Media Gateway 3500
Installation, Operation, and Maintenance

Version 3.0

Document #: LTRT-90704 Rev 006

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Notice

This manual describes the installation, operation and maintenance of the Media Gateway 3500.

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Abbreviations and Terminology

Each abbreviation, unless widely used, is spelled out in full when first used. Only industry-standard terms are used throughout this manual. Hexadecimal notation is indicated by 0x preceding the number.

Related Documentation

The documentation package contains the following publications:

- ***Media Gateway 3500 Product Description*** - contains the description of the product features, components, standard control protocols and management protocols (*Document # LTRT-925xx*).
- ***Media Gateway 3500 Installation, Operation & Maintenance Manual*** (this manual) -

Provides steps and information for preparing the area where the equipment is to be set-up, supplies instructions on the physical and electrical installation of a chassis and includes operation instructions and maintenance guidelines/troubleshooting procedures. It is intended for skilled installers, system level technicians and system managers (*Document # LTRT-907xx*).

- ***EMS User's Manual*** - The EMS (Element Management System) is an application that is used to configure and monitor all gateway elements from a remote location. Through the EMS, the system operator can also configure the Media Gateway 3500 to send all alarms set as they are to be handled according to manual or automatic rules. The manual is intended for System level operators who are to use the EMS.
- ***EMS Alarm Guide*** - *Document # LTRT 946xx*
- ***EMS Parameter Guide for the Media Gateway 3500*** - *Document # LTRT 942xx*

1 Introduction to the Media Gateway 3500

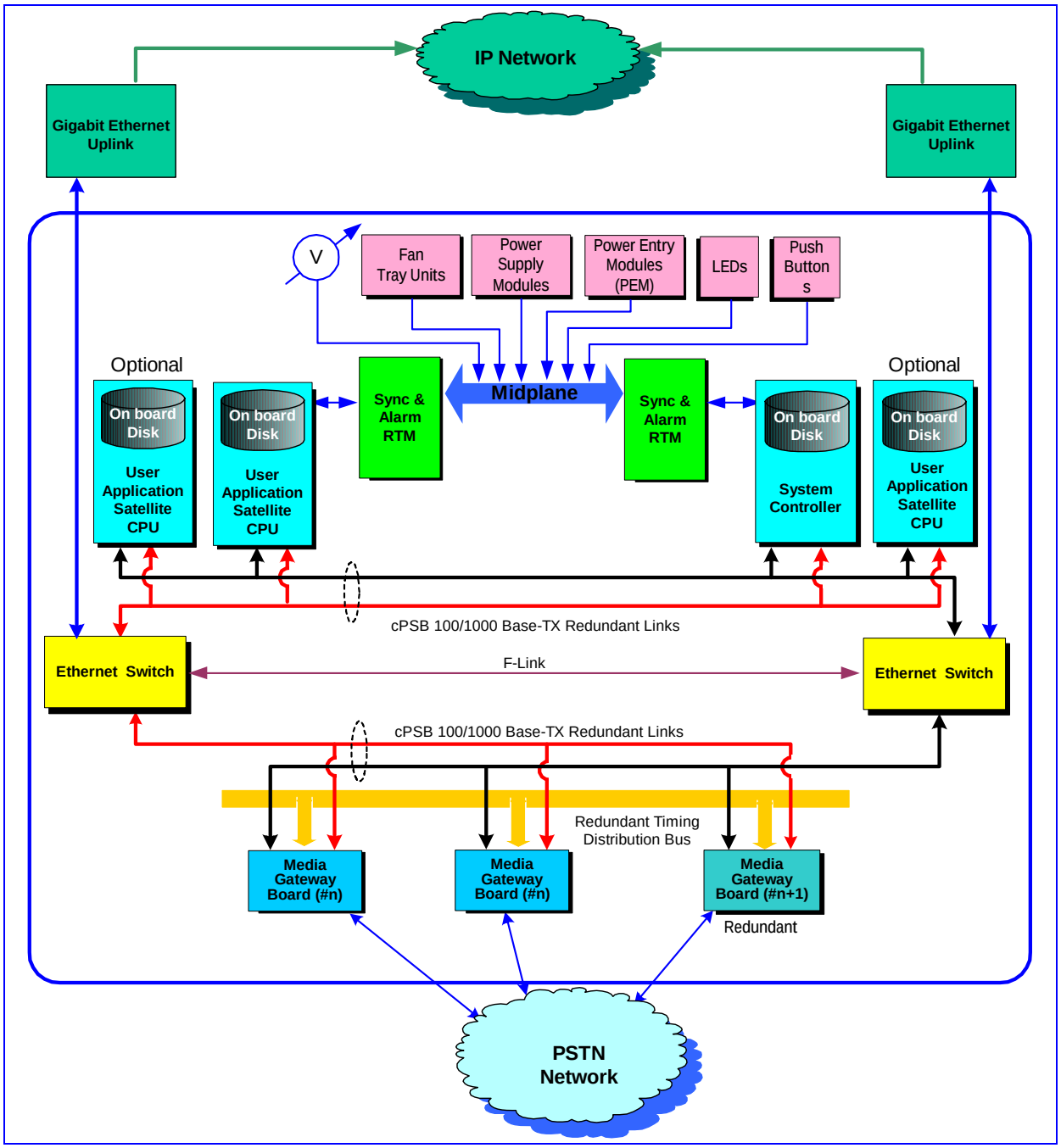
The **Media Gateway 3500** is a high channel density, medium-sized market-ready, standards-compliant, VoIP gateway. It incorporates leading Voice over Packet technology to enable Service Providers rapid time-to-market and reliable cost-effective deployment of next-generation networks.

The Media Gateway 3500 is a robust, scalable and modular solution, designed for the carrier environment, matching the density requirements for medium deployments, while meeting Network Service Providers' demands for high availability, reliable new voice infrastructure networks. For maximum reliability, the Media Gateway 3500 features protection switching and full redundancy of all common equipment.

1.1 Gateway Block Diagram

The block diagram of the Media Gateway options are illustrated in the figures below and depicts its functional internal engineering mechanisms.

Figure 1-1: Media Gateway Block Diagram



2 Hardware Overview

2.1 Media Gateway 3500 Hardware Configuration

The Media Gateway 3500 is offered in a redundant configuration covering power, switching, and media board components.

2.1.1 Media Gateway 3500 + TP-1610 Board Configuration

The table below details the components of the Media Gateway 3500 + TP-1610 board configuration.

Table 2-1: Components of the Media Gateway 3500 + TP-1610 Board Configuration

Component	Redundant Configuration
Chassis	1
System Controller (SC)	2
Synchronization and Alarm Rear Transition Module(SA)	2
Ethernet Switch Board - 24 100 Mbps Ports with 2 GbE uplinks (ES/4411)	2
Ethernet Switch 5 I/O Rear Module - (LIM/4411)	2
TP-1610 Media Gateway Boards	Up To 6
TP-1610 I/O Rear Transition Module (RTM/1610/Normal)	Up To 5
TP-1610 I/O Rear Transition Module – Redundant (RTM/1610/Redundant)	1
AC or DC Power Supply Modules (PS-1)	3
AC or DC Power Entry Modules (PEM)	1 AC/2 DC
Fan Tray Module (FM)	1
AC or DC Fan Tray Power Supply Module (APM)	2

2.1.2 Media Gateway 3500 Accessories Kit

Each Media Gateway 3500 is accompanied by an accessories kit, which includes:

- RS-232 Straight Cable for Console Terminal (not crossed-over)
- RS-232 Straight Cable for Ethernet Switch Console Terminal (not crossed-over)
- AC Power Cable (for AC configurations)
- CD containing Media Gateway 3500 system software
- CDs containing the EMS software (Optional)

2.2 Front and Back Views of the Media Gateway 3500

Figure 2-1: Media Gateway 3500 + 1610 Configuration - Front View

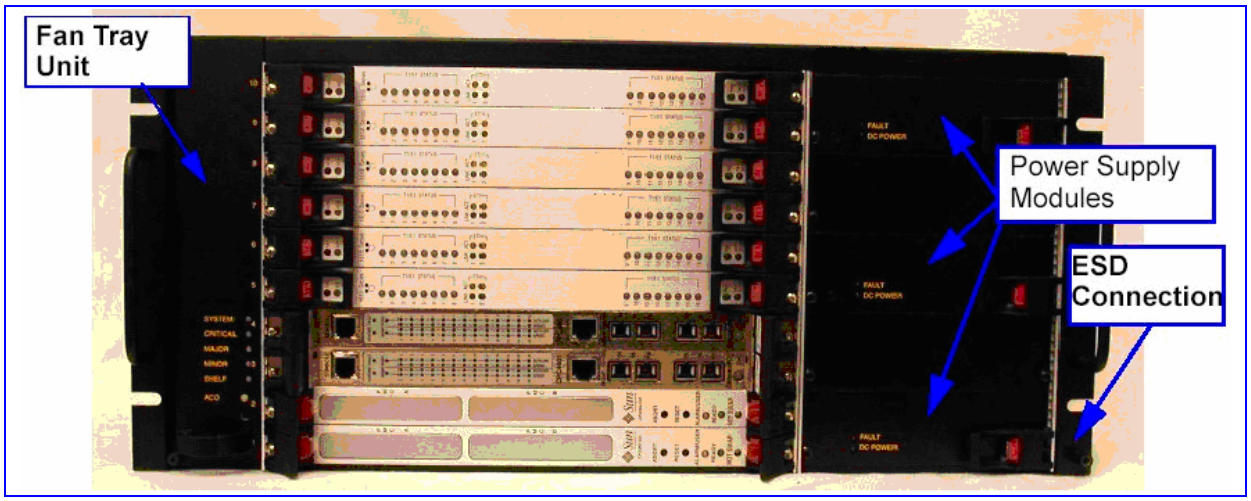


Figure 2-2: Media Gateway 3500 + 1610 Configuration, DC Power - Back View

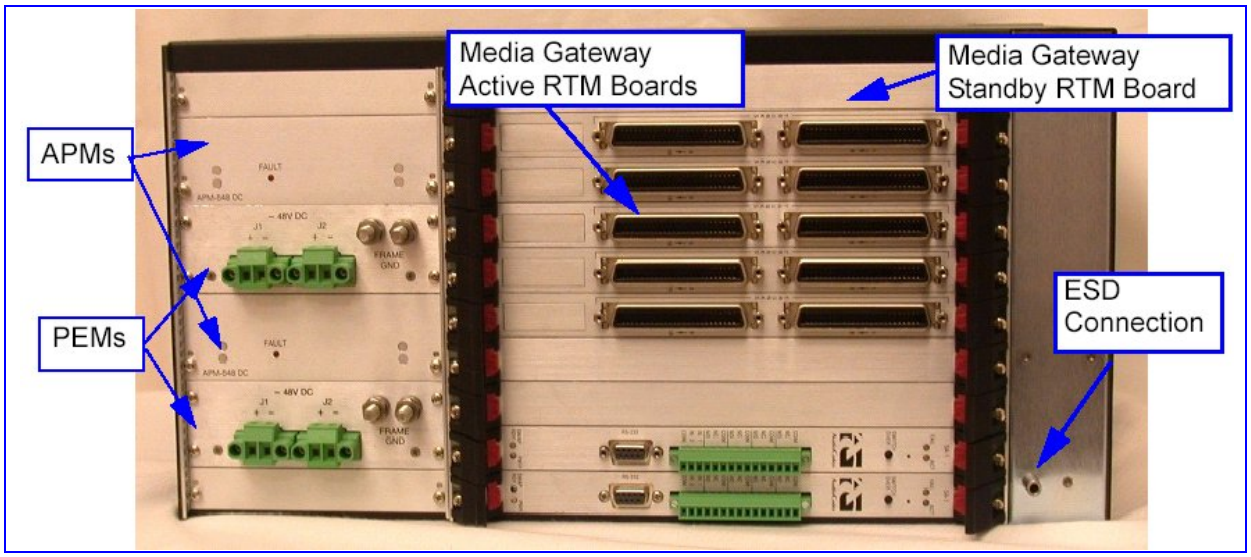
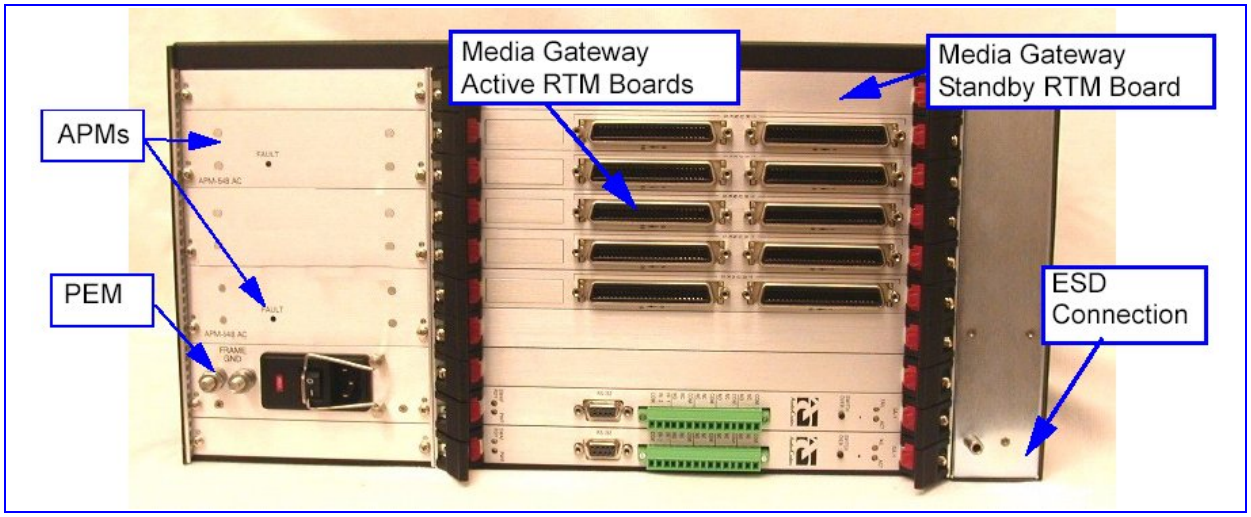


Figure 2-3: Media Gateway 3500 + 1610 Configuration, AC Power - Back View



2.3 The Chassis

The Media Gateway 3500 chassis complies with NEBS Level 3 requirements, and conforms to CompactPCI PICMG 2.0 standards. It contains a 10-slot card cage. All component boards have a sturdy, hot-swap cPCI 6U form factor. Boards are inserted from the front and the back and engage the midplane on either side inside the card cage. Slots for the boards are numbered from one to ten on the left of the card cage in the front, for identifying board placement. The midplane contains slot keys to match the appropriate board. This prevents insertion of a board in a wrong location.

The chassis also houses a fan tray unit to the left of the card cage and three Power Supply modules to the right of the card cage and an extractable air filter to the left of the card cage.

Table 2-2: Chassis Dimensions

Dimension	Value
Width	48.3 cm (19 inches)
Height	22.2 cm (8.75 inches)
Depth	
With projections	36.5 cm (13.7 inch)
Without projections	30 cm (11.8 inch)
Weight (Fully loaded)	22.6 kg (49.8 lb)

2.3.1 Earthing Requirements

Grounding and Bonding

Connect the equipment enclosure via the provided stud to Protective earth using No. 6 AWG copper grounding conductor from an approved grounding electrode.

Metallic parts of network equipment installed in the outside plant shall be grounded in accordance with Rule 99 of the most recent edition of the National Electrical Safety Code (NESC), ANSI/IEEE C2.[36]

Safety Earth

Intrinsically, the Media Gateway 3500 chassis must be safety-earthed using an equipment-earthing conductor. Do not depend on locknut-bushings and double-locknuts for bonding purposes. Use the earthing hardware provided with the chassis.

2.3.2 Power Requirements

The Media Gateway 3500 chassis can be powered from either AC or DC sources.

Table 2-3: Power Requirements

Type	Power Requirements	Connection Provisions
AC	100 to 240 V AC (nominal) 50/60 Hz	PEMs (Power Entry Modules) with Standard quick connect socket
DC	-40.5 to -60 V DC	PEMs with Input terminals

2.3.2.1 Power Consumption

2.3.2.1.1 DC Input Power

The average power consumption for a full complement of boards is approximately 460 watts (4 A at 115 VAC, 2 A at 230 VAC and 9.5 A at 48 VDC).

Two Power Entry Modules (PEM), each containing two input terminals, are provided for DC connections on the rear of the chassis. Power is required to be between -40.5 and -60 VDC. Each of the DC input terminal is reverse current protected. The pair of J1 input terminals and the pair of J2 input terminals provide redundancy protection of the power entry circuitry.

Recommendations for DC Power input:

- When using DC power as the primary input, ensure that the power supply complies with relevant safety standards e.g. CAN/CSA-C22.2 No. 60950-1 and UL 60950-1, and EN 60950-1.
- For High Availability, connect two separate DC power sources to avoid total power failure if one of the DC power sources fails.

2.3.2.1.2 AC Input Power

A standard, properly earthed, quick connect socket (IEC 60320 C20) and associated filtering and circuit breaker are located on the rear panel. The appropriate power cable is provided according to the customer's local standards. Power requirements are 100 to 240 V AC at a nominal 50/60 Hz line frequency.

WARNING

For AC, only one PEM is to be installed in the system.

Recommendations for AC Power input:

- It is recommended to connect the AC power source to a UPS to avoid total power failure if the AC power source fails. This is mandatory for high availability (i.e., on redundant system configurations).
- Connect AC-powered systems only to earthed power outlets.
- Connect the chassis to the facility's earth, using the earthing terminal(s) provided.

2.3.2.2 Electro Magnetic Compatibility (EMC) Features

The chassis is designed to comply with known EMC/RFI standards, including FCC Part 15, Class A; ICES-003, Class A; EN 55022, Class A; EN 300 386.

Compliance measures include:

- Venting holes - for air intake and exhaust, sized to provide for blockage of frequencies within the specified range
- Blank panels with contact fingers - used for covering empty slots when a configuration requires such
- RFI filters - built-in to the DC power inputs, assuring that conductive interference does not reach the Power Supply Modules, or that switching signals generated by the Power Supply Modules do not propagate over the main feed
- Air filters - integrates a honeycomb EMI shield in its assembly. The honeycomb structure consists of "cells" that are engineered to trap and absorb EMI noise while maintaining 95% to 99% aperture for minimal airflow impedance. A gasket installed around the frame makes sure there is conductivity of the frame to the enclosure.

2.3.2.3 Midplane Keying

Each slot is equipped with a key on the midplane to match the appropriate board type in order to prevent inserting a wrong board type into the slot.

Note: While the slot keys on the midplane are designed to prevent the insertion of a board in an incorrect location, be sure NOT to force a board into a slot to avoid damaging either the board or the midplane.

2.4 Cooling System

2.4.1 Cooling System

The Media Gateway 3500 components are cooled by a Fan Tray unit, located at the left of the card cage. The Fan Tray Unit draws air in through a perforated grill at the right side of the chassis.

The incoming air passes through a removable filter (located within the fan assembly, immediately inside the perforated grill), whose honeycombed design prevents RF interference.

The clean air is drawn by the fans and passes through the entire set of plug-in front and rear boards residing in the slots, cooling each one. The air exits the Media Gateway 3500 via perforated vents of the chassis.

Blank panels are used to cover all unoccupied slots (as per the customer's configuration) on both sides of the chassis. The front blank panels are especially constructed to allow optimal air flow within the chassis.

2.4.2 Fan Tray Unit

The Fan Tray Unit is easily removed and is hot swappable.

It contains 5 fans, providing required airflow for each board in the card cage, even if one of the fans stops working.

2.4.3 Advanced Power Module (APM)

The Advanced Power Module (APM) is the power supply for the fan tray unit. It is provided in either a DC or AC version according to the main power configuration. The APM is not hot-swappable.

WARNING

The APM is NOT hot-swappable, and should NEVER be removed while the system is under power.

2.4.4 Alarm Indicators

The fan module panel contains the alarm indicators (LEDs) Alarm Cutoff and Reset buttons.

The alarm indicators are connected to the fault detection and alarm system provided with the Media Gateway 3500. As needed, LEDs indicate critical, major or minor system faults as well as system and shelf alarms.

Figure 2-4: Fan Tray Unit Panel and Alarm Indicators

2.4.4.1 Alarm Indicators

The table below describes the chassis' front panel alarm indicators.

Table 2-4: Chassis Front Panel Alarm Indicators and Buttons

Component	Label	Description	Color Code	Remarks
LED 1	SYSTEM	Indicates that the System Controller board is properly functioning	Green OK Red Fail	Default = Red Steady Red during initialization of active SC. Steady Green indicates proper SC board functioning
LED 2	CRITICAL	Indicates the detection of a fault (or faults) - categorized as 'Critical'	Green OK Red Fail	Default = Red Red when critical alarm is set. When This Led is on, all other Major and Minor severity LEDs are also lit. Green when no critical alarms
LED 3	MAJOR	Indicates the detection of a fault (or faults) - categorized as 'Major'	Green OK Orange Fail	Default = Orange Orange when Major alarm is set. When this Led is on, the Minor severity LEDs is also lit. Green when no Major alarms
LED 4	MINOR	Indicates the detection of a fault (or faults) - categorized as 'Minor'	Green OK Orange Fail	Default = Orange Orange when minor alarm is set. Green when no Minor alarms
LED 5	SHELF	Indicates the health or failure of the chassis' hardware as detected by the alarm module	Green OK Red Fail	Default = Red Green = initialization complete Red = during initialization process
Pushbutton 1	ACO	Alarm Cut Off	---	Used to mute the telco alarm relay devices attached to the SA RTM. Returns all of the alarm relays to normal position, deactivating the alarm relay devices. Both the chassis LEDs and other gateway alarm signals are NOT affected. Accessed with finger
Pushbutton 2	---	For future use	---	

2.5 Media Gateway 3500 Boards

2.5.1 The TP-1610 Board

The TP-1610 board is a high-density, hot-swappable, compactPCI resource board with a capacity of 480 DS0 channels, supporting all necessary functions for voice, data and fax streaming over IP networks. It provides 16 E1/T1/J1 trunk interfaces and 2 redundant 100 Base-TX cPSB Ethernet ports.

The TP-1610 supports all essential functions for voice and fax streaming over IP packet networks, as well as DSP-based vocoding and echo cancellation, to deliver call traffic to the PSTN over TDM trunks. Two processor modules handle packet-streaming functions through two redundant, integral 100 Base-TX interfaces.

Each TP-1610 board is accompanied by a Rear Transition Module (RTM) board. The PSTN interfaces are connected to the RTM from the rear of the chassis. The redundant board is supplied with a special RTM.

- RTA-1 is supplied for each TP-1610 acting as an Active, non-redundant board.
- RTS-1 is supplied for each TP-1610 acting as a Standby, redundant board.

Slots 5 to 10 are used for up to six TP-1610 boards according to the customer's requirements. The appropriate RTMs are located in the rear cage of the Media Gateway 3500 in the corresponding slots. The figures below displays the TP-1610 RTM and the RTM for the redundant TP-1610 board.

Note: Empty slots must be covered with blank panels. Refer to 'Slot Cover Requirements' on page 140.

Figure 2-5: 1610 Board, Panel View

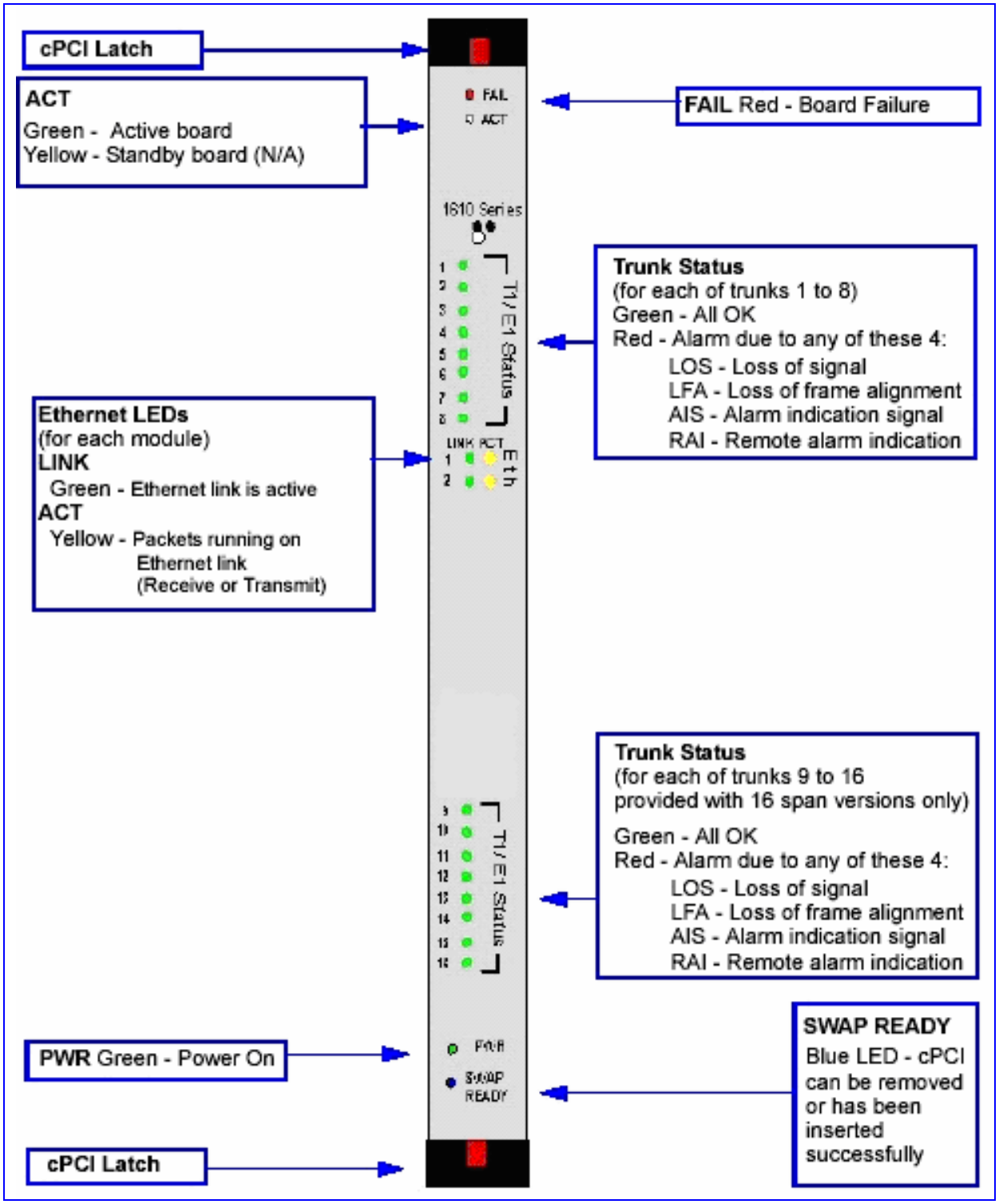
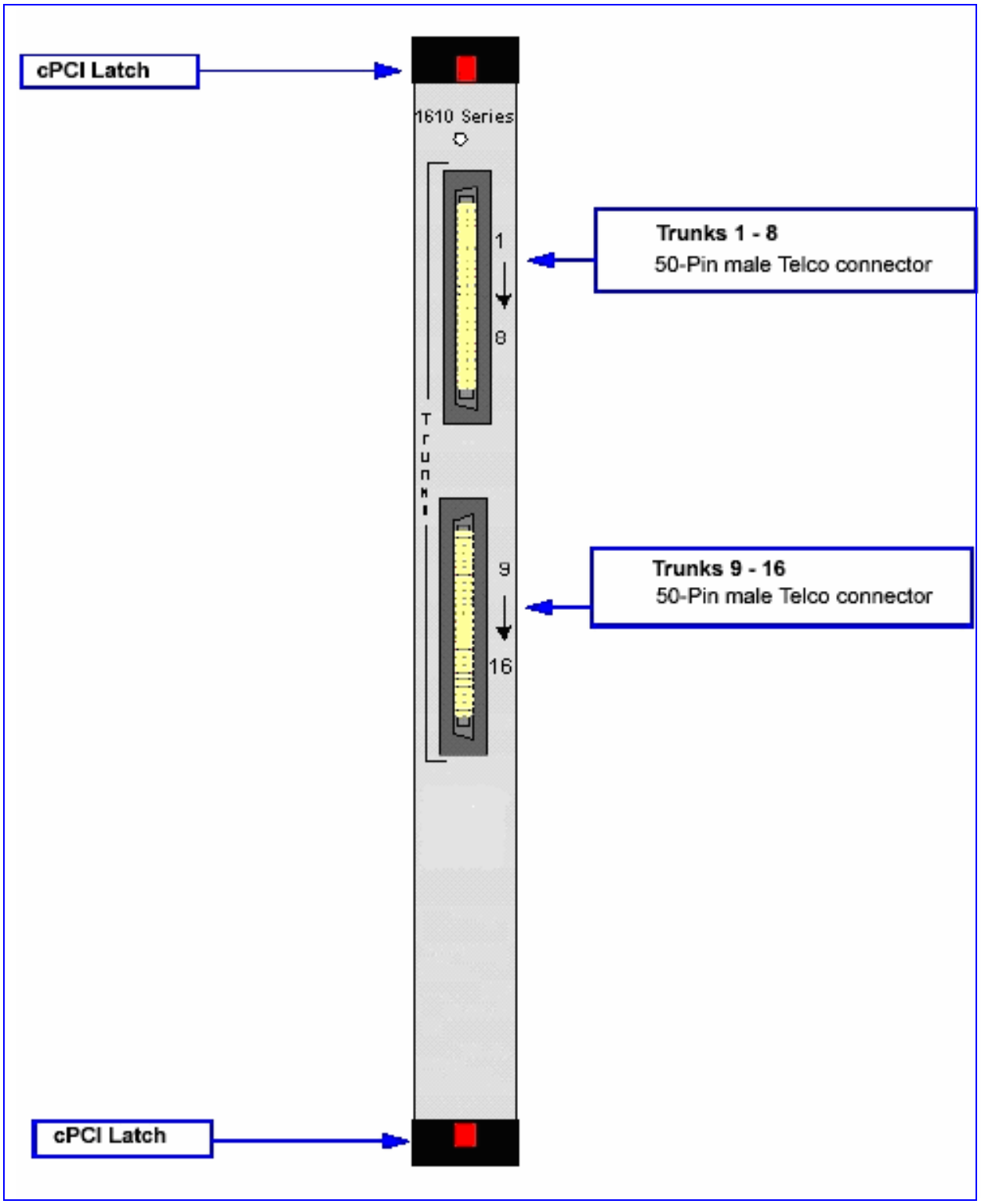
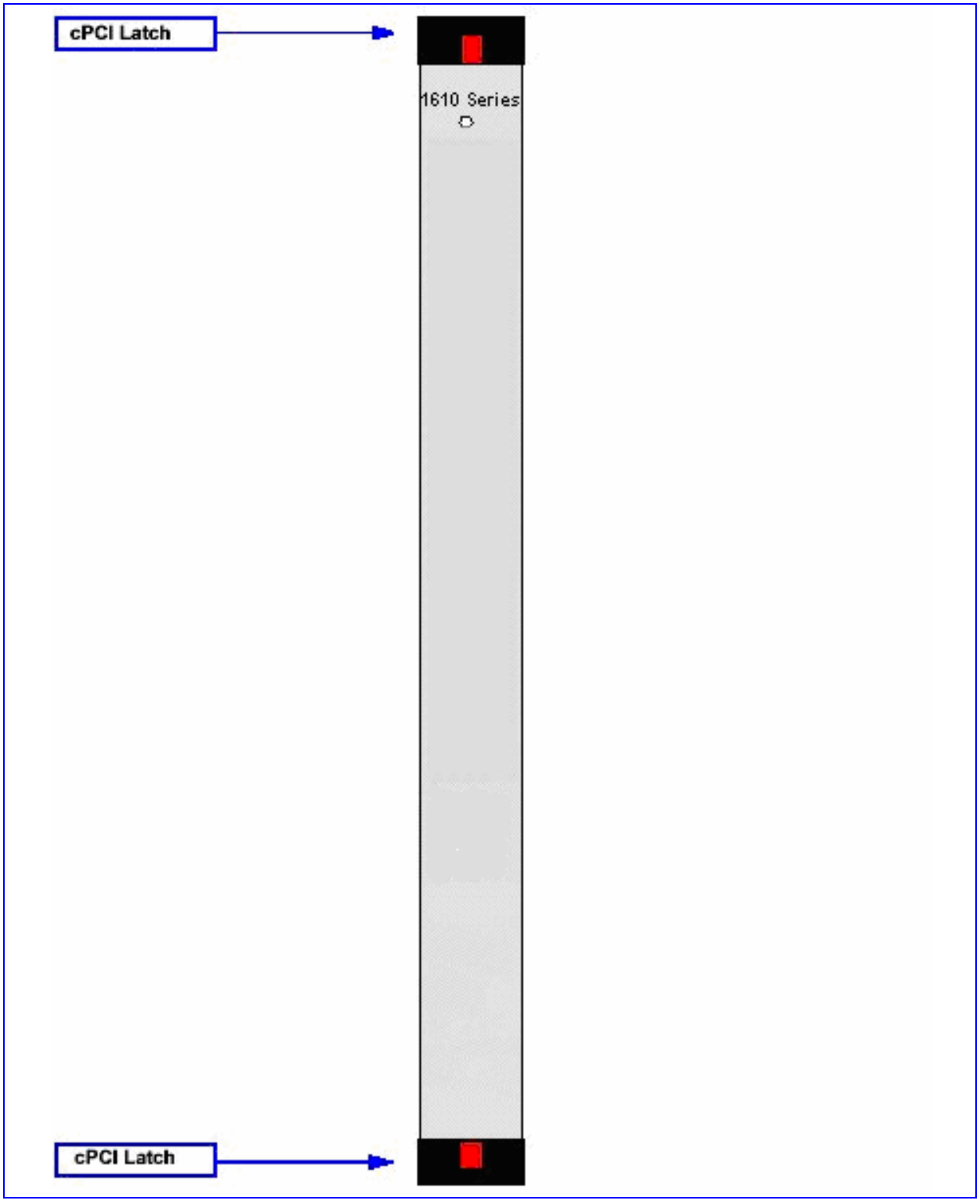


Figure 2-6: 1610 RTM Panel with 2 Telco Connectors




cPCI Latch
1610 Series
cPCI Latch

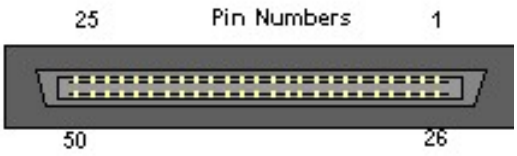
2.5.1.1 50-pin Telco Connector E1/T1/J1 Connections

The user's 50-pin male connector on Trunks 1 to 8 is connected to the 50-pin female connector labeled E1/T1/J1 1 to 8. The user's 50-pin male connector on Trunks 9 to 16 is connected to the 50-pin female connector labeled E1/T1/J1 9 to 16. The 2 male connectors must be wired identically, according to the table below.

Table 2-5: E1/T1/J1 Connections on each 50-pin Telco Connector

E1/T1/J1 Number			
1 to 8	**9 to 16**	**Tx Pins (Tip/Ring)**	**Rx Pins (Tip/Ring)**
1	9	27/2	26/1
2	10	29/4	28/3
3	11	31/6	30/5
4	12	33/8	32/7
5	13	35/10	34/9
6	14	37/12	36/11
7	15	39/14	38/13
8	16	41/16	40/15

Figure 2-7: 50-Pin Female Telco Board-Mounted Connector



2.5.1.2 TP-1610 Board Panel LED Indicators

Refer to the tables below for LED indicator definitions.

Table 2-6: Board Status LED Indicators

Label	Color	Function	
FAIL	Red	Board failure (fatal error)	
ACT	Green	Board initialization sequence terminated OK Indicates the Active board	Bi-color indicator
	Yellow	Board initialization sequence terminated OK Yellow on indicates Standby board	

Table 2-7: Trunks Status LED Indicators

Label	Color	Signal Description
Trunk Status 1 to 8 Trunk Status 9 to 16	Green	Trunk is synchronized (normal operation)
	Red	Loss due to one of the following:
	LOS	Loss of Signal
	LFA	Loss of Frame Alignment
	AIS	Alarm Indication Signal (The blue alarm)
	RAI	Remote Alarm Indication (The yellow alarm)

Table 2-8: cPCI Indicators

Label	Color	Function
PWR	Green	Power is supplied to the board
SWAP READY	Blue	The board can be removed or inserted

Table 2-9: Ethernet Indicators

Label	Color	Function
LINK	Green	Ethernet link is active
ACT	Yellow	Packets running on Ethernet link (Receive or Transmit)

2.5.2 SC (System Controller) Board

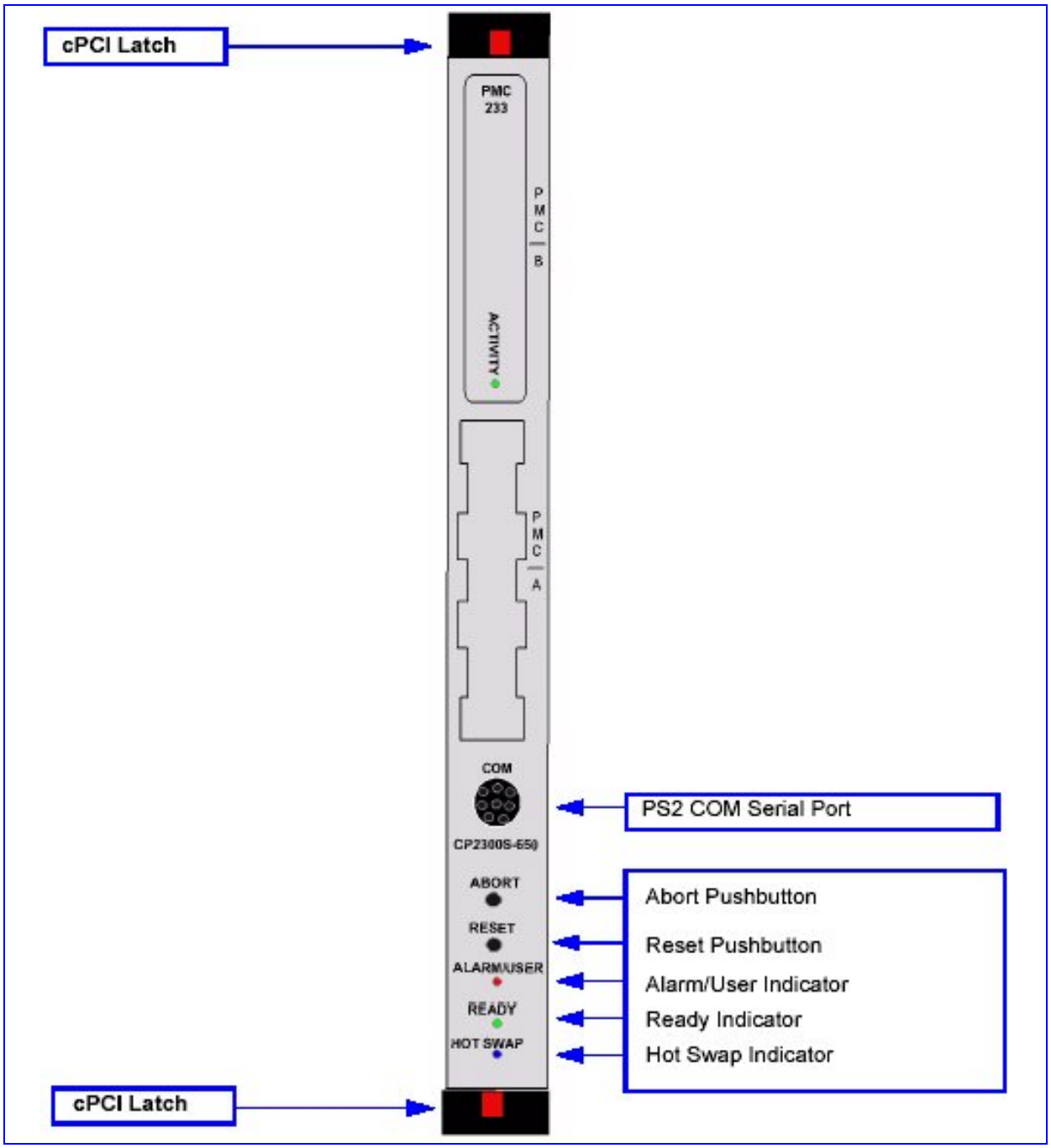
The System Controller (SC) is a Sun™ CompactPCI™ Single Board Computer (SBC), running on the Solaris™ 9 operating system. The Solaris 9 operating system is pre-installed on the 60Gb HD (on-board hard disk) on the SC board, which is designed for the 7/24 carrier grade operation. It also contains pre-installed SC system control software. The system is enhanced for advanced availability requirements.

This board provides PCI Industrial Computers Manufacturers' Group (PICMG) CompactPCI Packet Switched Backplane compliance and is NEBS Level 3 certified to meet the requirements of the communications and service provider environments. The SC board provides one vacant PCI mezzanine card (PMC) slot, which allows expanding its functionality in the future.

The SC boards are located in the first two slots 1 and 2 (color coded red in the chassis card cage). The figure below illustrates the front panel view of the SC. The front panel PS2 COM serial port provides RS-232 console connection.

Note: The RS-232 console connection can be made via the SC front panel PS2 COM serial port or via the RS-232 serial port on the SA RTM.

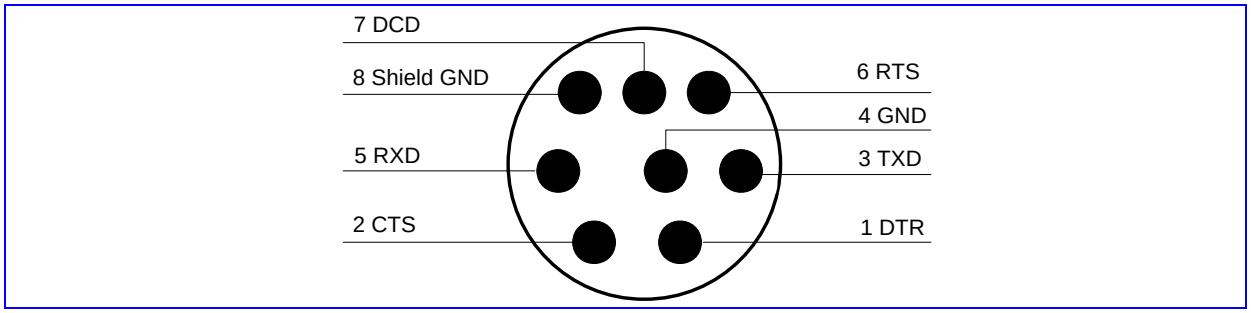
Figure 2-8: SC Panel



2.5.2.1 Front Panel PS2 COM Serial Port

The figure below displays the pin assignments for the front panel PS2 COM serial port.

Figure 2-9: SC Front Panel Serial Port Connector



The signal interface of the connector is according to the table below:

Table 2-10: RS-232 Console Pin Signal Interface

Pin #	Signal Name	Pin #	Signal Name
1	DTR	5	RXD
2	CTS	6	RTS
3	TXD	7	DCD
4	GND	8	Shield GND

2.5.2.2 System Controller Panel Indicators & Controls

Several indicators are located on the SC (refer to the table below).

Table 2-11: SC Board Indicators

Label	Color	Function	
Activity	Green	Located on the PMC hard disk PMC module Lit each time the SC software accesses the hard disk During normal operation, it blinks	
ALARM/USER	Blinking Green	Blinking Green indicates that the SC board is functioning properly	red/green (bi-color) indicator
	Yellow	Yellow indicates Ethernet Switch board status, communicated from the EMS	
READY	Green	Green power indicator; the board is properly powered.	
HOT-SWAP	Blue	Indicates that the board can be extracted from the chassis. When a board is inserted into a system, the LED is lit automatically until the hardware connection process is completed The LED then remains off until the extraction is once again enabled when opening the extractors	

There are two recessed pushbutton switches on the front-panel of the SC board:

WARNING

DO NOT use these pushbuttons to shutdown or reset the Sun™ Solaris™ operating system. Doing so can cause file corruption and loss of system serviceability. Use the correct shutdown procedure described in Shutdown Procedures. These pushbuttons are for use by Nortel Technical Support personnel only.

ABORT - Pressing the ABORT pushbutton halts the normal operation of the SC software back to the “OK Prompt” of the OpenBoot monitor, thereby re-initializing internal programming.

RESET - When the RESET pushbutton switch is pressed, it generates a Power-On-Reset (POR) signal.

2.5.3 SA Synchronization and Alarm RTM

The SA alarm rear termination modules (RTMs) provide the chassis management capabilities for the SC boards, by controlling the fans operation, monitoring the correct operation of the power supply modules, monitoring the midplane voltages, controlling the chassis LEDs and Telco alarm relays. It functions as an I/O extension of the SC functionality and it interconnects to all of the chassis' elements. Each SA board is hot swappable, allowing replacement during maintenance operation. In addition to the console port on the SB board itself, The SA RTM provides an RS-232 console serial port for interconnection with the SC board. The terminal block connector connects external electrical connections for triggering external devices according to Critical, Major, and Minor alarms.

The following list summarizes the SA functionality:

- Monitoring all midplane voltages
- Monitoring correct operation of all power supplies
- Controlling chassis temperature by changing fans' speed
- Monitoring the fans' speed
- Controlling the state of alarm relays
- Controlling the front panel chassis LEDs
- Detecting the state of front chassis push-buttons
- Monitoring PEM status

The SA RTMs are located in the rear cage of the Media Gateway 3500, in the respective slots 1 and 2, behind the SC boards in the front cage. These RTMs contain an RS-232 console port 9-pin female D-type connector (P2). The corresponding cable is a straight cable with a 9-pin male D-type connector (P1).

The signal interface of the connector is according to the table below.

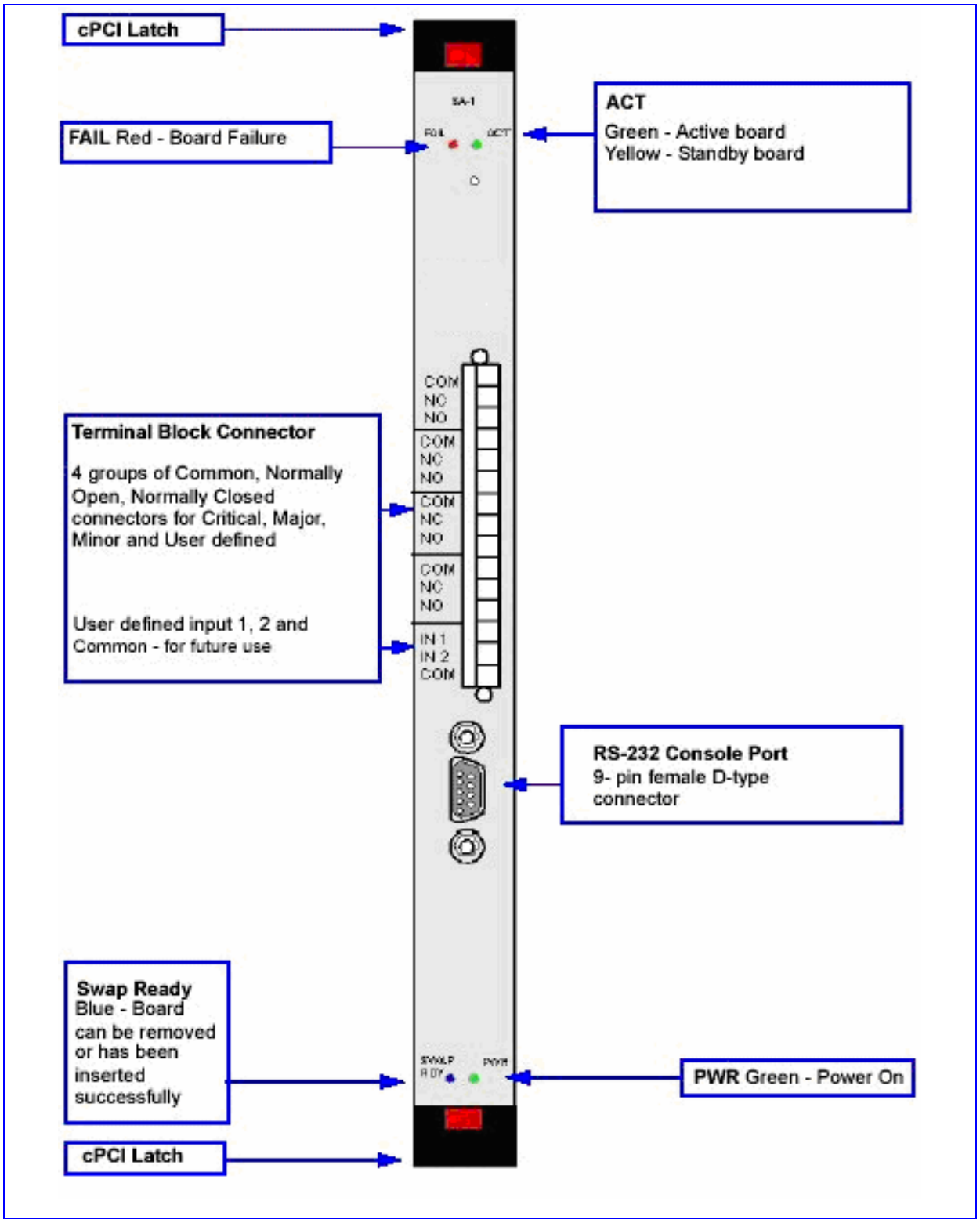
Table 2-12: RS-232 Console Pin Signal Interface

P1 Pin #	Signal Name	P2 Pin #
1	-	1
2	RX (Receive Data)	3
3	TX (Transmit Data)	2
4	-	4
5	GND (Ground)	5
6	-	6
7	-	7
8	-	8
9	-	9

Table 2-13: SA RTM LED Indicators

Label	Color	Function	
FAIL	Red	Board failure (fatal error)	
ACT	Green	Board initialization sequence terminated OK Indicates the Active board	bi-color indicator
	Yellow	Board initialization sequence terminated OK Yellow on indicates Standby board	
HOT-SWAP	Blue	Board can be removed or inserted	
PWR	Green	Power is supplied to the board	

Figure 2-10: SA RTM Panel



2.6 Ethernet Switch Boards

WARNING

To prevent broadcast storms, avoid external interconnection between the links of the two Ethernet Switches.

Note: The Ethernet Switch boards are placed in slots 3 and 4 only.

The ES/4411 Ethernet Switch board, based on CPC4411, complies with cPCI Extended Fabric Board standards utilizing a PICMG 2.16-compliant packet switching matrix onto a cPCI midplane. It enables the use of embedded, fault-tolerant, switched network architecture for higher system performance and reliability and enables inter-shelf communication.

The Ethernet Switch board is accompanied by the Ethernet Switch RTM. For more details refer to 'ES/4411 RTM' on page 43.

The figure below shows the front panel view of the Ethernet Switch board.

The Ethernet Switch board provides the following features:

- 24 cPSB-compliant 10/100 Base-TX ports (11 are connected to the Media Gateway 3500 midplane slots, the remainder are for future use)
- Two 1000 Base-SX (Gigabit fiber-optic) ports; where only one port is connected to external equipment.
- An out-of-band 10/100 Base-TX management port provided on the front panel

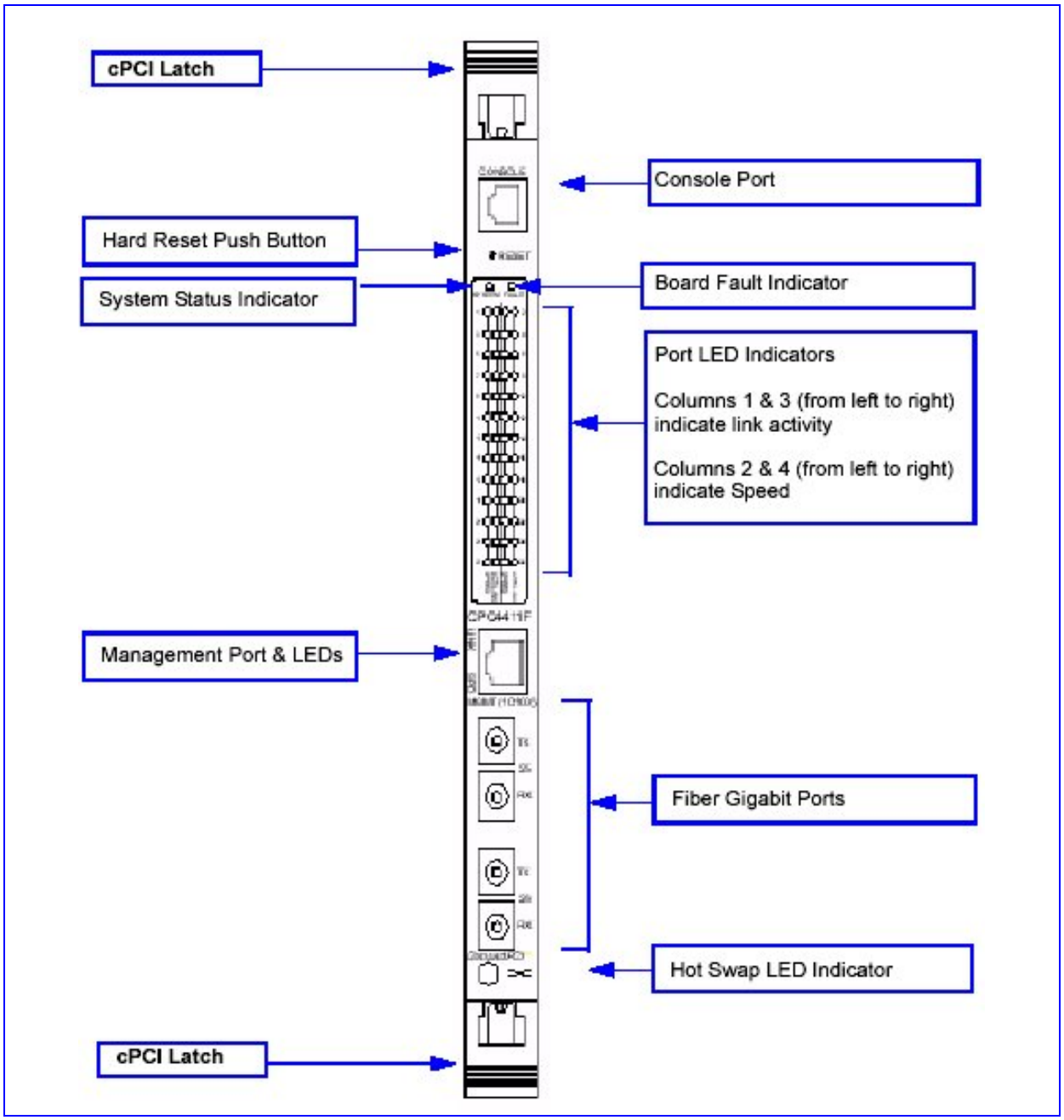
Each of the Ethernet Switch boards contains an RS-232 console port 6-pin female RJ-11 connector. This port is used for maintenance only.

The corresponding cable utilizes a 6-pin male RJ-11 connector and female DB-9 connector. The signal interface of the connector is according to the table below.

Table 2-14: RJ-11 Console Port Pinout

RJ-11 PIN#	Signal Name	PC DB-9 Connector
1	---	---
2	GND	5
3	RX	3
4	TX	2
5	GND	---
6	---	---

Figure 2-11: ES/4411 Panel



2.6.1.1 ES/4411 Panel Indicators

The status of the twenty-four switched Ethernet ports and the out-of-band management port is indicated by LEDs visible from the front panel. A green LED is used to indicate link and activity (transmit or receive), and a yellow LED is used to indicate the current port speed. These LEDs are organized into 4 columns. A green indicator in the first and third column from left to right indicates link activity (transmit or receive). A yellow indicator in the second and fourth column from left to right designates the current port speed 10/100/1000 Mbps. Refer to the tables below.

Table 2-15: Port/Link Activity Indicators

Indicator Status	Function
Green	Link exists
Off	No Link exists
Flashing Green	Activity (transmit or receive)

Note 1: The 10/100 Base-TX ports flash the Activity indicator when there is transmit or receive activity.

Note 2: The Gigabit (SX) ports flash the Activity indicator when there is receive activity only.

Table 2-16: Port Speed Indicators

Indicator Status	10/100 Mbps Port Indication
Yellow	100 Mbps
OFF	10 Mbps

Table 2-17: System Indicator

Indicator Status	Function
Green	Board is operational
Yellow	Board is booting
OFF	No power or serious fault

Table 2-18: Fault Indicator

Indicator Status	State Indication
Red	Fault
OFF	No fault or no power

Note: The FAULT indicator is off unless a serious internal error is detected.

Table 2-19: Ethernet Switch Hot-Swap Indicator

Indicator Status	State Indication
Blue	Board can be removed or inserted

2.6.1.2 ES/4411 Physical Slots to Ethernet Port Correlation - Media Gateway 3500 + TP-1610 Configuration

Table 2-20: ES/4411 Physical Slots to Ethernet Port Correlation

Slot Number	Slot 3 Ethernet Switch Port	Slot 4 Ethernet Switch Port	Dedicated to Board Type
1	1	1	SC
2	2	2	SC
3	-	24	Ethernet Switch interlink "F-link" used to interconnect two ES boards
4	24	-	Ethernet Switch interlink "F-link" used to interconnect two ES boards
5	3	3	TP-1610
6	4	4	TP-1610
7	5	5	TP-1610
8	6	6	TP-1610
9	13	13	TP-1610
10	14	14	TP-1610
-	18	18	Spare for future use
-	19	19	Spare for future use
-	20	20	100 Base-T port used for O&M or Control traffic when Interface Separation is enabled
-	21	21	100 Base-T port provides similar functionality as port 25 when 100 Base-T switch is used instead of GbE
-	22	22	100 Base-T port used for Control traffic when Interface Separation is enabled
-	23	23	100 Base-T port used as mirror port for Maintenance purposes
-	25	25	Gigabit Uplink to external equipment
-	26	26	Gigabit Uplink to external equipment (not used)

Note 1: The Ethernet Switches are internally interconnected via one of the Gigabit Ethernet links.

Note 2: Occupied in terms of the Ethernet Switch and reflected by the indicators.

2.6.1.3 ES/4411 RTM

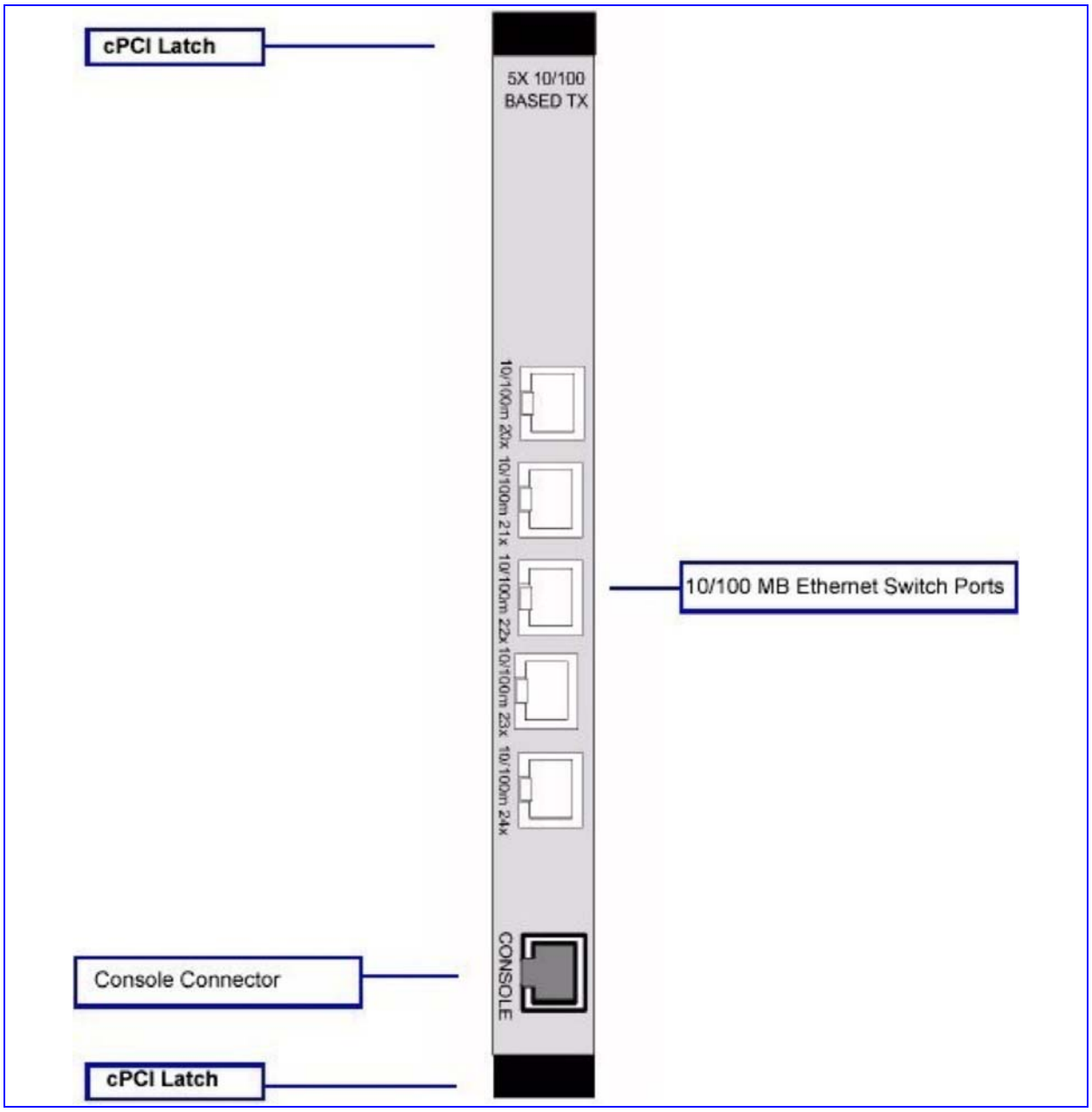
The ES/4411 RTM is supplied with the ES/4411 board and allows connection from the Media Gateway 3500 to 10/100 Base-T external Ethernet equipment instead of or in addition to using fiber GbE equipment. The Ethernet Switch RTM allows access to five additional 10/100 MB ports of the Ethernet Switch board not utilized for Media Gateway 3500 board connections. The Ethernet Switch RTM also contains an RS-232 console port, which is used for maintenance.

Table 2-21: ES/4411 RTM Port Pinouts

Pin Number	Signal Name
1	Rx+
2	Rx-
3	Tx+
4	-
5	-
6	Tx-
7	-
8	-

2.6.1.3.1 ES/4411 RTM Panel

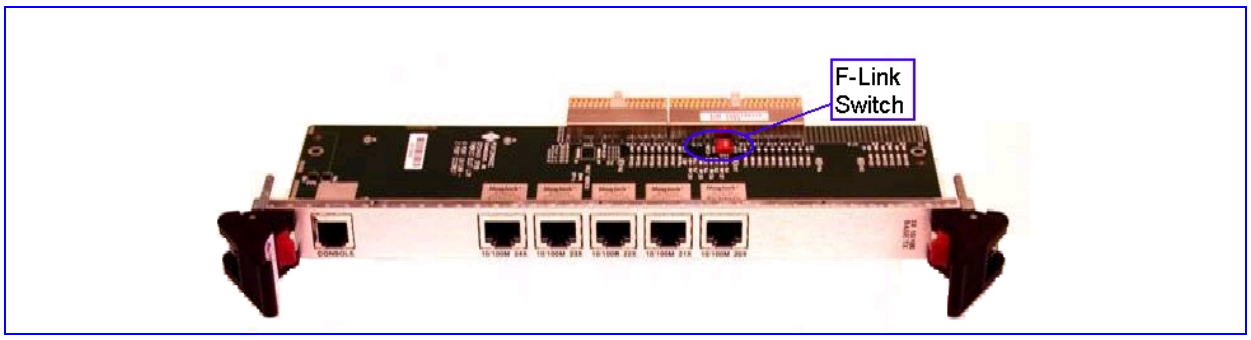
Figure 2-12: ES/4411 RTM Panel



2.6.1.3.2 ES/4411 RTM F-Link Switch Settings

The ES/4411 boards' hardware configuration is changed in version 3.0 and requires the F-Link (Fabric to Fabric) switch located on the ES/4411 RTM (refer to the figure below) to be set correctly.

Figure 2-13: ES/4411 RTM F-Link Location



Some of Media Gateways with version 2.1 were deployed with F-Link switch already properly set, while other deployments require that the F-Link switch be set correctly during Online Upgrade. Use the table below to verify the settings of the F-Link switches SW1-1 to 4 on the ES/4411 RTM to the **ON** position.

Table 2-22: ES/4411 RTM F-Link Settings

Bit	Description	Position Description	F-Link Position for Version 3.0
SW1-1	F2FTX+	ON = Link Port 24 (TX24+) to F2F * OFF = Link Port 24 (TX24+) to RJ-45 on rear panel	ON
SW1-2	F2FTX-	ON = Link Port 24 (TX24-) to F2F * OFF = Link Port 24 (TX24-) to RJ-45 on rear panel	ON
SW1-3	F2FRX+	ON = Link Port 24 (TX24+) to F2F * OFF = Link Port 24 (TX24+) to RJ-45 on rear panel	ON
SW1-4	F2FRX-	ON = Link Port 24 (TX24-) to F2F * OFF = Link Port 24 (TX24-) to RJ-45 on rear panel	ON

* Factory default position

3 Installation Process Flow

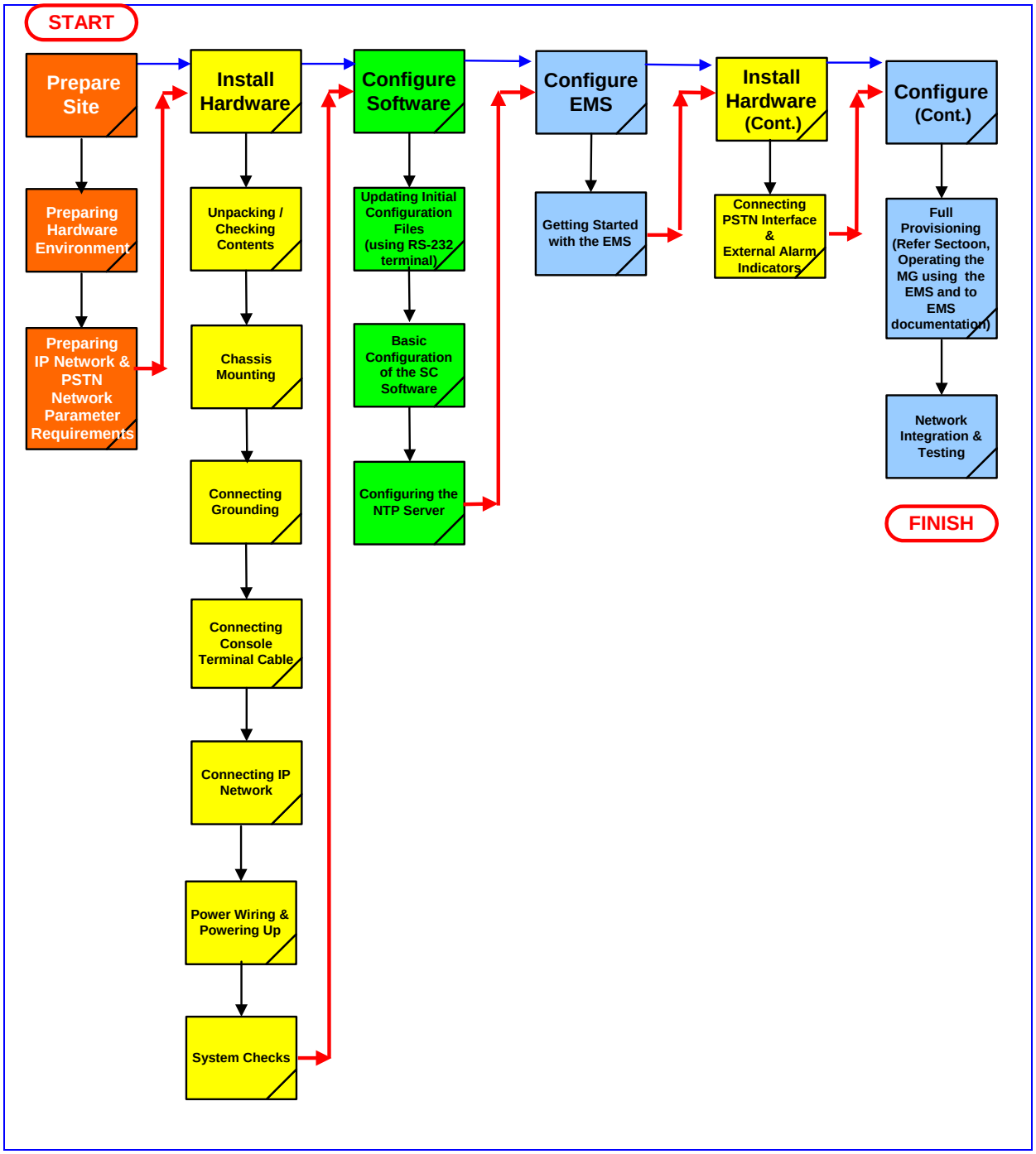
The installation process flow depicted in the figure below illustrates the steps involved in the installation process.

Customers should prepare the site according to the requirements described in the Site Preparation section prior to the installation of the Media Gateway 3500 equipment. The Hardware Installation phase comprises unpacking the equipment, mounting the chassis on the rack, connecting network, console, power and earthing cables, as well as powering up the system and verifying that it is in working order. Next is the Software Installation phase, which consists of defining IP parameters, configuring Sun™ Solaris™ OS accordingly and installing and configuring the System Controller software, as well as to connect to external equipment. This is followed by installing the trunk cables. The final installation phase consists of configuring the Element Management System (EMS) or alternative MIB Browser.

Note: The installation process includes installation of the system control software on the SC boards only. All boards come with pre-installed firmware and embedded software as appropriate. The SC boards come with a pre-installed Sun™ Solaris™ operating system

3.1 Installation Process Flow (TP-1610 Configuration)

Figure 3-1: Installation Process Flow (TP-1610 Configuration)



4 Site Preparation

4.1 Physical Requirements

The following describes the equipment that must be prepared on site before the Media Gateway 3500 can be installed.

4.1.1 Equipment

Table 4-1: Equipment Requirements

Item	Requirement
L2/L3 Switch or Routers	Two are required for High Availability. They must have 1 Gbps optical ports, refer to 'Interfacing with the IP Networks' on page 58.
NTP Server	Server platform for the Network Time Protocol. (A backup platform for redundancy is recommended) The EMS server may also be configured to serve as the NTP Server
SNMP Management Station	Nortel EMS (Element Management System) or Customer EMS. Alternatively, a MIB Browser can be used for minimal management operations
PC Terminal Console	The PC is used to install and configure the SC board software
Telco Rack	19-inch rack can support up to 6 Media Gateway 3500s
Screws and Washers	Appropriate for installing Media Gateway 3500 chassis on rack
Wrist Strap and banana plug or alligator clip	For electrostatic discharge (ESD) connection
Lugs and screws	Appropriate for earthing

4.1.2 Electrical

Prepare outlets suitable for above equipment and AC or DC inputs appropriate to Customer requirements for the Media Gateway 3500

Table 4-2: Electrical Requirements

Item	Requirement
Outlets	Suitable for above equipment and AC or DC inputs as appropriate to Customer requirements for the Media Gateway 3500
Circuit breaker	The capacity of the circuit breaker in the electrical cabinet must be sufficient to handle the power requirements described in this document
Power consumption	Provide sufficient capacity for the average power consumption for a full complement of boards: Power consumption: ▪ Media Gateway 3500 chassis with maximum TP-1610 boards: 460 watts (4 A @ 115 VAC, 2 A at 230 VAC and 9.5 A at 48 VDC)
For AC power only	UPS backup (Optional for simplex system configurations Required for redundant system configurations)

4.1.3 Cables

Note 1: Be sure to prepare the trunk connections before beginning the Media Gateway 3500 installation.

Note 2: For Cable pinout information, refer to the Pinout tables in ‘Media Gateway 3500 boards’ on page 25.

Table 4-3: Cabling Requirements

Item	Requirement
RS-232 Cables	For SA and ES Console Terminals (provided with the product)
Fiber Optic and copper Cables For Media Gateway 3500 + TP-1610 Configuration	The customer provides: PSTN: For NEBS GR-1088-CORE compliance use Shielded cables to connect to DS-1 and Ethernet ports For other installations then NEBS UTP cables may be used for DS-1 ports. (Refer to ‘TP-1610 Configuration - Cabling the Trunk Connectors' on page 101 and to the ‘50-pin Telco Connector E1/T1/J1 Connections’ on page 29.) Ethernet: For Uplinks, two incoming multi-mode 1000 Base-SX fiber optic cables with Dual SC terminators, using 850 nM transceivers. For ES RTM (LIM) interfaces, 100 Base-TX using CAT 5 cables. (Refer to ‘Connecting the ES/4411 IP Network Cabling' on page 100.)
Earthing Cables	Refer to ‘Earthing Requirements’ on page 20.
Power Cables	For DC, use 14 AWG stranded wiring to hook up to local For AC, use standard cable (Refer to 'Connecting System Power' on page 71.)

4.2 Defining IP Parameters

The tables below detail the parameters that the customer must provide as preparation for the installation procedures.

Note 1: The tables in this section provide fields in which you can fill in the relevant information.

Note 2: A list of the MAC addresses of the systems' boards should be provided with the product documentation. However, the MAC Address field in the table below is provided for your convenience.

Note: The PC should be in the same subnet as that of the Media Gateway 3500 components that communicate with the PC.

4.2.1 Gateway Addresses

If the network requires a Single IP configuration, use the Single IP Configuration column in the table below. If the network includes 3 subnets, use the 3 Subnets - OAM, Media and Control network columns in the table below:

Table 4-4: Gateway Addresses

	Single IP Network Configuration	3 Subnets		
		OAM Network	Media Network	Control Network
IP Address				
Subnet Mask				
Default Gateway Router				

4.2.2 Network Server IP Addresses

For the relevant Network Servers, prepare the following information:

Table 4-5: Network Server IP Addresses

Network Server	IP Addresses	Comment
DNS		Up to 3
NTP		
EMS		
NMS		
OSS		
APS		
Syslog		

4.2.3 DiffServ Priorities

Use the following parameters for DiffServ Priorities. They should be taken from the Network configuration.

Table 4-6: DiffServ Priority Parameters

DiffServ Class Name	Protocol Group	DiffServ Priority
Network	Communications between network devices within one administrative domain like ICMP, COPS, RSVP, DNS, DHCP, BootP, high priority OAM	
Premium Media	Telephony service like RTP media, T.38 Fax over IP, Lawful Intercept or Control protocols	
Premium Control	MGCP, MEGCO, TGCP, etc. Signaling protocols	
Gold	Used for Voice Streaming, Video on demand Broadcast TV, Video surveillance	
Bronze	Used for long-lived TCP, and HTTP flows like Non time-critical OAM&P, Email, Instant Messaging.	

Note: The priority settings assigned to a DiffServ Class name is assigned per Protocol group. The same assignment is relevant to all of the protocols in the Protocol group.

4.2.4 IEEE 802.1p QoS/CoS Layer 2 Traffic Prioritization

If IEEE 802.1p is implemented, prepare the following information:

Table 4-7: IEEE 802.1p Service Priority Classes

Service Priority Classes	Tag
Network Service Class DiffServ	
Premium Media DiffServ	
Premium Control DiffServ	
Gold Service Class DiffServ	
Bronze Service Class DiffServ	

4.2.5 Security Profiles

Use the table below for noting the security profiles of the EMS and OAM servers:

Table 4-8: Security Profiles

Server	IKE Pre-Shared Key	IKE Encryption
EMS		
OAM		

4.2.6 Defining IP Parameters - Media Gateway 3500 + TP-1610 Configuration

Table 4-9: MAC Address and IP Address Registration for Media Gateway 3500 + TP-1610 Configuration

Slot No.	Board Type	MAC Address (1)	MAC Address (2)	IP Address (1)	IP Address (2)
1	System Controller (SC)	N/A	N/A		N/A
2	System Controller (SC)	N/A	N/A		N/A
	MG IP Address (floating)	N/A	N/A		N/A
3	Ethernet Switch	N/A	N/A		N/A
4	Ethernet Switch	N/A	N/A		N/A
5	TP-1610				
6	TP-1610				
7	TP-1610				
8	TP-1610				
9	TP-1610				
10	TP-1610				

4.3 Environmental Requirements

4.3.1 NEBs Environmental Requirements

The Media Gateway 3500 chassis mechanical envelope complies with the requirements of NEBS GR-63-CORE, Issue 2.

The table below provides a list of the mechanical requirements which were imposed on the chassis design.

Table 4-10: NEBS Requirements

Physical Protection Requirements	Test level	Reference (GR-63 para.)
Humidity	5 to 90%	4.1.2
Altitude	-60 to 4000 m	4.1.3
Fire Resistance		4.2.3
Drop Test, Packaged	Drop height: 600 mm	4.3.1 (10-25 kg, one person carrying)
Drop Test, Unpackaged	Drop height: 75 mm	4.3.2 (10-25 kg, one person carrying)
Earthquake	Zone 4	4.4.1
Office Vibration	5-100-5 Hz/0.1g, 0.1 oct/minute; 3 axes	4.4.3
Transportation Vibration	5-100 Hz, 0.1 oct/minute; 100-500 Hz, 0.25 oct/minute	4.4.4
Airborne Contaminants	------	4.5
Thermal Shock	-40^{o} C to $+25^{o}$ C / -40^{o} F to 77^{o} F within 5 minutes $+70^{o}$ C to $+25^{o}$ C / -158^{o} F to 77^{o} F within 5 minutes	5.1.1.1 5.1.1.2

Presently, the system operation is guaranteed under the following conditions:

4.3.2 Temperature

Table 4-11: Temperature Range

Temperature Range for Operation	0^{o} C to $+55^{o}$ C
Recommended Ambient Temperature	$+5^{o}$ C to $+30^{o}$ C

4.3.3 Humidity

Table 4-12: Humidity Range

Relative Humidity Range for Operation	5 to 90%
Nominal Relative Humidity	70% (wet bulb)

4.3.4 Lightning Protection

In addition to correct earthing, sufficient lightning protection must be included at the site in order to prevent damage to the equipment. Damage to the equipment can result either from a direct strike of lightning or from propagated high voltage surges.

In order to avoid damage caused by lightning surges, installation of equipment should be compatible with Class 3 classification as defined by EN61000-4-5 Annex B, where the surge level may not exceed 2kV.

4.3.5 Altitude

Table 4-13: Altitude Range

Altitude	Up to 3048 m (10,000 ft)

4.3.6 Earthquake

Table 4-14: Earthquake Requirements

Earthquake	Zone 4

4.3.7 Rack Requirements

Table 4-15: Rack Requirements

Telco Rack	19-inch
Space	As per GR-63-CORE Maintenance access 762 mm (2’ 6”) Wiring access 610 mm (2’)

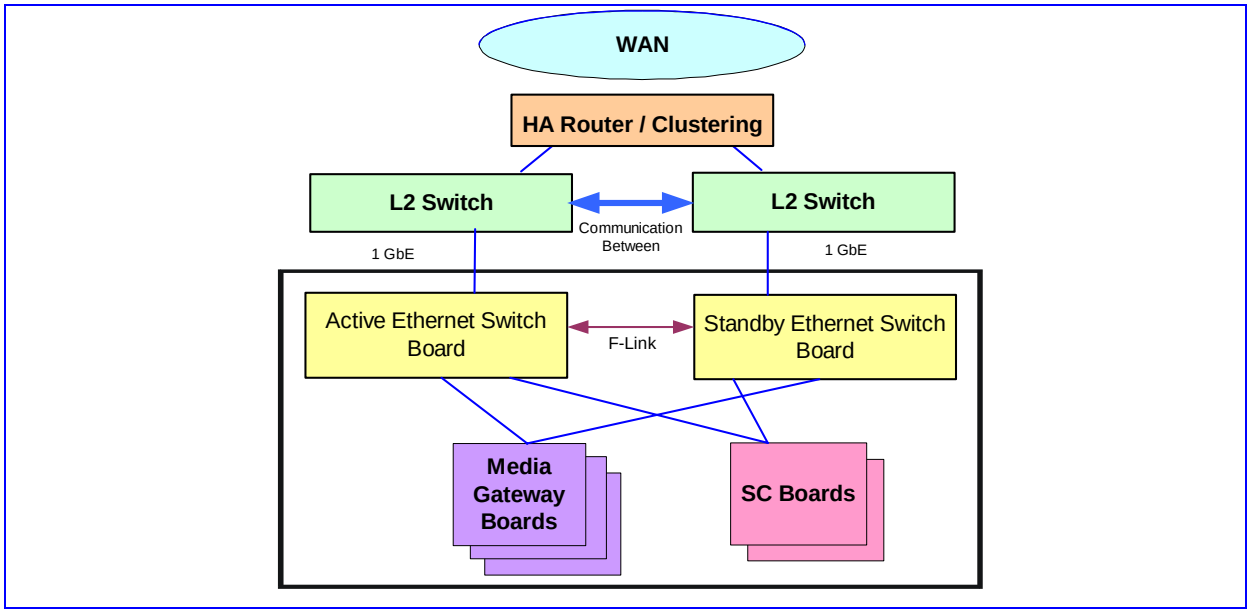
4.4 Interfacing with the IP Networks

To ensure full high availability capabilities, one of methods detailed below must be incorporated into the network infrastructure.

4.4.1 Method One: Cluster of Two Interconnected L-2 Switches

In a configuration with the cluster of two interconnected L-2 switches, the Media Gateway 3500’s uplink is connected directly to L-2 switches. The two Ethernet Switch boards must not be interconnected externally as this, combined with the intercommunication between the L-2 switches, causes a closed loop in the network.

Figure 4-1: Clustering of Two L-2 Switches



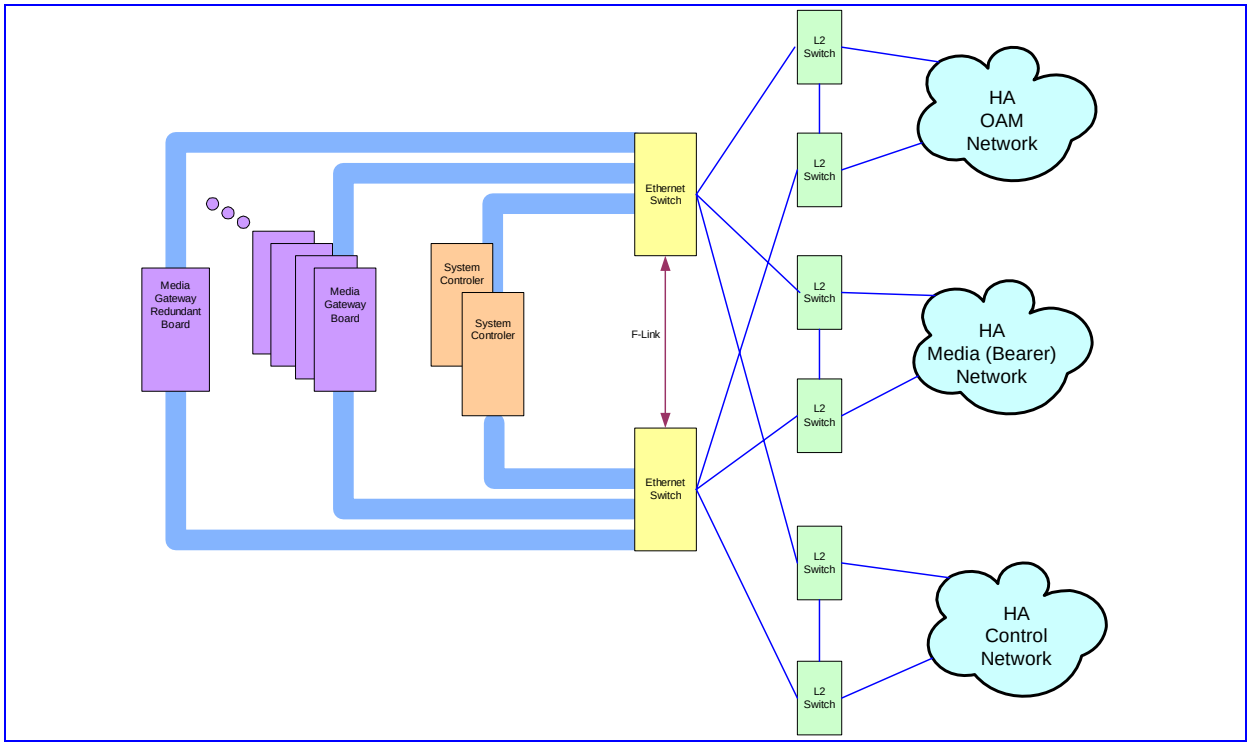
This configuration is more economical when more than one Media Gateway 3500 is deployed at a single site. The local communication between multiple Media Gateway 3500s passes through the two interconnected L-2 switches while all external communication passes through ports to the external router. The cables to the external router must meet the requirements of external communication.

4.4.2 Method Two: One L-2 Switch with Two VLANs

In a configuration utilizing a single L-2 switch, each of the two uplinks from the Ethernet Switch boards must be connected to separate VLANs. This dual connection, given the intercommunication between the Ethernet Switch boards, prevents a closed loop in the network. This is a slight modification of method 1. Because in this method the Switch is subject to a Single Point of Failure, it is not recommended.

Note: For multiple networks, apply these methods to each of the networks in the network configuration.

Figure 4-2: Multiple IP Networks



Note: For ES/4400, the HA Media (Bearer) Network is one GbE Fiber Optic link. The HA OAM Network and HA Control Network are 100 Base-T copper links.

4.5 Clock Synchronization

The Media Gateway 3500 Media Gateway can operate in either Non-Synchronized or Synchronized mode.

4.5.1 Clock Synchronization for PSTN Interfaces

When connecting the gateway to PSTN network, the clock synchronization methods that should be applied for the PSTN trunks must be reviewed. Typically, the gateway can receive the synchronization clock from several sources as BITS (Building Integrated Timing Source), SETS (SDH Equipment Timing Source) or from regular E1/T1 trunks. To accomplish this, the clock sources must be prioritized in order to achieve optimal synchronization switches.

The Media Gateway 3500 can operate in either Non-Synchronized or Synchronized mode.

4.5.1.1 Connections for the Non Synchronized Mode

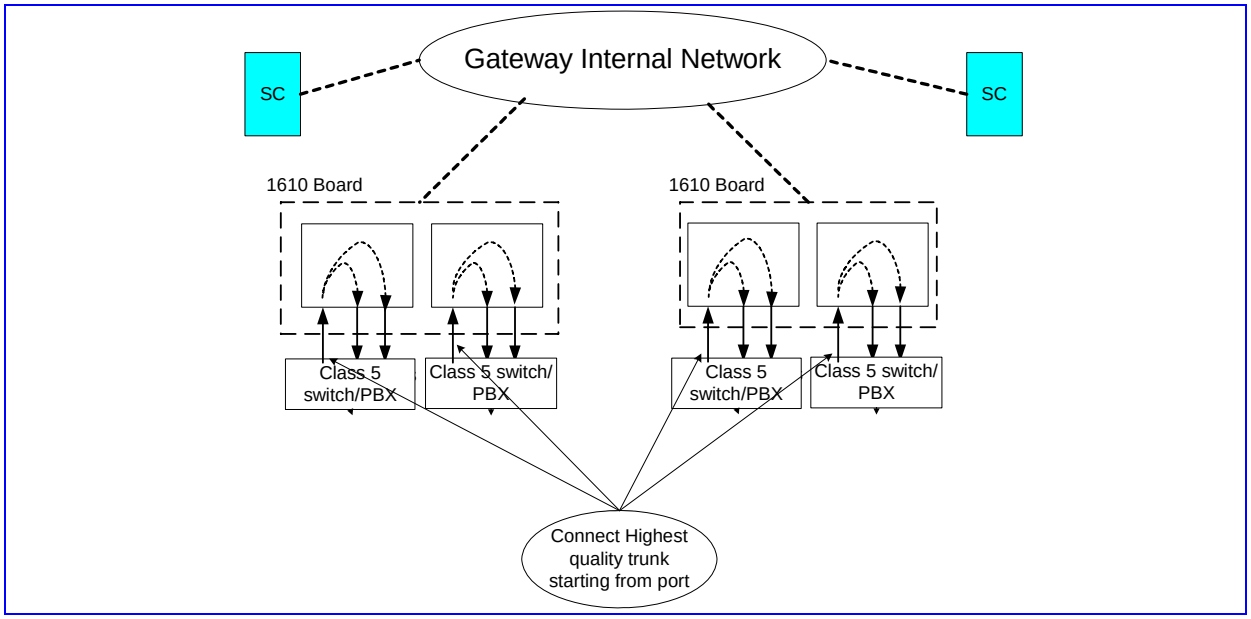
In non-synchronized mode, the gateway is not synchronized to a centralized unique clock. Instead, each 8-trunk group (1-8, 9-16) of every Media Gateway board is internally synchronized, deriving the clock from one of its active trunks.

This mode is the default mode that is used when the gateway terminates the synchronization chain and there is no need for a centralized clock inside the gateway, to synchronize all trunks to that clock.

Some guidelines for connection are:

- When clock quality of the group of 8 trunks is the same, the trunks may be connected arbitrarily.
- When a group includes trunks with different clock qualities, connect the most accurate and stable clock trunks to the Media Gateway board's trunk 9 to 16 (trunk 9 is the highest quality and 16 is the lowest quality.)

Figure 4-3: Non-Synchronized Mode Connections Diagram



Note: For more information, refer to the Programmer's User Manual, document # LTRT-962xx.

4.5.2 Connections for the Synchronized Mode

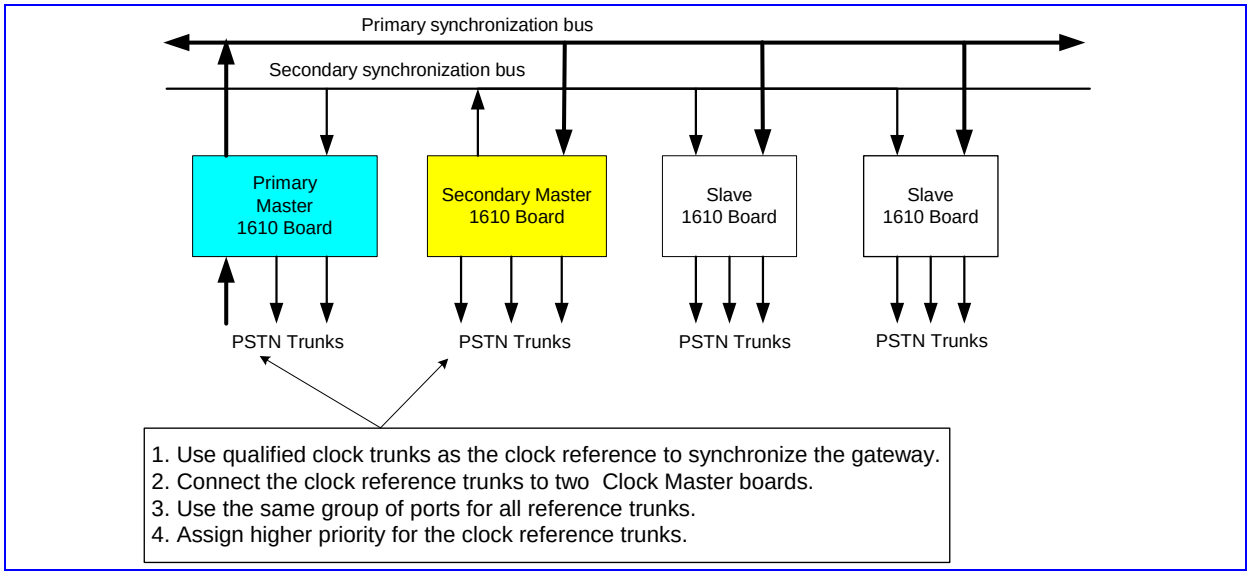
In synchronized mode, the Media Gateway 3500 operates in synchronization with the PSTN equipment attached to the PSTN interfaces. It derives the synchronization timing from one of the E1 / T1 / J1 trunks and distributes the timing to all other synchronous interfaces in the system according to Bellcore GR-1244-CORE line-timing scheme.

When working in synchronized mode, the reference trunks for Primary and Secondary clock master should be chosen from one of the following ranges: (1-8) or (9-16)

➢ To operate the gateway at redundant synchronization regime, take these 4 steps:

1. Configure two Media Gateway boards, to provide a redundant synchronization clock to the whole gateway.
2. Divide the highest quality trunks into two redundant clock reference groups.
3. Connect the highest quality trunks to the same trunks group on the clock master boards.
4. Assign the highest clock priority to the most accurate and stable ports on both clock master boards. Note that when assigning priorities, 15 is highest priority, 1 is lowest priority, and 0 means not to use the associated trunk for clock synchronization.

Figure 4-4: Synchronized Mode Connections Diagram



Reader's Notes

5 Unpacking/Checking Contents

The Media Gateway 3500 (configured and populated as per the customer's order) is shipped in a corrugated cardboard container.

➢ To unpack the Media Gateway 3500 Gateway, take these 7 steps:

1. Transport the Media Gateway 3500 to the installation location using an appropriate conveyor.
2. Carefully cut through the tape that binds the carton closed and open the top cover of the carton.
3. Open the protective plastic covering.
4. Grasp the Media Gateway 3500 chassis with both hands and lift it from the carton.
5. Place the Media Gateway 3500 chassis upright on a stable surface.
6. Save the packaging material in case the equipment needs to be transported at a future time.
7. Check the contents of the shipment against the delivery documents. Report any discrepancy regarding the contents or apparent damage to Nortel as soon as possible.

Reader's Notes

6 Mounting the Chassis on a Rack

Note: The Media Gateway 3500 complies with Network Equipment Building System (NEBS) requirements for racks.

The Media Gateway 3500 is provided with mounting flanges on either side of the front of the chassis, appropriate for standard 19-inch racks (provided by Customers). 23 inch racks are not supported by the Media Gateway 3500.

Rack Mount Safety Instructions (UL)

Note: When mounting the chassis on a rack, be sure to implement the following Safety instructions:

- Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.
- Maintain Air Flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation on the equipment is not compromised.
- Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
- Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g., use of power strips.)

Note: A shelf pre-installed in the rack can assist in the installation by placing the chassis on it while fastening the chassis to the rack.

➢ To mount the chassis on a rack, take these 2 steps:

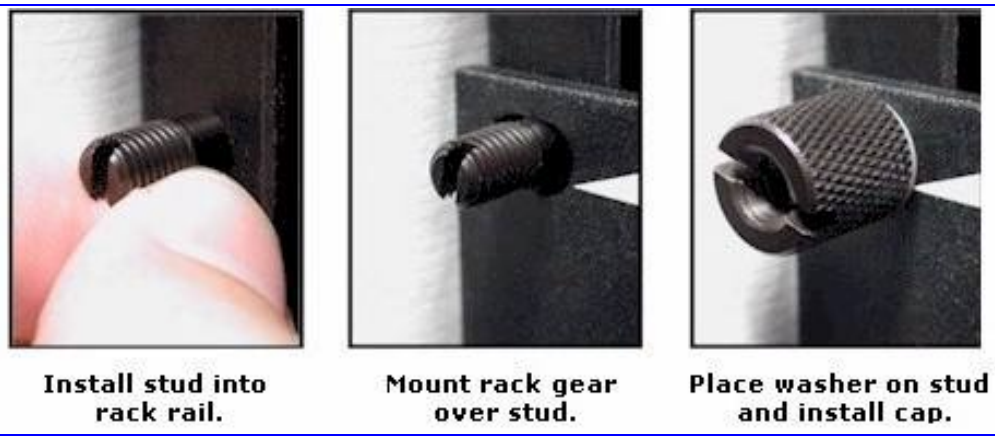
1. Grasp the handles on either side of the chassis as well as on the base of the chassis. Lift it and fit it onto the rack.
2. While a technician is holding the chassis in place; a second person fastens the chassis to the rack rails using four screws (not provided), two on each side of the chassis or as appropriate for your rack type. Refer to the figure below.

Figure 6-1: Attaching the Chassis to the Rack

Figure 6-2: Chassis on the Rack - Front View

Note: If you are using pre-installed support studs on the rack, lift the chassis and mount in place, over the installed studs. Place washers over the studs and secure the caps.

Figure 6-3: Installing Rack Using Pre-Installed Support Studs



Reader's Notes

7 Earthing

7.1 Earthing the Gateway

The gateway must be earthed to a stable local earth reference. The gateway's earth terminal should be connected thought a separate earth wire (6 AWG recommended) to the rack's earthing. The earth connection's resistance must not be greater than 0.1 ohm. Verify that the rack's earthing is properly done.

Earthing provisions for the Media Gateway 3500 are located on the Power Entry Module (PEM) panel, as shown in the figure below. There are two earth connectors situated immediately to the right of each DC power connector or to the left of the AC power connector. The chassis is supplied with earth lugs and screws.

The screw size is ¼ inch. The lug diameter is 0.63 inches.

➢ To connect the earthing, take this step:

- On the rear panel of the chassis, for DC, there are two pairs of earthing screws (refer the figure below showing the DC version); for AC there is one pair of earthing screws (refer the figure below showing the AC version). To each of these pairs, connect a two-hole standard barrel type copper lug attached to earthing wire. An example of an appropriate two-hole standard barrel copper lug is Molex heavy duty terminal connector #19221-0168.

Figure 7-1: Earthing Connections Chassis Rear PEMs (DC Version)

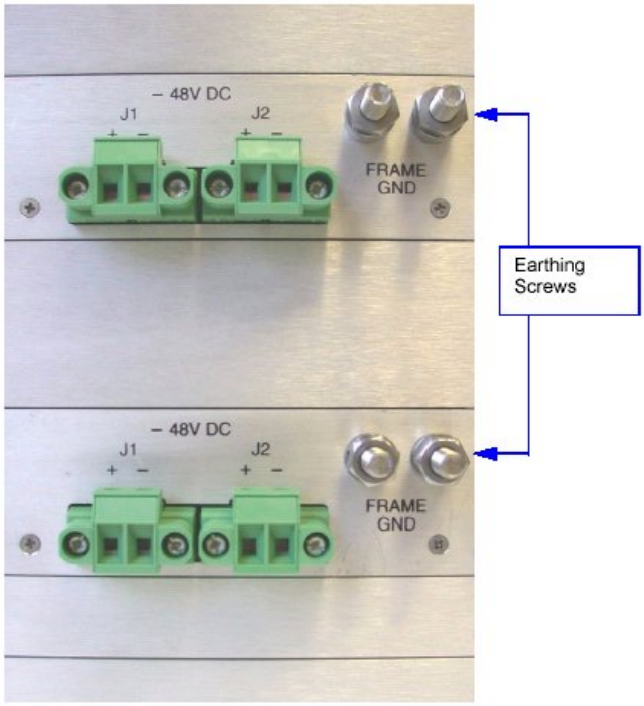
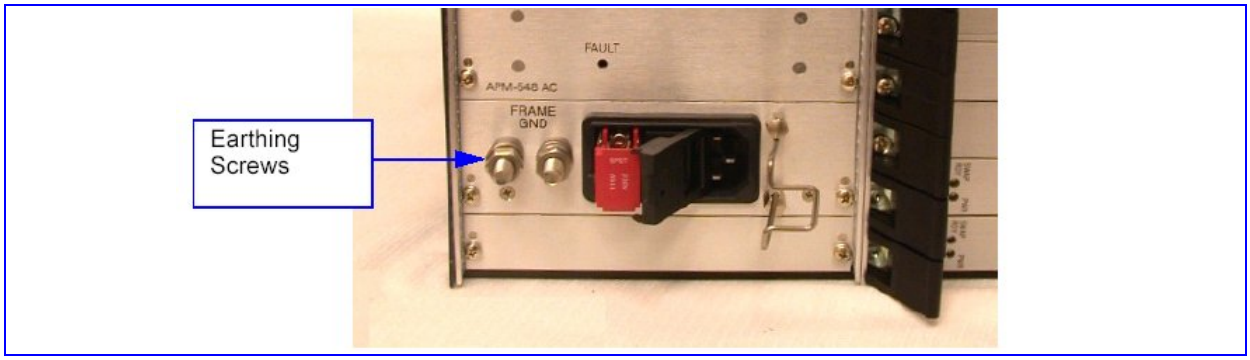


Figure 7-2: Earthing Connections Chassis Rear PEM (AC Version)



8 Powering Up

After mounting the chassis and connecting the fiber optic cabling, and earthing, as well as cabling the console, the system is ready to power up. Before the system is powered up, the following test procedures must be carried out. When this is completed, the power wiring can be connected.

8.1 Pre-Power Connection Test Procedures Checklist

➢ **To complete the installation up to this point, verify the next 9 items are correct:**

1. Check that an earthing lug is present and that the hardware connections at both ends of the cable are tight.
2. Check the electrical connections:
   - For DC power: Verify that the power connections to the two DC power inputs on the PEMs have been made and that the covers are in place.
   - For DC power: Verify the polarity of the connected cables to the DC inputs.
3. Check that all front slots are occupied, either by a board or by an appropriate front blank panel.
4. Check that all rear slots are occupied, either by a board or by a blank panel.
5. Verify that all boards are installed in their dedicated slots (refer to 'Front and Back Views of the Media Gateway 3500' on page 18).
6. Check that fiber optic cabling interconnects the two Ethernet Switches on ports 25 and 26 of their front panels' Gigabit ports (crossover connections for TX to RX).
7. Check that the console is connected to the SA RTM that is to be the initial active SC board.
8. Check that the SA RTM alarm cabling is secured to the Media Gateway 3500 chassis as well as to the external equipment.
9. Check that the Ethernet Switch fiber optic cabling is secured to the Media Gateway 3500 chassis as well as to the external equipment.
10. Check that the PSTN cabling on the Media Gateway boards are secured to the Media Gateway 3500 chassis as well as to the external equipment.

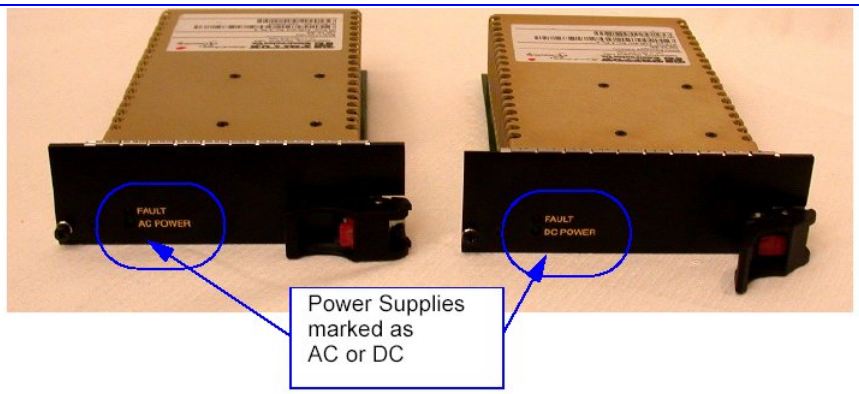
8.2 Connecting System Power

Power connections to the Media Gateway 3500 must comply with local safety codes. Power connections must be performed by qualified personnel only.

Caution

Be sure to make the earth connection before connecting the power. Refer to' Earthing' on page 69.

Figure 8-1: PS-2 Power Supply



The Media Gateway 3500 chassis can be powered from either AC or DC sources.

Caution

Use EITHER the AC or the DC power supplies. NEVER MIX connecting both types of power supplies in the same system, since chassis malfunction or permanent damage can result.

Use Nortel approved Power Supply units ONLY.

Table 8-1: Power Requirements

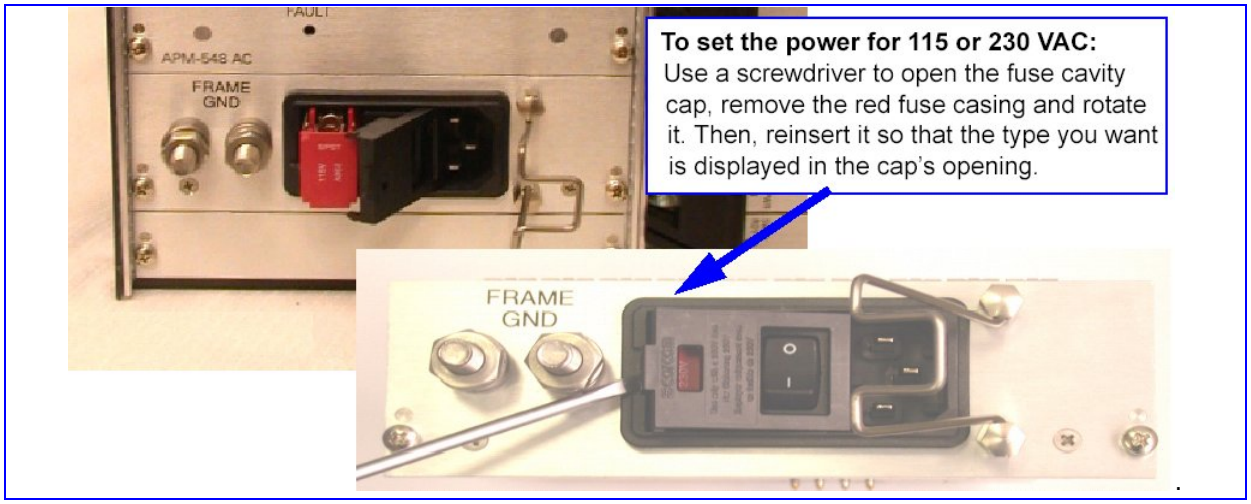
Type	Power Requirements	Connection Provisions
AC	100 to 240 V AC, nominal 50/60 Hz	Standard 3-prong sockets
DC	-40.5 to -60 V DC	Input terminals

8.2.1 Connecting AC Power

A standard, properly earthed, socket and associated circuit breaker is provided on the rear of the chassis. A power cable is provided according to the customer's local standard.

Table 8-2: AC Power Cable Types

Item	Description
A0539897	POWER CORD AC 3 WIRE MEMA 5-15P AMERICAN TYPE
A0539898	POWER CORD AC 3 WIRE 2.5m AUSTRALIAN TYPE
A0539894	POWER CORD AC 3 WIRE 1.8m CONTINENTAL EUROPE TYPE
A0539899	POWER CORD AC 3 WIRE 2.5m CHINESE TYPE
A0539896	POWER CORD AC 3 WIRE 2.5m BRITISH TYPE WITH 3A FUSE
RACR00005	POWER CORD AC 3 WIRE 2.5m ARGENTINEAN TYPE
A0539895	POWER CORD AC 3 WIRE 1.8m ISRAELI TYPE



Note: Using an AC power source with UPS is recommended to avoid total power failure if the AC power source fails. For redundant system configurations the UPS is required to assure continuous system functionality, in the event that a component failure occurs.

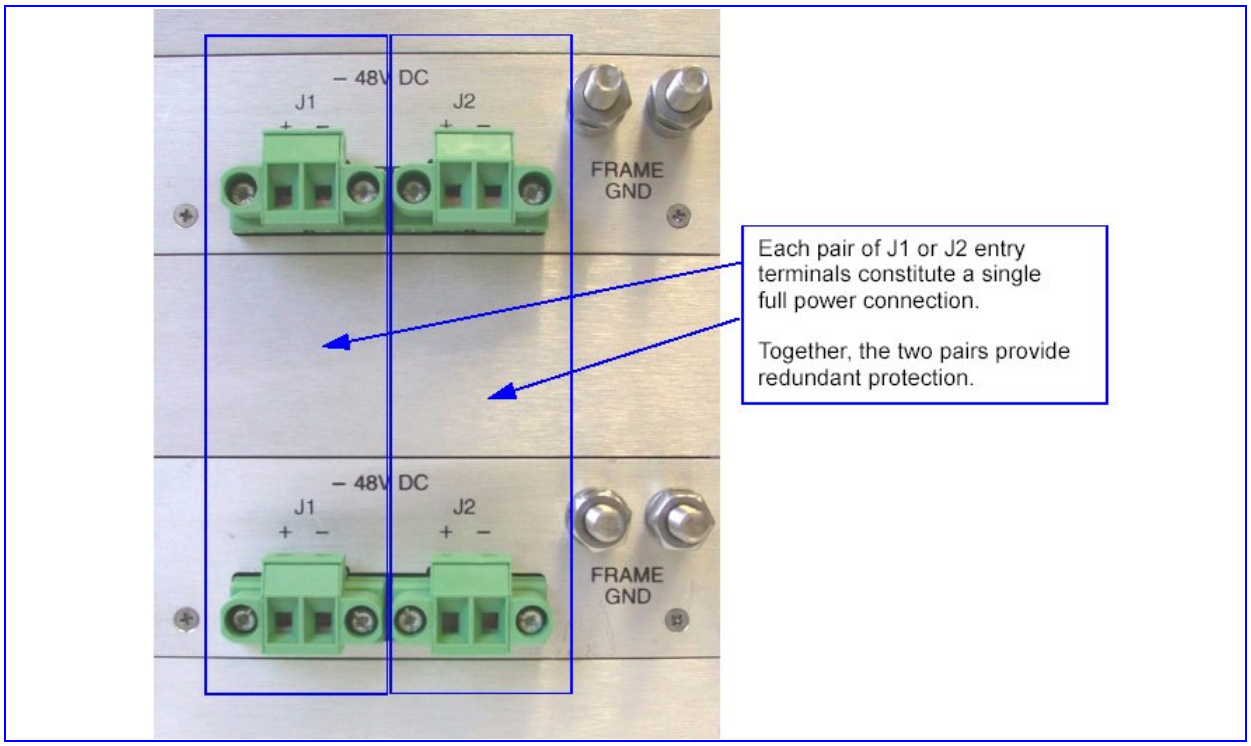
➢ To connect the AC power to the terminals, take the next 9 steps:

1. If a UPS is included, verify that an AC power source with UPS is to be used (required for redundant system configurations).
2. Verify that the circuit breaker in the electrical cabinet is sufficient to handle the power requirements.
3. Verify that the PEM is set to either 115VAC (for the range of 90 to 135 VAC) or 230 VAC (for the range of 190 to 264 VAC) as your standards require. If not, use a screwdriver to open the fuse cavity cap, remove and rotate the red fuse so that the type you require is displayed through the cap's opening. (Refer to the figure above.)
4. Close the cap. (there should be a click).
5. Check that the switch is set to the off position (O).
6. Connect the standard power cable to the 3-prong socket on the rear panel.
7. Plug in the power cable into an earthed power outlet.
8. Turn the switch to the on position (I).
9. Check that the LED indicators of the various boards are lit according to 'Media Gateway 3500 Boards' on page 25.

8.2.2 Connecting DC Power

The rear of the chassis (refer to the figure below) is provided with redundant pairs of power inputs for DC. These pairs are marked J1 and J2. Each pair (the two input terminals marked J1 and the two input terminals marked J2) must be connected to a separate power source for the redundancy configuration to function correctly.

Figure 8-2: DC Power Connections Redundant Pairs



WARNING

Make sure that the power connections are according to the indicated polarity.

➢ To connect the DC power to the terminals on each terminal block, take these 5 steps:

1. Remove input terminals from the PEM.
2. Connect two 14 AWG stranded wiring to the inputs, paying attention to the polarity, and tightening the upper screws.
3. Reinsert the input terminals into the power input terminals, and fastening the screws on the left and right sides. Refer to the figure below.
4. Check the LED indicators of the various boards are lit according to the table below.

5. Repeat these steps for the connections on the second PEM.

Figure 8-3: Making the DC Power Connections

8.3 Post-Power Connection Test Procedures Checklist

➢ **To complete the installation up to this point, verify the next 5 items are correct:**

1. Verify that air is flowing out the air vents of the chassis by feeling the air flow at the vents.
2. Check that there is communication via the console connected to the SA RTM that is the initial active SC board. Perform this check on both of the SC boards and SA RTM pairs.
3. Using the Ethernet Switch RS-232 cable, connect to the Ethernet Switch board's console port and verify that communication is established.
4. Verify that the external Ethernet equipment recognizes the Ethernet activity.
5. Check the LED indicators of the various boards are lit according to the table below.

Table 8-3: Functional Checks on Component Indicators

Functional Unit	Indicator	Indicator Status	Description
Ethernet Switch boards	SYSTEM	Yellow	Basic board integrity checks were completed
		Green	Awaiting BootP response
	FAULT	OFF	Normally OFF LED is Red if the board fails
	Hot Swap	OFF	Normally OFF LED is Blue during Hot Swap
SC boards	READY	Green	The board's power module is operational
	ALARM/USER	Flashing Green	Indicates correct operation of processor
	Hot Swap	OFF	Normally OFF LED is Blue during Hot Swap
Media Gateway boards	PWR	Green	The board is correctly powered
	ACT	OFF	At initial power the Green ACT LED is OFF for all boards. After software is installed on the SC board, this LED on the boards is lit, except for the redundant, standby board, for which it is OFF.
	Hot Swap	OFF	Normally OFF LED is Blue during Hot Swap
Fan Tray Unit	-		All LEDs on; Not applicable in Version 1.2

Table 8-3: Functional Checks on Component Indicators

Functional Unit	Indicator	Indicator Status	Description
APM Fan Tray Power Supply Module	FAULT	OFF	Normally OFF LED is Red if voltage to the fans is improper
Power Supply Module	Power	Green	Indicates ON Power input is within specified limits
	FAULT	OFF	Red LED is Off On indicates power input voltage is not within specified limits, over-temperature or input failure

Reader's Notes

9 Configuring SC Software for the First Time

The System Controller (SC) software is pre-installed on the SC board. You are required to configure the preinstalled Sun™ Solaris ™ 2.8/2.9 configuration files and SC software.

Note 1: Solaris™ 2.8/2.9 and the SC software are pre-installed on the system disks; therefore do not install either Solaris™ or the SC software.

Note 2: The software configuration procedure described in this section must be performed on **both** of the System Controller (SC) boards (the Master SC board or the one designated to be the Active board initially, as well as the Redundant SC board or the one designated to be the Standby board initially).

9.1 Console Terminal Cabling

The console terminal is connected to either the SC-2's PS2 COM serial port or the serial port on the SA-1 RTM for the purpose of performing the initial software installation procedure. This procedure must be performed on both of the SC-2 boards.

The pin assignments for the SC-2's PS2 Com serial port are shown in Table 29 on page 28.

The SA-1 RTM board has a serial port with stacked DB-9 connectors. The RS-232 Console Port 9-pin female D-type connector on the RTM board is shown in Figure 2-10 on page 25. The pin assignments are shown in Section 213, on page 31.

The connector is assigned to SC-2's Port A.

➢ To connect the console terminal, take this step:

- On the SC-2 RTM board to be the initial active SC-2 board, connect the RS232 cable from the PC console terminal to either the SC-2's PS2 COM serial port or the serial port on the SA-1 RTM.

9.2 Defining IP Parameters

The following IP parameters must be defined before beginning the configuration process:

- Subnet address for the system
- Subnet mask
- IP address of the default router
- Three IP addresses in the subnet (one for global use and one for internal use for each of the two SC boards)
- Two IP address for each Media Gateway board
- One IP address for the Solaris™ machine running the EMS server or the MIB Browser server
- IP address of NTP server (if exists). NTP server is server providing time of day

Note: The PC should be in the same subnet as that of the Media Gateway 3500 components.

9.3 Configuring the NTP Server

When using an NTP server to synchronize the date and time of the SC-2 boards, configure the Solaris™ server.

Note: The NTP server must be installed on a separate Solaris™ machine, apart from the Media Gateway 3500.

➢ To configure the Solaris™ server to be an NTP server, take these 3 steps:

1. Log on using the default username: **root** and password: (**according to the local machine's definitions)**.
2. At the command prompt, enter **cp /etc/inet/ntp.server /etc/inet/ntp.conf**
3. Edit file: **/etc/inet/ntp.conf** and replace the following lines:

From:	To:
server 127.127.XType.0 prefer	server 127.127.1.0 prefer
fudge 127.127.XType.0 stratum 0	fudge 127.127.1.0 stratum 0

9.4 Connecting via an RS-232 Terminal

Using the RS-232 terminal from the console connected to the SC board, access the HyperTerminal tool through: [Start]–>[Programs]–>[Accessories]–>[Communications]–>[HyperTerminal]

Open the console connection using the following parameters:

Bits per second:	9600
Data bits:	8
Parity:	none
Stop bits:	1
Flow control:	none

The Solaris startup sequence is initialized. When it is complete, the logon prompt is displayed.

Note: Pre-configured SCs have one account: Username **root**; Password **root**

9.5 Configuring the SC Boards

The SC configuration must be performed on both of the SC boards. The configuration procedure consists of two parts, which are to be performed on both of the SC boards.

- Updating the Basic SC Network Configuration - Installs the SC software and updates the basic SC network parameters
- Performing the Basic SC Configuration - Configures the basic IP parameters

For the first SC board, the installation and configuration procedures require selecting in part 1 option 1 to update the basic SC Network parameters and then, in part 2, selecting option 3 to change the installed configuration. During the Basic SC Configuration, the first SC board to be configured is set as the Master or Primary SC board.

For the second SC board, the installation and configuration procedures require selecting in part 1 option 1 to update the basic SC Network parameters and then, in part 2, selecting option 4 to copy the configuration from the Primary or first SC board. The second SC board to be configured is set as the Slave or Secondary SC board and as such, receives a copy of the settings already configured for the first SC board.

9.5.1 Updating the Basic SC Network Configuration

➢ **To update the basic SC Network configuration, take these 10 steps:**

1. At the RS-232 console terminal, If you are prompted, at the log-on prompt, clientxxx console, log on using the default username: **root** and password: **root**.
2. Stop SC software by running **tools tg dn** command.
3. Return to the console terminal and update the following network configuration information using the existing **sc_install.pl** script.

Note: Be sure to enter the IP addresses carefully. Errors can prevent the system from connecting to the network.

Note: All IP addresses and unique names in the following examples are for demonstration purposes only and must be designated by the customer according to his system requirements.

Example of the basic configuration process:

Entered text is shown in bold and the IP addresses are assumed for the purposes of this example.

```
~> perl sc_install.pl
Found uncompressed installation package...
Verify installation package integrity...

------------------------------------------------
  SC software installation & basic configuration
------------------------------------------------

     1 - Update SC network parameters.
     2 - Install and configure.
     3 - Change installed configuration.
     4 - Copy configuration from Primary SC.
     5 - Uninstall SW.
     0 - Quit.

Choose (0-5) : 1

**************************************************
**                                              **
** This option will change IP parameters of     **
** current SC board.                            **
**                                              **
**************************************************
```

4. At the Node name prompt, enter the unique name you designate for the SC board on which you are installing the software. Press **Enter.**

```
SC name (node name)                                    [clientxx]: SC1
```

5. Enter the correct IP address for the SC board and press **Enter**.

```
IP address                                        [10.6.8.33]: 10.2.229.253
```

6. Enter the correct IP address for the Default router and press **Enter**.

```
Default router                                      [10.6.0.1]: 10.2.0.1
```

7. Enter the correct IP address for the Subnet and press **Enter.** Do the same for the Subnet mask or accept the default.

```
Subnet mask                                         [10.6.0.0]: 10.2.0.0
```

8. To start the configuration, type **y** and press **Enter**.

```
According to IP and mask, network is 10.2.0.0.
Start configuring (y/n) ?                                [n]: y

   >>> Updated /etc/hosts ...
   >>> Updated /etc/nodename ...
   >>> Updated /etc/defaultrouter ...
   >>> Updated /etc/hostname.dmfe0 ...
   >>> Updated /etc/netmasks ...
   >>> Updated hostname ...

Done
*************************************************
```

9. Since this is a first-time configuration you can reboot the board at this time. To reboot the SC board, type **y** and press **Enter**.

```
**                                                 **
** After reboot you MUST choose option 2 (if       **
** not installed yet) or option 3 of this script.  **
**                                                 **
*************************************************

Reboot now (y/n) ?                                  [y]: y
```

10. Go to "Performing the Basic SC Configuration" below.

9.5.2 Performing the Basic SC Configuration

During the basic configuration of the first SC board, the IP addresses you have defined are entered at the appropriate prompts.

9.5.2.1 Basic SC Configuration on the First SC Board

➢ **To perform the basic SC configuration on the first SC board, take these 11 steps:**

1. Follow the configuration scripts shown in the example below.

Example of Part 1 of the basic configuration process:

Entered text is shown in bold and the IP addresses are assumed for the purposes of this example. Note the keyboard shortcuts detailed in the middle of the Example below.

```
~> perl sc_install.pl
Found uncompressed installation package...
Verify installation package integrity...

------------------------------------------------
  SC software installation & basic configuration
------------------------------------------------

     1 - Update SC network parameters.
     2 - Install and configure.
     3 - Change installed configuration.
     4 - Copy configuration from Primary SC.
     5 - Uninstall SW.
     0 - Quit.

Choose (0-5) : 3

------------------------------------------------
System configuration
------------------------------------------------

Keyboard shortcuts:
    ENTER  - leave default parameter value
    \      - return to previous parameter
    Ctrl-C - abort configuration script
```

2. At the **Global SC IP address** prompt, enter the IP address to be the one used to interface externally.

```
Global SC IP address                [0.0.0.0]: 10.1.2.3
```

3. At the **Master SC IP address** prompt, enter the internal IP address of the main or initially active SC board.

```
Master SC IP address                    [0.0.0.0]: 10.1.1.1
```

4. At the **Redundant SC IP address** prompt, enter the internal IP address of the standby SC board.

```
Redundant SC IP address (or 1.1.1.1 if none) [0.0.0.0]: 10.6.8.29
```

5. At the **EMS server** prompt, enter the IP address of the EMS server or MIB Browser server. For the Second EMS server (which is not applicable), accept the default of no IP address

```
EMS server                              [0.0.0.0]: 10.6.1.8
```

6. At the **NTP server IP** prompt, enter the IP address of the NTP server.

```
NTP server IP                           [10.2.229.57]:
```

7. At the **Enable Security** prompt, to enable security, enter 1. To disable Security, enter 0. For more information refer to 'Media Gateway 3500 Security Technology' on page 131

```
Enable Security (0-no, 1-yes)                       [0]:
```

8. You are prompted to enter the SC Root Password and the passwords for SNMP Read and Write Community. To leave a password unchanged, press **Enter**. To change a password, enter the new password. It must be at least 4 characters. You are prompted to re-enter the new password.

   The default passwords are:

   - SC Root - **root**
   - `SNMP Read Community -` **public**
   - `SNMP Write Community -` **private**

Note: For security reasons, it is recommended to change these passwords and make a note of the new passwords you enter for future reference.

```
SC Root Password                          [leave unchanged]: ******
SNMP Read Community                       [leave unchanged]: ******
SNMP Write Community                      [leave unchanged]: ******
```

A summary of the settings is displayed.

```
-----------------------------------------------
Summary:
    Global IP Address:      10.1.2.3
    Master SC IP Address:       10.1.1.1 (sc1)
    Redundant SC IP Address:   10.6.8.29 (sc2)
    EMS server:      10.6.1.8
    NTP server:         10.2.229.57
Enable Security                   :  0 (no)
SC Root Password                  :  ******
SNMP Read Community               :  ******
SNMP Write Community              :  ******
-----------------------------------------------
```

9. You are prompted to s**tart configuring.** Enter **y** to commence the configuration.

```
Start configuring ([y]/n)                       [n]: y

>>> Update /etc/inet/inetd.conf file ...
   >>> Restore file /etc/inet/inetd.conf from the backup ...
   >>> Update /etc/inet/services file ...
   >>> Restore file /etc/inet/services from the backup ...
   >>> refresh INET daemon ...
   >>> Update root password ...
   >>> Disable IPSEC configuration ...
>>> Configure Timer Resolution ...
   >>> Make backup of modified file /etc/system ...
>>> Configure alternate break sequence ...
   >>> Make backup of modified file /etc/default/kbd ...
>>> Configure TFTP ...
   >>> Make backup of modified file /etc/inet/inetd.conf ...
   >>> refresh INET daemon ...
>>> Configure FTP ...
   >>> Permit root login to FTP ...
   >>> Make backup of modified file /etc/ftpd/ftpusers ...
   >>> audcftp user is already defined ...
>>> Configure SSH ...
   >>> Permit root login to SSH ...
   >>> Make backup of modified file /etc/ssh/sshd_config ...
   >>> Refresh SSH daemon ...
>>> Update SNMP configuration files ...
   >>> Make backup of modified file /etc/srconf/agt/snmpd.cnf ...
   >>> Update SNMP community strings ...
   >>> Update /etc/inet/services ...
   >>> Make backup of modified file /etc/inet/services ...
   >>> kill solaris SNMP deamon if exists ...
   >>> Remove startup script of solaris SNMP deamon ...
```

```
   >>> Make backup of deleted file /etc/rc3.d/S76snmpdx ...
   >>> Make backup of deleted file /etc/init.d/init.snmpdx ...
   >>> Remove /usr/lib/smpdx ...
   >>> Make backup of deleted file /usr/lib/snmp/snmpdx ...
>>> Configure boot scripts ...
   >>> Make record of new file /etc/init.d/TG-1000 ...
   >>> Make record of new file /etc/rc3.d/S90_TG-1000 ...
>>> Configure password recovery scripts ...
   >>> Make record of new file /etc/init.d/pwd ...
   >>> Make record of new file /etc/rc3.d/S91pwd ...
>>> Configure NTP server ...
   >>> Make backup of modified file /var/spool/cron/crontabs/root ...
   >>> get current crontab configuration ...
   >>> No NTP server defined ...
   >>> reload crontab configuration ...
   >>> Remove startup scripts of sendmail ...
   >>> Make backup of deleted file /usr/lib/sendmail ...
   >>> Make backup of deleted file /etc/init.d/sendmail ...
   >>> Make backup of deleted file /etc/rc2.d/s88sendmail ...
>>> Configure syslog daemon ...
   >>> Update /etc/syslog.conf file ...
   >>> Make backup of modified file /etc/syslog.conf ...
   >>> Make record of new file /var/log/local0 ...
   >>> Make record of new file /var/log/daemon ...
   >>> Make record of new file /var/log/auth ...
   >>> Update /etc/logadm.conf file ...
   >>> Make backup of modified file /etc/logadm.conf ...
   >>> reload syslogd configuration ...
>>> Configure crontab ...
   >>> Make backup of modified file /var/spool/cron/crontabs/root ...
   >>> get current crontab configuration ...
   >>> add cleanlogs job and statistics job to crontab ...
   >>> reload crontab configuration ...
   >>> Update root password ...
>>> Tune up /tmp filesystem ...
   >>> Make backup of modified file /etc/vfstab ...
   >>> Make backup of modified file /etc/nsswitch.conf ...
   >>> Make record of new file /etc/resolv.conf ...
>>> Extract custom configuration files ...
   >>> Copy Project/Downloads/cmp_files/TP1610*.cmp files to
/tftpboot ...
   >>> Copy Project/Downloads/baseinifile_files/TP1610.ini file to
/tftpboot/TP1610.ini ...
   >>> Copy Project/Downloads/baseinifile_files/NormalTP1610.ini
file to /tftpboot/NormalTP1610.ini ...
   >>> Copy Project/Downloads/baseinifile_files/RedundantTP1610.ini
file to /tftpboot/RedundantTP1610.ini ...
   >>> Copy Project/Downloads/dat_files/* file to /tftpboot ...
   >>> Backup original versions of /tftpboot files ...

************************************
* IF CONFIGURATION IS DONE OK      *
* YOU MUST REBOOT THE SC !!!!!!!!!! *
************************************
```

10. When installing software on the first SC board, type **n** and press **Enter**.

Note: For Redundant systems with tow SC boards, DO NOT reboot the SC boards until after both are configured.

For Simplex configurations with only one SC board:

If your hardware configuration contains only one SC board, reboot now and confirming the reboot command when prompted.

```
IMPORTANT: If you have second SC, DO NOT REBOOT this SC until
installation of second SC already done !!!

           Reboot both SCs at the same time.

Do REBOOT now (n/y)                                    [y]: y
Are you sure (n/y)                                     [y]: y
```

The software files are updated and commence operating automatically.

The following startup scripts are updated:

```
Remove startup script for Solaris™ SNMP daemon.
Add startup script for the software.
```

11. To perform the basic SC configuration on the second SC board, go to 'Updating the Basic SC Network Configuration' on page 86.

Note: For Redundant systems with two SC boards, repeat the procedures details starting from 'Updating the Basic SC Network Configuration' on page 86 for the second SC board.

9.5.2.2 Basic SC Configuration on the Second SC Board

➢ **To perform the basic SC configuration on the second SC board, take these 10 steps:**

1. Follow the configuration scripts shown in the example below.

Example of Part 1 of the basic configuration process:

Entered text is shown in bold and the IP addresses are assumed for the purposes of this example. Note the keyboard shortcuts detailed in the middle of the Example below.

```
~> perl sc_install.pl
Found uncompressed installation package...
Verify installation package integrity...

------------------------------------------------
  SC software installation & basic configuration
------------------------------------------------

     1 - Update SC network parameters.
     2 - Install and configure.
     3 - Change installed configuration.
     4 - Copy configuration from Primary SC.
     5 - Uninstall SW.
     0 - Quit.

Choose (0-5) : 4

------------------------------------------------
SVerify that Primary SC 10.7.13.80 responds to ping...
10.7.13.80 is alive

-------------------------------------------------------------------------
-
Configuration will be copied from Primary SC 10.7.13.80 via SSH.
You will be asked for root password on 10.7.13.80 and optionally
some additional security-related questions.
-------------------------------------------------------------------------
-

root@10.7.13.80's password:
SystemParams.ini     100% |****************************|  5421
00:00


------------------------------------------------
Configuration Summary:
------------------------------------------------
Global SC IP Address            :  10.1.2.3
Master SC IP Address            :  10.1.1.1
Redundant SC IP Address (or 1.1.1.1 if none)  :  10.6.8.29
EMS Server IP Address           :  10.6.1.8
NTP Server IP Address           :  10.2.229.57
Enable Security                 :  0 (no)
SC Root Password                :  ******
SNMP Read Community             :  ******
SNMP Write Community            :  ******
```

```
Product Type                    :  2 (mediant5000)
Call Control Proxy Type         :  0 (noProxy)
Trunk Protocol                  :  0 (e1)
VOP Board Type                  :  1 (TP1610)
------------------------------------------------

Start configuring (y/n)                              [y]: y
```

The following is displayed:

```
 >>> Update /etc/inet/inetd.conf file ...
   >>> Restore file /etc/inet/inetd.conf from the backup ...
   >>> Update /etc/inet/services file ...
   >>> Restore file /etc/inet/services from the backup ...
   >>> refresh INET daemon ...
   >>> Update root password ...
   >>> Disable IPSEC configuration ...
>>> Configure Timer Resolution ...
   >>> Make backup of modified file /etc/system ...
>>> Configure alternate break sequence ...
   >>> Make backup of modified file /etc/default/kbd ...
>>> Configure TFTP ...
   >>> Make backup of modified file /etc/inet/inetd.conf ...
   >>> refresh INET daemon ...
>>> Configure FTP ...
   >>> Permit root login to FTP ...
   >>> Make backup of modified file /etc/ftpd/ftpusers ...
   >>> audcftp user is already defined ...
>>> Configure SSH ...
   >>> Permit root login to SSH ...
   >>> Make backup of modified file /etc/ssh/sshd config ...
   >>> Refresh SSH daemon ...
>>> Update SNMP configuration files ...
   >>> Make backup of modified file /etc/srconf/agt/snmpd.cnf ...
   >>> Update SNMP community strings ...
   >>> Update /etc/inet/services ...
   >>> Make backup of modified file /etc/inet/services ...
   >>> kill solaris SNMP deamon if exists ...
   >>> Remove startup script of solaris SNMP deamon ...
   >>> Remove /usr/lib/smpdx ...
>>> Configure boot scripts ...
   >>> Make record of new file /etc/init.d/TG-1000 ...
   >>> Make record of new file /etc/rc3.d/S90 TG-1000 ...
>>> Configure password recovery scripts ...
   >>> Make record of new file /etc/init.d/pwd ...
   >>> Make record of new file /etc/rc3.d/S91pwd ...
>>> Configure NTP server ...
   >>> Make backup of modified file /var/spool/cron/crontabs/root ...
   >>> get current crontab configuration ...
   >>> No NTP server defined ...
   >>> reload crontab configuration ...
   >>> Remove startup scripts of sendmail ...
>>> Configure syslog daemon ...
   >>> Update /etc/syslog.conf file ...
   >>> Make backup of modified file /etc/syslog.conf ...
   >>> Make record of new file /var/log/local0 ...
   >>> Make record of new file /var/log/daemon ...
   >>> Make record of new file /var/log/auth ...
   >>> Update /etc/logadm.conf file ...
   >>> Make backup of modified file /etc/logadm.conf ...
   >>> reload syslogd configuration ...
>>> Configure crontab ...
```

```
   >>> Make backup of modified file /var/spool/cron/crontabs/root ...
   >>> get current crontab configuration ...
   >>> add cleanlogs job and statistics job to crontab ...
   >>> reload crontab configuration ...
   >>> Update root password ...
>>> Tune up /tmp filesystem ...
   >>> Make backup of modified file /etc/vfstab ...

   >>> Make backup of modified file /etc/nsswitch.conf ...
   >>> Make backup of modified file /etc/resolv.conf ...
>>> Extract custom configuration files ...
   >>> Copy Project/Downloads/cmp_files/TP1610*.cmp files to
/tftpboot ...
   >>> Copy Project/Downloads/baseinifile files/TP1610.ini file to
/tftpboot/TP1610.ini ...
   >>> Copy Project/Downloads/baseinifile files/NormalTP1610.ini
file to /tftpboot/NormalTP1610.ini ...
   >>> Copy Project/Downloads/baseinifile_files/RedundantTP1610.ini
file to /tftpboot/RedundantTP1610.ini ...
   >>> Copy Project/Downloads/dat files/* file to /tftpboot ...
   >>> Backup original versions of /tftpboot files ...

************************************
* IF CONFIGURATION IS DONE OK      *
* YOU MUST REBOOT THE SC !!!!!!!!!! *
************************************
```

2. The script warns you not to reboot this SC until installation of second SC is already done, even though this is the configuration for the second SC board. Now that the installation of both the first and second SC boards are complete, reboot the SC board by entering y at the Reboot prompt or accept the default.

3. Confirm the Reboot by entering **y** at the prompt or accept the default.

```
IMPORTANT: If you have second SC, DO NOT REBOOT this SC until
installation of second SC already done !!!

           Reboot both SCs at the same time.

Do REBOOT now (n/y)                                    [y]: y
Are you sure (n/y)                                     [y]: y
```

The software files are updated and commence operating automatically.

9.6 Software Testing

To test that the software has been properly installed and configured, ping the SC-2 boards (to both the local IP addresses and the global IP address) to ascertain that their Global IP addresses can be accessed.

➢ To ping the SC-2 boards from the PC, take these 3 steps:

1. From the Start menu, select **RUN** and at the command prompt, enter **cmd**.

2. At the command prompt, enter **ping [Global IP address of an SC-2 board]**. A response should be received.

Note: If the Ping has not received the proper response, check the physical connections to the network.

3. Using Telnet, access each SC board and run the command: **tools d**

   The Analytical tool runs various test. Verify that the test results are all **OK.**

10 SC Software Backup/Restore Procedures

10.1 Creating the SC Software Backup

An offline backup of the System Controller (SC) software should be made at the following times:

- After completing the initial installation and configuration
- After making any change in the SC configuration
- Before performing a software upgrade download (this is to be sure that an up-to-date backup is indeed available should any complication occur as the result of the software upgrade)
- After software upgrade download

The SC software backup procedures are performed on the Active SC board and do not interrupt the operation of the Active SC board.

➢ To create an offline backup file for the SC software, take these 8 steps:

1. Connect to the Active SC board using Telnet. (Refer to Section 9.4, on page 72.)
2. At the prompt, type **tools tg bk** and press **Enter**. The backup sequence is activated.

```
sc1::~# tools tg bk
```

3. Two backup types are offered. Type **2** and press **Enter** for the full backup. The complete software installation and configuration database is included in the backup file created.

```
---------------
SC software supports 2 backup types:
    1) Database Backup
       Backs up only configuration database.
       Works fast and produces small backup files, however it
       cannot be restored if software installation is broken
       or destroyed.

    2) Full Backup
       Backs up complete software installation, including
       configuration database.
       Works slow and produces large backup files, however it
       is able to restore all software components.

What backup do you choose (1-Database/2-Full) ? 2
```

4. The Full Backup procedure is activated. You are prompted to confirm the action. Type **y** and press **Enter**.

```
----------------
Full Backup
-----------

This tool will create a copy of complete software installation
including configuration database.
You must run this tool only on ACTIVE SC !!!!!

Make a backup (y/[n]) ? y
```

5. You are prompted to accept the default backup file name (**Project.backup.tar**) or type in a new name for the backup file using the file naming convention *.*.tar. In the example below, the file is named Project.backup_02_12_2004.tar. You can enter any name instead of Project, and any name instead of backup_02_12_2004 as the name of the file. The File name must end with the extension .tar.

6. Press **Enter**. The backup file is created.

```
Backup file name [/Project.backup.tar]:
/Project.backup_02_12_2004.tar

Create backup file /Project.backup_02_12_2004.tar
Execute tar cvf /Project.backup_02_12_2004.tar /Project ...
```

7. The full list of all of the software installation and configuration elements are listed until the backup file creation is complete.

8. Use **ftp** to copy the **tar** file to a location outside of the SC board for safekeeping.

10.2 Restoring SC Software from Backup

Restoring the SC software from a backup **tar** file is provided as a precautionary measure and is intended for use in extreme cases only. Restoring the SC software from a backup **tar** file requires that the SC boards, and therefore the entire system, be non-operational.

Note: The Restore procedure must be performed on both of the SC boards.

➢ To restore the SC software from the backup file, take these 11 steps:

1. Shutdown both SC boards either using the EMS (refer to EMS documentation) or by typing the command **tools tg dn** at the Telnet prompt on both SC boards. You are prompted to confirm this command.

2. Connect to the Active SC board using Telnet. (Refer to 'Console Terminal Cabling' on page 81.)

3. Use **ftp** to copy the **tar** file from its safekeeping location outside of the SC board to the

SC board.

4. At the prompt, type **tools tg rs** and press **Enter**. The Restore procedure is activated.

5. You are prompted to choose from the two types of backups. To restore the full backup, type **2** and press **Enter**.

```
----------------
SC software supports 2 backup types:

    1) Database Backup
       Backs up only configuration database.
       Works fast and produces small backup files, however it
       cannot be restored if software installation is broken
       or destroyed.

    2) Full Backup
       Backs up complete software installation, including
       configuration database.
       Works slow and produces large backup files, however it
       is able to restore all software components.

What backup will you restore (1-Database/2-Full) ? 2
```

6. The Full Restore procedure is activated. Just in case, you are reminded that this procedure must be run only when the SC application is down on both of the SC boards and you are prompted to confirm the action. Type **y** and press **Enter**.

```
Full Restore
------------

This tool will restore from backup complete software installation
including configuration database.

IMPORTANT: You must run this tool only when SC application is
           down on both SCs.

Restore (y/[n]) ? y
```

7. You are prompted to accept the default backup file name (**Project.backup.tar**) or type in the correct name for the backup file. Be sure the name you type in matches the backup **tar** file from which you want to restore.

8. Press **Enter**. The restore process using the **tar** file begins

```
Backup file name [/Project.backup.tar]:
/Project.backup_02_12_2004.tar

Restore backup file /Project.backup_02_12_2004.tar
Execute tar xvf /Project.backup_02_12_2004.tar /Project ...
```

9. .The full list of all of the software installation and configuration elements are listed until the restore procedure is complete.

10. Repeat steps 1 to 10 for the second SC board.

11. Startup the system either using the EMS (refer to EMS documentation) or by typing the command at the Telnet prompt, **tools tg up**. You are prompted to confirm this command.

11 Cabling the Media Gateway 3500

- ES/4411 IP Network Cabling - 'Connecting the ES/4411 Network Fiber Optic Cabling' on page 100
- TP-1610 RTM PSTN Trunk Cabling - 'TP-1610 Configuration - Cabling the Trunk Connectors' on page 100
- SA RTM External Alarm Indicator Connections - 'External Alarm Indicator Connections' on page 101

Caution Laser

Note that the Ethernet Switch board contains a Class 1 LED/Laser emitting device, as defined by 21CFR 1040 and IEC825.

Do NOT stare directly into the beam as this can damage your eyesight.

Care in Handling Fiber Optic Cabling

When handling the fiber optic cables, be sure to implement the following points:

- Excessive bending of the Fiber Optic Cable can cause distortion and signal losses
- Ensure the minimum bending radius recommended by the Fiber Optic Cable supplier
- Maximum Fiber Optic Cable length for multimode fiber is 2 km
- Maximum Fiber Optic Cable length for monomode fiber is 22 km

Incoming optic cabling from the network infrastructure can originate from the top of the rack or from another shelf within the rack. Preserve the minimum-bending ratio indicated by the cable manufacturer.

To assure full high-availability capabilities, the configuration of the interface to the IP backbone must include certain redundant features from which two separate fiber optic cables are incoming to the Media Gateway 3500 Media Gateway. For more information on, refer to the section below.

11.1 Connecting the ES/4411 IP Network Cabling

Note 1: The fiber optic inputs of the ES/4411 boards port 25 are connected to a 1 Gigabit interface.

Note 2: When planning the connection, ensure that there is no closed loop in the network.

➢ To connect the fiber optic and or CAT6 copper cables, take this step:

- Connect to the ports on the ES/4411 RTM according to your OAM, Control and Management IP Separation configuration. (Refer to the table below.)

  When connecting the fiber optic cables to port 25, be sure to make a crossover connection between the TX and RX.

  While connecting the cables, be sure to thread them using the Customers' exterior cable management guides.

  Connection to the IP network is established.

Table 11-1: IP Separation and ES/4411s Port Allotment

IP Interface Separation		Port Allotment
One IP Interface	OAM/Control/Media	25*
Two IP Interfaces	OAM/Control	20
	Media	25*
Two IP Interfaces	OAM	20
	Control/Media	25*
Three IP Interfaces	OAM	20
	Control	22
	Media	25*

* Port 25 is located on the ES/4411 board front panel and Fiber Optic cables are used. All other ports are located on the ES/4411 RTM (Lim) and CAT5 copper cables are used.

11.2 TP-1610 Configuration - Cabling the Trunk Connectors

The digital PSTN interfaces are used to connect the E1/T1/J1 trunks to the SBTP-1610 E1/T1/J1 interfaces on the rear I/O module (TP-1610 RTM).

These are two 50-pin female Telco connectors (DDK 57AE-40500-21D) labeled Trunks 1-8 and Trunks 9-16 on the rear TP-1610 RTM (refer to 'TP-1610 RTM Panel Diagram' on page 27).

➢ To connect the trunk span cabling, take this step:

- On each of the TP-1610 RTMs, behind the TP-1610 boards, connect the E1/T1/J1 cables to the Media Gateway 3500 E1/T1/J1 interfaces.

  The user's 50-pin male connector of Trunks 1 to 8 is connected to the 50-pin female connector labeled E1/T1/J1 1 to 8. The user's 50-pin male connector of Trunks 9 to 16 is connected to the 50-pin female connector labeled E1/T1/J1 9 to 16. The 2 male connectors must be wired identically, according to '50-pin Telco Connector E1/T1/J1 Connections' on page 28.)

11.3 External Alarm Indicator Connections

External alarm indicators can be connected to the SA RTM. Use the green Terminal Block Connector to connect external devices according to the Critical, Major, and Minor severities as indicated. Devices can be controlled using Common, Normally Open or Normally Closed methods. See the diagram of the SA RTM in 'SA RTM Panel' on page 37.

The SA RTM provides two connectors – one is soldered on the SAT PCB and the second is a terminal block. The Terminal block contains 3 dry contact relays for connecting to Telco alarm equipment. This connection method is recommended for providing a high availability solution.

The alarm outputs are rated for 2A at 30V. A maximum gauge of 20 AWG for standard copper wire may be used.

➢ To connect the contact relays to Telco alarm equipment, take these 6 steps:

1. Check the equipment to be connected.
2. Open the screws that connect the terminal block to the PCB's connector.
3. Unplug the terminal block.
4. Select one of these two methods to connect the relays of both SA RTMs either using normal logic or inverse logic:
   - If the equipment has NO (Normally Open) and COM terminals, use normal logic scheme.
   - If the equipment has NC (Normally Closed) and COM terminals, use inverse logic scheme
5. Make connections according to the appropriate diagram below.

Figure 11-1: Normal Logic Alarm Connection Diagram

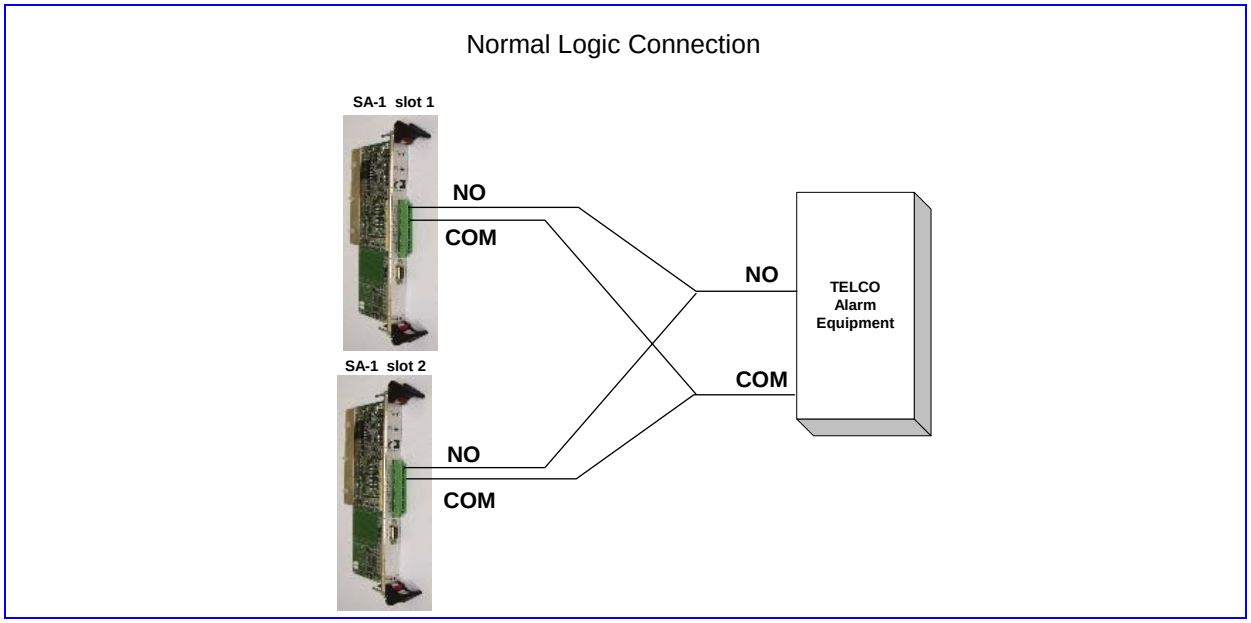
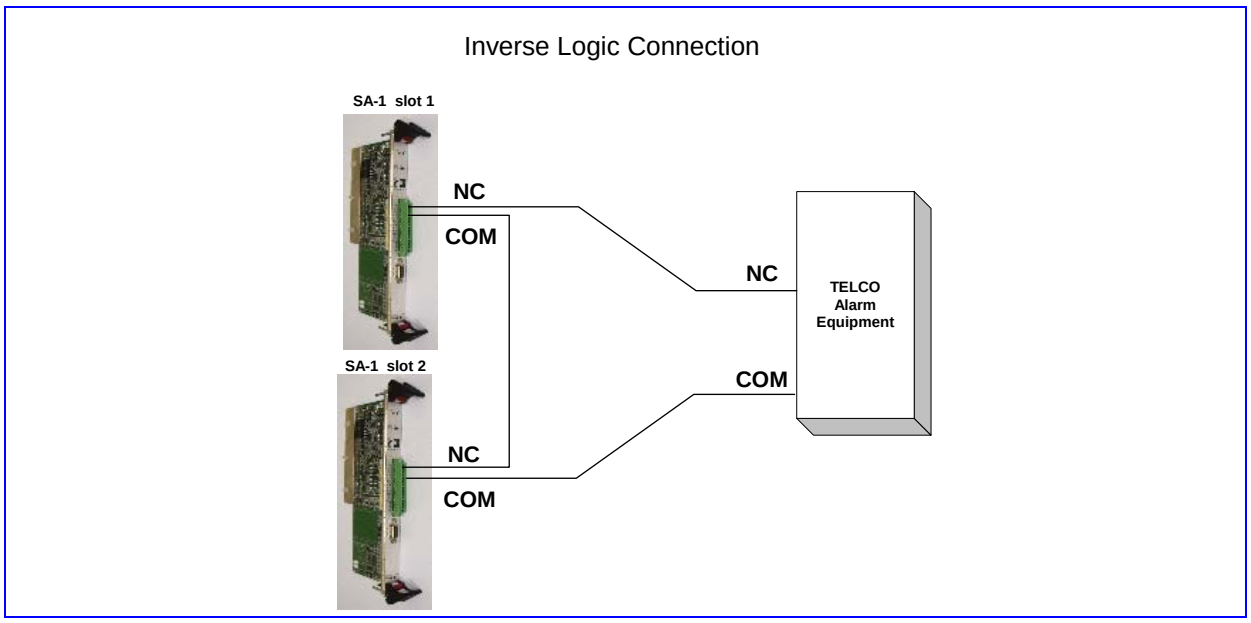


Figure 11-2: Inverse Logic Alarm Connection Diagram



6. Plug-in the terminal block into the PCB connector.

12 Operating the Media Gateway Using the EMS

The Nortel Element Management System (EMS) is an advanced solution for standards-based management of Media Gateways within VoP networks, covering all areas vital for the efficient operation, administration, management and provisioning (OAM&P) of MG 3500 media gateways.

For users who chose to operate the Media Gateway 3500 without the EMS, information on getting started with MIBs is available in 'Appendix - Getting Started with MIBs' on page 209. In addition, refer to the MIB browser user documentation.

The EMS enables Service Providers the ability to offer customers rapid time-to-market and inclusive, cost-effective management of next-generation networks. The standards-compliant EMS for media gateways uses distributed SNMP-based management software, optimized to support day-to-day Network Operation Center (NOC) activities, offering a feature-rich management framework. It supports fault management, configuration and security.

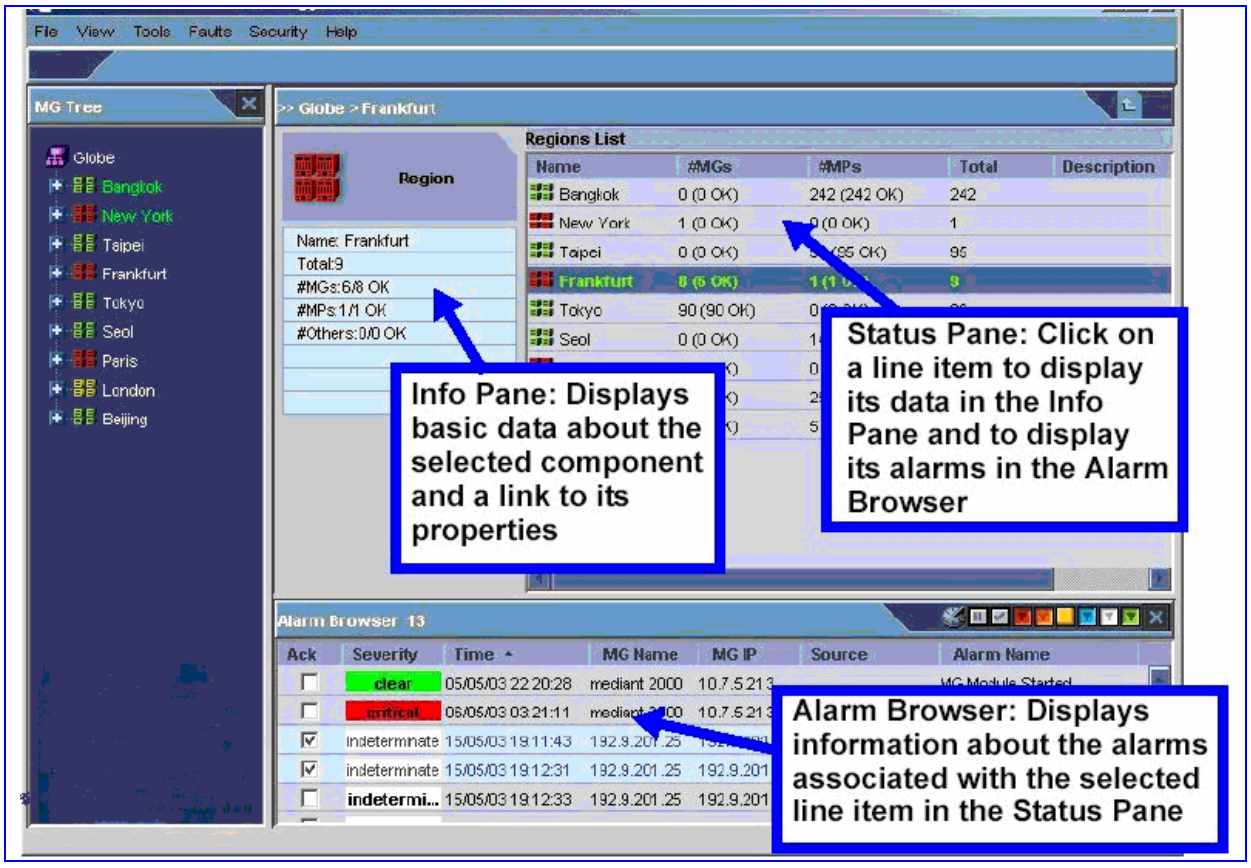
This section provides an overview of configuring and monitoring the Media Gateway in the EMS. Refer to the *Element Management System User's Manual*, LTRT-910xx for detailed information on the EMS, including information on the following basic operations list to be performed using the EMS:

- Fault Management
  - Using the Alarm Browser
  - Accessing the Alarm History
  - Using the Alarm Time Stamp (Requires NTP)
  - Accessing the Alarm Source
- Basic Configuration
  - Gateway Level
  - Trunk Level

The EMS server runs on a Sun™ Microsystems' Solaris™ OS SPARC station, while its clients can run an either a Solaris™ or a Windows™ based OS. The EMS communicates with the Media Gateway through SNMP protocol and the Media Gateway's MIB.

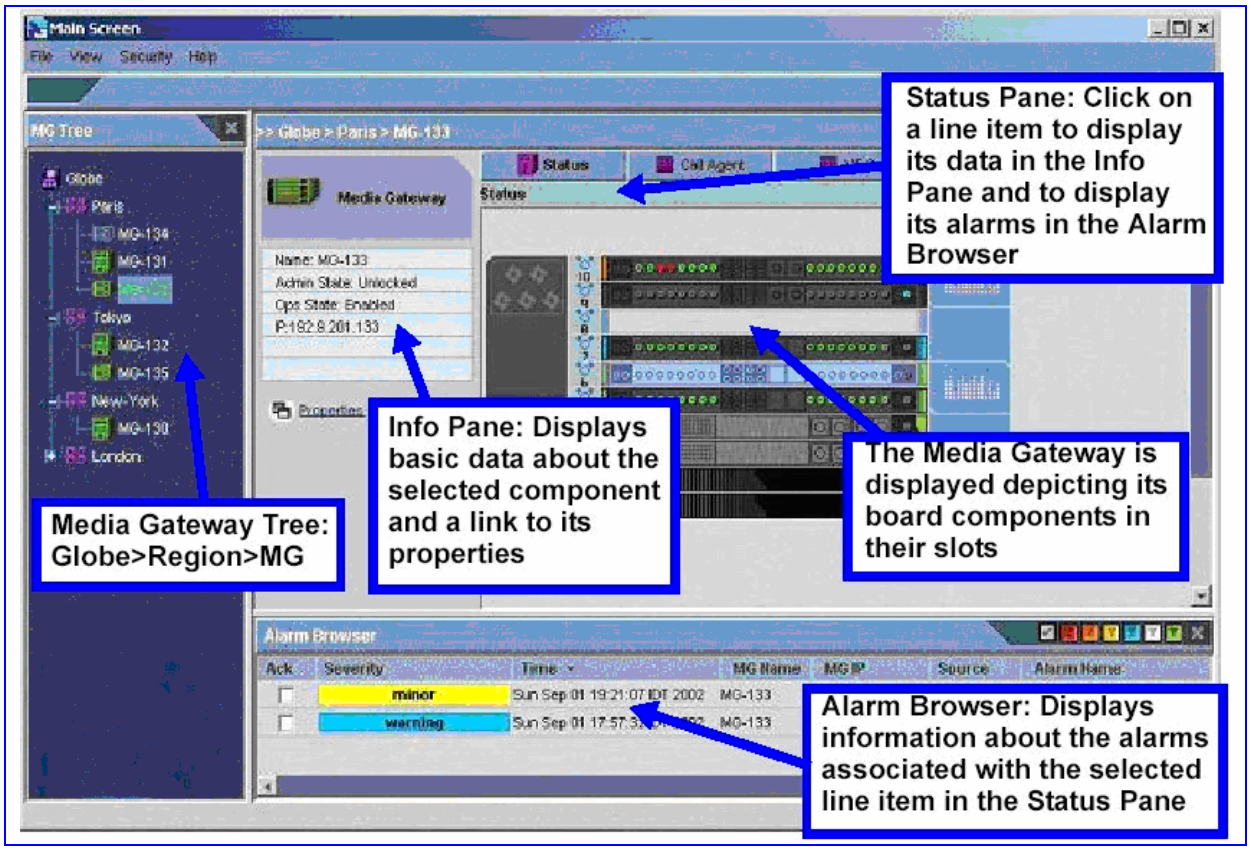
The figure below shows The EMS Regions screen with the path, **Globe>Frankfurt** selected in the Status pane.

Figure 12-1: EMS Regions screen



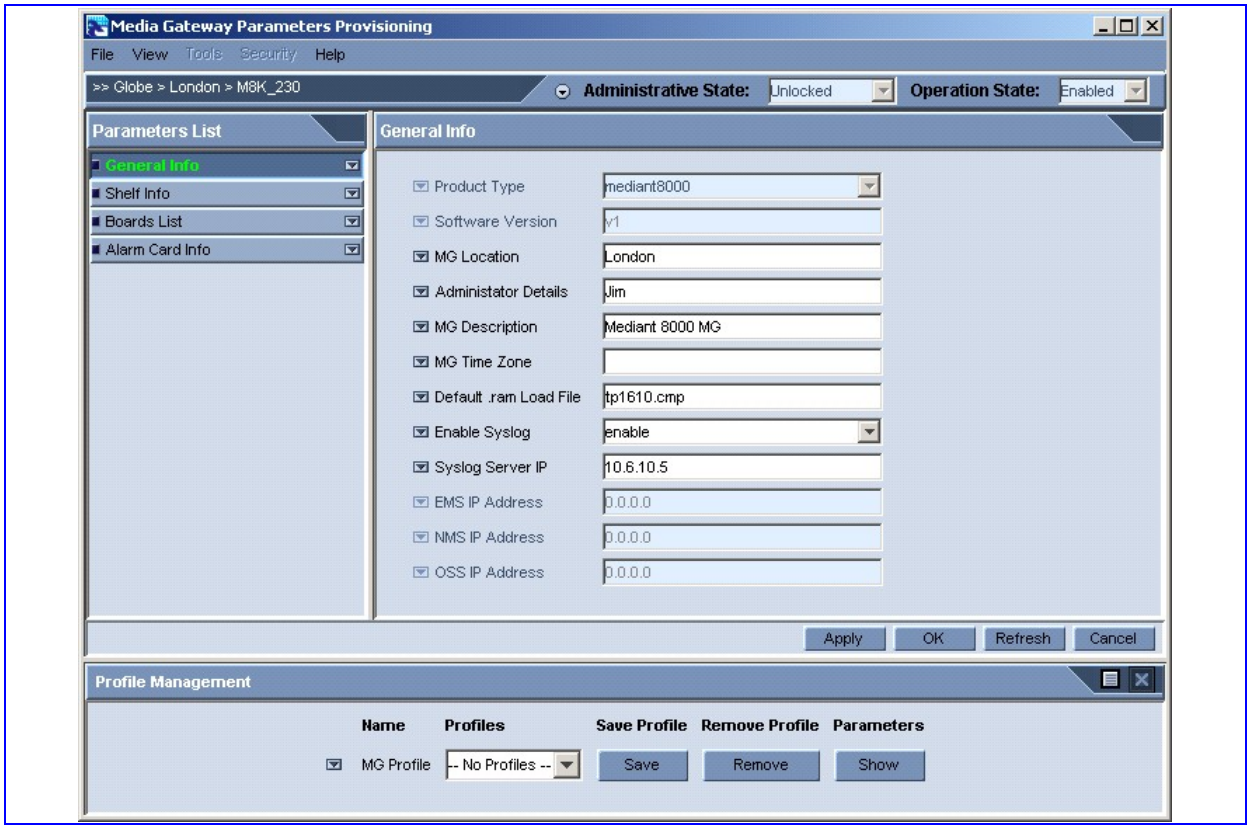
The figure below shows the EMS with a graphic representation of the Media Gateway 3500 (path, **Globe>Pars>10.7.9.71**) displayed in the Status pane.

Figure 12-2: EMS - Main Screen, Media Gateway Displayed



The figure below shows EMS trunk parameters provisioning screen for board # 1.

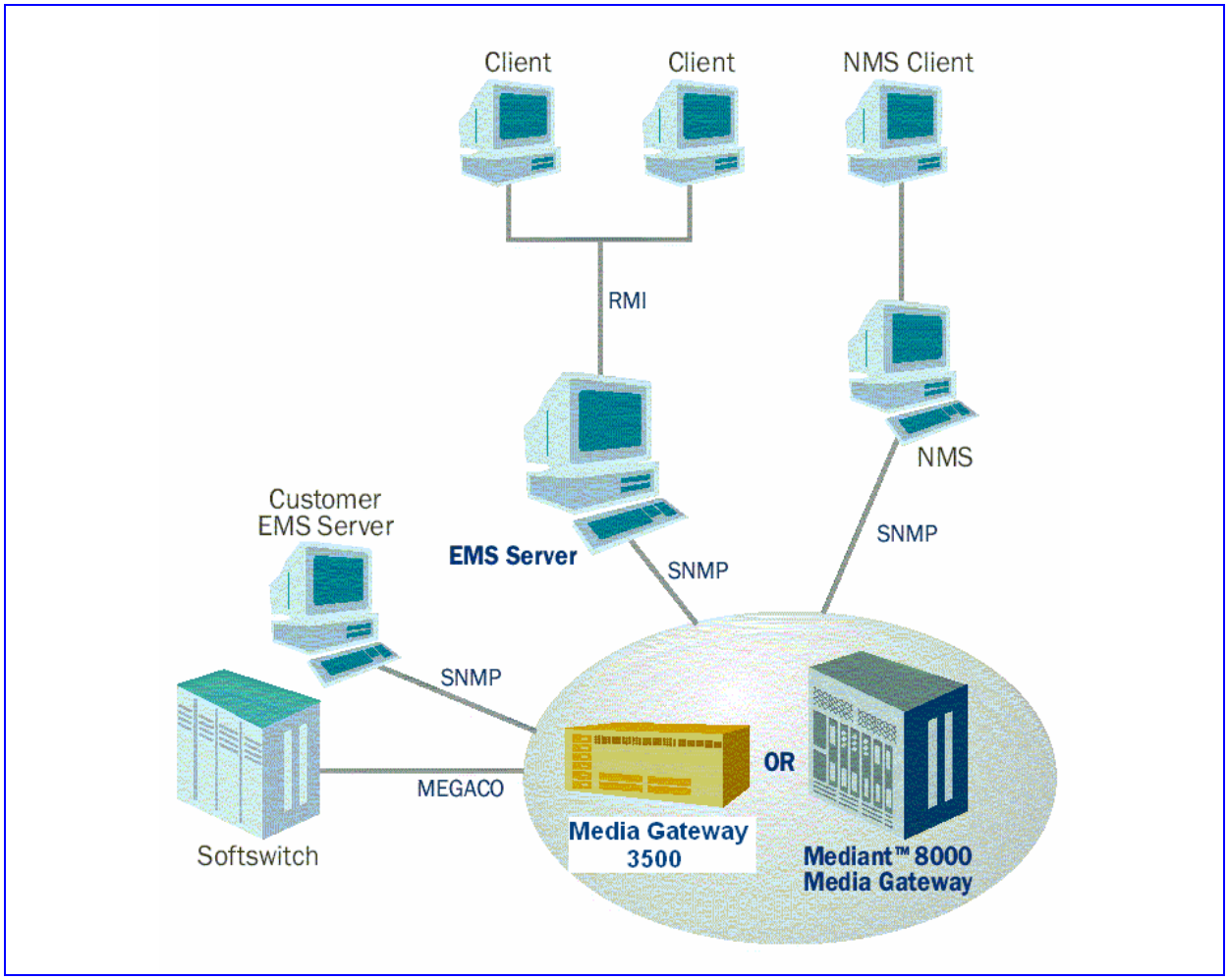
Figure 12-3: Trunk Parameters Provisioning Screen



12.1 EMS Architecture Overview

The EMS is an open, standard-based, scalable management tool. Typically, the EMS manages the functions and capabilities within each Media Gateway but does not manage the connectivity between different Media Gateways within the network. To support management of the connectivity between itself and other network elements, the EMS communicates upward to higher-level Network Management Systems (NMSs), according to ITU.T (International Telecommunication Union -Telecommunication Standardization Sector) M3.100 standards on the Telecommunications Management Network (TMN) layered model. This TMN-defined architecture for a layered Operations Support System (OSS) enables Service Providers to meet customer needs for rapid deployment of new services, as well as to meet stringent quality of service (QoS) requirements. The figure below shows the EMS integrated in a network system.

Figure 12-4: Media Gateway Management System Architecture



Note: The figure above depicts the Media Gateway 3500 Media Gateways. The diagram is representative as it applies to all Media Gateway products.

12.2 Basic Media Gateway Configuration in the EMS

Follow the directions in the relevant sections of the *Element Management System User's Manual*, Document #: LTRT-910xx as listed below.

- The EMS can manage only media gateways whose software version is defined in the Software Manager. Thus, before defining the MG Tree and the media gateways, introduce the software you'll be operating with to the EMS. Refer to the EMS User's manual section, Software Manager. Follow the steps for adding a new file to the Software Manager.
- For instructions on configuring the Media Gateway, refer to the EMS User's manual section, Configuring the Media Gateway 3500 Media Gateway. Follow the steps for adding/removing, locking/unlocking and provisioning a Media Gateway.
- Refer to EMS User's manual section, Monitoring Status Panes.
- For configuring a newly inserted Media Gateway board, refer to EMS User's manual section, *Media Gateway Level Status Pane*.
- For modifying a Media Gateway board Configuration, refer to EMS User's manual section, *TP Board-Level Provisioning Navigation Buttons*.
- For modifying a Trunk Configuration, refer to EMS User's manual section, *TP Board-Level Provisioning Navigation Buttons*.

Note 1: A combination of T1 and E1 trunks is not allowed in the same Media Gateway board.

Note 2: Although the protocol type of a trunk is an on-line parameter, moving from T1 to E1 cannot be performed in an on-line fashion. Instead, perform a Lock/Unlock on the Media Gateway board to move from T1s to E1s and vice versa.

- For setting Redundancy parameters, refer to EMS User's manual section, *TP/ Board-Level Provisioning Navigation Buttons* regarding Button 4 "Redundancy Group Properties". Refer to the table, TP-1610 Configuration - Limitations and Work-Around Issues.
- For setting Clock parameters, refer to EMS User's manual section, *TP Board-Level Provisioning Navigation Buttons* regarding Button 5 Clock Properties.

12.3 Performance Monitoring

The EMS offers two view types of Performance Monitoring:

- Real-Time View
- Historic View

For more details, refer to the Performance Monitoring section in *Element Management System User's Manual*, Document #: LTRT-910xx.

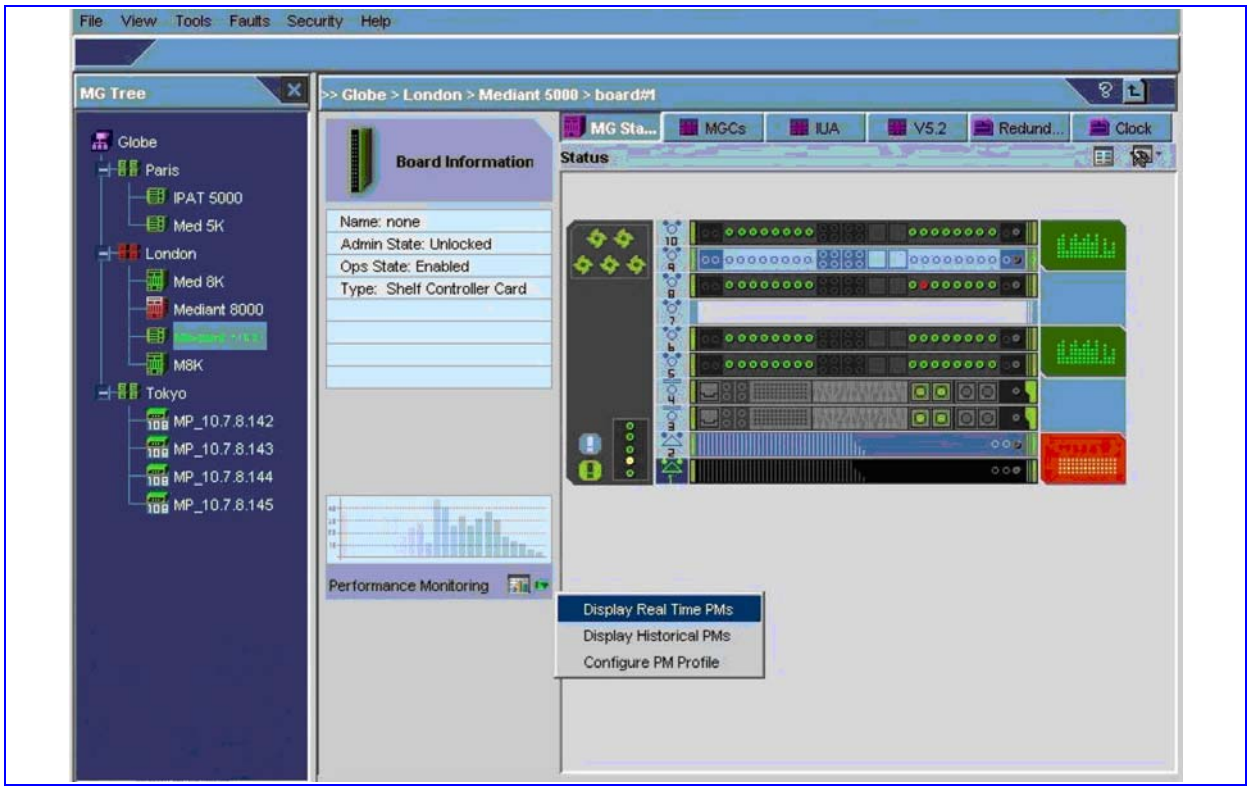
12.3.1 Real-Time Performance Monitoring

Real-time performance monitoring provides EMS users with the ability to perform high frequency polling of various system parameters.

➢ To select an entity to poll, take these 2 steps:

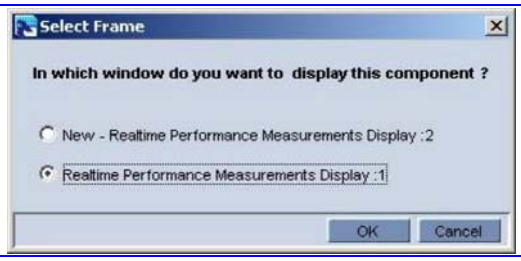
1. Navigate to the entity according to regular EMS navigation concepts and from the Performance Monitoring menu in the Info pane, select the **Display Real Time PMs** option (refer to the figure below).

Figure 12-5: Display Real Time PMs



2. Select the frame you prefer (a new frame or an already existing frame) to view the performance graph (refer to the figure below) and click **OK**.

Figure 12-6: Selecting the Frame to Display the Graph of the Entity Performance



Users can open up to five separate real-time graphs in the same client application. In each graph, you can simultaneously view up to 5 parameters of the same Media Gateway or compare the same parameters over different Media Gateways.

12.3.2 Viewing Historical Data

➢ To view collected (historical) data, take these steps:

1. Select the **Display Historical PMs** option in the Performance Monitoring menu; the 'History PM' screen opens.
2. Continue (as needed) to select entities to be added to the same screen. All entities must be of the same type (trunks, or System Controller boards, or Media Gateways of the same control protocol type). After all entities are selected, select the parameter to view by pressing the **Parameters Filter** button. Only parameters available for that entity type are displayed for selection.

   Note that you can select up to 15 parameters. Note that the number of entities you can select is unlimited.
3. Select the Time Interval according to which you need to review data and click **Refresh**. After data is displayed, you can save it as a *.csv* file by clicking the **Save** icon. Historical data comprises two tables: The uppermost table displaying detailed data (in user-defined intervals) and the table below it displaying summarized data. Each time a sample is taken from the media gateway, it is stored in the detailed table, where the entity name and index, parameter name, start, stop polling time and parameter value are specified. After every 24 hours of sampled data, the detailed table is summarized. For each entity and parameter, the start and stop summary time is stored and the average, minimal and maximal value is displayed. Detailed data is stored for a period of 7 days (in intervals of 15 minutes). Historical data is stored for 30 days (in intervals of 24 hours). Data storage time is dependent on available disk space.

12.4 Operating a Redundant Gateway

Each SC, Ethernet Switch and Media Gateway board in the redundant gateway configuration can operate as the Active or Redundant (Standby) board.

The Media Gateway board designated as the redundant board must be accompanied by the Redundant (Standby) Media Gateway RTM behind it (RTS-1 for TP-1610.)

The EMS displays the activity status of the board according to the table below. The board status is indicated by two color areas: slot status and board activity status.

Board activity status is indicated by the background color of the board. It can represent Active or Redundant status.

The slot status is a combination of administrative, operational states and appropriate severity of the alarm. It is represented by colored lines at both ends of the displayed boards.

The color code can be:

- gray when the administrative state = locked
- red when the operational state = disabled
- green when the operational state is normal
- blue/orange/yellow/red when operations are affected by a fault according to its alarm severity.

12.4.1 Media Gateway Board Redundancy

To set a Media Gateway board as the redundant board, the board must be locked first, right-click on the board and from the popup menu, select the Make Board Redundant option.

Note: The Media Gateway board designated as the Redundant board must be accompanied by the RTM behind it.

Setting the board as redundant provides redundancy for all chassis Media Gateway boards in an N:1 redundancy regime.

To cancel the Redundant functionality on the Media Gateway board, right-click on the designated board and from the popup menu, select the Make Board Non Redundant option.

CAUTION

If the redundant Media Gateway board is utilized to cover the functionality of a failed Media Gateway board, it is incumbent on the operator to replace the failed Media Gateway board and return the redundant Media Gateway board to Standby status as soon as possible. This way, the redundant Media Gateway board can resume its protecting status should a Media Gateway board again require backup coverage.

In the redundant gateway configuration, an Active Media Gateway board can be switched over to the Redundant Gateway board and then switched back to be active again. The Switch Over and Switch Back operation can be performed as follows:

1. Right click on the Active Media Gateway board (the board must be unlocked) and from the popup menu, select the Switch Over option. The original Active Media Gateway board becomes Redundant (Standby), and the original Redundant becomes Active.
2. The now Redundant Media Gateway board is locked after a switch over. Unlock the board. (Note: Switch Back operation requires that the now Redundant Media Gateway to be unlocked).
3. To perform Switch Back, right click on the switched over Active Media Gateway board and from the popup menu, select the Switch Back option. Note that on Switch Back, it is not necessary to “unlock” the redundant board as it will return to the available configuration in about 2 minutes.

12.4.2 Ethernet Switch Boards Redundancy

The two Ethernet Switch boards operate as an Active/Standby pair. In Media Gateway 3500, the Ethernet Switch board in slot 3 is the initially Active Ethernet Switch board (in the default settings) and the Ethernet Switch board in slot 4 is the initially Redundant (Standby) board. In the EMS, the Active Ethernet Switch board is displayed in black and the Standby Ethernet Switch board is displayed in blue-gray. An Ethernet Switch board which is disabled by a lock operation is displayed in red.

The SC board audits and aligns all elements in the system to interconnect via the designated Active Ethernet Switch board. Whenever a Media Gateway board or SC board makes a switchover to the secondary or redundant SC board (in which the Standby SC takes over the Active mode), the now Active SC board reassesses the situation and re-aligns all of the boards either by switching to the secondary or redundant Ethernet Switch board (in which the Standby ES takes over the Active mode), or by issuing a Media Gateway board switchover.

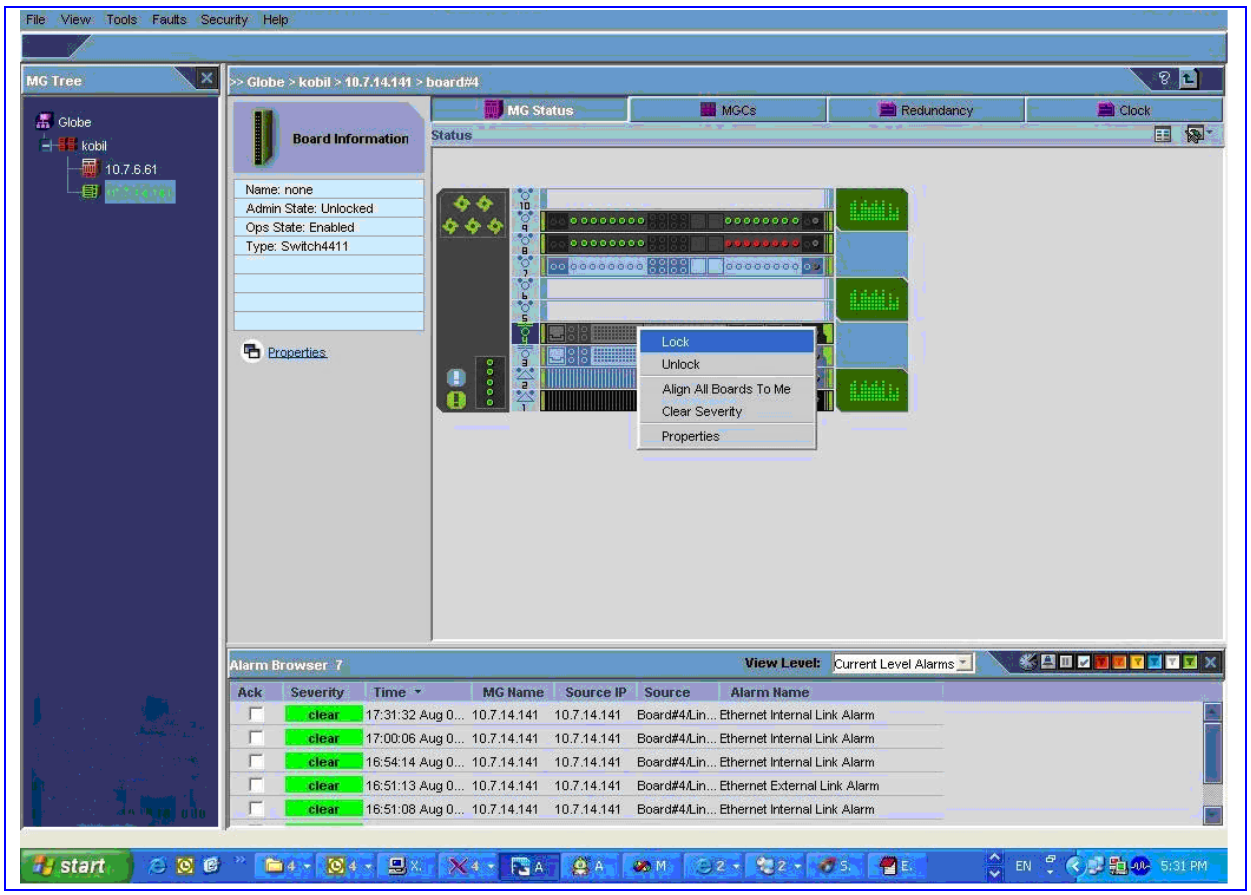
If for any reason, Ethernet Switch switchover occurs, i.e., the initially Active Ethernet Switch in slot 3 becomes Redundant (Standby) and initially Standby Ethernet Switch in slot 4 becomes Active, it is incumbent on the user to return the (now Redundant or Standby) Ethernet Switch in slot 3 to function as the Active Ethernet Switch board and similarly to return to (now Active Ethernet Switch in Slot 4 to function as the Standby Ethernet board.

IN the EMS, in addition to the status display of the Ethernet Switch boards, the user is notified by the “operational info” alarm trap issued from the Active SC announcing the message, “Network port 0 failed, start using network port 1”. In addition, the Ethernet Switch board is displayed as yellow indicating the appropriate “suspect” severity.

To switch the boards to their default positions via the EMS, right-click on the now Redundant (but initially Active) Ethernet Switch board and from the popup menu, select the **Align all Boards To Me** option.

An Ethernet Switch board’s yellow severity status can be cleared from the popup menu, by selecting the **Clear Severity** option. Refer to the figure below.

Figure 12-7: EMS Media Gateway Status Screen Showing Popup Menu



In the redundant gateway configuration, if for any reason locking of the ES board is to be performed to trigger the Ethernet Switch switchover, the following steps should be followed (assuming the current Active Ethernet Switch is in slot 3):

4. Lock the ES slot 3. The Active Ethernet Switch in slot 3 becomes Redundant (Standby) and the Standby Ethernet Switch in slot 4 becomes Active.
5. To return the (now Redundant or Standby) Ethernet Switch in slot 3 to function as the Active Ethernet Switch board by locking slot 4 (now Active Ethernet Switch), ensure first that Slot 3 is unlocked and in normal state or it has been up for 6 minutes after a reset (i.e. after 'unlock' operation is invoked).
6. Lock the ES slot 4. The Redundant Ethernet Switch in slot 3 becomes Active and slot 4 becomes the Standby (Redundant) Ethernet Switch.

12.4.3 SC Redundancy

The two SC boards operate as an Active/Standby pair. The background color of the active board is dark and the Redundant is blue. To switchover between the two SCs, right-click on the Active SC board and from the popup menu, select the Switch Over option.

12.5 Clock Control Application

12.5.1 Technical Overview

Clock synchronization is the mechanism of setting trunks clocks to be the same. Two slots (each populated by a TP board) are used as reference clock source. Clock synchronization operates as follows:

1. Each of the 16 trunks in each TP board can be configured with provisioning parameter tgTrunkClockPriority (refer to the *Element Management System User's Manual*, Document #: LTRT-910xx for detailed information on all trunk-level provisioning parameters). This parameter can be configured with a number in the range 0-15.
2. The slot containing the TP board with the trunk whose tgTrunkClockPriority parameter is configured with the highest value, assumes the function of clock board slot A. The trunk in the board serves as the clock reference trunk.
3. The slot containing the TP board with the trunk whose tgTrunkClockPriority parameter is configured with the second highest value, assumes the function of clock board slot B. The trunk in the board serves as the clock reference trunk.
4. Under the Clock entity (refer to the *Element Management System User's Manual*, Document #: LTRT-910xx), the parameters Slot A CLK Reference and Slot B CLK Reference are configured to refer to (2) and (3) respectively.

12.5.2 Configuring Clock Control

The following modes are supported:

- 'NONE' Working Mode (default) (refer to "'NONE' Working Mode" below)
- 'SYNCHRONIZED' Working Mode (refer to "'SYNCHRONIZED' Working Mode" below)

12.5.2.1 'NONE' Working Mode (Unsynchronized Mode)

'NONE' Working Mode is the initial (default) mode that assumes that all trunks in the same group are synchronized (each Media Gateway board has 2 trunk groups, trunk number 1-8 and 9-16).

In 'NONE' working mode:

- The entire media gateway is unsynchronized; this is the default clock synchronization mode of the system and does not require any provisioning.
- Both 1st and 2nd Clock Slot Ref are set to 0 (part of the Clock parameters provisioning).
- Each trunk group (1-8, 9-16) arbitrary chooses one of its trunks to be a reference trunk for synchronization of other trunks of the group.
- In this mode, the media gateway can provide a clock source only if the external system is connected through the same group of trunks (either 1-8, or 9-16).
- All trunks hosted by a single group are connected to the same PSTN switch.

Note: In 'NONE' mode, the media gateway should not provide a clock reference to the PSTN switch.

12.5.2.2 'SYNCHRONIZED' Working Mode

When at least one Clock Slot Ref is set to any slot other than 0, the media gateway is set to SYNC working mode.

Note: The Clock Slot Ref must refer to a slot containing a Media Gateway Board. It is recommended to place the Clock Reference Media Gateway boards in slots 10 and (or) 11.

To control the clock mechanism, the 'NONE' working mode must be changed to 'SYNCHRONIZED' working mode. When the system starts up, it starts up in the default 'NONE'. After defining the Clock Control, locking and unlocking the media gateway synchronizes the system.

To define the clock control mechanism (i.e., to change from 'NONE' to 'SYNC' Working Mode), take these 7 steps:

1. Lock the 'clock'.
2. Set 'Clock 1st TP Slot Ref' to the slot# that is connected to the primary clock source.
3. Set 'Clock 2nd TP Slot Ref' to the slot# that is connected to the secondary clock source.
4. For each trunk (only trunks 9-16) of the specified boards in the Ref slots:
5. Lock the trunk.
   - Set 'Clock Priority' to:

0 - if it is not a clock source.

1... 15 - if you want it to be a clock source. 1 is the lowest priority.

Unlock the trunk.

Note: Only the second trunk group, 9-16, on the Ref board can provide a clock source for the media gateway.

6. Unlock the Clock.
7. Lock and unlock the media gateway. Note that 'Synch' mode is not applied until the media gateway passes through the Lock/Unlock procedure.

12.5.3 Clock Synchronization Configuration Limitations for TP-1610 Configurations

When working with a redundant system scheme, there are a few limitations that require note. Generally, the following clock synchronization configurations are supported:

- SYNC mode
- NONE (Synchronized) Mode

12.5.3.1 SYNC Mode

When working in SYNC mode with a redundant system scheme, the following must be assured:

1. There must always be a sync clock in the chassis – TP-1610 boards A and B
2. The redundant (standby) board must function as a clock slave – TP-1610 board R

To achieve this requirement, at least 3 Media Gateway boards must be included in the system:

- Two clock master TP-1610 boards in the chassis - If the clock master board A fails, the second clock master TP-1610 board B continues supplying the sync clock.
- One redundant board for the TP switchover - If the clock master board A fails, its trunks are connected to the redundant (standby) TP-1610 board R, which functions as a slave clock after switchover.

Note: The redundant TP-1610 board can not function as the clock master.

12.5.3.2 NONE (Synchronized) Mode

When working in NONE mode with a redundant system scheme, the redundant (standby) TP-1610 board is required and does not handle the clock redundancy in chassis. All the trunks of the active TP-1610 board are synchronized in groups of 8 trunks, where each TP-1610 board has 2 trunk groups, trunk numbers 1 to 8 and 9 to 16. In this mode the entire media gateway is unsynchronized – instead, each trunk group (1 to 8, 9 to 16) arbitrary chooses one of its trunks to be a reference trunk for synchronization of other trunks of the group. In this mode, all trunks hosted by a single group are connected to the same PSTN switch.

Note: In ‘NONE’ mode, the media gateway does not provide a clock reference.

To achieve clock synchronization, a minimum of 2 TP-1610 boards only are required:

- NONE sync mode must be defined in chassis
- All connected trunks are set as clock masters on the connected equipment
- Each trunk group is always synchronized by an external source

Finally to summarize your alternatives:

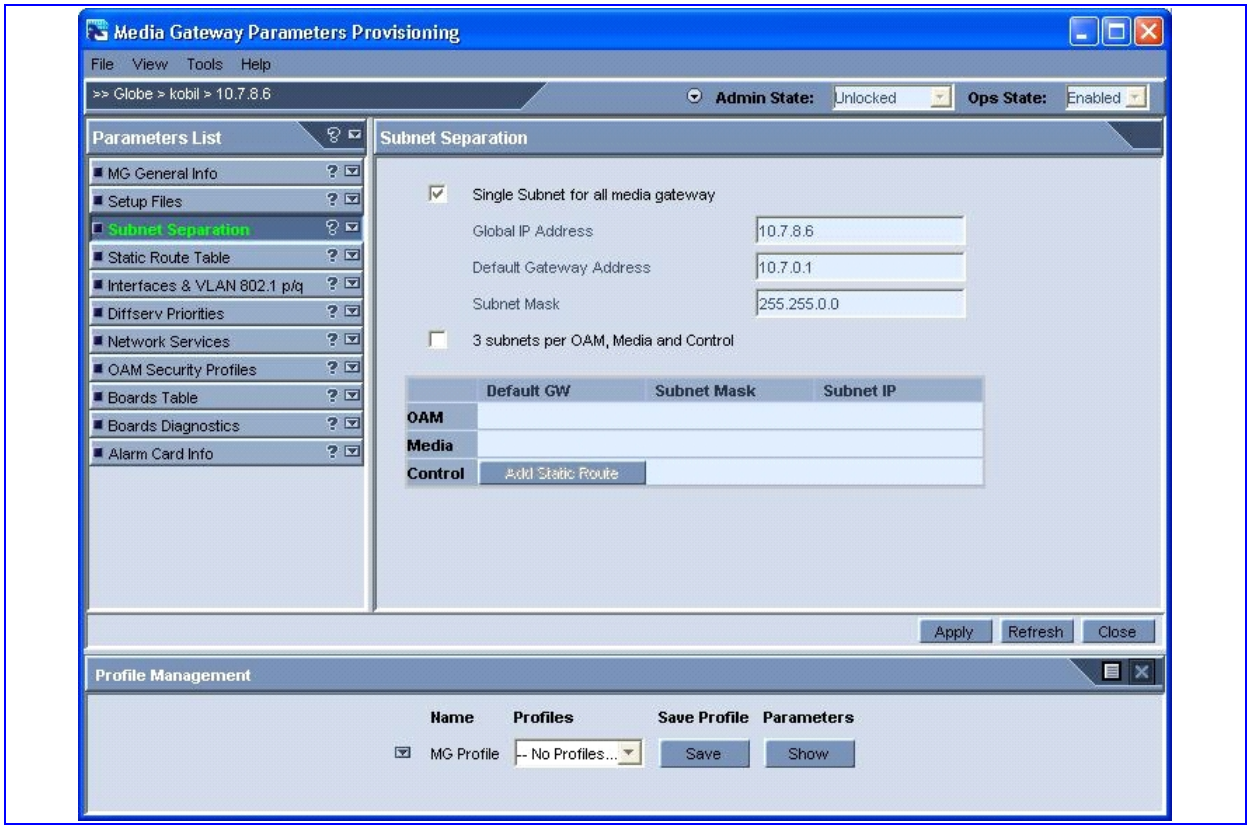
- Three TP-1610 boards are required for SYNC mode
- Two TP-1610 boards are required for None mode

12.6 Configuring the IP Addresses

12.6.1 Media Gateway IP Addresses

Using the appropriate table in 'Defining IP Parameters' on page 52, set the Media Gateway IP addresses for a single subnet or for 3 subnets for configuration between OAM, Media and Control.

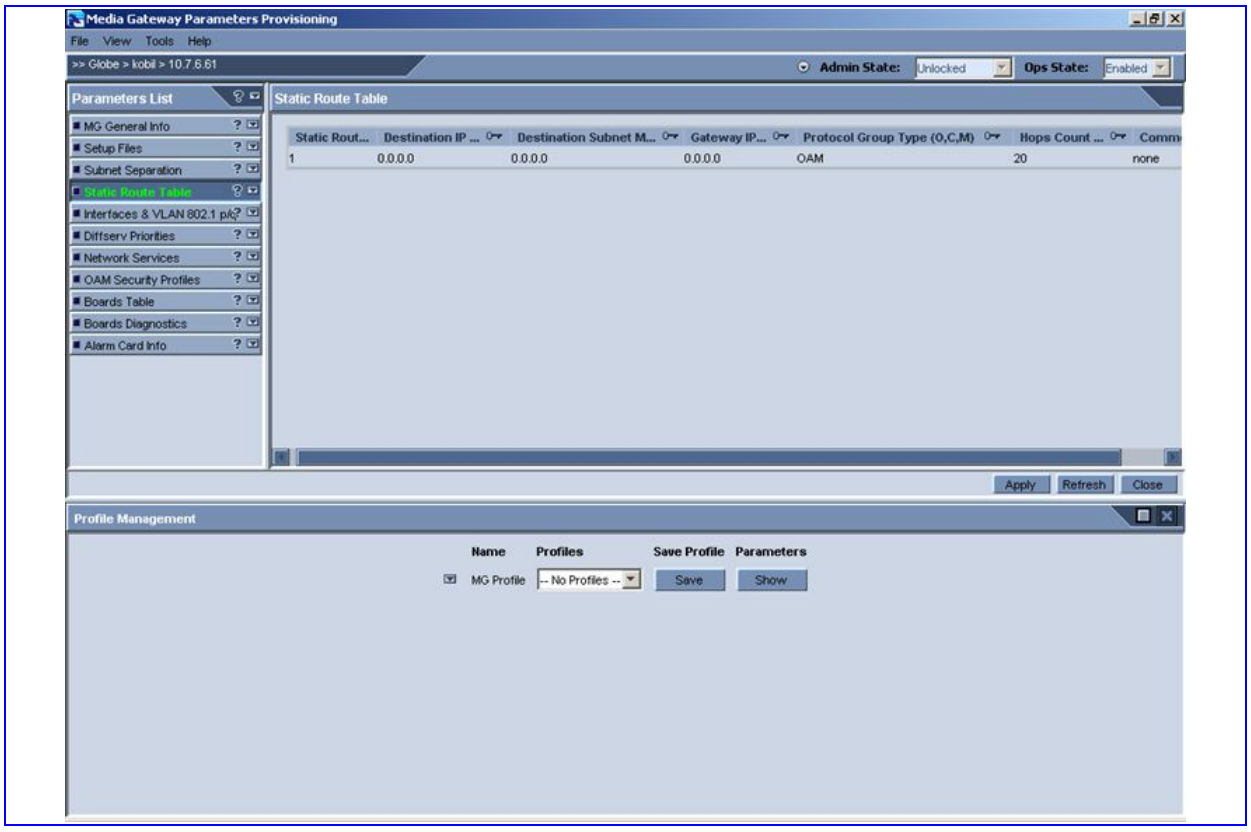
Figure 12-8: Subnet Separation Screen



➢ To configure the IP address for each of the Media Gateway boards, take these 3 steps:

1. In the EMS, lock the Media Gateway.
2. In the Subnet Separation screen, do one of the following:
   a. If you require a single subnet, mark the **Single Subnet for all media gateway** checkbox and enter the IP addresses for the following:
      - Global IP Address
      - Default Gateway Address
      - Subnet Mask
   b. If your configuration requires separate subnets for OAM, Media and Control, mark the **3 Subnet per OAM, Media and Control** checkbox and enter the IP addresses in the table for each row (OAM, Media and Control) for the Default GW, Subnet Mask and Subnet IP.
      a. For The Default GW of the Control subnet, click on the Add Static Route button. The Static Route Table screen appears.

Figure 12-9: Static Route Table Screen



b. For the static routes set the following parameters:

- Destination IP
- Destination Subnet Mask
- Gateway IP
- Protocol Group Type
- Hops Count
- Comment

3. Unlock the Media Gateway.

12.7 Auxiliary Files

The auxiliary files are *dat* files each containing the raw data used for a certain task such as Call Progress Tones, Voice Prompts, etc. *dat* files are created using the DConvert utility (refer to the Appendix, "Utilities" on page 222), which converts auxiliary source files into *dat* files. Some sample auxiliary source files are available in the software package CD. These *dat* files are downloaded to the MG 3500 using EMS.

Note: The auxiliary source files use the same *ini* file extension type as the *ini* configuration file, however, the functionality is different. Whenever the term, "*ini* file" is used, it refers to the configuration file and NOT to the auxiliary files.

12.7.1 Call Progress Tone and User-Defined Tone Auxiliary Files

The auxiliary source file for Call Progress Tones and User-Defined Tones contains the definitions of the Call Progress Tones and User-Defined Tones to be detected/generated by the MG 3500. The Call Progress Tones are mostly used for Telephony In-Band Signaling applications (e.g., Ring Back tone). Each tone can be configured as one of the following types:

- Continuous
- Cadence (up to 4 cadences)
- Burst

A tone can also be configured for Amplitude Modulated (AM) (only 8 of the Call Progress Tones can be AM tones). The Call Progress Tones frequency range is 300 Hz to 1890 Hz.

The User-Defined Tones are general purpose tones to be defined by the user. They can be set only as 'Continuous' and their frequency range is 300 Hz to 3800 Hz. The maximum amount of tones that may be configured for the User Defined and Call Progress Tones together is 32. The maximum frequencies that may be configured in the User Defined and Call Progress Tones together is 64. The MG 3500 sample configuration files supplied by Nortel can be used to construct your own file.

The Call Progress Tones and User-Defined Tones file used by the MG 3500 is a binary file with the extension "*.dat*". Only this binary *tone.dat* file can be loaded to a MG 3500. Users can generate their own *tone.dat* file by opening the modifiable *tone.ini* file (supplied with the *tone.dat* file as part of the software package on the CD accompanying the MG 3500) in any text editor, modify it, and convert the modified *tone.ini* back into a binary *tones.dat* file using the DConversion Utility supplied with the MG 3500 software package. (Refer to the Appendix, "Utilities" on page 222 for a description of the procedure for generating and downloading the Call Progress Tone file using this utility.)

To load the Call Progress Tones and User-Defined Tones configuration file to the MG 3500, refer to the EMS Server Installation and Maintenance Manual.

12.7.1.1 Format of the Call Progress Tones Section in the Auxiliary Source File

The format of the Call Progress Tones section in the auxiliary source file starts from the following string:

[NUMBER OF CALL PROGRESS TONES] - containing the following key only:

- **Number of Call Progress Tones** - defines the number of Call Progress Tones to be defined in the file.

[CALL PROGRESS TONE #X] - containing the Xth tone definition (starting from 0 and not exceeding the number of Call Progress Tones -1 defined in the first section) using the following keys:

- **Tone Type** - Call Progress Tone type

  Basic Tone Type Indices

  1. Dial Tone
  2. Ringback Tone
  3. Busy Tone
  4. Congestion Tone
  5. N/A
  6. Warning Tone
  7. Reorder Tone
  8. Confirmation Tone
  9. Call Waiting Tone

- **Tone Modulation Type** – The tone may be either Amplitude Modulated (1) or regular (0).
- **Tone Form** – The format of the tone may be one of the following indices:
  - Continuous
  - Cadence
  - Burst
- **Low Freq [Hz]** - Frequency in Hertz of the lower tone component for a dual frequency tone, or the frequency of the tone for a single tone. This parameter is relevant only in case the tone is not Amplitude Modulated.
- **High Freq [Hz]** - Frequency in Hertz of the higher tone component for of a dual frequency tone, or zero (0) for a single tone. This parameter is relevant only in case the tone is not modulated.

- **Low Freq Level [-dBm]** - Generation level 0 dBm to -31 dBm. This parameter is relevant only in case the tone is not Amplitude Modulated.
- **High Freq Level [-dBm]** - Generation level. 0 to -31 dBm. The value should be zero (0) for a single tone. This parameter is relevant only in case the tone is not Amplitude Modulated.
- **First Signal On Time [10 msec]** - "Signal On" period (in 10 msec units) for the first cadence ON-OFF cycle, for cadence tone. When a tone is configured to be continuous, this parameter defines the tone On event detection time. When a tone is configured to be burst tone, it defines the tone's duration.
- **First Signal Off Time [10 msec]** - "Signal Off" period (in 10 msec units) for the first cadence ON-OFF cycle, for cadence tone. In case of burst tone, this parameter defines the off time required after burst tone ended until the tone detection is reported. For a continuous tone, this parameter is ignored.
- **Second Signal On Time [10 msec]** - "Signal On" period (in 10 msec units) for the second cadence ON-OFF cycle. This may be omitted if there is no second cadence.
- **Second Signal Off Time [10 msec]** - "Signal Off" period (in 10 msec units) for the second cadence ON-OFF cycle. This may be omitted if there is no second cadence.
- **Third Signal On Time [10 msec]** - "Signal On" period (in 10 msec units) for the third cadence ON-OFF cycle. This may be omitted if there is no third cadence.
- **Third Signal Off Time [10 msec]** - "Signal Off" period (in 10 msec units) for the third cadence ON-OFF cycle. This may be omitted if there is no third cadence.
- **Forth Signal On Time [10 msec]** - "Signal On" period (in 10 msec units) for the forth cadence ON-OFF cycle. This may be omitted if there is no forth cadence.
- **Forth Signal Off Time [10 msec]** - "Signal Off" period (in 10 msec units) for the forth cadence ON-OFF cycle. This may be omitted if there is no forth cadence.
- **Carrier Freq [Hz]** – the Carrier signal frequency in case the tone is Amplitude Modulated.
- **Modulation Freq [Hz]** – The Modulated signal frequency in case the tone is Amplitude Modulated (valid range from 1 Hz to 128 Hz).
- **Signal Level [-dBm]** – the tone level in case the tone is Amplitude Modulated.
- **AM Factor [steps of 0.02]** – Amplitude modulation factor. Valid values: 1 to 50. Recommended values: 10 to 25.
- **Default Duration [msec]** - The default duration (in 1 msec units) of the generated tone.

Note 1: When defining the same frequencies for both a continuous tone and a cadence tone, the Signal On Time parameter of the continuous tone should have a value that is greater than the Signal On Time parameter of the cadence tone. Otherwise the continuous tone is detected instead of the cadence tone.

Note 2: The tone frequency should differ by at least 40 Hz from one tone to other defined tones**.**

Note 3: For more information on generating the Call Progress Tones Configuration file, refer to 'Converting a CPT *ini* File to a Binary *dat* File' in the Appendix, 'Utilities'.

Note 4: When constructing a CPT *dat* file, the **Use dBm units for Tone levels** checkbox must be marked. This checkbox enables defining the levels in [-dBm] units.

12.7.1.2 Format of the User Defined Tones Section

The format of the User Defined Tones section of the Call Progress Tone source auxiliary file starts from the following string:

[NUMBER OF USER DEFINED TONES] - containing the following key only:

- *Number of User Defined Tones* - defines the number of User Defined Tones to be defined in the file.

[USER DEFINED TONE #X] - containing the Xth tone definition (starting from 0 and not exceeding the number of User Defined Tones -1 defined in the first section) using the following keys:

- **Tone Type** – User Defined Tone type

  Basic Tone Type Indices

  1. Dial Tone
  2. Ringback Tone
  3. Busy Tone
  4. Congestion Tone
  5. N/A
  6. Warning Tone
  7. Reorder Tone
  8. Confirmation Tone
  9. Call Waiting Tone

- **Low Freq [Hz]** - Frequency in Hertz of the lower tone component for a dual frequency tone, or the frequency of the tone for a single tone.
- **High Freq [Hz]** - Frequency in Hertz of the higher tone component for of a dual frequency tone, or zero (0) for a single tone.
- **Low Freq Level [-dBm]** - Generation level 0 dBm to -31 dBm.

- **High Freq Level [-dBm]** - Generation level. 0 to -31 dBm. The value should be zero (0) for a single tone.
- **Default Duration [msec]** - The default duration (in 1 msec units) of the generated tone.

12.7.1.3 Default Template for Call Progress Tones

The MG 3500 is initialized with the default Call Progress Tones configuration. To change one of the tones, edit the default call *progress txt* file. The table below lists the default call progress tones.

Table 12-1: Default Call Progress Tones

[NUMBER OF CALL PROGRESS TONES] **Number of Call Progress Tones=9**	
#Dial tone [CALL PROGRESS TONE #0]	Tone Type=1 Tone Form = 1 (Continuous) Low Freq [Hz]=350 High Freq [Hz]=440 Low Freq Level [-dBm]=13 (-13dBm) High Freq Level [-dBm]=13 First Signal On Time [10msec]=300
#Dial tone [CALL PROGRESS TONE #1]	Tone Type=1 Tone Form = 1 (Continuous) Low Freq [Hz]=440 High Freq [Hz]=0 Low Freq Level [-dBm]=10 (-10dBm) High Freq Level [-dBm]=0 First Signal On Time [10msec]=300
#Ringback [CALL PROGRESS TONE #2]	Tone Type=2 Tone Form = 2 (Cadence) Low Freq [Hz]=440 High Freq [Hz]=480 Low Freq Level [-dBm]=19 (-19dBm) High Freq Level [-dBm]=19 First Signal On Time [10msec]=200 First Signal Off Time [10msec]=400

Table 12-1: Default Call Progress Tones

[NUMBER OF CALL PROGRESS TONES] **Number of Call Progress Tones=9**	
#Ringback [CALL PROGRESS TONE #3]	Tone Type=2 Tone Form = 2 (Cadence) Low Freq [Hz]=440 High Freq [Hz]=0 Low Freq Level [-dBm]=16 (-16dBm) High Freq Level [-dBm]=0 First Signal On Time [10msec]=100 First Signal Off Time [10msec]=300
#Busy [CALL PROGRESS TONE #4]	Tone Type=3 Tone Form = 2 (Cadence) Low Freq [Hz]=480 High Freq [Hz]=620 Low Freq Level [-dBm]=24 (-24dBm) High Freq Level [-dBm]=24 First Signal On Time [10msec]=50 First Signal Off Time [10msec]=50
#Busy [CALL PROGRESS TONE #5]	Tone Type=3 Tone Form = 2 (Cadence) Low Freq [Hz]=440 High Freq [Hz]=0 Low Freq Level [-dBm]=20 (-20dBm) High Freq Level [-dBm]=0 First Signal On Time [10msec]=50 First Signal Off Time [10msec]=50
#Reorder tone [CALL PROGRESS TONE #6]	Tone Type=7 Tone Form = 2 (Cadence) Low Freq [Hz]=480 High Freq [Hz]=620 Low Freq Level [-dBm]=24 (-24dBm) High Freq Level [-dBm]=24 First Signal On Time [10msec]=25 First Signal Off Time [10msec]=25

Table 12-1: Default Call Progress Tones

[NUMBER OF CALL PROGRESS TONES] **Number of Call Progress Tones=9**	
#Confirmation tone [CALL PROGRESS TONE #7]	Tone Type=8 Tone Form = 2 (Cadence) Low Freq [Hz]=350 High Freq [Hz]=440 Low Freq Level [-dBm]=20 (-20dBm) High Freq Level [-dBm]=20 First Signal On Time [10msec]=10 First Signal Off Time [10msec]=10
#Call Waiting Tone [CALL PROGRESS TONE #8]	Tone Type=9 Tone Form = 2 (Cadence) Low Freq [Hz]=440 High Freq [Hz]=0 Low Freq Level [-dBm]=20 (-20dBm) High Freq Level [-dBm]=0 First Signal On Time [10msec]=30 First Signal Off Time [10msec]=900

12.7.1.4 Modifying the Call Progress Tones File

Customers are supplied with modifiable Call Progress Tone auxiliary source files (with *ini* file extension) and non-modifiable Call Progress Tone *dat* binary files in the software package under **Tones**.

Only the binary *dat* file can be sent to the MG 3500.

In the auxiliary source file, customers can modify Call Progress Tone levels, Call Progress Tone frequencies to be detected/generated by the MG 3500, to suit customer-specific requirements. An example of a Call Progress Tone *ini* file name is *call_progress_defaults.dat*.

The default call progress tones configuration for various countries is found in the associated *ini* file. To change one of the tones, edit the *ini* file and then use it to create a new *dat* file.

For example: to change the dial tone to 440 Hz only, replace the #Dial tone section in the table below with the following text:

#Dial tone

[CALL PROGRESS TONE #1]

Tone Type=1

Tone Form = 1

Low Freq [Hz]=440

High Freq [Hz]=0

Low Freq Level [-dBm]=10 (-10dBm)

High Freq Level [-dBm]=0

First Signal On Time [10msec]=300; the dial tone is detected after 3 sec

Users can specify several tones of the same type using Tone Type definition. These additional tones are used only for tone detection. Generation of specific tone is according to the first definition of the specific tone. For example, the user can define an additional dial tone by appending the second dial tone definition lines to the tone *ini* file. The MG 3500 reports dial tone detection if either one of the two tones is detected.

➢ To modify these *ini* files and send the *dat* file to the MG 3500, take these 4 steps:

1. Open the CPT *ini* file (it opens in **Notepad** or in a customer-defined text file editor.)
2. Modify the file in the text file editor according to your specific requirements.
3. Save your modifications and close the file.
4. Convert the file with the DConvert Utility into a binary dat file (refer to "Converting a Modified CPT *ini* File to a *dat* File with the Download Conversion Utility" below).

12.7.1.5 Converting a Modified CPT ini File to a dat File with the Download Conversion Utility

After modifying the original CPT *ini* file (supplied with the MG 3500's software package), you can use the Download Conversion Utility to convert the modified file into a *dat* binary file. You can only send the *dat* file to the MG 3500. The *ini* file cannot be sent.

To convert a modified CPT *ini* file to a binary *dat* file, Run the executable Download Conversion Utility file, *DConvert240.exe.* For more information, refer to the Appendix,' 'Utilities" on page 222.

After making the *dat* file, send it to the MG 3500 using the EMS.

12.7.2 Playing Prerecorded Tones (PRT)

The Call Progress Tones and the User-Defined Tones mechanisms have several limitations such as limited number of predefined tones, or limited number of frequency integrations in one tone. To solve these problems and provide a more flexible tone generation capability, prerecorded tones and play can be downloaded to the MG 3500 and be played using regular tones generation commands.

12.7.2.1 PRT File Configuration

The PRT file that should be downloaded to the MG 3500 is a binary dat file, which was created using The DConvert utility. The tones should be recorded (or created using a Signaling Editor) if the user intends to download them in separate PCM files. The PCM files should include the following characteristics:

- Coder: G.711 A-law, G.711 µ -law or Linear PCM.
- Rate: 8 kHz
- Resolution: 8-bit
- Channels: mono

The PRT module plays the recorded tone repeatedly. This provides the ability to record only part of the tone, while still playing it for a full duration. For example, if a tone has a cadence of 2 seconds on and 4 seconds off, the recorded file should contain only the 6 seconds of the cadence. The PRT module repeatedly plays this cadence for the configured duration. In the same manner, a continuous tone can be played by repeating only part of it.

After the PCM files are properly prepared, these files should be converted into one *dat* file using the DConvert utility. For more information regarding the DConvert utility, and how to make a *dat* PRT file, refer to the Appendix, "Utilities" on page 222.

Note: The maximum number of prerecorded tones that can be stored in one *dat* file is 40.

12.7.2.2 Downloading the PRT *dat* File

Downloading the PRT *dat* file into the MG 3500 is be done using the EMS.

Note 1: The maximum PRT buffer size is 1 MB.

Note 2: If the same tone type was defined as PRT and as Call Progress Tone or User-Defined Tone, the MG 3500 plays it using the PRT module.

12.8 Setting DiffServ Priorities

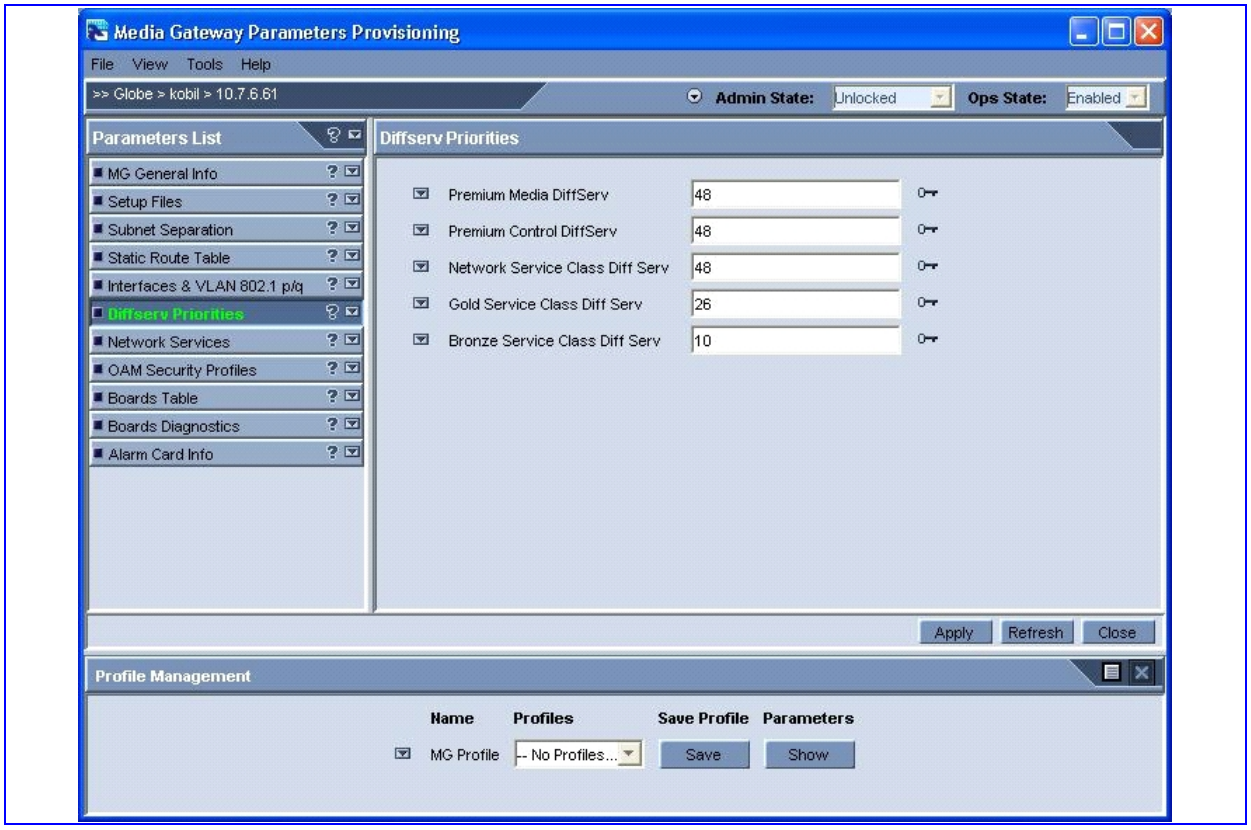
The Media Gateway 3500 supports up to 5 DiffServ Priority Classes. All of the supported protocols are mapped within these 5 classes according to packet-loss impact, acceptable delay and jitter. You can set the priority per DiffServ class in the EMS DiffServ Priorities screen.

Using the appropriate table in 'Defining IP Parameters' on page 52, set the DiffServ priorities.

➢ To set the DiffServ priorities, take these 3 steps:

1. Lock the Media Gateway.
2. in the EMS DiffServ Priorities screen, change the value for the DiffServ priority of the appropriate classes.
3. Unlock the Media Gateway.

Figure 12-10: DiffServ Priorities Screen



The DiffServ Priority value is the same that appears in the Layer 3 header in packets sent by the Media Gateway 3500.

Note: The priority settings assigned to a DiffServ Class name is assigned per Protocol group. The same assignment is relevant to all of the protocols in the Protocol group.

Table 12-2: DiffServ Class Name and Protocol Group Assignments

Protocol Group	Target Applications and Services	Tolerance to:		
		Loss	Delay	Jitter
Premium	Telephony service like RTP media, T.38 Fax over IP, Lawful Intercept or Control protocols	Very Low	Very Low	Very Low
Platinum	Used for Video Conferencing, Interactive Gaming	Low	Low	Low
Network	Communications between network devices within one administrative domain like ICMP, COPS, RSVP, DNS, DHCP, BootP, high priority OAM	Low	Low	N/A
Gold	Used for Voice Streaming, Video on demand Broadcast TV, Video surveillance	Med-Low	Med-High	High
Bronze	Used for long-lived TCP, and HTTP flows like Non time-critical OAM&P, Email, Instant Messaging	Low	Med-High	

12.9 Media Gateway 3500 Security Technology

12.9.1 Introduction to IPSec and IKE

The IPSec (IP security) and IKE (Internet Key Exchange) protocols are part of the IETF as well as PacketCable standards for security issues. IPSec and IKE are used together on the media gateway to provide security for control and management protocols. The IPSec protocol is responsible for securing the data streams. The IKE protocol (Internet Key Exchange) is responsible for obtaining the IPSec encryption keys and encryption profile (known as IPSec Security Association). IPSec is used by the Media Gateway 3500 to assure confidentiality, authentication and integrity for the following media types:

- Control traffic, such as H.248, MGCP and TGCP.
- Sigtran over SCTP traffic, such as IUA.
- Management traffic to EMS/ NMS/ OSS, such as SNMP, FTP and Telnet.

12.9.1.1 IKE

The Internet Key Exchange protocol is used to obtain the IPSec Security Associations (SAs). The SA contains the encryption keys and profile used by IPSec to encrypt an IP stream.

IKE specifications:

- Authentication mode - pre-shared key only.
- Both Main and Aggressive modes are supported for IKE Phase 1.
- The encryption algorithms that are supported for IKE SA are DES and 3DES.
- Hash types for IKE SA are SHA1 and MD5.

12.9.1.2 IPSec

The IPSec protocol is responsible for encrypting and decrypting the IP streams.

IPSec specifications:

- Transport mode only.
- Encapsulation Security Payload (ESP) only.
- Support for Initialization Vector (IV) and Cipher Block Chaining (CBC).
- The encryption algorithms that are supported for IPSec SA are currently DES and 3DES.
- Hash types for IPSec SA are SHA1 and MD5.

12.9.1.3 Media (RTP/RTCP) Security

The Media Gateway 3500 supports media encryption via TGCP (PacketCable extensions to MGCP protocol). With media security, IP voice traffic for some or all channels is encrypted using predefined session keys. No key negotiation is performed for media security. Instead, the Media Gateway 3500 assumes higher-level protocols handle key management (TGCP in this case).

Encryption specifications:

- AES - 128 (Rijndael) cipher algorithm, in CBC mode
- Optional 2-byte or 4-byte MAC based on MMH algorithm.
- Encryption key supplied by TGCP.

12.9.1.4 SSH

SSH (Secure Shell) provides secure encrypted communication between two distrusted hosts over an insecure network. SSH is the method used to secure the Media Gateway 3500 's Shelf Controller Telnet and FTP Server.

Specifications for the SSH implementation:

- SSH Protocol Version 2
- Supported encryption algorithms: AES-128, BLOWFISH, 3DES
- Supported authentication algorithms: SHA1, MD5
- User/password authentication on each login

12.9.1.5 SSL/TLS

SSL (the Secure Socket Layer), also known as TLS (Transport Layer Security), is the method used to secure the Media Gateway 3500 's Media Gateway Boards Web server and telnet. The SSL protocol provides confidentiality, integrity and authenticity of the Web server.

Specifications for the SSL/TLS implementation:

- Supported transports: SSL 2.0, SSL 3.0, TLS 1.0
- Supported ciphers: DES, RC4 compatible
- Authentication: Username & Password, X.509 certificates

12.9.2 Media Gateway 3500 Security Configuration

Media Gateway 3500 security configuration is performed via the following management interfaces:

- Installation CLI – secure mode ON/OFF and SC-EMS security association parameters;
- EMS GUI – all the rest (security associations with NMS and OSS servers, Call Agents etc.)

12.9.2.1 Enable Secure Mode

➢ **To enable Secure Mode, take these 5 steps:**

1. Connect to both SC boards via Secure Shell (SSH)
2. Stop software on both SC boards – "tools tg dn"
3. On the Primary SC board:
   - ➢ Run installation script "perl /sc_install.pl"
   - ➢ Choose option "3 – Change installed configuration"

- Select "Enable Security – yes"
- Provide IKE pre-shared key for the EMS server
- Change *root* password to your own selection
- Modify SNMP read/write community strings

4. On the Secondary SC board
   - Run installation script "perl /sc_install.pl"
   - Choose option "4 – Copy configuration from Primary SC "
   - Provide *root* password on Primary SC (the one you changed earlier)
   - Rest of the configuration, including security settings, will be copied from the Primary SC
5. Reboot both SC boards.

12.9.2.2 Software Re-Installation

Secure Mode may be enabled during software re-installation (option 2 in sc_install.pl script). The procedure is similar to the one described above.

12.9.2.3 Enable Secure Mode Examples

The following is an example of a System Configuration with an enabled Security mode.

```
System configuration
----------------------------------------------


Keyboard shortcuts:
    ENTER  - leave default parameter value
    \      - return to previous parameter
    Ctrl-C - abort configuration script


Global SC IP Address                          [10.7.9.242]:
Master SC IP Address                          [10.7.13.45]:
Redundant SC IP Address (or 1.1.1.1 if none)  [10.7.13.94]:
EMS Server IP Address                           [10.7.6.8]:
NTP Server IP Address                            [0.0.0.0]:
Enable Security (0-no, 1-yes)                           [0]: 1
EMS IKE Pre-Shared Key                  [leave unchanged]: ******
SC Root Password                        [leave unchanged]: ******
Re-enter SC Root Password                                : ******
SNMP Read Community                     [leave unchanged]: ******
SNMP Write Community                    [leave unchanged]: ******
Product Type [2]:
Call Control Proxy Type (0-noProxy, 1-mgcp, 2-megaco) [2]:
Trunk Protocol (0-e1, 1-v52)                            [0]:
VOP Board Type (1-TP1610, 2-SB1610, 3-TP6310, 4-SB6310) [1]:
```

The following is another example of a System Configuration with an enabled Security mode.

```
-----------------------------------------------
Configuration Summary:
-----------------------------------------------
Global SC IP Address            :  10.7.9.242
```

```
Master SC IP Address              :  10.7.13.45
Redundant SC IP Address (or 1.1.1.1 if none)  :  10.7.13.94
EMS Server IP Address             :  10.7.6.8
NTP Server IP Address             :  0.0.0.0
Enable Security                   :  1 (yes)
EMS IKE Pre-Shared Key            :  ******
SC Root Password                  :  ******
SNMP Read Community               :  ******
SNMP Write Community              :  ******
Product Type                      :  2 (mediant5000)
Call Control Proxy Type           :  2 (megaco)
Trunk Protocol                    :  0 (e1)
VOP Board Type                    :  1 (TP1610)
------------------------------------------------

Start configuring (y/n)                                [y]:


   >>> Update /etc/inet/inetd.conf file ...

   >>> Make backup of modified file /etc/inet/inetd.conf ...

   >>> Update /etc/inet/services file ...

   >>> Make backup of modified file /etc/inet/services ...

   >>> refresh INET daemon ...
```

12.9.2.4 Disable Secure Mode

➢ To disable Secure Mode, take these 5 steps:

1. Connect to both SC boards via Secure Shell (SSH)
2. Stop software on both SC boards – "tools tg dn"
3. On the Primary SC board:
   - Run installation script "perl /sc_install.pl"
   - Choose option "3 – Change installed configuration"
   - Select "Enable Security – no"
4. On the Secondary SC board
   - Run installation script "perl /sc_install.pl"
   - Choose option "4 – Copy configuration from Primary SC "
   - Provide root password on Primary SC (the one you changed earlier)
   - Rest of the configuration, including security settings, will be copied from the Primary SC
5. Reboot both SC boards

12.9.2.5 Software Re-Installation

Secure Mode may be disabled during software re-installation (option 2 in sc_install.pl script). The procedure is similar to the one described above.

12.9.2.6 Disable Secure Mode Examples

The following is an example of a System Configuration with a disabled Security mode.

```
System configuration
------------------------------------------------


Keyboard shortcuts:
    ENTER  - leave default parameter value
    \      - return to previous parameter
    Ctrl-C - abort configuration script


Global SC IP Address                          [10.7.9.242]:
Master SC IP Address                          [10.7.13.45]:
Redundant SC IP Address (or 1.1.1.1 if none)  [10.7.13.94]:
EMS Server IP Address                          [10.7.6.8]:
NTP Server IP Address                           [0.0.0.0]:
Enable Security (0-no, 1-yes)                          [0]: 0
SC Root Password                       [leave unchanged]: ******
SNMP Read Community                    [leave unchanged]: ******
SNMP Write Community                   [leave unchanged]: ******
```

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13 Testing the Installed System

After the hardware installation process is complete, software is configured, and the EMS has been configured, perform a test to verify that each board is operating.

➢ To ping the SC boards from the PC, take these 3 steps:

1. From the Start menu, select **RUN** and at the command prompt, enter **cmd**.
2. At the command prompt, enter **ping [Global IP address of an SC board]**. A response should be received.

Note: If the Ping has not received the proper response, check the physical connections to the network.

3. Using Telnet, access each SC board and run the command: **tools tg p**

   A list of SC software processes appears. Refer to the example below.

```
SC-1::~# tools tg p
LIST OF SC SOFTWARE PROCESSES:
------------------------------
 6559 tg_megac tg_megaco
 6558 tg_core  tg_core
 6557 tg_bootp tg_bootp
 6556 tg_tpncp tg_tpncpif
 6555 tg_sat   tg_sat
 6554 tg_mgcp  tg_mgcp
 6553 tg_hbg   tg_hbg
 6552 tg_hbm   tg_hbm
 6531 tg_watch /Project/bin/exe/tg_watchdog
```

   The following is an example of the list of SC software processes that appears if there is a problem in the SC software installation. If this occurs, the installation must be redone.

```
SC-1::~# tools tg p
LIST OF SC SOFTWARE PROCESSES:
------------------------------
 6531 tg_watch /Project/bin/exe/tg_watchdog
```

4. In the EMS application, open the Media Gateway Status screen and check the status of the system elements. For more information, refer to the *Element Management System User's Manual*, Document #: LTRT-910xx.

Reader's Notes

14 Hardware Replacement Procedures

14.1 Board Replacement Preliminaries

14.1.1 ESD Requirements

Electrical Component Sensitivity

Electronic components on printed circuit boards are extremely sensitive to static electricity. Normal amounts of static electricity generated by clothing can damage electronic equipment. To reduce the risk of damage due to electrostatic discharge when installing or servicing electronic equipment, use anti-static earthing straps and mats.

➢ **Before removing or replacing boards from the chassis, take these 2 steps:**

1. Locate the ESD (electrostatic discharge) connections on the Media Gateway 3500 chassis. Refer to the diagrams in 'Front and Back Views of the Media Gateway 3500' on page 18.
2. Attach a wrist strap for electrostatic discharge (ESD) and connect it to an ESD connection on the chassis using a banana plug or an alligator clip.

Note: Do not set components down without protecting them with an anti-static bag.

14.1.2 Slot Cover Requirements

Note: It is imperative to cover all unoccupied slots in the front cage of the Media Gateway 3500 chassis and all unoccupied slots in the rear cage of the Media Gateway 3500 chassis with blank panels to maintain a high, internal airflow. See the current release notes for more information before changing any configuration.

Figure 14-1: Blank Panel for Front Slots

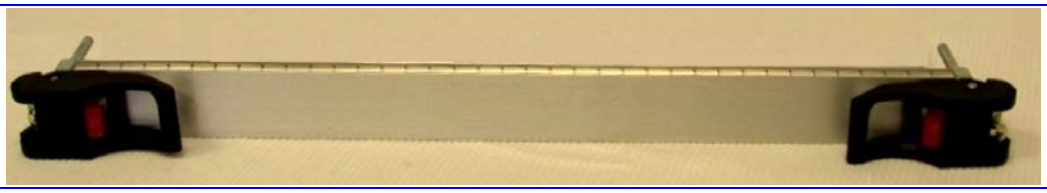
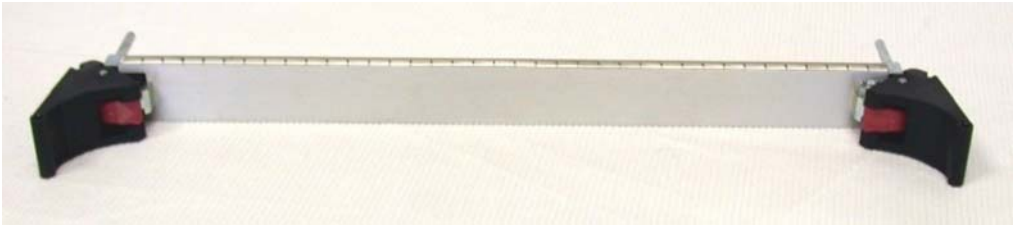


Figure 14-2: Blank Panel for Rear Slots



CAUTION

Board types are assigned to specific slots. The midplane behind the slots contain keys that are specific to the board types appropriate for the individual slots. Forcing a board into a slot for which the board is not keyed will damage the board and/or midplane. If a board does not slide in the full way with ease, check if it is indeed appropriate for the slot in which you are inserting.

14.2 SC Board Replacement Procedure

If you require the Solaris 9 OS software to be installed, refer to 'Installing the Solaris 9 OS' on page 142.

For Redundant configurations, in the event of an SC board failure, the Media Gateway 3500 system performs a switchover to the standby board automatically (now making it the active board) and notifies users with an alarm. Replace the failed SC board as soon as possible to restore the system's high availability. The SC boards are hot-swappable, meaning that the board can be inserted and removed while under power. After replacing the SC board, install the software. Refer to 'Redundant Configuration - Installing the SC Software' on page 146.

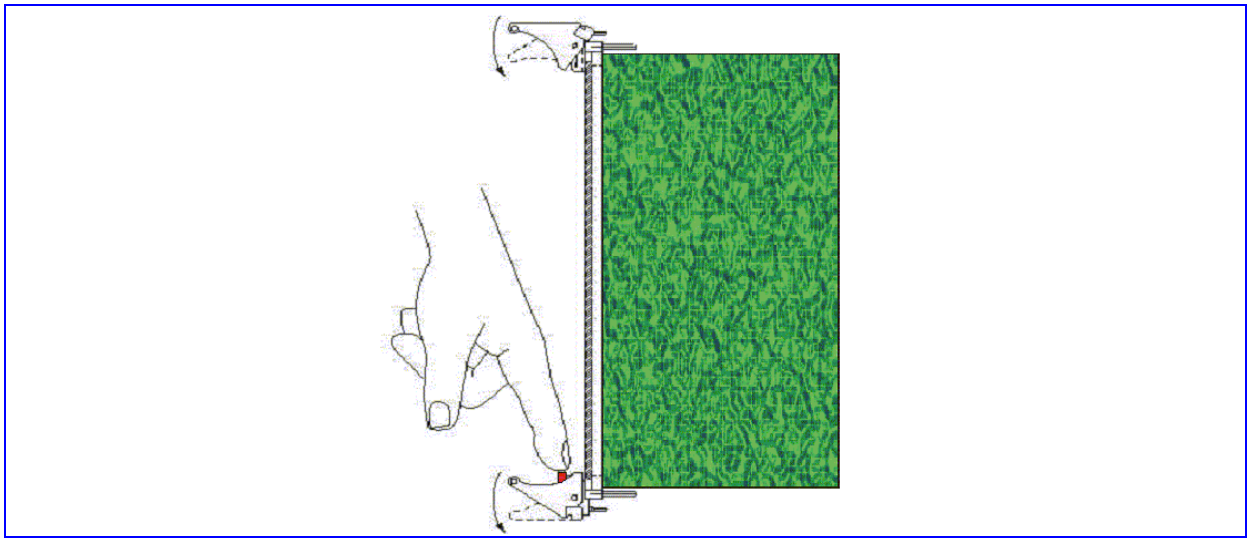
Note 1: In a Redundant configuration, should a primary SC board fail before a faulty secondary SC board has been replaced, replace and configure the SC board to be initially active first and then do the second SC board. To restore your custom configuration, use the procedures in 'SC Software Backup/Restore Procedures' on page 95.

Note 2: If you are replacing both SC boards, **DO NOT** reboot the system until after the second SC board is installed and configured using the procedures detailed in this section.

➢ To remove an SC board from the chassis, take these 3 steps:

1. Unfasten the screws on the plate of the board.
2. Simultaneously press the red ejector buttons on the two black ejector/injector latches on both ends and wait 60 sec for the Hot Swap blue LED to light, indicating that the board can be removed.

Figure 14-3: Red Ejector Buttons on a Board



3. Pull on the two ejector/injector latches and ease out the board from the slot.

➢ To insert an SC board into the chassis, take these 6 steps:

1. Hold the board Horizontal with the top of the board pointed upward.
2. With the black ejector/injector latches in the open (pulled out) position, insert the board in the slot, aligning the board on the grooves on each end.
3. Ease the board all the way into the slot until the ejector/injector latches touch the chassis. The Blue hotswap LED is lit.

Note: Push in the board until it is flush with the other boards. The SC board requires extra pressure to ensure it is pushed in back sufficiently.

4. Press the two black ejector/injector latches on both ends inward, toward the middle until you hear a click.
5. Wait for the hotswap blue LED to turn off.
6. Fasten the screws on the front plate of the board to secure the board to the chassis and to ensure that the board has an earth connection to the chassis.

14.2.1 Installing the Solaris™ 9 OS

The Solaris™ operating system is installed on the SC board. Each version of Media Gateway 3500 software requires a specific version of Solaris™ OS, which is configured specifically to for full Media Gateway 3500 hardware compatibility and high performance.

When it becomes necessary to re-install the Solaris™ OS on an SC boards, it is important to use the Solaris OS installation image provided by Nortel.

Media Gateway 3500 version 3.0 software requires Solaris™ 9 9/04.

14.2.1.1 Installation Requirements

Installation of Solaris™ OS on SC boards is performed via the network. The Solaris OS Installation image must be placed on an Install Server that fulfills the following requirements:

- Solaris™ 8 2/02 or later
- CD-ROM Drive
- At least 2 Gb free disk space in the root file system
- Resides on the same subnet with Media Gateway 3500

Note: The Install Server must reside on the same LAN with Media Gateway 3500 (i.e., it *must* be connected to the same Ethernet Switch).

The installation is to be performed on the SC board while it resides in the Media Gateway 3500 chassis. In addition, the SA-2 RTM must also be in place behind the SC board during the installation process.

14.2.1.2 Preparing the 'Install Image'

➢ To prepare the 'Install Image', take these 5 steps:

1. In the Install Server's CD-ROM drive, insert the Solaris™ 9 SC OS CD.
2. Open a terminal (via Telnet or X).
3. At the prompt, change the directory to the CD-ROM's root.

```
EMS-Server8:/ [root] => cd /cdrom/cdrom0
```

4. If there is no directory,**"cdrom0"** exists, type the command, **eject** and try again.

```
EMS-Server8:/ [root] => eject
```

5. At the prompt, run the 'install' script by typing ./**install** and pressing **Enter**.

```
EMS-Server8:/cdrom/cdrom0 [root] => ./install
```

The Install image creates a /jumpstart directory that is shared over the network.

14.2.1.3 Installing the Solaris™ 9 OS on the SC board

➢ To install the Solaris™ 9 OS on the SC boards, take these 9 steps:

1. On SC board, connect to the RS232 console.
2. Identify the SC hostname, IP address and MAC address of the SC board.

   Sample values are shown in red in the example below.

```
client224:~# ~ => ifconfig -a
lo0: flags=1000849<UP,LOOPBACK,RUNNING,MULTICAST,IPv4> mtu 8232 index
1
        inet 127.0.0.1 netmask ff000000
dmfe0:
flags=1000863<UP,BROADCAST,NOTRAILERS,RUNNING,MULTICAST,IPv4> mtu
1500 index 2
        inet 10.7.13.94 netmask ffff0000 broadcast 10.7.255.255
        ether 0:3:ba:78:8e:65
```

3. On the 'Install Server', open a terminal (via Telnet or X).
4. Define the SC board.

```
EMS-Server8:/ [root] => cd /jumpstart/Solaris_9_904_v1.0
```

```
EMS-Server8:/ /jumpstart/Solaris_9_904_v1.0 [root] => ./add_client.sh
sc name sc ip sc mac
```

5. Via the RS232 console connection on the SC board, copy the new firmware from the 'Install Image' to the local hard disk.

```
client224:~# ~ => mount -F nfs ems_ip:jumpstart /mnt
client224:~# ~ => cd  /mnt/Solaris 9 904 v1.0/Firmware
client224:~# ~ => perl copyFW.pl
```

6. Go to the OBP level by typing **sync;halt** and pressing **Enter**.

```
client224:~# ~ => sync;halt
ok>
```

Note: The Blue (hotswap) LED is lit after the 'sync;halt' command is entered, however this does not indicate any kind a failure and should be ignored.

7. Install new firmware. Follow the example below:

```
ok> setenv auto-boot? false
ok> reset-all
ok> flash-update /pci@1f,0/pci@1/ide@2/disk@0,0:a:,/firmware.bin
ok> setenv legacy-support? false
ok> setenv auto-boot? true
ok> setenv diag-switch? false
```

Note: The command, **setenv legacy-support? false** may fail on certain boards. If this occurs, ignore the failure and proceed with the next command.

Remain at the OBP level (do not reboot the board) and proceed to the next step.

8. Via the RS232 console connection on the SC board (you should already be at OBP level), install the Solaris™ 9 OS.

```
ok> boot net - install
```

The Solaris™ 9 OS installation takes approximately 10 min. During this process, the SC board is rebooted. A message appears when the installation is complete and a login prompt is presented.

9. To stabilize the file system, at the prompt, type **lockfs –f /** and pressing **Enter**.

```
client224:~# ~ => lockfs -f /
```

14.2.2 Installing the SC Software

➢ To install the SC software, take this step:

- Following the directions in 'Configuring System Controller Software for the First Time' on page 81, connect the console terminal to the SC board.

14.2.3 SC Installation Package

The SC installation package is provided on Media Gateway 3500 System Software Installation CD included in the accessory kit accompanying the Media Gateway 3500. The following are the software components on the CD:

Table 14-1: SC Installation Package Files

Directory	File	Description
root directory	sc_software.tar.gz	The *tar* file containing compressed SC software and related files

14.2.4 Copying the SC Software

➢ To copy the SC software, take these 4 steps:

Via the IP network, connect to the SC-2 board from the PC terminal using Telnet.

Note 1: Ensure that the PC terminal you are using is connected to the same IP network to which the Media Gateway 3500 is also connected.

Note 2: If for any reason you cannot establish a connection via the IP network, you can alternatively connect via one of the five RJ-45 ports in the Ethernet Switch RTM provided in the optional integration kit.

1. Copy the installation package from the MG3500 SW CD to the SC-2 board using the example below. This can be performed using FTP.

Note: The installation package files of more than one product may be provided on the CD you receive. Be sure to select the directory and installation package files appropriate for your system.

Example for copying the file:

Entered text is shown in bold and the IP address of the SC-2 board is assumed to be 10.1.2.3.

```
~> cd <directory of files>
```

2. Use the **dir** command to identify the installation package files

```
~> dir
sc_software.tar.gz.gz
```

3. Use the **ftp** command to access the sun system on the SC board. Enter the default host name and IP address of the SC board provided by Nortel.

```
~> ftp <sc default IP address>
Connected to sc.
220 sc1 FTP server (SunOS 5.8) ready.
Name : root
331 Password required for root.
Password: root

230 User root logged in.
ftp> ascii
200 Type set to A.
ftp> put sc_install.pl
200 PORT command successful.
150 ASCII data connection for sc_install.pl
226 Transfer complete.
42477 bytes sent in 0.0082 seconds
ftp> bin
200 Type set to I.
ftp> put sc_software.tar.gz
200 PORT command successful.
150 Binary data connection for sc_software.tar.gz
226 Transfer complete.
46615040 bytes sent in 5.9 seconds
226 Transfer complete.
ftp> quit
```

14.2.5 Redundant Configuration - Installing the SC Software

➢ To install the SC software, take these 12 steps:

1. Follow the installation scripts shown in the example below.
2. Log on using the default username: **root** and password: **root**.
3. Enter the **tcsh** command.
4. Enter the **/install.pl** command. The software installation & basic configuration menu appears.

Note: The installation procedure rewrites the “~/.cshrc” file.

Example for the installation script:

Entered text is shown in bold.

```
client241::~# /install.pl

Found compressed installation package - uncompress it...
   >>> uncompressing /sc_software.tar.gz file (this takes around 20
sec)...
   >>> done

Verify installation package integrity...
Unpack package version information...
   >>> unpacking version information (this takes around 10 sec)...
   >>> done

Found the following installation package:

    ----------------------------------------
             Media Gateway 3500
              Version : 3.0.25
    ----------------------------------------
```

5. When you are asked if you want to install, enter **y**.

```
Do you want to install (y/n)                        [n]: y

Unpack version-specific installation script...
   >>> unpacking /sc_install.pl file (this takes around 10 sec)...
   >>> done

Run version-specific installation script
```

6. Enter **2** to start the installation sequence.

```
-------------------------------------------------
  SC software installation & basic configuration
-------------------------------------------------

     1 - Update SC network parameters.

     2 - Install and configure.

     3 - Change installed configuration.

     4 - Copy configuration from Primary SC.

     5 - Uninstall SW.

     0 - Quit.


Choose (0-5) :2
```

7. You are prompted to install either the Master or Secondary SC. Type **1** to select the Secondary SC.

```
If you install Master SC you should configure it now.
If you install Secondary SC you should copy configuration from Master
SC.

Do you install Master or Secondary SC? [0=Master, 1=Secondary] [1]: 1
```

The following appears:

```
Verify that Primary SC 10.7.13.80 responds to ping...
10.7.13.80 is alive

------------------------------------------------------------------
-
Configuration will be copied from Primary SC 10.7.13.80 via SSH.
You will be asked for root password on 10.7.13.80 and optionally
some additional security-related questions.
------------------------------------------------------------------
-
```

8. When asked if you want to continue connecting, type **yes** and press **Enter**. (The following text and question appears during the first time connection is made when the SC board is newly installed only.)

```
The authenticity of host'10.7.13.80' can't be established.
RSA key fingerprint in md5 is:
68:d7:07:10:19:24:88:5f:a6:92:0e:c9:f6:ea:11:96
Are you sure you want to continue connecting (yes/no)? yes
```

9. You are prompted to enter the root password. Enter the password you set in 'Basic SC Configuration on the First SC Board' on page 86.

```
root@10.7.13.80's password: [PASSWORD]
```

The System ini parameters are copied from the Active (Master) SC and a summary of the configuration is displayed: (The following is an example only.)

```
SystemParams.ini     100% |*****************************|  5421
00:00

------------------------------------------------
Configuration Summary:
------------------------------------------------
Global SC IP Address            :  10.7.14.141
Master SC IP Address            :  10.7.13.80
Redundant SC IP Address (or 1.1.1.1 if none)  :  10.7.13.70
EMS Server IP Address           :  10.7.6.8
NTP Server IP Address           :  1.1.1.1
```

```
Enable Security                 :  0 (no)
SC Root Password                :  ******
SNMP Read Community             :  ******
SNMP Write Community            :  ******
Product Type                    :  2
Call Control Proxy Type         :  0 (noProxy)
Trunk Protocol                  :  0 (e1)
VOP Board Type                  :  1 (TP-1610)
------------------------------------------------
```

10. You are prompted to start the configuration. Enter **y** or accept the default setting to do so.

```
Start configuring (y/n)                          [y]: y
```

The following appears:

```
   >>> Update /etc/inet/inetd.conf file ...
   >>> Restore file /etc/inet/inetd.conf from the backup ...
   >>> Update /etc/inet/services file ...
   >>> Restore file /etc/inet/services from the backup ...
   >>> refresh INET daemon ...
   >>> Update root password ...
   >>> Disable IPSEC configuration ...
>>> Configure Timer Resolution ...
   >>> Make backup of modified file /etc/system ...
>>> Configure alternate break sequence ...
   >>> Make backup of modified file /etc/default/kbd ...
>>> Configure TFTP ...
   >>> Make backup of modified file /etc/inet/inetd.conf ...
   >>> refresh INET daemon ...
>>> Configure FTP ...
   >>> Permit root login to FTP ...
   >>> Make backup of modified file /etc/ftpd/ftpusers ...
   >>> audcftp user is already defined ...
>>> Configure SSH ...
   >>> Permit root login to SSH ...
   >>> Make backup of modified file /etc/ssh/sshd_config ...
   >>> Refresh SSH daemon ...
>>> Update SNMP configuration files ...
   >>> Make backup of modified file /etc/srconf/agt/snmpd.cnf ...
   >>> Update SNMP community strings ...
   >>> Update /etc/inet/services ...
   >>> Make backup of modified file /etc/inet/services ...
   >>> kill solaris SNMP deamon if exists ...
   >>> Remove startup script of solaris SNMP deamon ...
   >>> Make backup of deleted file /etc/rc3.d/S76snmpdx ...
   >>> Make backup of deleted file /etc/init.d/init.snmpdx ...
   >>> Remove /usr/lib/smpdx ...
   >>> Make backup of deleted file /usr/lib/snmp/snmpdx ...
>>> Configure boot scripts ...
   >>> Make record of new file /etc/init.d/TG-1000 ...
   >>> Make record of new file /etc/rc3.d/S90_TG-1000 ...
>>> Configure password recovery scripts ...
   >>> Make record of new file /etc/init.d/pwd ...
```

```
   >>> Make record of new file /etc/rc3.d/S91pwd ...
>>> Configure NTP server ...
   >>> Make backup of modified file /var/spool/cron/crontabs/root ...
   >>> get current crontab configuration ...
   >>> No NTP server defined ...
   >>> reload crontab configuration ...
   >>> Remove startup scripts of sendmail ...
   >>> Make backup of deleted file /usr/lib/sendmail ...
   >>> Make backup of deleted file /etc/init.d/sendmail ...
   >>> Make backup of deleted file /etc/rc2.d/s88sendmail ...
>>> Configure syslog daemon ...
   >>> Update /etc/syslog.conf file ...
   >>> Make backup of modified file /etc/syslog.conf ...
   >>> Make record of new file /var/log/local0 ...
   >>> Make record of new file /var/log/daemon ...
   >>> Make record of new file /var/log/auth ...
   >>> Update /etc/logadm.conf file ...
   >>> Make backup of modified file /etc/logadm.conf ...
   >>> reload syslogd configuration ...
>>> Configure crontab ...
   >>> Make backup of modified file /var/spool/cron/crontabs/root ...
   >>> get current crontab configuration ...
   >>> add cleanlogs job and statistics job to crontab ...
   >>> reload crontab configuration ...
   >>> Update root password ...
>>> Tune up /tmp filesystem ...
   >>> Make backup of modified file /etc/vfstab ...
   >>> Make backup of modified file /etc/nsswitch.conf ...
   >>> Make record of new file /etc/resolv.conf ...
>>> Extract custom configuration files ...
   >>> Copy Project/Downloads/cmp_files/TP1610*.cmp files to
/tftpboot ...
   >>> Copy Project/Downloads/baseinifile_files/TP1610.ini file to
/tftpboot/TP1610.ini ...
   >>> Copy Project/Downloads/baseinifile_files/NormalTP1610.ini
file to /tftpboot/NormalTP1610.ini ...
   >>> Copy Project/Downloads/baseinifile_files/RedundantTP1610.ini
file to /tftpboot/RedundantTP1610.ini ...
   >>> Copy Project/Downloads/dat_files/* file to /tftpboot ...
   >>> Backup original versions of /tftpboot files ...


************************************
* IF CONFIGURATION IS DONE OK       *
* YOU MUST REBOOT THE SC !!!!!!!!!! *
************************************
```

Even though this configuration is for the secondary SC, the following is displayed:

```
IMPORTANT: If you have second SC, DO NOT REBOOT this SC until
installation
           of second SC already done !!!

           Reboot both SCs at the same time.
```

11. You are prompted to reboot. Enter **y** or accept the default setting to do so.

```
Do REBOOT now (n/y)                                    [y]: y
```

12. You are prompted to confirm the reboot command. Enter **Y** or accept the default setting to do so.

```
Are you sure (n/y)                                     [y]: y
```

14.3 Media Gateway Board Replacement Procedure

In the event of a Media Gateway board failure, the Media Gateway 3500 automatically notifies users with an alarm. Replace the failed board as soon as possible to restore the system. Media Gateway boards are hot-swappable, meaning that the board can be inserted and removed when the Media Gateway 3500 is under power.

14.3.1 Media Gateway Board Definition Methods

With the Board Provisioning Mode parameter, in the EMS, the Media Gateway board can be defined using any of the following methods:

- Geographical Address (Default method)
- MAC Address (Refer to 'Ascertaining the MAC Addresses for the TP-1610' on page 153.)
- Auto-Discover

For more information refer to the *Element Management System User's Manual*, Document #: LTRT-910xx.

➢ To remove a Media Gateway board from the chassis, take these 4 steps:

1. In the EMS, lock the Media Gateway board to be replaced. For more information refer to the *Element Management System User's Manual*, Document #: LTRT-910xx.
2. Unfasten the screws on the plate of the board.
3. Gently pull the two black ejector/injector latches on both ends outwards (not actually removing the board) and wait for the Hot Swap blue LED to light, indicating that the board can be removed.
4. Pull on the two ejector/injector latches and ease out the board from the slot.

➢ To insert a Media Gateway board into the chassis, take these 8 steps:

1. Hold the board Horizontal.
2. With the black ejector/injector latches in the open (pulled out) position, insert the board in the slot, aligning the board on the grooves on each end.

3. Ease the board all the way into the slot until the ejector/injector latches touch the chassis.
4. Press the two black ejector/injector latches on both ends inward, toward the middle until you hear a click.
5. The Blue hotswap LED is lit momentarily. (If the Blue LED does not turn off, refer to the 'Diagnostics' on page 187.)
6. Fasten the screws on the front plate of the board to secure the board to the chassis and to ensure that the board has an earth connection to the chassis.
7. Using one of the Media Gateway Board Definition Methods discussed above, in the EMS, define the board.
8. In the EMS, unlock the Media Gateway board that has been replaced. For more information refer to the *Element Management System User's Manual*, Document #: LTRT-910xx.

➢ To remove the Media Gateway RTM from the chassis, take these 5 steps:

1. In the EMS, lock the Media Gateway board of the RTM to be replaced. For more information refer to the Element Management System User's Manual, Document #: LTRT-910xx.
2. Remove all of the cables attached to the RTM.
3. Unfasten the screws on brackets at both ends of the panel that secure the board to the chassis.
4. Press the red ejector buttons on the two black ejector/injector latches on both ends.
5. Grasp the panel and ease the board out of the slot.

➢ To insert a Media Gateway RTM board into the chassis, take these 7 steps:

1. Hold the board Horizontal.
2. With the black ejector/injector latches in the open (pulled out) position, insert the board in the slot, aligning the board on the groves on each end.
3. Ease the board all the way into the slot until the ejector/injector latches touch the chassis.
4. Press the two black ejector/injector latches on both ends inward, toward the middle until you hear a click.
5. Fasten the screws on the front plate of the board to secure the board to the chassis and to ensure that the board has an earth connection to the chassis.
6. Connect the cables as detailed below.
7. In the EMS, unlock the Media Gateway board that has been replaced. For more information refer to the *Element Management System User's Manual*, Document #: LTRT-910xx

➢ To cable the TP-1610 RTM, take these 2 steps:

1. On the TP-1610 RTM, attach the Telco cables.
2. Tightly fasten the screws at both ends of the Telco cables.

14.3.2 Ascertaining the MAC Addresses for the TP-1610

Each TP-1610 board contains two MAC addresses, known as first (located in the lower section of the installed board) and second (located in the upper section of the installed board) illustrated in the figure below. Refer to 'Hardware Replacement Procedures' on page 139 for information about removing and inserting the board.

Figure 14-4: TP-1610 Board MAC Address Locations

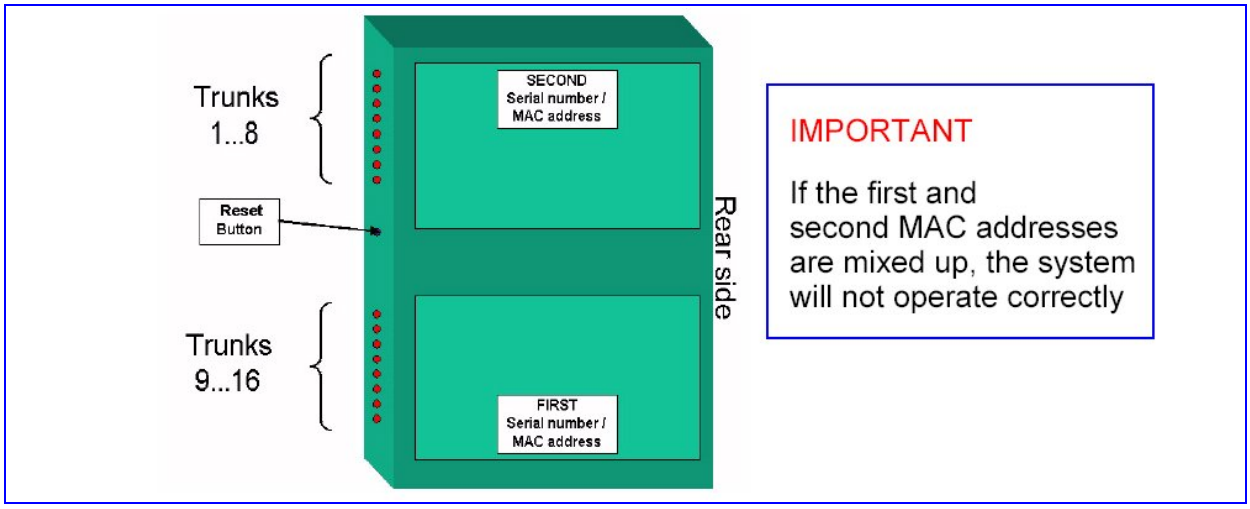
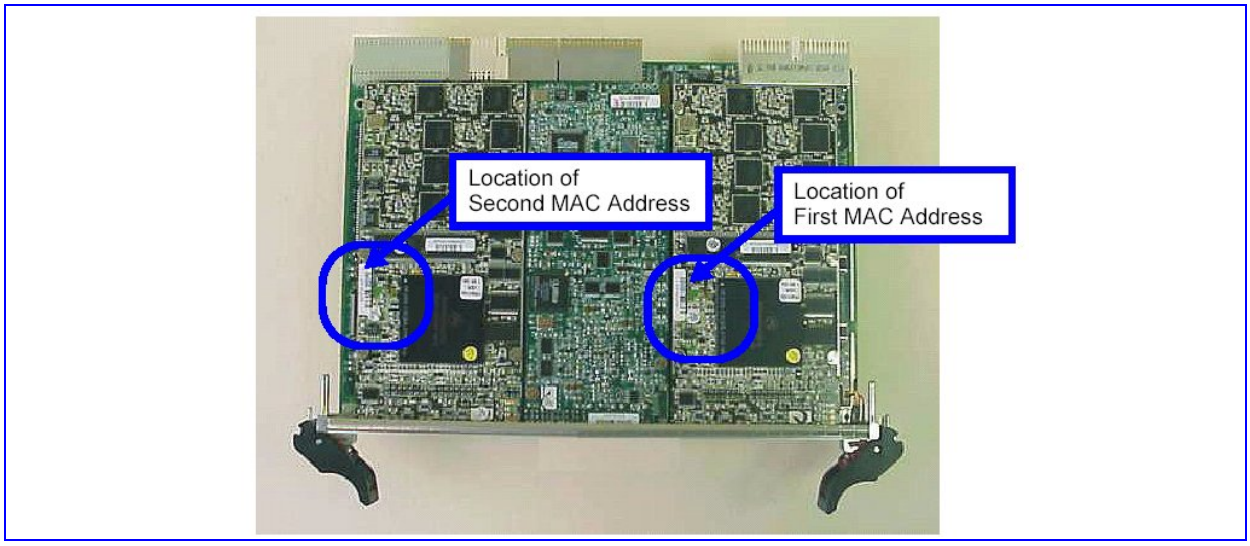


Figure 14-5: MAC Address Locations on TP-1610 Board



14.4 SA RTM Replacement Procedure

➢ To remove an SA RTM board from the chassis, take these 5 steps:

1. Remove the connected cables.
2. Unfasten the screws on the plate of the board.
3. Press the two red ejector buttons.
4. Pull on the two ejector/injector latches and ease out the board from the slot.

➢ To insert an SA RTM board into the chassis, take these 9 steps:

1. Hold the board Horizontal with the top of the board pointed upward.
2. With the black ejector/injector latches in the open (pulled out) position, insert the board in the slot, aligning the board on the grooves on each end.
3. Ease the board all the way into the slot until the ejector/injector latches touch the chassis and it is flush with the other boards.
4. Press the two black ejector/injector latches on both ends inward, toward the middle until you hear a click.
5. Fasten the screws on the front plate of the board to secure the board to the chassis and to ensure that the board has an earth connection to the chassis.
6. Replace the cable connections.
7. From the EMS, perform a manual switchover so that the SC with the newly installed SA RTM becomes the Active SC board.
8. Verify that the LEDs on the SA RTM are lit Green.
9. IN the EMS, verify that the status reports of the SC board of the replaced SA RTM indicate that it is operating correctly.

14.5 Ethernet Switch Board Replacement Procedure

➢ To remove an Ethernet Switch board from the chassis, take these 5 steps:

1. In the EMS, lock the Ethernet Switch board to be replaced. For more information refer to the *Element Management System User's Manual*, Document #: LTRT-910xx.
2. Remove the cables attached to the Ethernet Switch board.
3. Unfasten the screws on the plate of the board.
4. Gently pull the two black ejector/injector latches on both ends outwards (not actually removing the board) and wait for the Hot Swap blue LED to light, indicating that the board can be removed.
5. Pull on the two ejector/injector latches and ease out the board from the slot.

➢ To insert an Ethernet Switch board into the chassis, take these 9 steps:

1. Hold the board Horizontal with the top of the board pointed upward.
2. With the black ejector/injector latches in the open (pulled out) position, insert the board in the slot, aligning the board on the grooves on each side.
3. Ease the board all the way into the slot until the ejector/injector latches touch the chassis. The Blue hotswap LED is lit.
4. Press the two black ejector/injector latches on both ends inward, toward the middle until you hear a click.
5. Wait for the hotswap blue LED to turn off.
6. Fasten the screws on the front plate of the board to secure the board to the chassis and to ensure that the board has an earth connection to the chassis.
7. Reconnect the cables.
8. In the EMS, unlock the Ethernet Switch board that has been replaced. For more information refer to the *Element Management System User's Manual*, Document #: LTRT-910xx.
9. After 5 min., in the EMS, verify that the Ethernet Switch board is enabled.

➢ To remove an Ethernet Switch RTM board from the chassis, take these 4 steps:

1. In the EMS, lock the Ethernet Switch board of the RTM to be replaced. For more information refer to the *Element Management System User's Manual*, Document #: LTRT-910xx.
2. Remove the connected cables.
3. Unfasten the screws on the plate of the board.
4. Pull on the two ejector/injector latches and ease out the board from the slot.

➢ To insert an Ethernet Switch RTM board into the chassis, take these 9 steps:

1. Hold the board Horizontal with the top of the board pointed upward.
2. With the black ejector/injector latches in the open (pulled out) position, insert the board in the slot, aligning the board on the grooves on each end.
3. Ease the board all the way into the slot until the ejector/injector latches touch the chassis.
4. Press the two black ejector/injector latches on both ends inward, toward the middle until you hear a click.
5. Fasten the screws on the front plate of the board to secure the board to the chassis and to ensure that the board has an earth connection to the chassis.
6. Reconnect the cables according to the IP Separation configuration. (Refer to 'Ethernet Switch Boards' on page 37.).

7. In the EMS, unlock the Ethernet Switch board of which the RTM has been replaced. For more information refer to the *Element Management System User's Manual*, Document #: LTRT-910xx.
8. In the EMS, verify that the Ethernet Switch board is enabled.
9. In the EMS Main screen, Status pane, double click on the Ethernet Switch board of the RTM that has been replaced. In the dialog box that appears, verify that the uplink port is enabled.

14.6 Power Supply Module Replacement

Note: DC Power Supply Modules differ from the AC Power Supply Modules by containing an additional smaller connector on the back of a DC power supply.

➢ To remove a faulty power supply, take these 4 steps:

1. Unfasten the 4 screws on the plate of the power supply to be removed.
2. Press the red ejector button on the black ejector/injector latch.
3. Pull on the ejector/injector latch and ease out the power supply from the slot.
4. In the EMS, verify that the alarm (regarding the faulty power supply) is now clear.

Caution

Use EITHER the AC or the DC power supplies. Never connect both types of power supplies at the same time, as chassis malfunction or permanent damage can result.

The PEM (AC/DC) and APM Fan Tray PS (AC/DC) units are NOT hot-swappable, therefore they should NEVER be removed while power is connected.

➢ To insert a replacement power supply, take these 6 steps:

1. Hold the power supply horizontally with the black ejector/injector latch pointed outward.
2. With the black ejector/injector latch in the open (pulled out) position, insert the power supply in the slot.
3. Ease the power supply all the way into the slot until the ejector/injector latch touches the chassis.
4. Press the black ejector/injector latch inward, toward the middle until you hear a click.
5. Fasten the screws.
6. In the EMS, verify that the Alarm

14.7 Replacing the Fan Tray Unit

The fan tray unit is located to the left of the chassis cage.

Note: Be sure to prepare a replacement fan tray unit before removing the faulty fan tray unit. It is imperative the chassis does NOT remain without the fan tray unit for more than a short period of time (60 sec).

➢ To remove a faulty fan tray, take these 4 steps:

1. Release the 2 screws on the top left-hand corner and the bottom left-hand corner of the front panel of the fan tray unit.
2. Pull on the fan tray unit's handle outward by 2 cm.

Warning

When removing a fan tray unit, the fans continue to rotate at a high speed. Use caution **NOT** to touch the rotating fan blades.

3. Pull the fan tray unit outward by 2 cm.
4. Wait for the fans to stop rotating and then remove the fan tray completely.

➢ To insert a replacement fan tray unit, take these 4 steps:

1. Insert the fan tray unit into its slot, until the front panel is flush with the chassis plate.
2. Fasten the screws at both ends of the fan tray unit.
3. Verify that the fan is functioning correctly by putting your left hand over the grill on the left side of the Media Gateway 3500 chassis (when facing the front cage), and your right hand over the grill on the right side. Your left hand should feel a reasonably strong suction of the air drawn in by the fan. Your right hand should feel the air blowing reasonably strongly out of the Media Gateway 3500.
4. Check the EMS indicators to verify that alarm (regarding the faulty fan) is now cleared and that the Fan Tray unit is functioning properly.

14.8 Replacing Air Filters

The NEBS compliant air filters should be replaced approximately every 90 days. Air Filters - View from Front indicates the locations of the filters and shows the air filter partially removed from the Media Gateway 3500.

Caution

Be sure to prepare all of the equipment you need to replace the air filter before removing the existing air filter. It is imperative the chassis not remain without the fan tray unit for more than 60 sec.

➢ To remove the air filter, take these 2 steps:

1. Remove the fan tray unit (refer to Replacing the Fan Tray Unit).
2. With your fingertips, grasp the inside of the steel frame of the air filter and pull it out of its slot. It should slide out relatively easily. If it does not, pull with slightly more force.

Figure 14-6: Air Filter

➢ To reinsert the air filter, take these 5 steps:

1. Remove the fan tray unit.
2. Note the air flow arrows - direction indicator on the replacement filter. The arrows should be on top and pointing toward the card cage of the chassis.
3. Slide the air filter into its slot accordingly, pushing it all the way in.
4. Replace the fan tray unit in its location into the chassis (refer to Replacing the Fan Tray Unit).
5. Verify that the fan tray unit is functioning correctly by putting your left hand over the grill on the left side of the Media Gateway 3500 chassis (when facing the front cage), and your right hand over the grill on the right side. Your left hand should feel a reasonably strong suction of the air drawn in by the fan. Your right hand should feel the air blowing reasonably strongly out of the Media Gateway 3500.

Reader's Notes

15 Software Upgrade

Important Note

New Feature Keys are required during the upgrade of the Media Gateway 3500 from version 2.1 to version 3.0, or from 3.0 to 3.0 where Feature Keys have not been applied on the 2.1 to 3.0 upgrade. It is important to execute the procedure in Appendix – Updating the Media Gateway Boards Feature Key on page 215 in advance of the upgrade to check the Feature Key on the Media Gateway boards. If the report from the tool fk.pl indicates new Feature Keys are required, send the report to Nortel Technical Support who will provide a file containing the correct keys for the boards.

Online Software Upgrade on Redundant system is described below.

In order to distinguish between the two SC boards, the following terms should be used:

- Primary SC – **The** SC **board** that is Active before starting the **Software** upgrade
- Secondary SC – **The** SC **board** that is Standby before starting the **Software** upgrade

15.1 Online Software Upgrade – Overview

An online software upgrade is performed when both SC boards are up and running. The software upgrade process upgrades software on all of the boards in the chassis:

- System Controller boards
- Media Gateway boards
- Ethernet Switch boards

The gateway continues its operation uninterruptedly during a software upgrade of the SC software. However, calls are dropped during an upgrade of Media Gateway boards. To minimize impact on media gateway service, Media Gateway boards are upgraded one at a time so the media gateway's capacity is never reduced by more than a single Media Gateway board's capacity.

Caution

To further minimize call traffic loss for the individual Media Gateway boards, perform this procedure when low call traffic is known to occur.

15.2 Pre-Upgrade Configuration Backup

Prior to performing the Online Software Upgrade, you must manually perform a full configuration backup and store it on a third-party server. This backup maintains the ability to create a recovery that may occur because of abnormal hardware and/or network failure during the upgrade.

➢ Perform a full configuration backup.

For details on performing a full backup, refer to 'SC Software Backup/Restore Procedures' on page 95.

If you are upgrading from version 2.1, make an additional backup of the directory, ***/tftpboot*** (including all custom auxiliary files, e.g., voice prompt files).

1. At the prompt, type **tar cvf tftpboot.backup.tar /tftpboot** and press **Enter**.

```
client208::~# tar cvf tftpboot.backup.tar /tftpboot
```

   The file is saved on the local disk.

2. Store the backup file (**tftpboot.backup.tar**) on a different server for safe storage.

15.3 Online Software Upgrade between Version 2.1 and Version 3.0 – Site Preparation

Upgrading the Media Gateway 3500 from version 2.1 to version 3.0 is more complicated than a regular Online Software Upgrade, because it also requires an upgrade of the Solaris™ Operating System on the SC boards.

In order to perform this upgrade an "Installation Server" is required that fulfills the following requirements:

- SolarisTM 7 or later
- Capability of being a Jumpstart Server (this is a default configuration on a typical SolarisTM OS installation)
- At least 3 Gb free disk space in the root directory
- FTP server installed and configured to provide read-write access to the free disk space
- Fast network connection with the chassis (transfer rate of at least 20 Mb/sec)
- CD-ROM drive (optional)

Nortel recommends using EMS server as the “Installation Server” for automatic online upgrade. However, if connection between the EMS server and the Media Gateway 3500 chassis is not fast enough, a separate machine should be used as “Installation Server”.

If it is possible, Nortel recommends placing the “Installation Server” in the same subnet with the Media Gateway 3500 chassis. This placement makes a recovery from a failure during automatic OS installation much easier and faster.

In addition, the Ethernet Switch boards hardware configuration is changed in version 3.0 and requires the F-Link switch to be set correctly (refer to ‘ES/4411 RTM F-Link Switch Settings’ on page 45). Some of Media Gateways with version 2.1 were deployed with F-Link switch already properly set while other deployments require that the F-Link switch be set correctly during Online Upgrade.

Note: For manual OS upgrade (refer to section 15.4.2.4 Manual OS Upgrade on page 176), a separate Sun server that can act as the Installation Server is required to be on the same subnet with the Media Gateway 3500. A manual OS upgrade may be required if the automatic online Software upgrade fails and/or the OS itself fails to be upgraded.

15.3.1 Preparing the Installation Server

15.3.1.1 Solaris™ OS Image

Installation images of the Solaris OS must be loaded on the Installation Server.

Media Gateway version 2.1 uses Solaris™ 8 2/02. Media Gateway version 3.0 uses Solaris™ 9 9/04.

Both installation images must be loaded on the Installation Server in order to enable rollback to the previous configuration.

Nortel provides CDs with installation images of Solaris™ OS for each major Media Gateway version. Solaris™ OS is customized for the Media Gateway application, therefore customers must install OS images from these CDs **only**.

➢ In order to load the installation image on Installation Server, take these 4 steps:

1. Insert the Nortel Solaris SC OS CD with the current Installation Image into the CD-ROM drive.
2. Connect to the Installation Server via Telnet or RS-232 terminal as the ***root*** user.
3. At the prompt, change the directory to the CD's root by typing **cd /cdrom/cdrom0**. Press **Enter**.

```
EMS-Server8:/ [root] => cd /cdrom/cdrom0
```

4. At the prompt, run the "install" script by typing **./install**. Press **Enter**.

```
EMS-Server8:/cdrom/cdrom0 [root] => ./install
```

The Installation image is created under the directory **/jumpstart** on the Installation Server and is shared over the network.

15.3.1.2 Changing the Network Configuration of Installation Server

If you change network configuration of the Installation Server (IP address, subnet mask or default gateway) you must take the following measures to ensure that installed Solaris™ OS images are properly adapted to the new network settings:

1. For version 3.0.27_1.16 or earlier, to change the Installation Server‘s network configuration, take these 2 steps:

Using Telnet or the RS-232 terminal, connect to the Installation Server.

At the prompt, type these commands:

cd /jumpstart/Solaris_8_202_v1.0/Solaris_8/Misc/flash_config

./configure.pl all

cd /jumpstart/Solaris_9_904_v1.0/Solaris_9/Misc/flash_config

./configure.pl all

2. For newer releases than version 3.0, to change the Installation Server‘s network configuration, take this step:

Reboot the Installation Server.

15.3.1.3 FTP Server

The Installation server must be configured as an FTP server with read-write access for storing the SC software backups. The EMS server has an FTP server configured and running on it by default. For other Install Servers, refer to the configuration manual of the OS.

➢ To prepare the FTP server, take these 2 steps:

1. On the Installation Server, create a backup directory (if it does not already exist) by typing **mkdir /backup**. Press **Enter**.

```
EMS-Server8:/ [root] => mkdir /backup
```

2. Verify that the FTP server provides read-write access to the /backup directory by connecting to it via a FTP client and transferring sample files to/from it. If you use the EMS server as Installation Server, connect via FTP as the root user.

15.3.2 Preparing the Ethernet Switch Boards

Ethernet Switch boards should have F-Link jumper in 'enabled' position. Although you may alter F-Link configuration during Online Software Upgrade, we recommend to prepare/verify F-Link configuration prior to starting Online Software Upgrade.

Note that only version 2.1 with "Mode 4" (or later) Ethernet Switch scripts may properly run with F-Link enabled. Earlier version 2.1 revisions cause network loops if the F-Link is enabled.

Refer to 'ES/4411 RTM F-Link Switch Settings' on page 45 for detailed instruction on how to enable F-Link.

The Ethernet Switch boards must be connected to the customer's IP network (uplinks) via optical port 25 (1Gb port). It is very important, since version 3.0 changes Switch Board's port mapping and any uplink other than 25, even if it works on version 2.1 will not survive upgrade to version 3.0.

Both of the Ethernet Switch boards must be provisioned with valid IP addresses and be in full operational state (AdministrativeState=UNLOCKED, OperationalState=ENABLED). Refer to the version 2.1 installation and configuration manual on how to provision IP addresses to the Ethernet Switch. Note that IP addresses must be provisioned ***both*** on Ethernet Switch boards and in the Media Gateway database (via the EMS).

15.3.3 Preparing the Media Gateway Boards

Media Gateway boards must be loaded with the Feature Key that supports version 3.0. Refer to Appendix – Updating the Media Gateway Boards Feature Key on page 215 for the correct Feature Key and instructions on loading it into the Media Gateway boards.

Using the EMS, ***unlocked*** all of the Media Gateway boards and make sure that they are ***enabled*** prior to commencing the Online Software Upgrade procedure. If some of the Media Gateways can not be enabled, they must be explicitly ***locked***.

The ***unlocked*** and ***enabled*** Media Gateway boards are upgraded during the OS upgrade process. The ***locked*** Media Gateway boards are upgraded as part of the unlock process.

15.3.4 Preparing the SC Boards

If it is possible we recommend setting up connection to the RS232 console of both SC boards at the same time. Online Software Upgrade from version 2.1 to version 3.0 requires upgrade of the Solaris™ OS and SUN™ board's firmware. In a normal scenario both upgrades may be performed automatically. However, if for any reason the upgrade goes wrong, by using the RS232 console you can recover a stuck SC board. (Refer to 'Software Upgrade/Rollback Troubleshooting' on page 182.)

Use of Terminal Server is recommended.

15.3.5 Preparing the Network

Make sure that there is no Jumpstart Server in the network configured to load the SC boards while you perform Online Software Upgrade from version 2.1 to version 3.0. (If you manually installed an older version of version 3.0, most probably you used such a Jumpstart Server (e.g., on EMS) and it may still be configured to load the SC boards.)

➢ To remove a previously configured Jumpstart Server, take these 2 steps:

1. Connect to the Jumpstart server's Telnet or RS232 console. Type **/jumpstart/Solaris_9_904_v1.0/Solaris_9/Tools/** and press **Enter**.

```
EMS-Server8:/ [root] => cd /jumpstart/Solaris 9 904 v1.0/Solaris 9/
Tools/
```

2. Unconfigure the SC boards by typing **./rm_install_client** followed by the SC hostname. Press **Enter**. Do the same for the second SC board.

```
EMS-Server8:/ [root] => ./rm install client [SC1 hostname]
EMS-Server8:/ [root] => ./rm install client [SC2 hostname]
```

Note that path to the **./rm_install_client** script may differ, depending on the Solaris OS image version. If you are not sure how to unconfigure Jumpstart server, contact Nortel support.

15.4 Performing the Online Software Upgrade

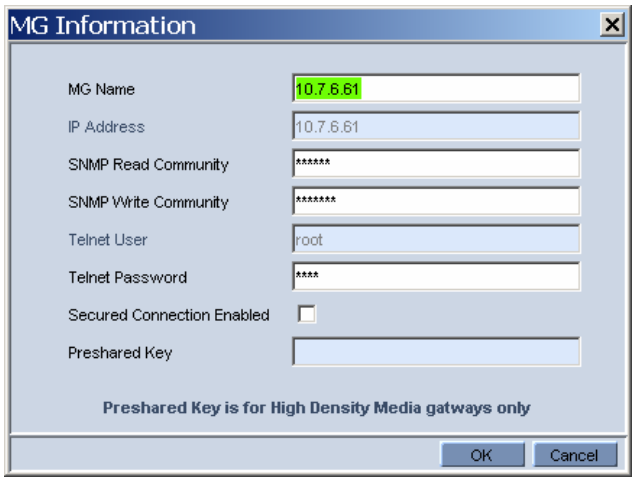
This section describes an Online Software Upgrade in a typical Media Gateway configuration when 2 SC boards are available.

Before starting Online Software Upgrade verify in the EMS that:

- Both SC boards are green (AdministrativeState=UNLOCKED, OperationalState=ENABLED);
- Both Ethernet Switch boards are green (AdministrativeState=UNLOCKED, OperationalState=ENABLED);
- All unlocked Media Gateway boards are green (AdministrativeState=UNLOCKED, OperationalState=ENABLED); if you have a malfunctioning Media Gateway board – LOCK it.

15.4.1 Configure Telnet/FTP password of the Media Gateway

1. In the MG Tree to the left, select the Media Gateway on which maintenance action is required.
2. Right click selected Media Gateway and choose Details option in the popup menu.



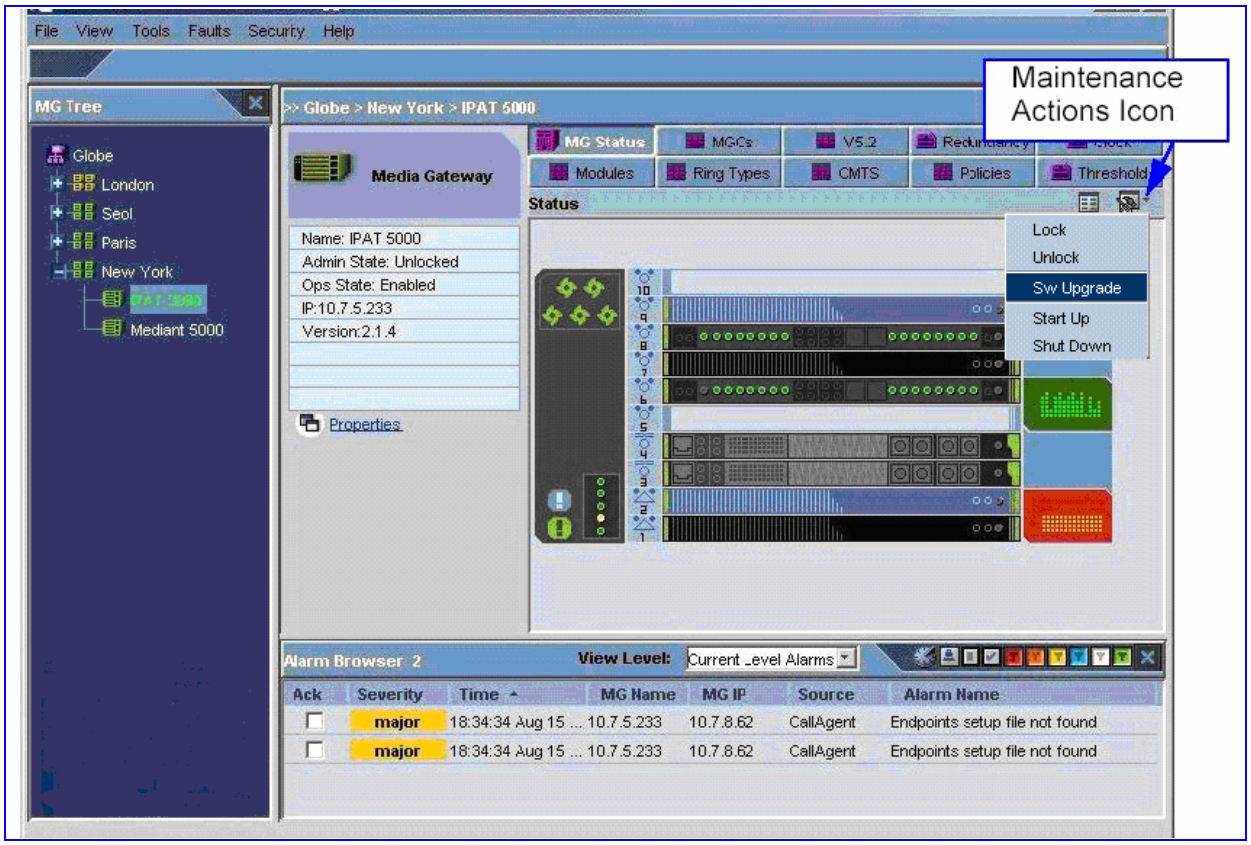
3. Change "Telnet Password" to match current configuration of your Media Gateway

15.4.2 Starting the Online Software Upgrade Wizard

To perform a software upgrade, take these 4 steps:

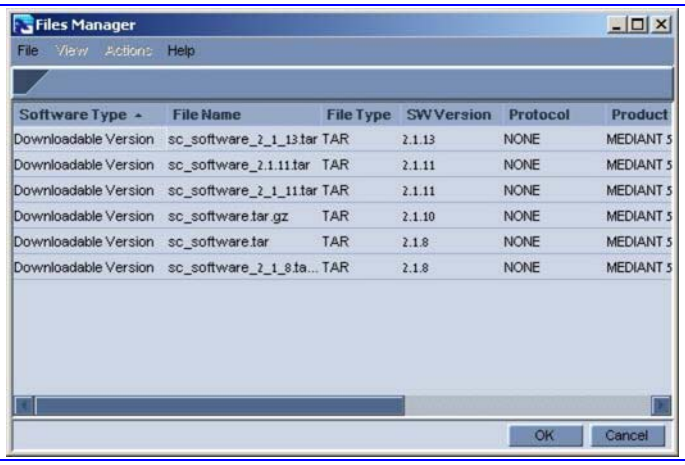
1. In the MG Tree to the left, select the Media Gateway on which maintenance action is required.
2. Click the  Maintenance Actions icon located at the top right of the Status screen. The popup menu opens (refer to the figure below).

Figure 15-1: Maintenance Actions Icon and Popup Menu



Select the **Sw Upgrade** option. The Files Management screen appears.

Figure 15-2: Files Management Screen



In the Files Manager screen, select the version file to be upgraded to and loaded to the device and click **OK.** You are asked to confirm your command. The Software Upgrade Wizard opens and guides you through the process.

The Online Software Upgrade Wizard GUI includes Wizard Stages screen section and a 'Summary Table' screen section. The Summary Table includes a summary of the Request / Response messages exchanged between the EMS server and each of the SC boards during the upgrade process. This screen can be used for debugging and to obtain additional information on the process. The Summary Table is saved in the EMS Client Logs files folder as a *csv* file.

➢ The EMS's Online Software Upgrade Wizard guides users through these 6 steps:

- Welcome Questionnaire
- Upgrading the Secondary SC Board
- Upgrading the Media Gateway Boards
- Upgrading the ES boards
- Upgrading the Primary SC Board
- Finish

15.4.2.1 Welcome Questionnaire

The Welcome Questionnaire includes basic questions regarding the software upgrade process. In this screen, configure the following parameters:

- **Graceful Shutdown Period (sec)** - the amount of time allowed for calls to end before performing the upgrade on an individual Media Gateway board. During this period, the Media Gateway board accepts no new calls, and at the close of this period, any remaining calls are dropped. You can enter any amount of time in seconds for this parameter with a default of 30 sec.

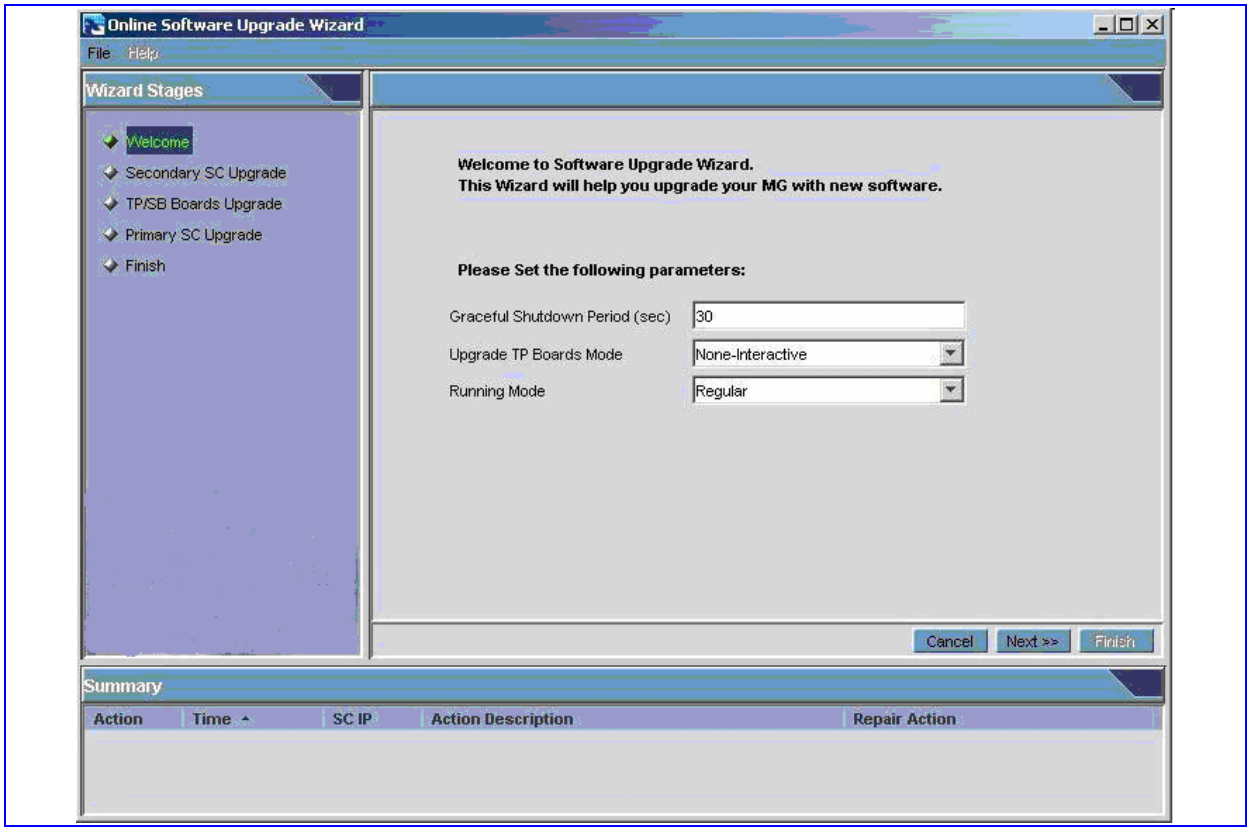
  Note: The Graceful Shutdown feature is currently not supported. Entering any value for this parameter does not have any effect on delay for upgrade.

- **Upgrade Media Gateway board Mode** - the following options are available:

  - **Non-Interactive** - the upgrade process moves to the next Media Gateway board with no interval other than the Graceful Shutdown period.
  - **Pause after the first Media Gateway board** - allows the user to pause after the first Media Gateway board is upgraded and test the system to assure that the upgrade process to the Media Gateway board functions is successful before upgrading the remaining Media Gateway boards
  - **Pause after each Media Gateway board** - allows the user to pause after each Media Gateway board is upgraded. The user controls the start time for each of the Media Gateway board upgrades. This is designed to further minimize calls dropped for each Media Gateway board.

- **Running Mode - Regular is the default running mode. The Debug option is for Nortel lab use only.**

Figure 15-3: Welcome to the Online Software Upgrade Wizard

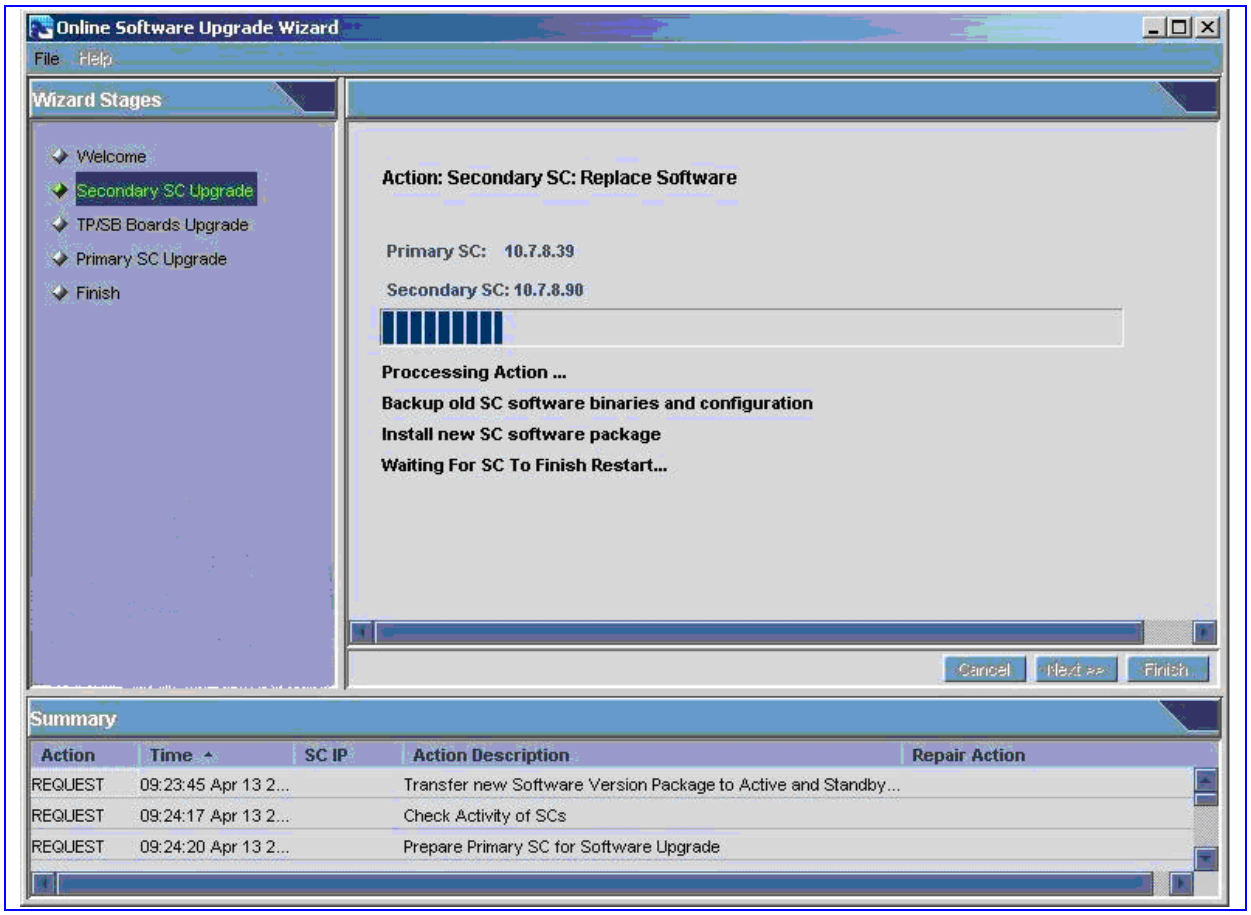


15.4.2.2 Upgrading the Secondary SC Board

In the first stage, the secondary (Standby) SC board's software is upgraded. When upgrade on this board is completed, a switchover action occurs which exchanges Active/Standby status between the SC boards. The secondary SC board becomes the Active board and the primary SC board becomes the Standby SC board. Thereafter, the secondary SC board (now the Active SC board) manages the upgrade process of the Media Gateway boards (refer to the figure below).

Following the upgrade of the Media Gateway boards' software, the software upgrade is then performed on the primary SC board which is now the Standby SC board.

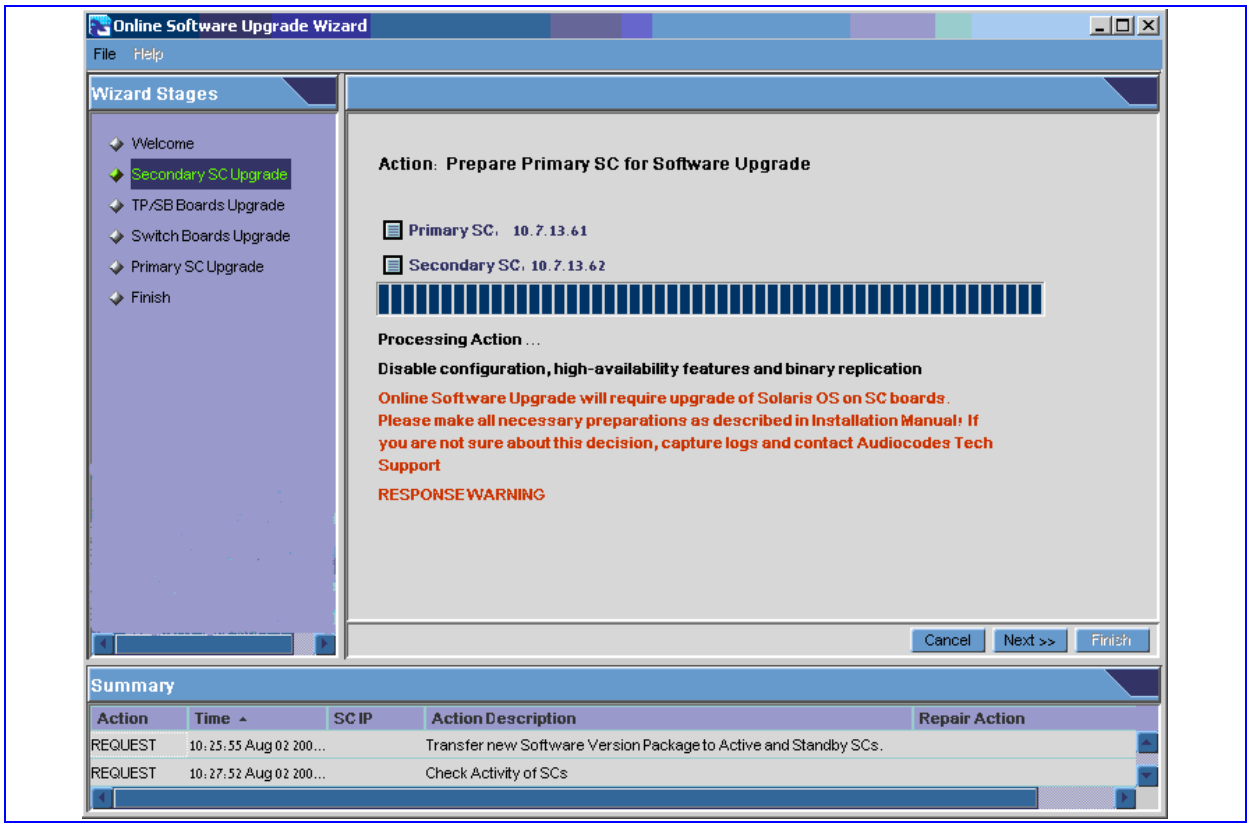
Figure 15-4: Software Upgrade in Process, Managed by the SC Board



15.4.2.3 OS Upgrade Phase for Version 2.1 to Version 3.0 Upgrade

When you upgrade from version 2.1 to version 3.0, the SC upgrade phase is more complicated because the Solaris™ OS must be upgraded as well. During the upgrade, an appropriate warning appears in the beginning of "Secondary SC Upgrade" step.

Figure 15-5: Software Upgrade in Process, Includes Solaris™ OS Upgrade Requirement Notification

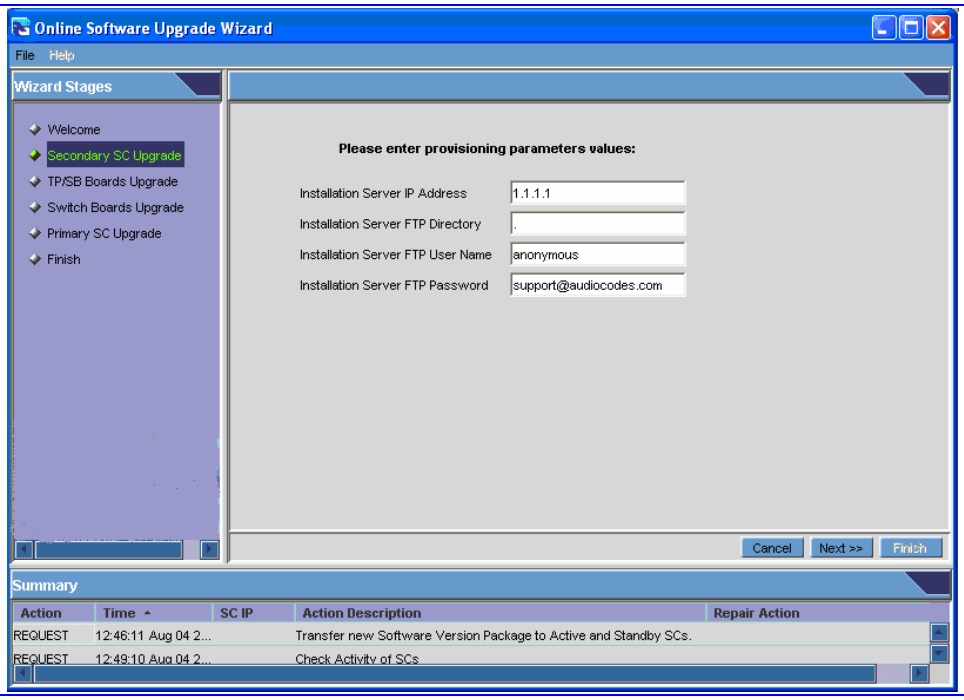


Note: Be sure that you have gone through all needed site preparation steps as described (refer to page 162) if you did not do that prior to commencing the Software upgrade.

When you are ready to proceed, click **Next**. The Online Software Upgrade Wizard displays an additional questionnaire screen that includes the following parameters:

- **Installation Server IP Address** - the IP address of the Installation Server; if you use EMS as installation server, enter IP address of the EMS server.
- **Installation Server FTP Directory** - the directory on the Installation Server where backup files will be stored; if you configured EMS server as described in this manual, enter "/backup" directory.
- **Installation Server FTP User Name** – username used to log into the Installation Server via FTP; if you use EMS as installation server, enter ***root*** username.
- **Installation Server FTP Password** – password used to log into the Installation Server via FTP; if you use EMS as installation server, enter root password.

Figure 15-6: Software Upgrade in Process, Provisioning Parameter Values Screen



Following this screen, the process performs a backup of the current configuration and saves it on the Installation Server. You are prompted to choose how the OS upgrade should be performed. Two options are available:

- **Automatic OS Upgrade**

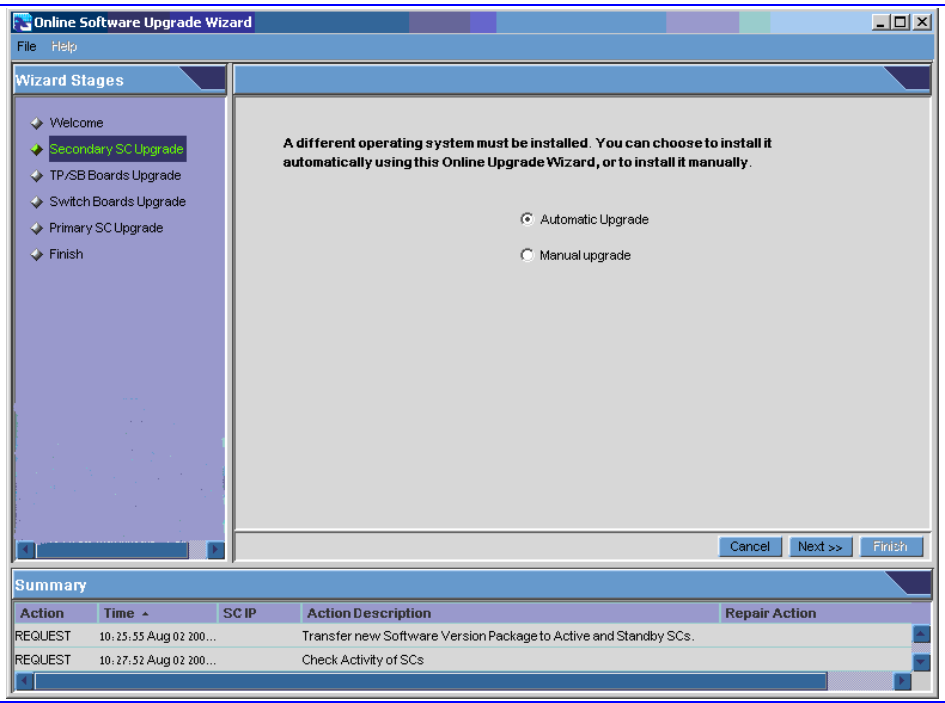
  The Second SC board serves as the Boot Jumpstart Server for the first SC board. In this option, the Installation Server may reside on a different subnet from the Media Gateway chassis. OS Upgrade is performed fully automatically, without any manual user intervention.

- **Manual OS Upgrade**

  The User upgrades the OS on SC board manually. When the OS upgrade is finished, the user proceeds with the Online Software Upgrade Wizard. The Installation Server or any other Jumpstart server may be used for the OS upgrade.

We recommend starting with the Automatic Upgrade option. If it fails, the process automatically falls back to the Manual Upgrade procedure.

Figure 15-7: Software Upgrade in Process, OS Upgrade Options Screen



The Automatic OS Upgrade usually takes from 20 to 60 minutes, depending on the speed of the connection between the SC board and the Installation Server. While Automatic OS Upgrade is performed, there is no "progress" indication in the EMS. The only way to check the current upgrade status is to connect via RS232 console to the SC board (if it is available). If the Automatic Upgrade fails, the user discovers this only after a sanity timeout (approx 1.5 hour).

If the Automatic OS upgrade fails, the process automatically falls back to the Manual OS Upgrade mode. If this occurs, refer to the section below for details on a Manual OS upgrade.

After the OS is successfully upgraded, the Software Upgrade Wizard installs the new software version on secondary SC board, activates it and proceeds to the next step.

15.4.2.4 Manual OS Upgrade

The Manual OS Upgrade may be needed in one of the following cases:

- Automatic Upgrade fails
- Only one SC board exists in the chassis

If the Automatic Upgrade fails, we recommend attempting to repeat it manually. For this, you must press the **RESET** button on the SC board you are trying to upgrade. The SC board reboots and automatically repeats the attempt to upgrade the OS automatically.

In the event that this procedure does not succeed, perform the full manual OS upgrade as described below.

In order to perform manual OS upgrade the following are required:

- RS232 connection to the SC board
- Installation Server that resides ***in the same subnet*** with SC boards

Detailed instructions for the installing Solaris™ 9 are provided on page 142.

Note: Before starting a manual OS installation, make sure that the other SC board is not configured as a Jumpstart Server. Refer to 'Preparing the Network' on page 166 for details.

After the OS installation is finished, the SC board may not perform an automatic reboot to the newly installed OS.

➢ In the event that an automatic reboot does not occur, take these 4 steps:

1. On the SC board on which you have installed the new OS, connect to RS232 console.
2. On the Keyboard, press Alt-B to go to the OBP level.
3. At this time, the SC board is in Diagnostic mode. This mode must be turned off. To turn off the Diagnostic mode, at the prompt, type setenv diag-switch? false and press Enter.

```
ok> setenv diag-switch? false
```

4. To reboot the SC board, at the prompt, type boot and press Enter.

```
ok> boot
```

15.4.3 Upgrading the Media Gateway Boards

The Media Gateway boards are upgraded one after another. The Media Gateway boards (except the Redundant board) are upgraded starting from the lowest slot number. Following this, the Redundant board is upgraded.

Active calls on the Media Gateway board are dropped during the upgrade. However, the predefined Graceful Shutdown period (and corresponding Service Change or RSIP messages) minimize the amount of the dropped calls.

Depending on the options you chose in the Welcome Questionnaire (refer to page 171), you can pause after the first Media Gateway board is upgraded (or after each Media Gateway board is upgraded) and verify that the process is successful.

With the first Media Gateway board, as well as the Active SC board upgraded, you can perform extensive testing of the new software in order to decide either to proceed with the Upgrade or to Rollback to the previous software configuration.

15.4.4 Upgrading the Ethernet Switch Boards

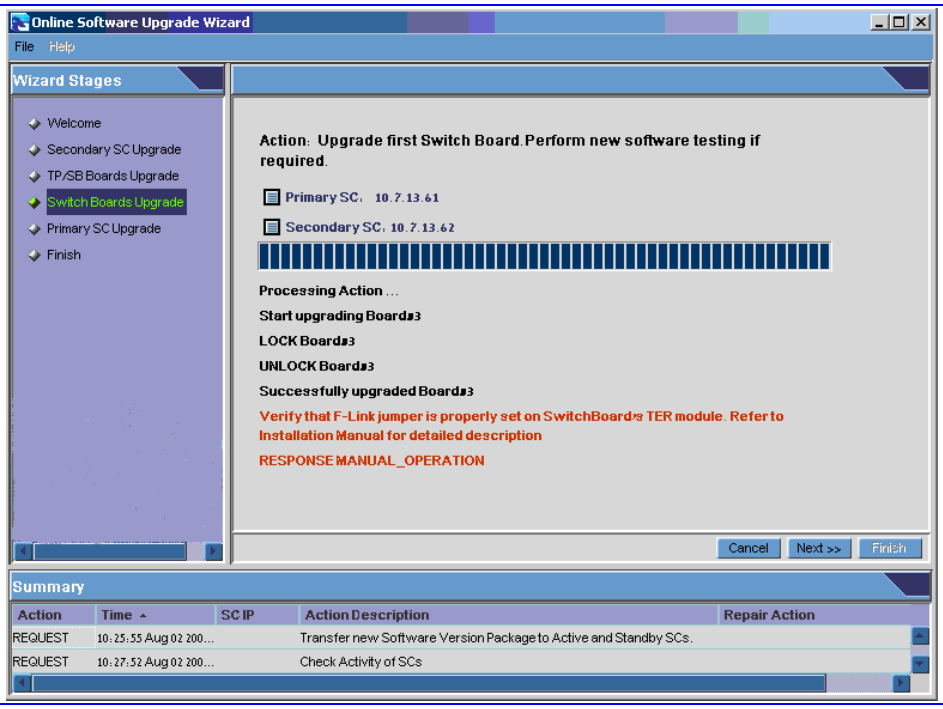
The Ethernet Switch boards are upgraded one after another starting from the board residing in the lower slot number.

After upgrading the first ES board, click the **Next** button.

At this point, the Active SC board, all of the Media Gateway boards and the Active Ethernet Switch board are upgraded to the new software version, making all of the essential parts of the new software distributed across all types of the boards in the chassis. You can perform extensive testing at this point and decide whether to proceed with the Upgrade or to Rollback to the previous software configuration.

When upgrading from version 2.1 to version 3.0, an additional warning appears to remind you to check the F-Link switch status on the upgraded ES Board. The F-Link switch must be set to the "enabled" state in order to enable proper operation of version 3.0. This is the last point where you can extract Ethernet Switch board and change F-Link switch state. If you do that, wait at least 10 minutes (to ensure that ES board starts up properly after hardware reset) prior to proceeding to the next stage. (Refer to 'ES/4411 RTM F-Link Switch Settings' on page 45.)

Figure 15-8: Software Upgrade in Process, Verify F-Link Screen



15.4.5 Upgrading the Primary SC Board

After the secondary SC board, all Media Gateway boards and Ethernet Switch boards are upgraded, the primary SC (now in the Standby SC board) is upgraded to the new version.

When upgrading from version 2.1 to version 3.0 the process is more complicated because of the OS Upgrade phase. However, it is identical to the one described in 'OS Upgrade Phase for Version 2.1 to Version 3.0' on page 173.

15.4.6 SC Board Cleanup

After completing the Online Software Upgrade process, some unneeded settings may remain on the Secondary SC board.

➢ To perform cleanup on Secondary SC board, take these 4 steps:

- Connect to the Secondary SC board via Telnet or RS232 console
- At the prompt, type **rm -rf /jumpstart** and press **Enter**. The boot image is removed from the SC board.
- At the prompt, type **df -k** and press **Enter**
- If the *<install server ip>:jumpstart* is still mounted then type the following to unmount it:

  umount /mnt

15.4.7 Finish

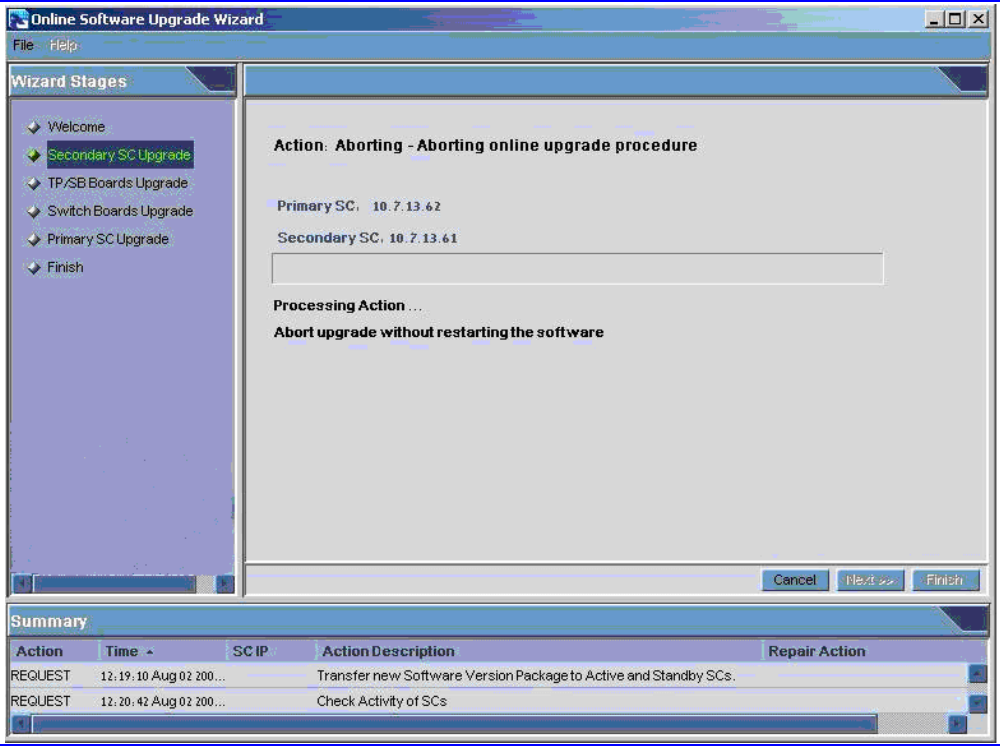
The last Software Upgrade Wizard screen states that the upgrade process has finished.

Note: Perform a full software configuration backup as per 'SC Software Backup/Restore Procedures' on page 95 to assure backup availability should it be required later.

15.5 Rollback

At any time during an upgrade process, users can perform a rollback to the previous software configuration by pressing the **Cancel** button in the Online Software Upgrade Wizard. In addition to that, the EMS automatically triggers a rollback if for any reason the upgrade process (software failure or network/hardware failure).

Figure 15-9: Software Upgrade in Process, Abort Screen



A rollback may or may not affect media gateway service. It depends on the original software version that was installed prior to starting Online Software Upgrade (and that is being rolled back to) and how far the upgrade has progressed by the time the rollback is performed.

For version 2.1 - rollback does not affect service (i.e., it can be performed without impacting the calls serviced by the media gateway) until the final phase of the 'Secondary SC Upgrade' stage - up to the point that the Active (primary) SC board is shut down and an activity switchover to the Standby (secondary) SC board is performed. After this point, rollback does affect service and causes a reset of all of the Media Gateway boards. The Ethernet Switch boards are not downgraded automatically. The user should downgrade them manually (refer to ‘Ethernet Switch Board Downgrade in Version 2.1’ on page 181).

For version 3.0 - rollback is graceful at ***any*** stage. Only those Media Gateway boards that were upgraded to the new software version are reset. The reset is done gracefully – similar to the way upgrade is performed. The Ethernet Switch boards are downgraded to the previous version automatically one by one – without any effect on service.

15.5.1 OS Downgrade

When upgrading from version 2.1 to version 3.0, rollback may require you to downgrade the OS on the SC board from Solaris™ 9 to Solaris™ 8. Similar to the OS upgrade, the following options are displayed:

- Automatic OS downgrade
- Manual OS downgrade

Automatic OS Downgrade

Automatic OS downgrade is performed fully automatically without any user intervention. If connection between the SC boards and the Installation Server provides sufficient speed, OS downgrade takes approximately 20 minutes.

Manual OS Downgrade

Manual OS downgrade is similar to the manual OS upgrade as described on page 176. You must install the OS version that corresponds to the previous software version (Solaris™ 8 for version 2.1 or Solaris™ 9 for version 3.0).

For each Media Gateway software version, there is a specific Solaris™ OS version as well as a specific firmware version.

- Media Gateway software version 2.1 runs on Solaris™ 8 and uses Firmware 1.0.15
- Media Gateway software version 3.0 runs on Solaris™ 9 and uses Firmware 1.1.3

In order to downgrade the firmware you must copy it from the Jumpstart Server to the SC board's local disk. This is possible only when an OS is currently installed on the SC board. You can manually downgrade to Solaris™ 8 only if there is an OS currently installed. To install Solaris™ 8, refer the 'Appendix - Solaris™ 8 OS Installation' on page 211.

In some cases an OS upgrade may fail "in the middle" and leave the SC board without any OS currently installed on disk.

➢ If an SC board is left with no OS installed, take these 5 steps:

a. On the SC board with no OS installed, connect to RS232 console.

b. On the Keyboard, press **Alt-B** to go to the OBP level.

c. To determine current firmware version, at the prompt, type **.version** and press **Enter**.

```
ok> .version
```

d. Install the OS that matches the current firmware version (even if it is not Solaris™ 8).

e. To install Solaris™ 8, refer the 'Appendix - Solaris™ 8 OS Installation' on page 211.

15.5.2 Ethernet Switch Board Downgrade in Version 2.1

Version 2.1 does not support the automatic downgrade of Ethernet Switch boards. The user must manually connect to them and perform the software downgrade as described in 'Appendix - Installing ES Board Software' on page 209.

If an RS232 connection to the Ethernet Switch boards is not available, a Telnet connection from Active SC board may be used instead. However, in version 3.0, the software automatically removes the 'global IP' address from the ES board when the F-Link is connected. Concurrently, the SC boards in version 2.1 can not connect to the "internal VLAN" IP addresses of ES boards.

➢ To overcome this limitation, take these 7 steps:

1. Using Telnet, connect to the Active SC board.
2. At the prompt, enter the command, '***cli 20 2,SAT RESETPTI 2 1***'. It resets the second ES board and keeps it from starting up. This causes the first ES board to get the 'global IP' address.

3. Using Telnet, connect to the first ES board (via global IP) and download the scripts to it. (Refer to 'Appendix - Installing ES Board Software' on page 209.)

   DO NOT RESET THE ES BOARD.

4. At the prompt, enter the command, '***cli 20 2,SAT RESETPTI 2 0***'. It starts up the second ES board. Wait 5 minutes (to let the second ES board finish rebooting).

5. In the EMS, lock/unlock the first ES board. It resets and is initialized with the scripts of version 2.1.

6. The second ES board now has the 'global IP' address (since version 2.1 keeps the F-Link down). Using Telnet, connect to the second ES board and download the version 2.1 scripts. (Refer to 'Appendix - Installing ES Board Software' on page 209.)

7. In the EMS, lock/unlock the second ES board. This causes it to reset. It is initialized with the scripts of version 2.1.

15.6 Software Upgrade/Rollback Troubleshooting

If you experience an unexpected network or software problem during online software upgrade (e.g., if the PC on which the EMS client runs, crashes, or the network connection to the media gateway is lost) and because of the failure you can neither complete nor cancel the online software upgrade, you must perform a manual rollback to the previous software configuration.

Note: If there is a failure during the Automatic OS Upgrade step, the process automatically falls back to the Manual OS Upgrade step. You can try to "manually repeat" Automatic OS Upgrade (refer to page 176 for details).

- Software Upgrade failure at anytime during the process - Refer to 'Performing a Manual Rollback to the Previous Software Configuration' below
- Software Upgrade failure after the Secondary SC board upgrade phase - Refer to 'Alternative to Rollback after "Secondary SC Upgrade" Phase during Version 2.1 to Version 3.0 Upgrade' On page 185

15.6.1 Performing a Manual Rollback to the Previous Software Configuration

➢ **To perform a manual rollback to the previous software configuration, take these 9 steps:**

1. Close the EMS Upgrade Wizard screen.
2. Connect to both of the SC boards through Telnet or the RS-232 port.
3. On each of the SC boards, (if the OS is currently running, i.e., Telnet works and/or a login prompt appears), log in and stop the SC software on both SC boards by typing tools tg dn. Press Enter.

```
client208::~# tools tg dn
```

4. If there is no Telnet connection an SC board, take these 2 steps:
   a. Connect to the RS232 console of the SC board and verify that the OS is actually not running on it.
   b. If the OS is running, stop the SC software as described above.

Note: It is important to stop SC software on ***both*** of the SC boards prior to proceeding to the next step.

5. If hardware failure occurs on one of the SC boards and it does not respond to the RS232 console at the OBP level, remove the failed SC board from the chassis. For details on replacing a failed SC board, refer to 'SC Board Replacement Procedure' on page 140.
6. Rollback the Primary SC board (if it has not been removed), using these 9 steps.
   a. To remove the "upgrade in progress" marker, type **rm –f /Upgrade/UpgradeInProgress.ini** and press **Enter**.

```
client208::~# rm -f /Upgrade/UpgradeInProgress.ini
```

   b. To verify the OS version on the Primary SC board (if it's running), **cat /etc/version** and press **Enter**.

```
client208::~# cat /etc/version
```

   c. If the OS version on the Primary SC board is different from the OS version needed by the previous software version (version 2.1 uses Solaris™ 8 2/02 and version 3.0 uses Solaris™ 9 9/04) or it is not running at all, downgrade the OS on the Primary SC board as described in 'OS Downgrade' on page 180.
   d. To restore the SC software from the pre-upgrade backup image, at the prompt type **tools tg rs 2** and press **Enter**.

```
client208::~# tools tg rs 2
```

   If you downgraded the OS on the SC board, the above command may fail because the ***tools*** script is missing.

```
client208::~# tools tg rs 2
tools: Permission denied
```

   e. If the ***tools*** script is missing, extract the ***tools*** script from the backup file, by typing **tar xvf [*backup_file]* /Project/scripts/tools**. Press **Enter**.

```
client208::~# tar xvf [backup file] /Project/scripts/tools
```

f. At the prompt, run the extracted tools script by typing **/Project/scripts/tools tg rs 2**. Press **Enter**.

```
client208::~# /Project/scripts/tools tg rs 2
```

g. If you rollback to version 2.1, restore the **/tftpboot** directory from the manual backup. Copy the saved backup file to ***both*** of the SC boards and extract it, by typing **tar xvf /tftpboot.backup.tar**. Press **Enter**.

```
client208::~# tar xvf /tftpboot.backup.tar
```

h. Disable any Jumpstart Server configuration that remains by typing **rm –f /etc/bootparams**. Press **Enter**.

```
client208::~# rm –f /etc/bootparams
```

i. To start the SC software, reboot the Primary SC board by typing. Press **Enter**.

```
client208::~# reboot
```

Rollback the Secondary SC board (if it exists), by using these 2 steps:

a. Rollback of the Secondary SC board is similar to the rollback of the Primary SC board described above. However, it is important to rollback a Primary SC board first, which minimizes the downtime frame when the Media Gateway is not functioning. If the Primary SC board has been removed, media gateway service is not restored until the rollback of the Secondary board is completed. (The system is in simplex configuration - dependent upon only one SC board.)

b. If Rollback has been performed on the Primary SC board and the Secondary SC rollback requires a manual OS downgrade, but you are unable to perform it, you may choose to remove the Secondary SC board from the chassis instead of downgrading it. If you choose to do so, the system is in simplex configuration (dependent upon only one SC board). For details on replacing a failed SC board, refer to ‘SC Board Replacement Procedure’ on page 140 or contact Nortel for assistance in repairing the failed SC software.

7. Rollback the Media Gateway boards.

   - The Media Gateway boards are automatically reset by the SC software and rolled back to the previous software version. You are not required to take any additional measures to accomplish this.

8. Rollback the Ethernet Switch boards.

   - For version 3.0 or later, the Ethernet Switch boards are automatically rolled back to the previous software version.
   - For version 2.1, you must manually downgrade them. Refer to ‘Appendix - Installing ES Board Software’ on page 209 for details.

15.6.2 Alternative to Rollback after "Secondary SC Upgrade" Phase during Version 2.1 to Version 3.0 Upgrade

During Online Software Upgrade from version 2.1 to version 3.0, if a failure occurs after the Secondary SC Upgrade step you are required to downgrade the OS on at least one of the SC board.

We strongly recommend performing a regular rollback procedure and returning to the previous software version as described above. However, some customers may wish to continue with the upgrade even though media gateway service is down until the process is completed.

➢ **To continue installing the new version, take these 4 steps:**

1. Remove the Primary SC board from the chassis.
2. From the Secondary SC board, remove the "upgrade in progress" marker by typing rm –f /Upgrade/UpgradeInProgress.ini. Press Enter.

```
client208::~# rm -f /Upgrade/UpgradeInProgress.ini
```

3. Reboot the Secondary SC by typing reboot. Press Enter.

```
client208::~# reboot
```

The Secondary SC board (with the new software) resets all of the Media Gateway boards and ES boards when it restarts and upgrades them with the new software.

4. Replace the failed SC board (refer to 'SC Board Replacement Procedure' on page 140) or contact Nortel for assistance in repairing the failed SC software.

15.7 Upgrade from Version 2.1 to Version 3.0 – Disabled New Features

The following features that are normally enabled during a straight version 3.0 installation are disabled after Online Software Upgrade from version 2.1. The user should manually enable them after the Online Software Upgrade is finished.

Table 15-1: Disabled Features for Upgrade from Version 2.1 to Version 3.0

No.	Feature Name	Default value in version 3.0	Value after upgrade from version 2.1	Provisioning guide
1	Geographical Address Boards Provisioning Mode Media Gateway boards are managed and distinguished by their slot number instead of their MAC address. This simplifies the addition of new Media Gateway boards and replacement of the existing ones.	On	Off	Change BoardProvisioningMode attribute in Gateway MO

15.8 Upgrade from Version 2.1 to Version 3.0 – Known Limitations

Table 15-2: Known Limitations for Upgrade from Version 2.1 to Version 3.0

No.	Limitation	Workaround
1	NTP Server configuration may be lost after upgrade from v2.1 to v3.0.	Change NTP Server attribute in Gateway MO after completing the upgrade
2	Timezone setting of SC board may be lost after upgrade from v2.1 to v3.0.	Manually edit TZ variable in /etc/TIMEZONE file. If not sure set this variable to "GMT" for Greenwich Mean Time.

15.9 Online Software Upgrade – Network Cleanup

After completing the Online Software Upgrade process, the Installation image must be removed from the network.

➢ To remove installation image, take these 4 steps:

- Connect to the Install Server via Telnet or RS232 console
- At the prompt, type **rm -rf /jumpstart** and press **Enter**. The installation image is removed from the network.
- Edit /etc/dfs/dfstab file and remove the following line from it:

  share -F nfs -o ro,anon=0 /jumpstart
- Restart NFS server by typing:

  /etc/init.d/nfs.server stop

  /etc/init.d/nfs.server start

16 Shutdown Procedures

In the event that you need to shut down the Media Gateway 3500, the correct shutdown procedure should be followed.

➢ To shut down a Media Gateway 3500, take these 5 steps:

1. Verify that no activity in the system is being generated from the EMS or MIB browser due to operator activity.

Note: Activity generated from the EMS or a MIB browser during shutdown can corrupt the software.

2. From the EMS or MIB browser, verify that no activity such as board failure or switchover takes place in the system for a duration of 5 minutes.
3. Lock the Media Gateway 3500 according to procedures detailed in the EMS User's Manual.
4. Stop the SC application in the Active SC board by entering the command: **tools tg dn**. Switchover takes place, in which the former Standby (Redundant) SC board assumes Active (Master) board functionality. Stop the SC application in the second SC board.
5. Using Telnet, connect to an SC board and enter the command, **shutdown -i5 -g0 -y**. The board is shut down. Do the same to the second SC board.

WARNING

Shutting off the power or disconnecting from the power source without first following this procedure may cause serious damage to components of the system.

The power feed to the media gateway can now be disconnected.

Reader's Notes

17 Diagnostics & Troubleshooting

This section describes the recommended method for maintaining Nortel' Media Gateway 3500 Media Gateways. Nortel provides a wide range of diagnostic tools to enable users to easily identify an error condition and to provide a solution or work around.

To facilitate system troubleshooting, be sure to enable the Syslog server. Refer to the *Element Management System User's Manual*, Document #: LTRT-910xx for more details about configuring the Syslog server. Also, refer to the Lock/Unlock maintenance procedures in the *Programmer's User's Manual*, Document # LTRT-962xx.

17.1 Troubleshooting Strategy

The goal of the maintenance procedures described in this section is, in the even of a component failure, to return the Media Gateway to full capacity as rapidly as possible. The maintenance philosophy is focused on locating the faulty component and replacing it. The Media Gateway's components are not normally repaired at the Customer's site. The following principles have been formulated to guide you in troubleshooting the system:

- Try connecting to the Media Gateway via the IP network. Locating the fault this way could save you a visit to the site or save you time when you arrive.
- Use a systematic process of elimination to try and identify the source of the problem. Ask the users of the Media Gateway to describe the nature of the problem they have encountered. Ask yourself questions such as these:
  - What is the scope of the problem?
  - Does it affect one particular interface, a group of interfaces, or the entire Media Gateway?
  - What capabilities are affected?
  - Does the problem occur during daytime hours only, or also during the night?
  - Did the problem(s) start after any configuration changes or other operator activities were made?
  - What is the likely source of the problem? A faulty interface or board? Loose or incorrect cabling? A problem in the common equipment or configuration definition?
- Perform the simplest test first. For example, if a particular interface does not work, check that the junction box cord is properly inserted and swap the interface cable to another working interface to see if the fault lies in the interface, before checking the wiring or the Media Gateway configuration.

17.2 Troubleshooting

The table below presents possible courses of action to remedy faults arising in the Media Gateway 3500 Media Gateway + TP-1610 configuration

Table 17-1: Troubleshooting Faults in the Media Gateway

Problem	Possible Cause(s)	What to do	Refer to
Gateway is dead: all boards and PS LEDs are off and there is no sound from the ventilation fans.	Power supply problem	**1.** Check that all of the power supplies are inserted (3/4 in M5K/M8K) **2.** Check that all the PSs are the same AC or DC type. In M5K, you can see that on the front panel of each PS. **3.** In M5K, look at the rear of the chassis to check that all PEMs are installed: **a.** One PEM is required for AC powering **b.** Two PEMs are required for redundant DC powering **c.** One PEM for non-redundant DC powering **4.** Check that the power wiring is well connected at both ends. a. One cable in AC case b. 2 DC wiring pairs to each PEM in case of DC supply with redundant power connection c. 1 DC wiring pairs to each PEM in case of DC supply without redundant power connection **5.** Check power supply switch ON position in case of AC powering.	
Gateway operation is silent	Fan problem	Check the front LED on the Fan Tray. Check the airflow from the ventilation holes on the chassis sides. Verify that the fan tray unit is inserted properly.	

Table 17-1: Troubleshooting Faults in the Media Gateway

Problem	Possible Cause(s)	What to do	Refer to
No Console communication to the SC board	Console settings	Check the communication port settings to verify: 9600, 8, N,1 Bit per second=9600 Data bits=8 parity=none Stop bit=1 Flow control=none	
	Cable connection	Verify that the Console cable is connected to the appropriate SC RTM	
	Cable problem	Replace the cable	
No communication with the Media Gateway	Ethernet Switch board (also known as Fabric Card) problems	Check that the Ethernet Switch boards (Fabric Cards) are inserted in slots 3 and 4. Check the board status LEDs. If the System LED is off, extract and reinsert the board.	
	Network problems	Check that one of the two Uplink connections is alive using status LEDs on the Ethernet Switch boards. Otherwise, all the board links will be disabled.	
	Ports 1 or 2 on the Ethernet Switch status LEDs are off	Ensure that the appropriate SC in slot 1 or 2 appropriately is operating correctly. Restart each of the Ethernet Switch boards to cause the SC switchover between the two Ethernet ports.	
	SC settings problem	Connect the Console to the SC board. Run the configuration utility to set the IP settings.	
Ethernet Switch startup is slow	It takes about 6 minutes to start up	In redundant gateway configuration, assure that the second Ethernet Switch is Active and properly operates, following the Ethernet Switch startup. It by-passes the slow startup limitation.	
The SC can not be connected using "telnet"	IP/subnet mask/default router of SC is wrong.	Connect to the SC board using RS-232 and check its parameters. If they are wrong - use "sc_isntall.pl" to fix them then reboot the system.	
No communication between the MIB browser and the Media Gateway	MIB browser setting problem	Ping the Media Gateway. If it responds, check the community stream settings on the MIB browser. Verify that you're working with SNMP V1 or V2.	

Table 17-1: Troubleshooting Faults in the Media Gateway

Problem	Possible Cause(s)	What to do	Refer to
	Media Gateway IP settings	Connect the Console to the SC board. Run the configuration utility to set the IP settings.	
No communication with boards	Software does not function in the device	Try to "ping" the board/module from the SC board. If ping fails, check for network problems/definitions and try to reset the board/module	
	Network problem	Check cables (uplink).	
	Network definitions	Check if default gateway can reach the IP of the board/module.	
		Check if the board/module got the correct IP. Check that the IP addresses of the boards are not used by another entity.	
		Check the validity of the IP address, subnet and default gateway. If default gateway is not used, enter 0.0.0.0	
BootP reply from wrong BootP server	Other BootP servers contain the MAC address of the board/module	Check that only your BootP server contains TP-1610 MAC address.	
		Check that there is no other BootP server active in the subnet. If there is, check that the MAC addresses for the boards are not defined in the second BootP server to prevent the boards from receiving IP addresses from the wrong source.	
On an Ethernet Switch board, no LED is turned on.	The uplink of the board is not connected.	Connect the uplink. Reset the board.	
A board does not change to the ENABLE state after it is set to UNLOCK.	The configured IP addresses for the board are already taken by another device in the network.	Ping to the configured IP addresses while it is locked. If the ping returns a response, then another device is already using the IP address. LOCK the board and configure new IP addresses for it. Then UNLOCK the board.	

Table 17-1: Troubleshooting Faults in the Media Gateway

Problem	Possible Cause(s)	What to do	Refer to
	The configured MAC addresses for the board are wrong.	Check the MAC address on the board and make sure that they are the same as listed in the configuration. If the MAC address in the configuration is not the same as on the board, LOCK the board, configure the correct MAC addresses and then UNLOCK the board.	
Pinging to a global IP address sometimes does not return a response.	The Network has loops inside.	Because switch boards disable their spanning tree functionality, external switches can create loops in the network. In this case, the packets may sometimes get lost. Make sure that external switches/routers have the “spanning tree” feature enabled.	
When an Ethernet Switch board is switched-over, there is no connection to the SC.	Each Ethernet Switch board is connected to a separate external router, and the routers are not connected by VRRP protocol.	When one switch stops working, all external networks must go through the other external router. This is possible only if the external routers are connected and are using VRRP protocol.	
The switchover from a failed TP-1610 board to the redundant TP-1610 board is not working.	The state of the Redundant TP-1610 board is not ENABLED and UNLOCKED and the feature, “Enable failed board automatic switchover” is off.	The Redundant TP-1610 board must be working and its status must be correctly set in order to allow the switchover.	
E1/T1/J1 trunks are not operating correctly	Board problem	Disconnect the trunk spans connection. Use the trunk spans splitter (50-pin to RJ-48C adaptor) to allow a connection to a single trunk span. Plug the loopback connector to one of the trunks. Verify that the appropriate trunk span LED on the front of the board changes color to green and that the trunk spans’ operative state is changed to ‘enabled’.	
		Check that the wiring of the cable is as described under 'Cabling the Media Gateway 3500' on page 99. Verify that the RX and TX signals polarity is OK.	

Table 17-1: Troubleshooting Faults in the Media Gateway

Problem	Possible Cause(s)	What to do	Refer to
	Synchronization problems - too many alarms on the trunks.	Verify that the clock hierarchy is set properly. Check which clock sync mode is being used and is set in the appropriate mode in both the gateway, trunks and in the systems to which the gateway is connected. Take into account that the clock recovery is done from the trunk set to non-zero clock priority. All other trunks use the gateway clock to synchronize the trunk.	
	Trunk span settings problems	Verify trunk span settings: type - E1/T1/J1 Framing method Line Code	
1610 board Warm Protection: (Capacity Sustaining Redundancy) Insertion of the same failed board under traffic	It takes up to 10 minutes to unlock the 1610 board under the following circumstances: ▪ The 1610 board fails and a Weak switch-over is performed ▪ The same TP board (the same two MACs) was inserted ▪ There are still many open connections (more than 10 RTP streams) toward this board.	This situation is unusual because: The failed 1610 board is usually replaced by another one (another two MACs) During Weak redundancy, the redundant board goes through a reset procedure and a ServiceChange messages is issued toward the Call Agent. In this way, the Call Agent deletes the far-end connections talking to the failed 1610 board and prevents RTP traffic. If the above doesn't occur, wait for up to 10 minutes for a failed 1610 board Unlock/BootP completion.	
Media Gateway management: Changing of Network settingsMedia	It is not recommended to change Network settings (default gateway and subnet mask) from EMS GUI.	SC may disappear from EMS vision if its new settings don't match the EMS Network settings. System should not be started without SA board being inserted.	
State change event on trunk span #1-#8 appear on trunk span #9-16 or vise versa	MAC1 and MAC2 are opposite	switch between MAC1 and MAC2	

17.3 Syslog Support

The Syslog protocol is an event notification protocol that allows a device to send event notification messages across IP networks to event message collectors, also known as Syslog servers. Since each process, application and operating system was written somewhat independently, there is little uniformity to Syslog messages. For this reason, no assumption is made regarding the contents of the messages other than the minimum requirements of its priority.

Syslog uses UDP as its underlying transport layer mechanism. The UDP port assigned to Syslog is 514. The Syslog message is transmitted as an ASCII message. The message starts with a leading "<" ('less-than' character), followed by a number, which is followed by a ">" ('greater-than' character). This is optionally followed by a single ASCII space. The number is known as the Priority and represents both the Facility and Severity as described in the Examples below.

The Nortel application performs as a Syslog client. Messages (currently Error Reports events) generated by the Nortel application are sent via UDP and IP to a Syslog server application.

Currently there are 5 error levels reported by the Syslog client Examples:

- Emergency level message:

  <128>sctp socket setsockopt error 0xf0 [File:sctp.cpp Line:453]

- Warning level message

  <132>Release contains no h.225 Reason neither q.931 Cause information stateMode:1 [File: Line:-1];

- Notice level message:

  <133>(lgr_flow)(2546) | #0:ON_HOOK_EV

- Info level message:

  <134>document http://ab.pisem.net/RadAAIP.txt was not found in documents table [File:vxml_handleDB.cpp Line:2348]

- Debug level message:

  <135>SCTP port 2905 was initialized [File:csAPI.cpp Line:150] [CID:0]

17.4 Gateway Faults and Alarm Monitoring

Gateway operations can be monitored in two different ways:

- Running in idle mode awaiting for alarm traps - stimulus operation
- Periodic polling for the MIB components - polling operation

This section describes the list of traps that the Media Gateway reports. It can be used when working in stimulus operation mode.

17.4.1 List of Alarms

The Media Gateway supports the following alarms list, where each of the alarms is assigned with its unique MIB Object Identifier (OID):

1. TPBoardFailureTrap (future)
2. MOAdminStateChange
3. MOOperativeStateChange
4. V5.2Alarm (For Broadband/Cable/IPAT applications only)
5. TrunkAlarm
6. STM1LinkAlarm
7. ConfigurationError
8. OperationalInfo
9. VoltageAlarm
10. FanAlarm
11. TemperatureAlarm
12. EthernetExternalLinkAlarm
13. EthernetInternalLinkAlarm
14. PowerSupplyAlarm
15. PushbuttonAlarm
16. BoardTemperatureAlarm
17. BoardDiagnosticsAlarm
18. NTP Alarms

For the User's convenience, all alarms generated by Media Gateway have the same standard structure which includes the following fields:

- *AlarmUniqueId* - the unique ID of alarm according to the MIB.
- *AlarmTitle* - the name of alarm (ID) in more readable form.
- *AlarmSource* - a text field indicating a source of generated alarm. It could be either a logical source (for example MO Managed Object path for such alarm as moOperativeStateChange) or a physical source (for example Fan_Number for FanAlarm).
- *Severity* - indicates alarm severity according to the ITU standard.
- *ProbableCause* - probable cause of the generated alarm according to the ITU standard.
- *ItuAlarmType* **-** generated alarm type according to the ITU standard.
- *AdditionalParamType1* - free string explaining the specific problem (or problem clearance) caused the alarm generation. It could also contain a numerical value if relevant.

For a detailed summary of the alarms supported in the Media Gateway 3500 Media Gateway, refer to the Alarms and Alarm Field Descriptions Table in the *Programmer's User's Manual*, Document # LTRT-962xx, *Element Management System User's Manual*, Document #: LTRT-910xx, and *EMS Alarm Guide*, Document #: LTRT 946xx.

17.5 Application, Solaris™ Log Files' Directories

The system's Log files are:

- Application log files exist in each SC-2 board in directory ~/Project/bin/log.
- Solaris™ log files exist in each SC-2 board in directory /var/adm/messages.

17.6 Simple Diagnostic Tool's File

- A simple diagnostic tool can be invoked by running **tools d**.

17.7 Useful Solaris™ Configuration Files

In the event that configuration problems are encountered, it's useful to check the integrity of the following files:

Table 17-2: Useful Solaris™ Configuration Files

File name	Contents	What to check
/etc/hosts	Mapping between machine name and IP address	Is the mapping OK?
/etc/hostname.*	Used network port and machine name	Is postfix of file the name of the first network port ("eri0") ? Does the file contain one line and the line has one word - the name of the machine?
/etc/inetd.conf	Network services configuration	Does the file contain an uncommented line of service "tftp"?
/etc/services	Services on machine	Does the file contain a line for "snmp", "tftp", "ftp" and "telnet" services?
/etc/defaultrouter	IP address of default router	Is the IP address correct?

17.8 Application, Solaris™ Log Files' Directories

The system's Log files are:

- Application log files exist in each SC-2 board in directory ~/Project/bin/log.
- Solaris™ log files exist in each SC-2 board in directory /var/adm/messages.

17.9 Simple Diagnostic Tool's File

- A simple diagnostic tool can be UTILIZED by running tools d.

17.10 Useful Solaris™ Configuration Files

In the event that configuration problems are encountered, it's useful to check the integrity of the following files:

Table 17-3: Useful Solaris™ Configuration Files

File name	Contents	What to check
/etc/hosts	Mapping between machine name and IP address	Is the mapping OK?
/etc/hostname.*	Used network port and machine name	Is postfix of file the name of the first network port ("eri0")? Does the file contain one line and the line has one word - the name of the machine?
/etc/inetd.conf	Network services configuration	Does the file contain an uncommented line of service "tftp"?
/etc/services	Services on machine	Does the file contain a line for "snmp", "tftp", "ftp" and "telnet" services?
/etc/defaultrouter	IP address of default router	Is the IP address correct?

17.11 Information Needed when Contacting Technical Support

When contacting Nortel Technical Support (refer to the title page or last page of this manual for detailed contact information), send the following information:

1. A detailed description of the problem.
2. Any information obtained from the troubleshooting process, suspected component, etc.
3. Information about any changes made to the system and its environment recently, i.e. to the system configuration, networking changes, etc.
4. *tar* file with all log and configuration files on the SC-2 board. This can be created by command "tar cf files.tar ~/Project/bin/SystemParams.ini ~/Project/bin/xmo/*.xmo ~/Project/bin/bmo/*.bmo".
5. A description of the system configuration (number and type of Media Gateway boards, number of Ethernet Switch (ES-1) boards (also known by the marketing term, Fabric Card), their IP addresses, etc.), noting the S/N of the suspected module.
6. Output of **tools d**.

18 Media Gateway 3500 Selected Functional Specifications

Table 18-1: Media Gateway 3500 Functional Specifications

Function	Specification
Capacity	
Network Ports/DSP Calls **(independent digital voice, fax or data ports)**	Up to 80 E1/T1 Links; Redundant*, 5+1 Media Gateway Boards configuration, or 96 E1/T1 Links for simplex** 6 Media Gateway Boards configuration **Redundant configuration with protected channels Wireline/Cable: 6,720 simultaneous VoIP voice calls for 5+1 TP-1610 Media Gateway Boards, 2,880 for 6 TP-1610 Media Gateway Boards in simplex mode Independent dynamic vocoder, fax or modem selection per channel Capacity is transcoding and voice coder type dependent
Optional Application Processor	Up to 2 Sun based Single Board Application Computers (Optional)
Voice Coders	G.729A, G.729E, G.723.1, G.726, G.711 Independent dynamic vocoder selection per channel
Media Processing	
IP Transport	VoIP (RTP/ RTCP) per IETF RFC 3550 and RFC 3551
DTMF/MF Transport	DTMF/MF RTP Relay per RFC 2833, Mute, Transparent (transfer in coder as voice)
Voice Processing	All voice processing features are supported simultaneously on all ports
	Dynamic Network Jitter Buffer with reordered RTP packets correction
	Call Progress Tones generation and detection
	Integral Announcement support towards PSTN/TDM, IP and ATM
	Transcoding of a G.711 RTP stream to any Low Bit-Rate Coder RTP stream using one DSP channel resource
	Mediation between two IP endpoints of the same coder without using any DSP channel resource
	Media duplication (one source to many destinations) using the same coder without using additional DSP channel resources
Voice Coders	Wireline: G.711, G.723.1, G.729A, G.727, G.726,

Table 18-1: Media Gateway 3500 Functional Specifications

<table>
<tr><th>Function</th><th>Specification</th></tr>
<tr><td></td><td>Cables: G.711, G.728 and G.729E</td></tr>
<tr><td>Echo Cancellation</td><td>G.165 and G.168 2000 compliant</td></tr>
<tr><td>Gain Control</td><td>Configurable Input/Output Gain Control: -31 dB to +31 dB in steps of 1 dB</td></tr>
<tr><td rowspan="4">Silence Suppression

Voice Activity Detection (VAD),
Comfort Noise Generation (CNG)</td><td>G.723.1 Annex A</td></tr>
<tr><td>G.729 Annex B</td></tr>
<tr><td>PCM and ADPCM - Per RFC 3389</td></tr>
<tr><td>3GPP Voice Activity Detection (VAD) 3GPP 26.094
and Comfort Noise Generation (CNG) 3GPP 26.092</td></tr>
<tr><td colspan="2">Fax and Modem Transport</td></tr>
<tr><td rowspan="6">Fax Relay and Bypass</td><td>Supported on all ports</td></tr>
<tr><td>Group 3 real-time Fax Relay to 14.4 kbps with auto fallback</td></tr>
<tr><td>Tolerant of delays of up to 9 seconds</td></tr>
<tr><td>T.30 (PSTN) and T. 38 (IP) compliant (real-time fax)</td></tr>
<tr><td>CNG tone detection & Relay per T.38</td></tr>
<tr><td>Automatic Fax ByPass (pass-through) to G.711 or ADPCM</td></tr>
<tr><td>Modem Bypass</td><td>Automatic switching (pass-through) to PCM or ADPCM for modem signals (V.34 or V.90 modem detection)</td></tr>
<tr><td colspan="2">IP Interface</td></tr>
<tr><td>Local Subnets</td><td>Different Local IP Addresses and Subnet masks for Operation Administration & Maintenance (OAM), Control and Media Protocols</td></tr>
<tr><td>IP Interface Separation</td><td><table><tr><th></th><th>ES/4411</th></tr><tr><td>OAM</td><td>100 Base-TX</td></tr><tr><td>Control</td><td>100 Base-TX</td></tr><tr><td>Media</td><td>1 Gigabit optical</td></tr></table></td></tr>
<tr><td>Static Routes</td><td>Configurable Static Routes tables</td></tr>
<tr><td>DiffServ RFC2474</td><td>Configurable, marking capabilities for Network, Premium Control, Premium Media, Gold and Bronze DiffServ classes</td></tr>
<tr><td colspan="2">Control Protocols</td></tr>
<tr><td>MEGACO (H.248)</td><td>Call control, Supporting Generic Media Package, Base Root, Tone Generator, Tone Detection, DTMF Generator, DTMF Detection, Call</td></tr>
</table>

Table 18-1: Media Gateway 3500 Functional Specifications

Function	Specification
	Progress Tones Generator, Call Progress Tones Detection, Basic Continuity, Network, RTP, TDM Circuit, Generic Announcement, Expanded Call Progress Tones Generator, Basic Service Tones Generation, Expanded Services Tones Generation, Basic CAS, R2 CAS, MF Generator, MF Detection, Inactivity Timer, Basic Call Progress Tones Generator with Directionality, Call Type Discrimination, IP Fax as well as other more packages
Security	
IPSec (ESP) with IKE pre-shared key	IPSec is supported for the management traffic to EMS/ NMS/ OSS and for control interfaces to MGC (with reduced channel capacity). Encryption algorithms - DES and 3DES Hash types - SHA1 and MD5
Access Control Lists	The control interfaces can be protected by access control lists.
Media Encryption **(Currently, Encryption key supplied by TGCP only)**	Media encryption is supported per PacketCable specification (with reduced channel capacity). AES - 128 (Rijndael) cipher algorithm, in CBC mode Optional 2-byte or 4-byte MAC based on MMH algorithm
SSH (Secure Shell)	To secure the Telnet and SFTP Server SSH Protocol Version 2 Supported encryption algorithms: AES-128, BLOWFISH, 3DES Supported authentication algorithms: SHA1, MD5 User/password authentication on each login
SSL (the Secure Socket Layer)	To secure Media Gateway Boards web server and telnet Supported transports: SSL 2.0, SSL 3.0, TLS 1.0 Supported ciphers: DES, RC4 compatible Authentication: Username & Password, X.509 certificates
PSTN Signaling	
In-band/Out-of-band Signaling **(DTMF & Tone Detection/Generation)**	DTMF per TIA 464B
	DTMF over RTP per RFC 2833
	MFC-R2, MF-R1, MF-R1 (US) including FG-A/B/D
	Packet side or PSTN side generation/detection of DTMF and User Defined Call Progress Tones (PSTN, IP) & Continuity Test Tones (per ITU-T Q.724 – only THRH is supported)
PSTN Protocols	CAS - T1 robbed bit: WinkStart, delay dial, immediate start, FGB, FGD, etc. MFC/R2 numerous country variants Unique script for each county variant, enabling maximum flexibility of the entire state machine of each CAS protocol

Table 18-1: Media Gateway 3500 Functional Specifications

Function	Specification
	Note: Currently supported on Media Gateway blade TP-1610 only
	CCS - ISDN PRI: ETSI EURO ISDN, ANSI NI2, DMS, 5ESS, Japan INS1500, QSIG Basic Call, Australian Telecom, New Zealand Telecom, Hong Kong Variant, Korean MIC
CAS Relay	ABCD signaling over RTP per RFC 2833 Note: Currently supported on Media Gateway blade TP-1610 only
SIGTRAN	IUA (RFC 3057) over SCTP (RFC 2960)
Cable Services	
PacketCable Vocoders	G.711 (A-law/m-law), G.728 and G.729E, supporting PacketCable PKT-SP-Codec Additional coders such as iLBC and BV16 may be supported - contact Nortel for further information
Media Gateway Control Protocols	TGCP, IT Package according to PacketCable PKT-SP-TGCP
PacketCable Security	Call Control Security, supporting IPSec with pre-shared Key, per relevant parts of PKT-SP-SEC Media (RTP/RTCP) Security - AES - 128, per relevant parts of PKT-SP-SEC
Maintenance	
Management	Element Management System, SNMP v2 OAM Single point of access via the System Controller; easy management and provisioning with standard SNMP v2 interface
Maintainability	All shelf modules are hot swappable, including boards, Power Supply modules, fans and Alarm modules
Redundancy Scheme	CPUs, Ethernet switches: Active/Standby Power supplies, fans: Load Shared Media Gateway boards: N+1
Diagnostic	Automatic and Manual HW and SW Diagnostic, BIT (Built in Test) fault detection, heart beat, chassis sub-systems monitoring
Physical Interfaces	
E1/T1 Interfaces	Two 50-Pin Telco connectors (DDK 57AE-40500-21D) via RTM rear panel I/O module, each handling 8 E1/T1 ports
IP Interfaces	ES/4411: • Two Uplinks - 1000 Base-SX with Dual SC terminators, using 850 nM transceivers for multimode fiber (MMF) optic cables RTM Interfaces - 100 Base-T using RJ-45 connector for CAT 5 cables
Hardware Specifications	

Table 18-1: Media Gateway 3500 Functional Specifications

Function	Specification
Dimensions (h x w x d)	222 x 483 x 311 mm (8.7 in. x 19 in. x 12.3 in.)
Enclosure	10 -slot 5 U cPCI chassis
Weight	Approx. 27 lbs. (12.3 kg) unloaded. Approx. 50 lbs. (22.6 kg), fully loaded
Mounting	Per EIA Standard RS-310-C in 19-inchrack
Midplane	PICMG 2.16 cPCI Packet Switching Backplane (cPSB) PICMG 2.1 cPCI hot swap specification PICMG 2.0 cPCI specification
Power	-48 V DC Dual Feed, with up to 3 DC Power modules OR 100 - 240 V AC with up to 3 AC Power modules
Cooling	Easily replaceable fan tray& filter
Regulatory Compliance	
Telecommunication Standards	TIA-968, CS-03, PTC220, JATE, A-Tick mark, HKTA, TBR4 and TBR13
Safety and EMC Standards	UL 60950-1, EN60950-1 FCC part 15 Class A CE Mark (EN 55022 Class A, EN 60950, EN 55024, EN 300386)
Environmental	NEBS Level 3: GR - 63-Core, GR -1089-Core Type 1 & 3, ETS 300 019

Specifications subject to change without notice.

19 Regulatory Information

Notice

Information contained in this document is believed to be accurate and reliable at the time of printing. However, due to ongoing product improvements and revisions, Nortel cannot guarantee the accuracy of printed material after the Date Published nor can it accept responsibility for errors or omissions.

Date Published: October 2005 Date Printed: October 2, 2006

Safety Notices

The protective earth terminal on the back of the 5000 must be permanently connected to protective earth.

Industry Canada Notice

This equipment meets the applicable Industry Canada Terminal Equipment technical specifications. This is confirmed by the registration numbers. The abbreviation, IC, before the registration number signifies that registration was performed based on a declaration of conformity indicating that Industry Canada technical specifications were met. It does not imply that Industry Canada approved the equipment.

Caution Laser

The device may contain a Class I Laser/LED emitting device, as defined by 21CFR 1040 and IEC825.

Do NOT stare directly into the beam or fiber optic terminations as this can damage your eyesight.

Digital Device Warnings

This equipment complies with Part 68 of the FCC rules and the requirements adopted by ACTA. On the interface card module of this equipment is a label that contains a product identifier in the format US: AC1ISNANTP1610. If requested this number must be provided to the telephone company.

The Telephone company may make changes in the facilities, equipment, operations or procedures that could affect the operation of the equipment. If this occurs, the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service. Should you experience trouble with this telephone equipment, contact Nortel. **Do not attempt to repair this equipment!**

Facility Interface Code: 04DU9.BN, 04DU9.DN, 04DU9.1KN, 4DU9.ISN

Service Order Code: 6.0N

USOC Jack Type: RJ21X or RJ48C

It this gateway causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also you will be advised of your right to file complaint with the FCC if you believe it is necessary.

Network Information and Intent of Use

The products are for access to ISDN at 2048 kb/s and for access to G.703 Leased lines at 2048 kb/s.

Network Compatibility

The products support the Telecom networks in EU that comply with TBR4 and TBR13.

Telecommunication Safety

The safety status of each port is declared and detailed in the table below:

Ports	Safety Status
E1 or T1	TNV-1
Ethernet (100 Base-T)	SELV
DC Input Power Port	SELV

TNV-1: Telecommunication network voltage circuits whose normal operating voltages do not exceed the limits for SELV under normal operating conditions and on which over voltages from telecommunication networks are possible.

SELV: Safety extra low voltage circuit.

FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Reader's Notes

20 Appendix - Installing ES Board Software

20.1 Media Gateway 3500 Media Gateway Version 2.1

Media Gateway 3500 Media Gateway version 2.1 does not support automatic management of the Ethernet Switch board's software. Therefore, the user must perform the installation manually as described below.

Software on Ethernet Switch boards is to be installed in the following cases:

- Initial system installation
- Ethernet Switch Board replacement
- Rollback after Online Software Upgrade

➢ To install software on an Ethernet Switch Board, take these 8 steps:

1. Make sure that the uplink is connected to port 25 (optical 1Gb port).
2. Transfer the ***pti.4411.mode4.tar*** installation package to the Active SC board via FTP.
3. Connect to the Active SC board via Telnet or RS232 console.
4. Open the ***pti.4411.mode4.tar*** installation package.

```
client18::~# tar xvf pti.4411.mode4.tar
```

5. Change the directory to the ***pti.4411.mode4*** and run installation script.

```
client18::~# cd pti.4411.mode4
client18::/pti.4411.mode4# ./install
```

6. Enter the IP address of the Ethernet Switch Board when prompted.

```
client241::/pti.4411.mode4# ./install
========================================
Update software on Ethernet Switch Boards
           (v2.1,  Mode 4)
========================================

Enter Ethernet Switch Board's IP address : 10.1.1.35

Enter Ethernet Switch Board's subnet mask : 255.255.0.0

Verify IP address... done

Upload software to Ethernet Switch Board... done

New software was successfully uploaded to the Ethernet
```

```
Switch Board, but it wasn't activated yet.

Please provision IP address of the Switch Board via EMS
and lock/unlock it in order to activate new software.
```

7. When the new software is uploaded, provision the IP address of the Switch Board via the EMS and LOCK/UNLOCK it.
8. Wait approximately 10 minutes until the ES Board becomes ENABLED. Verify this in the EMS.

20.2 Troubleshooting

➢ If Ethernet Switch Board doesn't have IP address, take these 3 steps prior to installing new software on it:

1. Connect to the Switch Board's RS232 console.
2. Log in using the username: **admin** and password: **password**.

```
Escape character is '^]'.
PTI CPC4411 (from application)...
login: admin
Password: password
#
```

3. Configure the IP address on Ethernet Switch board (note that this configuration does not survive reset, hence you should immediately proceed to the software installation as described above).

```
# ip config sw0 10.1.1.35
```

21 Appendix - Solaris™ 8 OS Installation

21.1 Introduction

The Solaris™ operating system (OS) is installed on the Shelf Controller (SC) boards of the Media Gateway 3500 Media Gateway. Each version of SC software requires a specific version of the Solaris™ OS. Because customized configured versions of the Solaris™ OS are utilized in the Media Gateway 3500 (to ensure full hardware compatibility and optimal software performance), it is important to utilize Nortel provided versions of the Solaris™ OS for installations on SC boards as needed.

Version 2.1 of the SC software requires that Solaris™ 8 2/02 be installed on the SC boards.

21.2 Installation Requirements

Installation of Solaris™ OS on SC boards is performed via the network. The Solaris OS Installation image must be placed on an Install Server that fulfills the following requirements

- Solaris™ 8 2/02 or later
- CD-ROM Drive
- At least 2 Gb free disk space in the root file system
- Resides on the same subnet with Media Gateway 3500

Note: The Install Server must reside on the same LAN with Media Gateway 3500 (i.e., it *must* be connected to the same Ethernet Switch.

The installation is to be performed on the SC board while it resides in the Media Gateway 3500 chassis. In addition, the SA-2 RTM must also be in place behind the SC board during the installation process.

21.3 Preparing the 'Install Image'

➢ To prepare the 'Install Image', take these 5 steps:

1. In the Install Server's CD-ROM drive, insert the Solaris™ 8 SC OS CD.
2. Open a terminal (via Telnet or X).

3. At the prompt, change the directory to the CD-ROM's root.

```
EMS-Server8:/ [root] => cd /cdrom/cdrom0
```

4. If there is no directory,**"cdrom0"** exists, type the command, **eject** and try again.

```
EMS-Server8:/ [root] => eject
```

5. At the prompt, run the 'install' script by typing ./**install** and pressing **Enter**.

```
EMS-Server8:/cdrom/cdrom0 [root] => ./install
```

The Install image creates a /jumpstart directory that is shared over the network.

21.4 Installing the SC board

21.4.1.1 Installing the Solaris™ 8 OS on the SC board

➢ **To install the Solaris™ 8 OS on the SC boards, take these 9 steps:**

1. On SC board, connect to the RS232 console.
2. Identify the SC hostname, IP address and MAC address of the SC board.

   Sample values are shown in red in the example below.

```
client224:~# ~ => ifconfig -a
lo0: flags=1000849<UP,LOOPBACK,RUNNING,MULTICAST,IPv4> mtu 8232 index
1
        inet 127.0.0.1 netmask ff000000
dmfe0:
flags=1000863<UP,BROADCAST,NOTRAILERS,RUNNING,MULTICAST,IPv4> mtu
1500 index 2
        inet 10.7.13.94 netmask ffff0000 broadcast 10.7.255.255
        ether 0:3:ba:78:8e:65
```

3. On the 'Install Server', open a terminal (via Telnet or X).
4. Define the SC board.

```
EMS-Server8:/ [root] => cd /jumpstart/Solaris_8_202_v1.0
EMS-Server8:/ [root] => ./add client.sh sc name sc ip sc mac
```

5. Via the RS232 console connection on the SC board, copy the new firmware from the 'Install Image' to the local hard disk.

```
client224:~# ~ => mount -F nfs ems_ip:jumpstart /mnt
client224:~# ~ => cd /mnt/Solaris 8 202 v1.0/Firmware
client224:~# ~ => perl copyFW.pl
```

6. Go to the OBP level by typing **sync;halt** and pressing **Enter**.

```
client224:~# ~ => sync;halt
ok>
```

Note: The Blue (hotswap) LED is lit after the 'sync;halt' command is entered, however this does not indicate any kind a failure and should be ignored.

7. Install new firmware. Follow the example below:

```
ok> setenv auto-boot? false
ok> reset-all
ok> flash-update /pci@1f,0/pci@1/ide@2/disk@0,0:a:,/firmware.bin
ok> setenv legacy-support? true
ok> setenv auto-boot? true
ok> setenv diag-switch? false
```

Note: The command, **setenv legacy-support? true** may fail on certain boards. If this occurs, ignore this failure and proceed with the next command.

Remain at the OBP level (do not reboot the board) and proceed to the next step.

8. Via the RS232 console connection on the SC board (you should already be at OBP level), install the Solaris™ 8 OS.

```
ok> boot net - install
```

The Solaris™ 8 OS installation takes approximately 10 min. During this process, the SC board is rebooted. A message appears when the installation is complete and a login prompt is presented.

9. To stabilize the file system, at the prompt, type lockfs –f / and pressing Enter.

```
client224:~# ~ => lockfs -f /
```

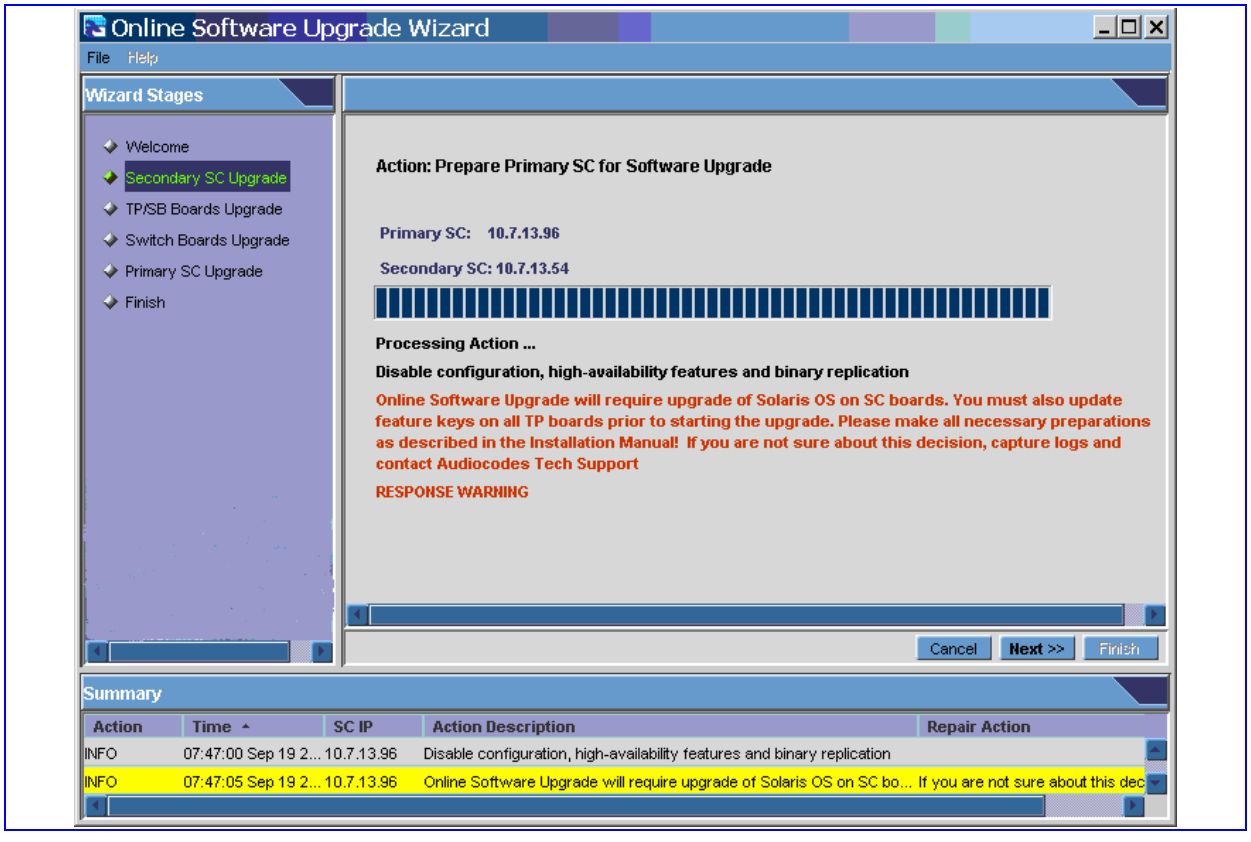
Reader's Notes

22 Appendix – Updating the Media Gateway Boards Feature Key

The Feature key for the Media Gateway boards defines the maximum software version that may be loaded on the Media Gateway board and specific applications that may be configured on it. Prior to upgrading the Media Gateway from version 2.1 to version 3.0, you must update the Feature keys of all of the Media Gateway boards in the system as part of "Site Preparation" (refer to 'Site Preparation' on page 49 for details).

During the Online Software Upgrade process, the wizard includes a reminder regarding upgrading the Feature keys (refer to the figure below).

Figure 22-1: Online Software Upgrade Wizard Screen - Update Feature Key Notice



Use the **fk_update.pl** script to query and update the feature key on the Media Gateway Boards. Find the script on the Media Gateway 3500 SW CD.

To update the Feature keys of the Media Gateway boards in the system, take these 5 steps:

1. Using FTP, from the 'MG 3500 SW' CD, copy the **fk_update.pl** script to the root directory on the Active SC board.
2. Using Telnet or the RS232 console, connect to the Active SC board.
3. Change the permissions of the **fk_update.pl** script by typing at the prompt:

chmod a+x /fk_update.pl

4. Run the **fk_update.pl** script in *dump* mode, by typing at the prompt:

/fk_update.pl dump

The script analyzes the feature key on each of the Media Gateway boards. If any of the feature keys are invalid, the script collects all of the required information and creates a report. If such a report is produced, send it to Nortel Technical Support who will provide a file containing the correct keys for your Media Gateway boards.

5. Once receiving the file, transfer this file to the Active SC board and apply it by typing at the prompt:

/fk_update.pl <key_filename>

Note: Feature keys go into effect only after Media Gateway boards are restarted. Optionally, from the EMS, lock/unlock Media Gateway boards after this Feature key update. However this is not a mandatory step, since boards are reset during Online Software Upgrade.

23 Appendix - Getting Started with MIBs

Using the EMS to manage their Media Gateway is strongly recommended due to the efficient, comprehensive and user-friendly environment offered in the EMS.

However, a customer may opt for the alternative management method using the Media Gateway's MIB and utilizing a MIB Compiler and Browser such as those provided by, for example, MGSOFT Corporation, accessible at URL 'http://www.mg-soft.com/'. This section describes this alternative management method.

For a detailed description of the MIB structure and provisioning parameter tables, refer to "SNMP Agent, of the Media Gateway" in the *Programmer's User Manual*, Document#: LTRT-914xx.

For information on using the MIB Compiler and MIB Browser, refer to the user manuals accompanying these applications.

➢ To manage the Media Gateway using the MIB Compiler and MIB Browser, take these 9 steps:

1. Compile the Media Gateway's MIB.
2. Save the compiled file.
3. Set the IP address of the remote Media Gateway.
4. Set the SNMP version V1 or V2. Note that the use of SNMP V2 allows use of the bulk operations for operation efficiency.
5. Set the read and write community to: public and private respectively.
6. Load the compilation result file into the MIB browser.
7. To check that the Solaris system is working, use the **ping** command to solicit a response from the Media Gateway. Continue if you get a response.
8. To check if the SC software is working properly, perform a **get** command on the Media Gateway.
9. Start navigation of the MIB parameters.

23.1 MIBS and Provisioning Options

This section provides the basic MIB navigation information necessary to modify elementary settings of the Media Gateway's components. The Media Gateway is supplied with some pre-configurations. However, it is recommended to configure all the read-write accessible parameters in the path:

```
..\tgConfig\tgMGInfo
```

When modifying the parameters of a Media Gateway, you must lock the element that you are going to configure, and all other elements related to that specific element (if any others exist).

a. When beginning to work with the Media Gateway for the first time, all the Media Gateway's elements are locked, allowing the SNMP Agent to start provisioning those elements.

b. It is important to unlock the elements when provisioning/configuration is complete, otherwise the Media Gateway will remain out of service.

23.1.1 Configuring a Newly Inserted Media Gateway board

➢ **To configure a newly inserted Media Gateway board, take these 10 steps with the MIB elements located under the following path:**

```
.\tgConfig\tgModule\tgSlotTable\tgSlotEntry
```

1. Define a new board in one of the chassis slots by setting tgSlotActionType = addBoard. As a result:

   When working with a MIB browser, a table of the slots is displayed.

   Select the appropriate specific slot number.

2. Verify the performed operation by reading tgSlotBoardType.
3. In the MIB elements located in the following path:

```
..\tgConfig\tgModule\tgTPBoardTable\tgTPBoardEntry
```

Set the first MAC address of the board by setting tgTPBoardMACAddr1 = first MAC address of the configured board (the MAC address of module that is connected to trunks 9-16). Refer to Section A.1 on page 139 for details on ascertaining the MAC address of the Media Gateway board.

Note: For the TP-1610 1610, it is very important to write the first MAC address as the value and not the second MAC address.

4. Set the second MAC address of the board by setting tgTPBoardMACAddr2 = second MAC address of the configured board
5. Set the first IP address of the board by setting tgTPBoardIPAddr1 = first IP address of the configured board.
6. Set the second IP address of the board by setting tgTPBoardIPAddr2 = second IP address of the configured board.
7. Set the subnet mask of the board by setting tgTPBoardSubnetMask = subnet mask address of the configured board.
8. Verify the performed operation by reading back the configured parameters.
9. Unlock the locked section by setting tgBoardActionType = unlock.

When these actions are complete, the specific slot is configured with a specified board type. All other board parameters are configured with the default values. Refer to the *Programmer's User Manual*, Document#: LTRT-914xx, for the list and description of the board parameters and the default values.

10. Check if an inserted board is operational by examining for the moOperativeStateChange alarm, which indicates AlarmSource = selected board# and ProbableCause = enabled.

23.1.2 Modifying a Media Gateway board Configuration

This section provides a brief process description of modification of board configuration. For a detailed description of the configuration methodology and detailed board parameters refer to the *Programmer's User Manual*, Document#: LTRT-914xx.

➢ To modify the configuration of a Media Gateway board, take these 4 steps with the MIB elements located under the following path:

```
..\tgConfig\tgModule\tgTPBoardTable\tgTPBoardEntry
```

1. Lock the configured MIB section by setting the tgBoardActionType = lock. As a result:

   When working with a MIB browser, a slot Table of 22 slots is displayed.

   Select the appropriate specific slot number.

2. Modify one of board's parameters, which have read-write access. For example, the obvious parameters that can be changed:

   tgTPBoardEnableDignostics to enable/disable power-on self-tests on the board.

3. Verify the performed operation by reading the appropriate parameter.

4. Unlock the locked section by setting the tgBoardActionType = unlock.

   When working with a MIB browser, a table of the slots is displayed.

   Select the appropriate specific slot number.

When these actions are complete, the specific slot is configured with appropriated settings. All other board parameters are configured with the default values.

23.1.3 Modifying a Trunk Configuration

For a detailed description of the configuration methodology and detailed trunk parameters, refer to the *Programmer's User Manual*, Document#: LTRT-914xx, for the list and description of the trunk parameters and the default values.

To modify a trunk configuration, take these 5 steps with the MIB elements located under the following path:

```
..\tgConfig\tgTrunk/tgTrunkTable\tgTrunkEntry
```

1. Lock the configured MIB section by setting the tgTrunkActionType = lock. As a result:

   When working with a MIB browser, a trunk Table of all gateway trunks is displayed.

   Select the appropriate specific trunk number.

2. Modify one of trunk's parameters, which have read-write access.

   For example, the obvious parameters that can be changed:

   tgTrunkType to select E1/T1/J1 type.

   tgTrunkFramingMethod - to modify the framing type of the trunk.

   tgTrunkLineCode - to modify the line coding of the trunk.

3. Verify the performed operation by reading the appropriate parameter.

4. Unlock the locked section by setting the tgTrunkActionType = unlock.

   When working with a MIB browser, a trunk Table of all gateway trunks is displayed.

   Select a specific trunk number.

When these actions are complete, the specific trunk is configured with appropriated settings. All other trunk parameters are configured with the default values. Refer to the *Programmer's User Manual*, Document#: LTRT-914xx, for the list and description of the board parameters and the default values.

5. Check the trunk status by examining the moOperativeStateChange alarm, which indicates AlarmSource = modified trunk# and ProbableCause = enabled or disabled.

   (Refer to 'List of Alarms' on page 195, or the *Programmer's User Manual*, Document#: LTRT-914xx, for the Alarm values.)

23.1.4 Removing a Media Gateway board

When a Media Gateway board is removed from the system, you must remove its MIB parameters.

➢ **To remove the MIB parameters of a removed Media Gateway board, take these 3 steps with the MIB elements located under the following path:**

```
..\tgConfig\tgModule\tgSlotTable\tgSlotEntry
```

1. Remove a configured board from a chassis slot by setting tgSlotActionType = removeBoard. As a result:

   When working with a MIB browser, a table of the slots is displayed.

   Select the appropriate specific slot number.

2. Verify the performed operation by reading tgSlotBoardType to compare with the configured VOP board type at the selected slot number.

3. Check that the board has been deleted by examining the moOperativeStateChange alarm, which indicates that AlarmSource = selected board# and ProbableCause = disabled.

(Refer to 'List of Alarms' on page 195, or the *Programmer's User Manual*, Document#: LTRT-914xx, for the Alarm values.)

24 Appendix - Utilities

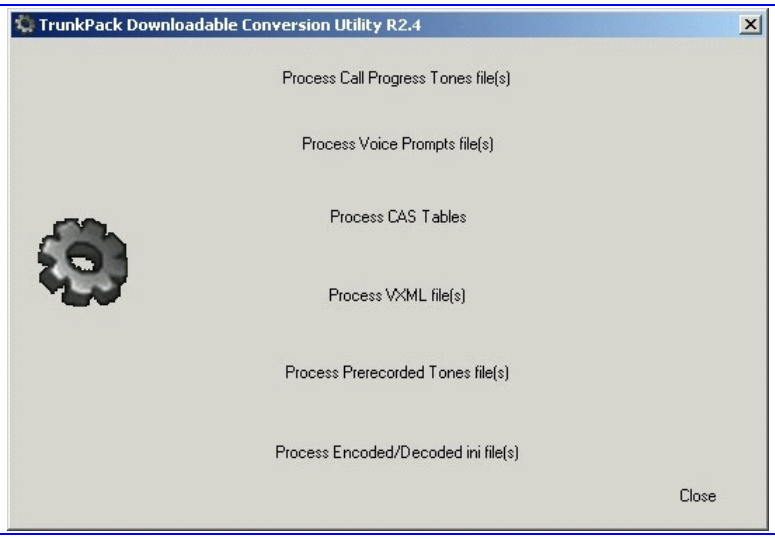
This section describes the functionality and operation of a list of utilities supplied with the software package.

24.1 Downloadable Conversion Utility

LOCATION:

```
.\Tools\DConvert.exe
```

Figure 24-1: Downloadable Conversion Utility Opening Screen



This utility is used to generate the following:

- Process Call Progress Tones file(s)
- Process Voice Prompts file(s)
- Process CAS Tables **(Even though this utility is listed in the main menu, it is NOT applicable to MG 3500)**
- Process VXML file(s) **(Even though this utility is listed in the main menu, it is NOT applicable to MG 3500)**
- Process Prerecorded Tones file(s)
- Process Encoded/Decoded ini file(s) **(Even though this utility is listed in the main menu, it is NOT applicable to MG 3500)**

The files constructed using these utilities can be downloaded to the MG 3500 via the EMS.

Some files may have usage restrictions as described under their usage information.

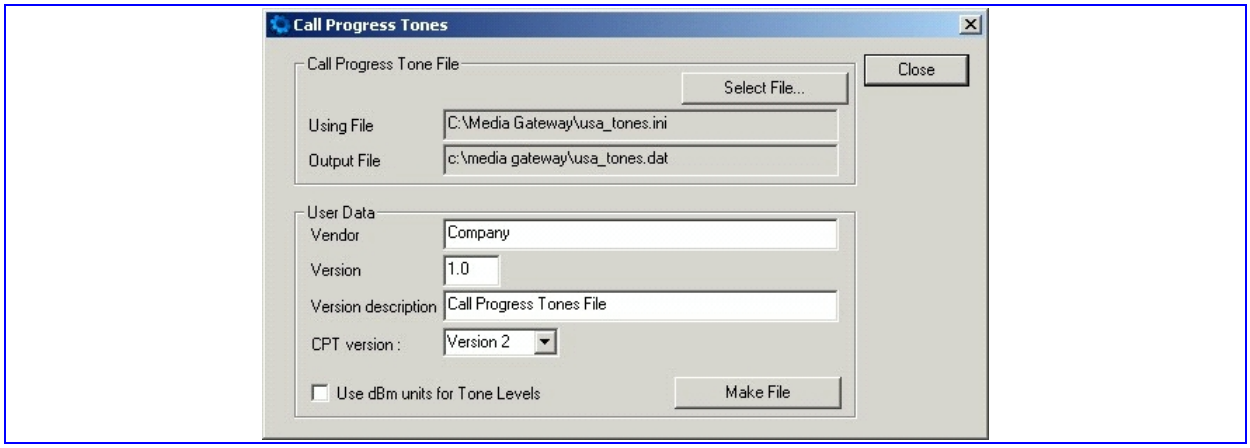
24.1.1 Process Call Progress Tones file(s)

24.1.1.1 Converting a CPT ini File to a Binary dat File

➢ To convert a CPT ini file to a binary dat file, take these 8 steps:

- Create a CPT ini file using the direction in "Modifying the Call Progress Tones File" on page 119 or by editing a CPT ini file provided by Nortel.
- Execute *DConvert.exe* and click the **Process Call Progress Tones file(s)** button. The Call Progress Tones dialog appears.

Figure 24-2: Call Progress Tones Screen



- Click the **Select File . . .** button and navigate to the location of the CPT *ini* file that you want to convert.
- Select the desired file and click **Open**. The name and path of both the CPT *ini* file and the *dat* file appear in the **Using File** field and **Output File** field respectively. (The file names and paths are identical except for the file extension.)
- Fill in the **Vendor, Version** and **Version Description** fields.
  - **Vendor** field - 256 characters maximum
  - **Version** field - must be made up an integer, followed by a period "**.**", then followed by another integer (e.g., 1.2, 23.4, 5.22)
  - **Description** field - 256 characters maximum
- The default value of the CPT version drop-down list is **Version 3**. Do one of the following:
  - If the gateway version release is prior to version 3.0, in the **CPT Version** drop-down list, select **Version 1** (to maintain backward compatibility).
- The **Use dBm units for tone levels** checkbox is not checked as the default. To use -dBm units for setting the Call Progress Tone and User Defined Tone Levels, click a checkmark into the **Use dBm units for tone levels** checkbox. This checkbox should be checked to maintain backward compatibility.

Note: The default value of the **dBm units for tone levels** checkbox is left unchecked for backward compatibility with versions prior to version 3.0.

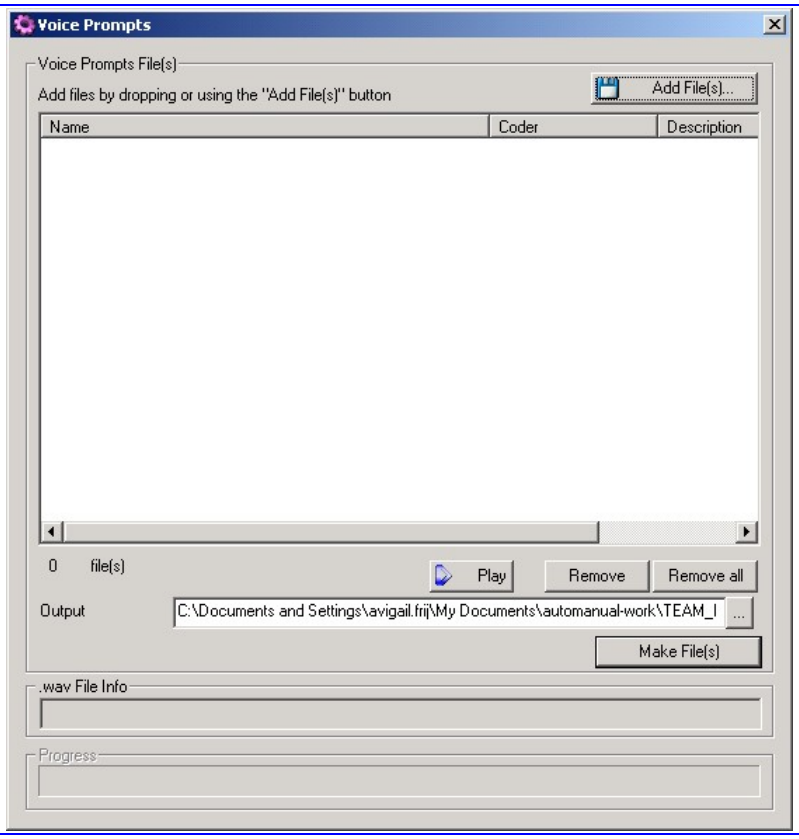
- Click the **Make File** button. The *dat* file is generated and placed in the same directory as shown in the **Output File** field. A message box informing you that the operation was successful indicates that the process is completed.

24.1.2 Process Voice Prompts file(s)

To generate a Voice Prompts file, take these 12 steps:

1. Create raw Voice Prompt files. The **DConvert** utility supports *wav* files as well.
2. Execute *DConvert.exe* and click the **Process Voice Prompts file(s)** button. The Voice Prompts window appears.

Figure 24-3: Voice Prompts Screen



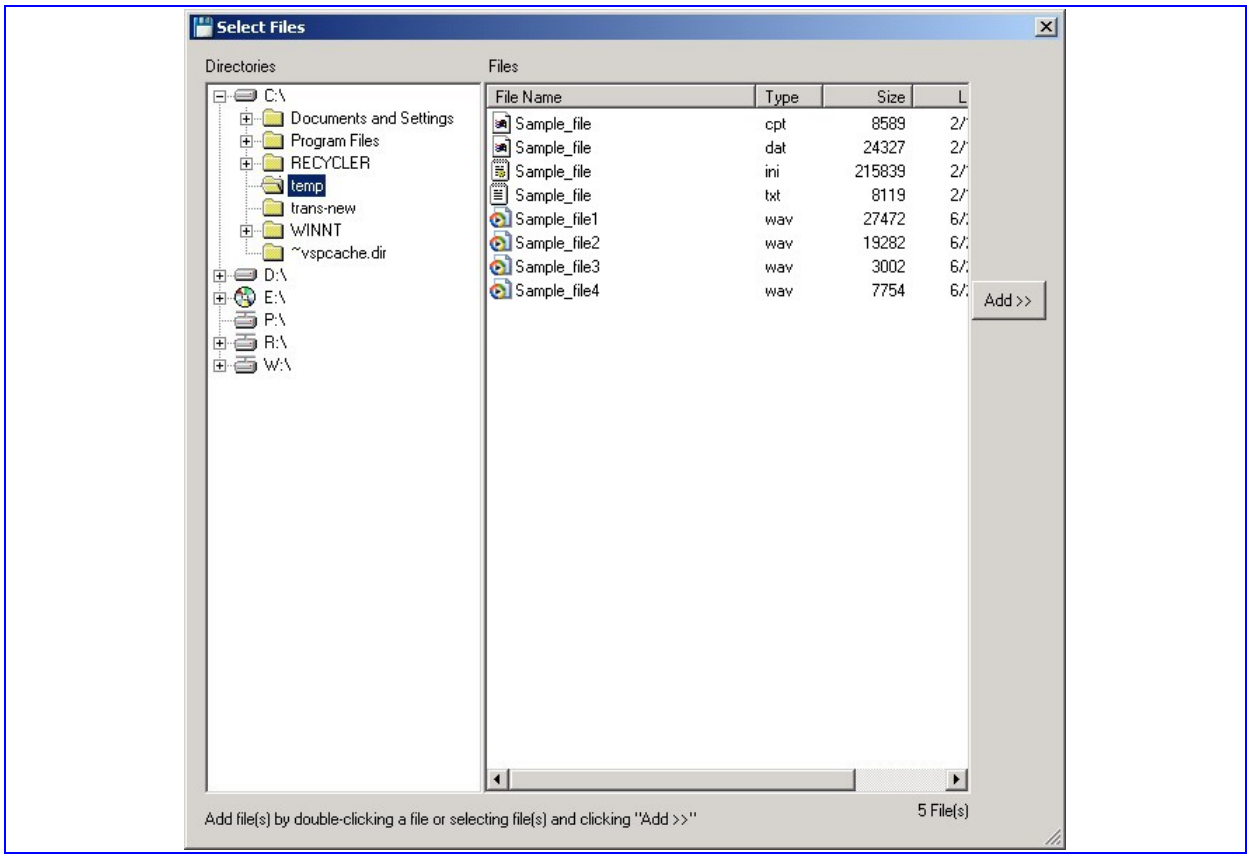
3. Select the raw Voice Prompt files (created in Step 1) step either by one of these actions:

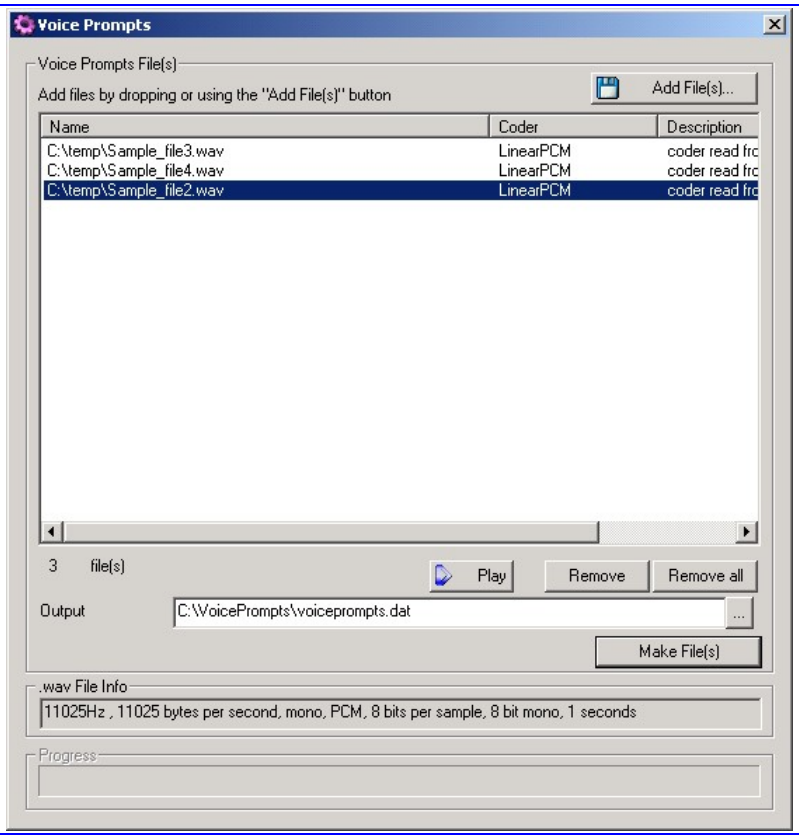
a. Click the **Add Files** button in the upper right corner. The Add Files window appears. (Refer to the figure, "Select Files Window" below.)

Navigate to the appropriate file.

Select it and click the **Add>>** button. To close the Add Files window, click the Exit button. (Press the **Esc** key to cancel changes.)

Figure 24-4: Select Files Window





b. From any location on the PC, select the appropriate files and drag-drop them into the Voice Prompts window.

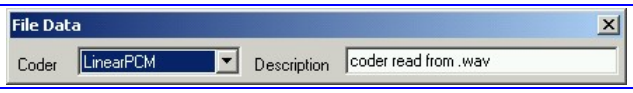
4. Arrange the files as desired by dragging and dropping them from one location in the list to another location.

Note: The sequence of files in the “Add Files...” window defines the Voice Prompt ID.

5. Use the Play button to preview the sound of the wav file. Use the Remove and Remove all buttons to remove files in the list as needed.

6. Select a coder for each file by first selecting the file (or files) and then double-clicking or right-clicking on it. The File Data window appears.

Figure 24-5: File Data Window



7. From the Coder drop-down list, select a coder type (to be used by the acPlayVoicePrompt() function).

8. In the Description field, enter a description (optional).

Note: For *wav* files, a coder is automatically selected from the *wav* file header.

9. Close the File Data dialog by clicking on the Exit button. (Press the Esc key to cancel changes.). You are returned to the Voice Prompts window.
10. The default Output file name is voiceprompts.dat. You can modify it. Or, use the Browse button to select a different Output file. Navigate to the desired file and select it. The selected file name and its path appear in the Output field.
11. Click the Make File(s) button to generate the Voice Prompts file. The Progress bar at the bottom of the window is activated. The dat file is generated and placed in the same directory as shown in the Output File field. A message box informing you that the operation was successful indicates that the process is completed.
12. The generated file can be used only for downloading using the ini file facility or using acOpenRemoteBoard() in full configuration operation mode. When using the acAddVoicePrompt(), use the single raw voice prompt files.

24.2 Packet Tracing

UDP2FILE is a PC application that can be used to record packets sent to it over the IP network. This utility can be used to capture PSTN traces and DSP traces.

24.2.1 Trunk (PSTN) Traces

This section contains direction on starting and collecting the PSTN trace via the Web. (Refer the figure below for a view of the Trunk Traces). Also, note if the PSTN trace is of an ISDN/SS7/ATM or CAS collection based on the physical device involved in the trace. This information is needed to properly parse the captured data.

➢ To start and collect the trunk trace via the Web, take these 12 steps:

1. On a PC run the UDP2File utility.
2. Select a suitable trace file name.
3. Determine the UDP port. Note: if there is a firewall between the gateway and the PC ensure that it is not blocking the UDP port you select for capturing the data.
4. Mark the PSTN Trace check box.
5. Press the **GO** button. The UDP2File utility will start to collect the trace messages when they are sent from the gateway.
6. Activate the Web page by entering <MG 3500 TP board IP address>/FAE in a browser window and choose the Trunk Traces tab (e.g., http://10.8.8.101/FAE). See Figure 24-6 below.
7. Use the user and password, which is the same for the unit.
8. In the Web page, set the trace level of each trunk.
9. Enable the trace via the Web.

10. Determine the UDP port (the same as in step 3).
11. Click the SUBMIT button. The board starts to send the trace messages to the UDP2FILE application.
12. In the UDP2File utility (Refer to Figure 24-7 below) you should see the number in the packets field increasing.

Figure 24-6: Trunk Traces Screen

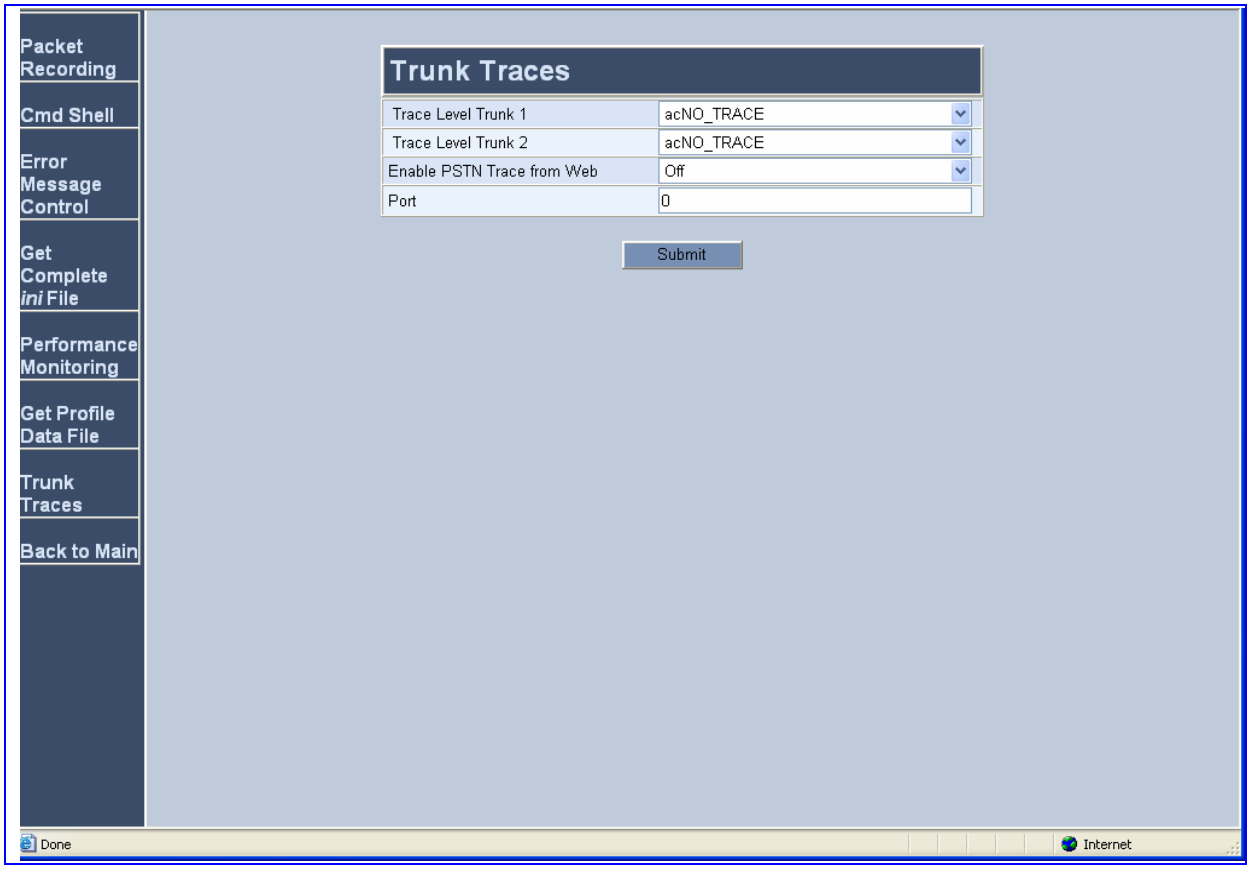


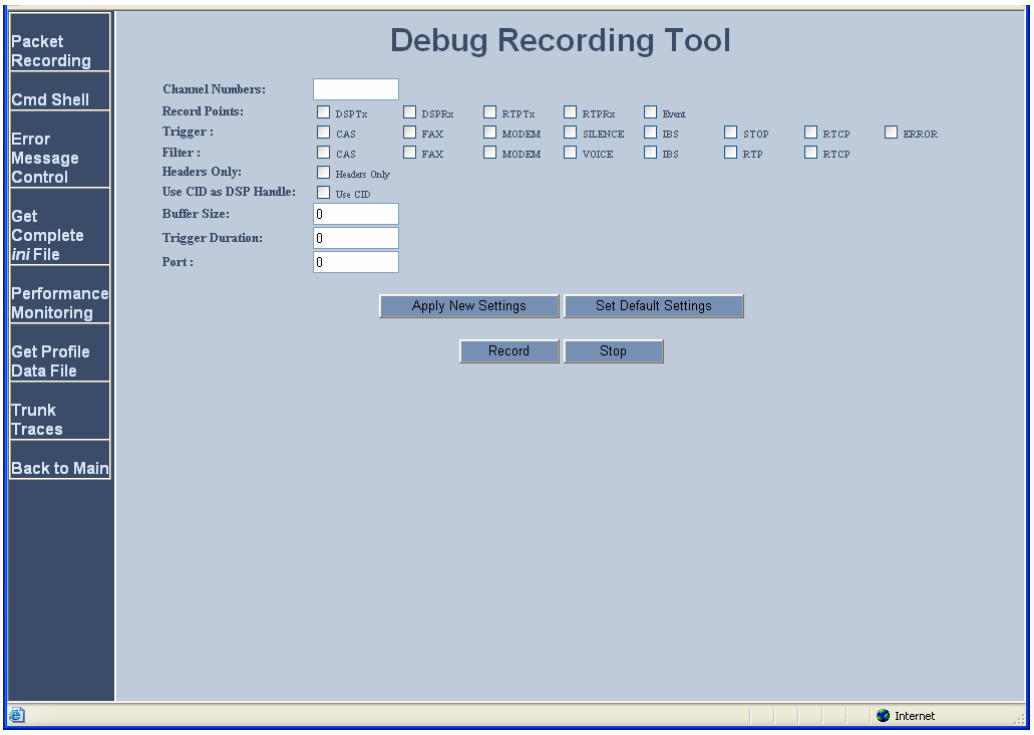
Figure 24-7: UDP2File Utility Dialog Box

24.2.2 DSP Traces

DSP traces are useful for capturing voice/data directly from a DS0 channel. To setup a DSP trace take the following steps:

1. On a PC run the UDP2File utility.
2. Select a suitable trace file name.
3. Determine the UDP port. Note: if there is a firewall between the gateway and the PC ensure that it is not blocking the UDP port you select for capturing the data.
4. Press the **GO** button. The UDP2File utility will start to collect the trace messages when they are sent from the gateway.
5. Activate the Web page by entering <MG 3500 TP board IP address>/FAE in a browser window and choose the Packet Recording tab (e.g., http://10.8.8.101/FAE). See Figure 24-8 below.
6. Use the user and password, which is the same for the unit.
7. Set the channel\channels to be recorded. It is not recommended to record more than 10 channels at once.
8. In the record points line check all the check boxes: DSP TX & RX, RTP TX & RX and events.
9. **Do not use trigger or filter.**
10. The port must be the same port as in the UDP2File application.
11. Press 'Apply New Settings'
12. Go to the UDP2File application and press 'Go', the application records packets sent on the selected port.
13. Go to the web page and press 'Record', the board sends the packet.
14. On the UDP2File application you should see the number in the packets field increasing if there is any activity on the selected channel(s).

Figure 24-8 Packet Recording Screen



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