated as Return Loss.

Insertion Loss is given by:

$L_{insertion}(dB) = 10_{log} (P_{out}/P_{in})$

Using the scenario shown in Figure 21, where the incident power is 10 W (40dBm), reflected power is 0.4 W (26dBm), the total power output is 9.6 W. Insertion Loss is 10_{log} (9.6/10) or 0.2dB.

Antenna Connection

To connect antenna cables:

1. Confirm that the antenna cables are labeled near the Macro Pole Mount BTS terminating end. Label the cables if they are not already labeled.
2. Thread the 7-16 Din type connector end of the MAIN cable onto the 7-16 DIN connector end on the antenna connection plate.
3. Thread the 7-16 Din type connector end of the DIVERSITY cable onto the 7-16 DIN connector end on the antenna connection plate.

GPS Connection

The GPS connection requires guidelines for timing information and for connecting the GPS cable to the Macro Pole Mount BTS.

About GPS in BTS

A BTS requires accurate timing information for both Time of Day (ToD) and message synchronization.

The Global Positioning System (GPS) is a constellation of 27 Earth-orbiting satellites (24 in operation and three extras in case one fails). A GPS receiver must locate four or more of these satellites, determine the distance to each, and use this information to deduce its own location. This operation is based on trilateration.

The GPS receiver and satellite both need clocks that can be synchronized to the nanosecond. Every satellite contains an atomic clock and the GPS receiver itself uses an ordinary quartz clock, which it constantly resets.

The receiver looks at incoming signals from four or more satellites and gauges its own inaccuracy - there is only one value for the "current time" that the

receiver can use. The correct time value will cause all of the signals that the receiver is receiving to align at a single point in space. That time value is the time value held by the atomic clocks in all of the satellites. So the receiver sets its clock to that time value, and it then has the same time value that all the atomic clocks in all of the satellites have.

Connecting GPS Cable to Macro Pole Mount BTS

A GPS antenna connection point is provided on the bottom of the Macro Pole Mount BTS.

Connecting GPS Cable

The Macro Pole Mount BTS integrated GPS cable uses an N type connector end. The N-type jack (female) connector allows the connection of a non-integrated GPS connector.

To connect an external GPS antenna cable:

1. Disconnect the existing GPS antenna cable from the bottom of the Macro Pole Mount BTS.
2. Thread the GPS cable end behind the sunshield panes and secure it.
3. Connect the external GPS antenna cable (N-type plug (male)) to the GPS connector on the bottom of the Macro Pole Mount BTS.

Warning:
Do not over tighten connector.

Warning:
The GPS antenna is active. Any DC blocking components on the GPS antenna cable (such as DC block or attenuators) will prevent proper antenna power feeding.

5 POWERING ON AND OFF

About This Chapter

This chapter describes how to power on and off the system and start up the software. It also describes verification procedures to be performed before applying power.

This chapter includes:

Before Powering On

Before powering on the Macro Pole Mount BTS:

- Ensure the two power connections to the two DC/AC power inputs have been made
- Check that the Macro Pole Mount BTS is properly grounded and that the hardware connections are tightened at both ends of the cable
- Check that all the required cables are connected properly.

Powering On

Powering on the system consists of:

Connecting to the BSC

Logging in and checking the status of the BSC application requires a connection to the BSC:

- An Ethernet or serial connection can be used to connect to the BSC. Some BSC implementations may require secure shell (SSH) connection. For a SSH connection, use a Telnet client that supports SSH and is configured to use port 22 instead of port 23.

Table 21 Default BSC Login Parameters

Parameter	Value
Default IP address	10.10.10.10
icell Password	icell
root Password	tel os
user target	target

To connect to the BSC using an Ethernet connection:

1 Connect to the BSC using Telnet or SSH:

a To Telnet to the BSC:

```
> telnet <BSC IP Address>
```

Login as icell

b To SSH to the BSC using the target username:

```
> ssh target@<BSC IP address>
target@<BSC IP address>'s password:
[target@<hostname> target]$
```

Change to the root user:

```
> su - root
[root@<BSC Name> root]#
```

Checking Status of BSC

Check the status of the BSC. The BSC should be both operational (enabled) and unlocked.

To check BSC status:

1 Connect to the BSC Element Manager, using HTTP GUI interface.

2 Select **cdma1x** to the right of GUI interface**,** then select **bscOperationalState**.

3 Confirm that the bscOperationalState is enabled.

4 Select **cdma1x,** then **bscAdministrativeState.**

5 Verify that the bscAdministrativeState is Unlocked.

Checking BSC Application Status

To check the BSC application status:

1 Enter icell_bsc status to view application status:

```
[icell@bsc7 icell]$icell_bsc status
```

The BSC application should display **started**. Refer to Example: BSC Application Status Check Session for an example Session.

Example: BSC Application Status Check Session

```
Red Hat Linux release 8.0 (Psyche)
Kernel 2.4.18-14 on an i686
login: icell
Password:
Last login: Mon Jan 27 12:19:20 from 10.10.1.13
[icell@bsc7 icell]$icell_bsc status
Status bsc_lxrel: started
21859
21864
[icell@bsc7 icell]$
```

If the BSC application is not started, then start it as described in Starting the BSC Application.

Starting the BSC Application

To start the BSC application:

1. Connect and login to the BSC. Refer to Connecting to the BSC.
2. Start the application

   `[icell@bsc7 icell]$ icell_bsc start`

   Check that the application is started

   `[icell@bsc7 icell]$icell_bsc status`

Testing Ethernet Connectivity

To test Ethernet connectivity:

1. Test IP connectivity between the test client and the BSC and BTS.

   ```
   > ping <BSC IP Address>
   > ping <BTS IP Address>
   ```

2. Close any BSC or BTS Element Manager connections.

Supplying power to BTS

To supply power to the BTS:

1. Make sure the power supply to the Macro Pole Mount BTS is **ON**.
2. Confirm visually that the power indicator on each Macro Pole Mount BTS power supply is lit.
3. Wait approximately one minute for the BTS to complete the boot process.

Bringing the Macro Pole Mount BTS into Service

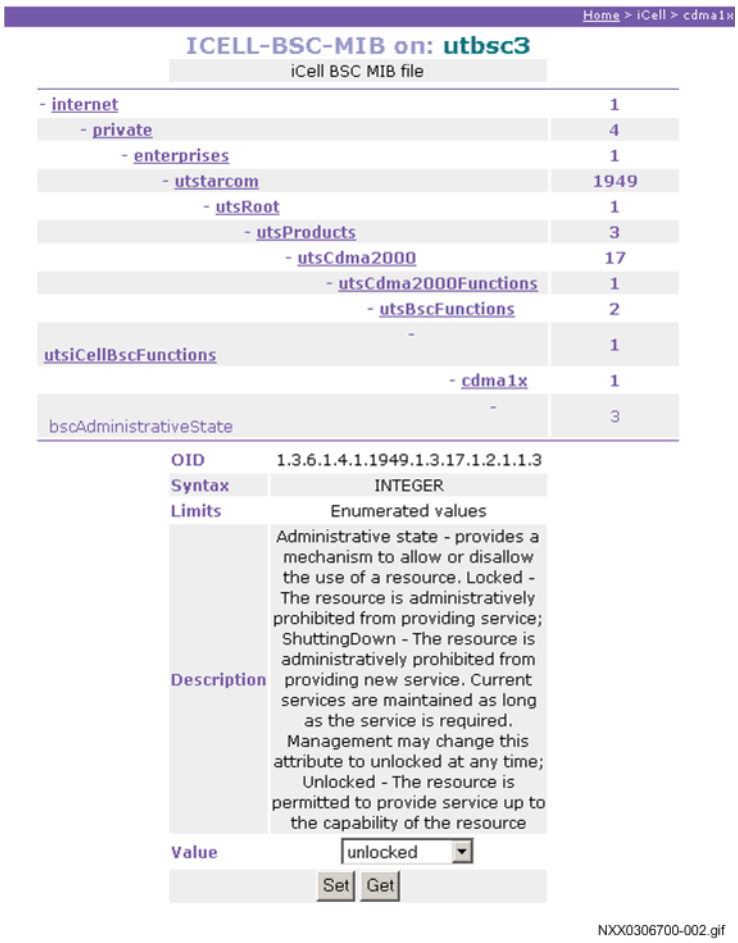
The Macro Pole Mount BTS is brought into service by unlocking the BSC, BTS, and then each BTS sector. The Macro Pole Mount BTS is fully in service when all sectors have blossomed.

To unlock the BSC:

1 Connect to the BSC Element Manager.
Refer to Connecting to BSC Element Manager on page 123.

2 On the menu, click **cdma1x** and then click **bscAdministrativeState**.
The page shown in Figure 22 appears.

Figure 22 Unlock BSC



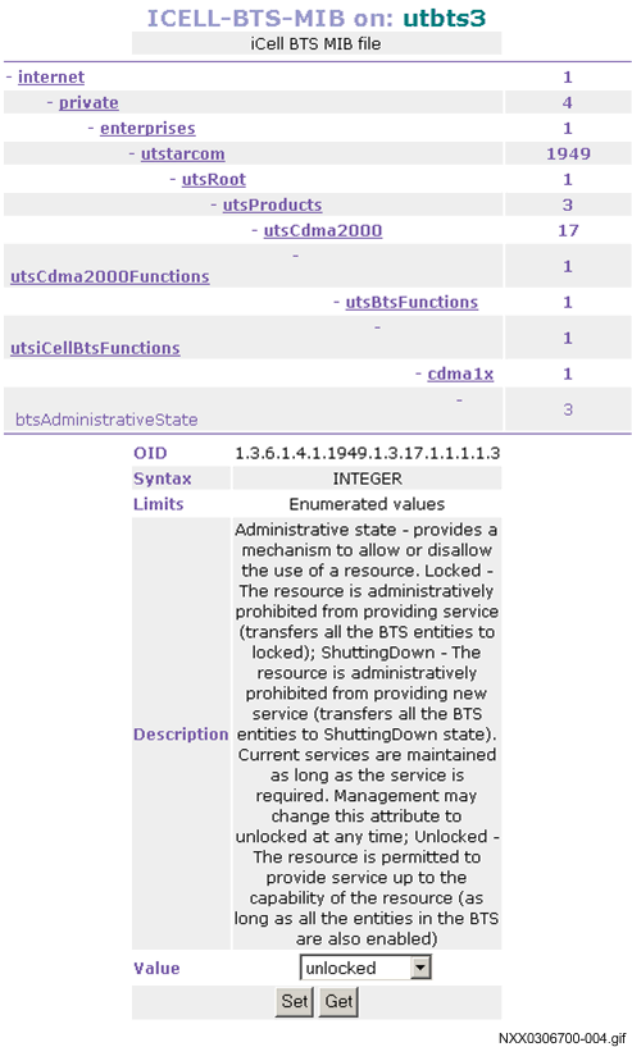
3 Select **unlocked** from the **Value** dropdown menu and then click **Set**.
The BSC is now in service.

To unlock the BTS:

1 Connect to the BTS Element Manager.
Refer to Connecting to BTS Element Manager on page 123.

2 On the menu, click **cdma1x** and then click **btsAdministrativeState**.
The page shown in Figure 23 appears.

Figure 23 Unlock BTS



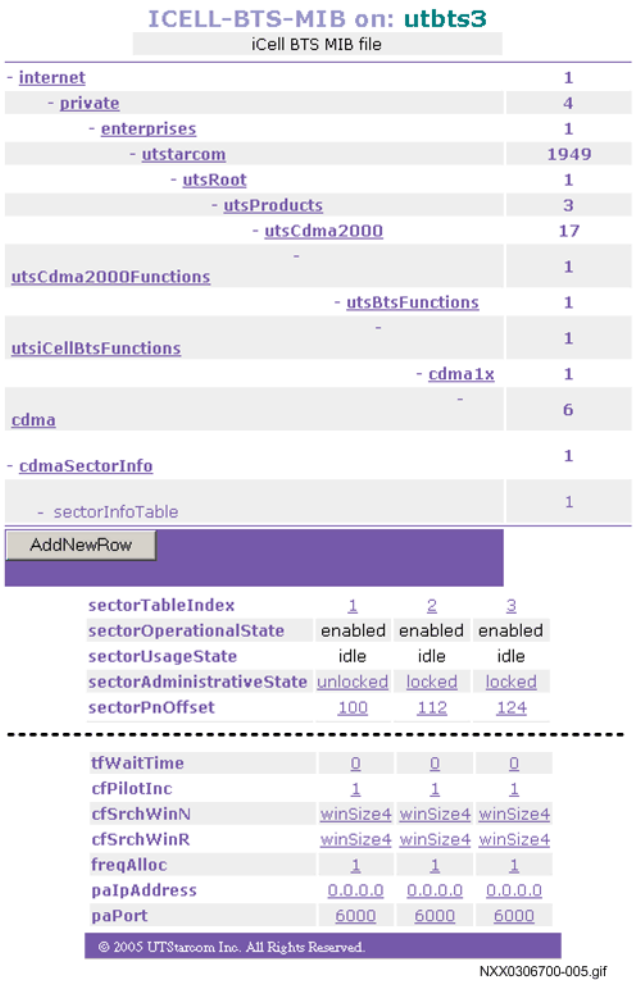
3 Select **unlocked** from the **Value** dropdown menu and then click **Set**.
The BTS is now in service.

4 Keep the connection to the BTS Element Manager for the next step.

To unlock the BTS sector:

1 In the BTS Element Manager, click **cdma1x**, **cdma**, **cdmaSectorInfo**, and then **sectorInfoTable**.
The page shown in Figure 24 appears.

Figure 24 BTS Sector Table



2 For sector 1, click **locked** in the first column of the **sectorAdministrativeState** row.
A page similar to that shown in Figure 25 appears.

Figure 25 Unlock BTS Sectors

3 Select **unlocked** from the **Value** dropdown menu and then click **Set**. The BTS sector is now in service.

4 Keep the connection to the BTS Element Manager for the next step.

Checking Status of the BTS and BTS Sectors

Check the status of the BTS, and BTS sector after the sector has blossomed. The BTS and sector should be both operational (enabled) and unlocked.

To check the BTS and sector status:

1 On the BTS Element Manager, click **cdma1x** and then **btsOperationalState**.

2 Verify that the **btsOperationalState** is **Enabled**.

3 Click **cdma1x** and then **btsAdministrativeState**.

4 Verify that the **btsAdministrativeState** is **Unlocked**.

5 Click **cdma1x**, **cdma**, **cdmaSectorInfo**, and then **SectorInfoTable**.

6 Verify that the **sectorOperationalState** for each sector is **Enabled**.

7 Verify that the **sectorAdministrativeState** for each sector is **Unlocked**.

8 Exit the BTS Element Manager.

Powering Off

Make sure the power supply to the Macro Pole Mount BTS is disabled before any installation or maintenance activity.

To power off the BTS:

1. Lock the BTS sectors. Refer to BTS Sector Table.
2. Lock the BTS. Refer to Locking BTS.
3. Lock the BSC. Refer to Locking BSC.
4. Stop the BSC application. Refer to Stopping the BSC Application.
5. Shutdown the BSC. Refer to Shutting Down BSC.

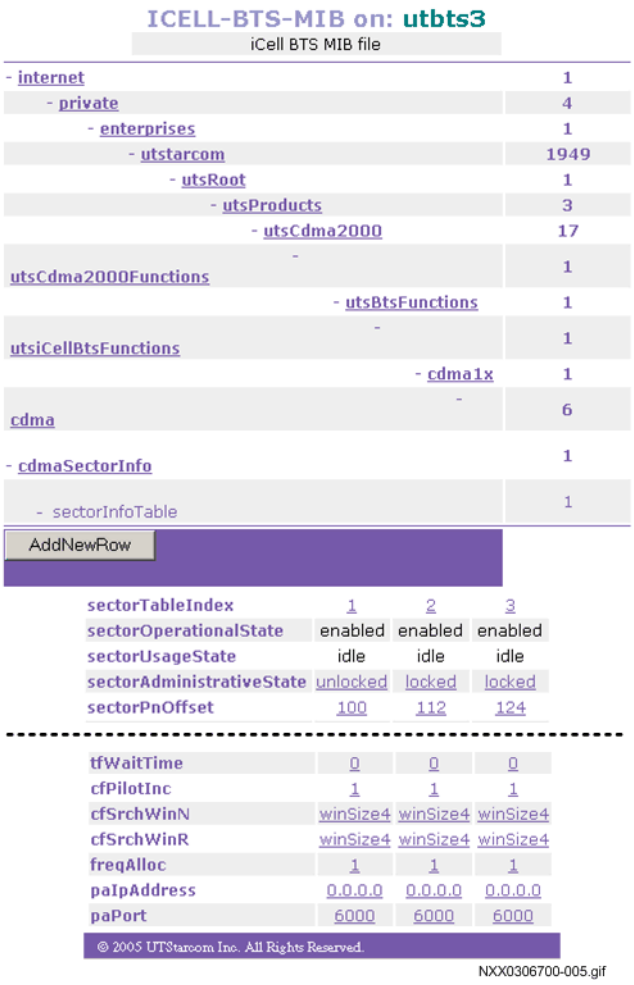
Locking BTS Sectors

Locking a BTS sector takes it out of service.

To Lock all BTS sectors:

1. Connect the test client to the Ethernet switch.
2. Connect to the BTS Element Manager. Refer to Connecting to BTS Element Manager on page 163.
3. On the menu, click **cdma1x**, **cdma**, **cdmaSectorInfo**, and then **sectorInfoTable**.
   The page shown in Figure 26 appears.

Figure 26 BTS Sector Table



4 For sector 1, click **Unlocked** in the first column of the **sectorAdministrativeState** row.
A page like that shown in Figure 27 appears.

Figure 27 Lock BTS Sectors

5 Select **Locked** from the dropdown menu and then click **Set**.
The BTS sector is now out of service.

6 Keep the connection to the BTS Element Manager for the next step.

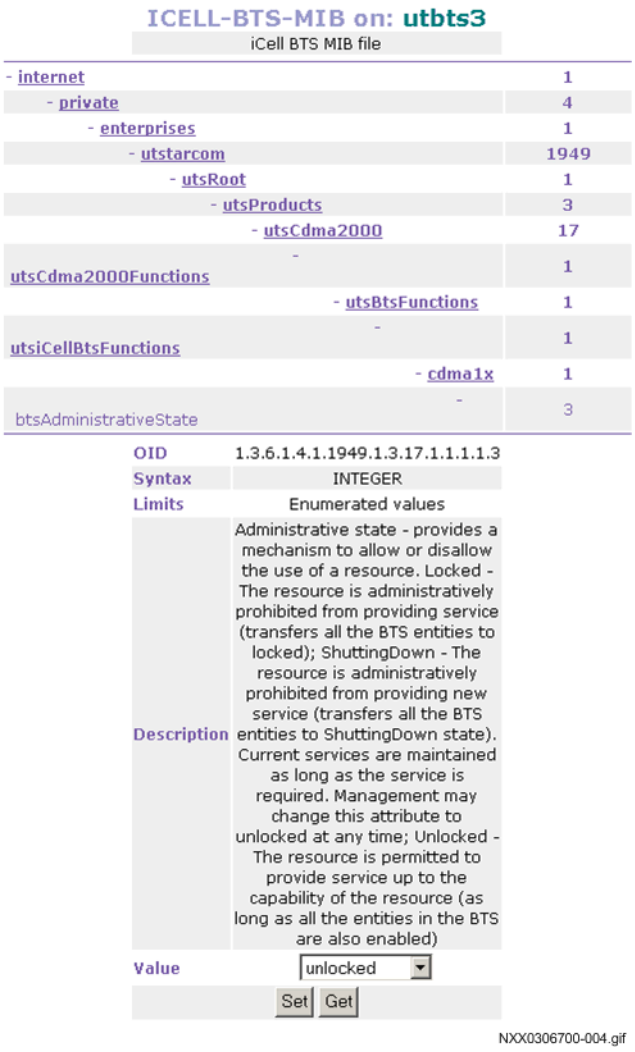
Locking BTS

Wait until the BTS is completely wilted before locking it.

To lock the BTS:

1 In the BTS Element Manager, click **cdma1x**, and then **btsAdministrativeState**.
A page similar to that shown in Figure 28 appears.

Figure 28 Lock BTS



2 Select **Locked** from the dropdown menu and then click **Set**. The BTS is now out of service.

3 Exit the BTS Element Manager.

Stopping the BSC Application

To stop the BSC application:

1 Connect and login to the BSC. Refer to Connecting to the BSC on page 69.

2 Stop BSC application

```
[icell@bsc7 icell]$ icell_bsc stop
```

3 Confirm that BSC application is **stopped.**

```
[icell@bsc7 icell]$ icell_bsc status
```

4 Keep the Telnet session open for a further procedure.

The application should be **stopped**.

Refer to Example: Stop BSC Application for an example session.

Example: Stop BSC Application

```
Red Hat Linux release 8.0 (Psyche)
Kernel 2.4.18-14 on an i686
login: icell
Password:
Last login: Mon Jan 27 12:19:20 from 10.10.1.13
 [icell@bsc7 icell]$ icell_bsc stop
Shutting down bsc_lxrel: ...
 [icell@bsc7 icell]$ icell_bsc status
Status bsc_lxrel:  stopped
 [icell@bsc7 icell]$
```

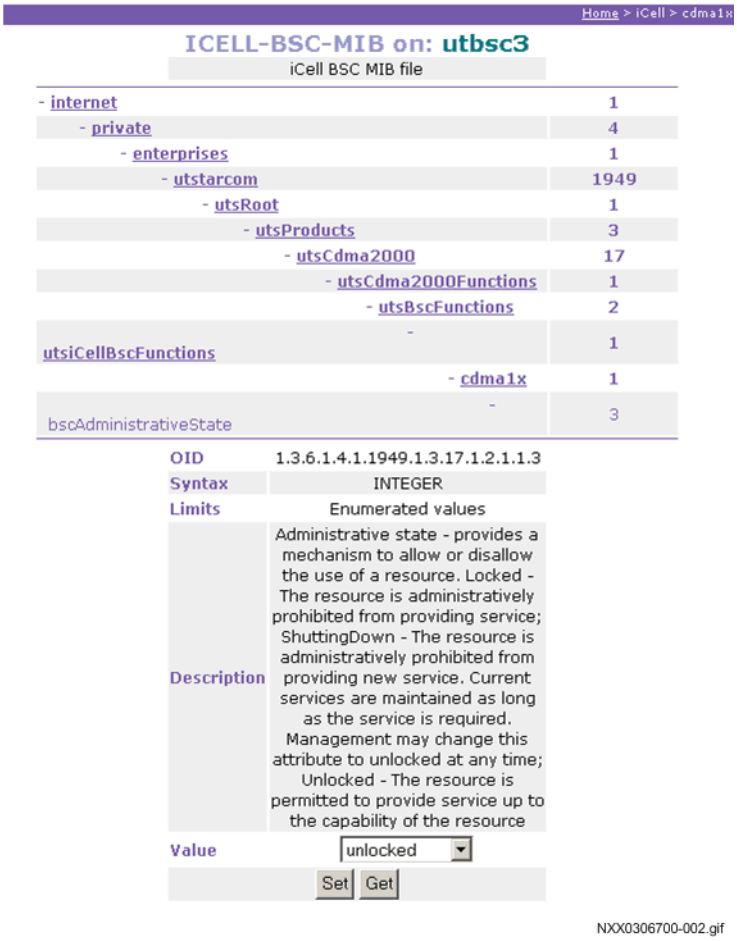
Locking BSC Lock the BSC to take it out of service.

To lock the BSC:

1 Connect to the BSC Element Manager. Refer to Connecting to BSC Element Manager on page 163.

2 On the menu, click **cdma1x** and then **bscAdministrativeState**. The page shown in Figure 29 appears.

Figure 29 Lock BSC



3 Select **Locked** from the dropdown menu and then click **Set**. The BSC is now out of service.

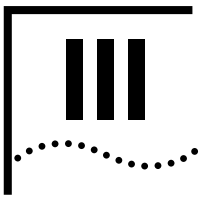
4 Exit the BSC Element Manager.

Shutting Down BSC To shut down the BSC:

1 Using the `root telnet` session, shutdown the BSC.
`[root@<BSC Name> root]# init 0`

2 Monitor standard output until **Power off** is displayed.

3 Exit the `telnet` session.



INITIAL CONFIGURATION

6 CONFIGURATION

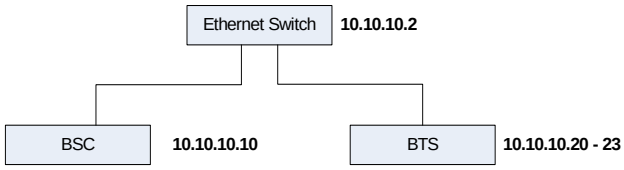
About This Chapter

This chapter includes:

- Configuration Procedure

The Macro Pole Mount BTS ships with its component network elements pre-configured with non-routable IP addresses, as shown in Figure 30. This chapter describes how to change to addresses that are routable on your network.

Figure 30 Macro Pole Mount BTS Shipping Configuration



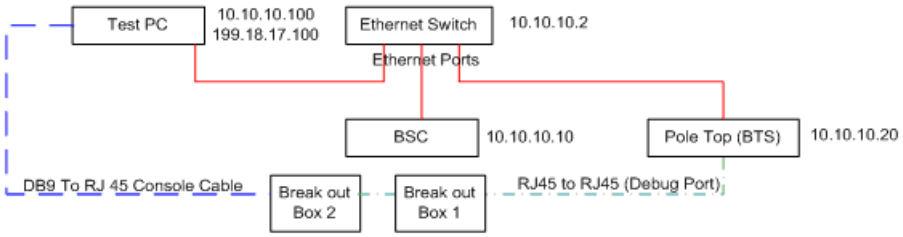
Configuration Procedure

- Configuring a Test PC
- Connecting the Test PC to the Ethernet Switch
- Performing Ping Test 1
- Configuring the Ethernet Switch
- Configure the BSC
- Configure the BTS
- Performing Ping Test 2
- Configuring the Macro Pole Mount BTS GPS
- Confirming the External GPS Feature is Enabled

Configuring a Test PC

Configure a test PC with two IP addresses. One IP address should be valid on the shipping network and the other on your network.

Figure 31 Example Test PC IP Configuration



To Configure a Test PC refer to Configuring Test Client on page 115.

Connecting the Test PC to the Ethernet Switch

Connect an Ethernet cable from a port on the Test PC to an empty port on the Ethernet Switch.

Performing Ping Test 1

Ping each of the network elements on the shipping network.

To perform the ping test:

1. From the Test PC, click **Start** | **Run**.
2. Enter **cmd**.
3. Ping the Ethernet Switch: **`ping 10.10.10.2`**
4. Ping the BSC: **`ping 10.10.10.10`**
5. Ping BTS1: **`ping 10.10.10.20`**

Resolve any connectivity problems you find. Refer to Example: A Successful Ping and Example: An Unsuccessful Ping.

Example: A Successful Ping

```
H:\>ping 10.10.10.2

Pinging 10.10.10.2 with 32 bytes of data:
Reply from 10.10.10.2: bytes=32 time<1ms TTL=128
Reply from 10.10.10.2: bytes=32 time<1ms TTL=128
Reply from 10.10.10.2: bytes=32 time<1ms TTL=128
Reply from 10.10.10.2: bytes=32 time<1ms TTL=128

Ping statistics for 10.10.10.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

Example: An Unsuccessful Ping

```
H:\>ping 10.10.10.2

Pinging 10.10.10.2 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.10.10.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

Configuring the Ethernet Switch

To configure the Ethernet switch:

1 Set up the serial connection from the Test PC to the Ethernet Switch as shown in Figure 32.

2 Configure the IP settings using the Ethernet Switch commands prompt or its http interface.

Figure 32 Setting Up the Serial Connection to the Ethernet Switch

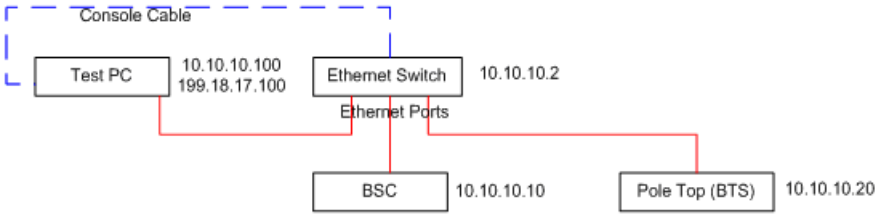


Table 22 Element Serial Configuration

Device	BPS	Bits/char	Stop Bit	Parity Bit
Switch	Lenovo: 38400 Cisco: 9600	8	None	1
BSC	38400	8	None	1
Pole Top (1xBTS)	38400	8	None	1

Changing the IP Address of the Ethernet Switch

Refer to Example: Changing the IP Address of the Ethernet Switch.

1 From the `Switch>` prompt, enter **`en`**.

2 For `password:`, enter **`tel os`**.

3 Enter **`ip address <new_address> <new_subnetmask>`**

If the switch responds with set ip addr error, follow the steps in Resetting to Factory Defaults.

4 Enter **`ip gateway <gateway_address>`**

5 Check the configuration: enter **`show switch`**.

6 Enter **`save`**.

7 Enter **`exit`**.

Example: Changing the IP Address of the Ethernet Switch

```
Switch> en
 password: tel os
Switch# ip address 199.18.17.2 255.255.255.0
Switch# ip gateway 199.18.17.1
Switch# save
Switch# show switch
  Ip Address       : 199.18.17.2
  Subnet Mask      : 255.255.255.0
  Default Gateway  : 199.18.17.1
  MAC Address      : 00:09:ca:14:94:10
  Spanning Tree    : Disable
  IGMP Snooping    : Disable
Switch# exit
Switch> <exit>
```

Optionally, the IP address of the Ethernet Switch through its http interface can be changed. Open a web browser and enter the URL http://10.10.10.2.

Resetting to Factory Defaults

Perform these steps only if the Ethernet Switch responds with `set ip addr error`.

1. From the `Switch#`, type **`reset factory`**.
2. When asked to continue, enter **`y`**.

   The switch resets.
3. Check whether the password is set up: enter **`en`**.
   - If `password:` appears, the password is set up correctly.
   - If `Switch#` appears, do the following:

   a Enter **`password`**.

   b At `new password:`, enter **`tel os`**.

   c At `re-type password:`, enter **`tel os`**.

Configure the BSC

Telnet to the BSC and edit its configuration files.

1. Connect serial cable from PC to breaker out box #2
2. Open up Hyper-terminal with Macro Pole Mount BTS setting
3. Telnet to the new BSC address.
4. Log in as **`target`**, password **`target`**.
5. Switch to root user: **`su root`**, password **`tel os`**.
6. Enter **`cd /etc`**.
7. Enter **`cp bsc1.cfg bsc1.cfg.bak`**.
8. Enter **`chmod 666 bsc1.cfg`**.
9. Start a web browser and enter **http://<new_bsc_address>**.
10. Log in as **icell**, password **icell**.

11 From the http interface to the BSC, click **cdma1x** | **interfaces** | **sntp** | **sntpServerIp**. Change Value to a BTS IP address, then click **Set**.

12 Click **Commands** | **commandSaveAndRestart**. Select **action**, then click **Set**.

13 Telnet to the new BSC address.

14 Log in as **`target`**, password **`target`**.

15 Switch to root user: **`su root`**, password **`tel os`**.

16 Enter **`cd /etc`**.

17 Enter **`vi hosts`**. Change and add lines as necessary to list the new BSC and BTS addresses.

Example: Editing hosts

```
127.0.0.1       localhost.localdomain   localhost
199.18.17.10    yourbsc1
199.18.17.20    yourbts1
199.18.17.21    yourbts2
...
```

18 Enter **`cd /sbin`**.

19 Enter **`./init q`**.

Configure the BTS

To configure the BTS:

1 Set up the serial connection to the BTS.

2 Configure the IP settings using the BTS command prompt and the http interface.

3 Repeat steps one and two for each additional BTS.

Configuring the Serial Connection to the BTS

1 Enter **`bootChange`**. The `boot device` line is revealed. Press Enter to reveal each line. To change a line, type the new value to the right of the current value, as shown in Example: The bootChange Command.

Example: The bootChange Command

```
-> bootChange

'.' = clear field;  '-' = go to previous field;  ^D = quit

boot device          : motfcc0 <Enter>
processor number     : 0 <Enter>
host name            : mars yourbts1 <Enter>
file name            : bin/vxw_imb_gnu29.st <Enter>
inet on ethernet (e) : 172.25.10.20 199.18.17.20:ffffff00 <Enter>
inet on backplane (b): <Enter>
host inet (h)        : 10.10.10.10 199.18.17.10 <Enter>
gateway inet (g)     : 10.10.10.1 199.18.17.1 <Enter>
user (u)             : icell target <Enter>
ftp password (pw) (blank = use rsh): target <Enter>
flags (f)            : 0x0 <Enter>
target name (tn)     : bts1 <Enter>
startup script (s)   : bin/icellstp1x.txt.org <Enter>
other (o)            : <Enter>
value = 0 = 0x0
 -> bts1xReset
Attaching to TFFS (0,0,/tffs0/) ... done.
```

2 After the bootChange is complete, enter **`bts1xReset`**.

3 Start a web browser and enter **http://<new_bts1_address>**.

4 Log in as **icell**, password **icell access**.

5 From the http interface to the BTS, click **cdma1x** | **interfaces** | **aBis** | **bscListTable** | **bscAddress**. Change Value to the BSC IP address, then click **Set**.

6 Click **Commands** | **commandSaveAndRestart**. Select **action**, then click **Set**.

Performing Ping Test 2

Ping each of the network elements on your network.

1 From the Test PC, click **Start** | **Run**.

2 Enter **cmd**.

3 Ping the Ethernet Switch: **`ping <new_switch_address>`**

4 Ping the BSC: **`ping <new_bsc_address>`**

5 Ping BTS1: **`ping <new_bts1_address>`**

6 Resolve any connectivity problems.

Remember to change the IP address of the Test PC back to the value it had at the start of this chapter.

Configuring the Macro Pole Mount BTS GPS

Enabling the GPS Feature on the BTS.

1 Connect to Management information Base (MIB).

2 Select **cdma1x** and click **hw,** then **gpsPeripheral, and gpsConnectedIndicator.**

3 Select **gpsConnected,** and Click the **Set** Button.

4 Again, select **cdma1x,** then select **debugInfo**, then **perform1PPSsynchronization**.

5 Choose **enabled** and click the **Set** button.

6 Again, select **cdma1x**, then select **hw**, then select **selPP1Sinput**.

7 Choose **coax** and click the **Set** button.

8 Again select **cdma1x**, then select **interfaces**, then select **sntp**, then **sntpServerIp.**

9 Enter **0.0.0.0** and click the **Set** button.

10 Select **hw, gpsPeripheral, gpsConfiguration, and gpsModule.**

11 Choose **resolutionT** and click the **Set** button.

12 Select **hw, gpsPeripheral, gpsConfiguration, and gpsConnectionType**

13 Choose **RS-485** and click the **Set** button.

14 Select **hw, gpsPeripheral, gpsConfiguration, and gpsModuleSector.**

15 Choose **1** and press the **Set** button.

16 Select **Commands** then **commandSaveAndRestart** and then click the **Set** button to save and restart.

Confirming the External GPS Feature is Enabled

To confirm that the external GPS feature is enabled:

1 Check that the **btsOperational** state is enabled.

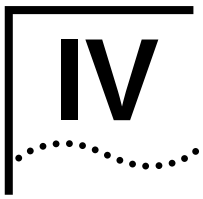
2 Select **cdma1x**, then **hw**, then **gpsPeripheral** then, **gpsSatellitesPowerLevelTable** and verify that at least one Satellite-Signal Strength is greater than 100.

3 Select **cdma1x**, then **hw**, then **gpsPeripheral** and verify that **gpsMode** is Normal.

4 Select **cdma1x**, then **hw**, then **gpsPeripheral** and verify that the gpsLatitude is correct.

5 Select **cdma1x**, then **hw**, then **gpsPeripheral** and verify that the gpsLongitude is correct.

6 Select **cdma1x**, then **hw**, then **gpsPeripheral** and verify that the gpsAltitude is correct.



VERIFICATION AND INTEGRATION

7 INSTALLATION VERIFICATION

About This Chapter

This chapter describes the verification and network integration for the Macro Pole Mount BTS.

This chapter includes:

- Verifying BSS Connectivity

Verifying BSS Connectivity

This section includes:

- Verifying Connectivity
- Loopback Testing

Verifying Connectivity

This section includes:

- Ping BSS Components

Ping BSS Components

Test the IP connectivity between BSS components by using the `ping` command.

The Ethernet cable between the test client and the Ethernet switch should still be attached. If the cable is not connected, refer to Configuring the Serial Connection to the BTS on page 89.

To ping the BSS components:

1 Ping each BSS component in turn and verify that it is reachable. BSS components are listed in Table 23.

Table 23 BSS Components

BSS Component	IP Address
Ethernet Switch	<Site-Specific>
BTS	<Site-Specific>
BSC	<Site-Specific>

If any one of the BSS components is not reachable with the site-specific IP address, use a serial connection to check the IP addresses on the unreachable component.

Loopback Testing

This section includes:

- Configuring BSC Loopback
- Configuring a Test Sector
- Testing Voice Capability
- Verifying Test Call Phone Set Parameters

Configuring BSC Loopback

Configure the BSC for diagnostic loopback testing. In a loopback test the BTS sends a signal to the BSC and receives the returned signal after it passes through the network. The sent signal is a voice call.

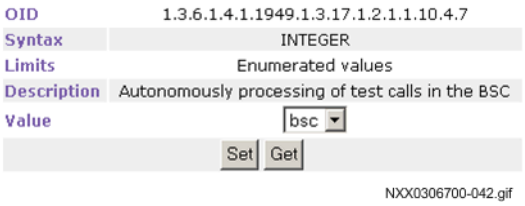
Loopback testing will test the integrity of the transmission network and the inter-operability of the BTS and BSC. No MSC connection is needed for loopback testing.

The Ethernet cable between the test client and the Ethernet switch should still be connected.

To configure loopback parameters on the BSC:

1. Open the BSC Element Manager.
2. Click **cdma1x**, **performance**, **testCalls** and then **testCallEndPoint**. The page shown in Figure 33 appears.

Figure 33 Test Call End Point Configuration



3. Select **bsc** from the dropdown menu and click **Set**.
4. Click **cdma1x**, **interfaces**, **ios**, and then **msclp**.
5. Enter an IP address of `0.0.0.0` and then click **Set**.
6. Click **cdma1x**, **cdma**, **cdmaSystemInfo**.
7. Configure the parameters listed in Table 24.

8 Keep the BSC Element Manager open.

Table 24 BSC Loopback Parameters

Parameter	Description
sid	System Identification
nid	Network Identification
mcc	Mobile Country Code

To configure loopback parameters on the BTS:

1 Open the BTS Element Manager.

2 Click **cdma1x**, **cdma**, **cdmaSectorInfo** and then **sectorInfoTable**.

3 Click the value next to s**ectorCdmaFreq** for the sector being tested, enter a CDMA frequency, and then click **Set**.

4 Keep the BTS Element Manager open.

Configuring a Test Sector

Table 25 BTS Loopback Parameters

Parameter	Description
sid	System Identification
nid	Network Identification
Sector CDMA FREQ	Frequency assignment
Sector EXT CDMA FREQ	Extended frequency assignment

Test a single sector in the BTS by locking the other BTS sectors. All BTS sectors should currently be unlocked.

To configure a test sector:

1 Open the BTS Element Manager, if not already connected.

2 Click **cdma1x**, **cdma**, **cdmaSectorInfo**, and then **sectorInfoTable**.

3 Lock the sectors not being tested.

Testing Voice Capability

Completing a voice call will test the loopback. Before a voice call can be completed, the BSC and BTS must be configured for loopback, the mobile and test client must be connected, and the phone set software must be installed and configured with the site-specific configuration values.

To test voice capability:

1 Dial any number of digits on the mobile and then press **Send**.

2 Speak into the mobile, and confirm that your voice is audible.

3 Terminate the call.

Verifying Test Call Phone Set Parameters

Verify the loopback test call parameters in the BSC using the BSC Element Manager.

To verify test call phone set parameters:

1 Connect to the BSC Element Manager.

2 Click **cdma1x**, **performance**, **testCalls**, and then **testCallInfoTable**. The **testCallInfoTable** displays details about test calls received by the BSC.

3 Confirm that a test call exists with the parameter values shown in Table 26.

Table 26 Successful Test Call Parameter Values

Parameter	Value
testCallImsi	IMSI of the mobile used in loopback test call.
testCallServiceOption	`evrcEchoSo3`
testCallActivation	`activeTestCall`
testCallStatus	`testCallActive`
testCallOrigination	`mobileOriginated`
testCallMuxOption	`1`
testCallTxRate	`fullRate`

4 Keep the BSC Element Manager open.

8 NETWORK INTEGRATION

About This Chapter

This chapter describes network integration for the Macro Pole Mount BTS.

This chapter includes:

Core Network Integration

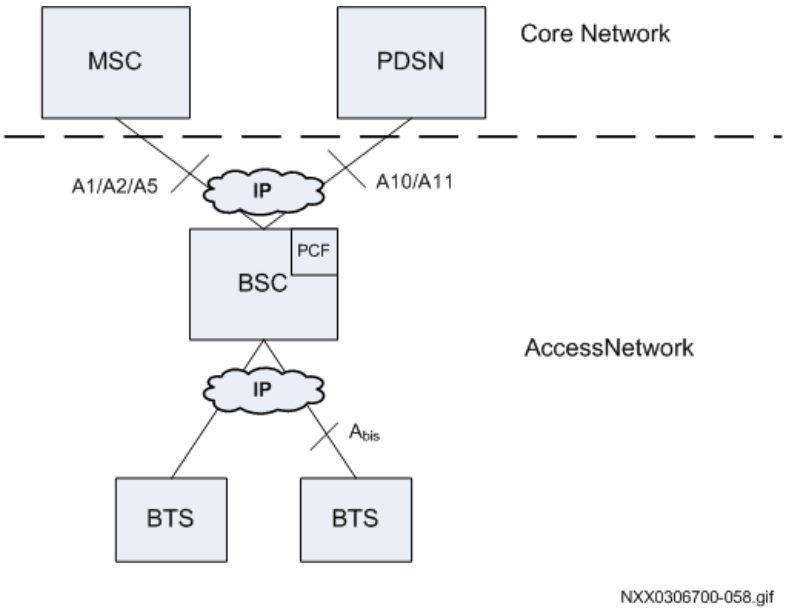
This section includes:

About Core Network Integration

The Access Network (Macro Pole Mount BTS) needs access to the Core Network (MSC, PDSN) to provide meaningful services, such as voice and data services.

Figure 34 shows the relationship between the Access Network and the Core Network.

Figure 34 Access Network and Core Network



The connection to both the MSC and PDSN is through a private IP network. The MSC and PDSN do not need to be reachable to provision the BSC with the Core Network connection details, but they must be reachable to perform any integration testing and to provide services.

The private IP network should already be established (refer to Existing Core IP Network Requirements on page 28).

Integrate the BSS into the Core Network during periods of low user traffic.

MSC Integration

This section includes:

- Connecting to MSC
- Checking Service Status

Connecting to MSC

The BSS needs to be connected to the MSC private IP network.

To connect to the MSC:

1. Connect the Ethernet cable-end from the MSC private IP network to the Ethernet switch on the Macro Pole Mount BTS.
2. Telnet to the MSC.
   Use the connection information gathered in Core Network IP Addresses and Password and Username Assignment.

3 The MSC prompt (`msc >`) should be available.
Keep the `telnet` session open.

Checking Service Status

1 Use the Command Line Interface (CLI) on the MSC to check the MSC service status with the following commands:

- `meg_dump`
- `meg_res_dump`
- `vsm_dump`
- `csi_dump`

These commands can be intensive users of MSC resources. The following procedure should be done only with the knowledge of MSC Administrator and preferably during low traffic periods.

To check service status:

1 Check the BSC is in service.

```
msc > meg_dump -l
```

Confirm that the `SVC_STATE` for the BSC shows `INS`, as shown in **bold** in Example: meg_dump Output.

2 Check Media Gateway resources.

```
msc > meg_res_dump -C
```

Confirm that the `state` of the BSC (treated as a Gateway by the MSC and identified by the BSC IP address) shows `INS`, as shown in **bold** in Example: meg_res_dump Output.

3 Check the VSM subsystem.

```
msc > vsm_dump
```

Confirm that the Virtual Switch Machine (VSM) dump shows ports `1000 -1004` as `INSERVICE`, as shown in **bold** in Example: vsm_dump Output.

4 Check the CSI subsystem.

```
msc > csi_dump
```

Confirm that Call Processing (CSI) dump shows `SSN inservice=TRUE IN SYNC with BSC`, as shown in **bold** in Example: csi_dump Output.

Example: meg_dump Output

```
msc > meg_dump -l

ID   GATEWAY_NAME      SVC_STATE       AUDIT_REPLIED      GATEWAY_SYNCED     AUD_TID
== ============ ========= ============= ============== ================================
 1     bsc1             INS                  1                  1              7506

 2     mg1              INS                  1                  1              7507
```

Example: meg_res_dump Output

```
msc > meg_res_dump -C

                      MEG MGCP RESOURCE TABLE

res_id  port gwid call_id state             term            cp_state
====== ===== ==== ======= ===== ========================== ==========
    0   1000    1       0 INS                  1@10.10.1.10       IDLE
    1   1001    1       0 INS                  2@10.10.1.10       IDLE
    2   1002    1       0 INS                  3@10.10.1.10       IDLE
    3   1003    1       0 INS                  4@10.10.1.10       IDLE
    4   1004    1       0 INS                  5@10.10.1.10       IDLE
...
   25   1025    1       0 INS                 26@10.10.1.10       IDLE
   26   1026    1       0 INS                 27@10.10.1.10       IDLE
   27   1027    1       0 INS                 28@10.10.1.10       IDLE
   28   1028    1       0 INS                 29@10.10.1.10       IDLE
   29   1029    1       0 INS                 30@10.10.1.10       IDLE
...
   72   3019    2       0 INS              ds/tr0/20@sprmg1       IDLE
   73   3020    2       0 INS              ds/tr0/21@sprmg1       IDLE
   74   3021    2       0 INS              ds/tr0/22@sprmg1       IDLE
   75   3022    2       0 INS              ds/tr0/23@sprmg1       IDLE
   *** Total number of MGCP resource is 106 ***
```

Example: vsm_dump Output

```
msc > vsm_dump

  Port   CP State       Service State Media State Ans Feat Group
====== =============== ============= =========== === ==== =====
  1000            NULL     INSERVICE         INS   0    1     1
  1001            NULL     INSERVICE         INS   0    0     1
  1002            NULL     INSERVICE         INS   0    5     1
  1003            NULL     INSERVICE         INS   0    1     1
  1004            NULL     INSERVICE         INS   0    0     1
...
  3000            NULL     INSERVICE         INS   0    5     3
  3001            NULL     INSERVICE         INS   0    0     3
  3002            NULL     INSERVICE         INS   0    0     3
  3003            NULL     INSERVICE         INS   0    0     3
  3004            NULL     INSERVICE         INS   0    0     3
```

Example: csi_dump Output

```
msc > csi_dump -Z

(1)  BSC=1  default_lac=1  SSN inservice=TRUE  IN SYNC with BSC
        AIF_codec=IOS4  AIF_msgflow=IOS  AIR_type=IS95
        srvc_option=3  speech_type=8kb Enhanced
        msc_idx=1  sms_page_max=80
        SCCP Type=GAP  (hostname=bsc1)  (qos.ret_on_err=NONE)
        usap=1  psap=1  bound=TRUE

DAD ANSI, route using SSN, address indicator is NATL
        SSN: 252 PC: 000.000.000
        Global Title is not present.

SAD ANSI, route using SSN, address indicator is NATL
        SSN: 252 PC: 000.000.001
        Global Title is not present.
```

If all of the MSC diagnostics show the BSC to be 'in service,' keep the MSC Telnet connection and go to MSC Integration Verification.

MSC Integration Verification

This section includes:

- Checking Mobile Registration in the VLR

Checking Mobile Registration in the VLR

The VLR is a logical Network Element in the wireless Core Network, and is integrated into the MSC. Mobiles that attempt to register in the network will generate a query to the VLR. Use a mobile to confirm that it can register in the network.

All of the BTS sectors were unlocked when the BTS was powered on (refer to Bringing the Macro Pole Mount BTS into Service on page 71). The sector where the mobile is located should remain unlocked, but the other sectors should be locked.

The registration of the mobile in the VLR is checked using the Command Line Interface (CLI) on the MSC. The following commands are used:

- `vlr_dump`

To check mobile registration in the VLR:

1. Open the BTS Element Manager.
2. Lock the 2 non-test BTS sectors.
   Refer to BTS Sector Table on page 77.
3. Power on the test mobile.
4. Check if the mobile is registered in the VLR.
   `msc > vlr_dump -s`
   Confirm that MIN, IMSI, or ESN is displayed in the dump, as shown in **bold** in Example: vlr_dump Output.
5. If the MSC is handling traffic and the VLR dump output is verbose then search for the mobile identity.
   `msc > vlr_dump -s | grep <MIN | IMSI | ESN search string>`
   Where `<MIN | IMSI | ESN search string>` is the MIN, IMSI, or ESN of the test mobile.

If the Core Network has a PDSN and the BSC was configured for a PDSN, go to PDSN Integration on page 105.

Otherwise, go to Making Test Calls on page 106 to begin making test calls to verify the network functionality.

Example: vlr_dump Output

```
msc > vlr_dump -s

VISITOR LOCATION REGISTER
=========================================================

MIN=7191234524 IMSI=XXXX ESN=0xFEE331E4
CARR_D=                DEST_D=000000000000000
MDN=464524          PIN=                VMB=000000000000000
HAVE_PROFILE=TRUE AUTH_DENY=0 OIND=7 GROUP=0 TERM_RESTRICT=2
CFU=2 CFB=2 CFNA=2 CW=2 TWC=2 CD=3 CNIP1=1 CNIR=1 CNIR_OVERRIDE=1
ORIG_TRIG=0x00000000 MSG_WAIT_TYPE=0x00 MSG_WAIT_CNT=255 255 255 255 255 255
DMH_BILL_D=000000000000000
TAL_DEST=(TYP=0 ADDR=0 0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0)
TAL_TRIGS=0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 ...
HO=0 VMW=0 status=0x0 party=0 lai=1 expiry=INDEFINITE
ACTV=TRUE ACCESS=Fri Jun 10 02:27:12 2005
SMS_ADDR nature=49 plan=13 encoding=3 bcd_digit=4 addr=0x35080000
SMS_ORIG_REST default=0 direct=0 force_message_center=0
SMS_TERM_REST default=0 reverse_charges=0
SMSDPF=0

MIN=6191234511 IMSI= ESN=0xFE3A2FD3
CARR_D=                DEST_D=000000000000000
MDN=464511          PIN=                VMB=000000000000000
HAVE_PROFILE=TRUE AUTH_DENY=0 OIND=7 GROUP=0 TERM_RESTRICT=2
CFU=2 CFB=2 CFNA=2 CW=2 TWC=2 CD=3 CNIP1=1 CNIR=1 CNIR_OVERRIDE=1
ORIG_TRIG=0x00000000 MSG_WAIT_TYPE=0x00 MSG_WAIT_CNT=255 255 255 255 255 255
DMH_BILL_D=000000000000000
TAL_DEST=(TYP=0 ADDR=0 0.0.0.0.0.0.0.0.0.0.0.0.0.0.0.0)
TAL_TRIGS=0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 ...
HO=0 VMW=0 status=0x0 party=0 lai=1 expiry=INDEFINITE
ACTV=TRUE ACCESS=Fri Jun 10 02:26:56 2005
SMS_ADDR nature=49 plan=13 encoding=3 bcd_digit=4 addr=0x35080000
SMS_ORIG_REST default=0 direct=0 force_message_center=0
SMS_TERM_REST default=0 reverse_charges=0
SMSDPF=0
```

PDSN Integration

This section includes:

Connecting to the PDSN

The BSS must be connected to the PDSN private IP network.

To connect to the PDSN:

1. Connect the Ethernet cable end from the PDSN private IP network to the Ethernet switch on the Macro Pole Mount BTS.
2. Telnet to the PDSN.
   Use the connection information gathered in Core Network IP Addresses and Password and Username Assignment.

Making Test Calls

This section includes:

- Before Making Test Calls
- Making Voice Test Calls
- Making Data Test Calls

Before Making Test Calls

A voice test call and a data test call (if applicable) are made to verify the integration. The 2 mobiles must have a subscriber profile in the HLR (voice calls) and the AAA (data calls) for the test calls to succeed.

The Operator (NOC personnel) should have provisioned the test mobiles in the respective HLR and/or PDSN as part of the prerequisites phase (refer to Recommended Test Equipment on page 25).

This guide does not describe how to provision a subscriber in the HLR or in the AAA server.

Making Voice Test Calls

A mobile-to-mobile call tests the MSC part of Core Network integration.

To make a voice test call:

1. Power on both test mobiles.
2. Confirm that a call can be originated and terminated from each test mobile to the other.

Making Data Test Calls

A data call tests the PDSN part of Core Network integration. A data call can be as simple as accessing any Web page on the Internet. The Audiovox test phone (any many other CDMA2000 phones) has a quick Web access button.

To make a data test call:

1. Select a test mobile and press the quick Web access button.
2. A Web page should be loaded in the phone.

If the voice and data (if applicable) test calls are successful, then the installation, configuration, and Core Network integration of the Macro Pole Mount BTS is complete.

If additional BTS need to be provisioned in the Macro Pole Mount BTS go to Provisioning Additional BTS.

Provisioning Additional BTS

This section includes:

About Additional BTS

The initial Macro Pole Mount BTS configuration has a single BTS that supports one FA. Other configurations add additional BTS units for increased capacity.

This guide does not describe how to add physical Macro Pole Mount BTS and supporting hardware to an existing Macro Pole Mount BTS configuration (hardware expansion). Please refer to the *Macro Pole Mount BTS Operations and Maintenance Guide* for hardware upgrade procedures.

The MSC Server will be provisioned for the particular Macro Pole Mount BTS configuration.

Provisioning Additional BTS describes how to provision additional BTS after the initial BSC and BTS have been configured. Provision each additional BTS in turn, bringing each one into service before adding the next BTS.

Provisioning Additional BTS

This section includes:

Provisioning BTS in MSC

The additional BTS need to be provisioned in the MSC. This guide does not describe how to provision the MSC. Refer to '*Adding and Removing Base Station Subsystems*' in the *MSC Server Provisioning Guide* (D00620) for details on how to provision additional BTS in the MSC.

Configuring Additional BTS

Configure each additional BTS with the same configuration as the first BTS, except for the following:

1. Amend the BTS1-specific names and addresses for the new BTS.
2. Use the first (initial) BTS as the SNTP server for all additional BTS.

Follow all of the procedures in Configure the BSC on page 89 to configure each additional BTS.

Reloading Additional BTS

Reload each BTS after it is configured.

Verifying BSS Operational State

1. Verify the operational state of the BSC and newly provisioned BTS. Refer to Configure the BTS on page 89.
2. Check the operational state of the BSC and all BTS again after all of the BTS have been provisioned.

Performing Loopback Testing

Perform loopback testing on the new each new BTS (the BSC will also have to be configured for the loopback test).

Making Test Calls

Make test calls from each a sector in each new BTS to test network functionality.

No further testing or verification of new BTS is required.

CDMA2000 Parameter Configuration

This section includes:

- About Factory CDMA2000 Parameter Settings
- Configuring CDMA2000 Parameters

About Factory CDMA2000 Parameter Settings

The CDMA2000 Access Network is configured using CDMA2000 parameters. Some parameters are configured on the BSC and some are configured on the BTS. The Macro Pole Mount BTS comes with a sample CDMA2000 parameter configuration (`bsc1.cfg` for the BSC and `bts1.cfg` for the BTS). Additional sample configuration files are also provided for multiple FA configurations.

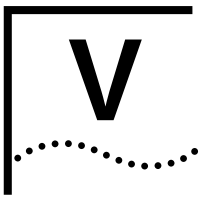
The factory default CDMA2000 configuration was deployed during initial configuration. (Refer to Configure the BSC and Configure the BTS). The installation verification and Core Network integration was performed using factory default CDMA2000 parameter values.

Configuring CDMA2000 Parameters

CDMA2000 parameters are configured using the BSC and BTS Element Managers. The parameters values are specific for each site, and the Network Planning document (site engineering specification) will provide the parameters values for the BSC and BTS for a given site.

This document does not describe how to configure the CDMA2000 parameters for a Macro Pole Mount BTS site. Refer to the *iCell BSS Parameter*

Configuration Reference for further information on CDMA2000 parameters (refer to Related Documentation on page 17).



APPENDICES

A

TEST CLIENT CONFIGURATION

About This Appendix

This appendix includes:

- Configuring Test Client
- Setting Up Installation Directory
- Installing and Configuring Other Software
- Connecting Test Client to BSS Components

Configuring Test Client

This section includes:

- Configure Test Client IP Address
- Configuring Serial Connection Settings

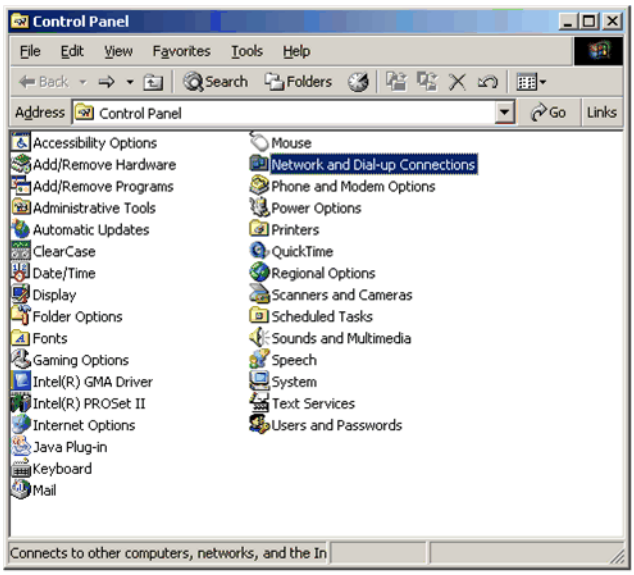
Configure Test Client IP Address

The test client (usually a laptop PC) must be on the same subnet as the Network Elements that are being configured.

To configure the IP address:

1 Click **Start**, and select **Settings**, and then click **Control Panel**. The window shown in Figure 35 appears.

Figure 35 Control Panel

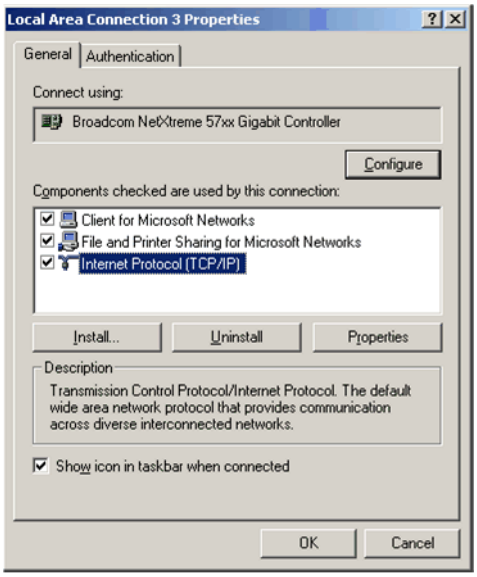


NXX0306700-011.gif

2 Double-click **Network and Dial-up Connections**.

3 In the Network and Dial-up Connections window, right-click **Local Area Connection** and click **Properties**.
The **Local Area Connection Properties** dialog box appears, as shown in Figure 36.

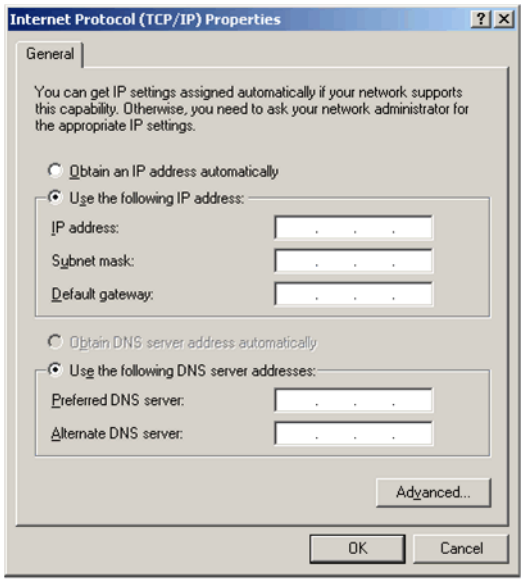
Figure 36 LAN Connection Properties



NXX0306700-012.gif

4 Select **Internet Protocol (TCP/IP)** and click **Properties**.
The **Internet Protocol (TCP/IP)** dialog box appears, as shown in Figure 37.

Figure 37 TCP/IP Properties



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5 Select **Use the following IP address** and enter the values listed in Table 27.

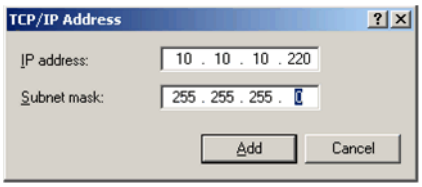
Table 27 Test Client IP Addressing

Parameter	Value
IP address 1	
Subnet mask 1	
Default gateway 1	
IP address 2	
Subnet mask 2	
Default gateway 2	

6 In the **Internet Protocol (TCP/IP)** dialog box, click **Advanced**.
The **Advanced TCP/IP Settings** dialog box appears.

7 In the **IP addresses** pane, click **Add**.
The dialog box shown in Figure 38 appears.

Figure 38 Secondary IP Address



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8 Add the secondary IP address and click **Add**.

9 Exit back to **Network and Dial-up Connections** and then close it.

The test client now has the IP addresses required to connect to the BSC, BTS, and Ethernet switch.

Configuring Serial Connection Settings

Portions of the installation and configuration process require a serial connection. Use a serial client to create a serial connection

1 Configure the COM1 port settings according to Table 28.

Table 28 COM1 Port Configuration Values

Parameter	Value
Bits per second	38400
Data bits	8
Parity	None
Stop bits	1
Flow control	None

This serial connection can be used for the elements listed in Table 29.

Table 29 Serial Connection Baud Rates

Network Element	Bits per Second (Baud Rate)
Ethernet Switch	38400
BSC	38400
BTS	38400

Setting Up Installation Directory

This section includes:

- About Tools CD ROM
- Setting up Install Directory

About Tools CD ROM

The tools CD ROM contains all of the software tools needed to install, configure, and test the Macro Pole Mount BTS. Refer to Tools CD ROM on page 27 for more information on the tools CD ROM.

Setting up Install Directory

Setup an installation directory on the test client.

To setup install directory:

1. Create a new `\install` directory under the root directory of the `C:` drive.
2. Insert the tools CD ROM into the test client.
3. Copy the contents of the tools CD ROM to the `C:\install` directory.
4. Remove the tools CD ROM from the test client and store it safely.

Installation, configuration, and verification procedures will reference this install path.

Installing and Configuring Other Software

This section includes:

- SSH Telnet Client

SSH Telnet Client

This section includes:

- Installing SSH Telnet Client
- Configuring SSH Telnet Client

Installing SSH Telnet Client

PuTTY is used as a Telnet client to access the BSC, and BTS. PuTTY is a free implementation of Telnet and SSH for Win32 and Unix platforms, and includes an xterm terminal emulator.

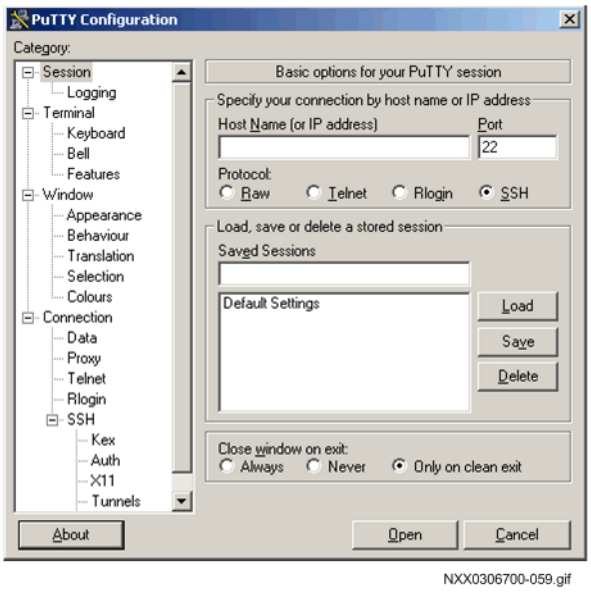
The following procedure assumes the contents of the tools CD ROM was copied to the local drive as described in Setting up Install Directory on page 118.

To Install SSH Telnet client:

1 Navigate to `C:\install\bss\support\telnet`.

2 Execute `putty.exe`.
The PuTTy application opens, as shown in Figure 39

Figure 39 PuTTY Application



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Configuring SSH Telnet Client

No additional configuration of PuTTY is required. Further configuration is optional. Click **About** > **Visit Web Site** to view the documentation.

Connecting Test Client to BSS Components

A connection to BSS components is required throughout various installation, configuration, and verification procedures. This section provides the details for how to connect to the BSS components. Both a serial connection and Ethernet connection are described for each BSS component.

This section includes:

- Serial Connections
- Connecting to Ethernet Switch
- Connecting to Element Managers

Serial Connections

A serial connection can be used for most installation, configuration, and verification activities. A serial connection is used to connect with the Ethernet switch, BSC, and BTS.

A standard serial cable with DB-9 connectors is used to connect the test client and BSS components. HyperTerminal is used as the serial client (refer to Configuring Serial Connection Settings on page 117 for details on configuring HyperTerminal).

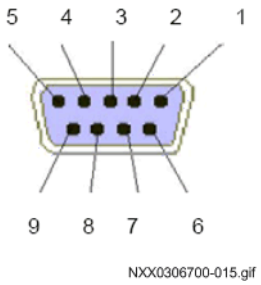
Serial Cable

Table 30 shows the pinouts for the serial cable and Figure 40 shows the DCE pinout on the switch.

Table 30 Serial Cable Pinouts

DCE DB-9 (Male) End	Pin	DTE DB-9 (Female) End
Received Line Signal Detect (DCD)	1	Received Line Signal Detect (DCD)
Received Data (RXD)	2	Transmitted Data (TXD)
Transmitted Data (TXD)	3	Received Data (RXD)
DTE Ready (DTR)	4	DTE Ready (DTR)
Signal Ground (SIG GND)	5	Signal Ground (SIG GND)
DCE Ready (DSR)	6	DCE Ready (DSR)
Request to Send (RTS)	7	Request to Send (RTS)
Clear to Send (CTS)	8	Clear to Send (CTS)
Ring Indicator (RI)	9	Ring Indicator (RI)

Figure 40 DCE Pinout on Switch (Female End)



Connecting to Ethernet Switch

This section includes:

- Ethernet Switch Serial Connection
- Ethernet Switch Ethernet Connection

Ethernet Switch Serial Connection

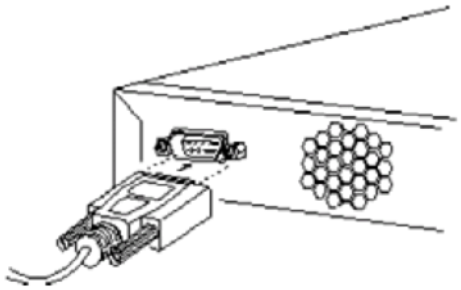
The test client should already be configured for both serial and Ethernet connections to the Ethernet switch (refer to Configuring Test Client on page 115).

To connect switch and test client serial cable:

1 Connect the male end of the DB-9 serial cable to the test client.

2 Connect the female end of the serial cable to the console port at the rear of the Ethernet switch.
Refer to Figure 41 for the location of the serial port.

Figure 41 Switch Serial Port Location



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3 Open HyperTerminal and press **Enter** a few times to get a prompt.

Ethernet Switch Ethernet Connection

An Ethernet cable is used to connect the test client and the switch. A standard cross-over Ethernet cable with 2 RJ-45 connector ends is required. The cable should be ~3M, depending on the site requirements.

Figure 42 shows the port numbering on the Ethernet switch.

Figure 42 Ethernet Switch Port Numbering

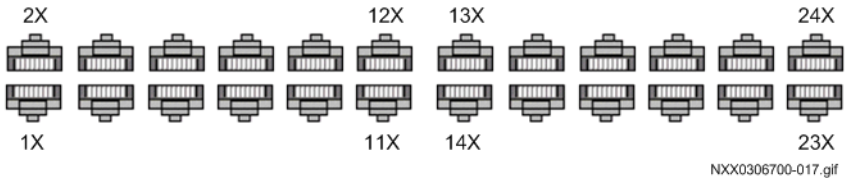

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Table 31 lists the ports assignments on the Ethernet switch.

Table 31 Ethernet Switch Port Assignments

Switch Port	Network Element
1X	BSS
3X	BTS
2X	Reversed

To connect test client and switch:

1. Connect one end of the Ethernet cable to the test client.
2. Connect the other end to port 13X on the Ethernet switch. Any open port will work.

IP Addressing Information

The Ethernet switch is configured as part of an overall IP network plan. Have the switch IP address information available before starting to configure the switch. The required IP information, and the factory defaults are listed in Table 32.

Table 32 Switch IP Address Information and Defaults

Site Specific Switch IP information	Factory Default
BTS	10.10.10.20
BSC	10.10.10.10
Switch IP Address	10.10.10.2
Subnet Mask	255.255.255.0
Default Gateway	10.10.10.1
Switch Password	tel os

Connecting to Element Managers

A connection to the BSC and BTS Element Managers is required throughout the installation, initial configuration, and installation verification phases. The Element Managers are browser-based HTTP interfaces.

The Element Managers present the Management information Base (MIB) for the BSC and BTS in a graphical format. Click the links to browse the MIB and GET and SET parameters values.

The Element Managers can be accessed after the Macro Pole Mount BTS has been powered on.

This section includes:

- Connecting to BSC Element Manager
- Connecting to BTS Element Manager

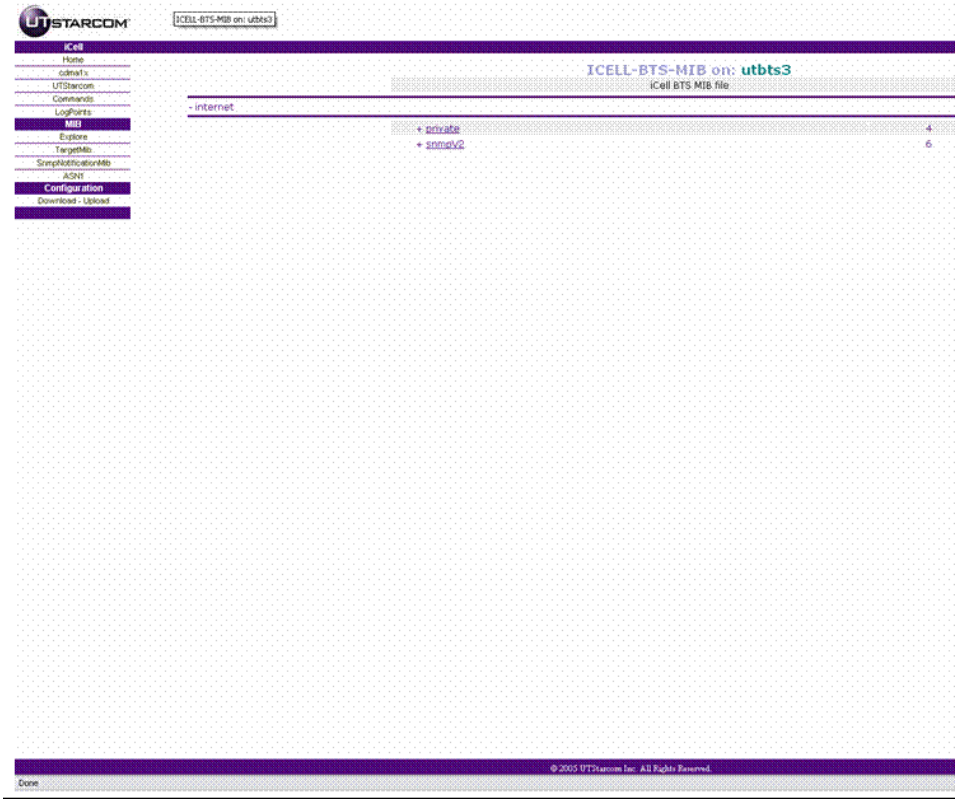
Connecting to BSC Element Manager

The BSC Element Manager is used to perform the Configuration Management tasks on the BSC. The configuration parameters for the BSC are under the cdma1x root.

To connect to BSC Element Manager:

1 Open a browser window and load the IP address of the BSC.
The BSC Element Manager interface is shown in Figure 43.

Figure 43 BSC Element Manager Interface



2 Click the links to navigate through the interface.

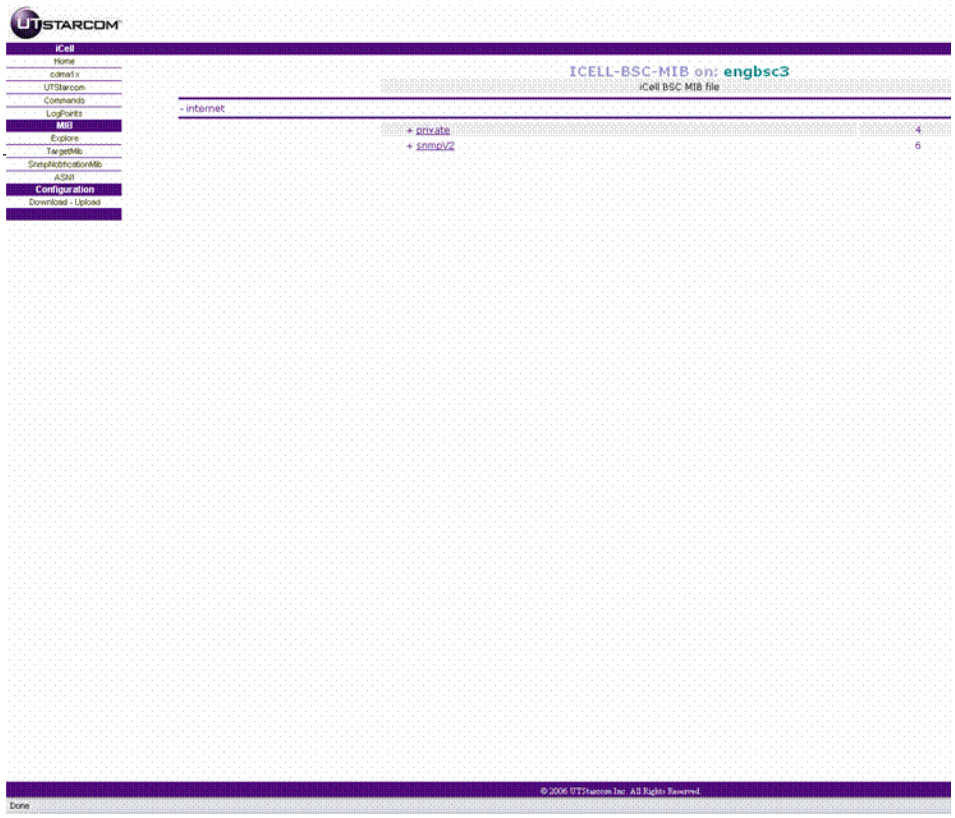
Connecting to BTS Element Manager

The BTS Element Manager is used to perform the Configuration Management tasks on the BTS. The configuration parameters for the BTS are under the cdma1x root.

To connect to BTS Element Manager:

1 Open a browser window and load the IP address of the BSC.
The BSC Element Manager interface is shown in Figure 44.

Figure 44 BTS Element Manager Interface



2 Click the links to navigate through the interface.

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