Technical Information

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1X SC 4812T LITE BTS OPTIMIZATION/ATP

Software Release R2.16.5.x

SC4812T LITE

CDMA2000 1X

PRELIMINARY

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Software Release 2.16.5.x

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Foreword

Scope of manual

This manual is intended for use by cellular telephone system craftspersons in the day-to-day operation of Motorola cellular system equipment and ancillary devices.

This manual is not intended to replace the system and equipment training offered by Motorola, although it can be used to supplement or enhance the knowledge gained through such training.

Obtaining manuals

To view, download, or order manuals (original or revised), visit the Motorola Lifecycles Customer web page at https://mynetworksupport.motorola.com/, or contact your Motorola account representative.

If Motorola changes the content of a manual after the original printing date, Motorola publishes a new version with the same part number but a different revision character.

Text conventions

The following special paragraphs are used in this manual to point out information that must be read. This information may be set-off from the surrounding text, but is always preceded by a bold title in capital letters. The four categories of these special paragraphs are:

NOTE

Presents additional, helpful, non-critical information that you can use.

IMPORTANT

Presents information to help you avoid an undesirable situation or provides additional information to help you understand a topic or concept.

CAUTION

Presents information to identify a situation in which damage to software, stored data, or equipment could occur, thus avoiding the damage.

WARNING

Presents information to warn you of a potentially hazardous situation in which there is a possibility of personal injury.

The following typographical conventions are used for the presentation of software information:

- In text, sans serif **BOLDFACE CAPITAL** characters (a type style without angular strokes: for example, SERIF versus SANS SERIF) are used to name a command.
- In text, `typewriter` style characters represent prompts and the system output as displayed on an operator terminal or printer.
- In command definitions, sans serif **boldface** characters represent those parts of the command string that must be entered exactly as shown and `typewriter` style characters represent command output responses as displayed on an operator terminal or printer.
- In the command format of the command definition, `typewriter` style characters represent the command parameters.

Reporting manual errors

To report a documentation error, call the CNRC (Customer Network Resolution Center) and provide the following information to enable CNRC to open an SR (Service Request):
– the document type
– the manual title, part number, and revision character
– the page number(s) with the error
– a detailed description of the error and if possible the proposed solution
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Contact us

Send questions and comments regarding user documentation to the email address below:
cdma.documentation@motorola.com

Motorola appreciates feedback from the users of our information.

Manual banner definitions

A banner (oversized text on the bottom of the page, for example, **PRELIMINARY**) indicates that some information contained in the manual is not yet approved for general customer use.

24-hour support service

If you have problems regarding the operation of your equipment, please contact the Customer Network Resolution Center (CNRC) for immediate assistance. The 24 hour telephone numbers are listed at https://mynetworksupport.motorola.com/. Select **Customer Network Resolution Center contact information.**

For additional CNRC contact information, contact your Motorola account representative.

Remember! . . . Safety depends on you!!

The following general safety precautions must be observed during all phases of operation, service, and repair of the equipment described in this manual. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the equipment. Motorola, Inc. assumes no liability for the customer's failure to comply with these requirements. The safety precautions listed below represent warnings of certain dangers of which we are aware. You, as the user of this product, should follow these warnings and all other safety precautions necessary for the safe operation of the equipment in your operating environment.

Ground the instrument

To minimize shock hazard, the equipment chassis and enclosure must be connected to an electrical ground. If the equipment is supplied with a three-conductor ac power cable, the power cable must be either plugged into an approved three-contact electrical outlet or used with a three-contact to two-contact adapter. The three-contact to two-contact adapter must have the grounding wire (green) firmly connected to an electrical ground (safety ground) at the power outlet. The power jack and mating plug of the power cable must meet International Electrotechnical Commission (IEC) safety standards.

NOTE

Refer to *Grounding Guideline for Cellular Radio Installations – 68P81150E62.*

Do not operate in an explosive atmosphere

Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment constitutes a definite safety hazard.

Keep away from live circuits

Operating personnel must:

- not remove equipment covers. Only Factory Authorized Service Personnel or other qualified maintenance personnel may remove equipment covers for internal subassembly, or component replacement, or any internal adjustment.
- not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed.
- always disconnect power and discharge circuits before touching them.

Do not service or adjust alone

Do not attempt internal service or adjustment, unless another person, capable of rendering first aid and resuscitation, is present.

Use caution when exposing or handling the CRT

Breakage of the Cathode–Ray Tube (CRT) causes a high-velocity scattering of glass fragments (implosion). To prevent CRT implosion, avoid rough handling or jarring of the equipment. The CRT should be handled only by qualified maintenance personnel, using approved safety mask and gloves.

Do not substitute parts or modify equipment

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification of equipment. Contact Motorola Warranty and Repair for service and repair to ensure that safety features are maintained.

Dangerous procedure warnings

Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed. You should also employ all other safety precautions that you deem necessary for the operation of the equipment in your operating environment.

WARNING

Dangerous voltages, capable of causing death, are present in this equipment. Use extreme caution when handling, testing, and adjusting.

Revision History

Manual Number

Manual Title

1X SC 4812T Lite BTS Optimization/ATP
Software Release 2.16.5.x

Version Information

The following table lists the manual version, date of version, and remarks on the version.

Version Level	Date of Issue	Remarks
A	SEP 2004	Released GA – Cloned from Release 2.16.3.x Manual
B	OCT 2004	Revised document format
C	FEB 2005	Extensive content rewrite and upgrade

Chapter 1: Introduction

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Manual Scope and Layout

This document provides information pertaining to the Optimization and Audit Tests of the Motorola 1X SC™ 4812T–Lite BTS frame. The following subjects are addressed: preliminary background information, Optimization and Alarm/Redundancy Tests, Acceptance Test Procedures (ATP) to verify Site Operation, Regulation Compliance, Site Turnover; and Troubleshooting.

This Optimization Procedure consists of a group of task-oriented tests. Each major test category (Audit, Initial Power–up, Calibration, etc.) is described in chapters that are broken down into multi-Page "Information Maps".

Each "Map" contains the information necessary to perform the test or operation. Included are all required Input Levels, Output Levels, Local Maintenance Facility (LMF) Application Software Commands, and Test Point Identification. Also described are important Test Process Concepts and Equipment Operation that should be understood by the operator. Whenever possible, graphics, flowcharts, or written examples complement the information or procedural Steps.

Assumptions and Prerequisites

This document assumes that the BTS Frames and cabling have been installed per the *1X SC 4812T–Lite BTS Hardware Installation* , 68P09262A57 that covers both the physical "bolt down" of the SC 4812T Lite BTS Frame and the specific Cabling Configurations.

Document Composition

This document covers the following major areas:

- **Introduction:** consists of preliminary background information (such as component and Sub–assembly locations and frame layouts) to be considered by the Cellular Field Engineer (CFE) before performing Optimization or ATP.
- **Preliminary Operations:** consists of Jumper Configuration of BTS Sub–assemblies, Pre–Power–up Tests, Initial Application of Electric Power to the BTS Equipment Frames, and Initial Power–up Tests.
- **Optimization/Calibration:** consists of procedures for downloading all BTS Processor Cards, Test Equipment Set–up, RF Path Verification, BLO Calibration and Calibration Audit, and Radio Frequency Diagnostic System (RFDS) Calibration.
- **Acceptance Test Procedures (ATP):** consists of automated ATP Tests, executed by the LMF, and used to verify all major Transmit (TX) and Receive (RX) Performance Characteristics on all BTS Equipment. This chapter also covers generating an ATP Report.
- **Prepare to Leave the Site:** discusses site turnover after the ATP is completed.

Optimization Manual Scope and Layout – continued

- **Basic Troubleshooting:** consists of procedures to perform when an ATP fails, as well as when incorrect results are obtained during Logon, Test Equipment Operation, Calibration, and Global Positioning System (GPS) Operation.
- **Appendices:**
  - Data Sheets for CFEs recording at the site
  - Pseudo–random Noise (PN) Offset Information
  - Optimization/ATP Matrix
  - BBX Gain Set Point vs BTS Output
  - CDMA Operating Frequency Programming Information
  - Manual Test Set–up Information
  - Downloading ROM and RAM Code
  - In–service Acceptance Test Procedures

Purpose of the Optimization

Why Optimize?

Proper Optimization and Calibration ensures that:

- Accurate Downlink RF Power Levels are transmitted from the site.
- Accurate Uplink Signal Strength Determinations are made by the site.

What Is Optimization?

Optimization compensates for the site-specific cabling and normal equipment variations. Site Optimization guarantees that the combined losses of the new cables. Also, the Gain/Loss characteristics and built-in tolerances of each BTS Frame do not accumulate and cause improper site operation.

What Happens During Optimization?

Overview

During Optimization, the accumulated Path Loss or Gain is first determined for each RF Transmit Path in the BTS. These Transmit Path Loss or Gain Values are then stored in a database along with RF Receive Path Default Values.

RF Path Definitions

For definitions of the BTS Transmit (TX) and Receive (RX) Paths, see "What is Bay Level Offset Calibration?" in the Bay Level Offset Calibration section of Chapter 3.

RF Paths and Transceiver Optimization

Six of the seven Broad Band Transceiver (BBX) Cards in each SCCP Cage are optimized to specific RX and TX Antenna Connectors. The seventh BBX Card acts in a redundant capacity for BBX Cards 1 through 6, and is optimized to *all* Antenna Connectors. A single Optimization Value is generated or each complete TX and RX Path. This eliminates the accumulation of error that would occur from individually measuring and summing the Gain and Loss of each element in the path.

Using RF Path Gain/Loss Values

BTS Equipment factors in the derived Optimization Values internally to adjust Transceiver Power Levels, leaving only site–specific Antenna Feedline Loss and Antenna Gain Characteristics to be factored in by the CFE when determining required site–specific Effective Radiated Power (ERP) Output Power Levels.

When to Optimize

New Installations

The following Operations and Optimization/Test Actions should be accomplished for a new BTS Site or for a new BTS Frame Installation at an existing BTS Site:

1. After the Initial Site Installation, it must be prepared for operation. This preparation includes verifying correct Hardware Installation, Initial Power–up, downloading of Operating Code, verifying GPS Operation, and verifying Transmit and Receive Paths.
2. Next, the Optimization is performed. Optimization includes Performance Verification and Calibration of all Transmit and Receive RF Paths, and download of accumulated Calibration Data.
3. A Calibration Audit of all RF Transmit Paths may be performed any time after Optimization to verify BTS Calibration.
4. After Optimization, a series of Manual Pre–Acceptance Test Procedure (ATP) Verification Tests are performed to verify Alarm and Redundancy Performance.
5. After Manual Pre–ATP Verification Tests, an ATP is performed to verify BTS performance. An ATP is also required to demonstrate regulation compliance before the site can be placed in service.

Site Expansion

Optimization is required after expansion of a site with additional BTS Frames.

Periodic Optimization

Periodic Optimization of a site may also be required, depending on the requirements of the overall system.

Repaired Sites

Refer to Appendix C for a detailed FRU Optimization/ATP Test Matrix outlining the minimum tests that must be performed *any time* a BTS RF Sub–assembly or Communications Cable associated with an RF Path is replaced.

Required Test Equipment and Software

Overview

Test Equipment and Software described in this section is required for the Optimization Procedure. Common assorted tools such as screwdrivers and frame Keys are also needed. Read the Owner's Manual for all of the Test Equipment to understand its individual operation before using the tools in the Optimization.

Policy

To ensure consistent, reliable, and repeatable Optimization Test Results, Test Equipment and Software meeting the following technical criteria should be used to optimize the BTS Equipment. Before beginning Optimization or Troubleshooting, make sure that the Test Equipment needed is on–hand and operating properly.

NOTE

Test Equipment can be substituted with other Test Equipment Models not supported by the LMF, ***but those models must meet the same technical specifications***.

It is the responsibility of the customer to account for any measurement variances and/or additional losses/inaccuracies that can be introduced as a result of these substitutions.

Test Equipment Calibration

Optimum system performance and capacity depend on regular equipment service and Calibration prior to BTS Optimization. Follow the Original Equipment Manufacturer (OEM) recommended Maintenance and Calibration Schedules closely.

Test Cable Calibration

Test Cables can make critical differences in Optimization accuracy. It is recommended that Cable Calibration be run at every BTS with the complete *Test Equipment Set*. This method compensates for Test Cable Insertion Loss within the Test Equipment itself. No other allowance for Test Cable Insertion Loss needs to be made during the performance of the tests.

Another method to account for Test Cable Insertion Loss is by entering it into the LMF during the Optimization Procedure. This method requires accurate Test Cable Characterization using Shop Test Equipment. Characterized Cables should be tagged with the Characterization Information, and the measured Signal Losses entered into the LMF before Field Optimization.

Required Test Equipment and Software – continued

Equipment Warm–up

After arriving at a site, Test Equipment should be plugged in and turned on immediately to provide the longest possible time for warm–up and sTabilization. The following pieces of Test Equipment must be warmed–up for *a minimum of 60 minutes* prior to use for BTS Optimization or RFDS Calibration:

- Communications Test Set
- Rubidium Time Base
- Power Meter

LMF Computer and Software

LMF Hardware Requirements

An LMF Computer Platform that meets the following requirements (or better) is recommended:

- Notebook Computer
- 266 MHz (32 bit CPU) Pentium Processor, or better
- MS® Windows 98® Second Edition (SE) or later Windows© Operating System
- 4GB Internal Hard Disk Drive
- SVGA 12.1–inch Active Matrix Color Display with 1024 x 768 (recommended) or 800 x 600 Pixel Resolution and capability to display more than 265 colors.

NOTE

If 800 x 600 Pixel Resolution is used, the LMF Window must be maximized after it is displayed.

- Memory Requirements:
  - Minimum required RAM: 96MB
  - Recommended RAM:
    - 128MB for Windows 98 SE
    - 256MB for Windows 2000 or later
- 20X CD–ROM Drive
- 3 1/2 inch Floppy Drive
- 56Kbps V.90 Modem
- Serial Port (COM 1)
- Parallel Port (LPT 1)
- PCMCIA Ethernet Interface Card (for example, 3COM Etherlink III) with a 10BaseT–to–COAX Adapter

LMF Software

The Local Maintenance Facility (LMF) Application Program is a Graphical User Interface (GUI)–based Software Tool. This product is specifically designed to provide Cellular Communications Field Personnel with the capability to support the following CDMA Base Transceiver Station (BTS) Operations:

- Installation
- Maintenance
- Calibration
- Optimization

Ethernet LAN Transceiver

- PCMCIA Ethernet Adpater + Ethernet UTP Adapter
  3COM Model – Etherlink III 3C589B

10BaseT/10Base2 Converter

- Transition Engineering Model E–CX–TBT–03 10BaseT/10Base2 Converter (or equivalent)

NOTE

Xircom Model PE3–10B2 or its equivalent can also be used to interface the LMF Ethernet Connection to the BTS Frame.

Ethernet LAN External In/Out Port Adapter

Trompeter Electronics, Inc., ADBJ20–E1–PL75 or equivalent BNC (F) to TRB (M) Adapter is required if it is necessary to connect the LMF Computer to the LAN External Interface Tri–axial Connectors located in the Power Entry Compartment.

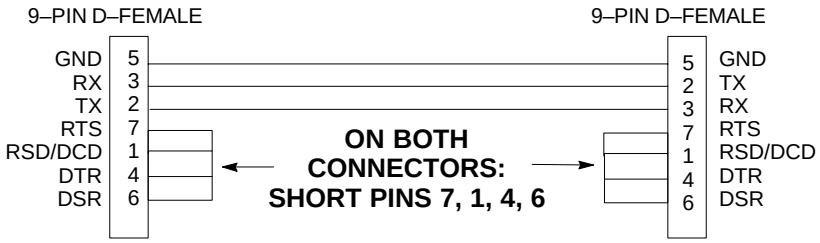
RS–232 to GPIB Interface

- National Instruments GPIB–232–CT with Motorola CGDSEDN04X RS232 Serial Cable or equivalent; used to interface the LMF to the Test Equipment.
- A standard RS–232 Cable can be used with the modifications shown in Figure 1-1.

NOTE

Pin 8 (CTS) does not have to be jumpered/shorted to the others because it is a Driver Output. The DTR is already a Driver Output Signal. The other pins are to receivers. Short Pins 7, 1, 4, 6 on each cable end.

Figure 1-1: Null Modem Cable Detail



Model SLN2006A MMI Interface Kit

- Motorola Model TRN9666A Null Modem Board. Connectors on opposite sides of the board must be used as this performs a Null Modem Transformation between cables. This board can be used for 25–pin to 8–pin, 25–pin to 25–pin, and 10–pin to 10–pin conversions.
- Motorola 30–09786R01 MMI Cable or equivalent; used to interface the LMF Computer Serial Port Connection to the Group Line Interface (GLI), Clock Synchronization Manager (CSM), External Trunked Interface Board (ETIB), and Module Debug Serial Ports.

Communications System Analyzer CDMA/Analog

Table 1-1: CDMA LMF Test Equipment Support Table

Item	Description	Test Capability
Test Sets		
Hewlett Packard, Model HP 8921A (with 83203B)	Communications Analyzer (includes 83203B CDMA Interface Option)	IS–95A/B only
Motorola CyberTest	Communications Analyzer	IS–95A/B only
Advantest R3465 (with 3561L)	Communications Analyzer (with 3561 CDMA option)	IS–95A/B only
Agilent E4406A (with E4432B)	Communications Analyzer (with Generator)	IS–95A/B and CDMA 2000 Testing
Advantest R3267 Analyzer (with R3562)	Communications Analyzer with Advantest R3562 Generator	IS–95A/B and CDMA 2000 Testing
Agilent 8935 Series E6380A (formerly HP 8935) with Option 200 or R2K	Communications Test Set	IS–95A/B and CDMA 2000 Testing
Agilent E7495A	Communications Test Set	IS–95A/B and CDMA 2000 Testing
Power Meters		
Gigatronix 8541C	Power Meter	
HP437B (with HP8481A Sensor)	Power Meter with Sensor – capable of measuring –30dBm to 20dBm	

A combination of Test Equipment supported by the LMF may also be used during Optimization and Testing of the RF Communications Portion of BTS Equipment when the Communications System Analyzer does not perform all of the following functions:

- Frequency Counter
- Deviation Meter
- RF Power Meter (Average and Code Domain)
- RF Signal Generator (capable of DSAT/CDMA Modulation)
- Audio Signal Generator
- AC Voltmeter (with 600 Ohm Balanced Audio Input and High Impedance Input Mode)
- Noise Measurement Meter
- C–Message Filter
- Spectrum Analyzer
- CDMA Code Domain Analyzer

GPIB Cables

Hewlett Packard 10833A or equivalent; one or two meters long, used to interconnect Test Equipment and LMF Computer.

Timing Reference Cables

- *Two* Huber & Suhner 16MCX/11BNC/K02252D or equivalent; right angle MCX–Male to standard BNC–Male RG316 Cables; 10 ft. long are required to interconnect the Communications System Analyzer to SGLN4132A and SGLN1145A CSM Card Timing References.

or

- *Two* BNC–Male to BNC–Male RG316 Cables; 3 meters (10 feet) long, used to interconnect the Communications System Analyzer to SGLN4132B and SGLN1145B (and later) CSM Front Panel Timing References in the RF Modem Frame.

Digital Multimeter

Fluke Model 8062A with Y8134 Test Lead Kit or equivalent; used for precision DC and AC Measurements to four decimal places.

Directional Coupler

Narda Model 3020A 20dB Coupler terminated with two Narda Model 375BN–M Loads, or equivalent.

RF Attenuators

- 20dB Fixed Attenuator, 20 Watt (Narda 768–20), used in conjunction with Calibration of Test Cables or during General Troubleshooting Procedures.
- 10 dB Fixed Attenuator, 20 Watt (Narda 768–10), for Cable Calibration with a Cybertest CDMA Analyzer.

Clamp–on DC Current Probe

Amprobe CT600, or equivalent, 600 Amp Capability with jaw size that accommodates 4/0 Cable. Used with the DMM for Back–up Battery Charging Tests.

Miscellaneous RF Adapters, Loads, etc.

As required to interface Test Cables and BTS Equipment and for various Test Set–ups. Should include at least (2) 50 Ohm Loads (Type N) for Calibration and (1) RF Short.

RF Load

100W Non–radiating RF Load used (as required) to provide Dummy RF Loading during BTS Transmit Tests.

High Impedance Conductive Wrist Strap

Motorola Model 42–80385A59; used to prevent damage from ESD when handling or working with cards/modules.

Driver Bit for Tamper–resistant Fasteners

Star fastener tamper–resistant insert bit set, Grainger 5F530 or equivalent, to remove tamper–resistant fasteners securing the BTS Frame Rear Access Cover.

Optional Equipment

This section provides a list of additional equipment that might be required during Maintenance and Troubleshooting Operations.

NOTE

Not all optional equipment specified in this section is supported by the LMF in automated tests.

Duplexer

Filtronics Low IM Duplexer (Cm035–f2) or equivalent; used during Spectral Purity Receive Band Noise Tests.

Frequency Counter

Stanford Research Systems SR620 or equivalent; used if direct measurement of the 3 MHz or 19.6608 MHz references is required.

Spectrum Analyzer

Spectrum Analyzer (HP8594E with CDMA Personality Card) or equivalent; required for *manual* tests other than standard Receive Band Spectral Purity Tests performed by the LMF.

LAN Tester

Model NETcat 800 LAN Troubleshooter (or equivalent); used to supplement LAN Tests using the ohm meter.

Span Line (T1/E1) Verification Equipment

As required for the local application.

RF Test Cable (if not provided with Test Equipment)

Motorola Model TKN8231A; used to connect Test Equipment to the BTS Transmitter Output during Optimization or during General Troubleshooting Procedures.

Oscilloscope

Tektronics Model 2445 or equivalent; used for Waveform Viewing, Timing, and Measurements, or during General Troubleshooting Procedures.

2–Way Splitter

Mini–Circuits Model ZFSC–2–2500 or equivalent; used to provide the Diversity Receive Input to the BTS.

CDMA Subscriber Mobile or Portable Radiotelephone

Safco Model 2136–150 with Power Supply Module and Antenna; used to provide Test Transmission and Reception during BTS Maintenance and Troubleshooting. *Do not substitute other models that do not feature special test modes*. Two radios will be required for system and drive–around testing *after* Optimization and BTS ATP are completed.

RF Circulator

Circulator (FERROCOM 5809866C01) or equivalent; can substitute for a Duplexer during Receive Sensitivity Frame Erasure Rate (FER) Testing in conjunction with Safco CDMA Mobile.

High Stability 10 MHz Rubidium Standard

Stanford Research Systems SR625 or equivalent. Required for CSM and High Stability Oscillator (HSO) Frequency Verification.

Required Documents and Related Publications

Required Documents

The following documents are required to perform Optimization of the Cell Site equipment:

- Site Document (generated by Motorola Systems Engineering), that includes:
  - General Site Information
  - Floor Plan
  - RF Power Levels
  - Frequency Plan (includes Site PN and operating frequencies)
  - Channel Allocation (Paging, Traffic, etc.)
  - Card/Module Placement
  - Site Wiring List
  - CDF or NECF Files (bts–#.cdf and cbsc–#.cdf or bts–#.necf and cbsc–#.necf)
- Demarcation Document (Scope of Work Agreement)
- Equipment Manuals for non-Motorola Test Equipment

Related Publications

Additional, detailed information about the installation, operation, and maintenance of the 1X SC™ 4812T–Lite BTS and its components is included in the following publications:

- *Cellular System Administration – CDMA OnLine Documentation*
- *1X SC4812 Series Circuit BTS Troubleshooting* Manual (68P09262A65)
- *1X SC4812 Series Packet BTS Troubleshooting* Manual (68P09262A65)
- *1X SC4812T Lite BTS FRU* manual (68P09262A60)
- *1X SC4812T Lite Hardware Installation* manual (68P09262A57)
- *CFC and CDL Reference* (68P09262A17)
- *LMF CDMA CLI Reference* (68P09262A25)
- *LMF On–Line Help*

Standard and Non–standard Terms and Abbreviations

Standard terms and abbreviations used in this manual are defined in *Cellular Glossary of Terms and Acronyms; 68P09213A95*. Any non–standard terms or abbreviations included in this manual are listed in Table 1-2.

Table 1-2: Non–Standard Terms and Abbreviations

Term or Abbreviation	Definition
1X	One of two bandwidths currently defined in the IS–2000 CDMA Specification, that extends the capability of the IS–95A and B Specifications. 1X Bandwidth provides Wireless Packet Voice and Data Transmission Capability at up to 144 Kbps.
BBX–1X	Broad Band Transceiver, 1X. Third Generation BBX Card with CDMA2000 1X Packet as well as IS–95A/B Capability.
BBXR	Redundant BBX for a SCCP Cage or Cage.
CCD	Clock Combining and Distribution. SCCP Cage Card that accepts Timing Signals from the active source and distributes them to other SCCP Cage Cards/Modules.
CIO	Combiner Input/Output
DBPF	Dual Bandpass Filter
DBM	Debug Monitor
DLM	DownLoad Manager. A Software Application resident on the GLI Card that permits download of software upgrades from the Centralized Base Station Controller (CBSC) to BTSs without the need for a site visit.
DMAC	Digital Metering, Alarm, Control Part of the Meter Alarm Panel (MAP) that provides control of and status information for the AC Power Rectifiers as well as Back–up Battery monitoring and test capability. – This term is used interchangeably with MAP. Refer to below.
DPLL	Digital Phase–Locked Loop
DRF	Duplexer, TX/RX Filter. Provides duplexing of BTS transmit and Receive Signals to one antenna per sector. – Each RF Path may contain a Dual Directional Coupler on each Antenna Port that allows sampling of Antenna Signals in the Forward (Transmit) and Reflected (Receive) Directions for use by an RF Diagnostic Subsystem (RFDS).

table continued on next page

Table 1-2: Non–Standard Terms and Abbreviations	
Term or Abbreviation	**Definition**
EMPC	Expansion Multi–coupler Preselector Card. BTS Expansion Frame MPC Card that is used to receive, amplify, and distribute RX Signals from the Starter Frame MPC.
GLI3	Group Line Interface Card, third generation Supports Packet Backhaul.
HSO	High Stability Oscillator. Module providing Back–up Timing Source for a BTS when the Timing Signal from the GPS or Remote GPS Unit is unavailable.
HSO2	HSO Card, second generation
HSOX	HSO Expansion. Card used in a BTS Expansion Frame to interface with the Starter Frame HSO and distribute the Timing Signals to the Expansion Frame CSM Cards.
ISC	In–Service Calibration. Technique for performing Calibration sector by sector on a BTS to avoid completely removing the site from service.
LPAC	Linear Power Amplifier Controller
MAP	Meter Alarm Panel. *1X SC4812T Lite BTS FRU* manual (68P09262A60) that contains the functions of both the Temperature Compensation Panel (TCP) and the DMAC. – Term is used interchangeably with DMAC.
MCC–1X	Multi–channel CDMA Card supporting 16 or 48 CDMA2000 1X or (with Software Release 2.16.0.84.3 and higher) IS–95A/B Channels.
MPC	Multi–coupler Preselector Card. BTS SCCP Cage Card used to amplify and distribute RX Signals to BBX Cards.
NECB	Network Element Configuration Baseline
NECF	Network Element Configuration File
NECJ	Network Element Configuration Journal
OLF	Object List File. File containing a list of the ROM and RAM Code Versions that should be operating on every device installed in a BTS. The file is resident on the Central Base Station Controller (CBSC) Mobility Manager (MM) and is passed to the GLI after a DLM Job is invoked. The GLI uses the OLF to determine which devices require Code Download to meet the OLF–specified Version.

table continued on next page

Table 1-2: Non–Standard Terms and Abbreviations	
Term or Abbreviation	**Definition**
PDA	Power Distribution Assembly. Assembly in an SC4812T Lite BTS providing internal DC Power Distribution and Circuit Protection.
RFMF	RF Modem Frame
RGD	Remote Global Positioning System (GPS) Distribution Module that provides distribution of Digital Timing Information to up to four BTS RF Modem Frames from a single Remote GPS Receiver.
RGPS	Remote Global Positioning System GPS Receiver and Signal Distribution Subsystem that provides Digital Timing Information for up to four BTS RF Modem Frames at a Cell Site.
RGPS Expansion Primary Frame	BTS Frame where the RGD is located and that serves as the Distribution Point for RGPS Digital Timing Signals to other (*Secondary)* BTS Frames at a Cell Site.
RGPS Expansion Secondary Frame	BTS Frame that receives RGPS Digital Timing Signals distributed from the *Primary* RGPS Expansion Frame at a Cell Site.
RHSO	Remote High–Stability Oscillator Subsystem that generates and distributes Synchronization Signals from a single HSO to up to four RF Modem Frames.
SCCP	Small CDMA Channel Processor The type of SCCP Cage used in the SC4812ET Lite BTS.
TRF	Transmit and Receive Filter TRFs contains separate Transmit and Receive Paths and Bandpass Filters that are not connected electrically. Transmit and Receive Antenna Signals are not duplexed and must be handled by separate antennas. Each RF Path may contain a Dual Directional Coupler on each Antenna Port that allows sampling of Antenna Signals in the Forward (Transmit) and Reflected (Receive) Directions for use by an RFDS.

Equipment Overview

Stand-Alone Frame

The 1X SC™ 4812T–Lite BTS Frame consists of a single cabinet containing RF and Power Amplifier components. The BTS may be powered by:

- 220V AC (rectified internally to +27V DC)
- –48V DC (power converted internally to +27V DC)
- +27V DC

Each frame can support up to two carriers in a 3–Sector Configuration. Six–sector operation is not supported with any SC4812T Lite configuration.

Figure 1-2 illustrates the external features of the BTS Frame, the single major component of the Motorola SC4812T Lite.

Expansion Site

Where more than two carriers are desired at a T Lite BTS Site, the original Starter Frame must be modified and an additional Expansion Frame with one or two carriers must be employed to achieve up to 4 carriers. Like the BTS Starter Frame, each cabinet contains RF and Power Amplifier components and employ the same Power Schemas as the BTS Starter Frame.

The BTS Frame Cabinet is identical for Starter and Expansion Frames except for the I/O Interconnect Panel. These differences are illustrated in Figure 1-3 through Figure 1-7.

Frame Configurations

Starter and Expansion Frame configurations are described as follows:

Starter Frame configuration supports one or two carriers, each with separate Antenna Sets. It can operate as a Stand–Alone BTS, or can be modified in the field to the Expansion Frame configuration.

Expansion Frame configuration supports one or two carriers using 2:1 TX Combiners and a single Antenna Set for the frame. It operates with an SC4812T Lite Starter Frame that has its own antennas and different carriers. Expansion Frames share RX Signals to provide Diversity RX for the opposite frame. Expansion Frames allow equipping a single SC4812T Lite BTS Site with up to four carriers.

Logical BTS

The BTS Software implements the Logical BTS capability. Previously, all BTS Frames co–located at a single site had to be identified in the network with separate and distinct BTS ID Numbers. In the Logical BTS Feature, all frames located at a single BTS Site are identified with unique Frame ID Numbers (Frame ID Numbers 1, 101, 201, 301) under a single (site) BTS ID Number.

A Logical BTS can consist of up to four SC 4812T Frames. When the LMF is connected to Frame 1 of a Logical BTS, you can access all devices in all of the frames that make up the Logical BTS. A Logical BTS requires a CDF/NECF File that includes Equipage Information for all of the Logical BTS Frames and their devices and a CBSC File that includes Channel Data for all of the Logical BTS Frames.

Logical BTS Numbering

The first BTS Frame of a Logical BTS has a **–1** Suffix (e.g., **BTS–812–1**). Other frames of the Logical BTS are numbered with Suffixes, **–101**, **–201**, and **–301** (e. g. **BTS–812–201**). When you log into a BTS, a **FRAME TAB** is displayed for each BTS Frame. If there is only one frame for the BTS, there is only one Tab (e.g., **FRAME–282–1**) for BTS–282.

If a Logical BTS has more than one frame, there is a separate **FRAME TAB** for each BTS Frame (e.g. **FRAME–438–1**, **FRAME–438–101**, and **FRAME–438–201** for a **BTS–438** that has three frames). If an RFDS is included in the CDF/NECF File, an **RFDS** Tab (e.g., **RFDS–438–1)** is displayed.

Actions (e.g., ATP Tests) can be initiated for selected devices in one or more frames of a Logical BTS. Refer to the Select Devices Help Screen for information on how to select devices.

SCCP Cage Card/Module Device ID Numbers

All cards/modules/boards in the frames at a single site, assigned to a single BTS Number, are also identified with unique Device ID Numbers dependent upon the BTS Frame ID Number in which they are located. Refer to Table 1-3 and Table 1-4 and Figure 1-8 for specific Device ID Numbers.

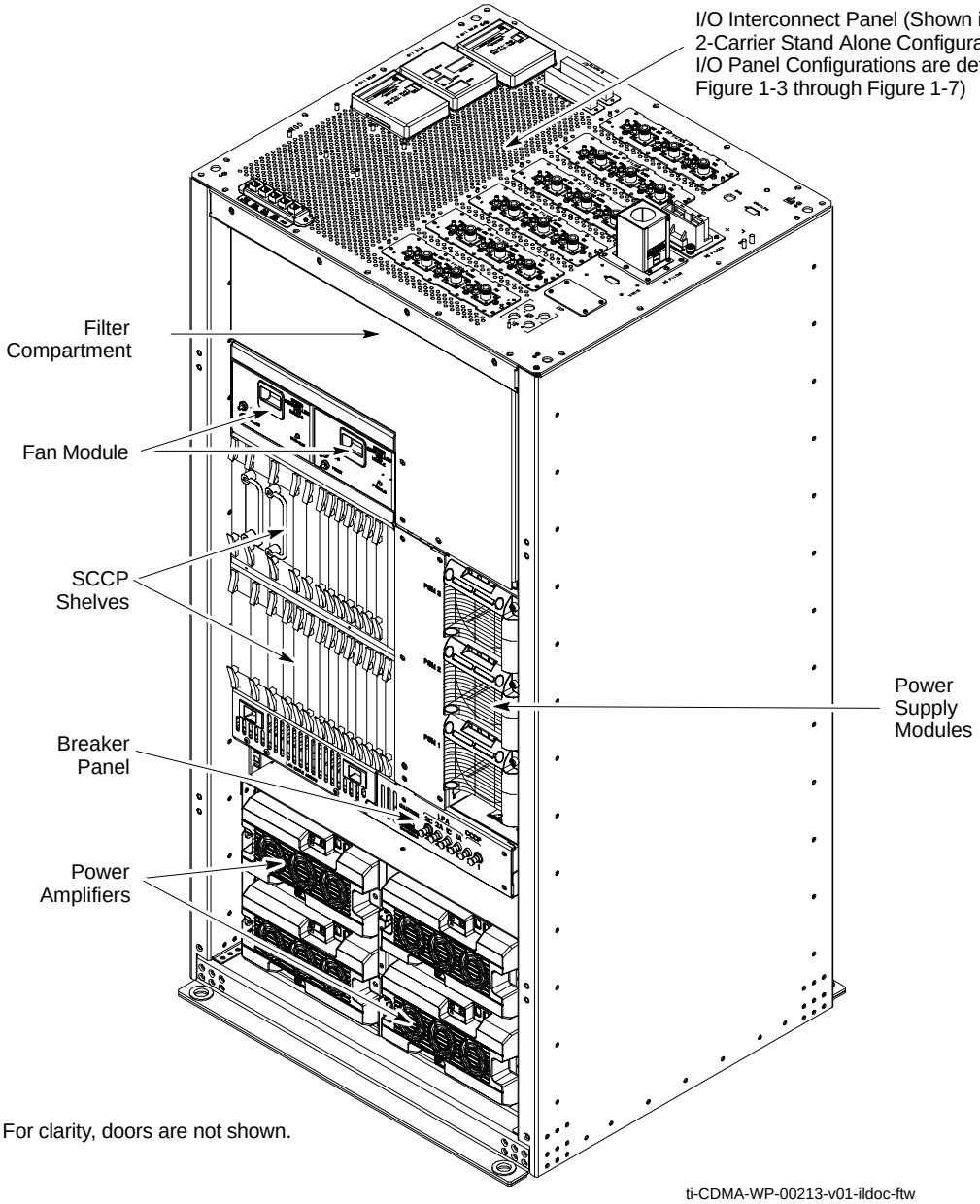
Table 1-3: SCCP Cage/Cage Card/Module Device ID Numbers (Top Shelf)

Frame #	Card/Module ID Number (Left to Right)										
	Power (PS–1)	Power (PS–2)	AMR–1	GLI3–1	MCC		BBX			BBX–R (Optional)	MPC/ EMPC–1
1	–	–	1	1	1	2	1	2	3	R1	–
101	–	–	101	101	101	102	101	102	103	R101	–
201	–	–	201	201	201	202	201	202	203	R201	–
301	–	–	301	301	301	302	301	302	303	R301	–

Table 1-4: SCCP Cage/Cage Card/Module Device ID Numbers (Bottom Shelf)

Frame #	Card/Module ID Number (Left to Right)														
	HSO	CSM –1	CSM –2	CCD A	CCD B		AMR–2	GLI3–2	MCC		BBX			SW	MPC/ EMPC–2
1	–	1	2	–	–	–	2	2	3	4	4	5	6	–	–
101	–	101	102	–	–	–	102	102	103	104	104	105	106	–	–
201	–	201	202	–	–	–	202	202	203	204	204	205	206	–	–
301	–	301	302	–	–	–	302	302	303	304	304	305	306	–	–

Figure 1-2: 1X SC™ 4812T–Lite BTS Frame (Typical)



Internal Assemblies and FRUs

The BTS Frame houses the Fan Modules, Small CDMA Channel Processor (SCCP) Cage, RF Power Amplifier Modules, PA Trunking Modules.

RF Filtering includes: DRF – Duplexers with TX Filter, RX Filter, and Diversity RX Filter and TRF – Non-Duplexed TX Filter, RX Filter, and Diversity RX Filter.

Power System components include an AC Power Input/Filter, DC Filter, Power Alarm Card (PAC), +27V DC Power Distribution Assembly (PDA).

Figure 1-2 shows the location of the internal assemblies and Field Replaceable Units (FRUs). A brief description of each item is found in the following paragraphs.

Figure 1-3 through Figure 1-7 show the location of components on the I/O Interconnect Panel for the various configurations.

Figure 1-3: I/O Interconnect Panel (1-Carrier Stand-Alone Frame)

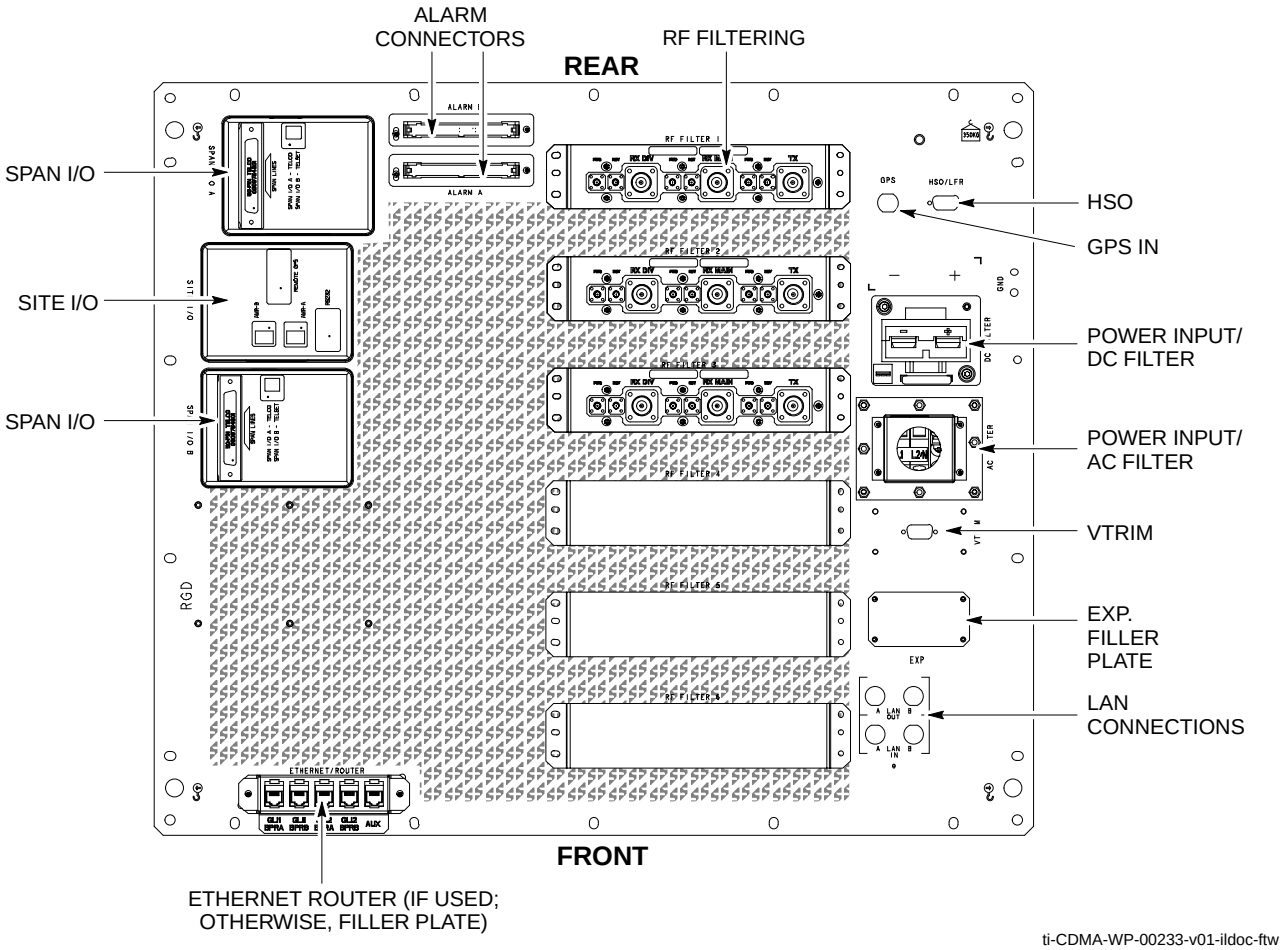


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Figure 1-4: I/O Interconnect Panel (2-Carrier Stand-Alone Frame)

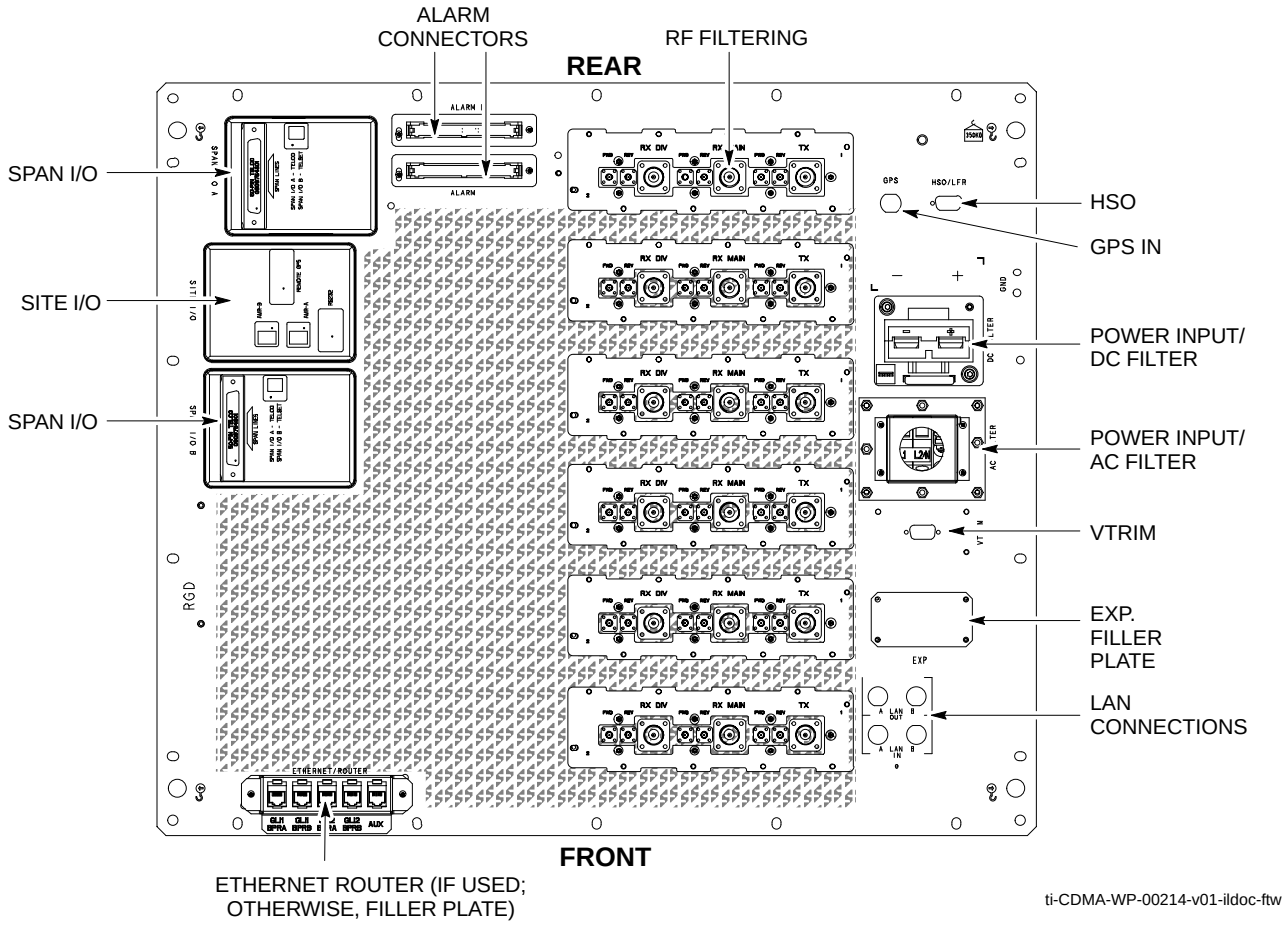


Figure 1-5: I/O Interconnect Panel (3-Carrier Starter Frame)

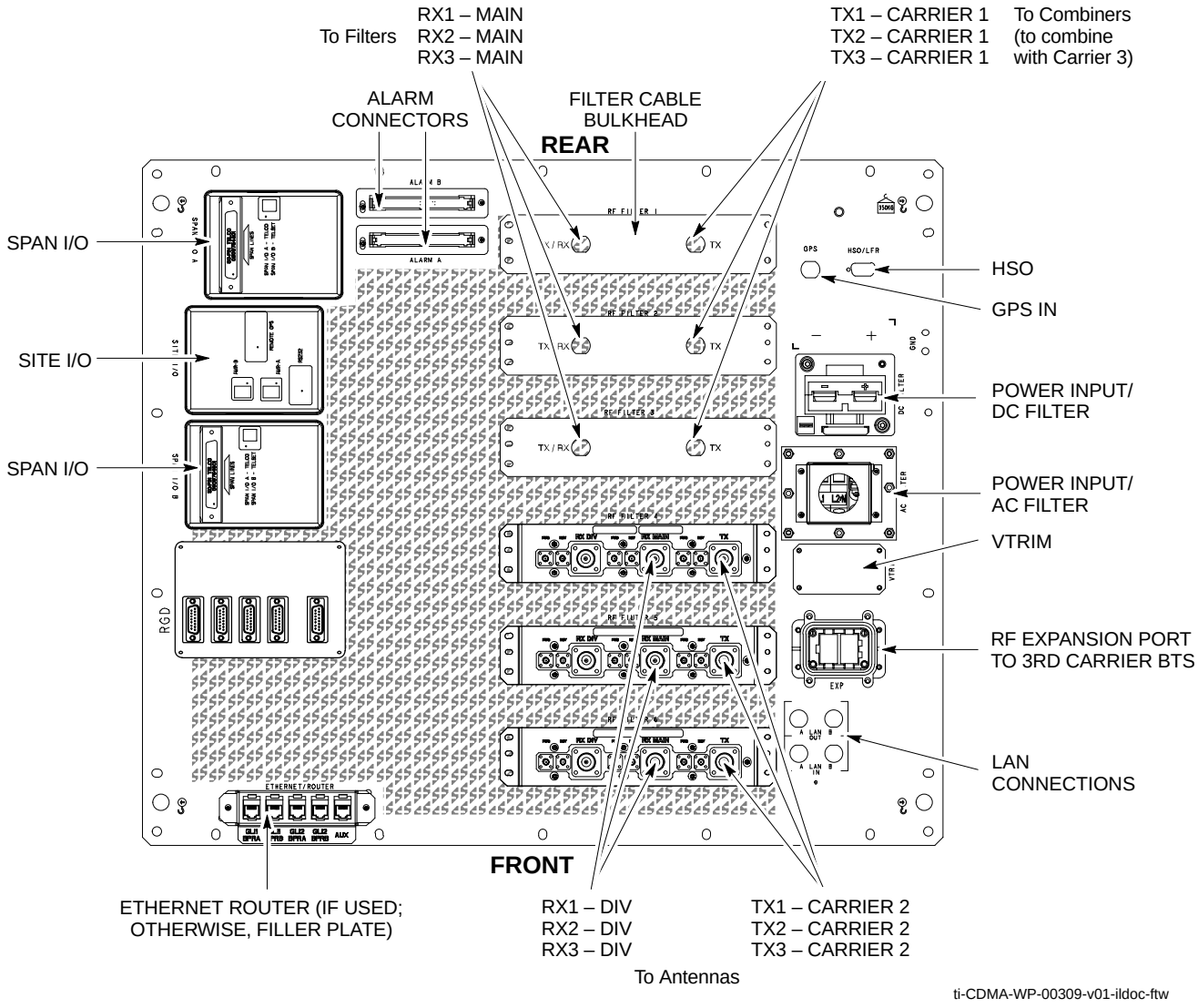


Figure 1-6: I/O Interconnect Panel (Starter Frame – 4 Carrier)

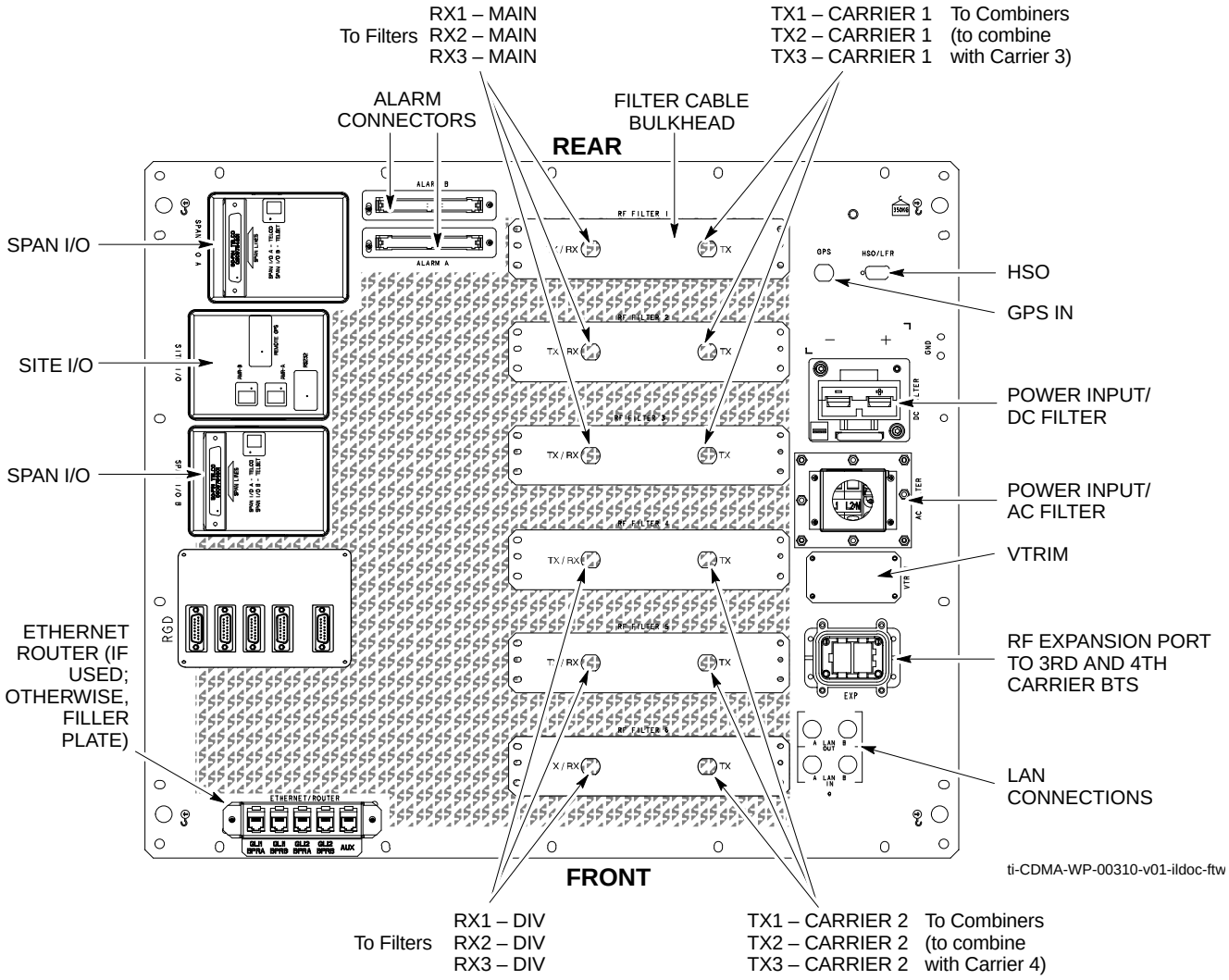
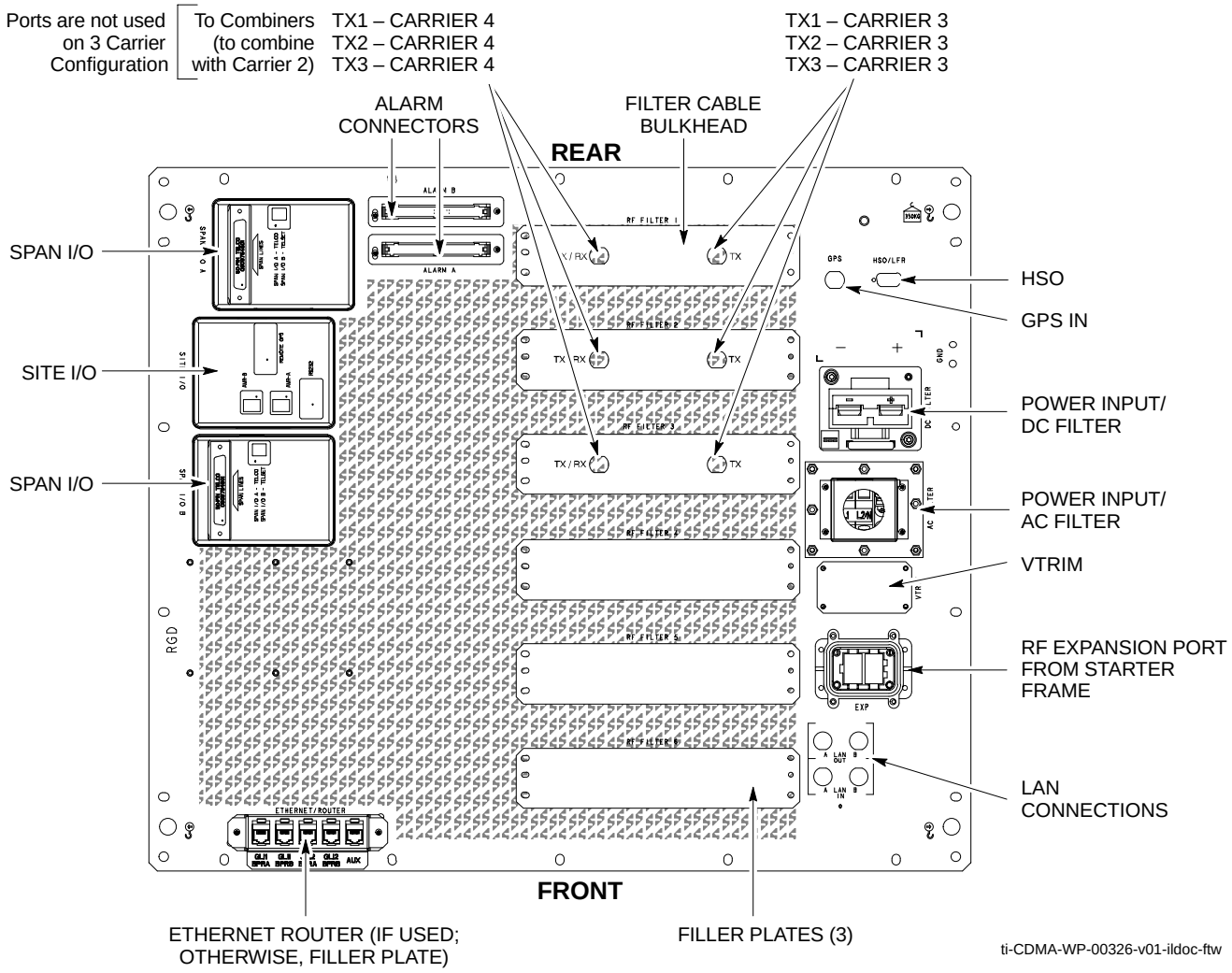


Figure 1-7: I/O Interconnect Panel (Expansion Frame – 3 and 4 Carrier)



DC Power Distribution Assembly (PDA)

The BTS Frame requires +27V, provided by direct input (+27V Version), –48V to +27V Power Converters (–48V Version), or AC Rectifiers and External Battery Back–up (AC Version). The +27V Power is then routed to the Circuit Breaker Panel. Refer to Figure 1-2.

The Breaker Panel distributes DC Power and System DC Bus Protection from the Loads with Distribution Circuit Breakers. The 6 post–Distribution Circuit Breakers permit removal of individual Loads.

Filter Compartment

The Filter Compartment (Figure 1-2) houses the Transmit/Receive Filters (TRF/DRF).

Span I/O Board

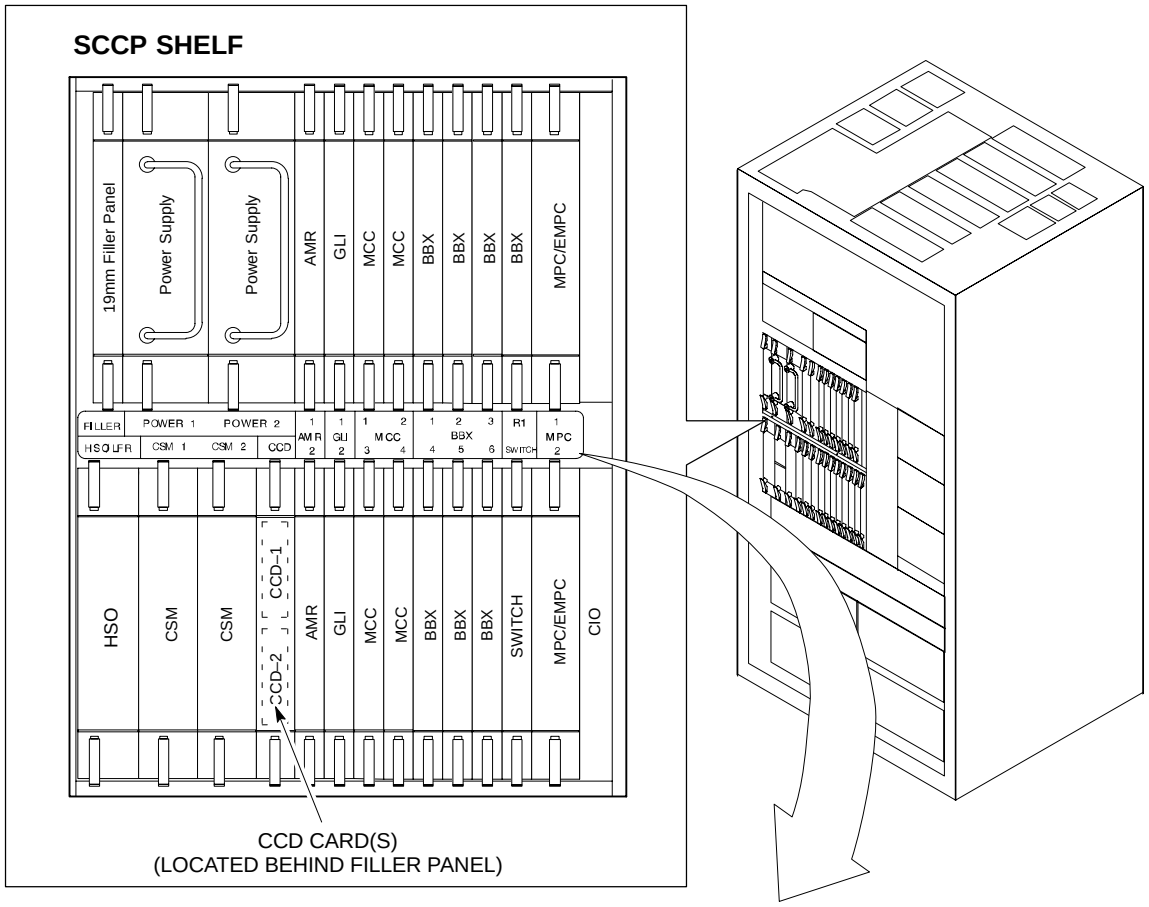
The Span I/O Board (Figure 1-3) provides the Span Line Interface to the SCCP Backplane.

Small CDMA Channel Processor (SCCP) Cage

The SCCP Cage has provisions for the following types and quantities of modules (Figure 1-8):

- Alarm Monitoring and Reporting (AMR) Cards (2)
- Broad Band Transceiver, 1X, (BBX–1X) Cards, primary (6)
- BBX–1X Card, redundant (1)
- CDMA Clock Distribution (CCD) Cards (2)
- Clock Synchronization Manager (CSM) on two Cards (one with GPS Receiver, if ordered)
- Combiner Input/Output (CIO) Card (1)
- Fan Modules (2)
- Filler panel (as required)
- Group Line Interface, third generation, (GLI3) Cards (2)
- High Stability Oscillator (HSO) Card (Optional) (1)
- Multi–coupler Preselector Cards (MPC) (2 per Starter Frame; 1 per Expansion Frame)
- Expansion Multi–coupler Preselector Card (EMPC) (1 per Expansion Frame)
- Multi–Channel CDMA (MCC–1X) Cards (4)
- Power Supply Modules (2)
- Switch Card (1)

Figure 1-8: SCCP Cage



FILLER | POWER 1 | POWER 2 | 1 AMR 2 | 1 GLI 2 | 1 2 MCC 3 4 | 1 2 3 BBX 4 5 6 | R1 SWITCH | 1 MPC 2
HSO/LFR | CSM 1 | CSM 2 | CCD

ti-CDMA-WP-00222-v01-ildoc-ftw REF

Transmit/Receive Filters

Duplexed TX/RX Filters (DRFs) and non–Duplexed TX/RX Filters (TRFs) provide separate, Bandpass–Filtered Sector Transmit and Receive Paths.

DRFs and TRFs may have Dual Directional Couplers incorporated to permit Signal Monitoring by the RFDS. Refer to Figure 1-9.

When TRFs are used, separate Transmit and Receive Antennas are required for each sector. DRFs permit a single Antenna Path for both the Main RX and the TX Signal for each sector.

Figure 1-9: DRF/TRF with Couplers Details

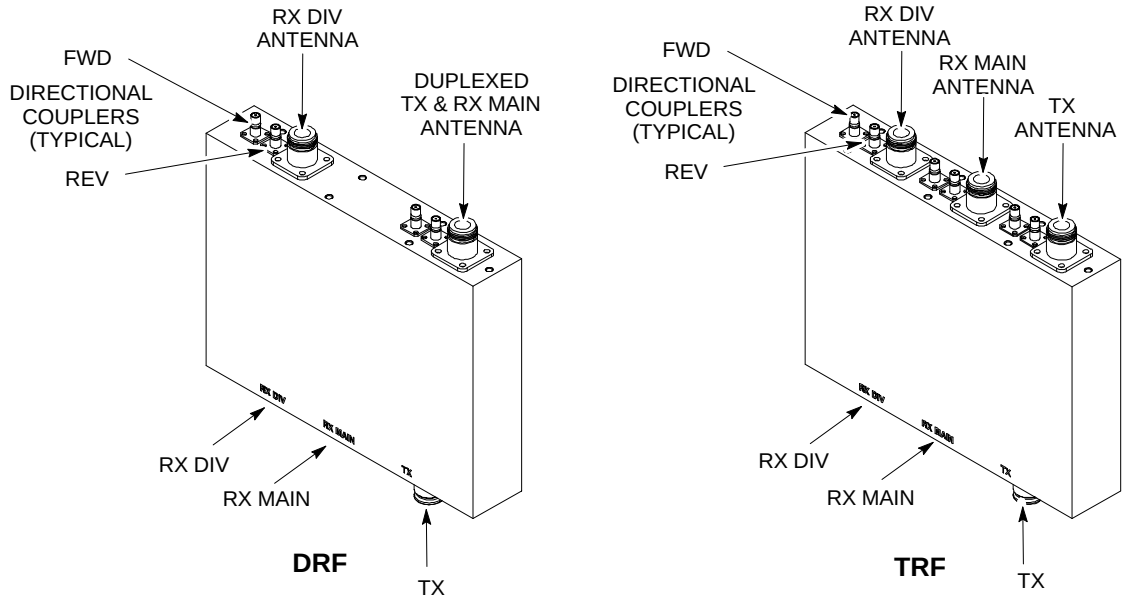
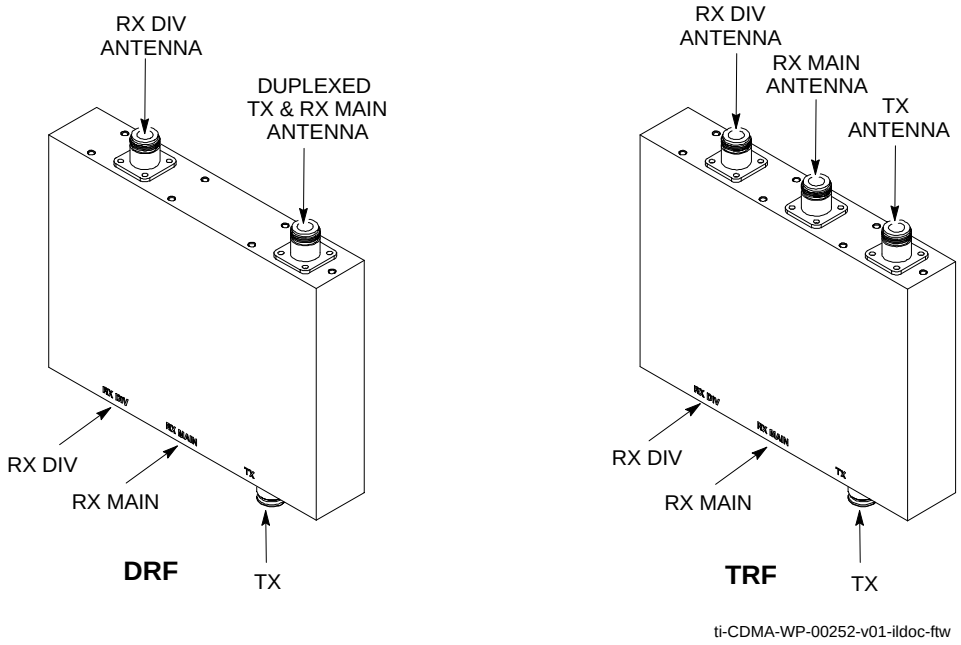


Figure 1-10: DRF and TRF Details



SCCP Cage Configuration and 1X Devices

SC 4812T Lite BTS Frames have one SCCP Cage that will support up to four MCC Cards and six BBX Cards.

MCC Cards

The BTS is configured with MCC–1X Cards and with Software Release R2.16.5.x and supports CDMA2000 1X. For additional Software Release Compatibility and Compatibility Information, contact the local Motorola Account Team.

BBX Cards

Up to six BBX–1X Cards can be supported. SCCP Cage Card Slots 1 through 6 are carrier–dependant and sector–dependent. The SCCP Cage R1 Card Slot is dedicated to the Redundant BBX. Refer to Table 1-5 for BBX Card Slot Carrier and Sector Correlations.

BTS Sector Configurations

Table 1-5 and Figure 1-11 outlines the basic configurations for one- or two-frame sites. More detailed information in Table 1-6 describes the correlation between Sectors, BBX Cards, and Filters.

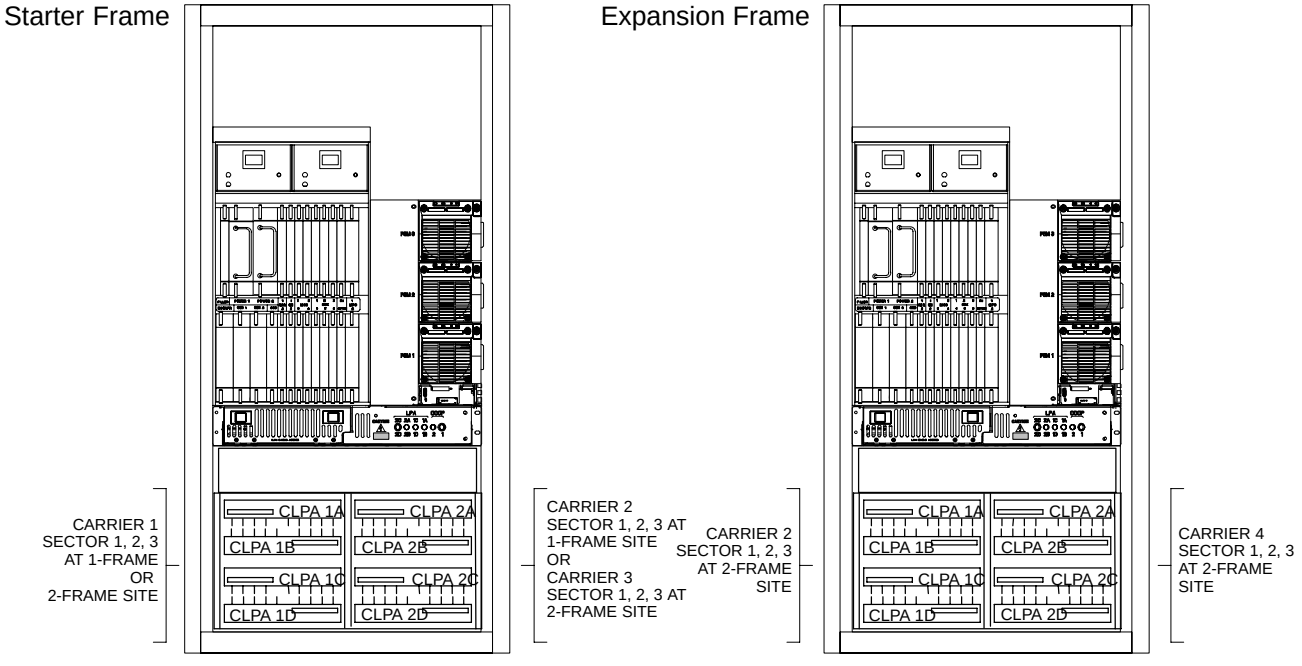
Table 1-5: *SC* 4812T Lite Carrier Configurations

Starter Site (1–Frame)						
3–Sector/2–Adjacent Carrier Starter Frame						
Carrier	**TX 1**	**TX 2**	**TX 3**	**TX 4**	**TX 5**	**TX6**
1	BBX–1	BBX–2	BBX–3	N/A	N/A	N/A
2	N/A	N/A	N/A	BBX–4	BBX–5	BBX–6
Expansion Site (2–Frames)						
3–Sector/2–Non–Adjacent Carrier Starter Frame (External 2:1 Combiner)						
Carrier	**TX 1**	**TX 2**	**TX 3**	**TX 4**	**TX 5**	**TX6**
1	BBX–1	BBX–2	BBX–3	N/A	N/A	N/A
3	BBX–4	BBX–5	BBX–6	N/A	N/A	N/A
3–Sector/2–Non–Adjacent Carrier Expansion Frame (External 2:1 Combiner)						
Carrier	**TX 1**	**TX 2**	**TX 3**	**TX 4**	**TX 5**	**TX6**
2	BBX–1	BBX–2	BBX–3	N/A	N/A	N/A
4	BBX–4	BBX–5	BBX–6	N/A	N/A	N/A

NOTE

Figure 1-11 shows the BTSs with fully populated CLPA Shelves. However, the SC 4812T Lite does not currently support 4 CLPA Modules per carrier; CLPA1D and CLPA2D will not be present.

Figure 1-11: SC4812T Lite CLPA Configuration



The matrix in Table 1-6 shows the correlation between the various Sector Configurations, Filters, Combiners, and BBX Cards.

Table 1-6: *SC* 4812T Lite Starter Frame Sector/Carrier Configurations

Configuration	Item	Sector 1	Sector 2	Sector 3	Sector 1	Sector 2	Sector 3
3–Sector/ 1–Carrier using DRFs	**Filter**	DRF 1	DRF 2	DRF 3	N/A	N/A	N/A
	BBX	BBX–1	BBX–2	BBX–3	N/A	N/A	N/A
	TX/ RX A	TX Carrier 1/ RX Main	TX Carrier 1/ RX Main	TX Carrier 1/ RX Main	N/A	N/A	N/A
	RX B	RX Diversity	RX Diversity	RX Diversity	N/A	N/A	N/A
3–Sector/ 2–Carrier using DRFs	**Filter**	DRF 1	DRF 2	DRF 3	DRF 4	DRF 5	DRF6
	BBX	BBX–1	BBX–2	BBX–3	BBX–4	BBX–5	BBX–6
	TX/ RX A	TX Carrier 1/ RX Main	TX Carrier 1/ RX Main	TX Carrier 1/ RX Main	TX Carrier 2/ RX Main	TX Carrier 2/ RX Main	TX Carrier 2/ RX Main
	RX B	RX Diversity	RX Diversity	RX Diversity	RX Diversity	RX Diversity	RX Diversity
3–Sector/ 3–Carrier using DRFs	**Filter**	DRF 1	DRF 2	DRF 3	DRF 4	DRF 5	DRF6
	BBX	BBX–1	BBX–2	BBX–3	BBX–4	BBX–5	BBX–6
	TX/ RX A	TX Carriers 1 & 3 (using 2:1 Combiners)/ RX Main	TX Carriers 1 & 3 (using 2:1 Combiners)/ RX Main	TX Carriers 1 & 3 (using 2:1 Combiners)/ RX Main	TX Carrier 2/ RX Main	TX Carrier 2/ RX Main	TX Carrier 2/ RX Main
	RX B	RX Diversity	RX Diversity	RX Diversity	RX Diversity	RX Diversity	RX Diversity
3–Sector/ 4–Carrier using DRFs	**Filter**	DRF 1	DRF 2	DRF 3	DRF 4	DRF 5	DRF6
	BBX	BBX–1	BBX–2	BBX–3	BBX–4	BBX–5	BBX–6
	TX/ RX A	TX Carriers 1 & 3 (using 2:1 Combiners)/ RX Main	TX Carriers 1 & 3 (using 2:1 Combiners)/ RX Main	TX Carriers 1 & 3 (using 2:1 Combiners)/ RX Main	TX Carriers 2 & 4 (using 2:1 Combiners)/ RX Main	TX Carriers 2 & 4 (using 2:1 Combiners)/ RX Main	TX Carriers 2 & 4 (using 2:1 Combiners)/ RX Main
	RX B	RX Diversity	RX Diversity	RX Diversity	RX Diversity	RX Diversity	RX Diversity
3–Sector/ 1–Carrier using TRFs	**Filter**	TRF 1	TRF 2	TRF 3	N/A	N/A	N/A
	BBX	BBX–1	BBX–2	BBX–3	N/A	N/A	N/A
	TX	TX Carrier 1	TX Carrier 1	TX Carrier 1	N/A	N/A	N/A
	RX A	RX Main	RX Main	RX Main	N/A	N/A	N/A
	RX B	RX Diversity	RX Diversity	RX Diversity	N/A	N/A	N/A
3–Sector/ 2–Carrier using TRFs	**Filter**	TRF 1	TRF 2	TRF 3	TRF 4	TRF 5	TRF 6
	BBX	BBX–1	BBX–2	BBX–3	BBX–4	BBX–5	BBX–6
	TX	TX Carrier 1	TX Carrier 1	TX Carrier 1	TX Carrier 2	TX Carrier 2	TX Carrier 2
	RX A	RX Main	RX Main	RX Main	RX Main	RX Main	RX Main
	RX B	RX Diversity	RX Diversity	RX Diversity	RX Diversity	RX Diversity	RX Diversity

Chapter 2: Preparatory Tasks

2

Table of Contents

Notes

Introduction

This section first verifies proper Frame Equipage against the Site–specific Documentation supplied for each BTS Application. This includes verifying Card/Module Placement, Jumper, and dual in–line package (DIP) Backplane Configuration Switch Settings. Next, pre-Power–up and initial power-up procedures are presented. Finally, power–down and normal Power–up procedures are covered.

Cell Site Types

Sites are configured as Omni or up to 3–Sectors – one or two carriers. Each type has unique characteristics and must be optimized accordingly.

CDF/NECF

The Configuration Data File (CDF) or Network Element Configuration File (NECF) contains site type and Equipage data information and passes it directly to the LMF during Optimization. The number of modem frames, number and types of BBX and MCC boards, and linear Power Amplifier assignments are some of the Equipage data included in the CDF/NECF.

IMPORTANT

Ensure that the correct **bts–#.cdf** (or **bts–#.necf**) and **cbsc–#.CDF File**s are used for the BTS.

– These should be the CDF/NECF Files that are provided for the BTS by the CBSC.

Failure to use the correct CDF/NECF Files can cause system errors.

Failure to use the correct CDF/NECF Files to log into a live (traffic carrying) site can shut down the site.

Site Equipage Verification

Review the Site Documentation. Match the Site Engineering Equipage Data to the actual cards, boards, and modules shipped to the site. Physically inspect and verify that the equipment provided for the frame is correct and undamaged.

WARNING

Always wear an approved Anti–static Wrist Strap while handling any circuit card/module to prevent damage by Electrostatic Discharge (ESD).

After removal, the card/module should be placed on a conductive surface or back into the anti–static packaging in which it was shipped.

Initial Installation of Cards/Boards/Modules

Table 2-1: Initial Installation of Cards/Boards/Modules Procedure		
✓	**Step**	**Action**
	1	Refer to the Site Documentation and, if it was not previously done, slide all cards, boards, and modules into the appropriate shelves as required. *** IMPORTANT** **DO NOT SEAT the cards, boards, and modules at this time.** **NOTE** On 800 MHz Systems equipped with BBXR, the Switch Card has a Configuration Switch that must match the Site Configuration. – Refer to Figure 2-1. *Non–redundant systems do not require a Switch Card.*
	2	As the actual site hardware is installed, record the Serial Number of each module on a "Serial Number Checklist" in the Site Logbook.

The Configuration Switch (shown in Figure 2-1) is a feature on the newer versions of the 800 Mhz Switch Card (some earlier cards do not have the Configuration Switch).

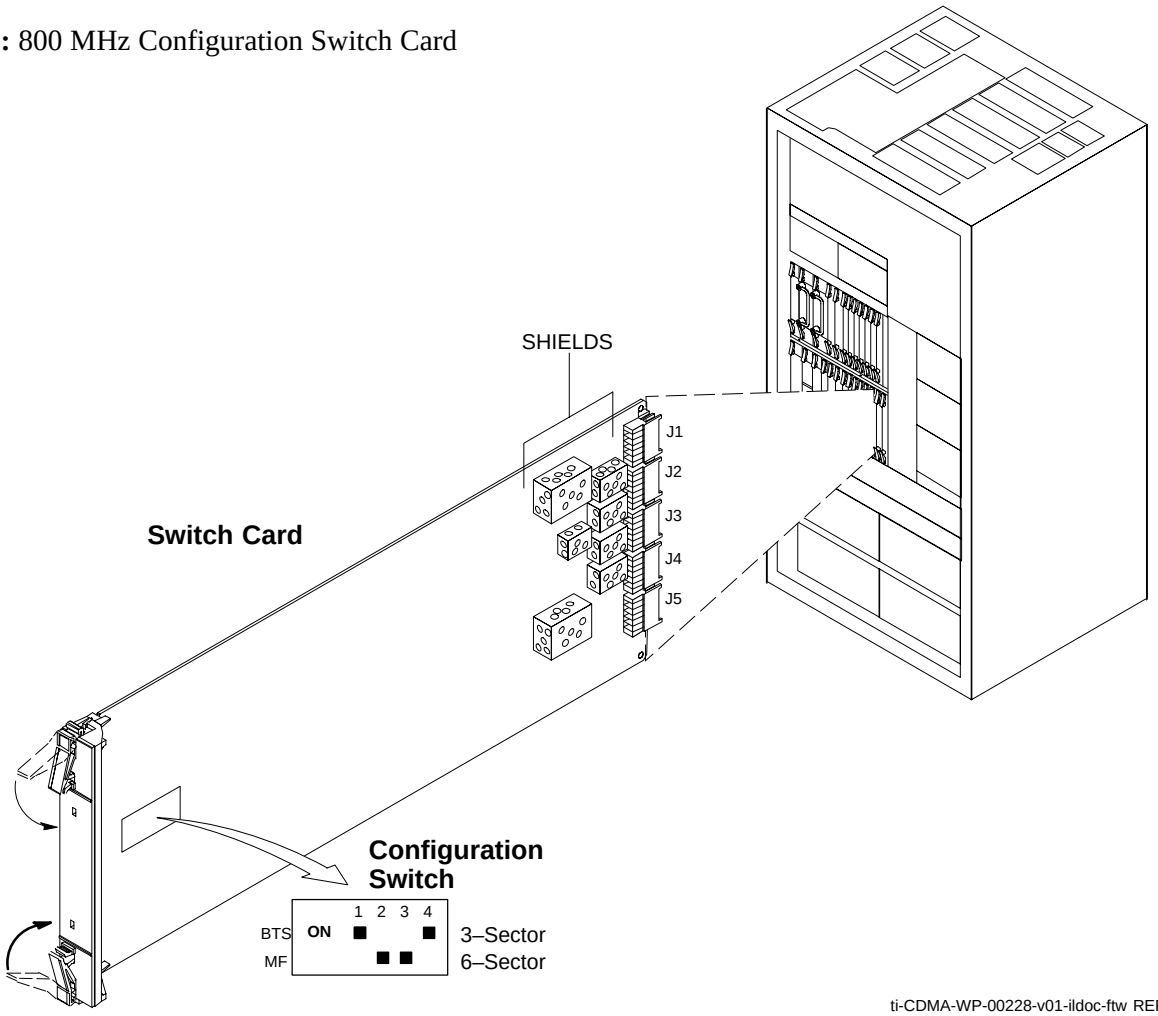
The configuration shown in Figure 2-1 is for a 3–Sector BTS.

- Switch 1 chooses BTS or MF.
- Switches 2 and 3 are not used.
- Switch 4 chooses 3–Sector or 6–Sector.

NOTE

Since the SC4812T Lite can accommodate a maximum of three sectors, Switch 4 defaults to the 3–Sector choice.

Figure 2-1: 800 MHz Configuration Switch Card

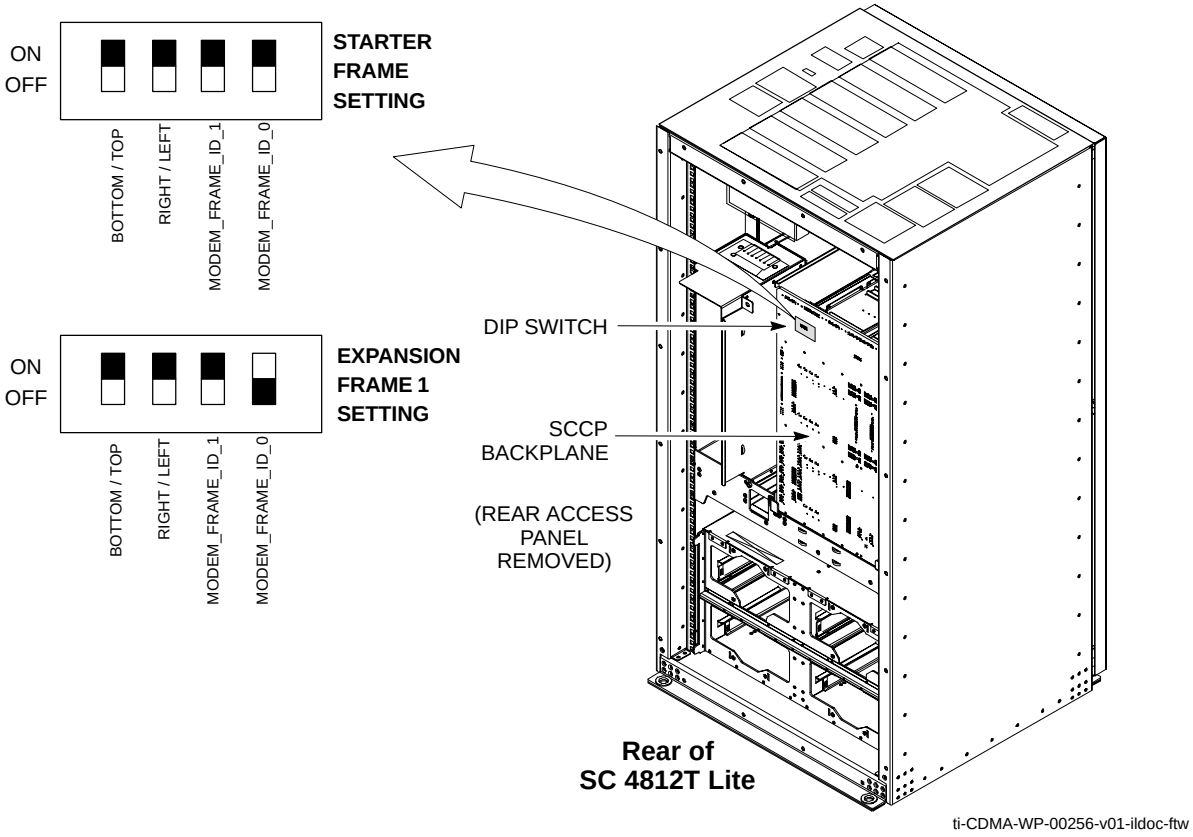


Setting Frame SCCP Configuration Switch

The Backplane Configuration Switch is located behind the BTS Frame Rear Access Panel. It must be set for the BTS Frame Type as shown in Figure 2-2.

The Backplane Configuration Switch Setting must be verified and set before power is applied to the BTS Equipment.

Figure 2-2: Backplane DIP Switch Settings

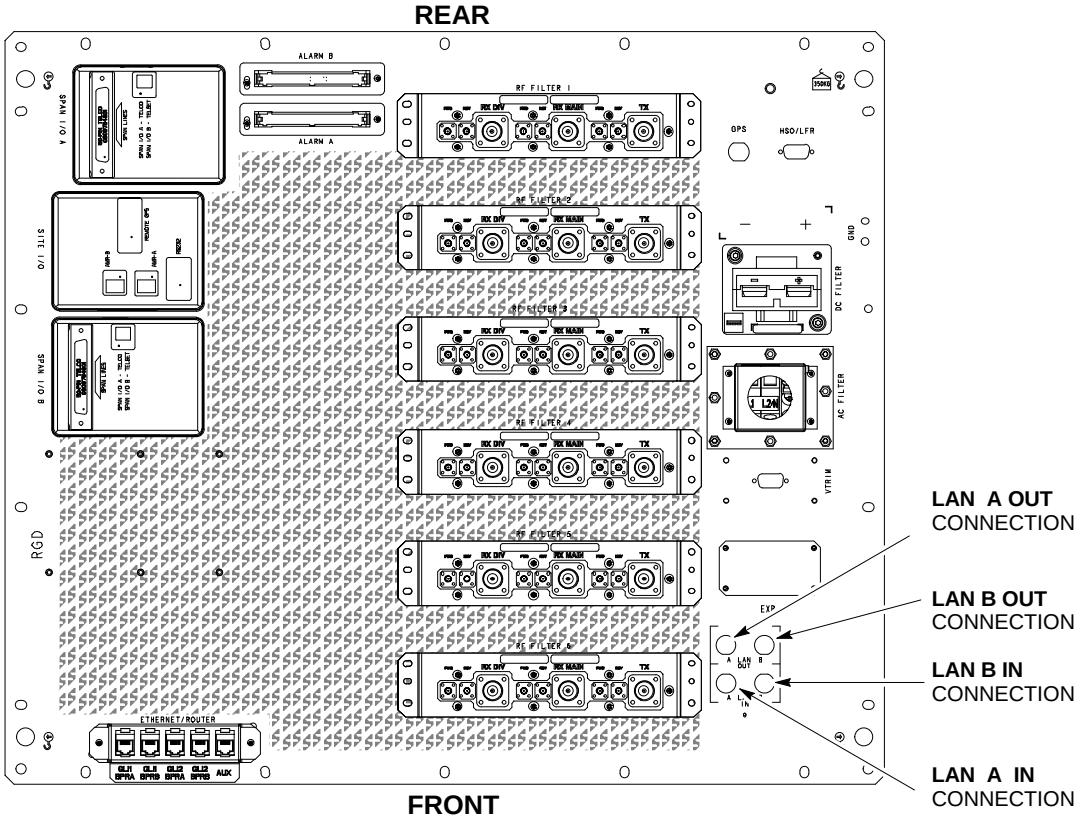


Ethernet LAN Termination

For proper operation, each end of the Primary and Redundant BTS Ethernet Local Area Networks (LANs) must be terminated with a 50 Ohm Load. For a BTS consisting of a Stand–Alone or an Expansion Frame, this is done by placing 50 Ohm Tri–axial Terminators on the LAN A and B External IN and OUT Connectors.

Check the LAN A and B External IN and OUT Connectors on the I/O Panel of each BTS Frame. Refer to Figure 2-3. Ensure terminators are installed on all the uncabled External LAN Connectors.

Figure 2-3: External Ethernet LAN Connectors



ti-CDMA-WP-00214-v01-ildoc-ftw REF

2

Objective

This procedure checks for any electrical short circuits and verifies the operation and tolerances of the Cell Site and BTS Power Supply Modules prior to applying power for the first time.

Test Equipment

The following Test Equipment is required to complete the Pre–Power–up Tests:

- Digital Multimeter (DMM)

CAUTION

Always wear a Conductive, High Impedance Wrist Strap while handling the any circuit card/module to prevent damage by Electrostatic Discharge (ESD).

Cabling Inspection

Using the Site–specific Documentation generated by Motorola Systems Engineering, verify that the following Cable Systems are properly connected:

- Receive RF Cabling – up to 12 RX Cables
- Transmit RF Cabling – up to six TX Cables
- GPS

NOTE

- The Negative DC Power Cable is colored red or blue.
- The Positive DC Power Cable (Ground) is colored black.

DC and AC Power Pre-test (BTS Frame)

Before applying any power to the BTS Frame, perform the procedure in Table 2-2 while referring to Figure 2-4 to verify that there are no shorts in the BTS Frame DC and AC Distribution System.

Table 2-2: DC and AC Power Pre–test (BTS Frame) Procedure

✓	Step	Action
	1	Physically verify that all DC and AC Power Sources supplying electric power to the BTS Frame are OFF (Customer Breakers open, i.e.: High Impedance).
	2	Perform the following actions on each BTS Frame.

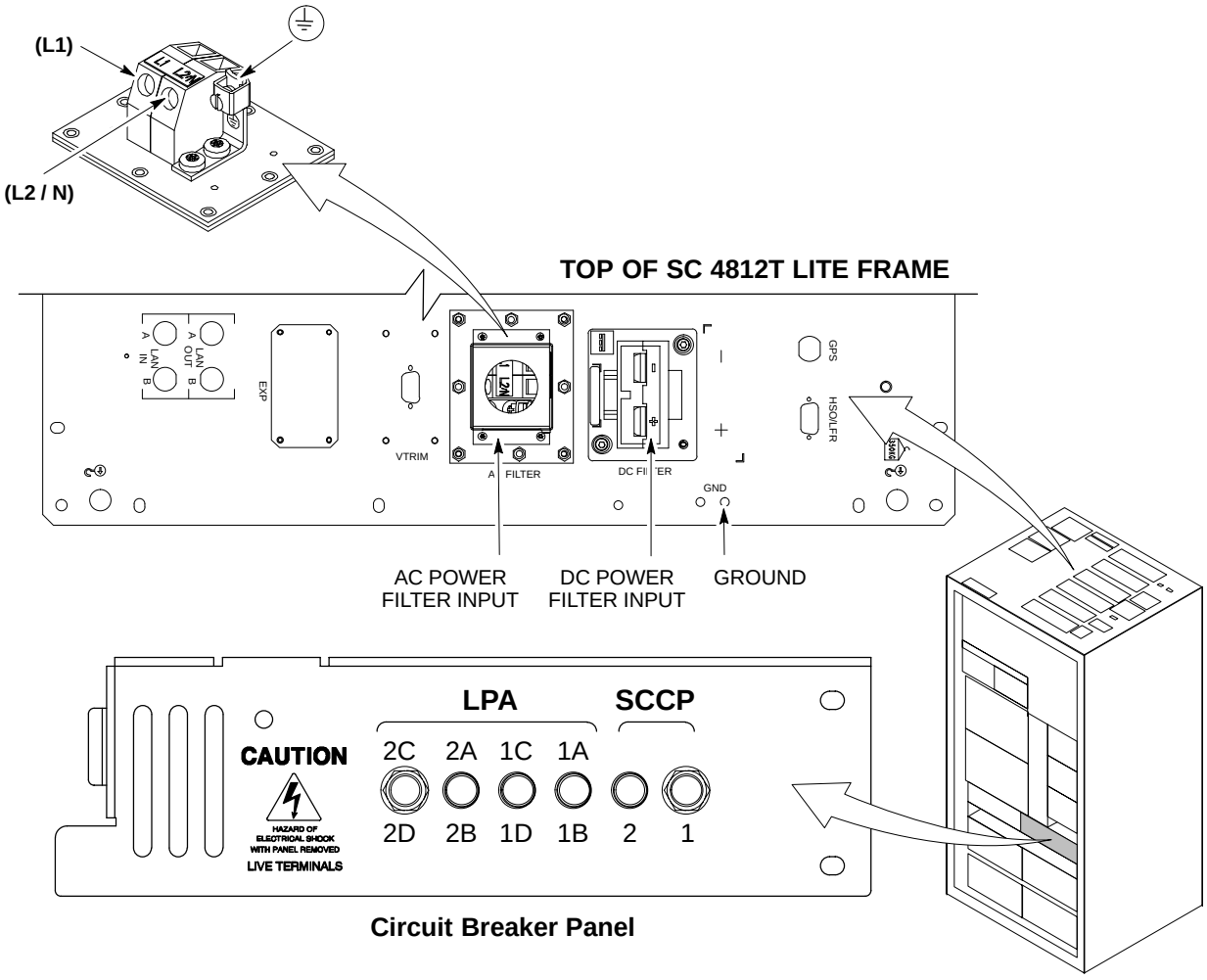
table continued on next page

Table 2-2: DC and AC Power Pre–test (BTS Frame) Procedure		
✓	**Step**	**Action**
	2a	Unseat all circuit boards (except the CCD and CIO Cards) in the SCCP Cage and CLPA Shelves, but leave them in their associated slots.
	2b	Set both of the SCCP Cage Circuit Breakers to the **OFF** position by ***pulling out*** their Power Distribution Circuit Breakers (labeled **SCCP 1 and SCCP 2**). – These circuit breakers are located on the Power Distribution Panel.
	2c	Set the four CLPA Circuit Breakers to the **OFF** position by ***pulling out*** the CLPA Circuit Breakers (four Circuit Breakers, labeled **LPA 1A–1D** through **LPA 2A–2D**). – These circuit breakers are located on the Power Distribution Panel.
	2d	Select your type of BTS Frame. • Proceed to Step 3 for –48V Systems. • Proceed to Step 4 for +27V Systems.
	3	For –48V Configurations ONLY: Perform the following actions to verify that the resistance on the –48V Bus.
	3a	Remove the Power Supply Modules (PSMs).
	3b	Verify that the resistance from the Positive (+) Power Feed Terminal with respect to the Ground Terminal on the top of the frame measures > **500 Ω**. – Refer to Figure 2-4.
	3c	Verify that the resistance from the Negative (–) Power Feed Terminal with respect to the Ground Terminal on the top of the frame measures > **500 Ω**. – This assumes that Customer Interface Cabling and Grounding has been installed; otherwise, the measurement should be < **5 Ω**. – Refer to Figure 2-4.
	4	**For AC Configurations ONLY:** Perform the following actions to verify that the resistance on the AC Frame. **△ WARNING** Ensure that the AC Circuit Breaker is OFF (and tagged/locked) prior to proceeding. Confirm that AC Voltage is not being applied to the BTS Frame.
	4a	Measure the resistance from L1 with respect to the Ground Terminal on the top of the frame measures >**10** kilohm. – Refer to Figure 2-4.
	4b	Access the L1 Terminal on the AC Filter or probe the L1 Socket in the PSM Slot. – Lightly probe the socket to avoid damaging the socket.
	4c	Measure the resistance from L2/N with respect to the Ground Terminal on the top of the frame measures >**10** kilohm. – Refer to Figure 2-4.

table continued on next page

Table 2-2: DC and AC Power Pre–test (BTS Frame) Procedure		
✓	**Step**	**Action**
	4d	Access the L2/N terminal on the AC Filter or probe the L2/N socket in the PSM Slot. – Lightly probe the socket to avoid damaging the socket.
	4e	If the reading is **< 500** Ω, an electrical short may be present somewhere in the AC Filter and PSM Shelf. – Isolate the problem and correct it before proceeding.
	5	Insert and lock the DC/DC Converter Modules for the SCCP Cage into their associated slots one at a time.
		! CAUTION Verify that the correct Power Supply Modules are be ing used by checking the Locking/Retracting Tabs. They should appear as follows. **STPN4009B** **PWR C–CCP 4812 +27V**
	6	Insert and lock all remaining cards, boards, and modules into their assigned slots in the SCCP Cage.
	7	In the –48V and AC BTS Frames, insert the Power Supply Modules one at a time in their assigned slots.
	8	Seat all CLPA and associated CLPA Fan Modules into their slots in the shelves one at a time.

Figure 2-4: AC and DC Power Distribution Breakers and Power Feed Terminals



Power-up Procedures

WARNING

Potentially lethal voltage and current levels are routed to the BTS Equipment.

This test must be performed with a second person present who will be acting in a safety role.

Remove all rings, jewelry, and wrist watches prior to beginning this test.

Input Power

In the tests to follow, power will first be verified at the input to each BTS Frame. After power is verified, cards and modules within the frame itself will be powered up and verified one at a time.

Before applying any power, verify that the correct Power Feed and Return Cables are connected between the Power Supply Module Circuit Breakers and the Power Connectors at the top of each BTS Frame. Verify correct cable position referring to Figure 2-4 on Page 2-9.

CAUTION

Always wear a Conductive, High Impedance Wrist Strap while handling any circuit card/module to prevent damage by Electrostatic Discharge (ESD).

Extreme care should be taken during the removal and installation of any card/module.

After removal, the card/module should be placed on a conductive surface or back into the anti–static bag in which it was shipped.

NOTE

For Positive Power Applications (+27V):

- The Positive Power Cable is red.
- The Negative Power Cable is black.

For Negative Power Applications (–48V):

- The Negative Power Cable is red or blue.
- The Positive Power Cable (ground) is black.

NOTE

Make sure the Connector Adapters are securely attached to each of the BTS Power Feeds and Returns.

Also, make sure the cables have been properly installed into each connector.

Common Power Supply Module Verification

The procedure in Table 2-5 must be performed on any BTS Frame connected to a common Power Supply Module at the site *after the common Power Supply Module has been installed and verified per the OEM suggested Power Supply Module procedures.*

Perform the following steps to verify that the Power Input is within specification *before* powering up the individual cards/modules within the frames themselves.

Table 2-3: Common Power Supply Module Verification Procedure

✓	Step	Action
	1	Physically verify that all DC and AC Power Sources supplying the frame are **OFF** or **DISABLED**.
	2	Perform the following actions in each BTS Frame:
	2a	Unseat all circuit boards (except the CCD and CIO Cards) in the SCCP Cage and LPA Shelves, but leave them in their associated slots.
	2b	Set the circuit breakers to the **OFF** position by *pulling out* the SCCP and LPA Circuit Breakers. – SCCP Cage Circuit Breakers are labeled **SCCP–1** and **SCCP–2**. – CLPA Circuit Breakers are labeled **LPA 1A–1D** through **LPA 2A – 2D**. – Refer to Figure 2-4 for the Circuit Breaker Panel layout if required.
	1	Remove the Power Supply Modules.
	2	Inspect the Input Cables to verify that the correct Input Power Polarity according to the decal on top of the frame.
	3	Apply power to BTS Frames, *one at a time*, by setting the appropriate circuit breaker in the Power Supply Module that supplies the frame to the **ON** position.
	4	After power is applied to each BTS Frame, use a digital voltmeter to verify Power Supply Module Output Voltages at the top of each BTS Frame are within specifications: – *–48V BTS:* **–48V DC nominal** – *+27 V BTS:* **+27V DC nominal** – *AC BTS:* **208V AC to 240V AC nominal**
	5	Plug in the Power Supply Modules (PSMs) one at a time and verify that the PSM LEDs appear GREEN.

Initial Power-up (BTS)

The procedure in Table 2-4 must be performed on each BTS Frame after Input Power from the common Power Supply Module has been verified. Perform the procedure in Table 2-4 to apply initial power to the cards/modules within the frame itself, verifying that each is operating within specification.

Table 2-4: Initial Power–up (BTS) Procedure

✓	Step	Action
	1	At the BTS, set the SCCP Power Distribution Circuit Breakers to the **ON** position by ***pushing in*** the circuit breakers. – Refer to Figure 2-4 on Page 2-9.
	2	Insert the SCCP Fan Modules. – Verify that the Fan Modules come on line.
		! CAUTION Verify that the correct SCCP Power Supply Modules are being used by checking the markings on the Locking/Retracting Tabs. Make sure that the markings appear as follows: **STPN 4009B PWR C–CCP 4812 +27V**
	3	Insert and lock the Power Supply Modules into their associated slots *one at a time*. – If no cards are installed in the SCCP Cage, the **PWR/ALM** LEDs on all three Power Supply Modules appear RED to notify the user that there is no Load on the Power Supply Modules. – If the LED is RED, do not be alarmed. After Step 3 is performed, the LEDs should turn GREEN; if not, then a faulty Power Supply Module is indicated and should be replaced *before proceeding*.
	3	Seat and lock all remaining cards and modules in the SCCP Cage into their associated slots.
	4	Seat the first equipped LPA Module Pair into the assigned slot in the upper LPA Shelf, including the LPA Fan.
	5	Repeat Step 4 for all remaining LPA Module Pairs.
		! CAUTION On frames that have CLPA Modules, engage the circuit breakers in pairs as marked on the Circuit Breaker Panel.
		NOTE Engage the circuit breakers only for the LPA Modules that are equipped.
	6	Set the LPA Circuit Breakers to the ON position *(per configuration*) by pushing them IN. – Confirm that the LEDs on LPA Modules light GREEN. – Refer to Figure 2-4 for the Circuit Breaker Panel Layout.

Table 2-4: Initial Power–up (BTS) Procedure		
✓	**Step**	**Action**
	7	After all cards/modules have been seated and verified, use a digital voltmeter to verify that Power Supply Module Output Voltages measured at the top of the frame remain within specifications: – *On –48V BTS:* **–48V DC nominal** – *On +27 V BTS:* **+27V DC nominal** – *On AC BTS:* **208 to 240V AC nominal**
	8	Repeat Steps 1 through 7 for additional co–located frames (if equipped).

Common Power Supply Module Verification

The procedure in Table 2-5 must be performed on any BTS Frame connected to a common Power Supply Module at the site *after the common Power Supply Module has been installed and verified per the OEM Power Supply Module suggested procedures.*

Perform the procedure in Table 2-5 to verify that the Power Input is within specification *before* Power–up is attempted on the individual cards/modules with the frames themselves.

Table 2-5: Common Power Supply Module Verification Procedure		
✓	**Step**	**Action**
	1	Physically verify that all DC and AC Power Sources supplying the frame are **OFF** or **DISABLED**.
	2	Perform the following actions on each BTS Frame:
	2a	*Unseat* all circuit boards (except CCD and CIO Cards) in the SCCP Cage and LPA Shelves, but leave them in their assigned slots.
	2b	Set the SCCP and LPA Circuit Breakers to the **OFF** position by *pulling them out*. – SCCP Cage Circuit Breakers are labeled **SCCP–1** and **SCCP–2**. – CLPA Circuit Breakers are labeled **LPA 1A–1D** through **LPA 2A–2D**. – Refer to Figure 2-4 for the Circuit Breaker Panel Layout, if required.
	3	Remove the Power Supply Modules.
	4	Inspect the Input Cables to verify that the Input Power Polarity is correct according to the decal on top of the frame.
	5	Apply power to the BTS Frames one at a time.
	6	After power is applied to each BTS Frame, use a digital voltmeter to verify that Power Supply Module Output Voltages at the top of each BTS Frame are within specifications: – *On –48V BTS:* **–48V DC nominal** – *On +27 V BTS:* **+27V DC nominal** – *On AC BTS:* **208 to 240V AC nominal**

table continued on next page

Table 2-5: Common Power Supply Module Verification Procedure		
✓	**Step**	**Action**
	7	Plug in the Power Supply Modules one at a time.
	8	Verify that the PSM LED on each Power Supply Module appears GREEN.

Power Removal

Introduction

DC and AC Power removal from an SC4812T Lite BTS is accomplished by performing the procedure in Table 2-6.

Some maintenance, upgrade, or other activities may only require removing DC Power. In those situations where *all* power must be removed from a frame, removing AC Power will also be required.

Remove Power

If it becomes necessary to remove power from the frame, refer to Figure 2-4 and perform the procedure in Table 2-6.

Table 2-6: Power Removal Procedure

✓	Step	Action
	1	Set all PDA Circuit Breakers to the **OFF** (pulled out) position in the following sequence:
	1a	Pull out the four LPA Circuit Breakers labeled **1A–1D** through **2A–2D**.
	1b	Pull out the two Power Distribution Assembly (PDA) Circuit Breakers labeled **SCCP–1** and **SCCP–2**.
	2	Confirm that all LEDs are OFF except for the Power Supply Module LEDs, if present.
	3	Remove all DC Power Sources (+27V, –48V, or Battery Back–up) to the BTS Frame by disengaging the appropriate Customer Circuit Breakers.
	4	Remove the AC Power, then lock and tag the AC Power Box (AC Frame only).
	5	Verify that all PSM LEDs are OFF.
		△ **WARNING** The Surge Capacitors in the DC PDA stores large electrical charges for long periods of time. Failure to discharge these capacitors as specified in Step 6 could result in serious personal injury and/or damage to the equipment.
	6	On the DC PDA, set the SCCP1 and SCCP2 Circuit Breakers to the **ON** (pushed in) position, and *wait at least 30 seconds*.
	7	Set the PDA SCCP1 and SCCP2 Circuit Breakers to the **OFF** position.

Notes

Chapter 3: Optimization/Calibration

Table of Contents

Notes

Overview

This section describes procedures for the following tasks.

- Isolating the BTS from the Span Lines.
- Preparing and using the LMF.
- Downloading System Operating Software.
- CSM Reference Verification/Optimization.
- Set–up and Calibration of the supported Test Equipment.
- Transmit/Receive Path Verification.
- Using the RFDS.
- Verifying that the Customer–defined Alarms and Relay Contacts are functioning properly.

NOTE

Before using the LMF, use a Text Editor to view the "CAVEATS" section in the "readme.txt" File in the c:\wlmf Folder for any applicable information.

Optimization Process Summary

After a BTS is physically installed and the Preliminary Operations, such as Power–up, have been completed, the LMF is employed to optimize the BTS. Companion Frames must be optimized individually as separate BTSs. The basic Optimization Process consists of the following:

Table 3-1: Basic Optimization Procedure

✓	Step	Action
	1	Enable CSM 2. `omc-000000 >`**ENABLE CSM–**`<bts#>`**–2**
	2	Verify that CSM 2 is INS_ACTIVE. `omc-000000 >`**STATUS CSM–**`<bts#>`**–1 PHY** • If CSM 2 ***is*** INS_ACTIVE, *proceed to Step 5.* • If CSM 2 ***is not*** INS_ACTIVE, *call the Customer Network Resolution Center.*
	3	Enable CSM 1. `omc-000000 >`**ENABLE CSM–**`<bts#>`**–1**
	4	Verify that CSM 1 is INS_ACTIVE and CSM 2 is INS_STANDBY. `omc-000000 >`**DISPLAY BTS–**`<bts#>` **STATUS** • If CSM 1 ***is*** INS_ACTIVE and CSM 2 ***is*** INS_STANDBY, *proceed to Step 6.* • If CSM 1 ***is not*** INS_ACTIVE and/or CSM 2 ***is not*** INS_STANDBY, *call the Customer Network Resolution Center.*

table continued on next page

Table 3-1: Basic Optimization Procedure

✓	Step	Action
	5	Code Load the first MGLI. omc-000000 >**LOAD MGLI-**<*bts#*>**-1** *** IMPORTANT** The parent CSM(s) must be in service. **NOTE** The GLI can be either a GLI2 or a GLI3.
	6	Code Load each BBX, and then the BBXR. omc-000000 >**LOAD BBX-**<*bts#*>**-**<*bbx#*> omc-000000 >**LOAD BBX-**<*bts#*>**-**<*bbxr#*>
	7	Verify that the PWR/ALM LED on each BBX and the BBXR goes **GREEN**. • If **all** the LEDs ***do go* GREEN**, *proceed to Step 8.* • If **any** LED ***does not go* GREEN**, *replace the faulty BBX.* – Refer to the *1X SC4812T Lite BTS FRU* manual (68P09262A60) Manual for replacement instructions.
	8	Code Load each remaining GLI. omc-000000 >**LOAD MGLI-**<*bts#*>**-**<*mgli#*> *** IMPORTANT** The parent CSM(s) must be in service. **NOTE** The GLI Cards can be either GLI2s or GLI3s.
	9	Code Load each MCC. omc-000000 >**LOAD MCC-**<*bts#*>**-**<*mcc#*>
	10	Code Load the RFDS TSIC or RFDS–1X RPROC (if installed). omc-000000 >**LOAD TSIC-**<*bts#*>**-**<*tsic#*> or omc-000000 >**LOAD RPROC-**<*bts#*>**-**<*rproc#*>

table continued on next page

Table 3-1: Basic Optimization Procedure

✓	Step	Action
	11	Use the LMF Status Function to verify that all of the CSM Cards, BBX Cards, GLI Cards, and MCC Cards respond with Device Status information. – If an RFDS is installed, verify that the TSU or RFDS–1X RPROC responds. **NOTE** If a device is installed and powered up, but is not responding and is colored GRAY in the LMF BTS Display, the device is not listed in the CDF File. – The CDF/NECF File must be corrected before the device can be accessed by the LMF.
	12	Verify that the GPS and HSO are operational.
	13	Using the LMF Selection Function, select the Test Equipment that is to be used for the Calibration.
	14	Calibrate the TX and RX Test Cables, if they have not previously been calibrated with the LMF Computer and Software Build that will be used for the Optimization/Calibration. – Cable Calibration Values can be entered manually, if required.
	15	Connect the required Test Equipment needed for a Full Optimization.
	16	Select all of the BBX Cards and all of the MCC Cards. Use the Full Optimization Function. – The Full Optimization Function performs TX Calibration, BLO Download, TX Audit, all TX Tests, and all RX Tests for all selected devices. • If the TX Calibration fails, repeat the Full Optimization for any failed paths. • If the TX Calibration fails again, troubleshoot and correct the problem causing the failure, and repeat the Full Optimization for the failed path. • If the TX Calibration and Audit Portion of the Full Optimization passes for a path, but some of the TX or RX Tests fail, troubleshoot and correct the problem causing the failure, and run the individual tests as required until all TX and RX Tests have passed for all paths.

Cell Site Types

Sites are configured as Omni/Omni or Sector/Sector (TX/RX). Sector/Sector sites are the Three–Sector Configuration. The SC4812ET Lite does not support Six–Sector Operation. Each Cell Site Type has unique characteristics and must be optimized accordingly.

NOTE

For more information on the different Site Types, please refer to the applicable *Hardware Installation* Manual.

CDF/NECF

The CDF/NECF (Configuration Data File/Network Element Configuration File) contains information that defines the BTS and data used to download files to the devices. A CDF/NECF File must be placed in the applicable BTS Folder before the LMF can be used to log into that BTS.

CDF/NECF Files are normally obtained from the CBSC using a Floppy Disk. A File Transfer Protocol (FTP) Method can be used if the LMF Computer has that capability. Refer to the *WinLMF On-Line Help SR2.16.x* for more information.

The CDF/NECF includes the following information:

- Download Instructions and Protocol
- Site–specific Equipage Information
- SCCP Cage Allocation Plan
  - BBX Equipage (based on Cell Site Type) including IS–95A/B or CDMA2000 1X Capability and Redundancy
  - CSM Equipage including Redundancy
  - Multi–Channel Card 24E, 8E, or –1X (MCC24E, MCC8E, or MCC–1X) Channel Element Allocation Plan. This plan identifies how the SCCP Cage is configured, and how the Paging, Synchronization, Traffic, and Access Channel Elements (and associated Gain Values) are assigned among the (up to 4) MCC24Es, MCC8Es, and/or MCC–1Xs in the SCCP Cage.
- Effective Rated Power (ERP) Table for all TX Channels to Antennas respectively. Motorola System Engineering specifies the ERP of a Transmit Antenna based on site geography, antenna placement, and government regulations.

  Working from this ERP Requirement, Antenna Gain and Antenna Feed Line Loss can be combined to calculate the required Transmit Power at the BTS Frame Antenna Connections. The corresponding BBX Output Power required to achieve that Power Level on any channel/sector can then be determined based on Bay Level Offset (BLO) Data established during the Optimization Process.

NOTE

Refer to Figure 3-1 and the *LMF Help Function On–line Documentation* for additional information on the layout of the LMF Directory Structure (including CDF/NECF File locations and formats).

BTS System Software Download

BTS System Software must be successfully downloaded to the BTS Processor Cards before Optimization can be performed. BTS Operating Code is loaded from the LMF Computer.

- BTSs configured for Circuit Backhaul use bts.CDF Files.
- BTSs configured for Packet Backhaul use bts.necf Files (bts–xxx.xml) located on the OMC–R.

IMPORTANT

Before using the LMF for Optimization/ATP, the correct **bts–#.cdf** and **cbsc–#.cdf** or **bts–#.necf** and **cbsc–#.necf** files for the BTS must be obtained from the CBSC and put in a **bts–#** folder in the LMF.

Failure to use the correct CDF/NECF Files can cause wrong results.

Failure to use the correct CDF/NECF Files to log into a live (traffic carrying) site can shut down the site.

The CDF/NECF is normally obtained from the CBSC on a DOS–formatted diskette, or through a File Transfer Protocol (FTP) if the LMF Computer has FTP Capability. Refer to the *LMF On–line Help Documentation Function* for the procedure.

Site Equipage Verification

If you have not already done so, use a Text Editor to view the CDF/NECF, and review the Site Documentation. Verify that the Site Engineering Equipage Data in the CDF/NECF matches the actual site hardware using a CDF/NECF Conversion Table.

CAUTION

- Use extreme care not to make any changes to the CDF/NECF File content while viewing the file. Changes to the CDF/NECF File can cause the site to operate unreliably or render it incapable of operation.
- Always wear a Conductive, High Impedance Wrist Strap while handling any circuit card/module to prevent damage by Electrostatic Discharge (ESD).
- Extreme care should be taken during the removal and installation of any card/module. After removal, the card/module should be placed on a conductive surface or back into the anti–static bag in which it was shipped.

Overview of Packet BTS Files

Software Release 16.0 and earlier releases contained the Configuration File named CDF for each BTS and CBSC that is used by LMF. In Software Release 16.1 for Packet BTS Platforms, for BTSs with GLI3 Booting in Packet Binary Mode, the CDF is replaced by two new Configuration Files called **Network Element Configuration Base (NECB)** and **Network Element Change Journal (NECJ)**.

The NECB contains the Baseline Configuration and is analogous to the CDF, while the NECJ contains all the changes made to the configuration since the last time the NECB was regenerated. Once the NECJ gets to 80% of its maximum size, the NECB is regenerated and all the updates are rolled into it.

These files play much broader and vital role than previous CDF Files. GLI3 Booting in Circuit Binaries works similar to R16.0.

A few LMF related important facts about these files are listed below.

- Both files (NECB and NECJ) are in XML Format.
- NECB contains all the up-to-date Static Configuration Information, and NECJ contains all the recent changes (including operations) that are not updated in the NECB.
- Both files can be viewed in any XML Viewer (most easily available is Internet Explorer V5.0 and higher). They can also be viewed by any other word processor, but the XML Tags will not be hidden from view.
- These files are created by the OMC–R from the MIB as per BTS Provisioning.
- These files are regenerated for each Software Release Upgrade on the system for each BTS.
- These files reside on both the OMC–R and Packet Backhaul GLI3 (unlike CDF) and are periodically synchronized between them.
- Both NECB and NECJ Files contain a “SoftwareVersion” Field in their Header Section identifying the System Release Version of these files.
- Instead of the **`bts#.CDF File`**, the Packet LMF uses a **`bts#`**.XML File, that is a copy of the NECB.XML File.
- The Packet GLI3 needs these files for Site Initialization.
- The scope of the NECB File has grown much broader than that of the CDF File and has much more BTS–centric information.

IMPORTANT

The use of generic versions of the NECB and NECJ Files should be **strictly avoided** in order to preserve the correct Site Initialization.

LMF Features and Installation Requirements

Before Optimization can be performed, the LMF Application Software must be installed and configured on a computer platform meeting Motorola–specified requirements. Refer to Required Test Equipment and Software in Chapter 1.

NOTE

In order for the LMF Graphics to display properly, the computer platform must be configured to display more than 256 colors. See the Operating System Software Instructions for verifying and configuring the Display Settings.

Software Files for installing and updating the LMF are provided on CD–ROM Disks. The following items must be available:

- LMF Application Program on CD–ROM
- CDF/NECF for each supported BTS (on diskette or available from the CBSC)
- CBSC File for each supported BTS (on Floppy Disk or CD–ROM)

FTP Server

To be able to download files to the GLI3, the LMF now runs FTP Server Software on the LMF Laptop. The LMF FTP Server runs from the LMF"s Home Directory. All the files necessary to run the LMF FTP Server are installed from the LMF CD–ROM. The FTP Server is automatically started by the LMF upon successful Login to a Packet BTS.

In addition, the LMF provides a new option in the Tools Menu called FTP Server. The option starts the LMFs FTP Server if **Start** is selected, and stops the server if **Stop** is selected. The LMFs FTP Server runs on Port 21.

If any other process is using that port, an Error Message is displayed to the user stating that the port is occupied. There is another option under the FTP Server Menu called FTP Monitor, that allows the user to watch FTP Activity between the LMF and GLI.

Firewalls

Firewalls will block the FTP Requests from the Packet GLI to the LMF Laptop. You must disable your firewall before attempting the **BTS Synch** Command. Some common firewall programs to look for include Network ICE, BlackICE, Norton's Desktop Firewall, Enterprise Firewall, and Personal Firewall.

FTP Server Port In Use

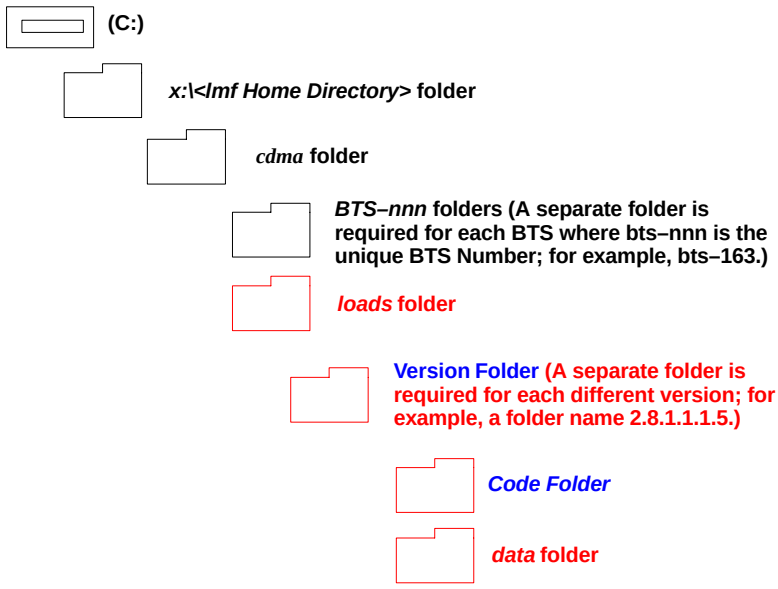
On some Windows 2000 Installations, a process called "**inetd.exe**" makes the FTP Server Port 21 unusable by the LMF. If the LMF reports that the FTP Server could not start because the port is in use, make sure the **inetd.exe** is not running by using the Task Manager's Process List.

If **inetd.exe** is running, end the process by selecting it and clicking the "End Process" Button. The process named "**inetd32.exe**" is NOT the same, and ending it will not resolve this problem.

LMF File Structure Overview

The LMF uses a **<*x*>:\<*lmf Home Directory*>** Folder that contains all of the essential data for installing and maintaining the BTS. The following list outlines the folder structure for the LMF. Except for the **bts-nnn** folders, these folders are created as part of the LMF Installation. Refer to the *CDMA LMF Operator's Guide* for a complete description of the folder structure.

Figure 3-1: LMF Folder Structure



NOTE

The "loads" folder and all the folders below it are not available from the LMF for Software Release R2.16.5.x. These folders may be present as a legacy from previous software versions or downloaded from the CBSC/OMC–R.

LMF Home Directory

The LMF Installation Program creates the Default Home Directory, **`c:\wlmf`**, and installs the application files and subdirectories (folders) in it. Because this can be changed at installation, the CDMA LMF Home Directory is referred to by the following generic name:

<x>:\<lmf Home Directory>

Where:

<x> = the LMF Computer Drive Letter where the CDMA LMF Home Directory is located.

<lmf Home Directory> = the Directory Path or Name where the CDMA LMF is installed.

NECF Filename Conventions and Directory Location

NECF

The NECF actually consists of two files: the NECB and NECJ. The naming convention for the NECB and NECJ is:

NECB*bts#.xml

NECJ*bts#.xml

Where:

* = any characters can be substituted there

= the actual integer BTS Number

The NECB and its corresponding NECJ must have the exact same name, except for the "B" and "J" difference after the Initial NEC Characters.

The NECB and the NECJ must reside in the **<LMF_HOME>\cdma\bts–#** directory corresponding to the BTS Frame they are for.

Load Information File (LIF)

The LIF contains all the Devices Binaries available for the specified System Software Release. It is the functional equivalent of the OLF File that is used in Circuit Backhaul Protocol.

The naming convention for the LIF is:

NE_LIF.xml

The LIF must reside in the **<LMF_HOME>\cdma\loads\<Software Release Number>** directory, where **<LMF_HOME>** is the Home Directory in which the LMF is installed.

– Usually **C:\wlmf <Software Release Number>** is the System Software Release Number (e.g. 2.16.1.0.10).

Cal File

The Cal File still resides in the **<LMF_HOME>\cdma\bts–#** Directory and is named **bts–#.cal**, where # is the actual integer number of the BTS.

LMF Installation and Update Procedures

This section provides information and instructions for installing and updating the LMF Software and Files.

NOTE

First Time Installation Sequence:

1. Install Java Runtime Environment (JRE)
2. Install U/WIN K–Shell Emulator
3. Install LMF Application Programs
4. Install/create BTS Folders

Any time you install U/WIN, you must install the LMF Software because the installation of the LMF modifies some of the files that are installed during the U/Win Installation. Installing U/Win overwrites these modifications.

There are multiple Binary Image Packages for installation located on the CD–ROM. When prompted, choose the package that corresponds to the Switch Software Release that is currently installed.

- Perform the Device Images install after the WinLMF Installation.
- If applicable, a separate CD–ROM of BTS Binaries may be available for Binary Updates.

Perform the procedure in Table 3-2 to install the LMF Application Program using the LMF CD–ROM.

Table 3-2: Install the LMF using a CD–ROM Procedure

✓	Step	Action
	1	Insert the LMF CD–ROM Disk into your Disk Drive and perform the following as required:
	1a	If the Set–up Screen appears, follow the instructions displayed on the screen.
	1b	If the Set–up Screen is not displayed, proceed to Step 2.
	2	Click on the **Start** Button.
	3	Select **Run**.
	4	Enter **d:\autorun** in the Open Box and click **OK.** **NOTE** If the CD–ROM Drive is not Drive “D”, replace the letter **d** in the command above with the correct CD ROM Drive Designator.

Copy BTS and CBSC CDF (or NECF) Files to the LMF Computer

Before logging on to a BTS with the LMF Computer to execute Optimization/Acceptance Test Procedures, the correct **bts-#.cdf** and **cbsc-#.cdf** (or **bts–#.necf** and **cbsc–#.necf**) Files must be obtained from the CBSC and put in a **bts-#** folder in the LMF Computer. This requires creating versions of the CBSC CDF Files on a DOS–formatted Floppy Diskette and using the diskette to install the CDF Files on the LMF Computer.

– If the LMF has FTP Capability, the FTP method can be used to copy the CDF or NECF Files from the CBSC.

– On Sun OS workstations, the **UNIX2DOS** command can be used in place of the **CP** Command (e.g., **unix2dos bts–248.cdf bts–248.cdf**). This should be done using a copy of the CBSC CDF File so the original CBSC CDF File is not changed to DOS Format.

NOTE

When copying CDF and NECF Files, comply with the following conventions to prevent BTS Login problems with the Windows LMF:

- The numbers used in the **bts-#.cdf** and **cbsc-#.cdf** (or **bts–#.necf** and **cbsc–#.necf**) file names must correspond to the locally-assigned numbers for each BTS and its controlling CBSC.
- The generic **cbsc–1.cdf** (or **cbsc–#.necf**) file supplied with the Windows LMF will work with locally numbered BTS CDF Files. Using this file *will not provide a valid Optimization* unless the generic file is edited to replace default parameters (e.g., Channel Numbers) with the operational parameters used locally.

The procedure in Table 3-3 lists the steps required to transfer the CDF Files from the CBSC to the LMF Computer. For further information, refer to the *LMF On–Line Help*.

Table 3-3: Copy CDF or NECF Files to the LMF Computer Procedure

✓	Step	Action
AT THE CBSC:		
	1	Login to the CBSC Workstation.
	2	Insert a DOS–formatted Floppy Diskette in the Workstation Floppy Drive.
	3	Type **eject –q** and press the **Enter** Key.

table continued on next page

Table 3-3: Copy CDF or NECF Files to the LMF Computer Procedure

✓	Step	Action
	4	Type **mount** and press the **Enter** Key. **NOTE** • Look for the *"floppy/no_name"* message on the last line displayed. • If the **EJECT** Command was previously entered, *floppy/no_name* will be appended with a number. Use the explicit *floppy/no_name* reference displayed when performing Step 7.
	5	Change to the directory, where the files to be copied reside, by typing **cd** `<directoryname>` (e.g., **cd bts–248**) and pressing the **Enter** Key.
	6	Type **ls** and press the **Enter** Key to display the list of files in the directory.
	7	In Solaris UNIX, create DOS–formatted versions of the **bts-#.cdf** and **cbsc-#.cdf** (or **bts–#.necf** and **cbsc–#.necf**) *F*iles on the diskette by entering the following command: **unix2dos** `<source filename>` **/floppy/no_name/**`<target filename>` (e.g., **unix2dos bts–248.cdf /floppy/no_name/bts–248.cdf**). **NOTE** Other versions of UNIX do not support the **unix2dos** and **dos2unix** Commands. – In these cases, use the UNIX **cp** (Copy) Command. The *copied* files will be difficult to read with a DOS or Windows Text Editor because UNIX Files do not contain Line Feed Characters. Editing *copied* CDF Files on the LMF Computer is, therefore, not recommended. – Using **cp**, multiple files can be *copied* in one operation by separating each filename to be copied with a space and ensuring the destination directory (*floppy/no_name*) is listed at the end of the command string following a space (e.g., **cp bts–248.cdf cbsc–6.cdf /floppy/no_name**).
	8	Repeat Step 5 through Step 7 for each BTS (bts–#) that must be supported by the LMF Computer.
	9	When all required files have been copied to the diskette, type **EJECT** and press the **Enter** Key.
	10	Remove the diskette from the CBSC Drive.
AT THE LMF:		
	11	Start the *Windows* Operating System is not running on the LMF Computer.
	12	Insert the diskette containing the **bts-#.cdf** and **cbsc-#.cdf** (or **bts–#.necf** and **cbsc–#.necf**) Files into the LMF Computer.
	13	Using *MS Windows* Explorer, create a corresponding bts–# folder in the **<*x*>:\<*lmf Home Directory*>\cdma** Directory for each **bts–#.cdf**/**cbsc–#.cdf** (or **bts–#.necf**/**cbsc–#.cdf**) File Pair copied from the CBSC.
	14	Use *MS Windows* Explorer to transfer the **bts-#.cdf** and **cbsc-#.cdf** (or **bts–#.necf** and **cbsc–#.necf**) Files from the diskette to the corresponding **<*x*>:\<*lmf Home Directory*>\cdma\bts–#** Folders created in Step 13.

Creating a Named HyperTerminal Connection for MMI Communication

Confirming or changing the Configuration Data of certain BTS Field Replaceable Units (FRU) requires establishing an MMI Communication Session between the LMF and the FRU.

Using features of the *Windows* Operating System, the connection properties for an MMI Session can be saved on the LMF Computer as a named *Windows* HyperTerminal Connection. This eliminates the need for setting up Connection Parameters each time an MMI Session is required to support Optimization.

Once the named connection is saved, a shortcut for it can be created on the *Windows* Desktop. Double–clicking the Shortcut Icon will start the connection without the need to negotiate multiple menu levels.

Perform the procedure in Table 3-4 to establish a named HyperTerminal Connection and create a *Windows* Desktop Shortcut for it.

Table 3-4: Create HyperTerminal Connection Procedure

✓	Step	Action
	1	From the Windows Start Menu, select: **Programs>Accessories>**
	2	Perform one of the following: – For *Windows NT, Windows 2000, or Windows XP,* select **Hyperterminal** and then click on **HyperTerminal**. – For *Windows 98,* select **Communications,** double click the **Hyperterminal** Folder, and then double click on the **Hyperterm.exe** Icon in the window that opens. • If a **Location Information** Window appears, enter the required information, then click on the **Close** Button. – This is required the first time, even if a modem is not to be used. • If a message saying "**You need to install a modem.....**" appears, click on **NO**.
	3	When the **Connection Description** Box opens, perform the following actions:
	3a	Type a name for the connection being defined (e.g., MMI Session) in the **Name:** Window.
	3b	Highlight any icon preferred for the named connection in the **Icon:** Chooser Window.
	3c	Click **OK**.

table continued on next page

Table 3-4: Create HyperTerminal Connection Procedure		
✓	**Step**	**Action**
	4	From the **Connect using:** Pick List in the **Connect To** Box displayed for the RS–232 Port Connection: – Select **COM1** or **COM2** (*Windows NT, Windows 2000, or Windows XP)* OR – Select **Direct to Com 1** or **Direct to Com 2** (*Windows 98*) Then, click **OK.**
		NOTE In Step 5, for LMF Computer Configurations where COM1 is used by another interface such as Test Equipment and a physical port is available for COM2, select COM2 to prevent conflicts.
	5	In the **Port Settings** Tab of the **COM# Properties** Window displayed, configure the RS–232 Port Settings as follows: • Bits per Second: 9600 • Data Bits: 8 • Parity: None • Stop Bits: 1 • Flow Control: None
	6	Click **OK**.
	7	Save the defined connection by selecting: **File > Save**
	8	Close the HyperTerminal Window by selecting: **File > Exit**
	9	Click the **Yes** Button to disconnect when prompted.
	10	Perform one of the following: – If the **Hyperterminal** Folder Window is still open (*Windows 98), proceed to Step 12.* – From the Windows Start Menu, select **Programs > Accessories**; *proceed to Step 11*.
	11	Perform one of the following: – For Windows NT, Windows 2000, or Windows XP, select **Hyperterminal** and release any pressed Mouse Buttons. – For *Windows 98*, select **Communications** and double click the **Hyperterminal** Folder.
	12	Highlight the newly–created Connection Icon by clicking on it.
	13	*Right click and drag* the highlighted Connection Icon to the Windows Desktop and release the right Mouse Button.
	14	From the Pop–up Menu that appears, select **Create Shortcut(s) Here**.

table continued on next page

Table 3-4: Create HyperTerminal Connection Procedure		
✓	**Step**	**Action**
	15	If desired, reposition the Shortcut Icon for the new connection by dragging it to another location on the Windows Desktop.
	16	Close the **Hyperterminal** *Folder Window* by selecting: **File** > **Close**

T1/E1 Span Interface

NOTE

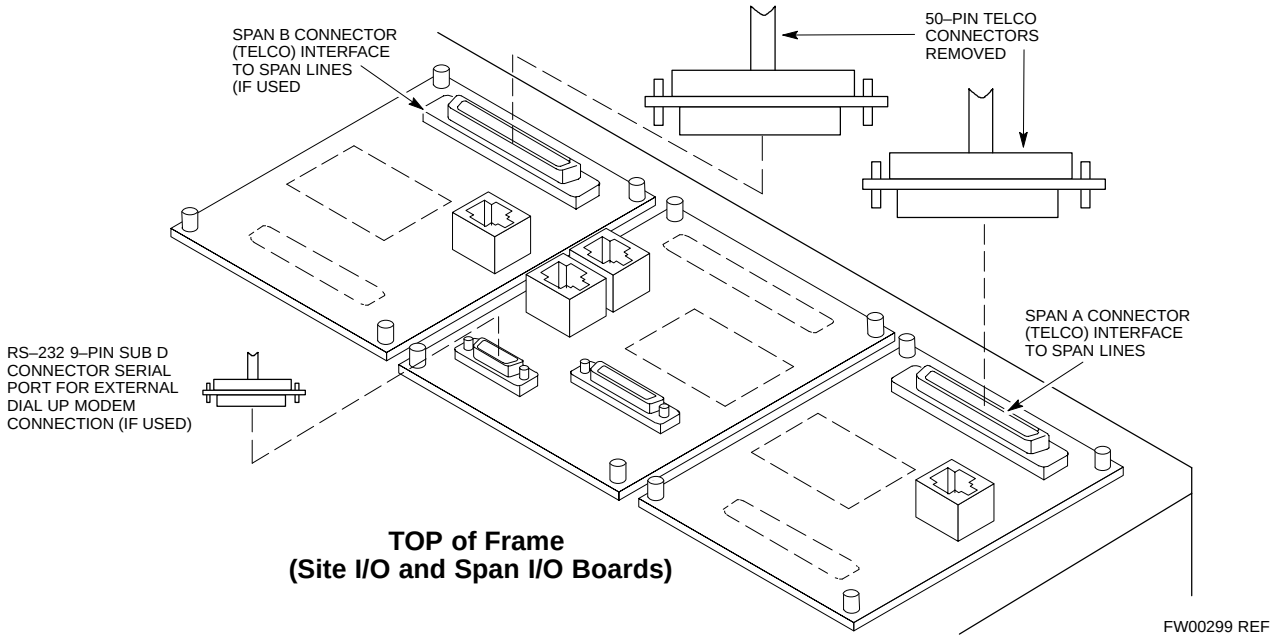
At active sites, the OMC–R/CBSC must disable the BTS and place it out of service (OOS). **DO NOT** remove the Span Line Cable Connectors until the OMC–R/CBSC has disabled the BTS.

Before connecting the LMF Computer to the BTS Frame LAN, the OMC–R/CBSC must disable the BTS and place it OOS. This will allow the LMF to control the BTS, and prevent the CBSC from inadvertently sending Control Information to the BTS during LMF–based Tests.

Isolate the BTS from the T1/E1 Span(s)

Once the OMC–R/CBSC has disabled the BTS, the Span(s) must be disabled to ensure the LMF will maintain control of the BTS. To disable the Spans, disconnect the BTS–to–CBSC Transcoder Span Cable Connectors from the Span I/O Cards (Figure 3-2).

Figure 3-2: Span I/O Board T1 Span Isolation



T1/E1 Span Isolation

Table 3-5 describes the action required for Span Isolation.

Table 3-5: T1/E1 Span Isolation Procedure

✓	Step	Action
	1	Have the OMC–R/CBSC place the BTS OOS.
	2	To disable the Span Lines, locate the Connector for the Span or Spans that must be disabled and remove the respective connector from the applicable SCCP Cage Span I/O Board (Figure 3-2).

Connect the LMF to the BTS

The LMF Computer may be connected to the LAN A or B Connector located behind the BTS Frame Lower Air Intake Grill. Figure 3-3 shows the general location of these connectors. LAN A is considered the Primary LAN.

Figure 3-3: LMF Connection Detail

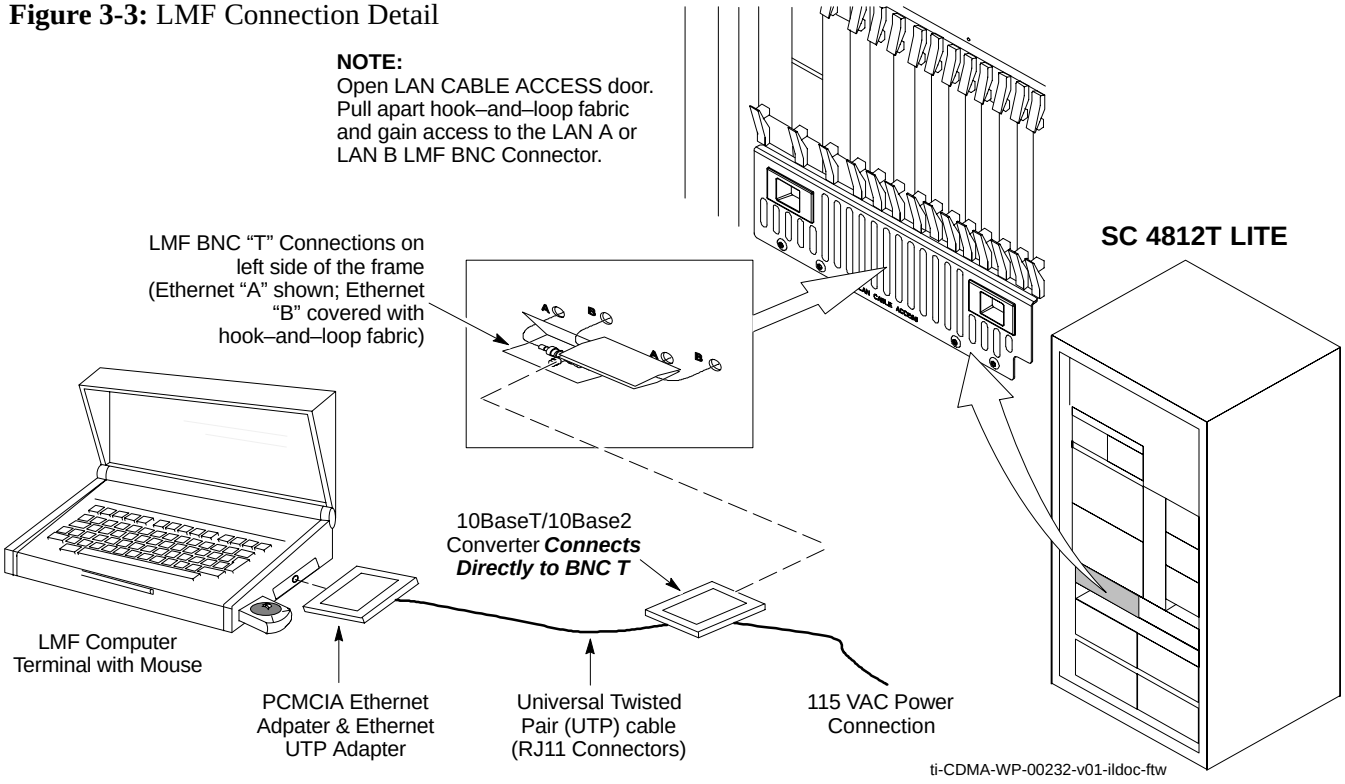


Table 3-6: LMF– to –BTS Connection Procedure		
✓	**Step**	**Action**
	1	To gain access to the LAN Connectors, open the LAN Cable Access Door, then pull apart the fabric covering the BNC "T" Connector and slide out the Service Tray, if desired. – Refer to Figure 3-3.
	2	Connect the LMF Computer to the LAN A (left–hand) BNC Connector by using a PCMCIA Ethernet Adapter. **NOTE** Xircom Model PE3–10B2 or equivalent can also be used to interface the LMF Ethernet Connection to the BTS Frame connected to the PC Parallel Port, powered by an External AC/DC Transformer. – In this case, ***the BNC Cable must not exceed 91 cm (3 ft) in length***.
		*** IMPORTANT** The LAN Shield is isolated from the Chassis Ground. The LAN Shield (exposed portion of the BNC Connector) **must not touch the chassis** during Optimization.

Connect the LMF to the BTS at the I/O Panel

On BTS Frames produced after May 2004, the LMF must be connected to the BTS 10Base–2 LAN at the LAN A or B OUT Connectors on the Frame I/O Panel. Figure 3-4 shows the locations and marking for the I/O Panel LAN Connectors. This procedure may also be used to connect the LMF to earlier production frames. LAN A is considered to be the Primary LAN.

NOTE

BTS Frames produced after May 2004 do not have a Service Shelf below the SCCP Cage. As a result, the COAXial Cable used to connect the LMF Computer with the I/O Panel LAN Connector must be long enough to permit placing the LMF Computer in another location during Optimization or Acceptance Testing.

Figure 3-4: I/O Panel LAN Connection

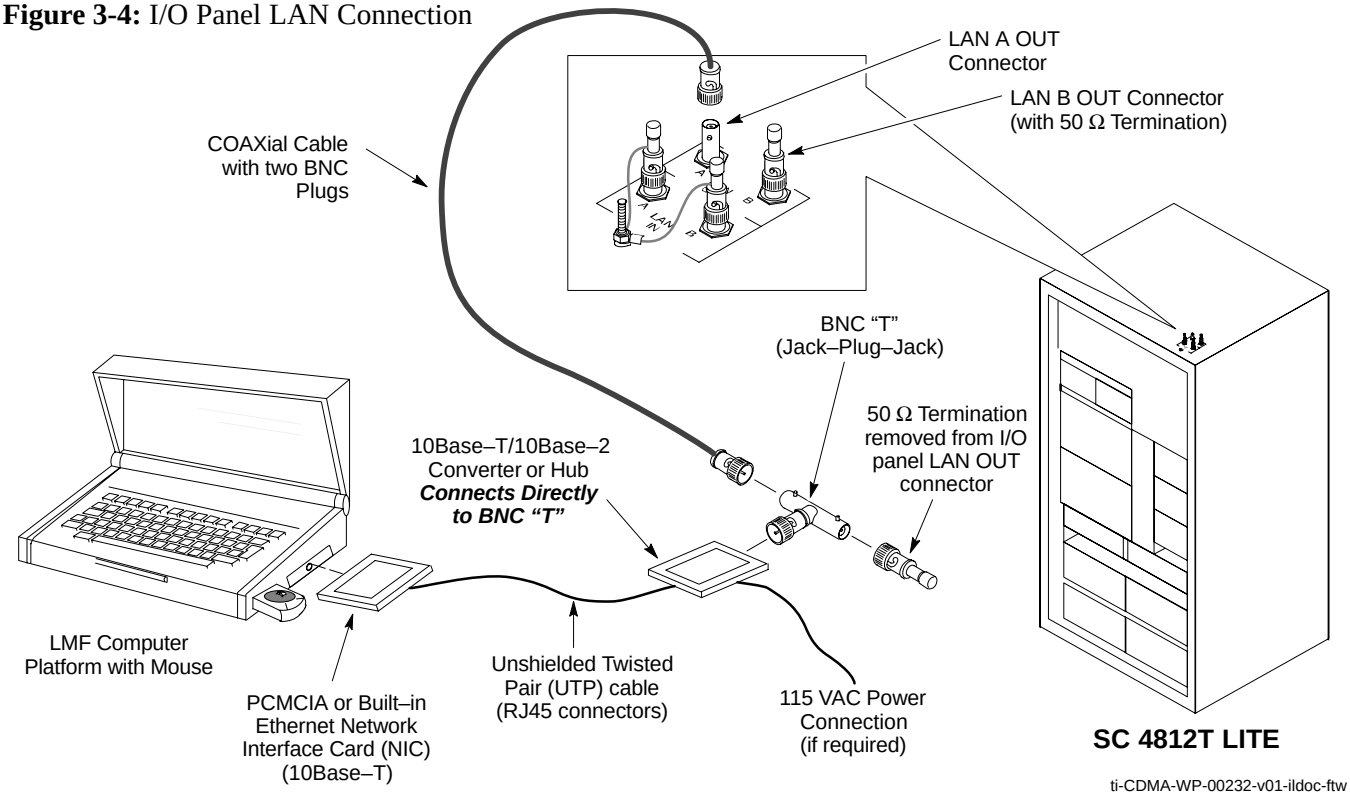


Table 3-7: Connecting the LMF to the BTS, I/O Panel LAN Connection		
✓	**Step**	**Action**
	1	Connect the LMF Computer Platform Network Interface Card (NIC) to the 10Base–2/10Base–T Converter or Hub.
	2	Connect a Jack–Plug–Jack Configuration BNC "T" Connector to the 10Base–2/10Base–T Converter or Hub (Figure 3-4).
	3	Connect one BNC Plug of the COAXial Cable to one Jack of the BNC "T" Connector.
	4	*** IMPORTANT** 1. In this step, *do not* disconnect the 50 Ω Terminator from either LAN IN Connector on the I/O Panel (these terminations may be grounded with a Jumper Wire which is fastened to the I/O Panel). 2. When this step is performed, the active 10Base–2 LAN will swap to the one with the terminated LAN OUT Connector (LAN B in Figure 3-4). At the top of the frame, remove the 50 Ω Terminator from one LAN OUT Connector on the I/O Panel, and connect the remaining BNC Plug on the COAXial Cable to this LAN OUT Connector.
	5	Connect the 50 Ω Terminator removed in Step 4, above, to the other jack of the BNC "T" Connector on the Converter or Hub.
	6	At the I/O Panel, remove the 50 Ω Terminator from the other LAN OUT Connector, and wait 30 seconds for the active LAN to swap to the one connected to the BNC "T".
	7	Replace the 50 Ω Terminator on the LAN OUT Connector from where it was removed in Step 6, above.

Switching the Active LAN

When the LMF Computer is connected to the BTS at the I/O Panel 10Base–2 LAN Connectors, switching the INS_ACT GLI Card to another LAN (Active LAN Swap) requires more operator actions than with a Service Shelf LMF Connection. Follow the procedure in Table 3-8 to force the active LAN Swap with this type of connection.

NOTE

This procedure is written so it can be used starting with *either* LAN A *or* LAN B.

Table 3-8: Forcing an Active 10Base–2 LAN Swap with LMF I/O Panel Connection

✓	Step	Action
	1	With the LMF Computer connected to a 10Base–2 LAN at the I/O Panel, force the INS_ACT GLI Card to swap to the other 10Base–2 LAN by performing the following actions. – Refer to Figure 3-4.
	1a	Disconnect the LMF COAXial Cable from the I/O Panel LAN OUT Connector.
	1b	Remove the 50Ω Terminator from the BNC “T” Connector at the 10Base–T/10Base–2 Converter or Hub (Figure 3-4).
	1c	Install the 50Ω Terminator on the I/O Panel LAN OUT Oonnector from where the COAXial Cable was removed in Step 1a, above.
	1d	Wait approximately 15 seconds.
	1e	Remove the 50Ω Terminator from the other I/O Panel LAN OUT Connector, and install it on the open jack of the BNC “T” Connector at the 10Base–T/10Base–2 Converter or Hub (Figure 3-4).
	1f	Connect the COAXial Cable to the LAN OUT Connector from which the 50Ω Terminator was removed in Step 1e, above.
	1g	Wait approximately 15 seconds.
	2	If applicable, return to the procedure that required performing this operation.
	3	If not directed to this operation from another procedure, briefly remove and then replace the 50Ω Terminator on the I/O Panel LAN IN Connector for the LAN from which the LMF was disconnected in Step 1a, above.
	4	Verify the LAN is active by pinging the processor of the INS_ACT GLI Card using the procedure in Table 3-15.