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Meridian SL-100

Product Guide

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NORTEL

Meridian SL-100

Product Guide

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Version 18.01, MSL17, Preliminary. This version removes services and features information, as this is described in more detail in the *Meridian SL-100 Application Planning Guide*.

May 2001

Version 17.01, MSL15, Standard. This version presents the standard release of this document and provides information about Optivity Telephony Manager for Meridian SL-100, 2.0.

Contents

About this document

Purpose and audience

This document describes the circuit-switched Meridian SL-100 hardware platform, of which many of the components can be reused when evolving to the Communication Server 2100.

This document's audience is service provisioning, administrative and network management and planning personnel.

How to check the version and issue of this document

The version and issue of the document are indicated by numbers (for example, 01.01). For example, the first release of a document is 01.01. In the next software release cycle, the first release of the same document is 02.01.

The first two digits indicate the version. The version number increases each time the document is updated to support a new software release.The second two digits indicate the issue. The issue number increases each time the document is revised, but re-released in the same software release cycle. For example, the second release of a document in the same software release cycle is 01.02.

FOR MORE INFORMATION

To determine whether you have the latest version of this document, check the release information in the *Meridian SL-100 Master Index of Publications*.

References in this document

This guide provides an overview of the hardware components that make up the Meridian SL-100. The document is designed to act as a road map to help you find the hardware information related to your specific network configuration. As such, at the end of many of the sections in this guide, there are tables that list references to more detailed information about the component described.

Note: Reference documents may contain Nortel product names used in the carrier market.

Meridian SL-100 hardware overview

This section describes the Meridian SL-100 circuit-switched hardware components.

FOR MORE INFORMATION

For more detailed information, see the documents listed in the "References" section at the end of this chapter.

This chapter contains the following sections:

- **SuperNode generations**
- **Meridian SL-100 platforms**
- **Meridian SL-100 cabinets and frames**
- **References**

To provide large enterprise customers with maximum flexibility when selecting their communication system, Nortel continues to offer the circuit-switched Meridian SL-100 solution. The Meridian SL-100 combines the best of both worlds: Nortel carrier-grade Digital Multiplex System (DMS) and the world leading Meridian 1 Private Branch Exchange (PBX). The Meridian SL-100's architectural design which includes processing, switching, access and call control layers, enables you to invest in new technologies, such as IP technology, and to do so incrementally while leveraging your investment in the rest of your Meridian SL-100 system.

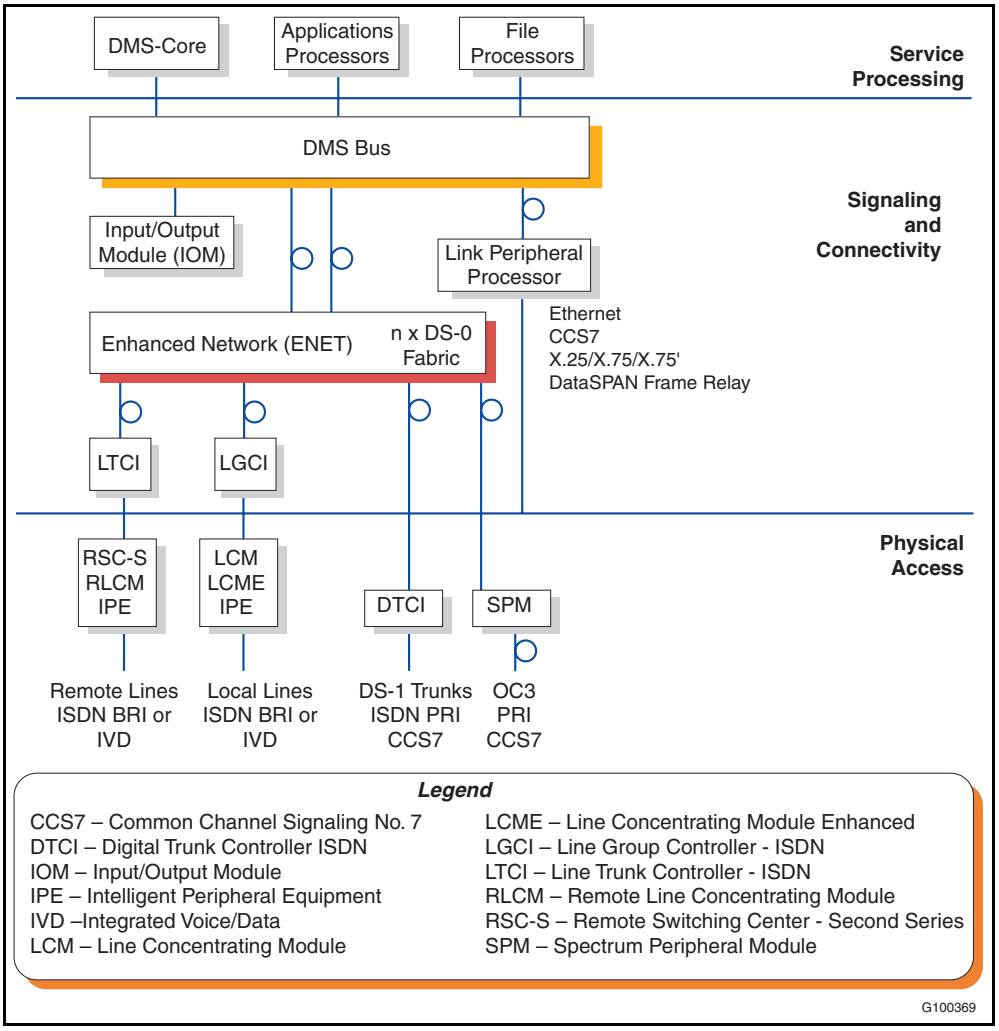
The Meridian SL-100 provides fully integrated voice and data communications and management. It serves as either a switching or networking manager for corporate, military and institutional purposes. This large-scale, software-controlled private switching system handles up to 60,000 digital voice or data connections, or a combination of both, to a wide variety of other voice or data systems.

There are two types of Meridian SL-100 systems and they are differentiated by the core processor. The first type is the SuperNode core with enhanced call processing and handling capabilities. The second type is a scaled-down version of the SuperNode core, called the SuperNode Space Enhanced (SNSE) core, designed to serve smaller offices with a maximum of 36,000 lines.

Note: The number of lines supported depends on the switch configuration, the feature implementation, the amount of ISDN line penetration and the Centi-Call Seconds (CCS) per line.

Figure 1 illustrates the Meridian SL-100 hardware architecture.

Figure 1
Meridian SL-100 layered hardware architecture



Some of the attributes of the hardware architecture which distinguish the Meridian SL-100 from the competition include the following:

- built-in redundancy which sets the standard in reliability
- small footprint and energy-efficient design to minimize facility costs
- modular design which allows organizations to scale the system to meet their requirements
- clear evolutionary paths to minimize upgrade costs and maximize investment protection, including the migration to the Communication Server 2100 which is the next generation of the Meridian SL-100

SuperNode generations

The SuperNode generation of switches, which includes the SuperNode and SuperNode SE systems, is based on evolutionary technology, yielding the following improvements over the NT40 generation of switches:

- increased processing and call-handling capability
- reduced size
- improved reliability

SuperNode switches consists of the following three components:

- core – the control component.
- bus – the messaging component; hereafter called the Message Switch (MS) bus or MS bus in this document to differentiate it from other types of buses.
- link – the software infrastructure that implements public networking standards including Common Channel Signaling and ISDN public standards and protocols.

SuperNode switches have a distributed architecture and increased processing capabilities, which provide an infrastructure for the development of new features and services. The SuperNode system also provides an interface to fiber transmission systems.

Overview of functional elements

All Meridian SL-100 systems consist of the same functional elements: the control component, the messaging component, the switching network, the peripheral modules and the input/output controller. Table 1 describes the functional elements.

Table 1
Meridian SL-100 functional elements

Element	Description
Control component	The duplicated control component coordinates call processing, including the actions of the switching network and of the Peripheral Modules. The SuperNode control component is called the “core.” The core’s major elements are a Computing Module (CM) and System Load Module (SLM). ***Note:*** The SuperNode messaging component is not contained in the control component, but is separate and called the message switch bus.
Messaging component	The messaging component routes messages within the Meridian SL-100 system. The SuperNode messaging component is the MS bus. The MS bus consists of duplicated message switches. The message switch is based on the SuperNode CPU; thus, it uses some of the same software as the Computing Module and the Central Control Complex CPU.
Switching network	The switching network is a digital switching matrix that interconnects the Peripheral Modules using Time Division Multiplexing (TDM). The switching network has duplicate network planes for reliability. It is made up of microprocessor-controlled digital switching Network Modules (NM) and is connected to the SuperNode MS bus.
Peripheral Modules	The Peripheral Modules (PMs) provide an interface between the switching network and telephony terminals such as lines and trunks. They also provide an interface between the Meridian SL-100 system and Remote Digital Terminals (RDTs), access nodes and other vendors’ switching equipment.
Input/Output Controller	The Input/Output Controller (IOC) provides an interface between the messaging component (the SuperNode MS bus) and input/output devices such as magnetic tape drives, disk drives, data links, video display units and printers. A video display unit connected to the IOC is used as a component of a Maintenance and Administration Position (MAP) workstation. The MAP workstation provides a user interface to the Meridian SL-100 system.

Meridian SL-100 platforms

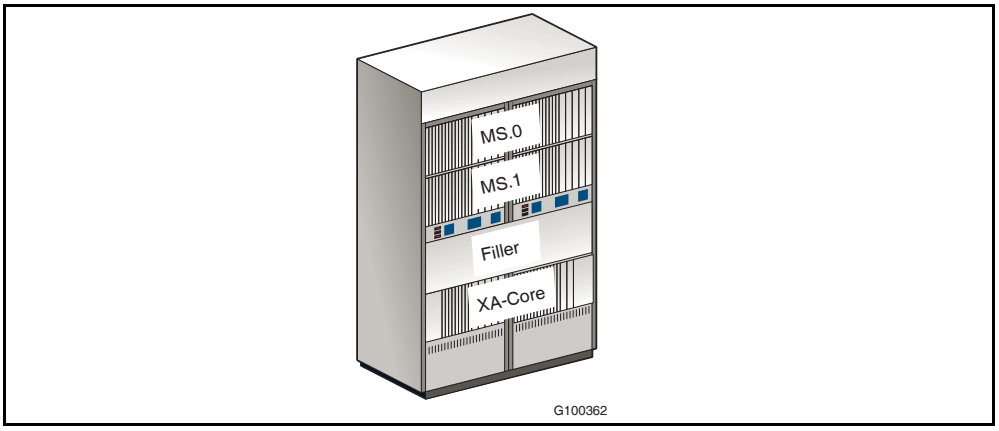
Meridian SuperNode for large applications

The Meridian SL-100 is a powerful communications system that combines advanced hardware architecture with premier PBX software features. The Meridian SL-100 is based on the highly successful technology Nortel developed for Digital Multiplex System (DMS) central office switches. These switches have set worldwide standards for reliability. The built-in redundancy of all critical system components ensures system operations integrity. As the largest member of the Meridian 1 family of sophisticated business communications systems, the Meridian SL-100 has provided superior service in a variety of industries for almost two decades.

The Meridian SL-100 supports a wide range of voice, data, video and multimedia applications. The system can be flexibly configured to address both current and future capacity and applications requirements as a result of its 100,000 digital voice or data line capacity threshold. The Meridian SL-100 incorporates the Nortel advanced Dual Plane Common Control (DPCC) design, which efficiently uses the system's processing power by providing distributed control over many processors. The system's modular design also allows easy upgrades as new processor technology becomes available.

Figure 2 shows an example of a Meridian SuperNode.

Figure 2
Meridian SuperNode

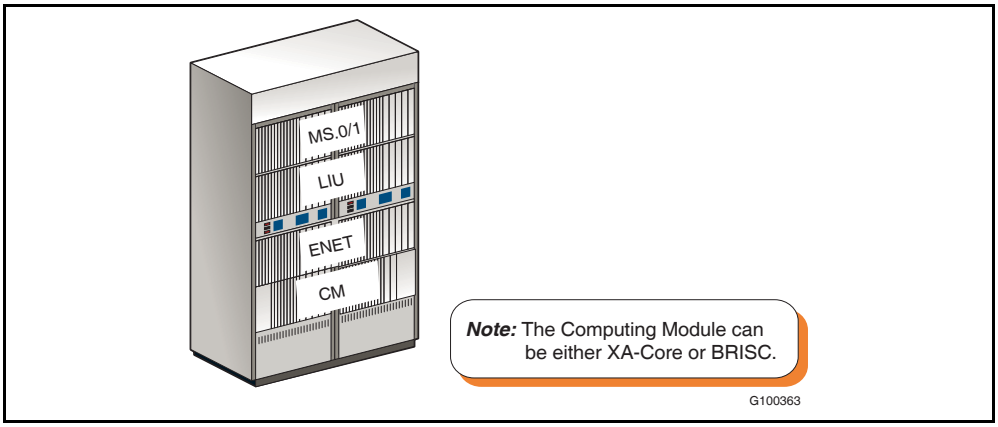


Meridian SuperNode SE (Space Enhanced) for smaller applications

As a smaller alternate solution to the Meridian SuperNode, the SuperNode SE (SNSE) is specifically designed for lower line-size (4,000 to 50,000) application-intensive requirements. The specific number of provisionable lines is dependent on the actual switch configuration, Centi-Call Seconds (CCS) per line and the actual mix of feature penetration.

The SNSE configuration provides the platform for current and future Meridian SL-100 applications and features required for the small switch market (see Figure 3).

Figure 3
Meridian SuperNode SE



The Meridian SuperNode SE offering combines the functionality of the DMS-Core, DMS-Bus, 16K ENET and a single-shelf Link Peripheral Processor (LPP) into one cabinet by providing the following:

- State-of-the-art processing capability of XA-Core.
- Duplex ENET configured for up to 16,000 channels on one shelf.
- A Link Interface Shelf (LIS) for additional 12 Interface Units (IUs) depending on provisioning rules.
- Available with optimal memory using block sparing.
- Duplicated, load-sharing Message Switch (DMS-Bus) on one shelf.

Meridian SL-100 cabinets and frames

Cabinet concept

The Meridian SL-100 system cabinet structure consists of basic hardware switching modules mounted in 1.8m (6 ft.) gray or brown cabinets.

Modular design

Modular design techniques are used in the development of both the software and hardware. Modularity can be thought of as the implementation of a complex system through a set of functional units or modules connected by well-defined interfaces. As a result of proper module and interface design, the various units can be connected, disconnected, modified or improved without affecting either the operation of the other modules in the system or the system as a whole.

This modularity gives the system flexibility in physical layout and function, in providing special features and in system expansion. The cabinetized Meridian SL-100 can be adapted to specific customer line, trunk and service circuit requirements through additional engineering.

Advantages of the cabinet

The cabinetized Meridian SL-100 offers these benefits:

- Provides pre-cabled, factory-assembled, and tested cabinets; thus, reducing on-site installation or commissioning intervals.
- Provides a modular system that easily expands and accommodates variations in system size and feature choices and allows integration of future system enhancements.
- Eliminates the need for additional external earthquake bracing by using prebraced steel cabinets.
- Presents a modern, computer-style appearance, ideally suited for computer rooms having raised flooring and low, suspended ceilings.
- Shortens delivery time.
- Simplifies system expansions.

Dimensions

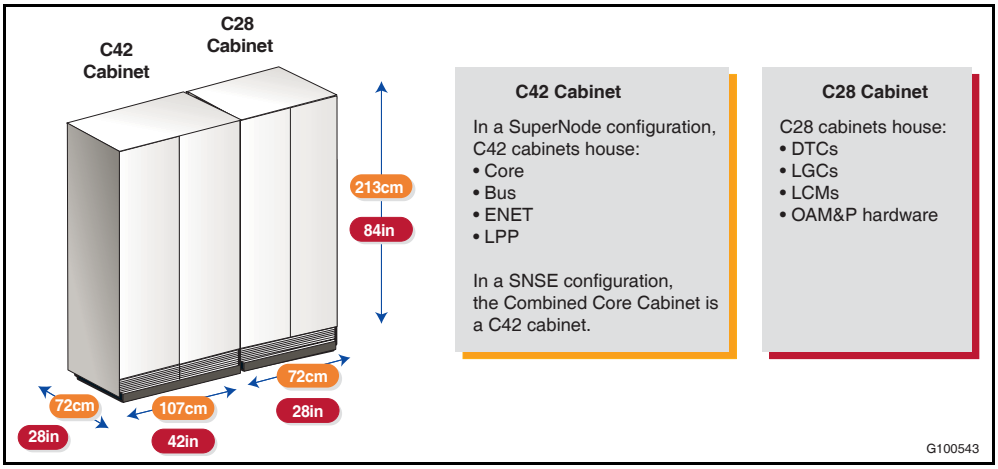
Current Meridian SL-100 hardware is housed in cabinets or frames with the following dimensions:

- C42 cabinet: 183 cm high x 107 cm wide x 72 cm deep (72” x 42” x 28”)
- C28 cabinet: 183 cm high x 72 CM wide x 72 cm deep (72” x 27” x 28”)
- Open frame: 213 cm high x 72 cm wide x 46 cm deep (84” x 28 x 18”)

Each cabinet or frame contains four shelves with slots for equipment (for example, card slots for inserting circuit cards). Cabinets are equipped with double doors on both the front and rear to provide convenient access for maintenance personnel.

Figure 4 illustrates the dimensions of C42 and C28 cabinets and lists the hardware units that can be housed in each one. An open frame can house the same type of units as C28 cabinets.

Figure 4
Dimensions of current Meridian SL-100 cabinets



Note: Standard Meridian SL-100 frames are also used to house the Spectrum Peripheral Module. The dimensions of the Spectrum Peripheral Module hardware are smaller than those of equivalent XPM units, but to minimize costs adapter brackets are used to house Spectrum Peripheral Modules in existing frames. Overall footprint can still be reduced, because access to all cards in the Spectrum Peripheral Module double-height shelves is from the front of the frame, which means that parallel rows of Spectrum Peripheral Module frames can be arranged back to back.

References

Table 2 shows where you can find more detailed information about the Meridian SL-100 hardware platform and components.

Table 2
References (Sheet 1 of 2)

Document	Number
Enhanced MAP Workstation Product Guide	555-4001-012
Ethernet Interface Unit on LPP Services Guide	555-4001-024
Meridian 1 Interworking Services Guide	555-4001-026
Digital Line Module (DLM) Reference Manual	555-4001-101
Remote Peripherals General Description	555-4001-104
ISDN Primary Rate Interface Reference Manual	555-4001-106
ASCII SMDR Data Access Description and Implementation	555-4001-119
Computer-to-PBX Interface General Description	555-4001-125
Asynchronous Interface Line Unit Reference Manual	555-4001-126
Intelligent Peripheral Equipment (IPE) Reference Manual	555-4001-129
Line Side T-1 Interface for IPE (LTI) Services Guide	555-4001-022
Peripheral Module Release Document (PM RELDOC)	555-4001-599
Getting Started with Optivity Telephony Manager User Guide	555-4001-316
Translations Guide	555-4031-350
Alarm Clearing Procedures	555-4031-543
Trouble Locating and Clearing Procedures	555-4031-544
Recovery Procedures	555-4031-545
Routine Maintenance Procedures	555-4031-546
Card Replacement Procedures	555-4031-547
Service Order Reference Manual	555-4031-808
Operational Measurements Reference Manual	555-4031-814
Log Report Reference Manual	555-4031-840

Table 2
References (Sheet 2 of 2)

Document	Number
Customer Data Schema	555-4031-851
Office Parameters Reference Manual	555-4031-855

In addition, because the Meridian SL-100 is based on the DMS system, there are many useful DMS documents that are included on the fully-searchable Customer Documentation CD-ROM that ships with the system.

Meridian SL-100 general functions

The Meridian SL-100 system consists of the following functional areas:

- SuperNode and SuperNode SE system functionality
- Network Modules
- Peripheral Modules
- maintenance and administration area

The main functional areas of the Meridian SL-100 system are connected by links carrying speech samples and control messages in the form of serial digital data. Each link provides a two-way (four-wire) transmission path for 32 channels of Time Division Multiplexed (TDM) data.

The speech links have 30 channels for transmission of Pulse Code Modulation (PCM) speech samples and two channels for control messages. The message links have all 32 channels assigned exclusively to control messages.

This chapter contains the following sections:

System functionality

Both the full-sized SuperNode and the SuperNode SE systems consist of two hardware elements (core and bus) and one software element (link), as illustrated in Figure 5 on page 25 and Figure 6 on page 26, and described in the following paragraphs.

Core

There are two Meridian SL-100 core processors currently in the field as follows:

- XA-Core see "XA-Core" on page 29.
- Series 70 (BRISC)

> ***Note:*** BRISC is still supported on existing systems, but is no longer shipped with new systems.

Series 70 Core functions

The SuperNode and SuperNode SE components are duplicated for reliability and operate as synchronized pairs. One plane is in-service (active) and performs call processing and other operations. The other plane (standby) performs the same operations, but checks for variations between itself and the active plane. Any difference between the two planes results in a maintenance interruption and a recovery action.

Each plane of the BRISC core consists of the following:

- Computing Module (CM)
- system memory
- System Load Module (SLM)
- call management processor
- Message Switch (MS) interfaces

The core performs the call processing function, system management, system sanity checking, maintenance, and loading and downloading of programs.The core interacts with other components of the Meridian SL-100 through the MS bus, which supports multiple application modules.

Figure 5
Functional areas of the Meridian SuperNode system (one of duplicated planes)

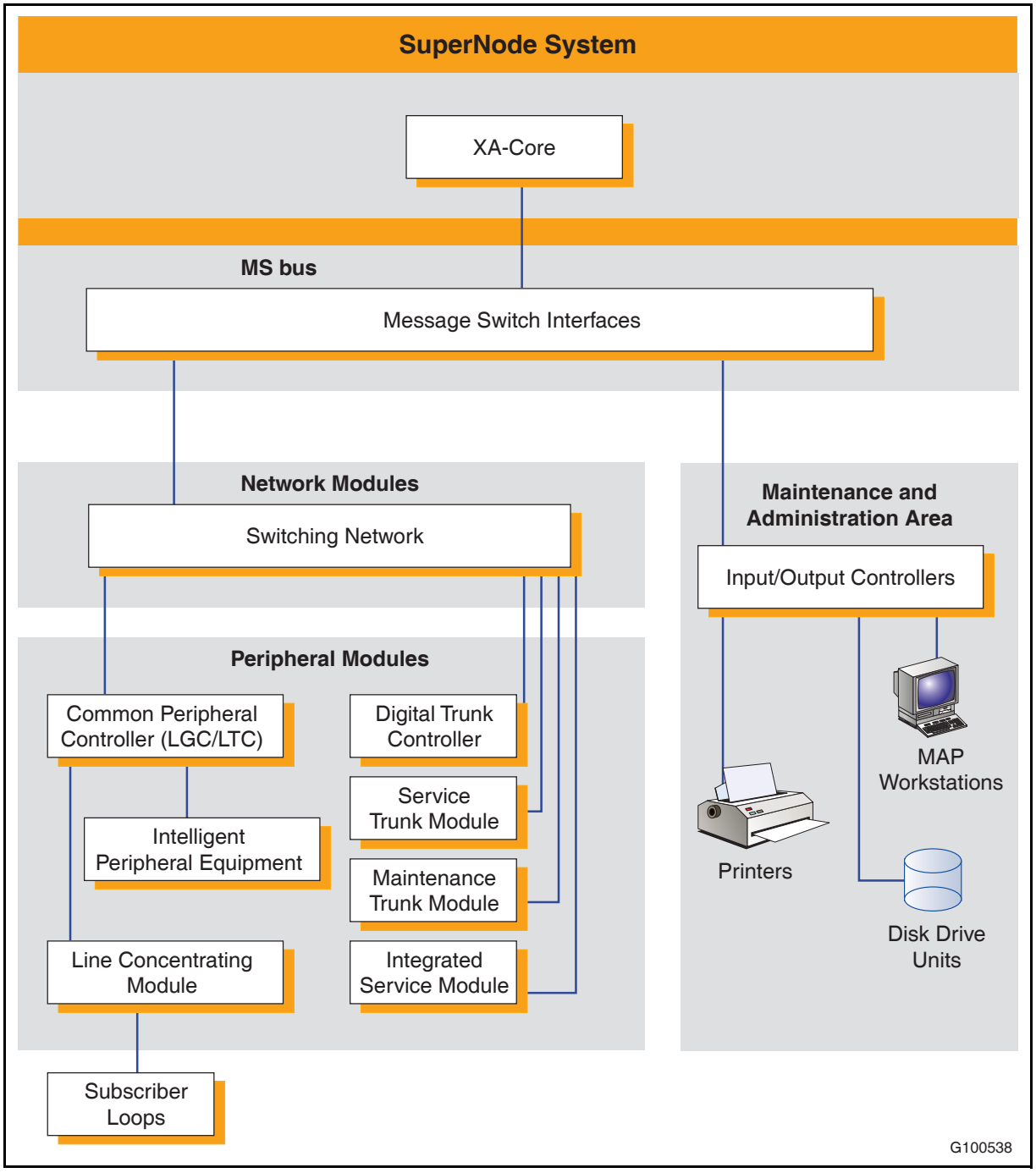
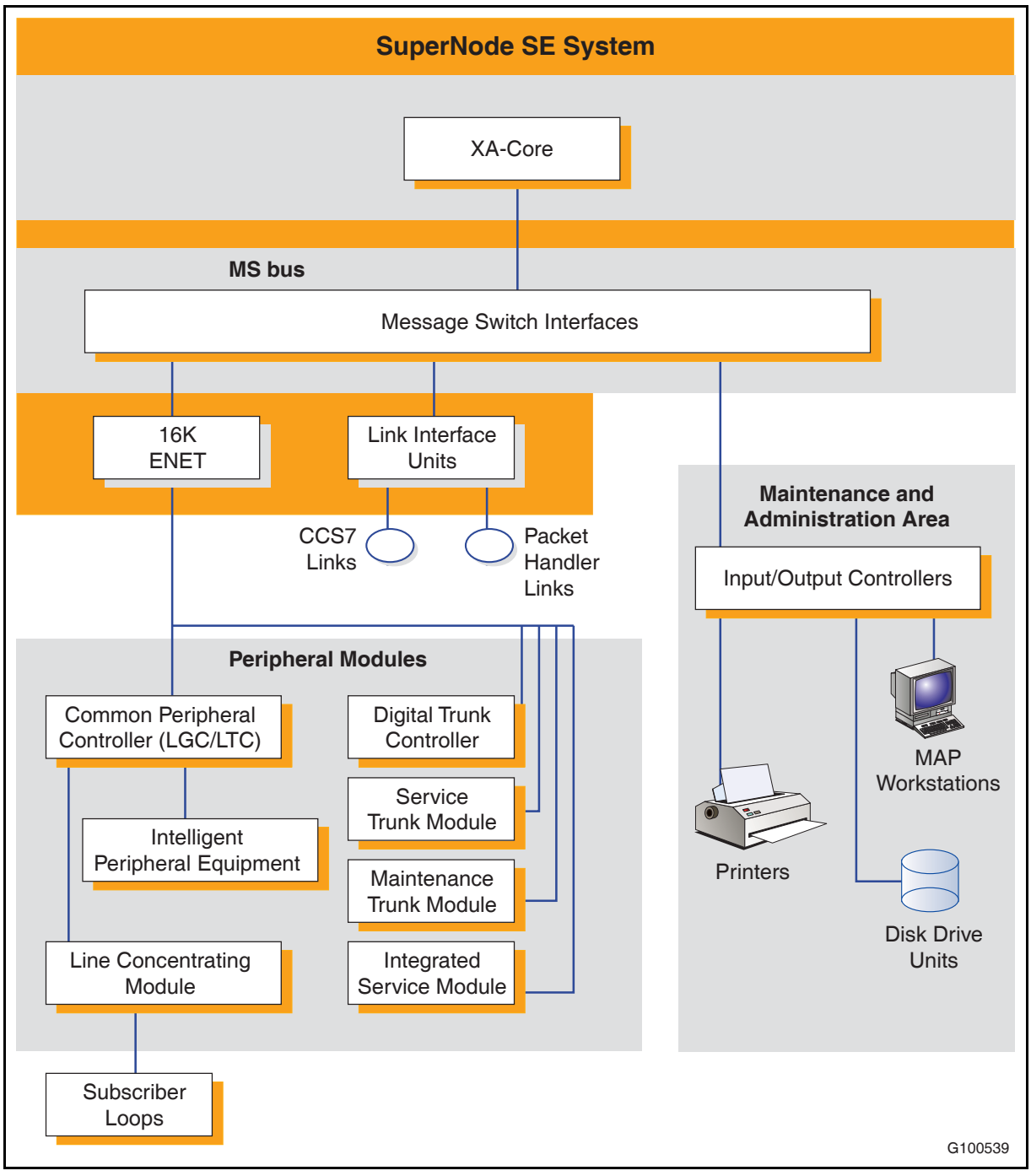


Figure 6
Functional areas of the Meridian SuperNode SE system with internal 16K ENET and optional LIUs (one of duplicated planes)



Bus functions

The MS bus supplies system messaging, allowing system peripherals and processors connected to the MS bus ports to communicate freely with one another.

The MS bus consists of the following:

- processor bus
- transaction bus
- control processor with supporting memory
- mapper
- processor transaction bus interface
- system clock
- port interface units

Link functions

The link is the software and protocol structure used on signaling links for SuperNode and SuperNode SE applications that interface with the telecommunications network. The link enables the networking of SuperNode systems, SuperNode SE systems and interfaces for customer programming applications. The link delivers a range of network signaling services based on public standards.

Protocol sets within the link include the Common Channel Signaling #7 (CCS7) set for the following:

- transaction and trunk signaling
- Integrated Services Digital Network (ISDN) access
- network operations protocols
- X.25 packet communications

The link also supports the DMS packet handler, which provides national ISDN-1 compliant packet service. DMS packet handler signaling includes the following:

- X.25 and X.75/X.75' protocols for packet processing
- ISDN Basic Rate Interface (BRI) access

Network modules

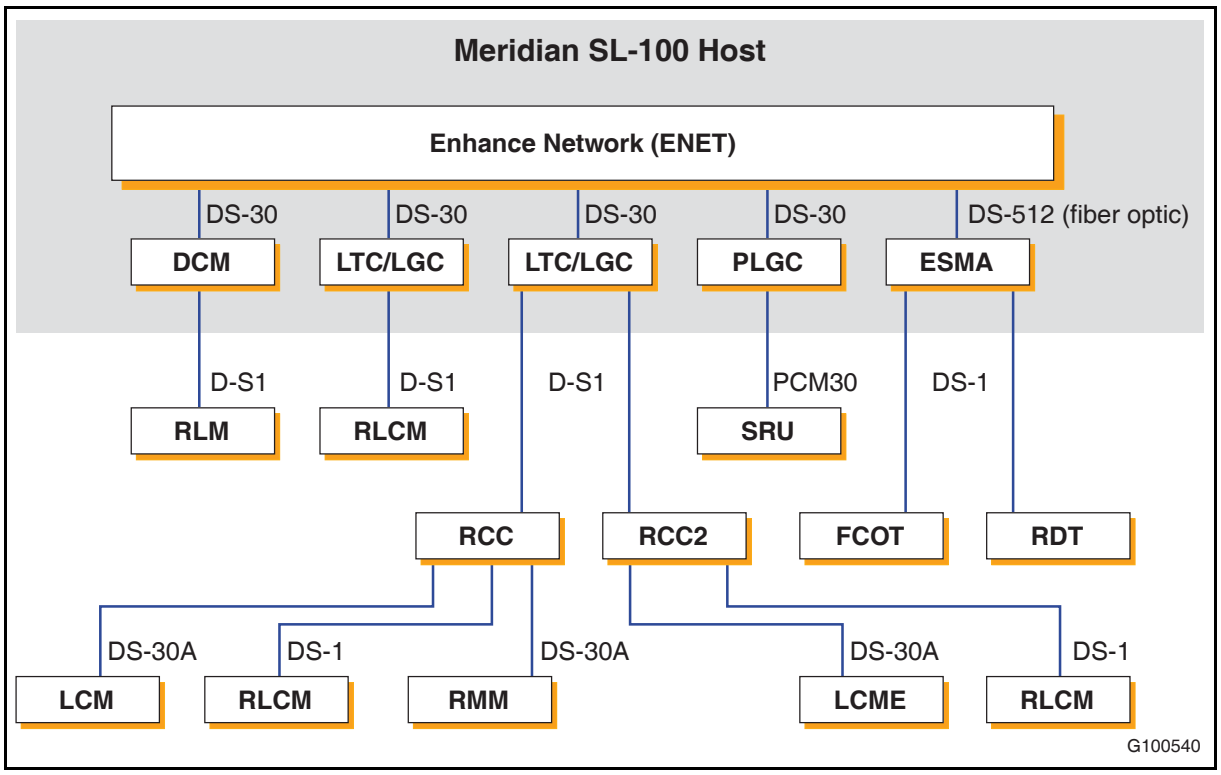
The Network Module (NM) is one of the main functional components of the Meridian SL-100 that connects to the MS bus. Figure 7 on page 28 is an illustration of the NM using the Enhanced Network (ENET).

The NMs are duplicated as two parallel sets (plane 0 and plane 1) of the two-way transmission paths for each connected channel between the Peripheral Modules (PMs). The duplicated parallel paths ensure that if one channel in a transmission path fails, the alternate channel is immediately available. Meanwhile, recovery action is taken to restore the failed channel.

Two types of networks are supported: Junctored Network (JNET) and Enhanced Network, although Nortel recommends the upgrade to ENET for improved performance. ENET is a non-blocking, junctorless, single-stage time switch that is compatible with all Meridian SL-100 PMs. ENET is a replacement for JNET, therefore, the two networks cannot coexist in the same system. ENET hardware is either housed in an external ENET cabinet (for SuperNode systems) or a single ENET shelf located in the SuperNode SE cabinet. ENET is provisioned with new SuperNode systems and all SuperNode SE systems.

Note: JNET's last supported release will be SE07 and it will not be supported after December 31, 2005.

Figure 7
Functional areas of the Meridian SL-100 network module (ENET)



XA-Core

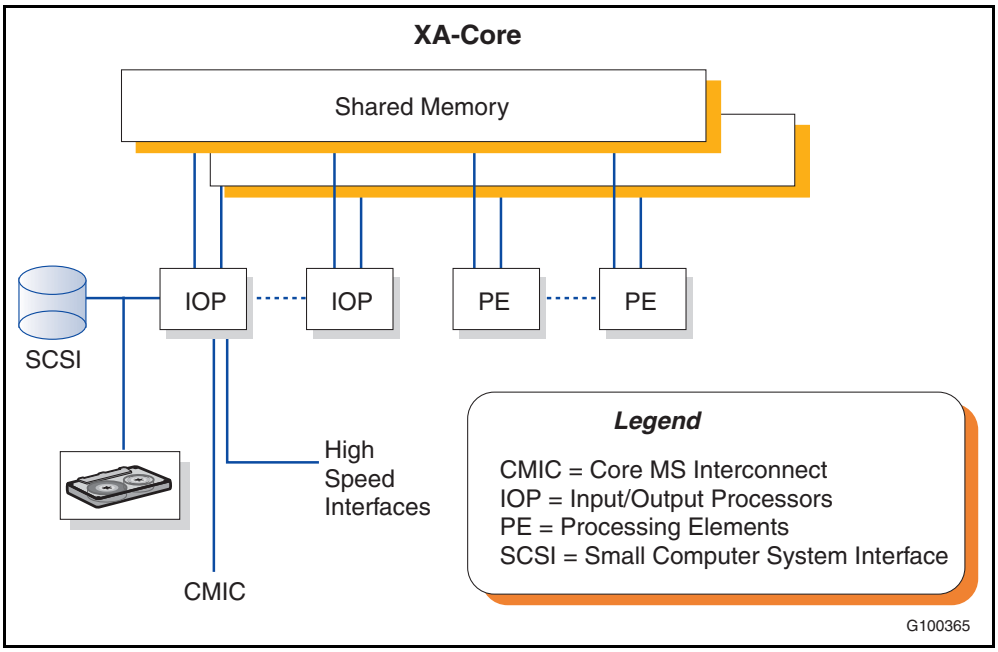
XA-Core is an architecture for achieving scalable computing power. XA-Core represents a fundamental paradigm shift in providing incremental capacity. With XA-Core, capacity growth is a function of both the speed of each processor and the number of processors. XA-Core is based on the PowerPC family of processors which provides the system with a powerful Central Processing Unit (CPU).

XA-Core's processing capability offers significant improvements in switching capacity through a multi-processor architecture using the following three elements:

- Shared Memory (SM)
- Multiple Processing Elements (PEs)
- I/O Processors (IOPs)

The DMS-bus processes and sends messages to nodes in the SuperNode and SuperNode SE switches. The DMS-bus has two load-sharing Message Switches (MS). The DMS-link allows the Meridian SL-100 core and DMS-bus to communicate in the SuperNode and SuperNode SE switches. The base core software establishes the signaling, which is then executed by the XPMs to the PSTN. The DMS-link is the connection path between the XA-Core and the rest of the system. Figure 8 illustrates the XA-Core architecture.

Figure 8
XA-Core architecture



From a strategic perspective, XA-Core provides a key element in transitioning to the next-generation Communication Server 2100 in Nortel's multi-service, packet-switched IP telephony solution. All XA-Core components used in current TDM (circuit-switched) applications can be retained in the Communication Server 2100, which preserves network investments and simplifies transition.

XA-Core replaces the existing CM/SLM as the DMS-Core in both the SuperNode and SuperNode SE (SNSE) configurations of the central core. The XA-Core processing power and architecture allow switch capacity to both increase substantially and to be scalable to meet future requirements. Processing elements, memory, and I/O devices can be added or provisioned as needed.

Note: Installation of XA-Core requires the Enhanced Network (ENET).

XA-Core is comprised of a single shelf consisting of three cards as shown in Table 3.

Table 3
XA-Core card configuration

Card	Description
Processor Element (PE)	Power MPC7410/500 MHz. Duplicated per PE for fault detection. 512 MB on-board memory for Program Store. Scalable Real-time – in-service addition of PEs. Scalable Reliability – "n+m" reliability.
Input/Output Processors	Common Host I/O Processors (IOP). Individual personality "Packlets" – two per IOP. OC-3/ATM MS Links. Remote Terminal Interfaces (RS-232). Provisionable mass storage devices: >= 4 GB disks; 1.3-4 GB DAT. Fault Tolerant File System.
Shared Memory (SM)	Shared Data Store, Master Copy of Program Store. Duplex memory; independently mated 32 MB blocks. Hot spare for reliability. 192 MB granularity; 1728 MB capacity.

XA-Core features include the following:

- scalable capacity based on multiprocessing
- plug-in processors, memory and I/O port cards

- provides 2.3 times the capacity of SN70EM
  - three active processors, including hot spare
  - 768 MB of memory
- robust reliability through
  - fault detection and recovery
  - built-in self-test and diagnostics
  - auto identify, auto-configure and auto-test
- capability for 10 times capacity of SN70EM
- Shared-Memory
- Parallel-Processing Machine
- Independent scalable sub-systems

The benefits of the XA-Core architecture include the following:

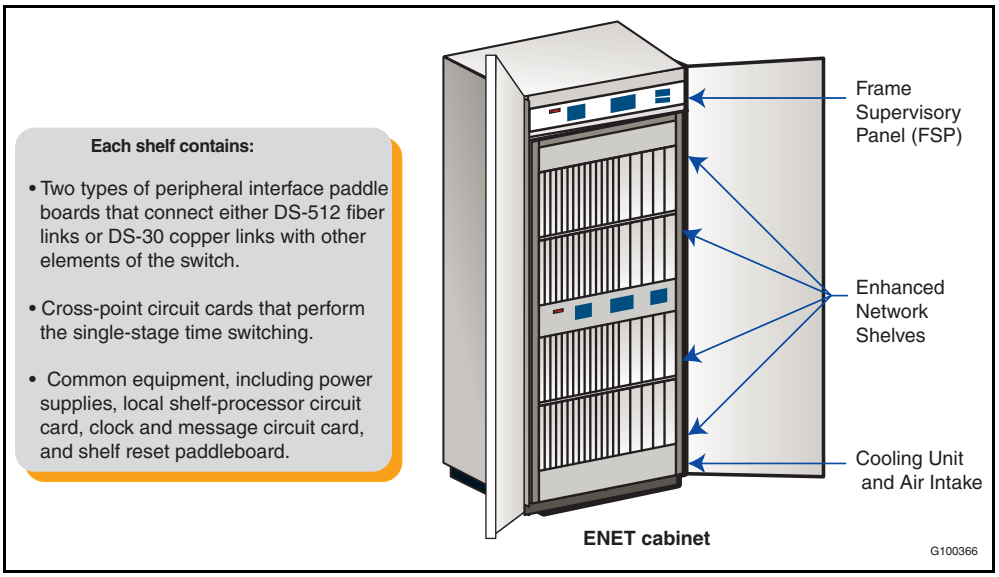
- Reduced cost of ownership.
- Scalable capacity.
- Software compatibility with both cross-threaded and non-cross-threaded call processing architectures.
- Hardware compatibility with Series I, Series II and Series III peripherals.
- Order of magnitude improvement in core reliability, exceeding GR-512 requirements.
- Compatibility with the full line of DMS-100 family products and all existing software architectures.
- Simplified “plug-and-play” provisioning of processor elements, input/output processors and memory, allow this processor to enable the large enterprise to make incremental capacity adjustments easily and cost-effectively.
- The life-cycle of XA-Core components is significantly extended over the current single processor architecture. Instead of completing an upgrade by replacement of the entire processor set, new XA-Core components can be simply added along side existing investments.
- With the XA-Core, spare processors can be used to share the call-processing load, as well as for “hot” backup. Instead of remaining in standby mode, these spares actively participate in the switch’s processing to broaden reliability and supplement capacity during short-term overload situations.

- Auto provisioning of processor elements, enhanced fault detection and isolation, simpler extraction of failed cards and LED activity indicators are some of XA-Core's enhancements to Operations, Administration, Maintenance and Provisioning (OAM&P). These enhancements can contribute to significant savings in technician time spent on maintenance activities.
- Versatility – XA-Core can serve as a platform to boost capacity for organizations hosting large line sizes of feature-rich services such as Advanced Intelligent Network and National ISDN-2.
- DMS SuperNode system compatibility – Interfaces with components developed for the DMS SuperNode and DMS SuperNode SE systems, such as the Message Switch (MS), Enhanced Network (ENET) and Link Peripheral Processor (LPP).
- Abundant processing capacity – XA-Core can help make real-time concerns a thing of the past. In addition, dynamic call processing distribution and a 2-Gigabyte addressable memory range expand call processing capacity and speed, and favorably enhance life cycle costs.

Enhanced Network (ENET)

ENET is the switching platform for the Meridian SL-100. It is a key hardware element which supports a full range of wideband services. Figure 9 shows an ENET cabinet.

Figure 9
ENET cabinet



The Enhanced Network replaces the junctored network modules. It is a non-blocking, junctorless, single-stage time switch that can expand its capacity from 4k to 128k unidirectional channels. ENET is compatible with all Meridian SL-100 PMs, including the fiberized Series II PMs.

ENET is available in a 64 kbyte single-cabinet or 128 kbyte dual-cabinet configuration with four shelves per cabinet. The ENET cabinet uses the same hardware, power, electromagnetic interference and cooling design as the SuperNode cabinet.

Each ENET shelf is composed of the functional systems described in Table 4.

Table 4
ENET functional systems

System	Description
Processor and memory system	The processor and memory system provides operational and diagnostic control for the ENET shelf. The CPU card includes 4 MByte of RAM, which holds the operating software of the ENET. It also contains 128 kbytes of ROM firmware for bootloading and initialization procedures.
Clock and messaging system	The clock and messaging system consists of the clock and message card, which provides input/output control and the clock source for the ENET shelf. It also contains a DS-512 fiber interface paddleboard, which provides channelized fiber links to the DMS-bus for messaging. One of the links provides the clock source for synchronization with the DMS-bus.
Crosspoint system	The crosspoint system consists of cards that form the switching matrix. The cards are connected to the other cards on the same shelf, as well as cards on other shelves in the ENET cabinet.
Transmission and interface system	The transmission and interface system consists of the transmit and receive interfaces between the PMs and the crosspoint cards of the ENET. The interfaces supported are fiber (DS-512) and copper (DS-30) speech links. Series I PMs connect to the ENET through existing copper links, whereas Series II PMs connect to the ENET using DS512 fiber links.
Power system	The power is provided by two +5V-, 80-A power converters and two -5V-, 20-A power converters. One of each type is located at each end of an ENET shelf and provides power for one half of the shelf.

Table 5 describes the benefits of ENET.

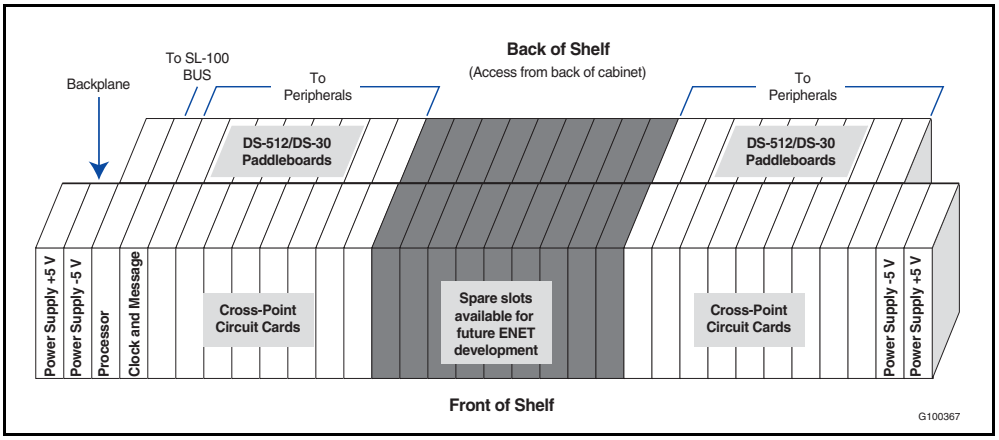
Table 5
ENET benefit summary

Benefit	Description
Easy modular growth	In the single-cabinet configuration, a fully duplicated ENET can increase to 64,000 channels in cost-effective increments. With the addition of a second cabinet, ENET capacity can be expanded up to 128,000 channels.
Simplified engineering	As a junctorless, non-blocking switching matrix, ENET does not require complicated engineering. Unconstrained by traffic and load balancing, its provisioning is based only on peripheral link terminations. ENET provides the platform for circuit-switched, channel-switched, cross-connect or nailed-up digital service.
Minimal footprint	ENET houses up to 64,000 one-way duplicated channels in the single cabinet configuration or 128,000 in two cabinets.
Junctorless architecture	Because ENET operates without junctored connections, a switch extension can be accomplished without redistributing junctored connections.

ENET is a single-stage, non-blocking, junctorless time switch. It offers superior performance, high capacity and efficient engineering and maintenance.

ENET has its own internal 32-bit processor based on the Motorola 68020, thus using common technology with the DMS SuperNode system. The basic network building block is a 16k x 16k time switch cross-point card (see Figure 10). Sixteen cross-point cards are matrixed to provide a 128k x 32k time switch that occupies one shelf in the ENET cabinet. Provisioning four shelves within the cabinet permits a matrix size of 64K x 64K, fully duplicated. A second cabinet can be added to support an ultimate capacity of 128K x 128K channels.

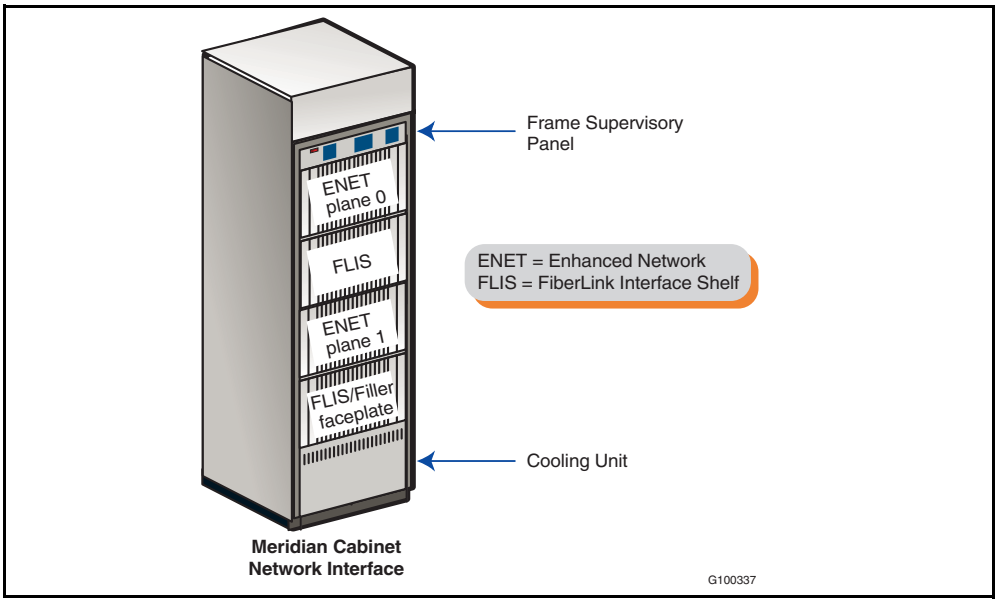
Figure 10
ENET shelf layout: top view



Meridian Cabinet Network Interface (MCNI)

The Meridian Cabinet Network Interface (MCNI) offers customers both the Enhanced Network (ENET) and the FiberLink Interface Shelf (FLIS) in a single cabinet (see Figure 11).

Figure 11
Meridian Cabinet Network Interface



The MCNI provides a reduced-footprint solution for businesses to take advantage of the advanced capabilities of the Enhanced Network. The MCNI meets the interface requirements of evolving server-based applications such as Symposium Call Center, Symposium CompuCALL TAPI Driver, Optivity Telephony Manager for Meridian SL-100 (OTM-MSL) and an array of applications using the Ethernet Interface Unit (EIU).

The MCNI answers the needs of the following two different customer groups:

- Customers who have up to a 32K ENET and wish to add a FLIS and the variety of features it makes possible. This product enhancement is executed in the field.
- Customers who wish to upgrade their manufacture discontinued Junctured Network (JNET) systems to up to a 32K ENET and acquire an FLIS. This product is delivered to the customer from the factory.

Both product solutions combine up to a 32K ENET and up to two Link Interface Shelves (LIS) in the same frame. Therefore, neither requires the addition of a separate FLIS cabinet.

The MCNI provides the following flexibility:

- At those sites where ENET and FLIS already exist in two cabinets, a field conversion combines the existing FLIS and ENET into one cabinet to reduce footprint.
- At sites that have a Dual Plane Common Control (DPCC) SuperNode with JNET, but that do not have Link Peripheral Processor (LPP) or FLIS, an upgrade to up to a 32K ENET and up to two LIS shelves with EIU, CCS7 and other advanced applications is executed.
- At sites that have a Dual Plane Combined Core SuperNode with up to a 32K ENET, but that do not have LPP or FLIS, a field upgrade adds up to two LIS shelves into the 32K ENET cabinet.

Some of the features available with the MCNI are as follows:

- non-blocking network matrix supporting up to 32,000 redundant ports
- up to 24 Application Specific Units, including
  - Link Interface Unit (LIU7) supporting CCS7
  - Ethernet Interface Unit (EIU) supporting 10BaseT interface
  - Network Interface Unit (NIU) supporting Channelized Access delivery of CCS7 services
  - Enhanced Link Interface Unit (XLIU) providing X.25 packet handler services
  - Frame Relay Interface Unit (FRIU)

Link Peripheral Processor

The Link Peripheral Processor (LPP) is a multipurpose platform that serves as a strategic tool for economically introducing an array of network simplification applications. Provisioned with appropriate “personality cards” (referred to as interface units) and software, the Link Peripheral Processor supports the following:

- Common Channel Signaling #7 (CCS7)
- Synchronous Digital Network (SDN) Packet Services (XLIU)
- Ethernet Interface Unit (EIU)

The Link Peripheral Processor allows a variety of interface units (up to 36) to occupy the same cabinet, and in many cases, the same shelf. Enterprises can introduce and administer new applications with minimal expense, mixing and matching as necessary to meet the requirements of each individual switch. The single-shelf Link Peripheral Processor, resident on the SuperNode SE, ensures low startup costs for applications that require 12 or fewer personality cards.

Table 6 describes the benefits of the Link Peripheral Processor.

Table 6
Link Peripheral Processor benefit summary

Benefit	Description
High reliability assured	The LPP has established a solid record of reliability. The Local Message Switch and Frame Bus (FBus) are fully duplicated and normally operate in load-sharing mode, but if necessary, either plane can carry the full messaging load alone. Duplication allows for uninterrupted communication from all components to, from, or within the LPP. For example, the Network Interface Units (NIUs) used for CCS7 and Packet Handler applications operate in a warm-spared mode, which allows the standby component to immediately take over if necessary.
Optimized system performance and multicomputing power	By preserving resources of the core and DMS-Bus, LPP applications optimize overall Meridian SL-100 system operations. Distributed-processing architecture means that each interface unit has its own high-performance processor to power an application, allowing the central processor to concentrate on call-processing and other computing functions of a feature-rich and function-rich telecommunications environment.
Channelized access	Using dedicated links between service applications and the Application Interface Units (AIUs), the LPP allows channelized access to an interface unit through the network. Application traffic entering the Meridian SuperNode (Option 211) system can be directed to DS-30 ports in the switching matrix. The DS-30 links transmit individual DS-0 channels to NIUs that control communication to and from the AIUs on the LPP. Channelized access offers important advantages for delivering new services from the LPP platform, including the following: • Reduced costs – eliminates the need for external channel banks or multiplexers in applications requiring DS-0 connections. • Increased efficiency – provides a direct path to the LPP that keeps traffic off the DMS-Bus. • Enhanced reliability – supports interface-unit “pooling”, which allows a spare AIU to take over in the event of failure of the active AIU.
Versatile platform	Meridian SL-100 users can provision new services and capabilities on the LPP platform with only an incremental increase in investment by simply adding application-specific interface units and any necessary Right-To-Use (RTU) software.

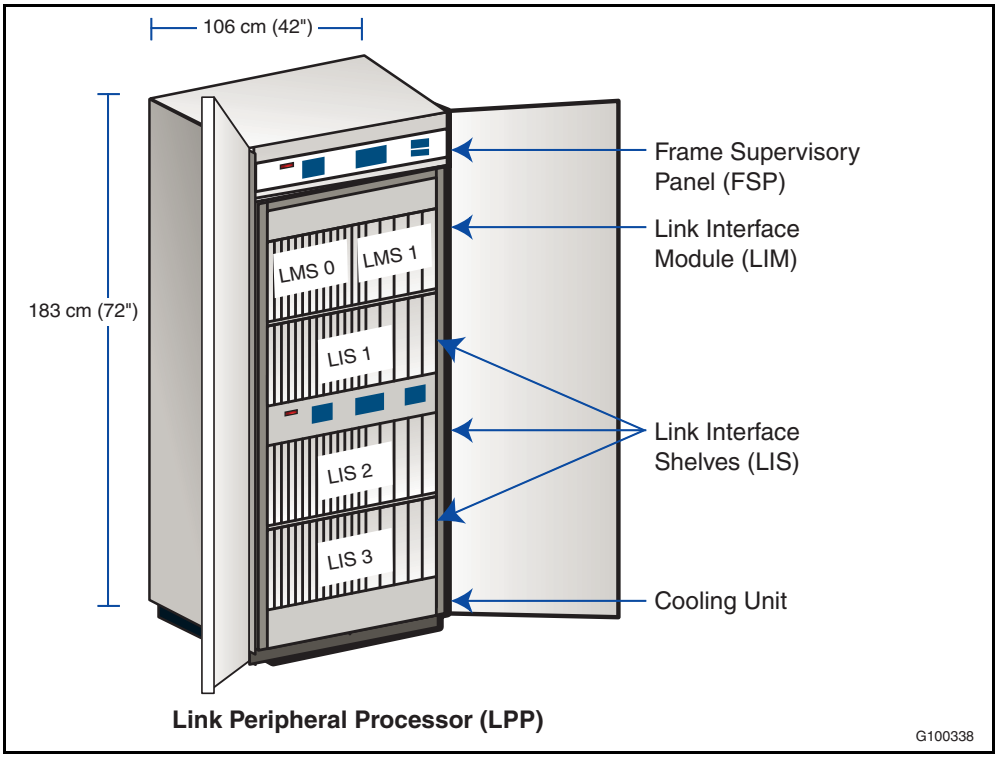
The LPP provides high-speed connectivity (up to 1.5 Mbps throughput) between an Ethernet LAN (Local Area Network) and the DMS-Bus. This high-speed connectivity allows for easy integration with an external LAN, remote access to the Maintenance and Administrative Position (MAP) from third-party computing equipment, support for attached computing resources, and support for industry-standard transport and access protocols such as Transmission Control Protocol/Internet Protocol (TCP/IP), Telnet and File Transfer Protocol (FTP). The EIU is also the standard interface to server-based applications such as Symposium Call Center, Call Pilot and Optivity Telephony Manager for Meridian SL-100.

The LPP is a unique modular hardware component providing advanced applications for the Meridian SL-100. Figure 12 on page 39 shows an LPP.

The LPP cabinet is configured as follows:

- **Link Interface Module (LIM)** – The LIM controls messaging between the DMS-Bus and the LPP and between the LIUs in the LPP. It consists of two Local Message Switches (LMS) and two Frame Transport Buses (F-BUS).
- **Link Interface Shelves (LIS)** – There are three Link Interface Shelves in the LPP. The LIS holds the circuit cards and paddleboards which make up the different Application Interface Units. The LIS for the LPP can house up to 12 LIUs per shelf for a total of 36 LIUs per cabinet.

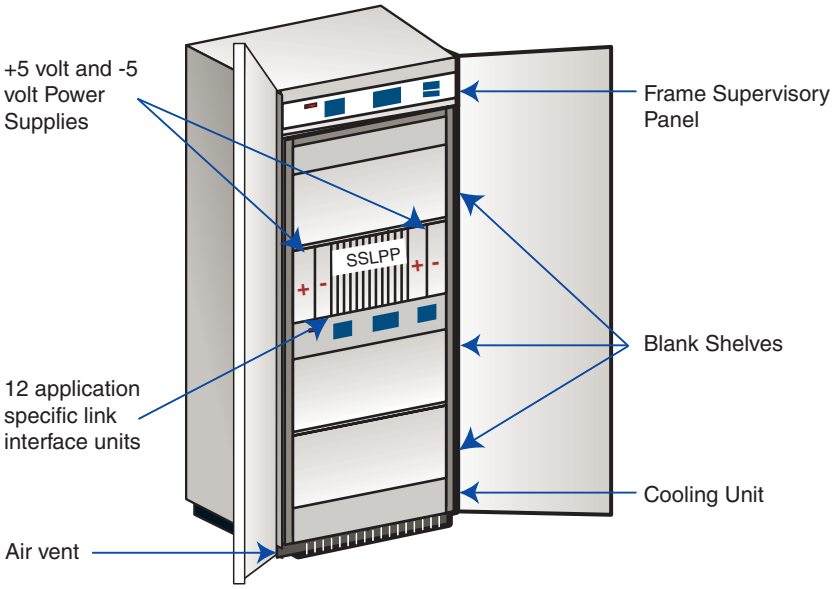
Figure 12
Link Peripheral Processor



Single-Shelf Link Peripheral Processor (SSLPP)

The Single-Shelf Link Peripheral Processor (SSLPP) was developed in response to customer demand for a lower priced/lower capacity version of the Link Peripheral Processor (LPP). It offers an economical LPP solution for the smaller-sized private network. Figure 13 on page 40 shows an SSLPP.

Figure 13
Single-Shelf Link Peripheral Processor



Single-Shelf Link Peripheral Processor (SSLPP) configured with 12 Application Interface Units

Peripheral Modules

Peripheral Modules (PMs) are microprocessor-controlled units that connect to the network modules. Each Peripheral Module has a Peripheral Processor (PP) function that performs local processing and controls the flow of messages between itself and the Computing Module. This independent action by the Peripheral Processor relieves the Computing Module of routine local processing, which enables the Computing Module to concentrate on higher-level activities.

Peripheral Modules are responsible for the following functions:

- scanning the lines in the modules for changes of circuit state
- performing timing functions for call processing
- collecting and storing digits
- generating digital tones
- sending and receiving signaling and control information to and from the Computing Module
- checking the integrity of established voice or data paths through the network

- Digital Recorded Announcement Machine (DRAM) or enhanced DRAM (EDRAM)
- conference circuits

Peripheral modules are categorized as Series I, Series II or Series III peripherals. Table 7 describes the three types of Meridian SL-100 Peripheral Modules.

Table 7
Peripheral Module series

Series	Description
Series I peripherals	Series I peripherals are also called trunk module-type (TM-type) PMs. Series I peripherals have only one processor. The following is a list of Series I peripherals: • Maintenance Trunk Module (MTM) • Service Trunk Module (STM) • Intelligent Peripheral Equipment (IPE)
Series II peripherals	Series II peripherals are also called XMS-based PMs (XPMs). Series II peripherals have two processors and two separate operating units. The following is a list of Series II peripherals: • Digital Trunk Controller (DTC, DTC-I) • Enhanced Line Concentrating Module (ELCM, LCM-E) • Digital Line Module (DLM) • Line Group Controller (LGCI) • Line Trunk Controller (LTCI) • Remote Cluster Controller (RCC, RCC2) • Subscriber Carrier Module-100 Access (SMA, ESMA)
Series III peripherals	Series III peripherals are known as Link Peripheral Processor-based (LPP-based) peripherals. Series III peripherals include modules for the Link Peripheral Processor and the SuperNode Combined Core (SCC). The following is a list of Series III peripherals: • Channel Frame Processor (CFP) • Ethernet Interface Unit (EIU) • Frame Relay Interface Unit (FRIU) • Link Interface Module (LIM) • Link Interface Unit for SS7 (LIU7) • Network Interface Unit (NIU) • X.25-X.75 Line Interface Unit (XLIU)

See “Meridian SL-100 peripherals” on page 43 for additional information about Peripheral Modules.

Meridian SL-100 peripherals

Meridian SL-100 peripherals fall into the following categories:

- trunk peripherals – provide terminations of circuit-switched traffic to/from other switches or PBXs
- line peripherals – provide terminations for external lines to/from subscriber terminals and data devices

This chapter contains the following sections:

- **Trunk peripherals**

  Note: The Communication Server 2100 does not directly support bearer channels and therefore does not support trunk traffic peripherals. Trunk traffic peripherals are used only used in Meridian SL-100 and hybrid Communication Server 2100 configurations.

- **Line peripherals**

  Note: Line peripherals do not apply to the Communication Server 2100, which supports lines through line media gateways, not though proprietary line peripherals. Meridian SL-100 and hybrid Communication Server 2100 configurations use line peripherals.

- **Link Peripheral Processor-based peripherals**

FOR MORE INFORMATION

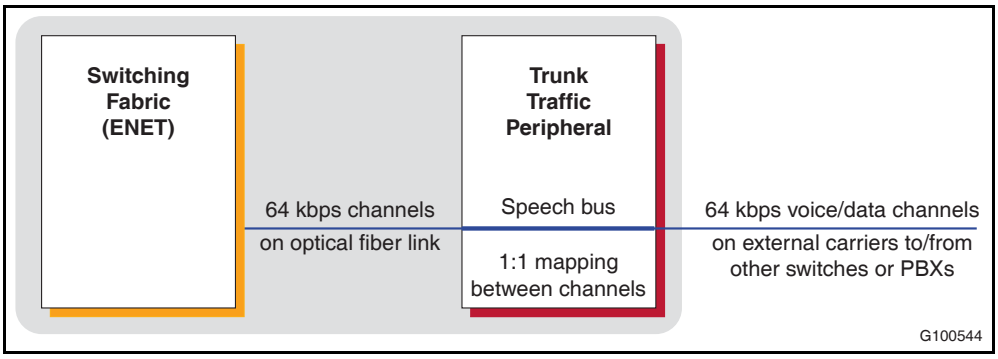
Refer to the *Peripheral Module Release Document (PM RELDOC)*, 555-4001-599, for detailed information about how to update the software in Meridian SL-100 Peripheral Modules and hardware types. This document provides load names, update procedures and other release-specific information.

Trunk peripherals

Introduction

The primary purpose of a trunk traffic peripheral is to provide non-concentrated 1:1 mapping (through an internal speech bus) between 64 kbps bearer channels on external carriers and 64 kbps channels on optical fiber links to the ENET switching matrix, as illustrated in Figure 14.

Figure 14
The role of trunk traffic peripherals



The signaling that controls call establishment for the bearer channel is conveyed in separate signaling channels. Signaling terminations convert externally visible trunk signaling to/from internal Meridian SL-100 messages that can be understood by the Core. For CCS7 trunk interfaces, signaling channel terminations are housed in dedicated trunk signaling peripherals, such as the Link Peripheral Processor. For common channel signaling systems such as PRI, signaling channel terminations are housed in the same trunk traffic peripherals as the corresponding bearer traffic.

Digital Trunk Controller

Functional overview

Digital Trunk Controllers (DTCs) based on Extended Peripheral Module (XPM) technology have been the standard Meridian SL-100 trunk traffic peripheral since the introduction of the SuperNode architecture.

A Digital Trunk Controller terminates external carrier links to/from other switches and PBXs, and connects 64 kbps traffic channels provided by these external links with 64 kbps channels provided by internal DS-512 optical fiber links to the Meridian SL-100 switching matrix. There is no concentration at the Digital Trunk Controller. The maximum Peripheral-side (P-side) capacity is 480 trunks (16 PCM30 ports with 30 user channels each), and each is mapped 1:1 onto one of the 480 user channels provided by the DS-512 internal link.

Digital Trunk Controllers support the following types of copper carrier:

- T1 – 1.5 Mbps DS1 carriers with 24 64 kbps timeslots using u-law companding. T1s are standard in North America and are also used in Japan and Hong Kong.
- E1 – 2 Mbps PCM30 carriers with 32 64 kbps timeslots using A-law companding. E1s are standard in Europe and most other international markets.

Note: The DTC(I) does not support E1 trunks.

Within the Digital Trunk Controller, voice and data traffic is converted from serial form into a parallel form, to be conveyed using the Digital Trunk Controllers speech bus. The speech bus supports 640 10-bit-wide channels, 480 of which are reserved for the 64 kbps user channels routed through the Digital Trunk Controller. This makes it possible for the Digital Trunk Controller to provide and detect in-band tones.

CCS7 trunk signaling is conveyed in dedicated 64 kbps signaling links on PCM30 carriers. Such signaling is not terminated in the Digital Trunk Controller. Instead, the signaling links are routed through the Digital Trunk Controller and the switching matrix to be terminated in a Link Peripheral Processor (see “Link Peripheral Processor” on page 36). ISDN trunk signaling channels are, however, terminated in the Digital Trunk Controller itself and the signaling is converted to an internal Meridian SL-100 equivalent to be conveyed to the Core. CCS7 trunks and ISDN PRI trunks cannot be mixed on a Digital Trunk Controller.

A Digital Trunk Controller is a twin-shelf unit, in which the active shelf and its components are fully duplicated by a second shelf operating in hot standby mode, ready to take over and maintain service continuity in the event of a failure.

Functional elements

Table 8 describes the functional elements that make up the Digital Trunk Controller.

Table 8
Digital Trunk Controller functional elements (Sheet 1 of 2)

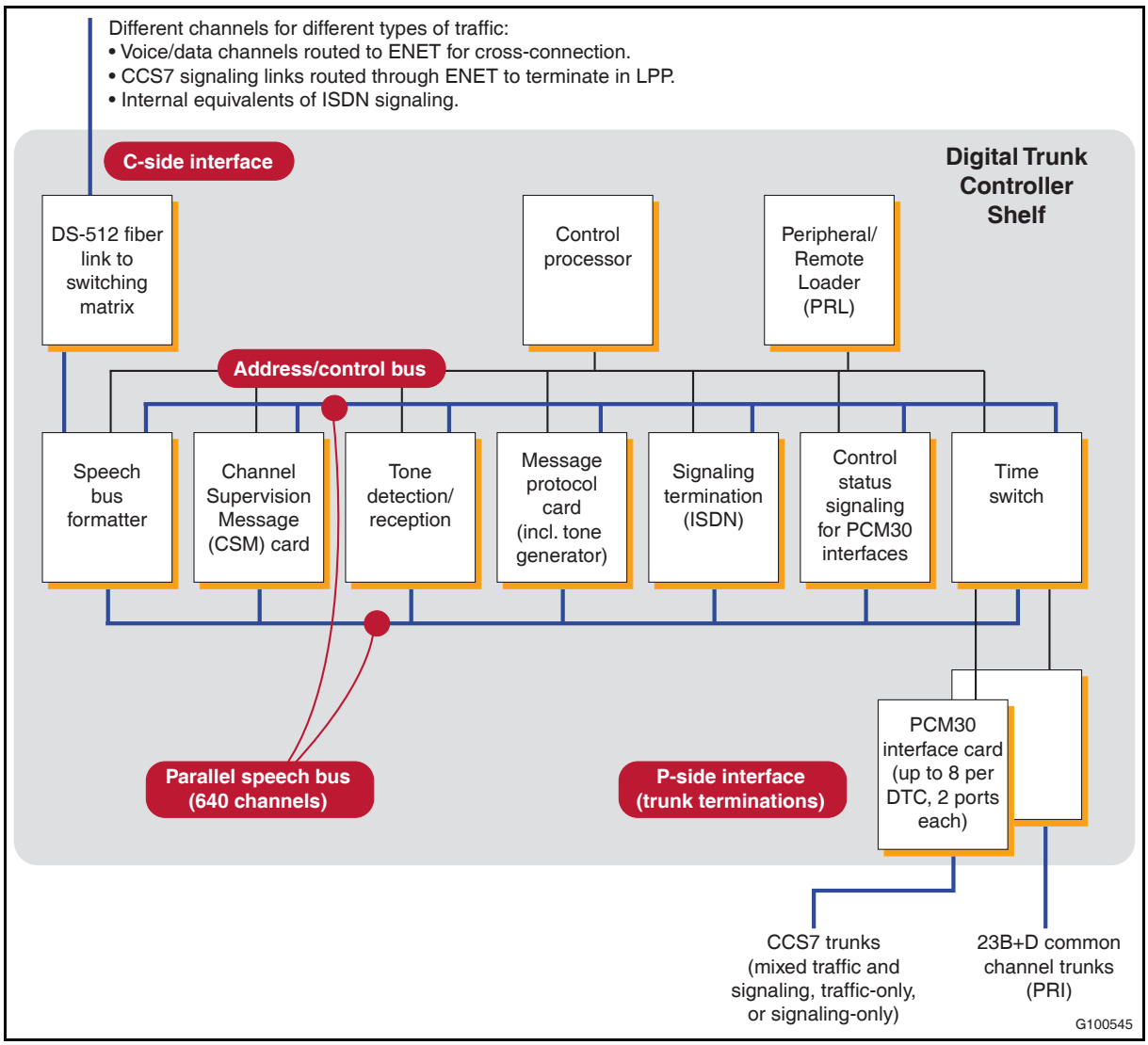
Element	Description
DTC Control Processor	The control processor of the Digital Trunk Controller controls other Digital Trunk Controller components, including those the perform serial/parallel conversion and tone generation/reception. The SX05 PowerPC Control Processor is the standard processor for newly-deployed Digital Trunk Controllers. It provides the following advantages over previous processors: • significant performance improvements • 64 Mbytes on-board memory • 128 flash memory • optional on-board Peripheral/Remote Loader (PRL)
P-side interface components	Terminations for P-side carriers support a variety of CCS7 and PRI trunk interfaces. T1 carriers are terminated on 6X50 cards. For a T1, the external bit-stream is All Bits Inverted (ABI) u-law. 6X44 time switch, which makes connections between 64 kbps carrier channels and the timeslots on the Digital Trunk Controller's internal speech bus, converting serial bit stream on an external carrier to/from a parallel data stream on the speech bus. Signaling card providing control/status information for PCM30 interface.
Core-side (C-side) interface components	DS-512 optical fiber interface to the Meridian SL-100 switching matrix. The speech bus formatter and clock card performs serial-to-parallel conversions of encoded voice signals received on the DS-512 interface and parallel-to-serial conversion of encoded voice signals destined for the DS-512 interface. Each parallel data stream to/from the formatter is connected to the speech bus timeslot through the Channel Message Supervision (CSM) interface card. The clock selection of the formatter card provides the Digital Trunk Controller shelf clock. The Channel Supervision Message interface card performs parity checking on the parallel data streams to/from the formatter and monitors speech path integrity for each active call.
Message Protocol Card (MPC) with downloadable tones	The Message Protocol Card interfaces with the parallel speech bus to provide a C-side and P-side messaging interface using the DMSX protocol. In particular, it accepts control messages from the Core and relays them to other components. It also supports the provision of tones on the outgoing speech channels by means of a toneset downloaded to it as part of the static XPM data.
Signaling termination cards	The Enhanced ISDN Signaling Preprocessor (EISP) card terminates ISDN PRI signaling.

Table 8
Digital Trunk Controller functional elements (Sheet 2 of 2)

Element	Description
Tone detection/ reception	The following optional cards are used to monitor speech bus channels for incoming tones and report detected tones to the control processor: • Universal Tone Receiver (UTR) – A Universal Tone Receiver can monitor up to 30 channels for up to 128 different tones. • Global Tone Receiver (GTR) – A performance-enhanced version of the Universal Tone Receiver, which can detect either u-law or A-law tones. • Continuity Tone Detector (CTR) – Monitors incoming CCS7 trunks for continuity checking tone. ***Note:*** As an alternative to a tone receiver in a DTC, the Meridian SL-100 can also make use of tone detection/reception capabilities provided by a card in an Maintenance Trunk Module (MTM) or Integrated Services Module (ISM) slot.
Peripheral/ Remote Loader	The Peripheral/Remote Loader (PRL) is a 16-Mbyte flash memory card that stores Digital Trunk Controller static data and a backup image of the control processor, supporting rapid reload of the Digital Trunk Controller after a failure. Load files are transferred to the Peripheral/Remote Loader as a background task while the Digital Trunk Controller is at task level. The SX06BA 16-Mybte flash memory card is designed for use with peripherals based on the SX05AA processor.

Figure 15 on page 48 shows the relationship between Digital Trunk Controller functional elements.

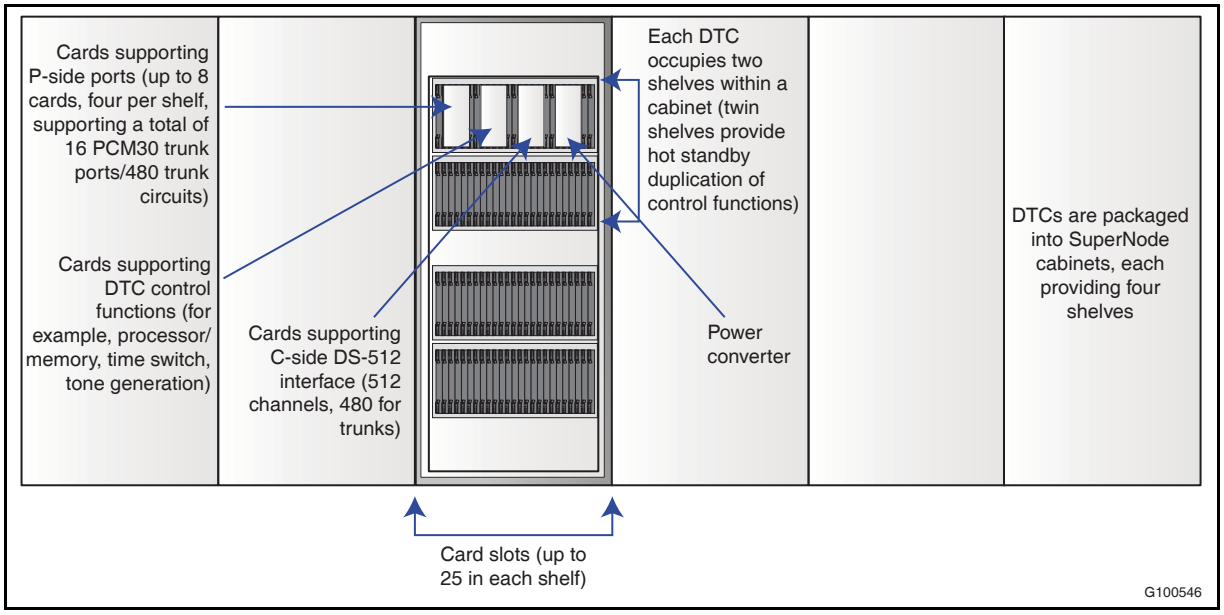
Figure 15
The architecture of an XPM-based Digital Trunk Controller



Digital Trunk Controller shelf contents

Figure 16 on page 49 illustrates how XPM-based Digital Trunk Controllers are packaged into SuperNode cabinets.

Figure 16
Digital Trunk Controller packaging



Spectrum Peripheral Module (SPM)

Functional overview

The Spectrum Peripheral Module (SPM) is an advanced trunk peripheral designed to support high-capacity applications by providing trunk terminations for optical carriers, rather than the copper carriers terminated by the Digital Trunk Controller. Spectrum Peripheral Modules and Digital Trunk Controllers are functionally complementary. A given Meridian SL-100 switch can support whatever combination of trunk peripherals best suits its network role. It is possible to add new Spectrum Peripheral Modules and/or Digital Trunk Controllers to existing switch configurations as required.

Like the Digital Trunk Controller, the primary purpose of the Spectrum Peripheral Module is to terminate external links to/from other switches and PBXs and to connect channels provided by these external links with channels provided by internal DS-512 optical fiber links in the Meridian SL-100 switching matrix.

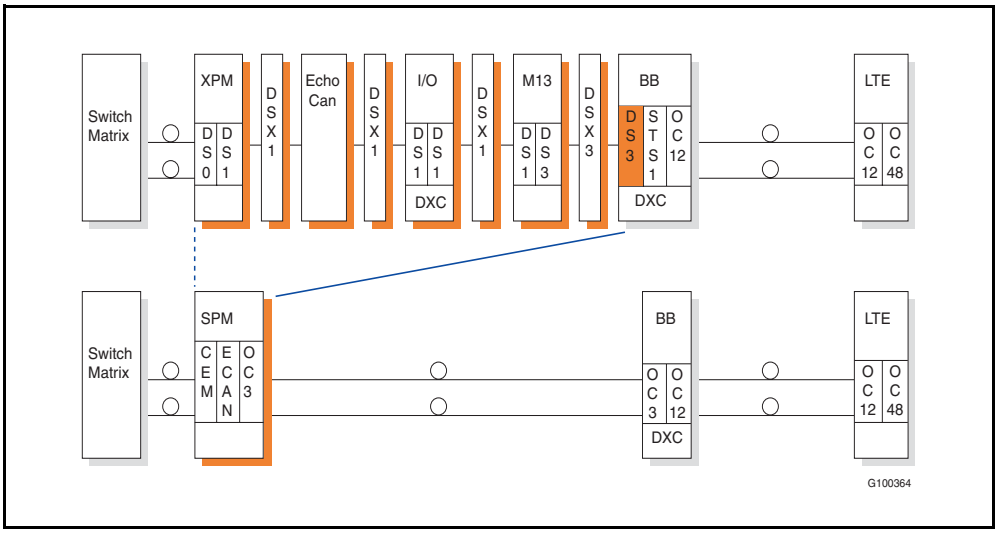
The main difference between the Spectrum Peripheral Module and the Digital Trunk Controller is that the Spectrum Peripheral Module supports the direct termination of high-speed external interfaces on OC-3 optical fiber.

The SPM architecture

- allows for multiple interfaces with network traffic
- performs integrated signal processing functions
- handles routine call processing in conjunction with the Meridian SL-100 host

Figure 17 shows a schematic of the evolution of SPM.

Figure 17
Schematic showing the evolution of SPM



Functional elements

Table 9 describes the functional elements that make up the Spectrum Peripheral Module.

Table 9
Spectrum Peripheral Module functional elements

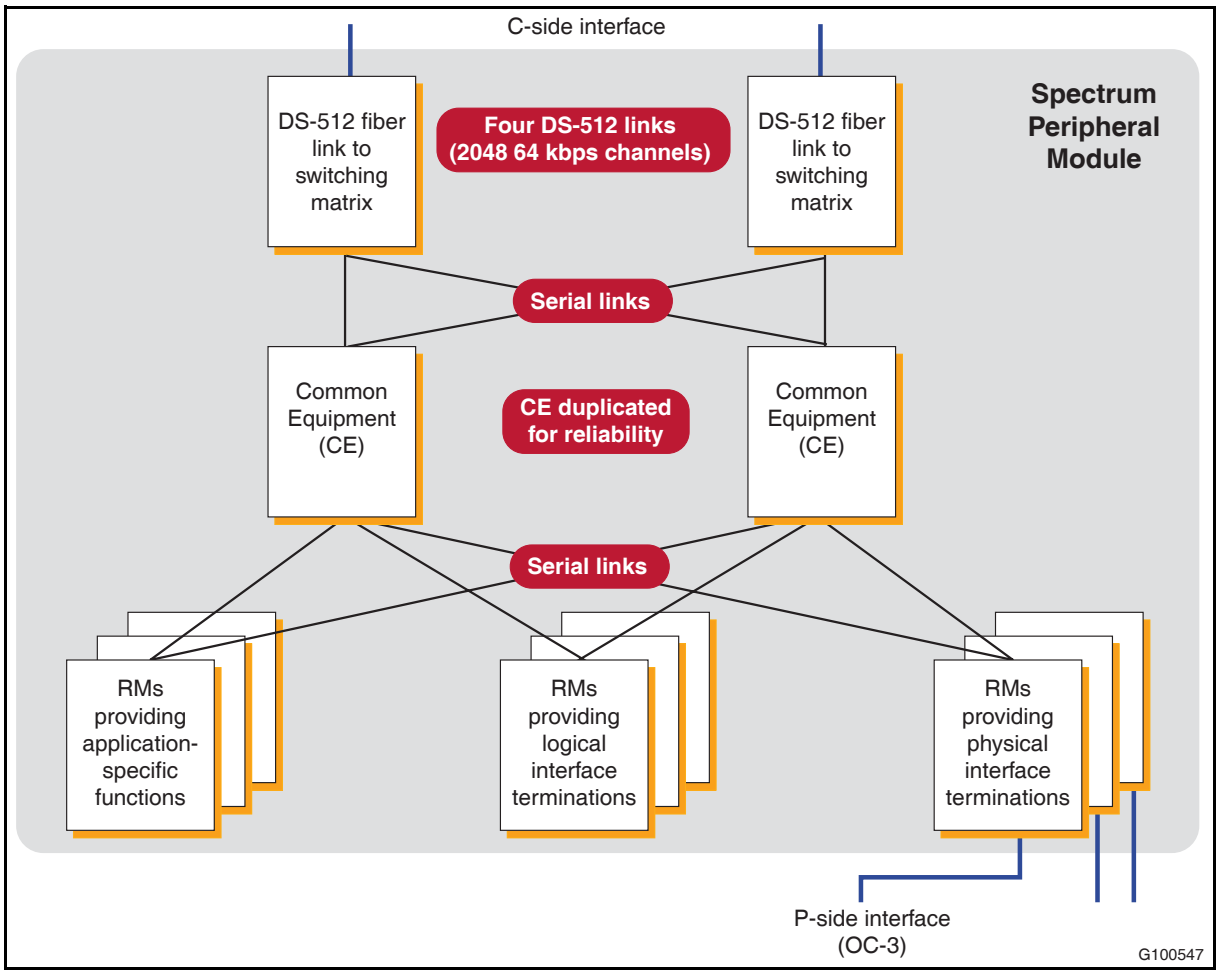
Element	Description
C-side links	Four DS-512 optical fiber links to/from ENET, supporting 2,048 kbps channels, four times as many as a Digital Trunk Controller.
Common Equipment (CE)	A single-card module comprising the following: • PowerPC 603 processor. • Time switch, with potential support for 12,000 64 kbps channels, for mapping channels from external interfaces on the Spectrum Peripheral Module's internal serial links. • Support for local call processing and maintenance. • 28 64 kbps channels available for messaging between the Spectrum Peripheral Module and the Core.
Internal serial links	There are internal serial links between the Common Equipment and Resource Modules. These are the logical equivalent of the Digital Trunk Controller's parallel speech bus, but with higher capacity.
Resource Modules (RMs)	Up to 26 resource modules can be provisioned in a Spectrum Peripheral Module. A given Resource Module can combine several functions (for example, the OC-3 P-side interface Resource Module not only terminates the OC-3 carrier link, but also routes CCS7 signaling links to the Link Peripheral Processor through ENET). The functions supported by Spectrum Peripheral Module Resource Modules are as follows: • Physical termination of P-side interfaces – OC-3 optical termination Resource Module terminating external links operating at nominal rate of 155 Mbps. Also supports routing of CCS7 signaling links to the Link Peripheral Processor through ENET. Technicians must provision at least two OC-3 Resource Modules in an SPM for protected link operation (only one is active). • Logical termination of trunk signaling for P-side interfaces – CCS7 signaling is groomed off by the OC-3 interface Resource Module and routed through the Spectrum Peripheral Module and ENET to terminate on the Link Peripheral Processor. Primary Rate Interface signaling is terminated on a Data Link Controller (DLC) card in the Spectrum Peripheral Module. • Digital Signaling Processors (DSPs) providing application-specific functionality – Digital Signaling Processors Resource Modules are logical equivalents of specialized Digital Trunk Controller cards such as the STR and GTR, but are more flexible and powerful. They support services such as tone generation and echo cancellation. They can interact with user channels through the Spectrum Peripheral Module to support applications, in the same way that the STR, for example, interacts with a specific Digital Trunk Controller channel to detect service-related tones. Specific Digital Signaling Processors Resource Modules include the following: — Digital Signaling Processors supporting tone generation — Voice Service Processor (VSP) — Echo Cancellers

A Spectrum Peripheral Module supports one active external OC-3 carrier link, plus another link provisioned to support protected link operation. This link provides connections to/from other switches and PBXs using an optical fiber backbone network. The Spectrum Peripheral Module connects the 64 kbps traffic channels provided by the external link with 64 kbps channels provided by four internal DS-512 optical fiber links to the Meridian SL-100 switching matrix.

There is no concentration at the Spectrum Peripheral Module. The maximum P-side capacity is 1,953 64 kbps trunks and each one of these is mapped 1:1 onto one of the 2,048 user channels provided by the DS-512 internal links. Two SPM units can be housed in a cabinet which doubles the above capacity resulting in four times the capacity provided by an XPM-based Digital Trunk Controller cabinet.

Figure 18 shows the relationship between SPM functional elements.

Figure 18
Spectrum Peripheral Module architecture



Benefits

The Spectrum Peripheral Module offers the following:

- a 1+1 redundant OC-3 trunking interface for the Meridian SL-100
- an equipment sparing STS-1 interface (redundant electronic modules)

The SPM provides an OC-3 interface directly into the Meridian SL-100 system. This flexible, multiple-application platform offers high-speed trunking technology to the Meridian SL-100 with a modular, scalable, world-class design.

Each SPM supports up to 2,016 DS-0s by using the OC-3 interface. Each frame houses two SPMs. This significantly simplifies the switching office by reducing the number of switching-peripheral frames and 3/1 multiplexers to help trim the trunking footprint from 4.2 to 6.5 times over current configurations. Users can recapture even more floor space by installing SPMs back-to-back or up to 15 cm (six inches) from walls.

The reduction in peripheral frames, batteries and rectifiers in the office can translate into lowering power expenses some five to ten times less than existing lineups. Engineering planning, and physical provisioning tasks associated with adding new trunks are cut by 48 times over a DS1 office, with the potential to reduce total cable termination by 14 times. And, with only a few card types, the SPM helps significantly lower ongoing expenses in office spares.

The consolidation of equipment in the office helps reduce the number of points of failure. Redundant optical switch links, impressive low bit error rate, and the absence of optical-to-electrical conversions, also contribute to improved in-service time.

The SPM's wide bandwidth, scalable processing, and flexible SONET payload mapping make this an ideal integrated platform for easy entry into data services, video (including video conferencing) and other high-bandwidth offerings. And the SPM's multiple application architecture enables users to deploy new services quickly, without increasing peripheral count which all translates into greater efficiency for your business.

The Spectrum Peripheral Module provides the following additional benefits:

- flexible, modular, scalable architecture with space-saving front access
- ANSI, GR-512 and NEBS compliant design

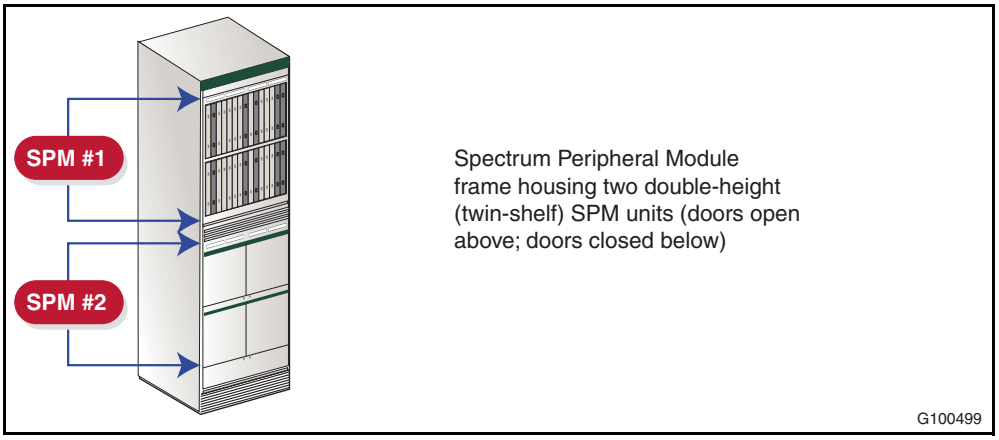
- hot insertion/hot extraction of modules
- supports both short-reach (2 km/1.2 miles) and intermediate reach (15 km/9.3 miles) optics
- spare hardware slots and processing capacity for future growth
- duplicated crossover links handle double fault conditions
- redundant processor and OC-3 trunking
- hot standby common equipment switches over without dropping current stable calls
- self-testing and advanced diagnostics
- enhanced fault detection and isolation down to a single card
- LEDs provide at-a-glance monitoring

Nortel designed spare processing capacity and hardware slots (near 70% free shelf space in initial releases) to help make the SPM future ready for other trunk service to meet customer requirements, including the evolution to an Interworking Spectrum Peripheral Module - IP used in the Communication Server 2100 hybrid configuration.

Hardware packaging

The Spectrum Peripheral Module is a double-height shelf unit (in effect a twin-shelf unit like the Digital Trunk Controller) and is housed in a customized four-shelf system as shown in Figure 19. The dimensions of the SPM hardware are smaller than those of equivalent XPM units, but to minimize costs adapter brackets can be used to house SPMs in existing frames.

Figure 19
Spectrum Peripheral Module



Line peripherals

Introduction

This section describes Meridian SL-100 on-switch line peripherals which support the following three main functions:

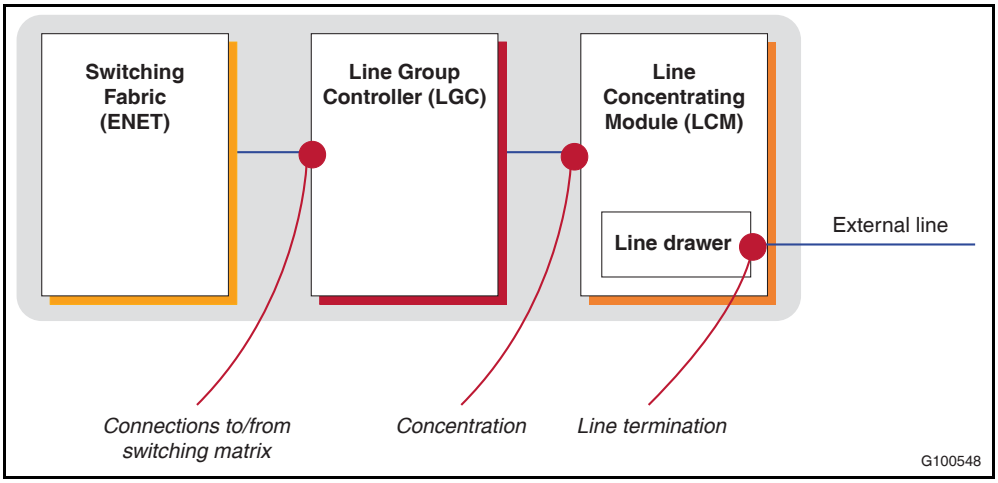
- Providing line terminations – Line peripherals provide terminations for external lines and low-capacity PBXs. An external line can be terminated directly on the switch (for example, a copper twisted pair terminated on a line card). Alternatively, the line can be terminated on an external multiplexer, in which case the physical connection is provided by a 64 kbps channel on a 2 Mbps PCM30 carrier between the switch and the multiplexer. Line signaling can be analog (in-band or out-of-band) or digital.
- Providing connections between external lines and internal channels – Setting up a call to/from an external line requires the Meridian SL-100 to through-connect the external line to the switching matrix through internal 64 kbps channels.
- Concentration – A primary distinction between line interfaces and trunk interfaces is that lines are concentrated (that is, there are fewer C-side traffic channels than P-side traffic channels). External lines (P-side channels) contend for the available C-side channels. The appropriate degree of concentration depends on the application. The aim is to provide an appropriate balance between maximum utilization of internal channels and the level of subscriber service (likelihood of getting dial tone). For example, typically lines in an residential environment such as a college dormitory are heavily concentrated (by factors up to 10:1), but business lines such as the college's administrative office are only lightly concentrated.

Traditionally, these three functions have been allocated to different units as follows:

- Line Group Controller (LGC) – Supports connections to/from the switching matrix for P-side carriers.
- Line Concentrating Module (LCM) – Supports levels of concentration. Level of concentration is determined by the number of lines (P-side) and the number of carrier links to/from the Line Group Controller (C-side).
- Line drawers – Provides physical terminations for external lines.

Figure 20 on page 56 shows the allocation of line peripheral functions between the Line Group Controller, Line Concentrating Module and line drawers.

Figure 20
Allocation of line peripheral functions



This section also describes the Intelligent Peripheral Equipment module, which is a highly-specialized line peripheral that provides many value-added applications to large enterprises.

Line Group Controller

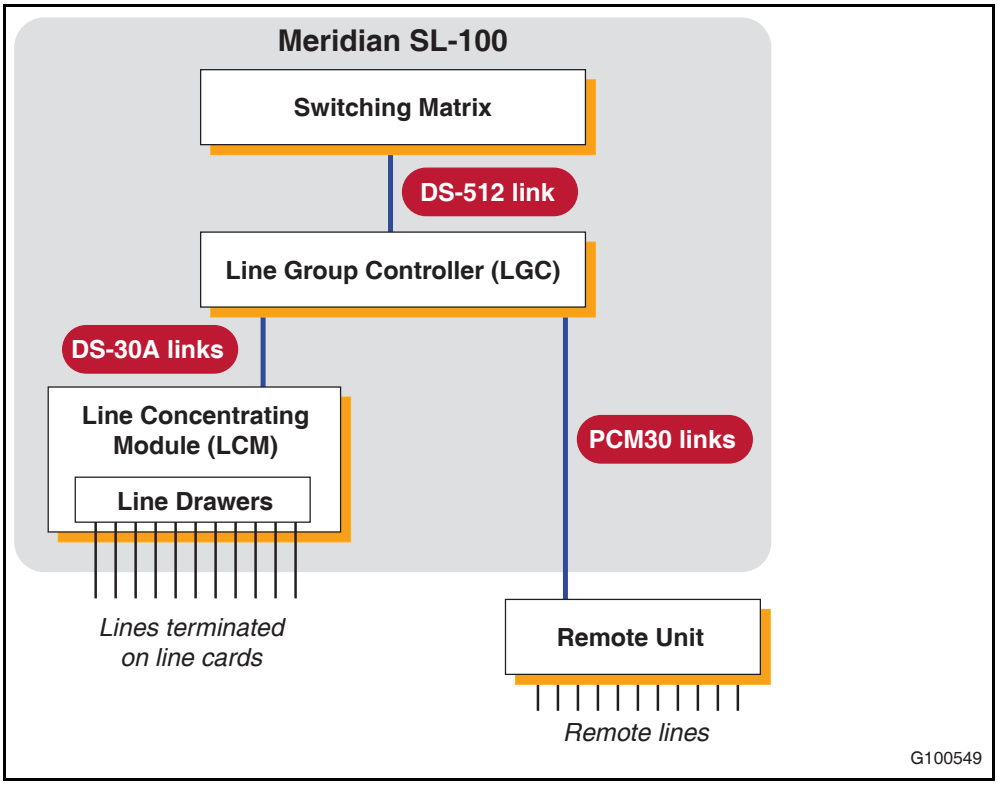
Functional overview

Line Group Controllers support Line Concentrating Modules (LCMs) and provide LCMs with access to the ENET switching matrix. A Line Group Controller interfaces with the ENET on the C-side using a single DS-512 optical fiber link. On the P-side, connections between the Line Group Controller and Line Concentrating Modules are supported using 2 Mbps links as follows:

- DS-30A links are used when interfacing with host Line Concentrating Modules (DS-30A is an internal Meridian SL-100 interface).
- PCM30 links are used for interfacing with remote unit Line Concentrating Modules. Control signaling uses either DMSX or the open High-Level Data Link Control (HDLC) protocol, depending on the messaging card in the Line Group Controller.

Figure 21 on page 57 shows the relationship between the Line Group Controller and other components.

Figure 21
Line Group Controller links with other components



The Line Group Controller provides call processing and handling capabilities, tone circuits and a time switch that can connect individual 64 kbps P-side channels with C-side channels to/from ENET.

The Line Group Controller supports concentration for line interfaces to make sure that C-side capacity is not wasted (that is, there may be more P-side channels than C-side channels, in which case the P-side channels contend for the available C-side channels). Depending on the level of concentration required, there can be from two to six links between the Line Group Controller and a Line Concentrating Module. Physically, a Line Group Controller can support up to 20 P-side ports, giving a theoretical maximum of 10 LCMs supported using the minimum of two ports on the Line Concentrating Module. To avoid traffic congestion, however, Line Groups Controllers are engineered to support a maximum of 16 P-side ports for up to eight Line Concentrating Modules.

Within the Line Group Controller, voice and data traffic is converted from serial form (as used for PCM30 and DS-512 channels) into parallel form, to be conveyed over the Line Group Controller's speech bus. The speech bus supports 640 10-bit-wide channels, 480 of which are reserved for the 64 kbps user channels routed through the Line Group Controller. This makes it possible for the Line Group Controller to provide and detect in-band tones.

A Line Group Controller is a twin-shelf unit, in which the active shelf and its components are fully duplicated by a second unit operating in hot standby mode, ready to take over and maintain service continuity in the event of failure.

Functional elements

Table 10 describes the functional elements that make up the Line Group Controller.

Table 10
Line Group Controller functional elements (Sheet 1 of 2)

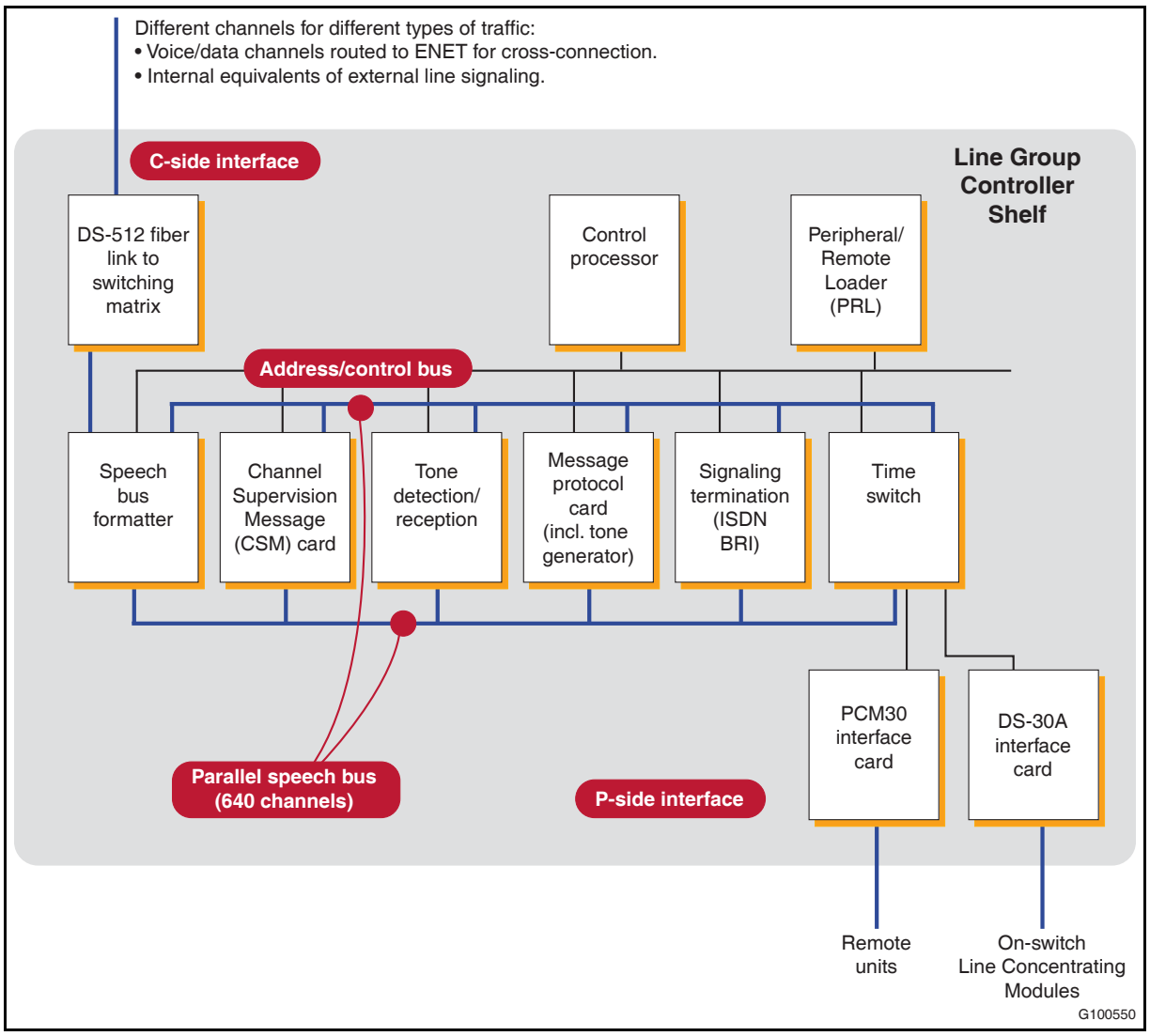
Element	Description
Control processor	The control processor controls other Line Group Controller components, including those that perform serial/parallel conversion and tone generation/reception. The SX05 PowerPC control processor is the current standard for newly-deployed Line Group Controllers. It offers the following advantages: • Significant performance improvements over previous types of control processor • 64 Mybtes on-board memory • 128 Mybtes flash memory • Optional on-board Peripheral/Remote Loader
P-side interface components	P-side interface components include the following: • Cards terminating DS-30A internal links to on-switch Line Concentrating Modules. • Cards terminating 2 Mbps PCM30 external carrier links to Line Concentrating Modules in remote units. • Time switch that makes connections between speech bus timeslots and external carrier channels and converts the parallel data stream on the speech bus to/from a serial bit stream on a 64 kbps carrier channel.

Table 10
Line Group Controller functional elements (Sheet 2 of 2)

Element	Description
C-side interface components	C-side interface components include the following: • DS-512 optical fiber interface to Meridian SL-100 switching matrix. • Speech bus formatter and clock card that performs serial-to-parallel conversion of encoded voice signals received through the DS-512 interface. It also performs parallel-to-serial conversion of encoded voice signals destined for the DS-512 interface. Each parallel data stream to/from the formatter is connected to a speech bus timeslot through the Channel Supervision Message (CSM) interface card. The clock section of the formatter provides the Line Group Controller shelf clock. • Channel Supervision Message interface card that performs parity checking on the parallel data streams to/from the formatter and monitors speech path integrity for each active call.
Messaging card with downloadable tones	The messaging card interfaces with the parallel speech bus to provide a C-side and P-side messaging interface using the DMSX protocol. In particular, it accepts control messages from the Core and relays them to other components. It also supports the provision of tones on outgoing speech channels by means of a toneset downloaded to it as part of the static XPM data.
Signaling termination cards	The Enhanced D-channel Handler (EDCH) card terminates ISDN Basic Rate Interface (BRI) signaling (that is, sends/receives messages to/from the signaling channel of BRI lines).
Tone detection/ reception	The following optional cards are used to monitor speech bus channels for incoming tones and report detected tones to the control processor: • Universal Tone Receiver (UTR) – A Universal Tone receiver can monitor up to 30 channels for event tones and digits. • Global Tone Receiver (GTR) – An enhanced version of the Universal Tone receiver that can detect up to 128 frequencies of u-law or A-law tones on 60 or 30 channels simultaneously. ***Note:*** A Line Group Controller can also make use of tone detection/reception capabilities provides by a card in an Maintenance Trunk Module (MTM) or Integrated Services Module (ISM) slot.
CLASS Modem Resource (CMR) card	To support Custom Local Area Subscriber Services (CLASS) for analog lines, a Line Group Controller can house a CLASS Modem resource card. This card uses modem functionality to provide digital information over analog lines (for example, to provide caller name and number during silent intervals in the ringing cadence).
Peripheral/ Remote Loader (PRL)	The Peripheral/Remote Loader is a 16-Mybte flash memory card that stores Line Group Controller static data and a backup image of the control processor, supporting rapid reload of the Line Group Controller after a failure. Load files are transferred to the Peripheral/Remote Loader as a background task while the Line Group Controller is at task level.

Figure 22 on page 60 illustrates the relationship between Line Group Controller functional elements.

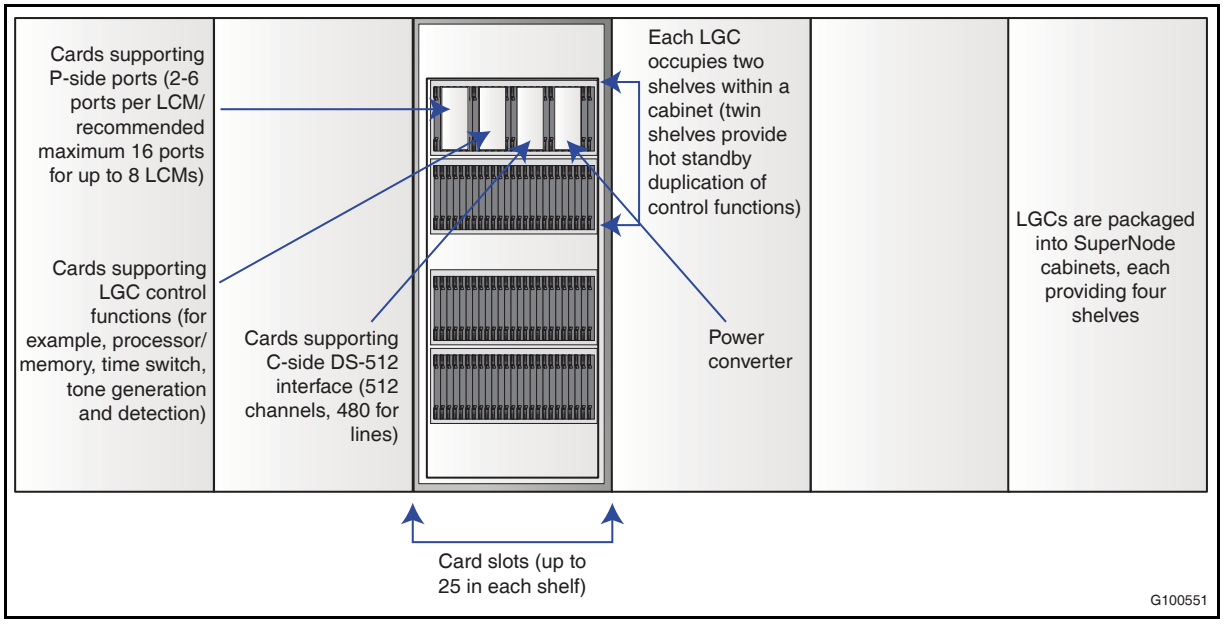
Figure 22
Line Group Controller architecture



Line Group Controller shelf contents

Figure 23 on page 61 illustrates how Line Group Controllers are packaged into SuperNode cabinets.

Figure 23
Line Group Controller packaging



Line Concentrating Modules

Functional overview

Line Concentrating Modules (LCMs) house line drawers and support communication between the Line Group Controller and the physical line terminations provided by those drawers. Line Concentrating Modules also provide whatever degree of concentration is appropriate for the application, maintaining a balance between maximum utilization of internal channels and level of subscriber service (likelihood of getting dial tone). Line Concentrating Modules can be located in the Meridian SL-100 itself or in remote units.

A Line Concentrating Module is a twin-shelf unit. Each shelf has its own control processor. The two processors normally operate in load-sharing mode, with each being responsible for the line drawers in its own shelf. In the event of failure, either processor can control all the line drawers in the unit, but at a lower rate of call traffic.

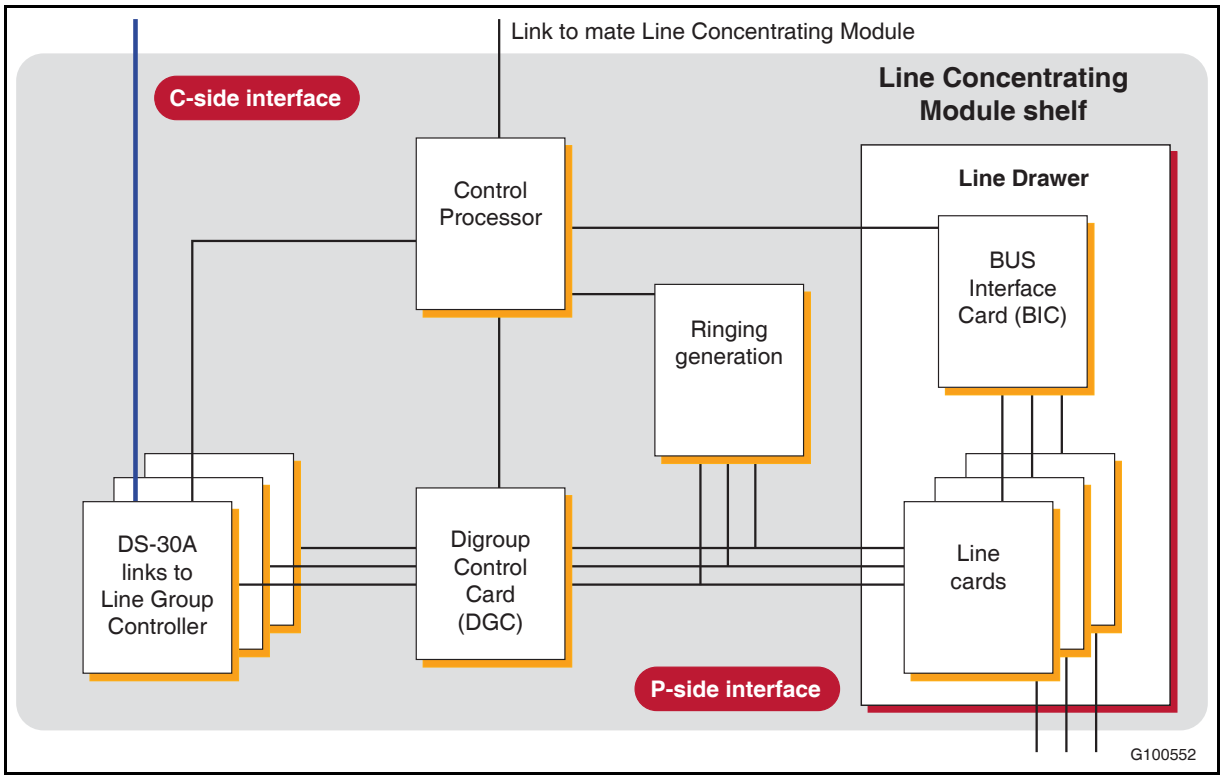
The main components of the Line Concentrating Module are as follows:

- Control processor – Controls the operation of other Line Concentrating Module components.
- Digroup Control Card (DCC) – Provides time-switched connections for speech/data channels between line drawer cards and the C-side links to the Line Group Controller.

- Ringing generation – A ringing generator card provides the appropriate ringing cadence for outgoing line connections.
- Line drawers – These drawers, up to five per Line Concentrating Module shelf, house the cards that terminate subscriber line interfaces. Each drawer houses a Bus Interface Card (BIC), which supports access to the line drawer from the control processor.

Figure 24 illustrates the relationship between Line Concentrating Module functional elements.

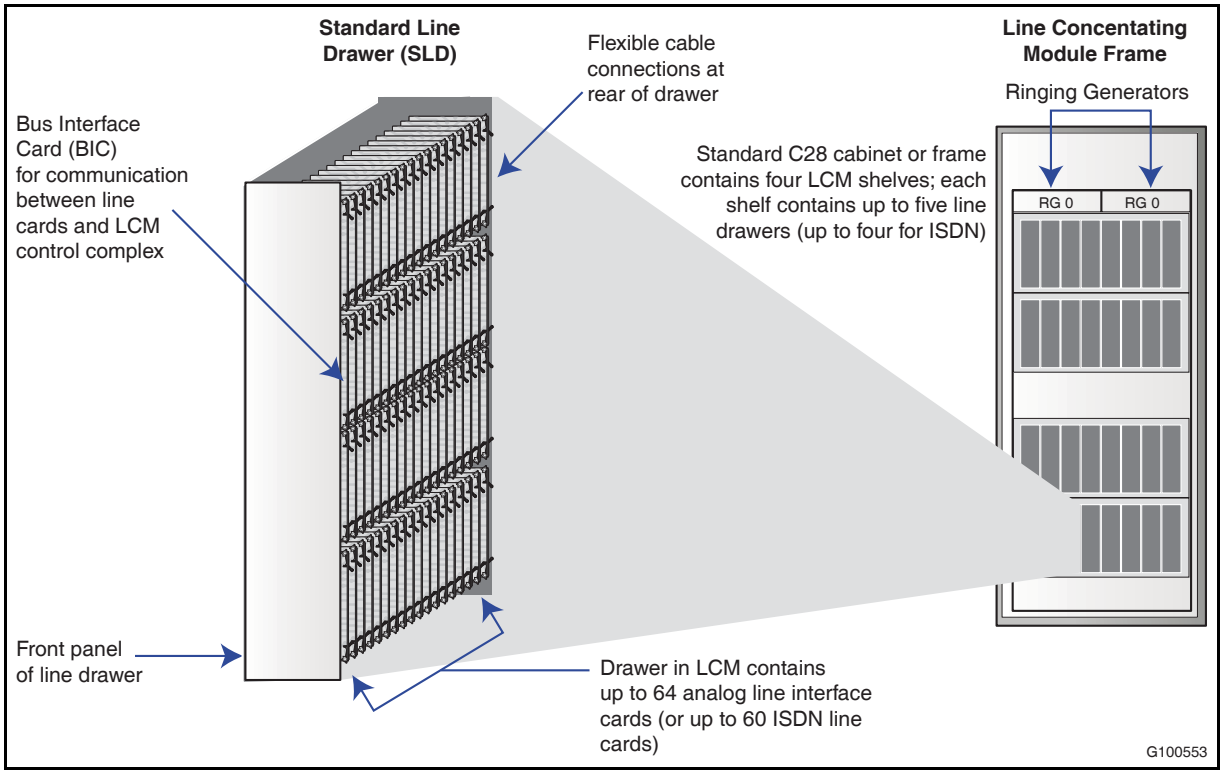
Figure 24
Line Concentrating Module architecture



Line Concentrating Module shelf contents

Standard Line Concentrating Modules are twin-shelf units housed in four-shelf cabinets or frames. Each Line Concentrating Module has up to 10 line drawers, five per shelf. Depending on the type of line terminations it contains, a Line Concentrating Module line drawer can terminate up to 64 analog line cards or 60 virtual lines. The maximum capacity of a complete Line Concentrating Module is, therefore, 640 line cards and that of a complete cabinet or frame is 1280 line cards. Figure 25 on page 63 illustrates how line cards are housed in drawers and how line drawers are in turn housed in frames.

Figure 25
Packaging line cards in a line drawer



Depending on the level of concentration required, there can be from two to six 2 Mbps links between a Line Group Controller and Line Concentrating Module (up to 18 for an ISDN-enabled LCME). Each Line Group Controller has a theoretical maximum of 20 ports for 2 Mbps Line Concentrating Module links. Given the maximum of 2 Mbps links per Line Concentrating Module, a Line Group Controller can theoretically support up to 10 Line Concentrating Modules.

A primary purpose of the Line Concentrating Module is to provide the appropriate level of concentration between line interfaces, which are typically under utilized, with the internal LCG-LCM connections, which are heavily used. The maximum concentration (approximately 10:1) involves concentrating the Line Concentrating Module maximum of 640 line terminations onto the minimum two 2 Mbps links between the Line Group Controller and the Line Concentrating Module. This would be suitable for very lightly used lines (for example, those in a campus residence). The minimum concentration for a fully-provisioned Line Concentrating Module (approximately 35:1) involves concentrating 640 line terminations onto the maximum six 2 Mbps links between the Line Group Controller and the Line Concentrating Module. This would be suitable for business lines.

Line Concentrating Modules support intra-switching (that is, the speech path between the two lines supported by the same Line Concentrating Module is through-connected at the Line Concentrating Module, not through the ENET switching matrix). Note, however, that call processing is still performed by the Core, so the Line Concentrating Module still needs to communicate with the Core through ENET and the Line Group Controller for call establishment and clearing.

Line Concentrating Modules contain a Ringing Generator card used to provide ringing to the subscriber lines. This is duplicated for reliability. An enhanced Ringing Generator card is available that has dipswitches that can be used to control the ringing cadence generated by the card.

Line Trunk Controller

The Line Trunk Controller is a peripheral module that is a combination of the Line Group Controller and the Digital Trunk Controller and provides all the services offered by both. It supports the Line Concentrating Module and AB trunks.

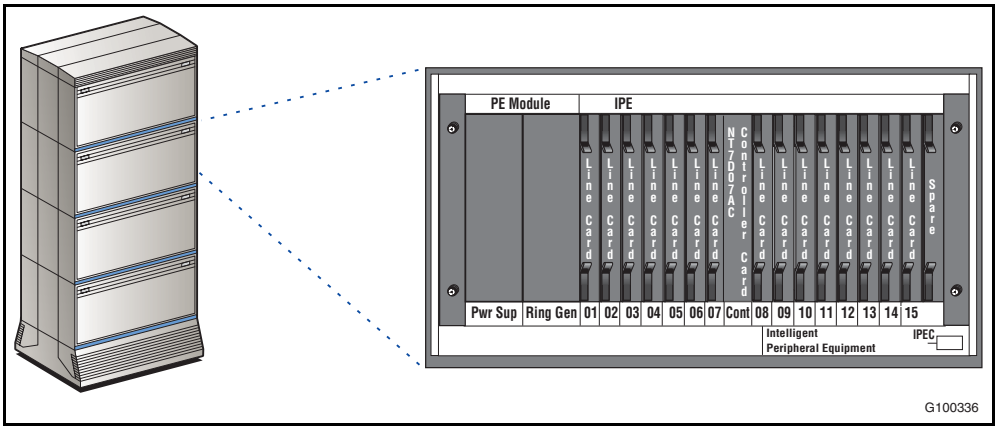
The Line Trunk Controller-ISDN (LTC-I) is a peripheral module that is a combination of the Line Group Controller and the Digital Trunk Controller and, like the LTC, provides all the services offered by both. The LTC-I is wired to support up to eight Line Concentrating Modules or Digital Line Modules (DLM) requiring up to 20 DS-30A trunk ports and 16 DS-30 line ports.

Intelligent Peripheral Equipment (IPE)

The Intelligent Peripheral Equipment (IPE) Module on the Meridian SL-100 provides the capability for customers to use M3900 Series Telephones, Meridian Digital Telephones and line-side features and services. Since the IPE is common to both the Meridian 1 and Meridian SL-100 systems, users who move from Meridian 1 systems to the Meridian SL-100 are already familiar with telephone equipment and many of its features and services. In addition, customers who upgrade from Meridian 1 systems to Meridian SL-100 systems can capitalize on their initial investment in both terminals and peripheral equipment.

Figure 26 on page 65 shows an IPE shelf.

Figure 26
IPE shelf



DC powered IPEs

DC power is required for the IPEs in Meridian SL-100 host and remote switching center offices.

DC powered IPEs have the following requirements:

- DC IPE shelf
- DC Powered Pedestal
- DC Power Card (NT6D40)
- DC Ring Generator (NT6D42) (optional)

AC powered IPE

An AC powered IPE can only be configured as a remote IPE behind the TSI TII product. In the AC-powered systems, power components external to the IPE are not required. AC systems perform a single conversion from the AC input voltage to the DC voltages required by circuit cards in each module. Optional reserve power requires an Uninterruptible Power Supply (UPS) and batteries. AC power supplies operate from a nominal input of 208 to 240 volts AC, single-phase. While the actual input range of the AC power supplies is 180-208 V, no restrapping of the power supplies is required if the input line voltage is within 208-240V AC. AC-powered systems require one IG-LG 30 orange receptacle for each column within 2.4m (8 ft.) of the column's pedestal. Each column comes equipped with one 30 Amp cord and plug.

IPE cards

Table 11 describes the Meridian SL-100 IPE cards

Table 11
IPE circuit cards

PEC Code	Description	Features
NT5D11XX	Line-Side T-1 Card	Connects compatible T-1 peripheral equipment such as Voice Mail systems, Voice Response Units, etc.
NT6D40XX	DC Power Card	DC power card performs a conversion from -52v DC nominal input to +5.1, +8.5, +10, -10, +15,-15v at a maximum output of 560 watts.
NT8D06XX	AC Power Card	AC power card performs a single conversion from the AC input voltage to the DC voltages required by circuit cards in each module.
NT8D21XX	AC Ring Generator	Supplies ringing current to Analog Line cards.
NT6D42XX	DC Ring Generator	Supplies ringing current to Analog Line cards.
NT7D07XX	EXPEC Circuit Card	IPE controller card that provides DC30A to DS-30X protocol conversion.
NT8D02XX	XDLC Digital Line Card	Provides 16 channel digital ports with voice and data communication (replaces EB vintage card).
NT8D09XX	Message Waiting Analog Line Card	16 channel analog ports with voice communication and message waiting indication. The NT8009XX does not support CLASS and Attendant Consoles on the Meridian SL-100.
NTDF29XX	Meridian Home Office II Card	Allows remote access to teleworkers at home or small office, using M2616 or M2216 sets.
NT5D51XX	Meridian Integrated Conference Bridge	Provides 32 conference ports on the IPE. Expandable to 62 conferences using two cards.

Enhanced IPE Controller Card (EXPEC) The Enhanced Controller Card (NT7D07BA) is a single card that consists of a single board with a dual slot faceplate. The EXPEC provides enhanced capabilities compared with the NT7D07AC. NT7D07BA includes the following components:

- A new processor (MPU) within the controller.
- An increase in RAM to 8 megabytes (Mb).
- Communication with the EXPEC through an Ethernet port.

- Supports 4Mb of FLASH memory.
- Support 256 kilobytes (Kobe) of SRAM.

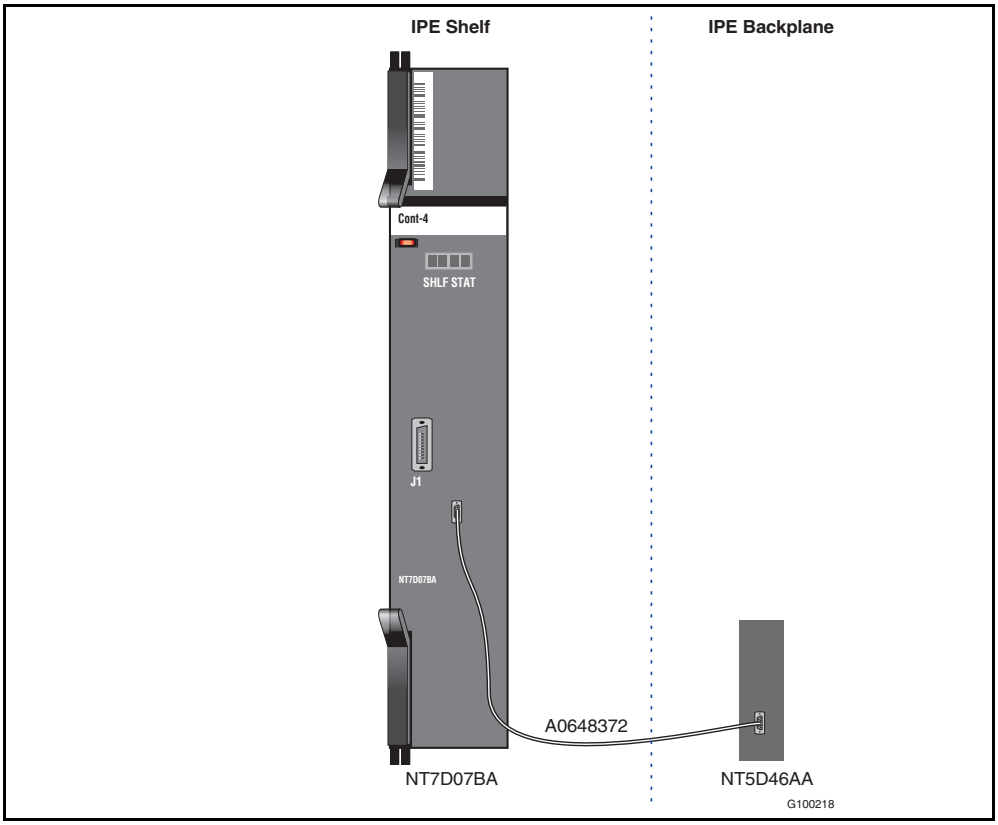
The Enhanced controller card gives the system added value by allowing the IPE system to remain in an INSV (in-service) condition while transferring the software into the flash memory from Optivity Telephony Manager for Meridian SL-100, and then booting the system from flash. This service results in less down-time and it allows more flexibility in the schedule for upgrading system software. In addition, this allows a customer to connect the IPE hardware into an enterprise data network using the Ethernet connection. This connection allows a software upgrade through the data network for quicker and more convenient loading. Finally, it offers an increase in DRAM, coupled with IPE version checking and a upgraded pSOS operating system.

Customers receive the new card with the latest software load delivered on the EXPEC card. The active IPE will be Manual Busy (Manb) then the old card is removed and the new card installed. An optional Ethernet cable and bulkhead adapter is available for connection to the LAN. This optional connection is desirable to provide minimal downtime when loading the IPE.

Datafill for Table IPEINV adds fields “XPECTYPE” as STANDARD (NT7D07AC) or ENHANCED (NT7D07BA). The field “STATE” was added to provide information about the Ethernet connection to the IPE. Datafill the tuple field either DISABLED when there is no Ethernet connection or ENABLED in which there is an Ethernet connection. When ENABLED is datafilled, enter datafill for three more fields: IPADDR to enter the IP address that will be used, SUBNET to add the subnet mask information and DFLT_GWY to provide the default gateway address that is required. Once the new IPE is Returned to Service (RTS’d) the IP address is configured. Access to the IPE from Optivity Telephony Manager for Meridian SL-100 becomes available at this time.

Figure 27 on page 68 shows the IPE backplane connection.

Figure 27
IPE backplane connection



Line Side T1 Interface (LTI) The Line Side T1 IPE Interface (LTI) line card provides enhanced capabilities for the Intelligent Peripheral Equipment (IPE) product. T1 interfaces have become commonplace on today's Voice Mail and Voice Response Unit equipment. Up to this point in time, the only method available for a customer to attach these T1 interfaces to Nortel equipment was through channel banks. This method is expensive, bulky, and provides poor performance due to the conversion from digital to analog and back to digital. The LTI product solves this problem.

The Line Side T1 IPE Interface supports the following applications:

- Voice Mail systems
- Interactive Voice Response (IVR) systems
- Voice Response Units (VRU) systems
- Turret systems (used in Financial and Stock Trading Companies)
- Automatic Call Distribution (ACD) systems
- Switches with Automatic Call Distribution (ACD) systems

- Interfacing Norstar systems to the Meridian SL-100 through the LTI
- With LTI at the host, interfacing to remote phones that are connected to Channel Banks

The LTI combines the system software interface of an Analog Line Card (XALC) with a T1 interface into a single IPE circuit card. The LTI is packaged as a standard IPE circuit card, capable of insertion into any of the left-most 15 IPE slots designated for line cards (the LTI requires two slots, so it cannot be inserted into slot 16).

The DS-30X interface converts the DS-30X time slots into the necessary format for transmission over the T1 link.

The MUX/Sequencer circuitry steers each DS-30X time slot to the correct T1 time slot.

The A/B bit control circuitry converts on-hook, off-hook, and ringer control messages from the DS-30X loop into A and B signaling bits in the T1 links.

The T1 interface circuitry provides the 1.544 Mbps interface to the T1 link. The T1 interface connects to the network through the 25 pair connection at the rear of the IPE shelf.

The LTI supports 24 circuits. Since the Analog Line Card, that the LTI emulates, can only support 16 ports, the LTI implements a daughterboard arrangement to access a second IPE card slot.

The LTI accommodates SF or ESF Framing and B8ZS or AMI line coding, using robbed-bit signaling.

Remote T1 IPE Interface (TII) The T1 IPE Interface (TII), developed by Telecom Strategies, Inc. (TSI), allows Intelligent Peripheral Equipment (IPE) modules to be remotely located from the Meridian SL-100 host or Remote Switching Center (MCRM, MCRM-S), over standard T1 facilities to distances up to 112.5 km (70 miles).

The Remote T1 IPE Interface (TII) cost-effectively extends a Meridian SL-100 IPE module up to 112.5 km (70 miles) from a host or RSC over standard T1 facilities. A local TII circuit card converts up to three DS-30A loops from the host or RSC into T1 compatible format. A remote TII circuit card converts the T1 format signals back to DS-30A loops for attachment to a remote IPE module.

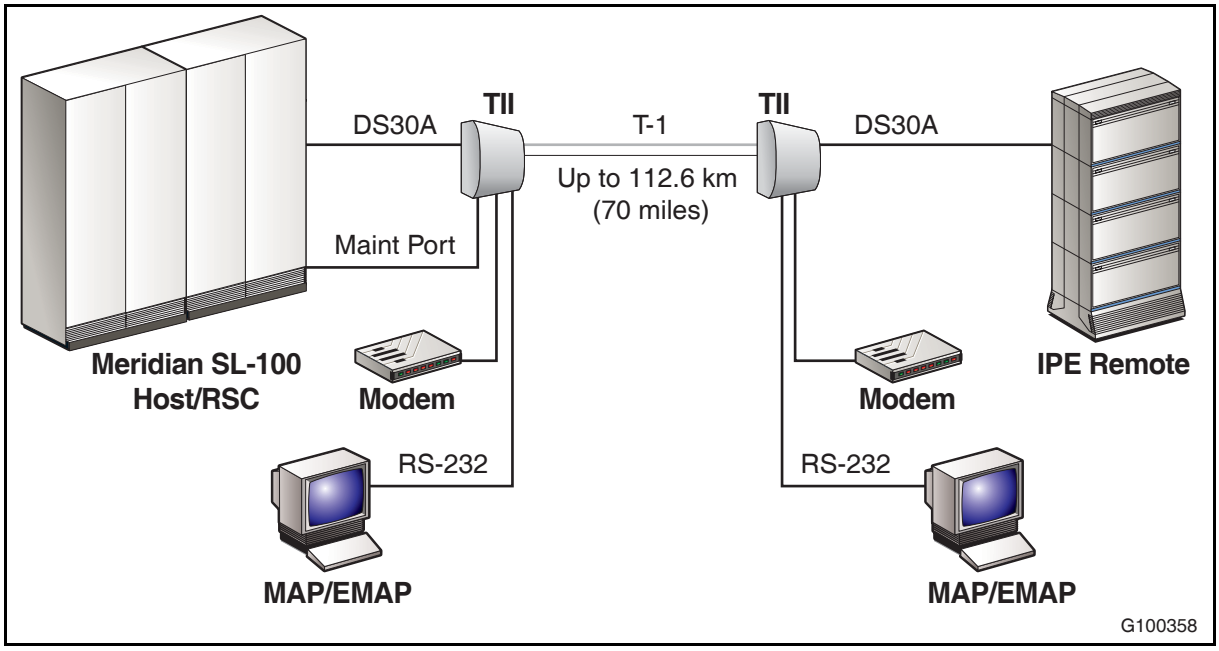
The TII can attach to standard network T1 facilities, private T1 facilities, T1-compatible microwave or infrared transmission equipment, or dry two-pair wiring. The T1 IPE Interface is compatible with both SF and ESF T1 framing, as well as B8ZS coding, and is fully DACS compatible.

Optional redundancy is available to protect against T1 failure. A full range of T1 link diagnostics and monitoring capability is provided in the product. The TII is packaged in a 48 cm or 58.5 cm (19 or 23) inch card cage, or a wall-mounted enclosure. Optional 48 volt DC is available, or 110 volts AC power is available.

Note: The IPE Remote can be powered by optional 48 volts DC or 220 volts AC.

Figure 28 shows the Remote T1 Interface configuration.

Figure 28
Remote T1 IPE Interface configuration



Since the TII is not included in the NTI Customer Premises Equipment Distributorship Agreement, TII equipment and support is provided direct from TSI Authorized Distributors. However, Nortel engineering is required for delivery of the IPE and associated interface equipment.

All of the DS-30A links from the TII must reside on the same XPM.

Downloading IPE software

Download the IPE software using one of the following methods:

- Download the IPE software from the MAP. Normal downloading of the IPE is still supported.
- Download the IPE software from the Optivity Telephony Manager for Meridian SL-100 using the IPE Ethernet port. Optivity Telephony Manager for Meridian SL-100 provides the EXPEC with the information about where to retrieve the file (DISKUT or an FTP server). The EXPEC then retrieves the file through the EIU (if the file is in DISKUT) and provides the software load into flash memory. The customer can now set the ITOC table in the EXPEC to the load that will be put in-service. Loading is not necessary, unless the flash load on the IPE card is corrupted. Removal of power does not affect the load in flash.

When a user needs to RTS the IPE they can now use the IPE menu command “RTS FLASH_”. This command boots the IPE card from flash memory and puts the unit in-service.

Cutoff on Disconnect Controller

The CDC-12, developed in cooperation with Telecom Strategies Incorporated (TSI), is a compact, wall-mountable unit which allows people to use modems, paging equipment, Voice Mail systems, and other 2500-type devices more effectively, connected to an Intelligent Peripheral Equipment (IPE) module, which require a positive indication of distant end disconnection. The CDC-12 is cross-connected in series with up to 12 IPE-based 2500-type analog ports to provide a momentary interruption of line current when a distant-end disconnection occurs. This momentary interruption is recognized by the terminal equipment as a distant-end disconnection which allows the device to go on-hook and gracefully end the communication session.

A control port off the CDC-12 is connected to a digital port on the Meridian SL-100 to emulate an M2616 digital telephone. The Meridian SL-100 database is configured such that each of the twelve ports requiring cutoff on disconnect indication appears as a line on the digital control port. Either the Multiple Appearance Directory Number (MADN) feature, or Busy Lamp Field (BLF) feature, can be used to configure the digital control port.

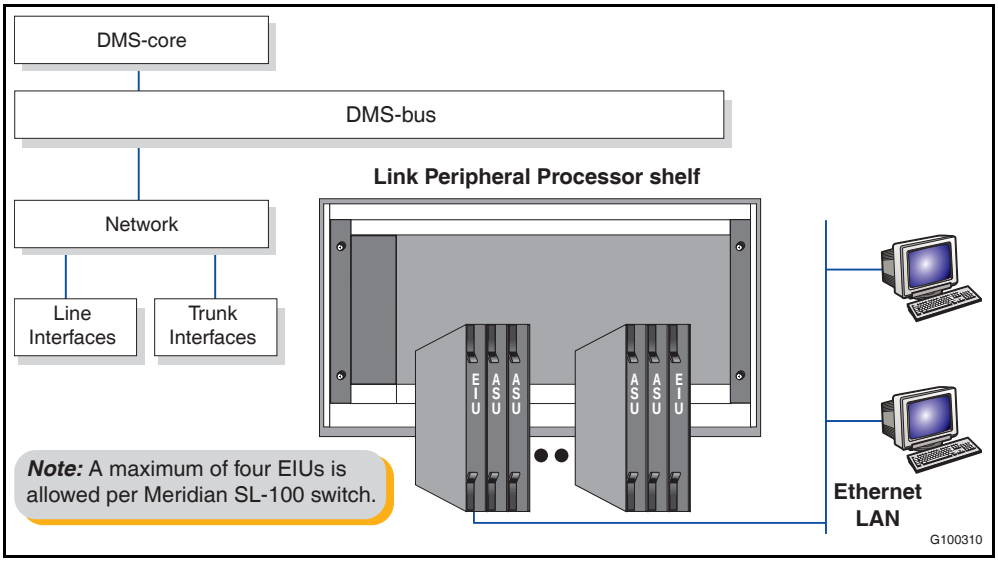
Since the CDC-12 is not included in the NTI Customer Premises Equipment Distributorship Agreement, CDC-12 equipment and support is provided direct from TSI Authorized Distributors. However, Nortel engineering is required for delivery of the IPE and associated interface equipment.

Link Peripheral Processor-based peripherals

Ethernet Interface Unit (EIU)

The Ethernet Interface Unit (EIU) provides a link between a Meridian SL-100 switch and a Local Area Network (LAN) using Ethernet technology. Figure 29 simplifies this concept.

Figure 29
Ethernet Interface Unit block diagram



The Ethernet Interface Unit

- provides the physical connection between the switch and the LAN
- converts data from LAN-supported protocols to Meridian SL-100-supported protocols
- provides the primary interface to server-based applications including the following:
  - — Symposium Call Center
  - — Symposium TAPI Driver over Intelligent Call Management (ICM)
  - — Telnet, MAP and File Transfer Protocol (FTP) services
  - — Transmission Control Protocol and Internet Protocol (TCP/IP) services
  - — User Datagram Protocol (UDP) services
  - — Integrated Voice Response
  - — CompuCALL to TCP/IP
  - — Station Message Detail Recording (SMDR)

— Optivity Telephony Manager for Meridian SL-100

— Simple Network Management Protocol (SNMP)

— Real-time Station Message Detail Recording

The Ethernet Interface Unit acts as a router between the Meridian SL-100 and an external Ethernet LAN. The EIU provides remote access to the MAP from third-party computing equipment (for example, workstations, terminals and printers) connected to the Meridian SL-100 through an Ethernet LAN. With the EIU, technicians can perform Operations, Administration, Maintenance and Provisioning (OAM&P) functions from the ease and convenience of the Local Area Network. The physical implementation of the EIU is standardized in the Institute of Electrical and Electronic Engineers (IEEE) 802.3 standard.

Benefits

The Ethernet Interface Unit offers the following:

- High-speed Ethernet connectivity (up to 1.5 Mbps throughput between an Ethernet LAN and the DMS Bus) permitting easy integration with an external LAN.
- Support for attached computing resources such as computers, workstations and printers.
- Support for industry-standard transport and access protocols such as TCP/IP, UDP, Telnet and FTP.
- Enhanced OAM&P capabilities by drawing on the strength of state-of-the-art computing technologies.
- Simple Network Management Protocol interface for network management applications.
- Computer telephony message transport through the Intelligent Call Management link.
- Support for user requests from the server/switch and capability to evaluate, manipulate and process the information obtained. This saves time, increases productivity, and reduces investment in equipment and personnel.

EIU hardware requirements

EIUs reside within the Link Peripheral Processor (LPP) in a Meridian SL-100 SuperNode or SNSE cabinet, or in a Meridian Cabinet Network Interface (MCNI) cabinet. In all cases, they reside alongside other Application Specific Units (ASUs) such as the CCS7 Link Interface Unit (LIU7), Frame Relay Interface Unit (FRIU), Network Interface Unit (NIU), Enhanced Link Interface Unit (XLIU) providing X.25 packet handler services, and more.

The EIU can reside in the LPP cabinet or the SNSE Link Interface Shelf (LIS).

The EIU consists of a three-card set as follows:

- NTEX22BA/BB Integrated Processor FBus (IPF) card which houses the M68030 processor and 8Mb DRAM.
- NT9X84AA Ethernet Interface Card (EIC), which houses the local high-speed buffer and Media Access Control layer.
- NT9X85AA Ethernet Interface Paddleboard (EIP), which provides the physical link to the Local Area Network using the generic interface connection described below.

A single EIU is required for each LAN connection to the switch. However, two EIUs for each LAN connection are recommended. When operating in a hot-standby mode, the two EIUs provide fault-tolerant communications to the LAN. In hot standby, one EIU carries the full traffic load. If the active EIU fails, traffic is automatically shifted to the standby EIU.

The EIU uses two generic components, an Application Unit Interface (AUI) cable and a Media Access Unit (MAU), to physically link with the LAN. The AUI consists of four shielded twisted-pair wires, with a 15-pin D-type connector (DB 15) at each end. The MAU transfers packets from the medium supporting the Ethernet LAN (thick wire, thin coax, UTP or fiber optic) to the AUI cable. Both of these units are LAN-based equipment and are commercially available.

IP Client Manager for the Meridian SL-100

Description

The IP Client Manager (IPCM) uses IP technology to deliver the full Meridian business features sets and capabilities to users connected to a managed IP network. The IP Client Manager 2.5 connects through a TDM T1 interface to a Line Trunk Controller ISDN (LTC-I) on the Meridian SL-100. The Meridian SL-100 supports the IP Phones 2002 and 2004 and the IP Softphone 6350 through the IP Client Manager.

Note: The IP Client Manager can also be used with the Communication Server 2100. In SE08, the IP Client Manager was rebranded as the IP Media Gateway.

The IP Client Manager consists of the following components:

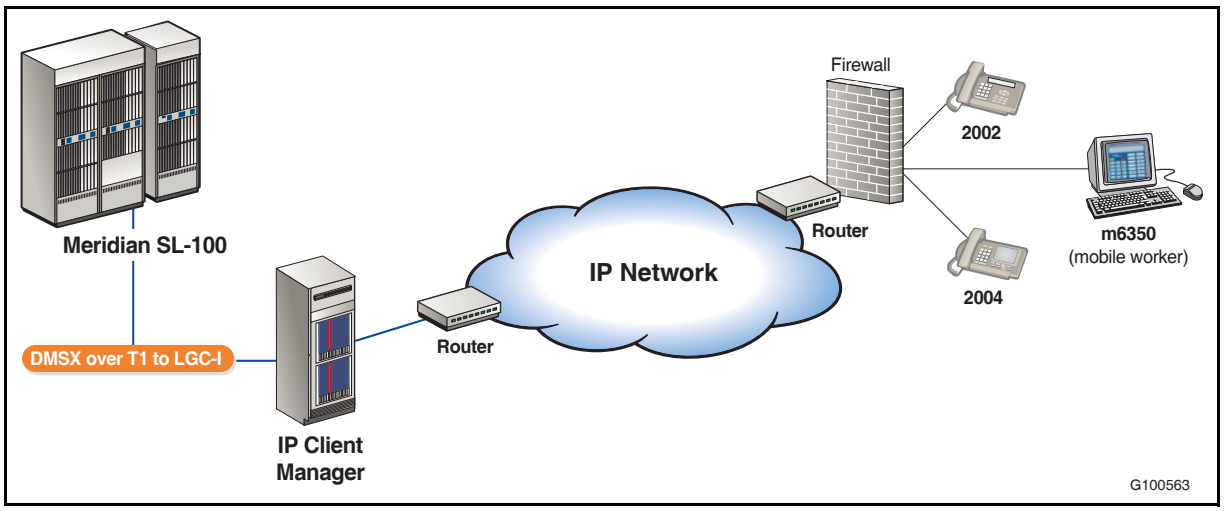
- One fully-loaded SAM16 chassis containing a pair of CPU cards and their associated TDM and Digital Signaling Processor (DSP) cards.
- An Element Manager which provides the ability to configure and monitor one or more IP Client Manager and their IP phones.
- An Ethernet Switch that connects the IP Client Manager to its client and Administration LANs.
- IP phone hardware and software.

The IP Client Manager provides many telephony functions, including the following:

- conversion between TDM and IP
- compression and decompression of digitized signals
- connection and negotiation
- configuration and administration functions

Figure 30 on page 76 shows an example of the IP Client Manager Meridian SL-100 network configuration.

Figure 30
IP Client Manager Meridian SL-100 network configuration



The IP Client Manager

- extends Meridian SL-100 services up to 2556 users per chassis
- retains investment in TDM services infrastructure, while evolving to IP services
- provides the following enterprise features over an IP network, anywhere, anytime, with no service compromises:
  - Custom Local Area Signaling Service (CLASS)
  - Computer Telephony Integration (CTI)
  - Call Center

The IP Client Manager combines the rich feature set and high reliability of the Meridian SL-100 with the next-generation capabilities of IP telephony. Delivering lower costs and enhanced services, regardless of a user's location, the IP Client Manager extends the reach of IP telephony to local and remote IP-based environments. Organizations using the IP Client Manager can migrate to IP telephony through seamless integration with existing customer groups, Virtual Private Networks (VPNs) and Call Centers.

IP Client Manager gateway functionality

The IP Client Manager acts as a gateway when it interfaces with the Meridian SL-100 in that it provides an interface between the IP network and the PSTN. The IP Client Manager gateway provides the interface between the Meridian SL-100 and a managed IP network. A pair of CPU cards and the associated TDM and Digital Signaling Processor (DSP) cards make up the gateway.

The IP Client Manager connects to the Line Group Controller (LGC), Line/Trunk Controller (LTC)/Remote Cluster Controller (RCC) through a T1 link.

The IP Client Manager acts as a “lights out” server (that is, it has no monitor, keyboard or mouse). Once connected and powered up, technicians perform all maintenance remotely from a PC on the Administration LAN.

Supported clients
The IP Client Manager enables a user to initiate and make IP telephony calls and to use a wide range of features from a Meridian SL-100. In SE08, the IP Client Manager supports the following two types of clients:

- The IP Softphone 6350 application, which is an IP telephony software client installed on a PC, running a Windows 2000 operating system, attached to a LAN. The IP Phone 6350 works with a headset and adapter which plugs into a Universal Serial Bus (USB) port on the PC.
- The Nortel IP Phone 200x series, which connect directly to a client LAN or a telephony switch module. Currently, the IP Client Manager supports the 2002 and 2004 models.

Ethernet switch
Ethernet switches connect the IP Client Manager to the Administration and Client LANs. Although the IP Client Manager requires only one Ethernet switch to operate, Nortel recommends that you configure two Ethernet switches to provide Administration LAN redundancy.

Note 1: With one Ethernet switch, if there is a failure the two CPU cards will not communicate with each other through the Administration LAN. Each CPU card will then tell the Meridian SL-100 that its mate node is missing and the Meridian SL-100 will take both nodes out of service.

Note 2: This configuration does not provide Client LAN redundancy. If an Ethernet Switch is lost, the IP phones active on the Ethernet switch will drop and then recover.

The enterprise must supply their own Ethernet Switches, which must provide support for 802.1Q VLANs. Nortel recommends the Nortel BPS2000 Ethernet Switch.

Element manager
IP Client Manager ships with a Web-based element manager.

The Web-based element manager interface provides all of the functionality necessary for configuring and monitoring an IP Client Manager and its IP phones. The interface uses a series of web pages hosted on the element manager and runs on any platform that supports Microsoft Internet Explorer, version 5.0 or later.

The web-based gateway configuration interface consists of the following:

- A home page that has links to the following:
  - — A gateway overview page that provides a summary of the gateway and its components.
  - — Detailed status pages for each gateway element.
- A collection of pages that report the configuration states of the gateway elements.
- A Gateway Configuration Wizard for performing initial setup and configuration of the gateway, as well as making changes to the IP Client Manager.
- Pages for configuring user profiles.
- Pages for configuring users.
- Pages for configuring client IP phones.

Protocol support
The IP Client Manager supports the following protocols:

- H.248 protocol for connections to Communication Servers
- UNIStim for IP softphone and IP phone control (a Nortel proprietary protocol)
- G.711, G.723.1, and G.729 codecs
- DMS-X for connections to the Meridian SL-100

Security
The IP Client Manager has built-in user authentication and Network Address Translation (NAT).

Hardware requirements

The following major components make up the IP Client Manager:

- PTE2000 frame
- Service Application Module (SAM) 16 chassis
- Element Manager (running windows 2000 with terminal access)

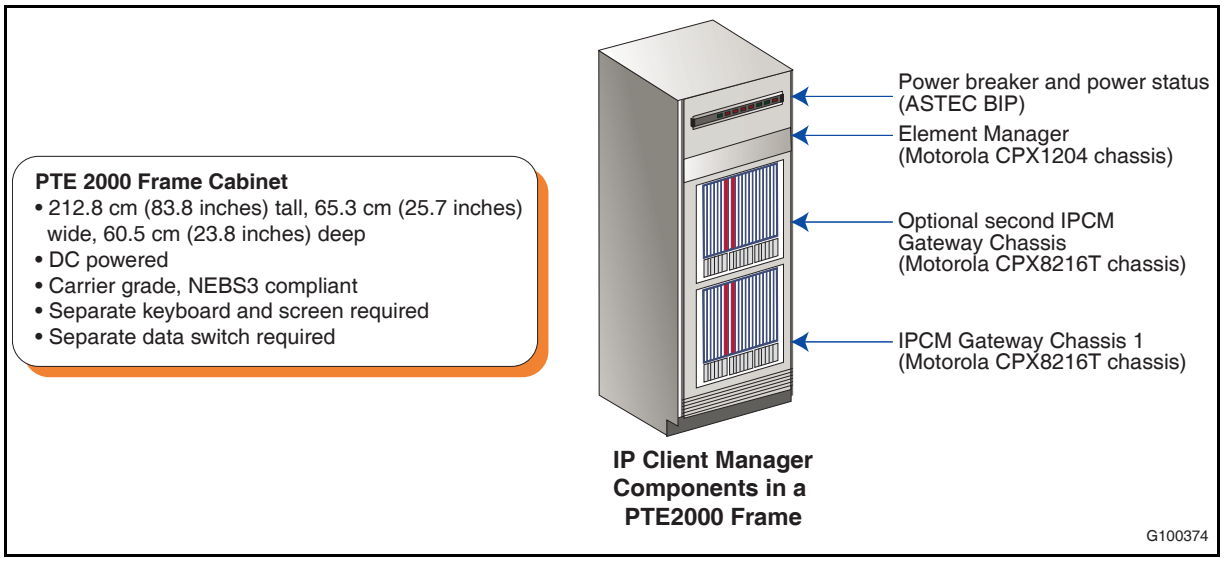
- CPV5370 Central Processing Unit (CPU) cards running Windows NT 4.0 Embedded.

  Note: NT 4.0 Embedded is not subject to the Windows NT 4.0 product retirement schedule.

- TDM and DSP cards.

Figure 31 shows an IP Client Manager sample cabinet configuration.

Figure 31
IP Client Manager cabinet configuration



Features

An IP phone connected through the IP Client Manager appears to the Meridian SL-100 as a conventional Meridian Business Set (MBS) line agent. Most call types and traditional Meridian SL-100 enterprise features that you can provision on an M5216 business set are supported by an IP Client Manager IP phone, with a few exceptions.

Meridian SL-100 remote units

This chapter contains the following section:

- Remote Switching Center (RSC)

Remote Switching Center (RSC)

At greater and greater distances from the host switch, demand is growing for high-bandwidth services, ranging from teleconferencing to multimedia communications. Network migration to support services in remote locations comes in stages presenting a major challenge for the an organization with distributed campuses, which must deploy various access vehicles to provide distributed services.

The Meridian SL-100 Remote Access family offers cost-effective solutions for this changing environment. Copper and fiber-based interfaces extend the range of Meridian SL-100 features and services including voice, data, Automatic Call Distribution (ACD) and ISDN to subscribers in remote locations.

Remote Switching Center family

The Remote Switching Center (RSC) family of products delivers a full range of host Meridian SL-100 services to remotely-located subscribers or customers currently served by analog switches. This substantially increases an organization's communication options by extending deeper into the network the delivery of CLASS, voice, data, ISDN, ACD and other advanced digital services. In addition, the RSC minimizes outside-plant expenditures and conserves host resources by providing the following:

- Centralized Operations, Administration, Maintenance and Provisioning (OAM&P) at the host Meridian SL-100 Maintenance and Administration Position (MAP).
- Reduced expenses for training and spares inventories through commonality with the host and with other Meridian SL-100 remote access vehicles.

- Reduced operating expenses through intraswitching, which allows calls originating and terminating on the RSC to be switched without using host links or host resources during a call, after call set up.
- Simplified network planning and conservation of host resources through “back-door” dynamic trunking, which links the RSC to subtending PBXs and supports remotes off the RSC.

MCRM-S (RSC-S)

The Remote Switching Center-Second series (RSC-S) provides a maximum of 54 peripheral ports, in addition to ISDN capabilities. The Meridian SL-100 packaging combines the RCC2 shelf, EXT shelf and the Power Distribution Panel (PDP) into one cabinet.

The RSC-S lowers the costs per line over the lifetime of the equipment while delivering advanced digital services to remote subscribers. Like the MCRM, the MCRM-S can grow to meet increasing line demand through the addition of MCLM’s (ELCM’s), MCLM-Es (ISDN LCMs) and Intelligent Peripheral Equipment Columns (IPEC), as needed.

The MCRM-S is also capable of supplying power to three Intelligent Peripheral Equipment (IPE) columns. This helps reduce the power equipment costs for the remote.

In a dual model, the RSC-S supports up to 10,000 lines (POTS at 3.0 CCS with 30% intraswitching). This provides organizations with the ability to maximize the services available from the Meridian SL-100 at an extended location.

Extended distance on MCRM-S

Enterprises deploying the MCRM-S can reach farther than ever into the network with Extended Distance Capability (EDC; BAS00009). With this package, the MCRM-S can be deployed at distances greater than 240 km (150 miles) from the host, depending on the transmission characteristics of the host links. Revenue-generating services, such as CLASS, ISDN, and ACD, can penetrate significantly deeper into the network.

The specific distance depends on the transmission facilities being used, as well as traffic levels the switch has been engineered to meet. Verification office activities have tested MCRM-S installations with EDC that serve approximately 1,300 POTS subscribers at a simulated distance of 800 km (500 miles) from the host office, looping a combined transmission path of copper, fiber and radio.

This feature requires the NTMX76AB messaging circuit card.

20 C-Side DS1 Links on RCC2/MCRM-S

This feature provides support for a RCC2-to-host LTC/LGC interface with 20 DS1 C-side links. Increasing the number of supported RCC2 C-side links from 16 links to 20 increases the number of speech channels from 382 to 478. This development accommodates increased traffic needs, expanding the C-side traffic capacity by 25%.

The RCC2 shelf requires hardware to support the expansion to RCC2 C-side links. These hardware items are listed below:

- The NTMX87BA pentium (packlet) carrier, which holds five of the NTMX81 packlets.
- The NTMX81 packlets, which are smaller than the existing packlets.
- A matrix pack card (NTMX75DA), which supports the configuration, is required. This NTMX75DA matrix card maps the DS1 links (both new and existing) to the DS-30 links.

The RCC2 shelves with the expanded C-side configuration (holding 20 links) can co-exist with 16 C-side link RCC2 shelf configurations in the same office.

The hardware is supported in software version XPM05 and up.

The RCC2 shelves with the expanded C-side configuration (holding 20 links) can co-exist with 16 C-side link RCC2 shelf configurations in the same office.

When provisioning for 20 C-side DS1s from RCC2 to host, note that the host must have a dedicated controller for the 20 RCC2 ports.

Upgrading to MSL11 with RCC2s also require a hardware change from NTMX77 to NTAX74 when going to the MSL11 load, prior to the PM Software Upgrade. The NTMX77 is no longer available in MSL11 for the RCC2.

Emergency Stand Alone

Emergency Stand Alone (ESA) provides the RSC remote peripherals with the intelligence to allow continued service for intraswitched calls, when communication to the Meridian SL-100 host is lost. This includes support of basic station-to-station calls within the remote. Because they require the use of a modem in the host, Attendant Consoles are not supported during ESA operation.

When communication is lost on the primary DS1 links to the Meridian SL-100 host office, the remote automatically enters the ESA mode. ESA operation continues until communication is restored over at least one of the primary DS1 links. During entry to the ESA mode, established calls are not dropped.

There are two ways to exit ESA:

1. Fast Cold Exit – All calls are dropped and new calls can be established in approximately one minute.
2. Warm Exit – Established calls are not dropped, but the time to establish new calls is extended by two to four minutes.

Calls in the process of being established are dropped during ESA entry and exit.

During ESA, calls to subscribers outside the remote site receive overflow tone. Emergency and operator calls are routed to specified lines in the remote. Requests for special features are ignored or receive reorder tone. Calls to subscribers within the remote site from outside receive reorder or busy tone.

Meridian Cabinet Remote Unit (MCRU)

The MCRU serves as an interface between remotely-located subscriber lines and the Meridian SL-100 host. The MCRU is connected to the host either directly through DS1 links, or through a Meridian Cabinet Remote Module-Second series (MCRM-S) connected to the host.

Each MCRU supports up to 640 lines (depending on traffic), providing the same line quality as the Meridian SL-100 host. The MCRU provides an interface for the following types of equipment:

- 500/2500-type telephone sets
- Electronic Telephone Sets (ETS)
- Low-Speed Data Units (LSDU)
- High-Speed Data Units (HSDU)

These devices connect to the MCRU by plug-in line circuit cards. Each telephone set or data device has its own line card in the MCRU. This allows replacement of a faulty card without interruption of service to another line. The MCRU sends control data and digitized voice information from the subscriber to the Line Group Controller (LGC) at the host site.

The MCRU supports Emergency Stand Alone (ESA). If the link between the host and the MCRU is interrupted, telephone calls which originate and terminate within the MCRU will be completed; however, calls to or from the host are not possible.

Note: For sites with MSL15 or above, the requirement for sites with software load MSL15 is the Global ESA processor card (NTMX45AA) for Meridian SL-100 single cabinet MCRU/RLCMs. It provides the Emergency Standalone (ESA) capability in the event that host-to-remote communication is lost. Additionally, this processor card is intended to replace two existing circuit cards previously provisioned to support ESA in the MCRU. These two cards are the NT6X45AF (processor) and the NT6X45AFAB/AC (memory card). The NTMX45AA card supports downloadable firmware where the NT6X45AF did not, therefore there is no longer a need for the NT6X47AB/AC and it is replaced in the Host Interface Equipment (HIE) slot with an NT0X50AA filler faceplate.

Remote off Remote (MCRU off of MCRM-S)

A range of from two to 32 RCC2 (Remote Cluster Controller) ports can provide DS1 interfaces. These ports can be connected to DS1 transmission facilities to another remote site. The RCC2 P-side can be provisioned with all DS-30A links, all DS1 links, or a combination of both.

An MCRU can be located at a remote-off-remote site. The MCRU can support a maximum of 640 local analog lines.

The remote-off-remote configuration allows subscribers connected to an MCRU to share DS1 facilities to the host Meridian SL-100 with subscribers connected to the MCRM-S.

In a remote-off-remote configuration, the combined distance between the host and the furthest remote is normally 240 km (150 miles). However, the distance between the MCRM-S and the MCRU cannot exceed 80 km (50 miles).

Trunking off of Remote Switching Center

The Remote Switching Center is capable of line-to-trunk calls within the RSC. This allows for trunking capability without tying up facilities to the remote and back to an external at the remote locality. This saves facility charges, as well as long distance charges. Also available is limited trunking capabilities while a remote is in the Emergency Stand Alone mode.

PRI trunking off the RSC-S

The RSC-S platform supports NTNA and NI-2 PRI trunking. Up to 20 PRI spans can be provisioned off the RSC-S. The full suite of NI-2 features supported through MSL11 are supported in active mode on the RSC-S. For ESA mode, basic call, as well as D-channel back-up are provided.

The ability to support PRI off the RSC-S provides feature transparency between host and remote, and greater trunking efficiencies from remote sites.

Cabinet modular hardware

Cabinet descriptions

Unified steel cabinets are designed to be compatible with future technology and capable of upgrading with system enhancements, such as the SuperNode and SuperNode SE products.

Note: Check with your Nortel representative to make sure that the Meridian SL-100 hardware components described in this chapter are still supported in the field.

Cabinet dimensions

The exterior dimensions and maximum weights of Meridian SuperNode cabinets and IPE columns are shown in the following table.

Table 12
Cabinet and column dimensions (Sheet 1 of 3)

Cabinet or column	Height	Width	Depth	Weight
CIPE	72 in 180 cm	28.5 in 72.4 cm	28 in 71.1 cm	350 lb 158.8 kg
CISM	72 in 180 cm	28.5 in 72.4 cm	28 in 71.1 cm	643 lb 291.7 kg
CMSS	72 in 180 cm	28.5 in 72.4 cm	28 in 71.1 cm	514 lb 233.1 kg
CMVI	72 in 180 cm	28.5 in 72.4cm	28 in 71.1 cm	370 lb 168.2 kg
CPDC	72 in 180 cm	28.5 in 72.4 cm	28 in 71.1 cm	350 lb 158.8 kg

Table 12
Cabinet and column dimensions (Sheet 2 of 3)

Cabinet or column	Height	Width	Depth	Weight
ENET	72 in 180 cm	42 in 106.7 cm	28 in 71.1 cm	1600 lb 725.7 kg
FLIS	72 in 180 cm	42 in 106.7 cm	28 in 71.1 cm	1600 lb 727 kg
IPEC (with four IPE modules)	82 in 208.3 cm	31.5 in 80 cm	25.5 in 64.7 cm	838 lb 380.1 kg
LPP	72 in 180 cm	42 in 106.7 cm	28 in 71.1 cm	1600 lb 727 kg
MCAM3	72 in 180 cm	28.5 in 72.4 cm	28 in 71.1 cm	643 lb 291.7 kg
MCDM	72 in 180 cm	28.5 in 72.4 cm	28 in 71.1 cm	530 lb 240.4 kg
MCGM	72 in 180 cm	28.5 in 72.4 cm	28 in 71.1 cm	400 lb 181.4 kg
MCLM	72 in 180 cm	28.5 in 72.4 cm	28 in 71.1 cm	920 lb 417.3 kg
MCLM-E	72 in 180 cm	28.5 in 72.4 cm	28 in 71.1 cm	920 lb 417.3 kg
MCNI	72 in 180 cm	42 in 106.7 cm	28 in 71.1 cm	1800 lb 818 kg
MCNM	72 in 180 cm	28.5 in 72.4 cm	28 in 71.1 cm	678 lb 307.5 kg
MCPM	72 in 180 cm	28.5 in 72.4 cm	28 in 71.1 cm	646 lb 293 kg

Table 12
Cabinet and column dimensions (Sheet 3 of 3)

Cabinet or column	Height	Width	Depth	Weight
MCSM	72 in 180 cm	28.5 in 72.4 cm	28 in 71.1 cm	606 lb 274.9 kg
MCSS	72 in 180 cm	28.5 in 72.4 cm	28 in 71.1 cm	514 lb 233.1 kg
MCTM-I	72 in 180 cm	28.5 in 72.4 cm	28 in 71.1 cm	710 lb 322 kg
SPM	72 in 180 cm	27 in 67.5 cm	18 in 45 cm	858 lb 386 kg
SuperNode DPCC	72 in 180 cm	42 in 106.7 cm	28 in 71.1 cm	1600 lb 725.7 kg
SuperNode SE SCC	72 in 180 cm	42 in 106.7 cm	28 in 71.1 cm	1600 lb 725.7 kg

Cabinet exterior design

The cabinet has two center-open doors on both front and rear. The doors are easily installed, removed for servicing, and replaced. A lock and catch assembly is located in the top cap of each door.

The doors and end covers of the cabinet are Meridian product light gray. The cabinet frame is dark gray.

To accommodate raised computer flooring, the base of the cabinet depth fits standard North American and European raised floor tiles. A recessed area in the front at the base of the cabinet serves as an air intake for the cooling unit. Another air inlet is located at the rear of the cabinet, but is not recessed.

It is not necessary to bolt the cabinets to the floor, except in earthquake risk areas.

Cabinet interior design

Four standard 24-in. (61cm) width equipment shelves can be mounted inside the standard 28-in. cabinet.

Four equipment shelves can be mounted inside the standard 42-in. SuperNode DPCC and SuperNode SE SCC cabinets. The 42-in. cabinet is also used for ENET and LPP modules.

A Frame Supervisory Panel (FSP) or Modular Supervisory Panel (MSP) is located at the top of the cabinet.

In some cabinets, integral cooling fan units are located in the cabinet base. These units do not interfere with equipment mounting space.

Cabinet cabling

The cabinet packaging for Meridian SL-100 products permits either overhead or underfloor cabling.

Where raised flooring is used, external cables are routed under the flooring, through an opening in the base of the cabinet below the rear bulkhead. Where raised flooring is not used, external cables are routed through the rear bulkhead opening at the top of the cabinet to cable racks (which are also used for routing between cabinet lineups).

Power and alarm cables run horizontally within cabinets in the same lineup. (Refer to “System configuration” on page 143 for details on lineup configurations.) Thus, the Electromagnetic Interference (EMI) shield is not broken, and the cables need not be routed through a shielded duct.

All cabinets meet the requirements of the Federal Communications Commission (FCC) Part 15 EMI compliance.

Earthquake resistance

Each steel cabinet is constructed of two single-piece side members joined to a specially reinforced base that provides resistance to earthquake vibration damage. Bolting two or more reinforced cabinets together improves earthquake resistance.

Among other things, the New Equipment Building Specifications (NEBS), Applied Technology Council (ATC), and Uniform Building Codes (UBC) establish seismic (earthquake) zoning.

Earthquake risk zones are considered to be ATC Zone 6 and 7, UBC Zone 4, and NEBS Zone 4. In these zones, a minimum of 3000 psi concrete strength at 5.5 in. of concrete thickness is required to meet the specifications of the cabinet floor anchors.

Assuming the building that houses the cabinets is not destroyed, damage resistance is provided against forces up to 150 percent of (NEBS) Zone 4 and ATC 3-06 specifications.

The cabinet also exceeds the NEBS tipping specification, therefore, the cabinet requires four bolts and anchors for fastening to a solid floor in earthquake risk areas. In earthquake risk areas where raised flooring is used, a consulting engineer should supervise the installation of a suitable base structure.

Site level power and grounding

Meridian SL-100 systems are powered by an external, customer provided power plant. All Meridian SL-100 system installations require a -48 V power source. Meridian SL-100 systems use an Isolated Bonding Network (IBN) but can share power plant facilities with Common Bonding Network (CBN) equipment. Equipment lineups are individually grounded through the frame ground equalizer to a single point ground.

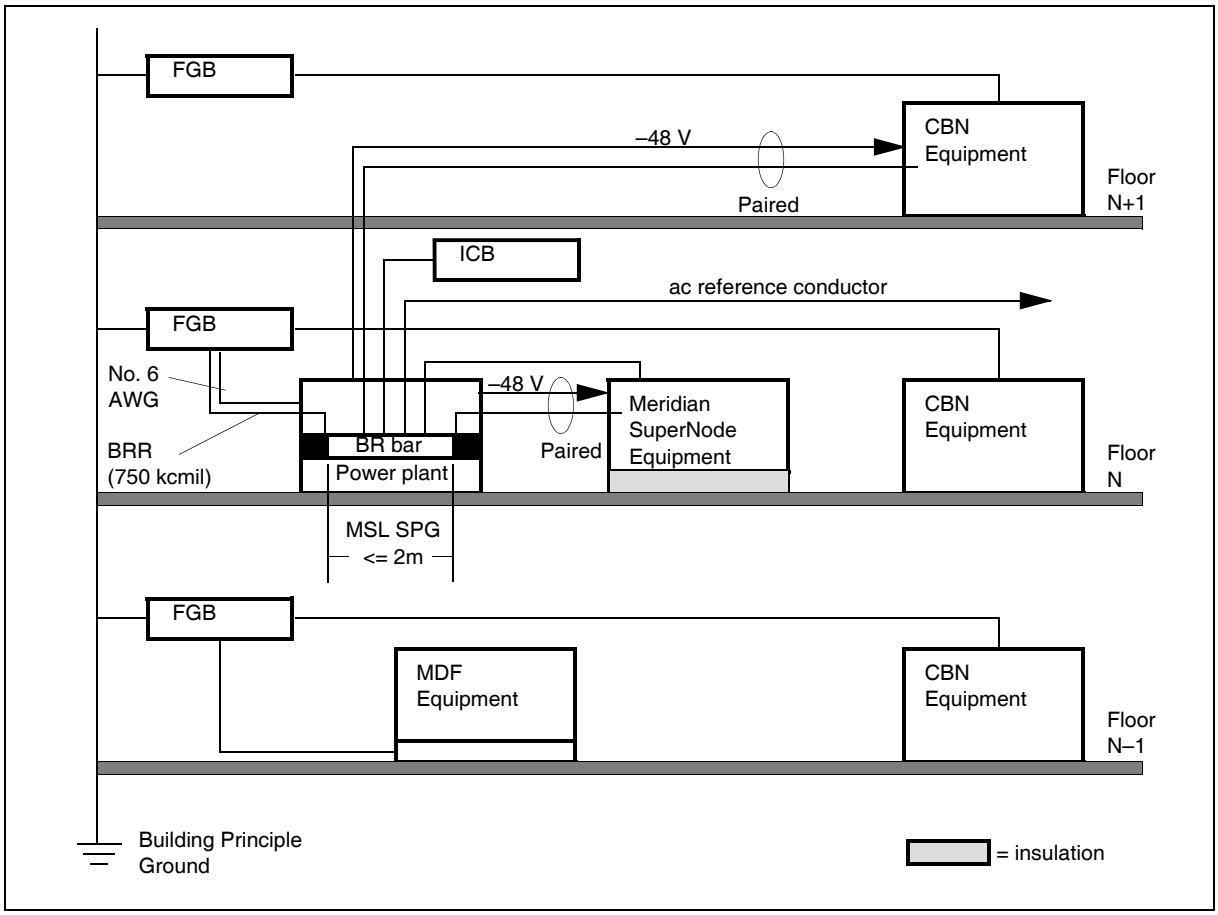
Power plant configuration

The operating range for Meridian SL-100 systems is -43.75 V to -55.8 V measured at the input terminals of Meridian Cabinet Auxiliary Modules (MCAM).

Power is usually supplied by a centralized power plant, which is shared with other systems or is dedicated. Terminal equipment, such as display terminals and printers, is considered to be an integral part of the Meridian SL-100 system and is powered by AC power.

Figure 32 on page 92 shows the recommended method for positioning the power plant when equipment cannot be located on a single floor. The power plant, located on the middle floor, can accommodate equipment on up to three floors. This configuration is capable of supporting both IBN and CBN equipment and allows the power plant battery return to serve as the Single Point Ground (SPG).

Figure 32
Power plant topology



System grounding and bonding

Figure 33 on page 93 shows a typical configuration, grounding the system with all cabinets bonded together and connected to the Building Principle Ground (BPG). This illustration shows the system connected to a single, Building Principle Ground. The grounding design for the cabinets fully isolates all powered circuitry from the steel walls and shelves, as well as from the floor and building structure.

The system, when configured as shown in Figure 33 on page 93, provides the following:

- All systems and subsystems maintain separate and isolated Logic Returns (LRs), Battery Returns (BRs) and Frame Grounds (FGs).
- All external I/O is shielded from external interference by EMI filters.
- All cabinets are connected at their frame ground studs.

- All LRs are daisy chained and referenced to the BR plate of the MCAM3 in the lineup.
- Intra- and inter-system communication is dc-isolated.
- The lineups are physically isolated from the building using adequate insulation.

Figure 33
System grounding and bonding

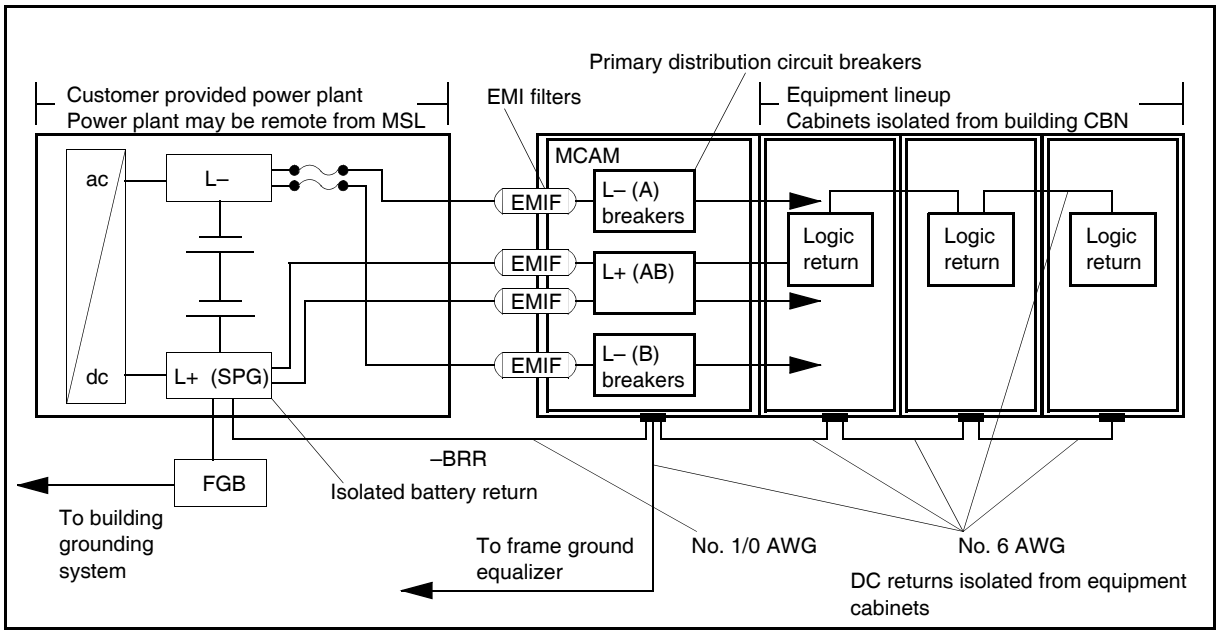


Figure 34 on page 94 shows the frame ground and battery return connections between lineups. The frame ground connections connect the frames of each lineup to the frame grounding reference, a single point ground. The battery return connections connect the A-feed battery return to the B-feed battery return in alternate lineups to ensure battery return equalization among lineups.

Figure 34
Frame ground and battery return connections

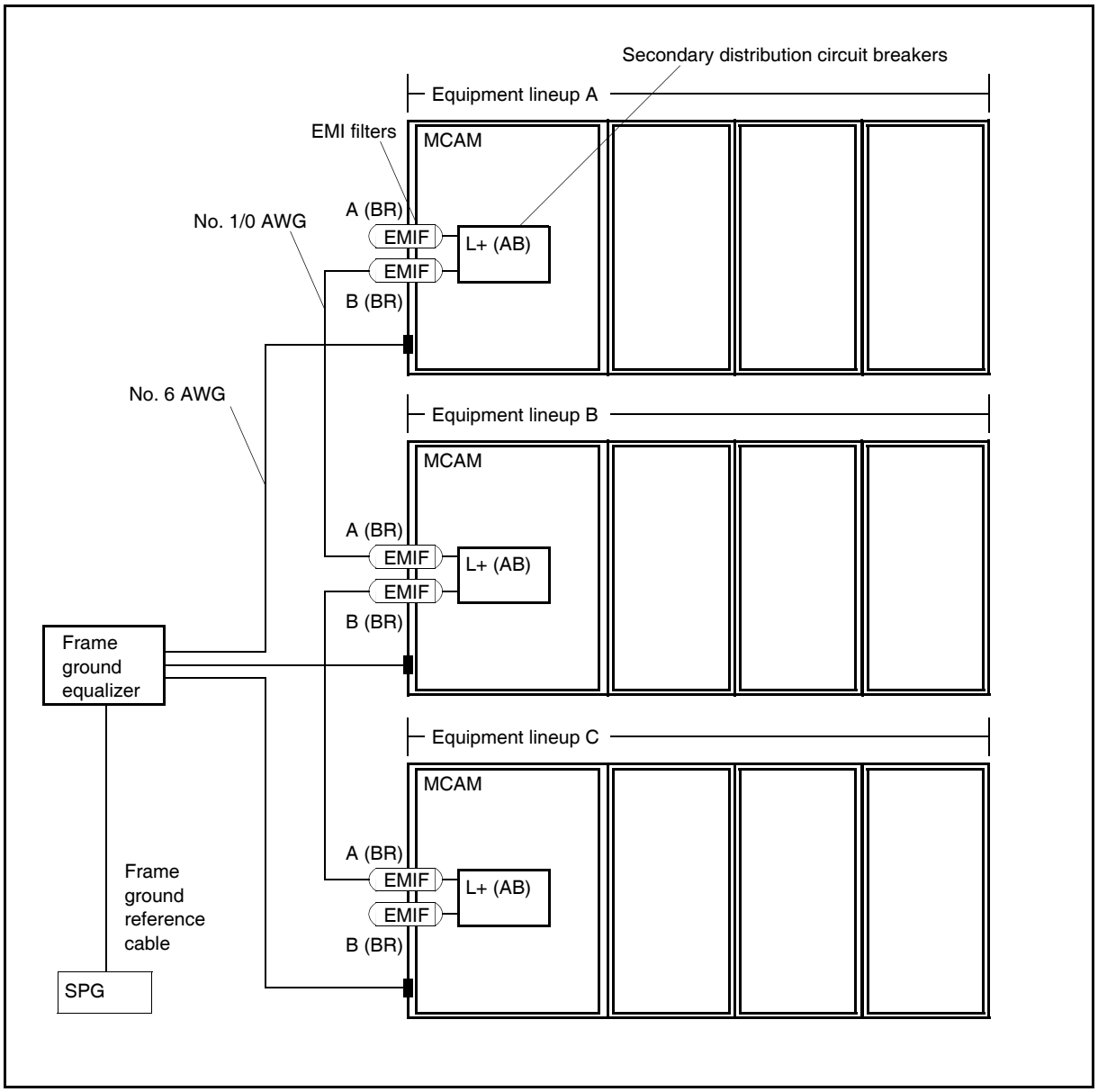
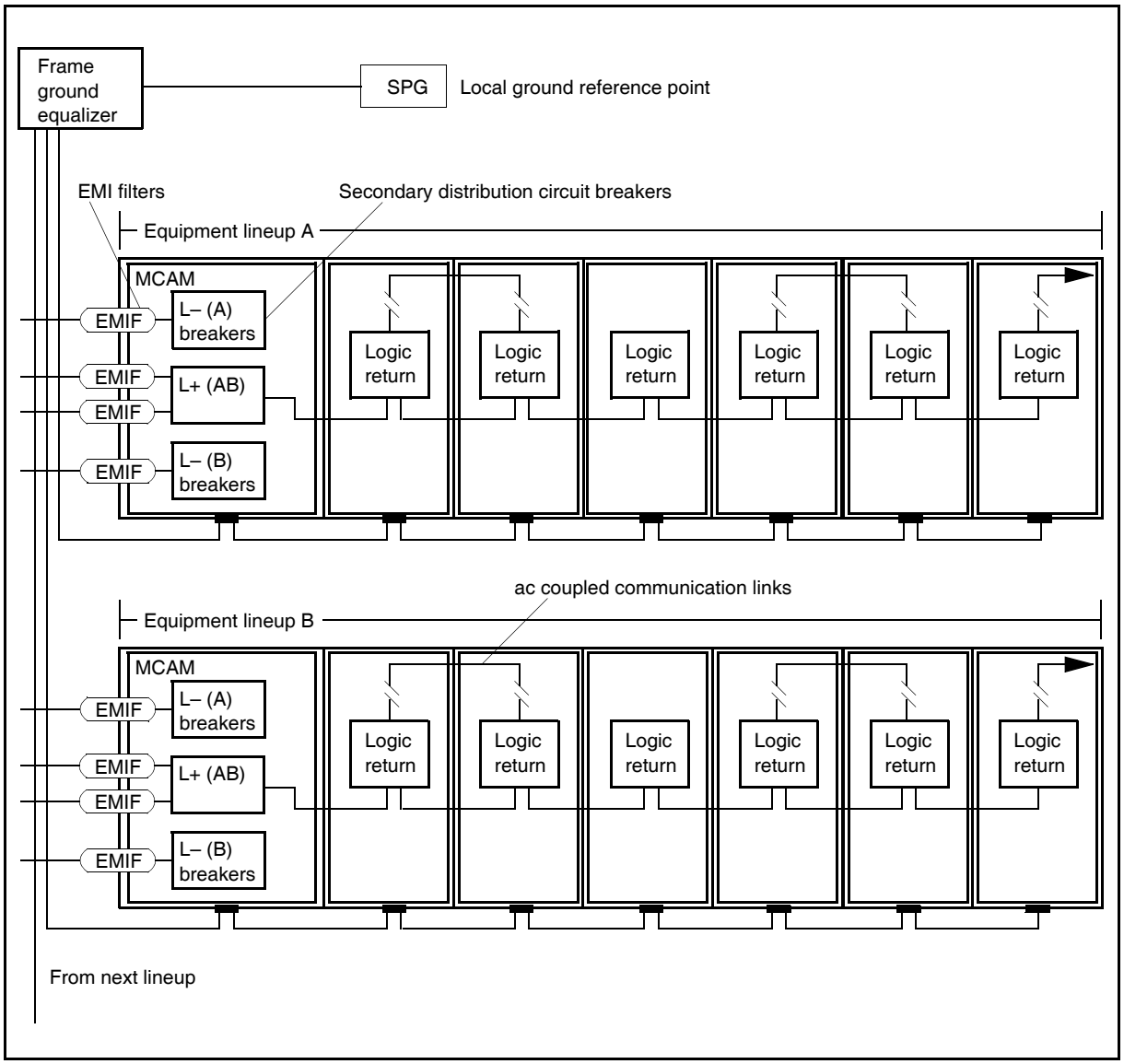


Figure 35 on page 95 shows the grounding plan that provides each frame with an individual connection to the Frame Ground Equalizer (FGE). The FGE is connected to the SPG with a single connection. In this grounding system, an individual ground cable is run from the SPG to the frame ground stud on the MCAM in each lineup. Within the individual lineups, the ground cable is daisy chained from the MCAM to each cabinet in the lineup.

The logic returns shown in Figure 35 are daisy chained together and connected to a single ground point in the MCAM, which prevents ground loops and ensures proper reference levels between functionally connected modules. Logic returns are isolated from frame grounds and from battery returns within individual cabinets. This grounding scheme virtually eliminates all system faults resulting from logic reference differentials (such as cut-offs, network integrity failures and memory transients) by removing the effects of ground noise from the circuitry.

Figure 35
Star-IBN frame grounding configuration



Communication link grounding

The isolated bonding network must be protected from grounds associated with external communications links. The communications links must be isolated to address both operational concerns and safety concerns. Operational and safety concerns include signals that are referenced to different ground potentials, which can cause signal errors and circuit damage, and metallic connections that allow contact between different ground potentials.

The four types of external communications links used with the Meridian SL-100 system are fiber optic links, EIA-232 links, shielded twisted pair links and coaxial links. The Meridian SL-100 system supports all four types of links with the following constraints:

- Fiber optic links must have metallic components, such as metallic strengthening members, connected at both ends.
- EIA-232 must be isolated using back-to-back modems, opto-isolators or an equivalent approved isolation device (except when it interfaces with an Input/Output Module). EIA-232 cables should not extend beyond the immediate IBN area. Both synchronous and asynchronous EIA-232 links can be isolated using fiber optic modems.
- Shielded twisted pair signals must be transformer-coupled. EMI compliant links must bond the cable shield to the frame ground on the Meridian SL-100 system, to the Transmission Bonding Bar (TBB) if extending beyond the IBN area, and at the end of the link. EMI noncompliant links (such as an Ethernet link) must bond the cable shield to the frame ground at the sending end of the link and must be open at the receiving end of the link.
- External coaxial links must be ac-coupled with the high voltage protection of the center conductor. (Transformer coupling is recommended.) The cable shield must be bonded to the IBN ground reference with a TBB and to the frame ground of the Meridian SL-100 system. The shield of internal coaxial links must not be referenced to the system logic return.

Workstation, printer, and modem power and grounding

External devices such as MAP workstations, printers, modems and digital carrier trunk interfaces must be isolated from external grounding systems.

Workstations and printers, and modems located with a workstation or printer, must not be powered from an internal power source (embedded inverter). Workstations, printers, and collocated modems can be powered by a CBN source such as commercial ac, Uninterruptible Power Source (UPS), external inverter derived ac or another acceptable ac source.

MAP workstations and RITF terminals must not use dc-coupled communications links.

Overview of cabinet modules

Each cabinet contains a specific module providing special services. The Meridian SL-100 system can be configured to adapt to various customer needs by designing a system lineup that combines the required cabinet modules.

Core modules

The core modules are as follows:

- SuperNode – Dual Plane Combined Core (DPCC)
- SuperNode SE – SuperNode Combined Core (SCC)

Network modules

The network modules are as follows:

- Meridian Cabinet Network Module (MCNM)
- Enhanced Network (ENET)
- Meridian Cabinet Network Interface (MCNI)

Peripheral modules

The peripheral modules are as follows:

- Trunk cabinets:
  - Meridian Cabinet Trunk Module-ISDN (MCTM-I)
  - Meridian Cabinet Service Module (MCSM)
  - Cabinetized Integrated Services Module (CISM)
- Line cabinets:
  - Meridian Cabinet Line Module (MCLM)
  - Meridian Cabinet Line Module-Enhanced (MCLM-E)
  - Meridian Cabinet Digital Module (MCDM)
  - Intelligent Peripheral Equipment Column (IPEC)
- Link Peripheral Processor (LPP)

- Spectrum Peripheral Module (SPM)
- Cabinetized International Peripheral Equipment (CIPE)
- Cabinetized Multi-Vendor Interface (CMVI)
- Meridian Cabinet Auxiliary Module phase 3 (MCAM3)
- Meridian Cabinet General Module (MCGM)

Note: The MCAM3 and MCGM are multipurpose cabinets that house both peripheral modules and maintenance and administration modules.

Maintenance and administration modules

The maintenance and administration modules are as follows:

- Meridian Cabinet Power Module (MCPM)
- Meridian Cabinet Auxiliary Module phase 3 (MCAM3)
- Meridian Cabinet General Module (MCGM)
- Meridian Cabinet Spares Storage (MCSS)
- Cabinetized Miscellaneous Spares Storage (CMSS)
- Cabinetized Power Distribution Center (CPDC)

Note: The MCAM3 and MCGM are multipurpose cabinets that house both peripheral modules and maintenance and administration modules.

Remote peripheral modules

The remote peripheral modules are as follows:

- Meridian Cabinet Remote Unit (MCRU)
- Meridian Power Remote Module-SONET (MCRM-S)

For more illustrations and detailed information on IPECs, refer to the *Intelligent Peripheral Equipment (IPE) Reference Manual.*

For system lineup details, see “System configuration” on page 143.

Figure 36
Core and memory expansion cabinets

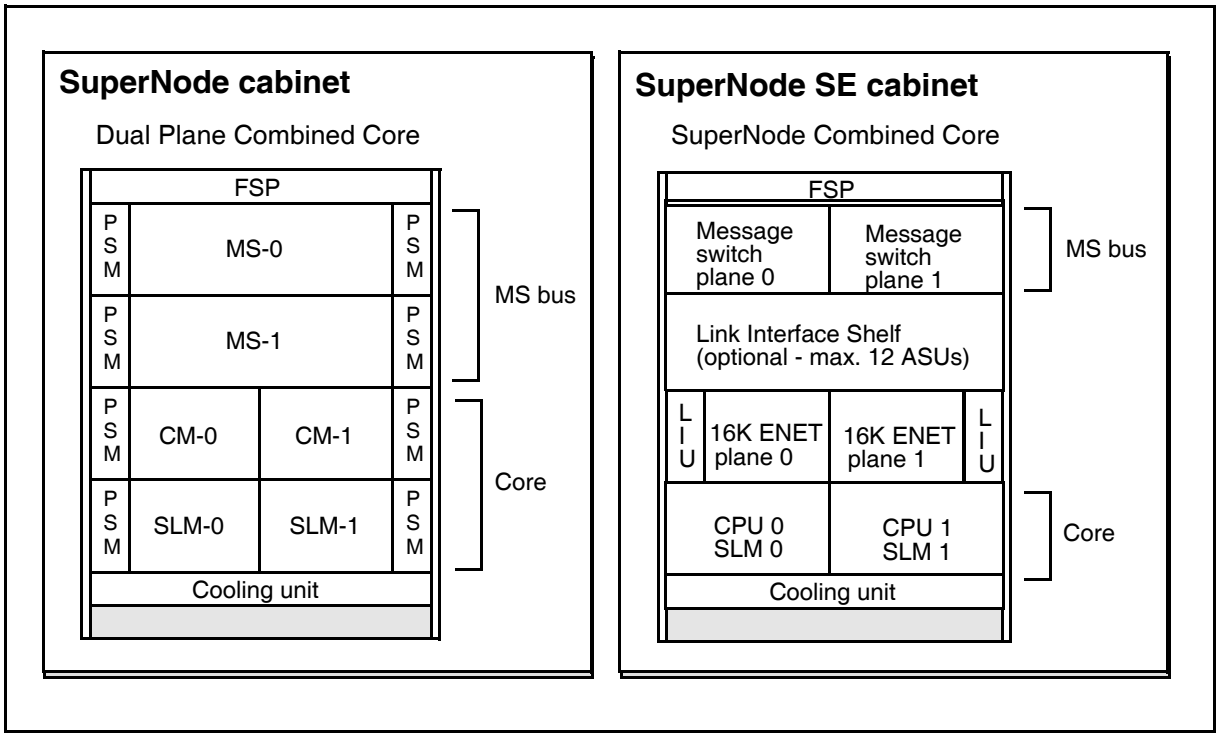


Figure 37
Peripheral cabinets

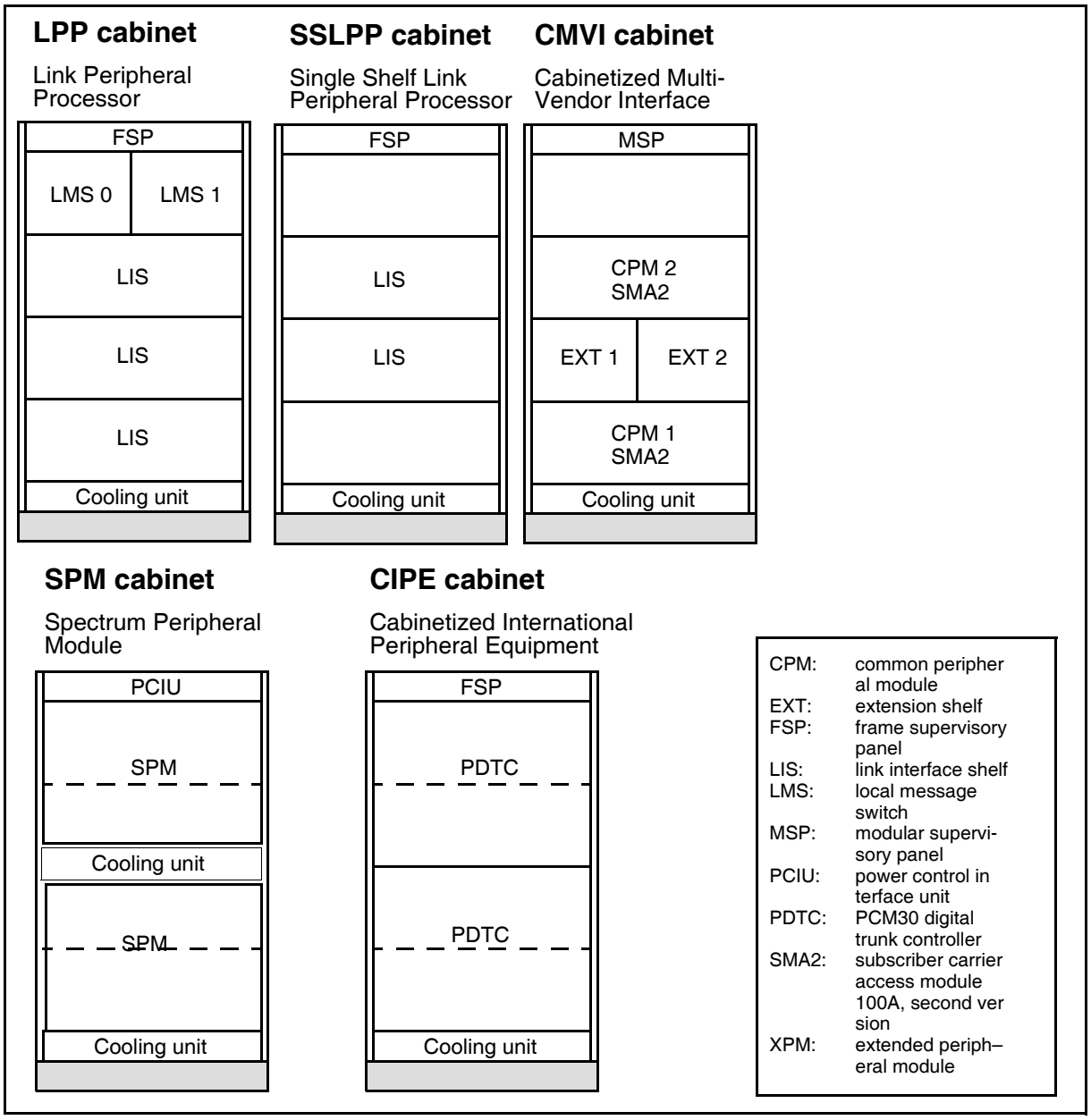


Figure 38
Trunk cabinets

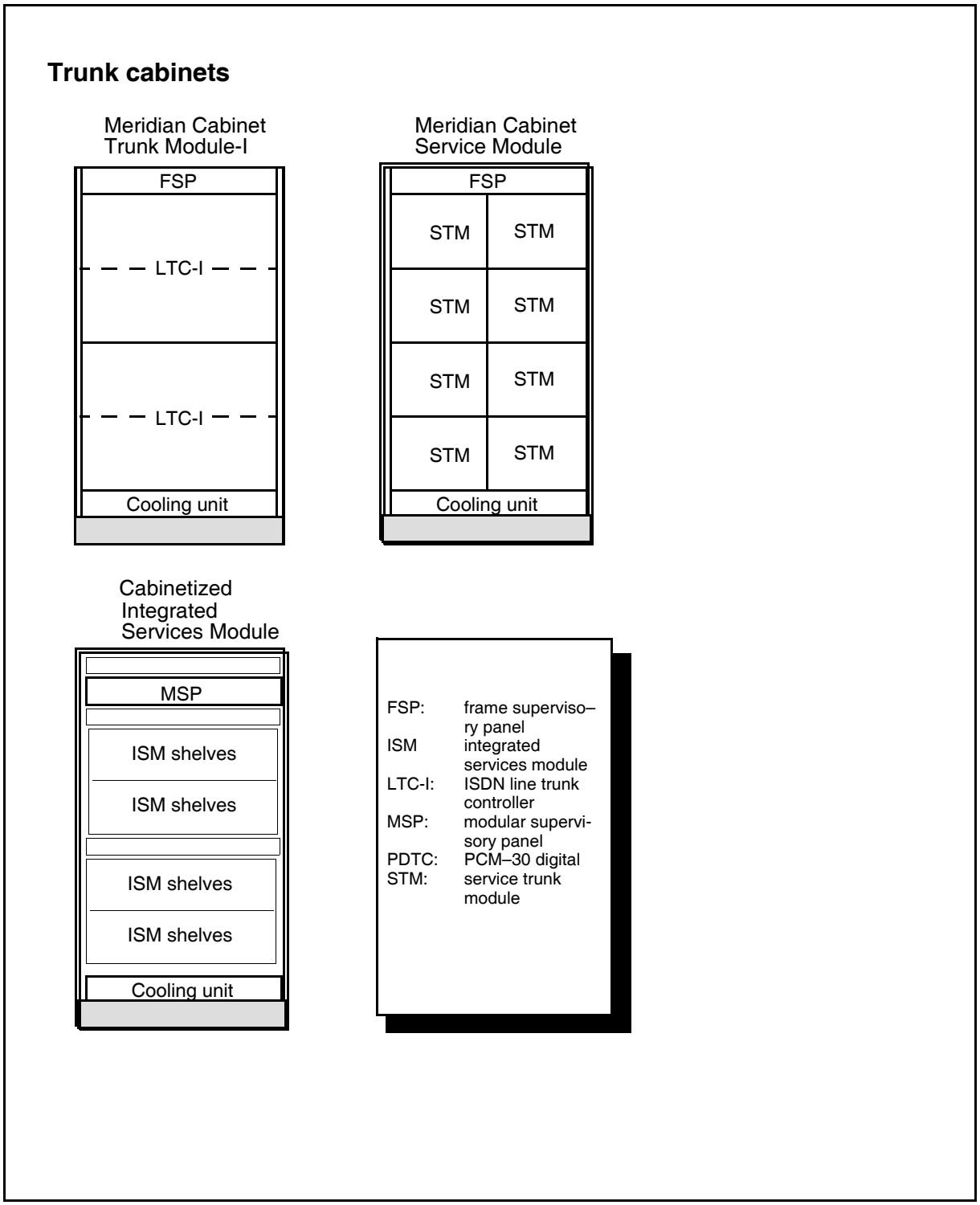


Figure 39
Line cabinets

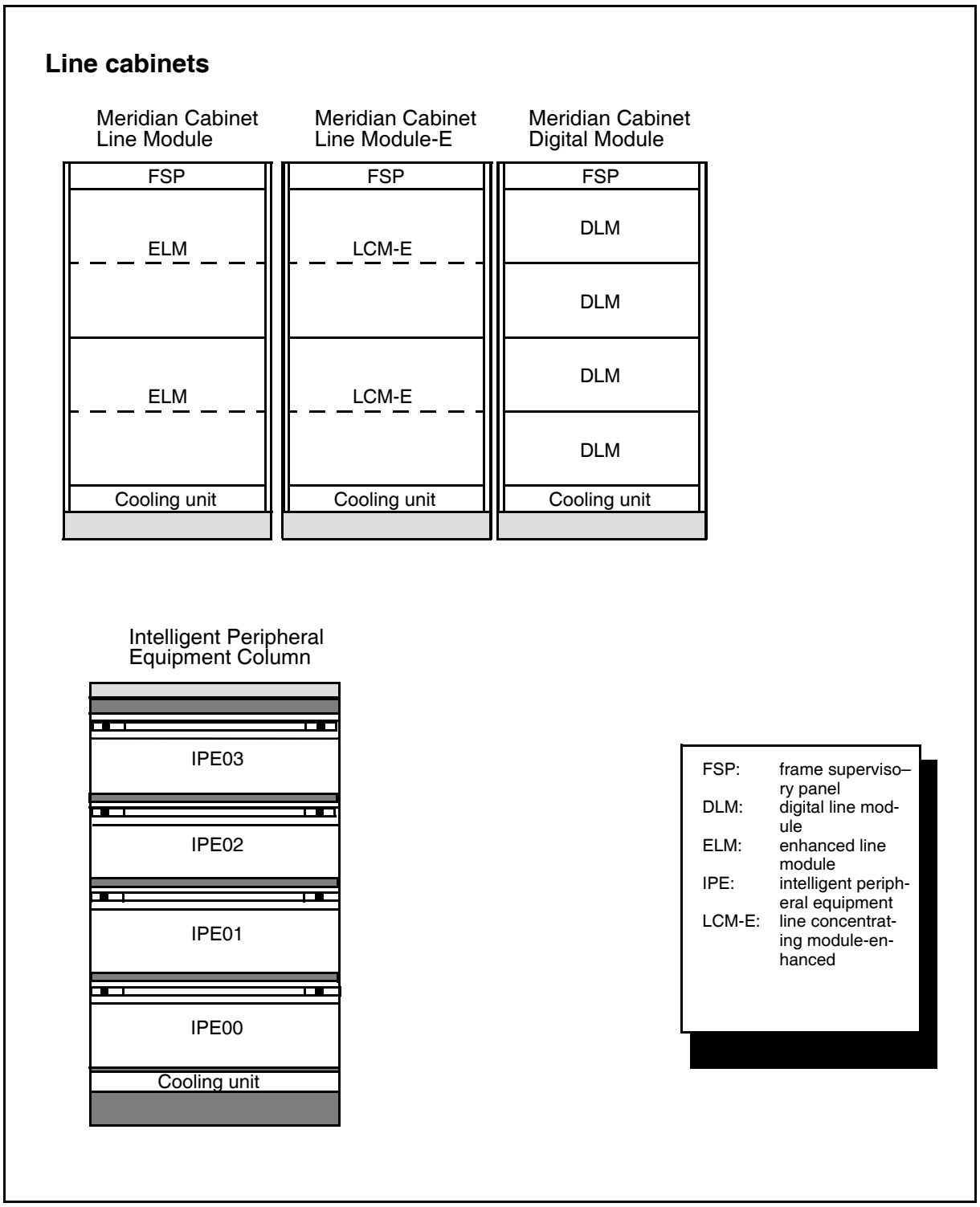


Figure 40
Network cabinets

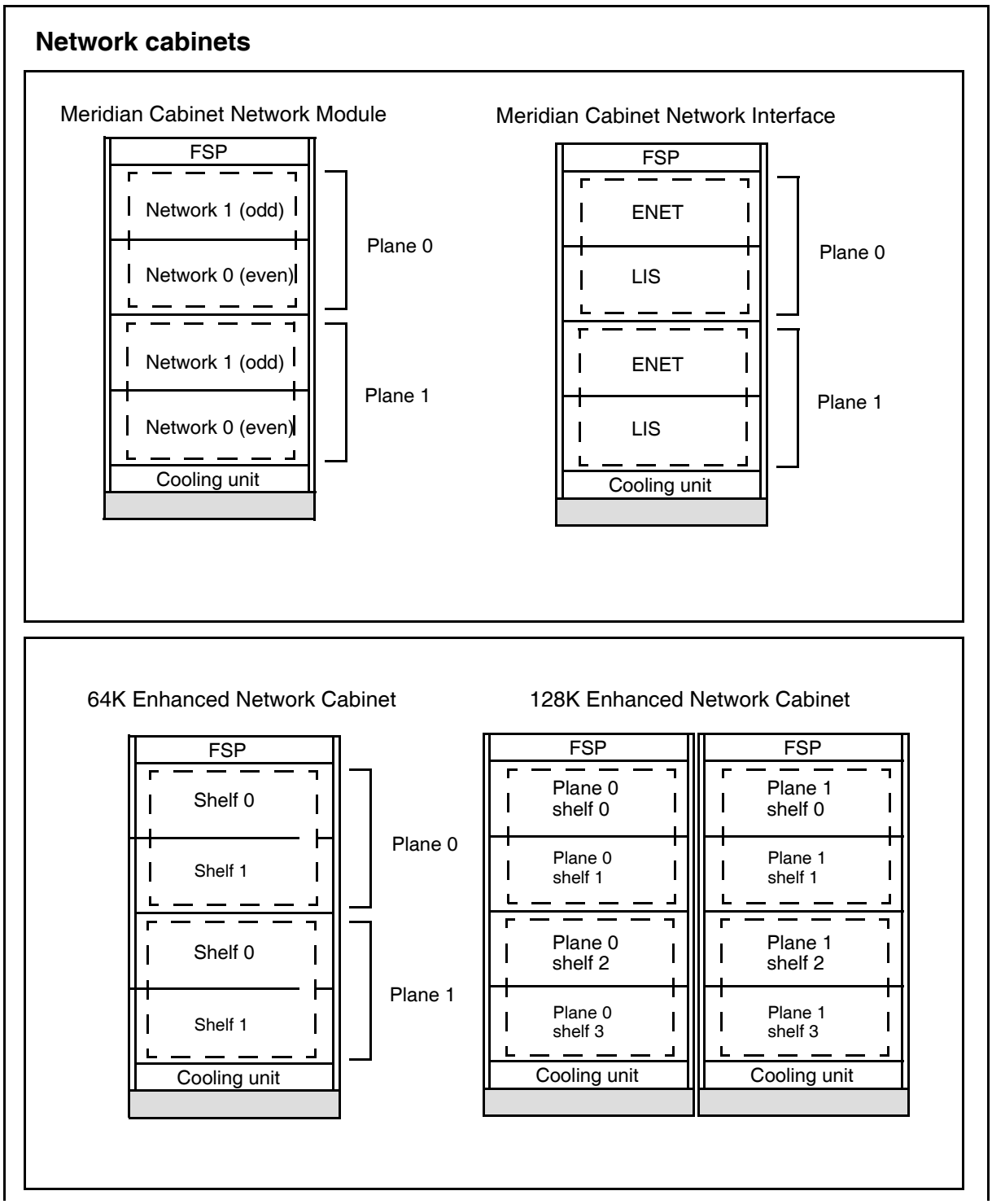


Figure 41
Maintenance and administration cabinets

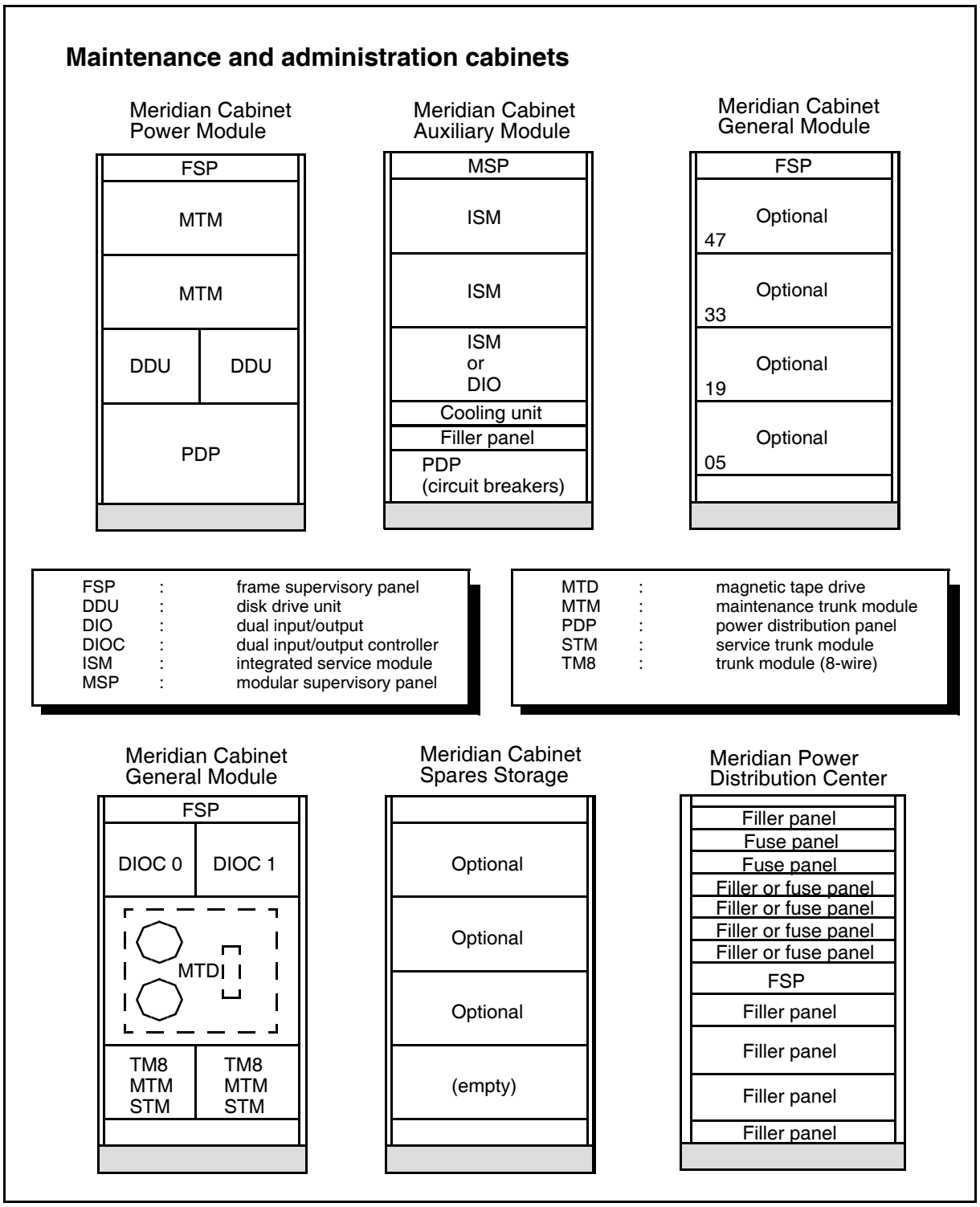
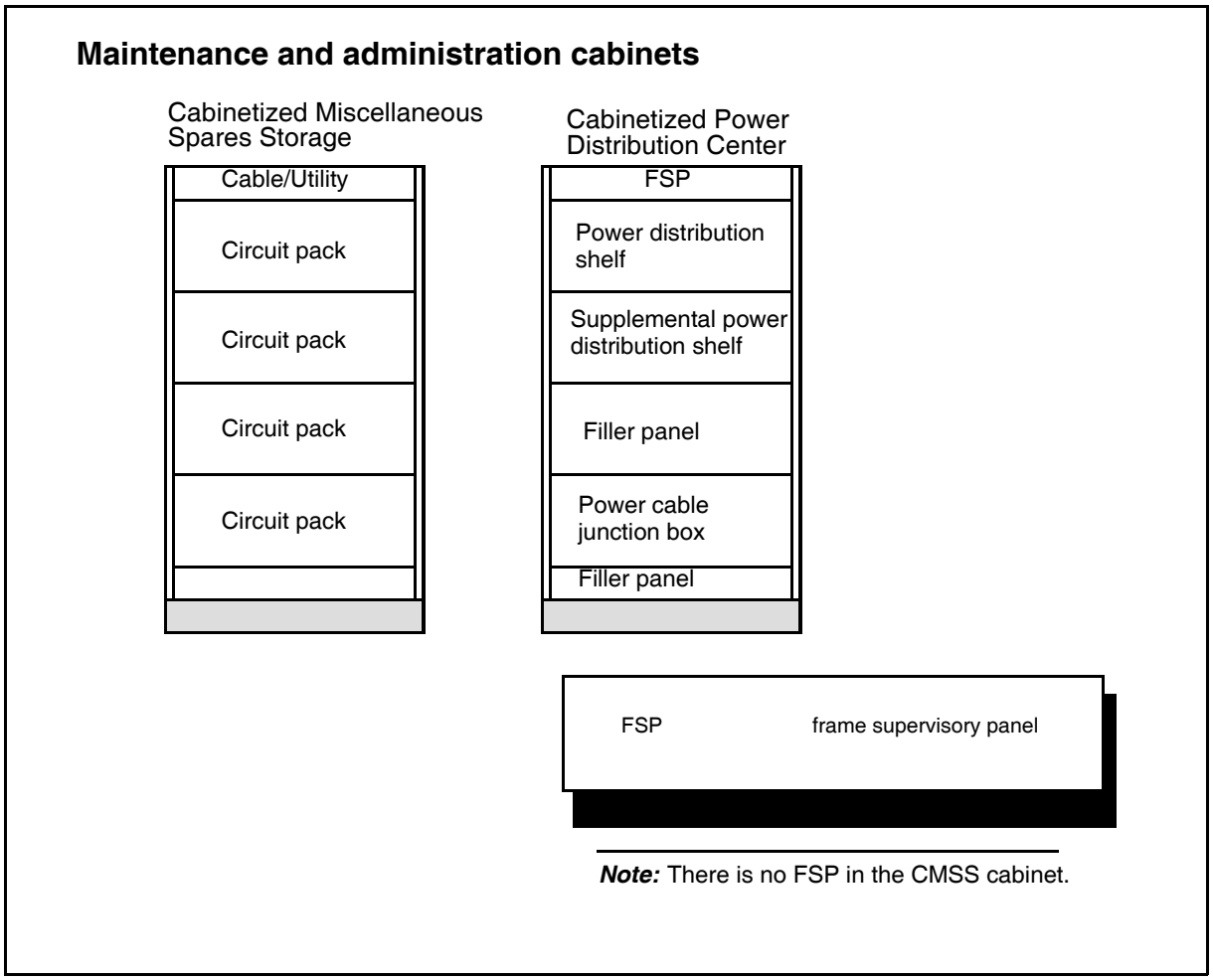


Figure 42
Maintenance and administration cabinets (2)



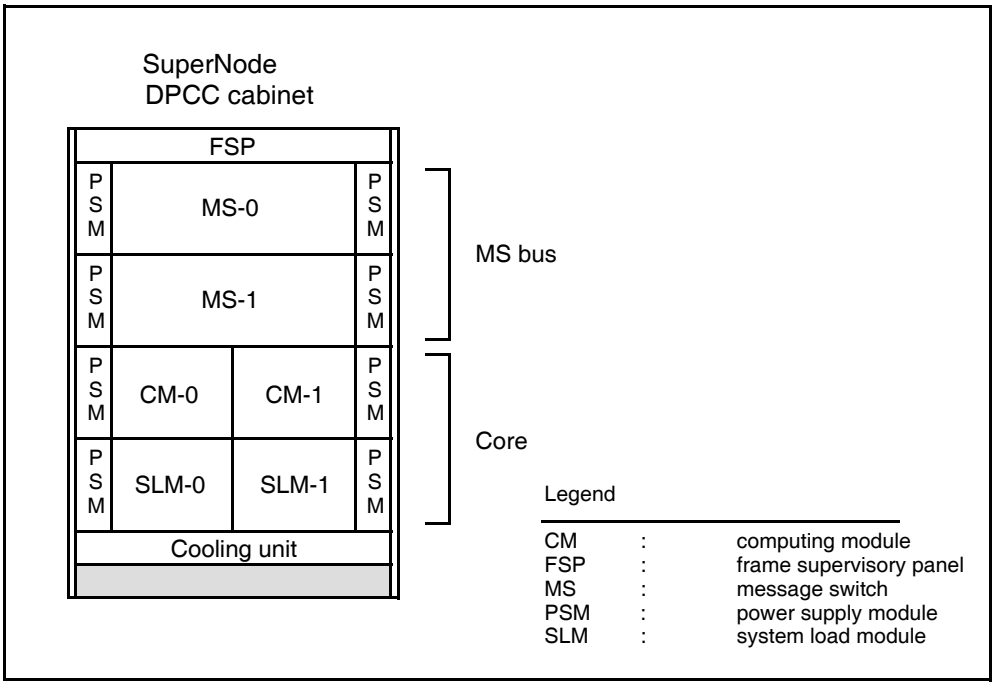
SuperNode cabinet module

The SuperNode Dual Plane Combined Core (DPCC) consists of four shelves, as shown in Figure 43 on page 106. The components housed in the DPCC are described in subsequent paragraphs.

The DPCC cabinet packages the following:

- a dual-plane message switch that supersedes the central message controller in the current Meridian SL-100 system
- a computing module that supersedes the current Central Processing Unit, program store, and data store
- a system load module that provides a mass storage system

Figure 43
SuperNode DPCC components



Cooling unit

The high-capacity cooling unit consists of four, high-speed DC-powered fan blowers. Two of these four fans are operated with a separate power feed for reliability.

System Load Module

The System Load Module (SLM) is the mass storage system used for storing office images and for booting new loads or stored images into the Computing Module. The SLM is designed for loads in excess of 250 megabytes.

The SLM shelf contains two SLMs that interface directly to the Computing Module through a Computing Module port. Each SLM is packaged into a single replaceable unit consisting of a disk drive, a streaming cartridge tape drive and a controller circuit card.

Computing Module

The Computing Module (CM) shelf is part of the core that performs the call processing function.

The CM shelf contains two CM planes. Each CM plane has the following:

- processor used for call management
- message switch interfaces
- reset terminal interface
- memory circuit cards

The message switch interfaces allow the CM to communicate with the rest of the Meridian SL-100 system through the Message Switch. Reset terminals control, diagnose and report the status of the CPUs.

Message switch

The top half of the SuperNode cabinet contains the dual-shelf Message Switch control complex and MS port interfaces. The fully duplicated Message Switch performs the system message function and is the messaging hub of the SuperNode system.

The MS contains the following:

- 128-Mbytes per second message bus system
- message switch control complex
- provisionable message port interfaces, used for the connection to the CM, NMs and IOC
- central system clock, used for the synchronization of the Meridian SL-100 system. Currently, this clock provides stratum 3 synchronization internally. (Stratum 2 synchronization requires an added shelf in an MCGM cabinet.)

Power supply module

Each shelf consists of two Power Supply Modules (PSMs) at each end. Each PSM consists of one +5 V/80 A and one -5 V/20 A power converter circuit card.

The fan unit is supplied with -48 V for the four dc fan blowers. The power drain for each shelf is 20 A at -48 V dc, and the power drain for the fan is 8 A at -48 V dc.

Total current required per bay is 80 A.

Frame Supervisory Panel

The Frame Supervisory Panel (FSP) controls alarms in the cabinet.

Power requirement

The SuperNode DPCC cabinet is powered by an external -48 V dc source provided by the Meridian Cabinet Auxiliary Module (MCAM). These cabinets are described in “Maintenance and administration cabinet modules” on page 133.

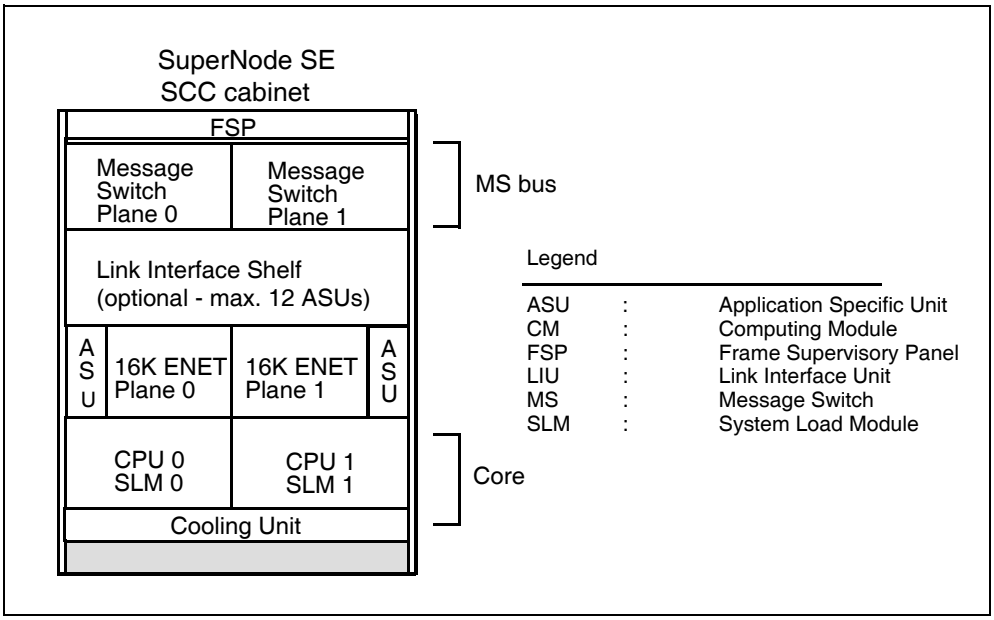
SuperNode SE cabinet

The SuperNode SE (SNSE) cabinet is also known as the SuperNode Combined Core (SCC). This cabinet consists of four shelves as shown in the Figure 44. The core and the bus occupy just one shelf each, unlike the full-size SuperNode cabinet, which requires two shelves each for the same components. One of the remaining shelves houses an ENET, and the other shelf can be provisioned with the optional Link Interface Shelf.

Single-shelf core

The compact core consists of two synchronized CM planes that manage high-level call processing functions. The planes are connected by the mate exchange bus, which allows the processor on each plane to compare computations and, thus, ensures the system’s integrity between active and inactive planes. The CM also loads and downloads programs.

Figure 44
SuperNode SE SCC components



System Load Module

The two SLMs (which occupy the bottom shelf with the two CM planes) are used for software loads, office images and PM loads. Each SLM consists of one cartridge tape drive and a Disk Drive Unit (DDU).

Single-shelf bus

The message switch is a hub for the communication between the switch's components. The MS occupies the upper shelf of the SCC and is equipped with cards on the front and corresponding paddleboards on the rear. The cards share a common bus with the paddleboards.

Cooling unit

The cooling unit provides forced-air ventilation for the equipment housed in the SCC.

Link interface

The Link Interface Shelf (LIS) is a single-shelf Link Peripheral Processor (LPP) capable of supporting 12 Application Specific Units (ASUs). An example of an ASU is the Link Interface Unit (LIU) for CCS7 applications. The 12 ASUs supported by the LIS are in addition to the two LIUs that can be provisioned with the ENET shelf for CCS7 applications.

If additional ASUs are needed, external LPP cabinets may be added. The SuperNode SE system supports external LPPs up to the full physical capability of the SuperNode SE message switch.

Enhanced Network

The Enhanced Network (ENET) shelf provides up to 16K ENET channels on two planes, provisionable in 4K increments. The shelf can also be provisioned with two LIUs, which can be used for CCS7 links.

Frame Supervisory Panel

The FSP controls alarms in the cabinet.

Power requirement

The SuperNode SE cabinet is powered by either the Meridian Cabinet Auxiliary Module phase 3 (MCAM3). Both supply -48 V dc power to the SuperNode SE cabinet. The power supply option selected is based on the lineup configuration chosen by the user. For details on SuperNode SE configurations, refer to "System configuration" on page 143.

SNSE cabinet

The SNSE cabinet includes the following:

- Message Switch (MS)
- Link Interface Shelf (LIS)
- Enhanced Network (ENET)
- Computing Module (CM)
- Frame Supervisory Panel (FSP)
- cooling unit

The SNSE offers the following functions:

- BRISC 70EM
- ENET
- 12 ports for CCS7
- Ethernet Interface Unit (EIU)
- packet handler

For more information about the SNSE, refer to the previous information on the SuperNode SE in this chapter.

Network cabinets

The network cabinets consist of the Meridian Cabinet Network Module (MCNM), the ENET cabinet, and the Meridian Cabinet Network Interface (MCNI). Each cabinet is described and illustrated in subsequent pages.

Enhanced network

The ENET cabinet is the standard SuperNode cabinet and, in this application, is provisioned with four ENET shelves. The ENET cabinet is available in either a 64k single-cabinet configuration consisting of two planes with two shelves per plane (see Figure 45 on page 111) or a 128k ENET dual-cabinet consisting of one cabinet serving as plane 0 and a second cabinet serving as plane 1 (see Figure 46 on page 111). All cabinets are provisioned with four ENET shelves, an FSP and a cooling unit. ENET cards are installed in the shelves as needed.

Figure 45
64K single-cabinet ENET components

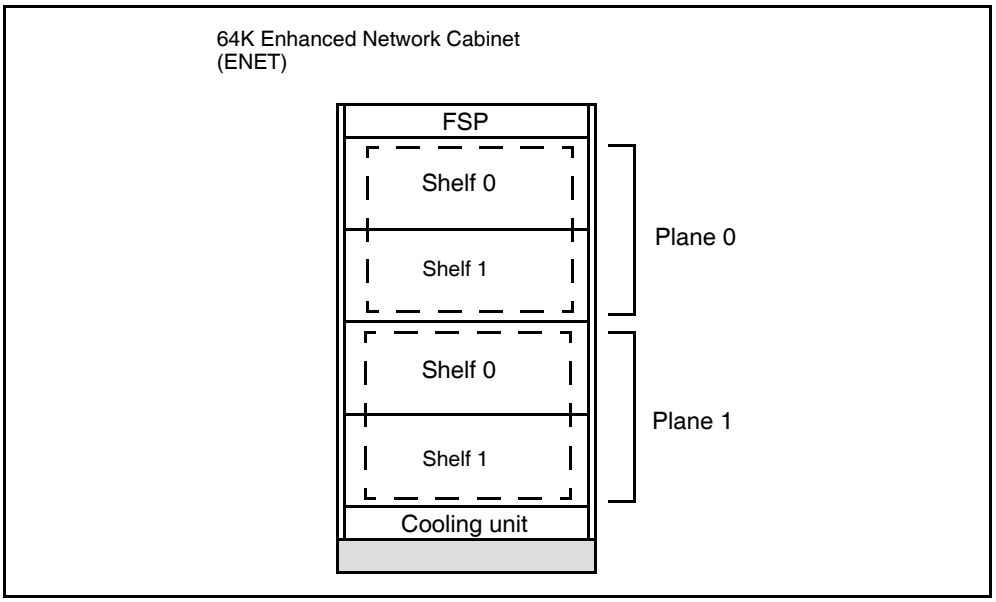
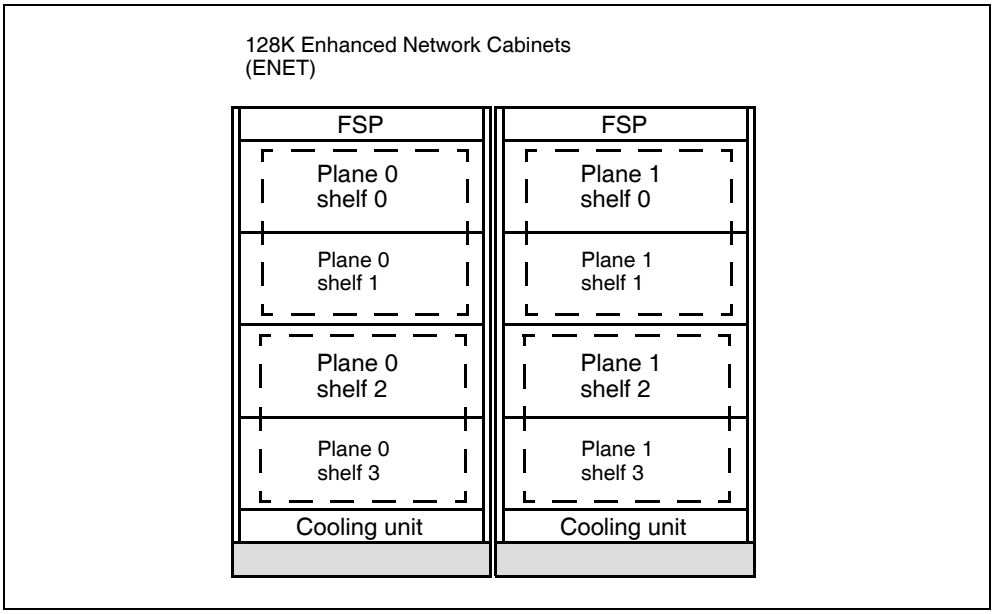


Figure 46
128K dual-cabinet ENET components



Frame Supervisory Panel

The FSP distributes and controls power and alarms in the cabinet.

Cooling unit

The high-capacity cooling unit consists of four, high-speed dc-powered fan blowers. Two of these four fans are operated with a separate power feed for reliability.

Power converters

Each ENET shelf includes one +5 V/80 A and one -5 V/20 A power converter circuit cards. The power converters are located at each end of the shelf with each power converter providing power for one half of the shelf.

Power requirement

The ENET cabinet is powered by either the Meridian Cabinet Auxiliary Module phase 3 (MCAM3). Both supply -48 V dc power to the ENET cabinet. The power supply option selected is based on the lineup configuration chosen by the user. The ENET cabinet is powered by an external -48 V dc source called the Cabinetized Power Distribution Center (CPDC). These cabinets are described in "Maintenance and administration cabinet modules" on page 133.

Note: For detailed information on ENET, refer to the *DMS SuperNode Product Guide* and *Peripheral Modules.*

Meridian Cabinet Network Interface (MCNI)

The MCNI addresses user requirements by providing networking capabilities in a singular, inexpensive package. This product addresses two types of users:

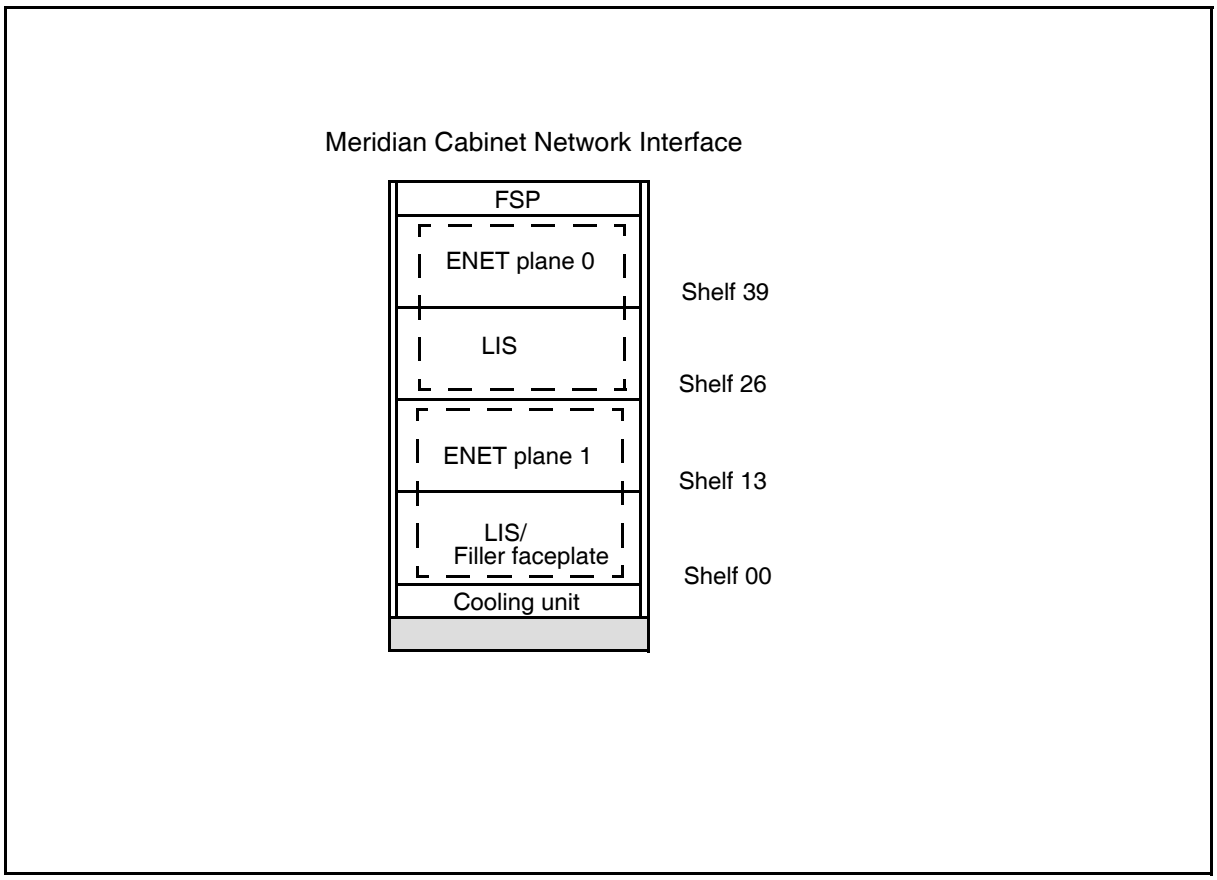
- Users who have a 32K Enhanced Network (ENET) cabinet and wish to add the capability of a Fiberized Link Interface Shelf (FLIS), and the variety of features it makes possible. This is provided by NTYA05UK.
- Users who wish to replace their Junctured Network (JNET) systems with a 32K ENET and acquire FLIS capability in one cabinet can do so by purchasing a factory-built MCNI cabinet (NTYA05AA).

The MCNI

- combines 32K ENET capability and FLIS capability plus options
- offers a non-blocking network matrix supporting up to 32,000 cross-points
- accommodates up to 24 Application Specific Units (ASUs) with two Link Interface Shelves (LIS), or up to 12 ASUs with one LIS. The limitations and restrictions, which apply to the FLIS cabinet, also apply to the MCNI cabinet. These are listed in engineering change memorandums (ECM) 612, 620, 626, and 632. The LIS supports the following:
  - Link Interface Unit (LIU7) for CCS7
  - Ethernet Interface Unit (EIU) to support 10-BaseT interface
  - Network Interface Unit (NIU) to provide channelized access delivery of CCS7 services
  - Frame Relay Interface Unit (FRIU) to support frame relay services
  - Enhanced Link Interface Unit (XLIU) to provide X.25 packet handler services
  - applications supported in the Enhanced Multi-purpose Cabinet (EMC)

For more information about ENET and FLIS, refer to “Enhanced Network” on page 109 and “Link Peripheral Processor” on page 123, respectively. Figure 47 on page 114 illustrates the MCNI components.

Figure 47
Meridian Cabinet Network Interface components



Trunk cabinet modules

The series of trunk cabinet modules have the same hierarchical system function in the switch architecture. This series includes the following cabinets:

- Meridian Cabinet Trunk Module-ISDN with the following controllers:
  - — Line Trunk Controller with ISDN (LTC-I)
  - — Line Group Controller with ISDN (LGC-I)
  - — Digital Trunk Controller with ISDN (DTC-I)
  - — Subscriber Carrier Module-100A second version (SMA2)
- Meridian Cabinet Service Module (MCSM)
- Cabinetized Integrated Services Module (CISM)

Meridian Cabinet Trunk Module-ISDN

The Meridian Cabinet Trunk Module-ISDN (MCTM-I) contains up to two duplicated Common Peripheral Controllers that can be configured as LTC-Is, LGC-Is, DTC-Is, LTGs, LGCs or DTCs.

Note: The common peripheral controllers CPCs are wired as LTC-Is to eliminate custom engineering, but can be configured as LGC-Is or DTC-Is with the appropriate circuit cards. The LTC-I is used in Figure 48 on page 116, which shows the MCTM-I components. The components of this cabinet module are described in subsequent paragraphs.

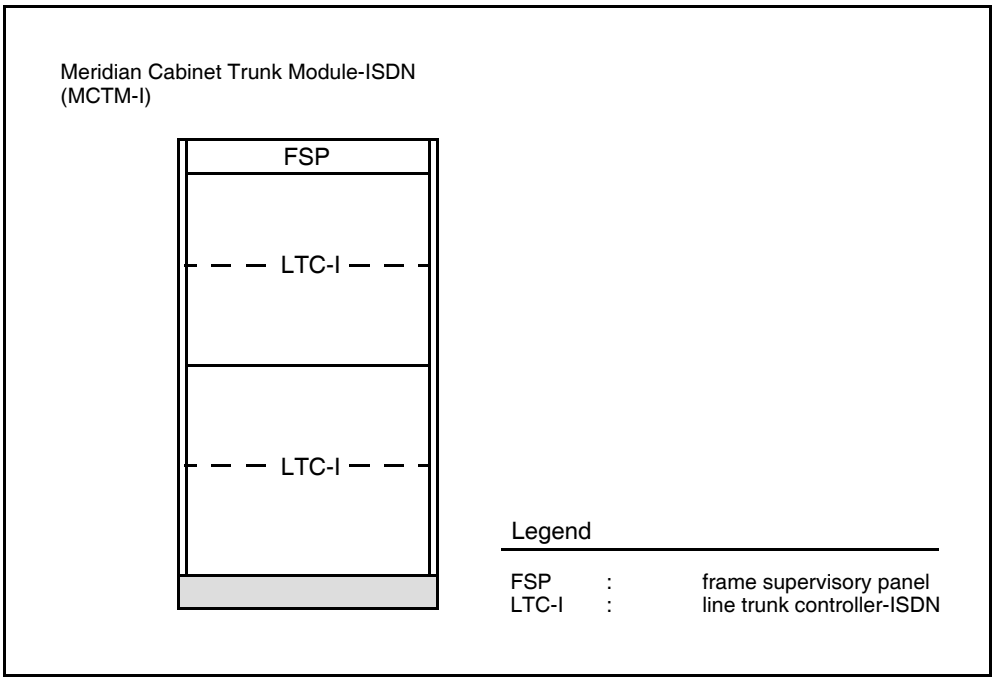
Line Trunk Controller-ISDN

The LTC-I is a peripheral module that is a combination of the LGC and the DTC and provides all the services offered by both. The LTC-I is wired for any combination of LTC-I, DTC-I, or LGC-I supporting up to eight Line Concentrating Modules (LCMs) or Digital Line Modules (DLMs) requiring up to 20 DS-30A trunk ports and 16 DS-30 line ports.

The LTC-I and DTC-I can support DS-1 ports. The DS-1 ports for each LTC-I are fully wired to filtered connectors in the rear bulkhead for use as digital trunks, to connect remote modules, or both.

Up to eight LCMs or DLMs can be configured for each LTC-I. Each LCM or DLM has a dedicated connector on the rear bulkhead, which is prewired for six DS-30A links, simplifying the external cabling to the MCLM or MCDM. Inside the cabinet, the wiring permits on-site configuration for two to six links for each LCM or DLM. Cables providing 16 network DS-30 links to each LTC-I are connected to the LTC-I as needed, on site.

Figure 48
MCTM-I components



LTC-Is are provisioned with Universal Tone Receivers (UTRs) containing 30 circuits. An additional 30 circuits can be provisioned with an additional pair of circuit cards.

Line Group Controller-ISDN

The LGC-I is a peripheral module that connects DS-30 links from the network to the LCM. The LGC is essentially the same as the LTC; however, the LGC adds line support.

Digital Trunk Controller-ISDN

The DTC-I is a peripheral module that connects DS-30 links from the network to the digital trunks. The MCTM-I has two fully duplicated DTC-Is. Each controller can support up to 20 DS-1 trunk ports. The lower shelves contain DTC-I 0; the upper two shelves contain DTC-I 1. The DTC-I supports ISDN packfill.

The DS-1 ports for each DTC-I are fully wired to filtered connectors in the rear bulkhead for use as digital trunks, to connect remote modules, or both. The DS-1 ports are fully connectorized, using the band pass RF filters for improved EMI performance. Additionally, the cabling and connectors allow the rear bulkhead to interface to the ISDN packet handler.

The DTC-Is are always provisioned with UTRs containing 30 circuits and 30 provisionable circuits.

A pair of Special Tone Receivers (STRs) provide the capability for call reorigination on each DTC-I for which the STRs are provisioned.

Cabinetized Integrated Services Module

The CISM cabinet houses shelves for Integrated Services Modules (ISMs), in addition to performing the functions of the Trunk Module (TM) and the Maintenance Trunk Module (MTM).

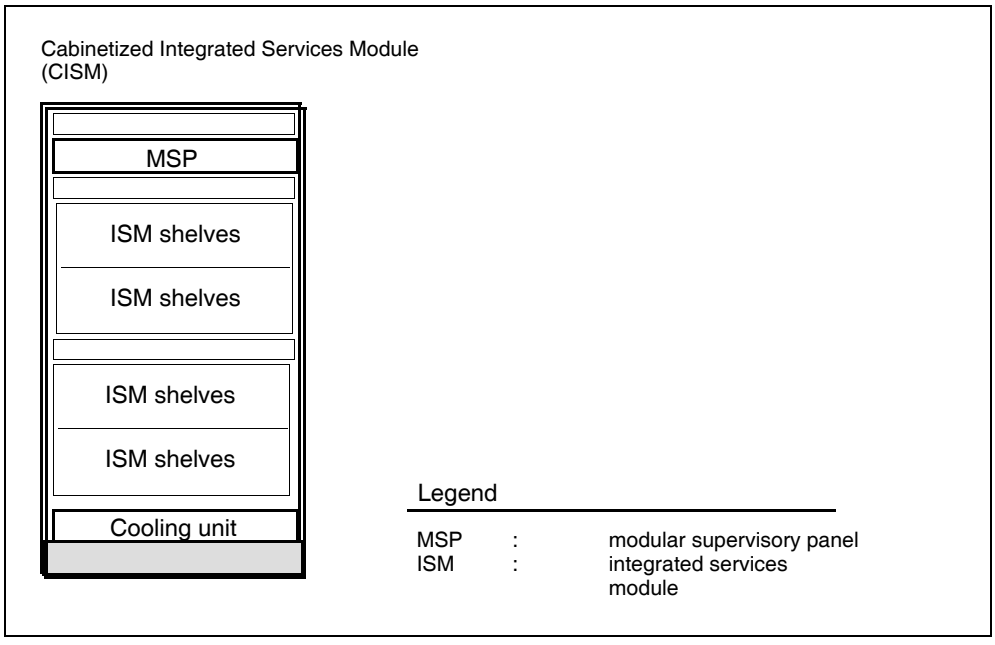
Modular Supervisory Panel

The MSP distributes and controls power, provides monitoring and controls alarms in the CISM cabinet. It also provides a maintenance block that includes connections for telephone and data, and test jacks for Alarm Battery Supply (ABS).

Integrated Service Module

The Integrated Service Module (ISM) provides the same functionality as the Trunk Module (TM) and the Maintenance Trunk Module (MTM), as well as functionality similar to the Service Trunk Module (STM) by using conference bridges and digital service circuits, such as the Conference Trunk Module (CTM) and the Enhanced Digital Recorded Announcement Machine (EDRAM), respectively.

Figure 49
CISM components



Line cabinet modules

The series of line cabinet modules have the same hierarchical system function in the switch architecture.

The following are cabinets in the LM series, where MCLM stands for Meridian Cabinet Line Module.

- MCLM with Enhanced Line Module (ELM)
- MCLM-E with ISDN Line Concentrating Module-Enhanced (LCM-E)
- Meridian Cabinetized Digital Module (MCDM) with Digital Line Module (DLM)

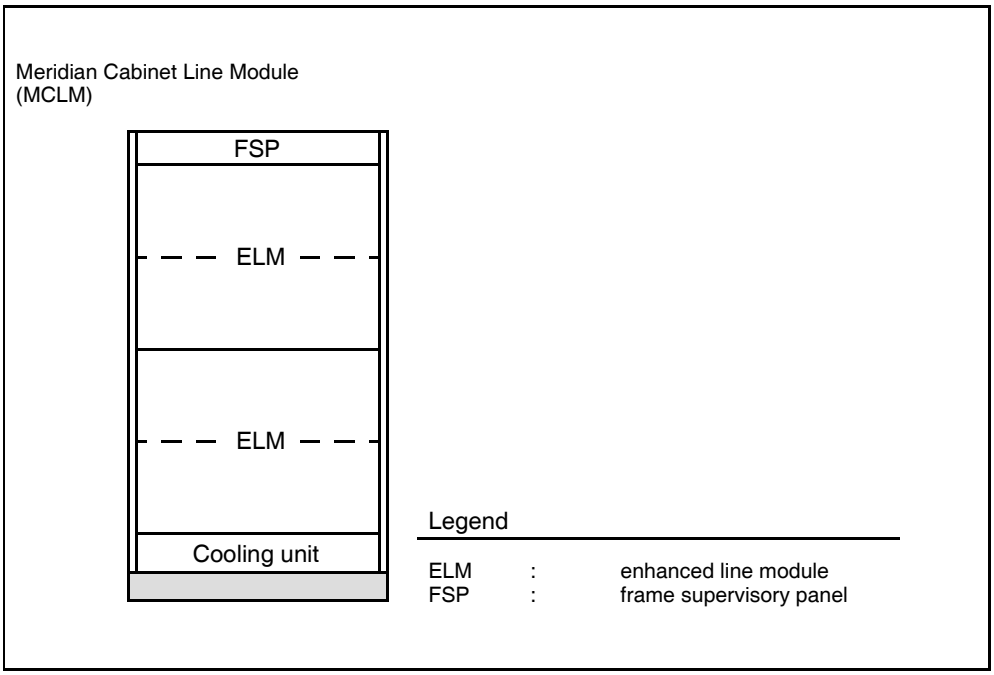
These are described and illustrated on the following pages.

Meridian cabinet line module

The MCLM contains two duplicated ELMs. Each ELM has eight line drawers, which house 512 line cards. The MCLM cabinet provides 1024 single line card slots.

Figure 50 shows the MCLM components. The components of this cabinet module are described in subsequent paragraphs.

Figure 50
MCLM components



Cooling unit

Top and bottom units provide forced-air cooling with two-speed fans. The fans normally run at low speed to minimize noise. If a condition of thermal stress occurs, the fans switch to high speed.

Enhanced Line Module

The ELM uses a common backplane for the duplicated controller, ringing generator and drawer fusing. All four line drawers on each shelf are located on the left side. The control equipment (such as ringing generators, fuse panels, power converters and LCM processors) is located on the right side. This arrangement allows easier removal of line cards from the drawers.

The six DS-30A links for an ELM are hard-wired to a single connector on the rear bulkhead. The Metallic Test Access (MTA) cable is hard-wired to the back panel and also connects to the MCAM3 (described later in this chapter).

All tip and ring cables from the line drawers are hard-wired to EMI-filtered, 50-pin connectors on the rear bulkhead, which eliminates on-site installation of the Main Distribution Frame (MDF) cables to the line drawers.

Over voltage protection

Line cards NT6X17BA, NT6X18BA, NT6X19AA and NT6X21AD are used only with telephone wiring protected by a Nortel Protector Cat. No. 303M-12AIKE in combination with a 26AWG copper wire with thermoplastic insulation. This is the maximum fusing wire to be used in series with the protector and is mandatory for over voltage protection.

Refer to the *DMS-100 Family Hardware Description Manual* and the *Installation Safety Manual (ISM)* for more safety information.

Frame Supervisory Panel

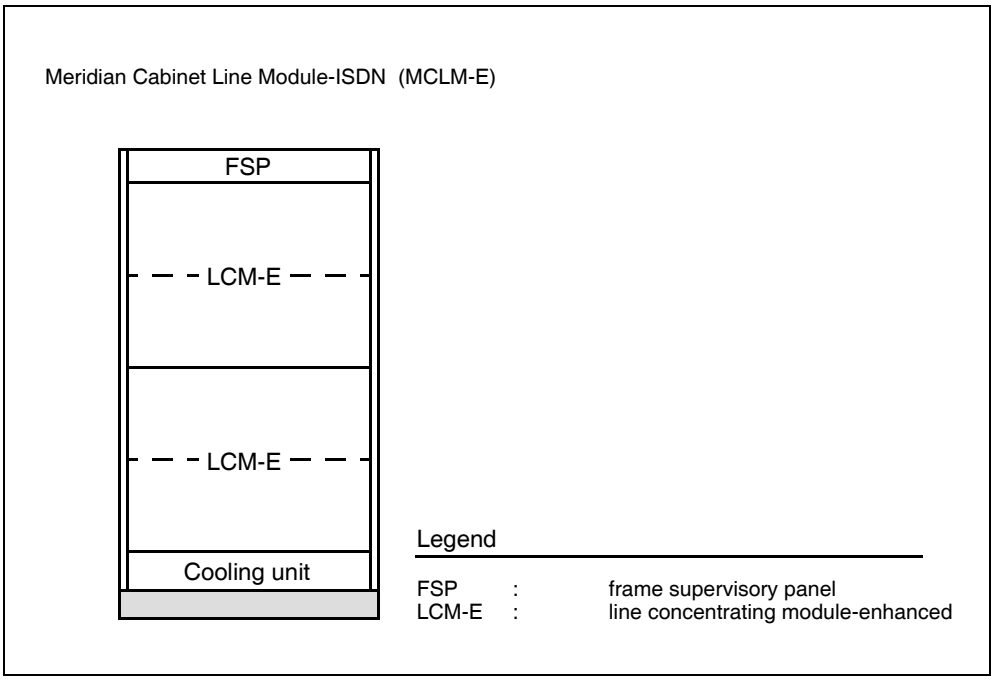
The FSP distributes and controls power and alarms in the cabinet.

Meridian Cabinet Line Module-Enhanced

The MCLM-E contains two duplicated ISDN LCM-Es. The LCM-Es provide ISDN Basic Rate Interface (BRI) and standard line capability. The LCM-Es provide 480 ISDN U lines or 240 ISDN T lines.

Figure 51 on page 120 shows the MCLM-E components. The components of this cabinet module are described in subsequent paragraphs.

Figure 51
MCLM-E components



Cooling unit

The cooling unit provides forced air cooling with two-speed fans. The fans normally run at low speed. If a condition of thermal stress occurs, the fans switch to high speed.

ISDN Line Concentrating Module-Enhanced

The LCM-E is a dual unit peripheral module that terminates ISDN lines, Electronic Business Set (EBS) lines and datapath lines. The LCM-E occupies two shelves and supports a total of eight physical line drawers. The two units operate in a load sharing mode; either unit is capable of taking over the activity of the other. Each shelf of the LCM-E contains four physical line drawers and common equipment consisting of two power converters, a processor card and two digroup control cards.

Where the LCM-E supports a mixture of line types, the total number of lines supported varies depending on the mix of lines installed. Each of the eight line drawers can be provisioned with 20 ISDN line cards (U-line cards), 24 datapath line cards or 48 EBS line cards. An LCM-E configured with a single type of line card supports 160 ISDN lines, 192 Datapath lines or 384 EBS lines.

Over voltage protection

Line cards NTEX17AA, NT6X17BA, NT6X18BA, NT6X19AA and NT6X21AD are used only with telephone wiring protected by a Nortel Protector Cat. No. 303M-12AIKE in combination with a 26 AWG copper wire with thermoplastic insulation. This is the maximum fusing wire to be used in series with the protector and is mandatory for over voltage protection.

Refer to the *DMS-100 Family Hardware Description Manual* and the *Installation Safety Manual (ISM)* for more safety information.

Frame Supervisory Panel

The FSP distributes and controls power and alarms in the cabinet. Duplicated ring generators and a four-fan cooling unit are also integrated into the FSP.

Intelligent Peripheral Equipment Column

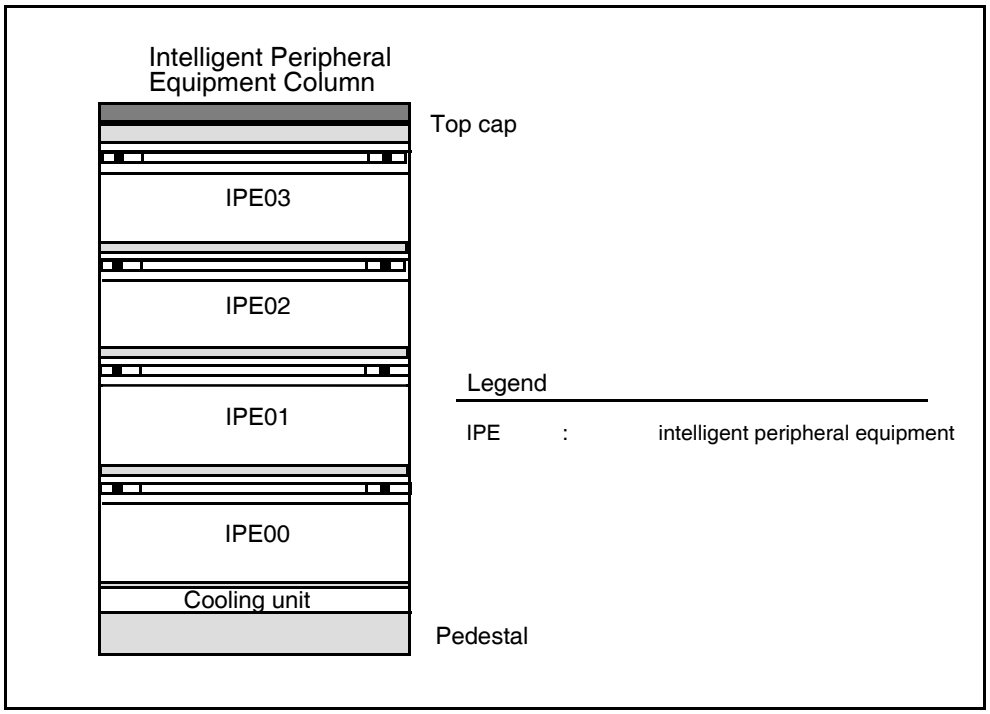
The IPEC contains up to four Universal Equipment Modules (UEMs) to house the Intelligent Peripheral Equipment (IPE) modules. One UEM provides the framework for housing one IPE module.

Each IPEC requires one Extended System Monitor (XSM) card that can be configured either as a master or a slave. One master XSM is capable of supporting up to 64 columns (IPEC) and up to 63 slave XSMs located in other columns, using a daisy chain of serial communication links. Only the master XSM reports status (of the master XSM and the slaves connected to it) to the system CPU or responds to system status inquiry messages.

Note: For detailed information on the XSM card and other elements of Intelligent Peripheral Equipment, refer to the *Intelligent Peripheral Equipment (IPE) Reference Manual*.

Figure 52 on page 122 shows the IPEC components. The components of this cabinet module are described in the subsequent paragraphs.

Figure 52
IPEC components



Cooling unit

The cooling unit provides forced-air cooling with two-speed fans. The fans normally run at low speed. If a condition of thermal stress occurs, the fans automatically switch to high speed. Under normal conditions, both fans operate. If one of the two fans fails, or the temperature reaches 65 degrees Celsius, a fault is reported.

Intelligent Peripheral Equipment module

Up to four IPE modules can be housed in one IPEC. The IPE modules are numbered from 0 to 3 (bottom to top) in the IPEC.

Each IPE consists of the following:

- one controller card, provisioned in card slots 07 and 08
- up to 16 line cards (analog, digital or both); any mix of Digital Line Cards (DLCs), Analog Line Cards (ALCs), Line-side T-1 Interface (LTI) cards, or analog Message-waiting Line Cards (MLCs) can be provisioned in slots 00 through 15

- one dc (direct current) ringing generator (required when one or more MLCs are provisioned)
- one dc-version Peripheral Equipment Power Supply (PEPS), which provides power to the IPE shelf and regulates all the voltages required by the cards on the shelf

The Enhanced IPE Controller (EXPEC) card is an enhanced version of the IPE controller (XPEC) card. Each of these cards provide functionality to the IPE. For more information, refer to the *IPE Reference Manual.*

Top cap
The top cap is mounted on the highest IPE module of the IPEC. The top cap consists of thermal sensors, a fan speed sensor, a front and rear exhaust grill and a column alarm indicator.

The sensors and alarm indicator interface with the XSM card located in the pedestal.

Power requirement
The IPE cabinet is powered by an external -48 V dc source provided by the CPDC. IPEs require the CPDC as a power source and cannot be powered by an MCAM unit. The CPDC cabinet is described in "Maintenance and administration cabinet modules" on page 133.

Peripheral cabinet modules

The following cabinets house the peripheral modules and the peripheral interface for the Meridian SL-100 system:

- Link Peripheral Processor (LPP)
- Intelligent Peripheral Equipment Column (IPEC)
- Cabinetized Multi-Vendor Interface (CMVI)
- Spectrum Peripheral Module (SPM)
- Cabinetized International Peripheral Equipment (CIPE)

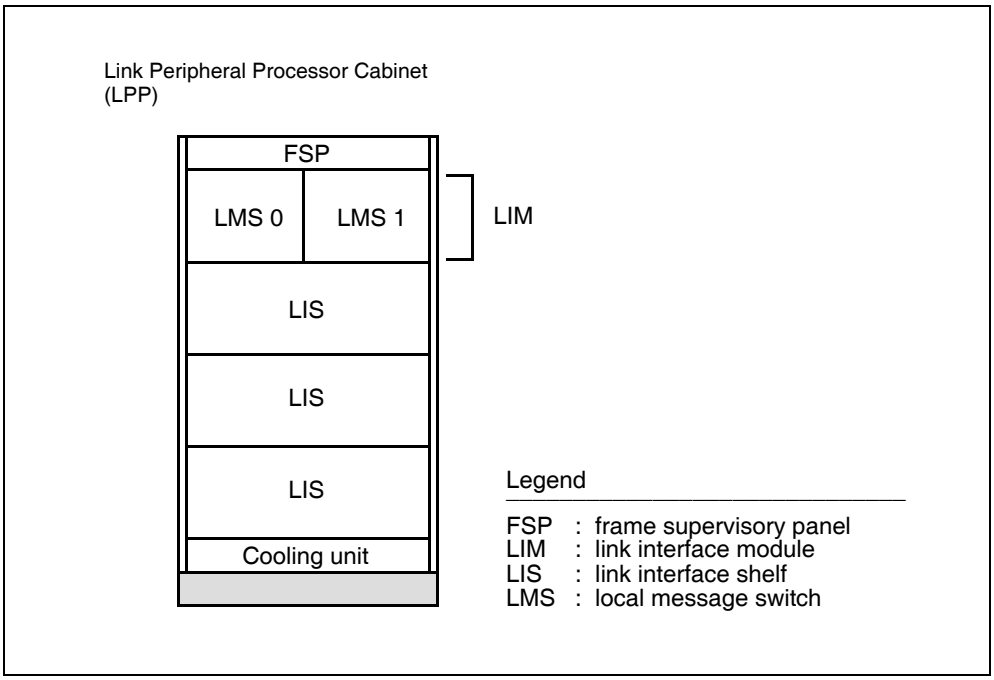
These cabinets are described and illustrated on the following pages.

Link Peripheral Processor

The LPP is a peripheral based on the Meridian SL-100 system cabinet architecture. The LPP allows enterprises to add special applications such as CCS7 and DMS packet handler.

Figure 53 on page 124 shows the LPP components.

Figure 53
LPP components



LPP cabinet component descriptions

The LPP cabinet contains two types of components: the Link Interface Module (LIM) and Link Interface Shelf (LIS).

- Link Interface Shelf

  The LIS houses modular, add-in cards and paddleboards known as Application Specific Units (ASUs). Examples of ASUs are the Link Interface Unit (LIU) for CCS7 applications and the X.25/X.75/X.75' Link Interface Unit (XLIU) for DMS packet handler applications. A maximum of three LISs can be provisioned in each cabinet and each shelf can house up to 12 ASUs for a total of 36 ASU slots. Frame transport buses (F-buses) are used to transfer messages between the ASUs and the Link Interface Module.

- Link Interface Module

  The LIM controls the messaging between the ASUs in an LPP and also between the LPP and DMS MS-bus. The LIM consists of two Local Message Switches (LMS) and two F-buses. Each LMS uses a dedicated F-bus to communicate with the ASUs in an LPP. The LMSs and F-buses operate in a load sharing mode, and a single LMS and F-bus can handle the entire messaging of an LPP. This configuration ensures LIM reliability in the event of an LMS failure. DS-30 links are used to communicate between the LMSs and the DMS MS-bus.

LPP network interfaces

Messaging between the LPP and a customer's network is done using either an ASU paddleboard or channelized access as described in the following paragraphs.

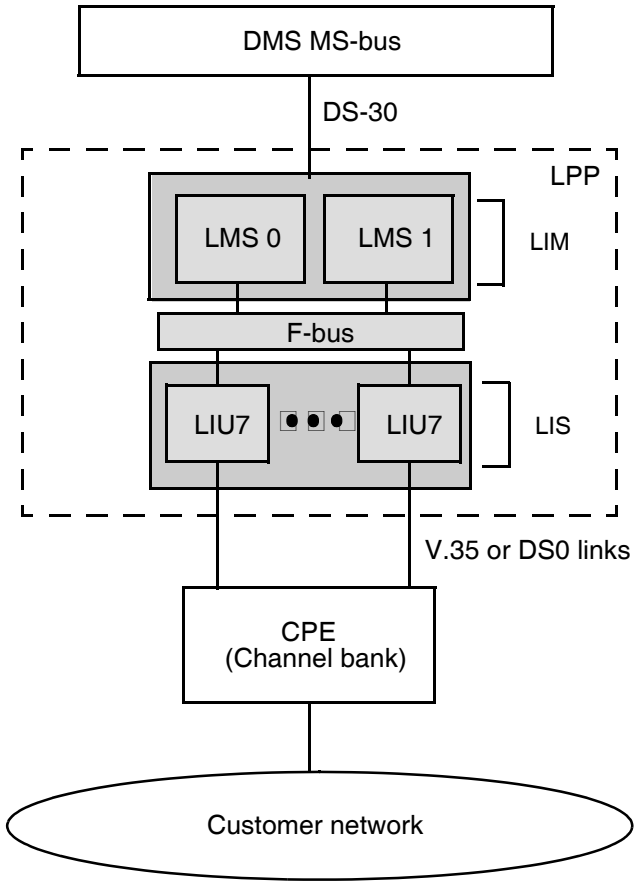
- ASU paddleboard

  The ASU paddleboard provides a direct V.35 or DS0 connection between the ASU and Customer Premises Equipment (such as a channel bank). Refer to Figure 54 on page 126 for an illustration of this configuration.

- Channelized access

  Channelized access allows direct messaging between the LPP and the DMS network (ENET or JNET) using a Network Interface Unit (NIU). The NIU is a type of Application Specific Unit that uses DS-30 links to communicate with the DMS network, and uses a channel bus (C-bus) to communicate with the ASUs located on the same shelf as the NIU. Refer to Figure 55 on page 127 for an illustration of this configuration.

Figure 54
ASU paddleboard configuration



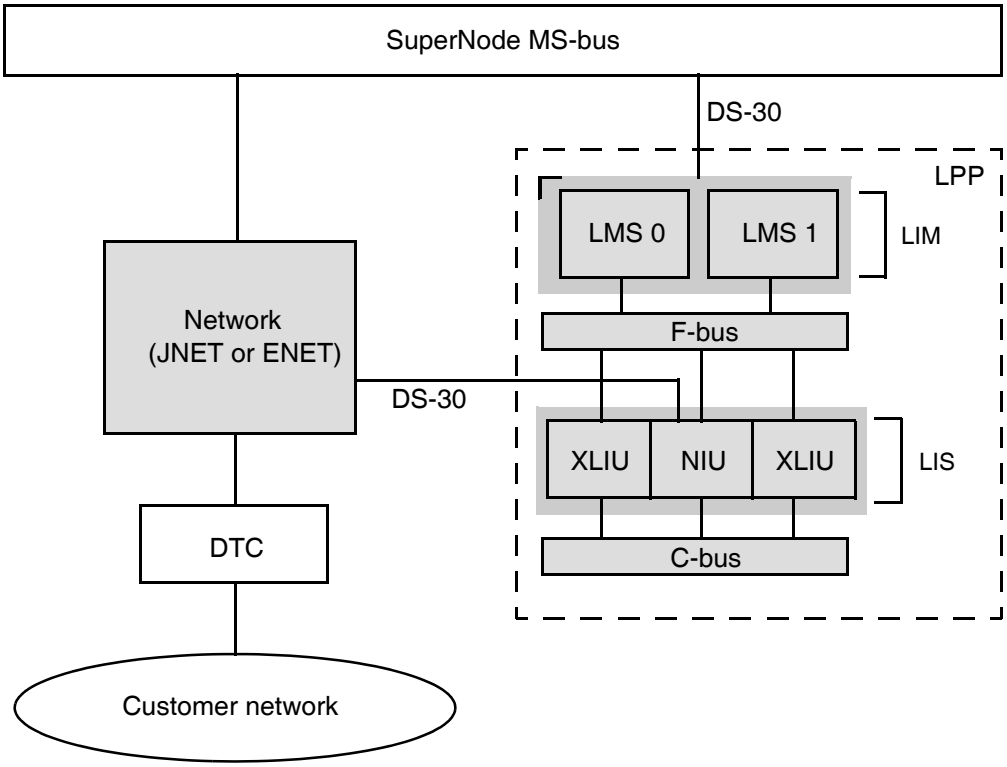
LPP components

LIU7 link interface unit that supports CCS7 applications (LIU7 is a type of ASU)

LMS local message switch that controls messaging between the ASUs in an LPP and between the LPP and DMS MS-bus

F-bus transports messaging between the ASUs and the LMSs

Figure 55
Channelized access configuration



LPP components

LMS	local message switch that controls messaging between the ASUs in an LPP and between the LPP and DMS MS-bus
F-bus	transports messages between the ASUs and LMSs
XLIU	provides X.25 and X.75 layer 2 and 3 services for packet handler applications (XLIU is a type of ASU)
NIU	network interface unit that transports data between the DMS network and ASUs
C-bus	provides communication between the ASUs and NIUs on a given shelf

Single-shelf LPP (SSLPP)

The SSLPP cabinet can also be configured as a single-shelf LPP, which is an option for Meridian SL-100 offices that do not require a large number of ASUs. The single-shelf LPP configuration differs from the LPP in that it does not have an LMS controlling the messaging between the LPP and DMS MS-bus. Instead, the ASUs communicate directly with the DMS MS-bus over fiber-optic cables. The single-shelf LPP can be configured with one or two shelves supporting up to 24 ASUs (12 ASUs for each shelf).

The Link Peripheral Processor (LPP) is a high capacity vehicle for services such as frame relay, packet switching, CCS7 call control and ethernet interface. The LPP is required to support the Ethernet Interface Unit (EIU). Users of smaller Meridian SL-100 systems that do not require such high capacity as the LPP, require a more economical method of accessing EIU/LPP services. The SSLPP is an alternative to a full Link Peripheral Processor where:

- The number of Link Interface Unit (LUI7) Application Specific Units (ASUs) desired does not make the full LPP a cost-effective option.
- Offices lacking floor space near the core processor makes it impossible to install an LPP cabinet.

For more information about the FLIS, refer to the *DMS-100 Family Provisioning Manual*.

Frame Supervisory Panel
The FSP distributes and controls power and alarms in the cabinet.

Cooling unit
The high-capacity cooling unit consists of four, high-speed DC-powered fan blowers. Two of these four fans are operated with a separate power feed for reliability.

Power requirement
The LPP cabinet is powered by an external -48 V dc source provided by an CPDC. LPPs require the CPDC as a power source and cannot be powered by an MCAM unit. The CPDC cabinet is described in "Maintenance and administration cabinet modules" on page 133.

Note: For detailed information about the LPP, refer to the *Peripheral Modules.*

Cabinetized Multi-Vendor Interface

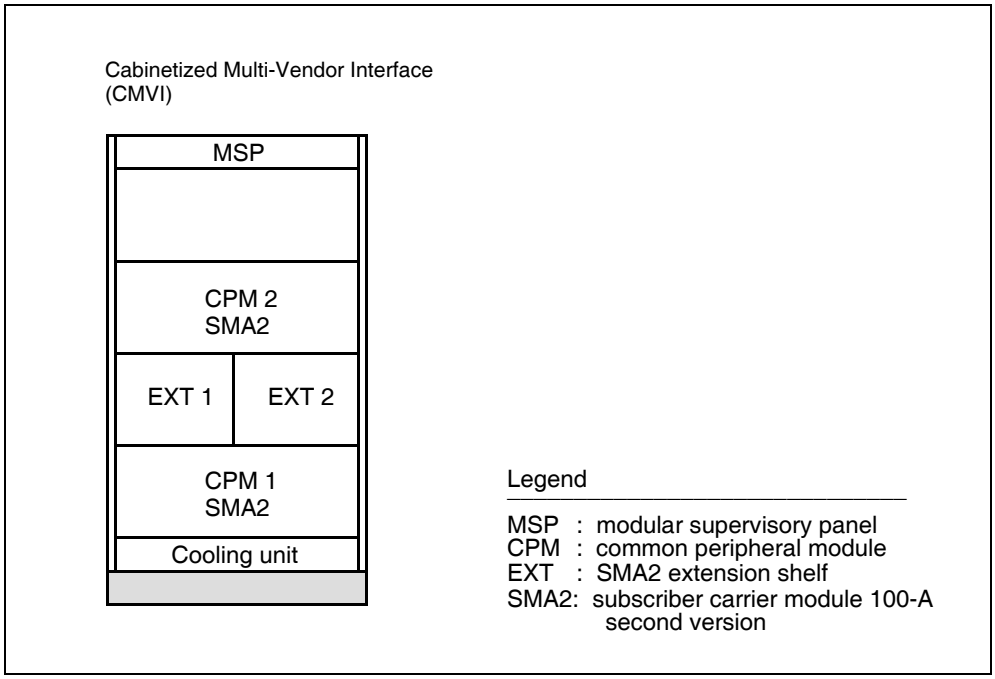
The CMVI provides the multi-vendor interface between the Meridian SL-100 system and the S/DMS AccessNode and other Remote Digital Terminals (RDTs). The Subscriber Carrier Module-100 Access, second version (SMA2), which resides in the CMVI cabinet, allows the Meridian SL-100 system to connect to the Fiber Central Office Terminal (FCOT) in the S/DMS AccessNode or any T1-based access platform from any supplier that conforms to the Bellcore standard TR-TSY-000303 (TR-303).

Note: The SMA2 is also known as the Enhanced SMA (ESMA).

The CMVI comprises two main SMA2 shelves and one SMA2 extension shelf (a double shelf that services both of the main shelves). Each SMA2 provides up to 28 peripheral side (P-side) DS-1 ports per RDT, with up to 48 P-side DS-1 links total. The DS-1 links carry both traffic and messaging for up to eight RDTs or up to five RDTs if the RDTs require ISDN.

Figure 56 shows the CMVI components. The components of this cabinet module are described in subsequent paragraphs.

Figure 56
CMVI components



Subscriber Carrier Module-100A second version (SMA2)
The SMA2 main shelves are dual unit shelves. Each unit on the main SMA2 shelf contains its own set of control complexes, including a Universal Processor (UP), an Enhanced ISDN Signaling Preprocessor (EISP), and associated memory. The control complex in either unit on a main shelf can control all call processing in the SMA2.

The main SMA2 shelf supports up to 24 P-side DS-1 ports. (The additional 24 ports for each SMA2 are provided by the extension shelf.) The SMA2 interfaces with the switching network using either one DS-512 or up to 16 DS-30 control side (C-side) links.

The SMA2 contains resources dedicated to subtending RDTs. These resources act as logical entities known as Integrated Digital Terminals (IDTs). One SMA2 supports up to eight IDTs, with each IDT being dedicated to a corresponding RDT. Depending on traffic requirements, a number of FCOT and RDT configurations are possible.

The SMA2 provides an ISDN interface through Enhanced D-channel Packet Handler (EDCH) circuit cards. The EDCH cards and the DS-1 cards share the same locations in the SMA2 module. For every DS-1 card that is replaced with an EDCH card, the number of DS-1 ports is reduced by eight.

Extension shelf
The extension shelf provides space for additional DS-1 or EDCH cards. The extension shelf comprises two half-width shelves with the left half being dedicated to SMA2 0 and the right half being dedicated to SMA2 1. If the extension shelf is populated with DS-1 cards, each side provides up to 24 additional DS-1 links for the SMA2 main shelves.

Both sides of the extension shelf requires two combination shelf power supply and DS60 interface cards (two DS60 cards on each side). Each DS60 card provides 14 DS60 links to one of the dual units on the SMA2 main shelf.

Modular Supervisory Panel
The Modular Supervisory Panel (MSP) distributes and controls power and alarms in the cabinet. Interlocks for each LTC-I prevent power loss on the duplicated units at the same time.

Cooling unit
The high-capacity cooling unit consists of four, high-speed DC-powered fan blowers. Two of these four fans are operated with a separate power feed for reliability.

Power requirement
The CMVI cabinet is powered by an external -48 V dc source provided by either a CPDC or an MCAM unit. These cabinets are described in “Maintenance and administration cabinet modules” on page 133.

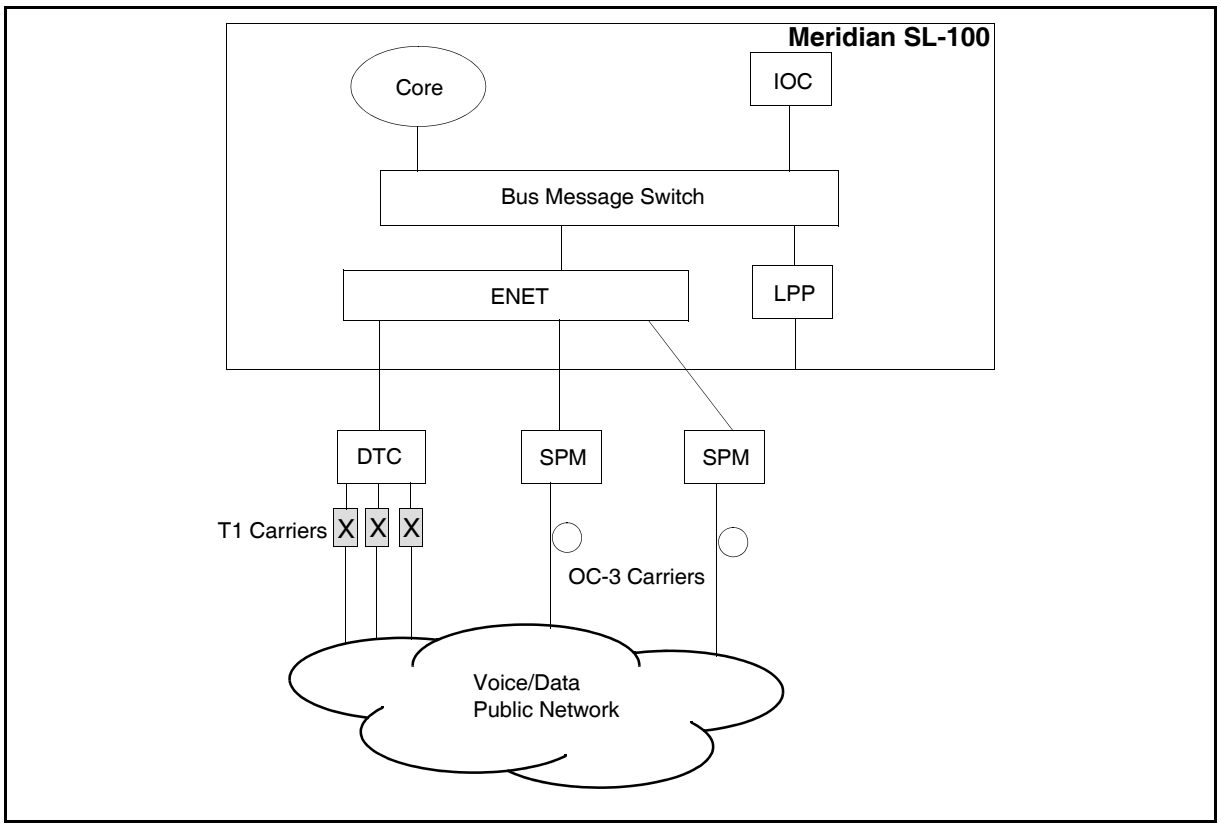
Spectrum Peripheral Module

The Spectrum Peripheral Module (SPM) delivers a high-speed Synchronous Optical Network (SONET) interface to the Meridian SL-100 switch. Per Trunk Signaling (PTS) and ISDN User Part (ISUP) signaling are used over the SONET trunks to provide call processing capability. The SPM offers 1+1 redundant OC-3 trunking interface with integrated echo cancellation. It is a fully integrated peripheral module that is operated, administered, maintained and provisioned like other Meridian SL-100 peripheral modules.

Note: The SPM is supported by both the SuperNode and SuperNode SE.

The SPM directly terminates an OC-3 SONET carrier and feeds the individual traffic from the carrier into the Meridian SL-100 switch. The SPM does not need external cross connects or multiplexers to bring the carrier down to the T1 level, because this is handled internally. The SPM terminates a single OC-3 fiber trunk which represents more than four times as many trunks as a single DTC. Refer to Figure 57.

Figure 57
SPM within the Meridian SL-100 switch



Cabinetized International Peripheral Equipment

The CIPE is used primarily in the European market to support the E1 standard. It is the international version of the Cabinetized Control Peripheral Equipment (CCPE). The CIPE contains two dual-shelf Extended Peripheral Modules (XPMs) configured as either Line Group Controllers (LGC) or Digital Trunk Controllers (DTC). Each shelf contains two LGC/DTC processor boards.

The CIPE connects to the network through either DS-30 trunks (twisted pair) or DS-512 trunks (fiber optic cables). This cabinet connects LCMs with DS-30A trunks (also twisted pair). All connections to the network, line card modules or PCM-30 trunks pass through the bulkhead for Electromagnetic Interface (EMI) compliance.

Frame Supervisory Panel

The FSP is located at the top of the cabinet and distributes -48V dc of power to shelves and contains cabinet alarms.

Cooling units

The cooling unit is located at the bottom of the cabinet and is forced air cooled with a fan unit integrated into the base of the cabinet.

Common peripheral controller shelf assembly (offshore)

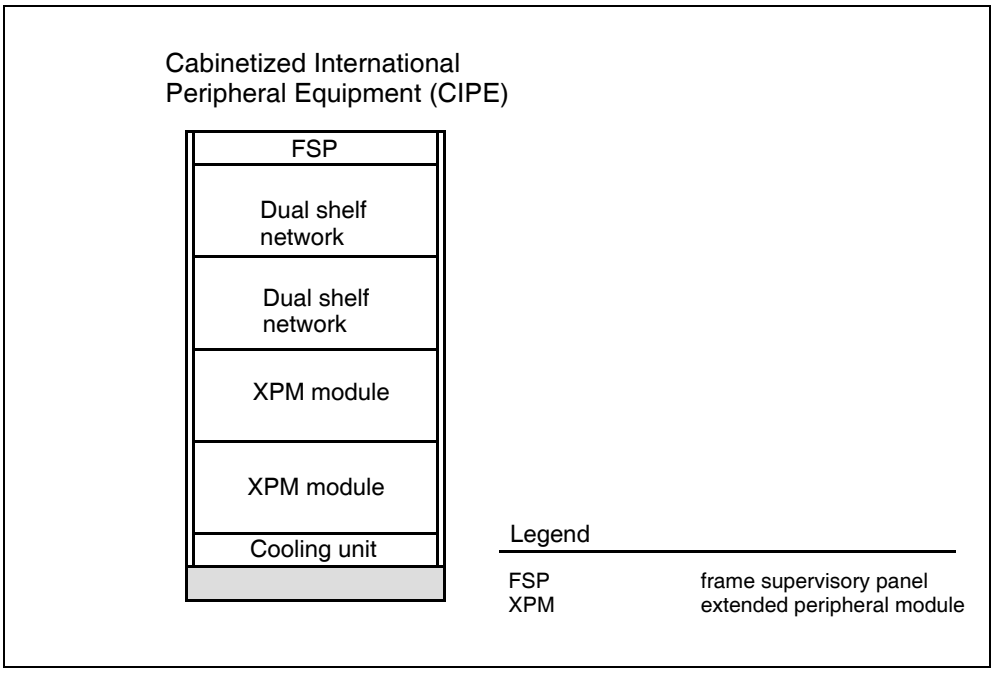
Each module (Cabinetized Line Group Equipment [CLGE] and Cabinetized Digital Trunk Equipment [CDTE]) is housed in two adjacent shelves. One pair of shelves is in positions 47 and 33 and a pair of shelves is in positions 19 and 05.

The CLGE defines the CIPEs intended function when the cabinet is configured specifically to house the LGC and ISDN LGC.

The CDTE defines the CIPEs intended function when the cabinet is configured specifically to house the DTC and ISDN DTC.

Figure 58 on page 133 shows the CIPE components.

Figure 58
CIPE components



Meridian cabinet auxiliary module phase 3

The MCAM3 is a multipurpose cabinet that houses both peripheral modules and maintenance and administration modules. The MCAM3 is described in the next part with maintenance and administration cabinet modules.

Maintenance and administration cabinet modules

The maintenance and administration cabinets include the following modules:

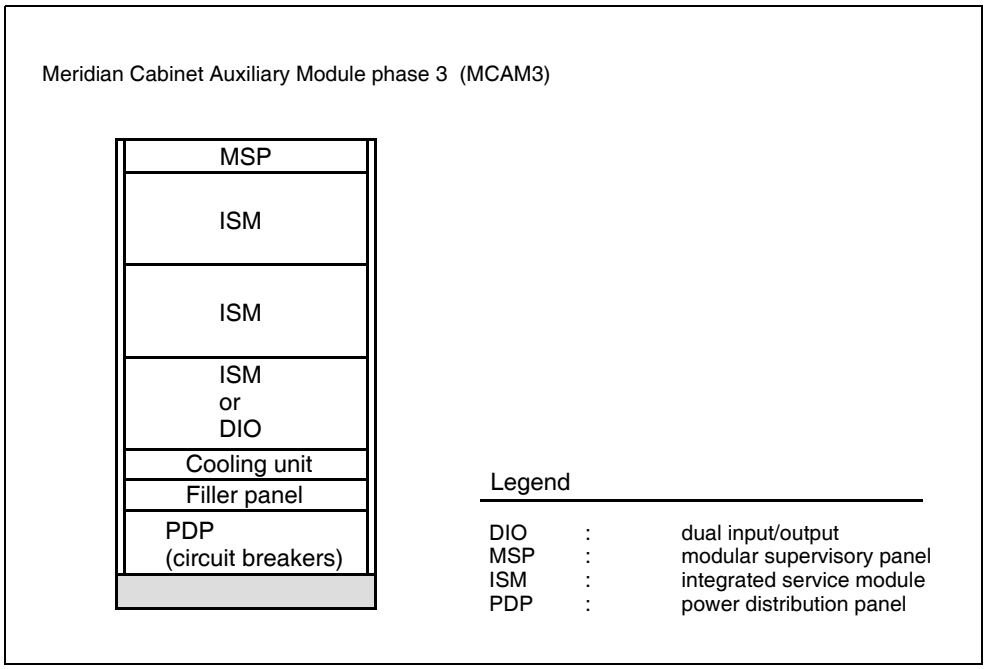
- Meridian Cabinet Auxiliary Module phase 3 (MCAM3)
- Cabinetized Miscellaneous Spares Storage (CMSS)
- Cabinetized Power Distribution Center (CPDC)

Meridian Cabinet Auxiliary Module phase 3

The MCAM3 cabinet houses shelves for Integrated Service Modules (ISMs) and a Power Distribution Panel (PDP). The MCAM3 cabinet is typically configured with three ISMs. In addition to performing the functions of the Trunk Module (TM) and Maintenance Trunk Module (MTM), the MCAM3 provides power to the lineup.

Figure 59 shows the MCAM3 components. The components of this cabinet module are described in subsequent paragraphs.

Figure 59
MCAM3 components



Modular Supervisory Panel

The MSP distributes and controls power, provides monitoring and controls alarms in the MCAM3 cabinet. It also provides a maintenance block that includes connections for telephone and data, and test jacks for Alarm Battery Supply (ABS).

Integrated Service Module

The Integrated Service Module (ISM) provides the same functionality as the Trunk Module (TM) and the Maintenance Trunk Module (MTM), as well as functionality similar to the Service Trunk Module (STM) by using conference bridges and digital service circuits, such as the Conference Trunk Module (CTM) and the Enhanced Digital Recorded Announcement Machine (EDRAM), respectively.

Dual Input/Output module

The Dual Input/Output (DIO) module provides the interface between the Meridian SL-100 system and the maintenance and billing subsystem. The DIO interface provides interfaces to printers, video display units, magnetic tape drives, modems and dedicated billing processors.

Cooling unit

The cooling unit contains three 48V fans that provide a uniform airflow to the cabinet through a 25.4 cm (10-inch) by 58.4 cm (23-inch) exhaust area. An air filter placed directly above the fans provides the required particulate filtration. The fans normally run at low speed to minimize noise levels; however, if a condition of thermal stress occurs, the fans switch to high speed.

Power Distribution Panel

The PDP provides power for up to 11 cabinets (including the MCAM3), depending on the configuration. The circuit breaker module comprises two rows of 20 center trip circuit breakers, of which, half are connected to the A-feed and half to the B-feed. Each row has 16 30-amp circuit breakers and 4 10-amp circuit breakers. An LED assembly is provided to indicate if any breakers fail.

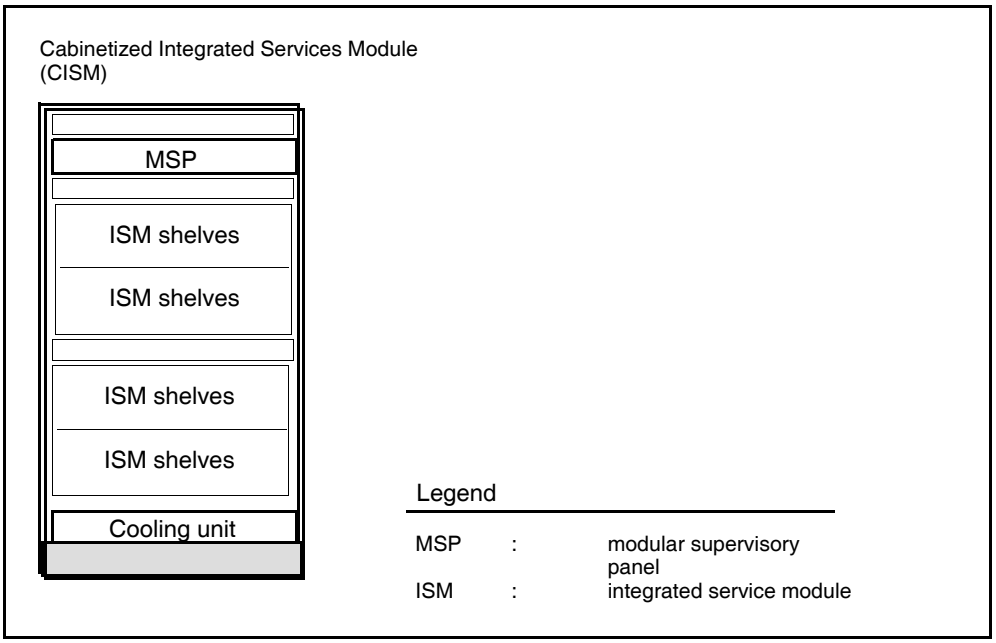
External power supply

The MCAM3 cabinet requires one -48V A-feed, one -48V B-feed, one 48V ABS feed and one ground feed from the power plant. The external battery supply is connected through filtered connections to the PDP.

Cabinetized Integrated Services Module

The CISM cabinet houses shelves for Integrated Services Modules (ISMs), in addition to performing the functions of the Trunk Module (TM) and the Maintenance Trunk Module (MTM).

Figure 60
CISM components



Modular Supervisory Panel

The MSP distributes and controls power, provides monitoring and controls alarms in the CISM cabinet. It also provides a maintenance block that includes connections for telephone and data, and test jacks for Alarm Battery Supply (ABS).

Integrated Service Module

The Integrated Service Module (ISM) provides the same functionality as the Trunk Module (TM) and the Maintenance Trunk Module (MTM), as well as functionality similar to the Service Trunk Module (STM) by using conference bridges and digital service circuits, such as the Conference Trunk Module (CTM) and the Enhanced Digital Recorded Announcement Machine (EDRAM), respectively.

Cooling unit

The cooling unit contains three 48V fans that provide a uniform airflow to the cabinet through a 25.4 cm (10-inch) by 58.4 cm (23-inch) exhaust area. An air filter placed directly above the fans provides the required particulate filtration. The fans normally run at low speed to minimize noise levels; however, if a condition of thermal stress occurs, the fans switch to high speed.

Cabinetized Miscellaneous Spares Storage

The CMSS can be configured with shelves and shelf inserts to provide storage for circuit cards, plus a utility tray for technician tools. The CMSS provides framework, hardware and ground braid assembly.

Storage shelf assembly

The storage shelf assembly is located in positions 03, 17, 31, and 45, but is always configured from the bottom up. The assembly provides a card cage, plus sliders in the front and the rear for mounting spare circuit cards. The shelf accommodates a maximum of 54 circuit cards (22.2 mm [.875 in.] wide) or 42 circuit cards (28.5 mm [1.124 in.] wide). One shelf can be configured for each mounting position.

Meridian SL-100 spares circuit card shelf assembly

The assembly provides a card cage, plus sliders for storing up to two power converters and 20 Meridian SL-100-size cards on the front side and a maximum of 26 paddleboards on the rear side.

The spare circuit card shelf assembly is located in positions 04, 18, 32, and 46. Always configure the shelf assembly from the bottom up, and when mixing the storage shelf assembly with the Meridian SL-100 spares circuit card shelf assembly, always configure the storage shelf assemblies first.

The Meridian SL-100 spares shelf assembly is configured in position 46 only when the storage shelf assembly is configured in position 31.

Storage shelf assembly insert

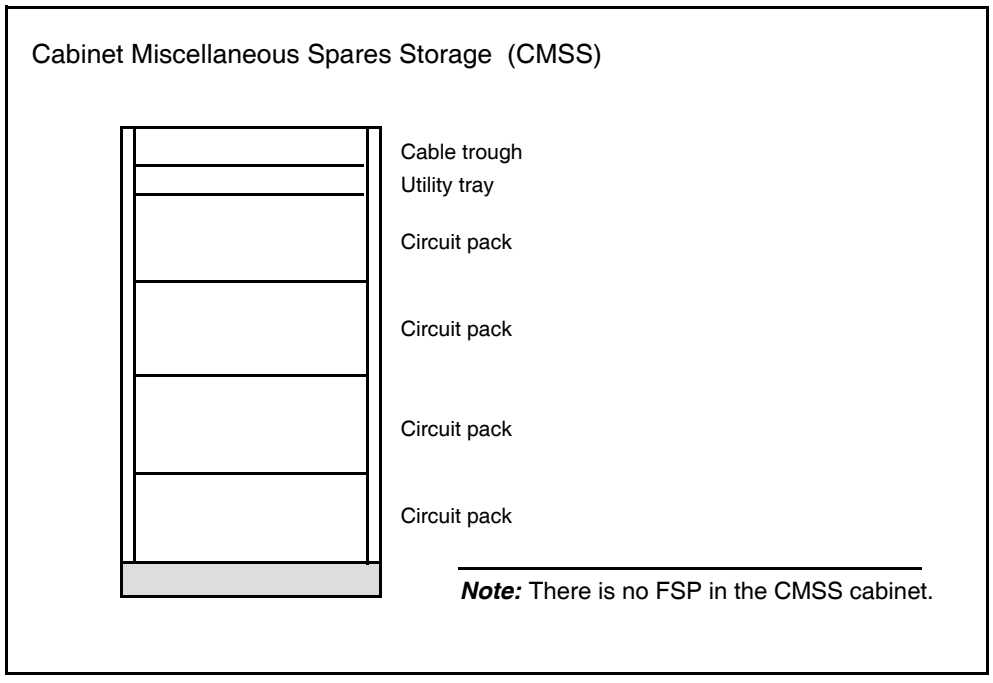
The storage shelf assembly insert provides storage for odd size circuit cards. The shelf insert stores a maximum of 22 circuit cards. Two shelf insert assemblies can be installed into the bottom storage shelf assembly at location 03. One storage shelf assembly insert is placed in the left side of the storage shelf assembly from the front and the second storage shelf assembly insert in the left side of the storage shelf assembly from the rear of the cabinet.

Line card storage chassis

A line card storage chassis is provided when line cards are configured. If the system requires line cards and three or more networks, two line card storage chassis should be provided.

Refer to Figure 61 for CMSS components.

Figure 61
CMSS components



Cabinetized Power Distribution Center

The CPDC is a single cabinet used to distribute power to the cabinets in the corresponding lineup. It provides dc power distribution and protection and optional inverted ac power for endguard outlets. The CPDC is the first cabinet in a lineup of up to 11 cabinets.

The Office Alarm Unit (OAU) provides alarm control and the CPDC services as the interface between equipment lineups and the OAU. The OAU is located in the first Cabinetized Trunk Module Equipment (CTME).

The CPDC provides a common product for numerous applications in both hosts and remotes. It also provides a compact configuration for small applications with the option for seamless growth. The CPDC provides Electromagnetic Interference (EMI) compliance at the system level for all power distribution and at the cabinet level for all input power cabling.

Cabling

The dc power plant for the office supplies power to the CPDC at a nominal voltage of -48 V through separate battery feeders, A and B. (The power is returned from each CPDC to the power plant through battery return conductors, which are the same size as the battery feeders.)

The power is then distributed from the fuse/breaker panels in the CPDC to the Frame Supervisory Panels (FSPs) in the various equipment frames in the lineup through secondary battery feeders. It is returned to the CPDC through return feeders of the same size.

Required dc voltages other than -48 V are obtained from dc-dc converters, which are powered from -48 V and located within each equipment frame.

The CPDC accepts external cabling with either top or bottom entry. Internal cabling for all loads, except for those in an NT9X01 or NT9X95AA style cabinet, exit and enter through the side of the cabinet. The NT9X95AA style cabinet accepts horizontal cabling. Feeds for the NT9X01 cabinet exit by way of feedthrough filter capacitors located on the NTRX31AA EMI bulkhead and route externally to these cabinets. Conversion to the NT9X95AA style eliminates the NT9X01 external power filters.

Frame Supervisory Panel

The FSP includes a frame fail light mounted at the top of the front of the cabinet and an electrostatic discharge wrist strap, located in the front.

Power Distribution Shelf

The Power Distribution Shelf (PDS) provides wiring and circuit breaker protection to distribute power to the Meridian SL-100 system. The CPDC distributes up to a maximum of 200 A of 48 V dc power on each of its separate A and B buses.

A recommended 250A power board fuse provides overload protection. Distribution of the bulk dc power to equipment loads is by way of 30 A circuit breakers.

One or two PDSs can be configured, except for a lineup with a SuperNode-based cabinet, in which case one PDS is configured at shelf position 30. Configuration of PDS shelves varies according to the types of Meridian SL-100 frames to which the CPDC provides power.

A dc breaker panel is available and contains a total of 42 circuit breakers (21 on each of the A and B buses). Capacitive filtering of each bus is provided on the breaker panel and one breaker on each bus is dedicated to this function, leaving 20 breakers for each bus for secondary distribution.

Supplementary power distribution shelf (optional)

A supplementary power distribution shelf can be configured. See “Power Distribution Shelf” on page 139.

Power cable junction box

The power cable junction box provides connection for supplementary shelves and is standard equipment on the CPDC.

500W inverter (optional)

The 500W inverter is an optional component that serves convenience outlets located in the equipment lineup endguards. The inverter kit contains the A0367433 LaMarch inverter, which converts the -48 V (nominal) dc from the office battery to 110 V ac.

Bulkhead filler panel

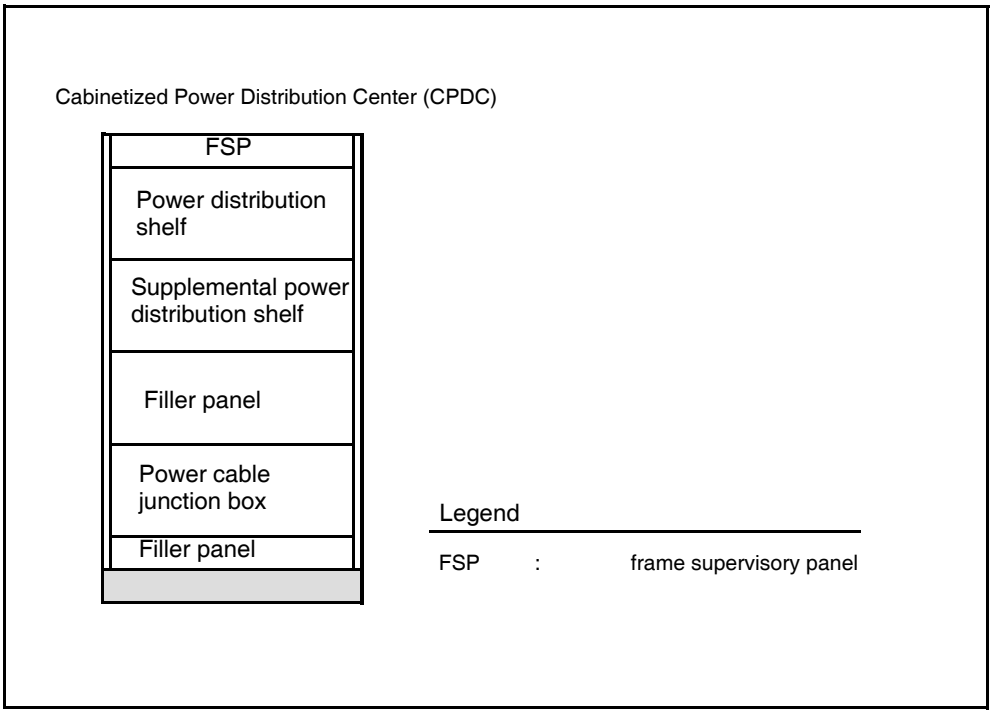
Two bulkhead filler panels are used when the CPDC is in a lineup without a SuperNode, Link Peripheral Processor (LPP), or ENET mounted in a cabinet.

16-inch filler panel

One 16-in. (0.41 m) filler panel comes standard with the CPDC and is mounted at shelf position 14. One or two other panels should be used to fill unused PDS shelf spaces at positions 30 and 46.

Refer to Figure 62 on page 140 for CPDC components.

Figure 62
CPDC components



Remote peripheral cabinet modules

Remote peripherals are specially equipped units located at a maximum distance of 150 miles (240 km) from the host Meridian SL-100 system, but operate as peripheral modules of the Meridian SL-100 system through DS-1 links. The Meridian SL-100 host office can accommodate up to 64 remote sites, depending on the configuration.

The remote peripheral cabinets include the following modules:

- Meridian Cabinet Remote Unit (MCRU)
- Meridian Power Remote Module-SONET (MCRM-S)

The remote peripheral cabinets are described briefly in the following section. For more information about remote peripherals, refer to the *Remote Peripherals General Description*.

Meridian Cabinet Remote Unit

The MCRU can interface up to 640 remote subscribers to a Meridian SL-100 host. The MCRU interfaces to the host through two to six DS-1 links. The remote provides an intra-calling capability, allowing calls between subscribers on the same MCRU to be locally switched. At the Meridian SL-100 host, DS-1 links from the MCRU interface to the system through an LTC or LGC. For increased reliability, the primary DS-1 links should terminate on different DS-1 line cards at the host LTC or LGC.

In the event of a complete outage of all DS-1 links between the remotes and the host office, the Emergency Standalone (ESA) feature provides the capability to maintain basic service for remote subscribers. Additional hardware is required for this optional service.

Meridian Cabinetized Remote Module-SONET

The MCRM-S is a replacement for the MCRM-I that performs all the functions of the ISDN cabinet on a new platform that provides an interface for future fiber optics. The MCRM-S supports all services for POTS, IVD and ISDN lines.

Connectivity

The FLIS is installed in an EMC and connected to the core using DS-512 fiber links. These fiber links allow the EMC cabinet to be located up to two kilometers from the core processor.

System configuration

Cabinet update

Many of the Meridian cabinets are manufacture discontinued (MD) to streamline the product line. There are also a couple of Meridian cabinets that have reached the end of life. All of the cabinets that are manufacture discontinued, or have reached the end of life, have replacements.

Single Shelf Link Peripheral Processor (SSLPP)/Fiberized Link Interface Shelf (FLIS)

The Link Peripheral Processor (LPP) is a high capacity vehicle for services such as frame relay, packet switching, CCS7 call control, and ethernet interface. The LPP is required to support the Ethernet Interface Unit (EIU). Users of smaller Meridian SL-100 systems that do not require such high capacity as the LPP, require a more economical method of accessing EIU/LPP services. The SSLPP/FLIS is an alternative to a full Link Peripheral Processor where:

- The number of Link Interface Unit (LUI7) Application Specific Units (ASUs) desired does not make the full LPP a cost-effective option.
- Offices lacking floor space near the core processor makes it impossible to install an LPP cabinet.

For more information about the FLIS, refer to the *Fiberized Link Interface Shelf Hardware Description Manual* and the *DMS-100 Family Provisioning Manual*.

Hardware components

Hardware components of the FLIS include the following:

- Link Interface Shelf (LIS)
- LIS F-bus Controller (LFC)
- LIS Fiber Interface (LFI)

The controlling entity for the LIS is composed of the LFC and the LFI. The LFC contains the firmware required to initialize the board and it receives the downloaded software required to maintain its messaging paths.

Figure 63 illustrates two FLIS shelves within the Enhanced Multipurpose Cabinet (EMC). The integral FLIS hardware components are indicated in this diagram. A single shelf configuration can also be provisioned.

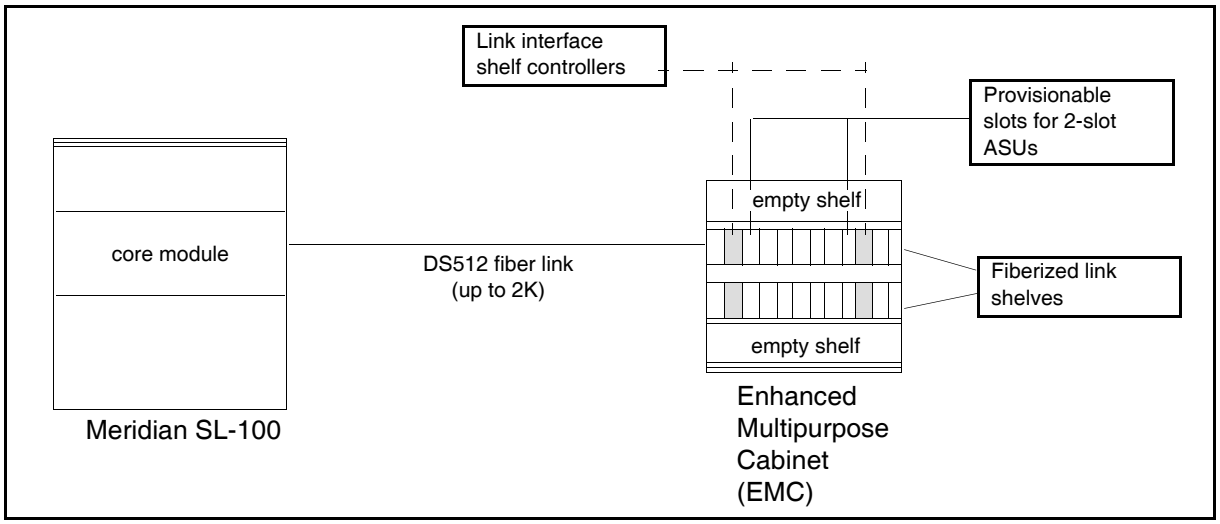
Hardware requirements are as follows:

- DTC7 card on the XPM
- LIU7 (on the peripheral module)
- EIU (on the peripheral module)

Software

The FLIS software consists of central software, MS-bus software and LFC software.

Figure 63
SSLP/FLIS configuration



System configuration overview

The Meridian SL-100 system cabinetized configuration is based on five system groups of modules (groups 0 to 4).

- The first group, called the primary group or group 0, contains the central control functions shown in the following list:
  - the Dual Plane Combined Core (DPCC) cabinet for the SuperNode system
  - the SuperNode Combined Core (SCC) cabinet for the SuperNode SE system
  - other system elements to support up to 9000 lines
- The other four groups, called secondary groups or groups 1 to 4, contain elements that are added as required to increase the system size.

Cabling between modules is minimized, being self-contained within a lineup. The only external connections are the lines, trunks and network connections to the core module and other group networks.

This chapter describes the typical standard group configurations and the non-standard configurations with merged lineups.

Standard group configurations

Every SuperNode system requires a three-lineup configuration for the primary group (group 0) for the first 9000 lines, plus two lineups of a secondary group for each 9000-line increment.

Every SuperNode SE system can be configured with a two- or three-lineup configuration for the primary group (group 0) for the first 9000 lines, plus two lineups of a secondary group for each 9000-line increment.

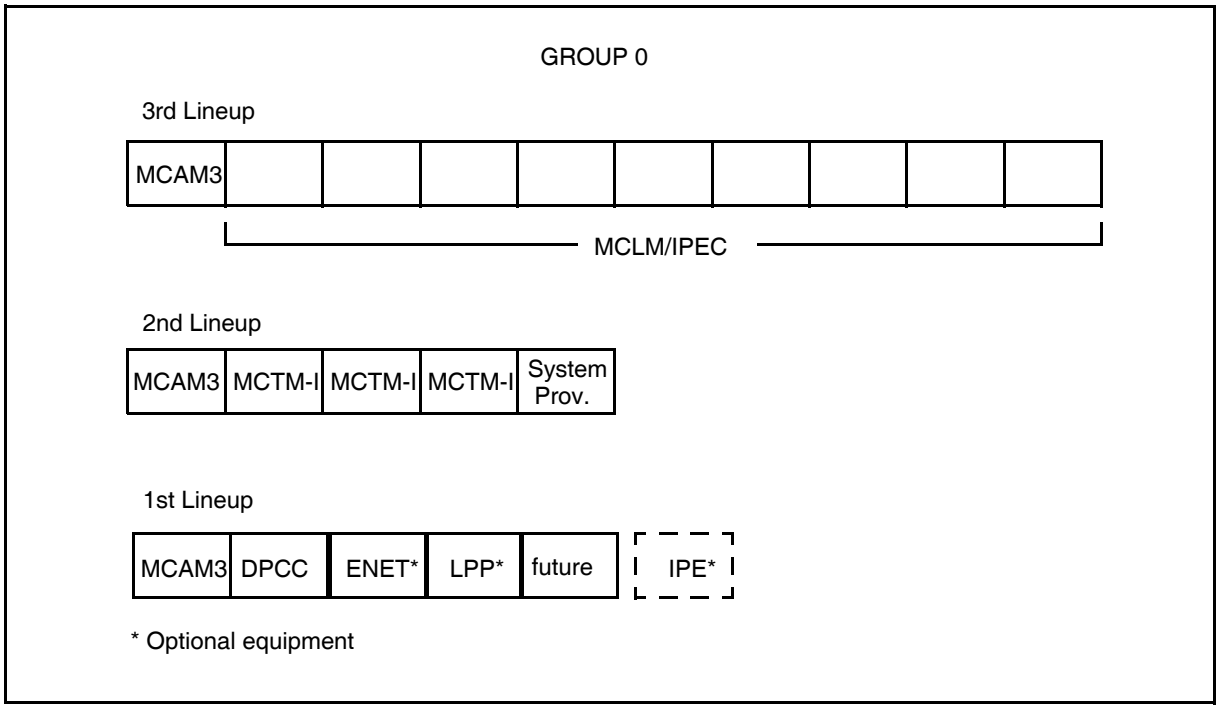
Primary group lineups

SuperNode system

For a one-group SuperNode system serving up to 9000 lines (8 ccs per line) or for the primary group (group 0) of a larger system, the first lineup consists of the Cabinetized Power Distribution Center (CPDC); DPCC; optional cabinets such as Enhanced Network (ENET), Link Peripheral Processor (LPP), and Intelligent Peripheral Equipment (IPE); plus room for future cabinets.

Every initial SuperNode system requires the first lineup as shown in Figure 64 on page 146.

Figure 64
Primary group – SuperNode system lineup



The second lineup of the primary group for a full-size SuperNode system consists of the Meridian Cabinet Auxiliary Module phase 3 (MCAM3), followed by three Meridian Cabinet Trunk Module-ISDN (MCTM-I) cabinets and a system provisionable cabinet.

The third lineup of the primary group consists of the MCAM3, plus up to eight Meridian Cabinet Line Modules (MCLMs) or up to ten Intelligent Peripheral Equipment Cabinets (IPEC), or a combination of MCLMs and IPECs, as needed.

All MCLM and IPEC cabinets of the third lineup are directly connected to their respective MCTM-I in the second lineup by a single standard cable for each Enhanced Line Module (ELM) that connects between the rear bulkheads. All other cabling is self-contained within the lineups.

SuperNode SE system
The power source (CPDC, or MCAM3) determines the primary group lineup configuration for a one-group SuperNode SE system serving up to 9000 lines (8 ccs per line) or a primary group (group 0) of a larger system.

SuperNode SE systems powered by a CPDC require three lineups in the primary group (Figure 65 on page 148), and systems powered by an MCAM3 require two lineups (Figure 66 on page 148).

SuperNode SE system powered by a CPDC

For SuperNode SE systems powered by a CPDC, the first lineup of cabinets consists of a CPDC, SCC, optional cabinets such as the LPP and IPE, plus room for future cabinets (Figure 65 on page 148).

The SuperNode SE system's second lineup of cabinets consists of the MCAM3, followed by three MCTM-Is and a system provisionable cabinet (Figure 65 on page 148). The SuperNode SE cabinet (SCC) contains an ENET shelf, therefore, MCNMs are not provisioned with the system.

The SuperNode SE system's third lineup consists of the MCAM3, plus up to eight MCLMs (Figure 65 on page 148).

All MCLM cabinets of the third lineup are directly connected to their respective MCTM-I in the second lineup by a single standard cable for each ELM that connects between the rear bulkheads. All other cabling is self-contained within the lineups.

Figure 65
Primary group – SuperNode SE powered by CPDC

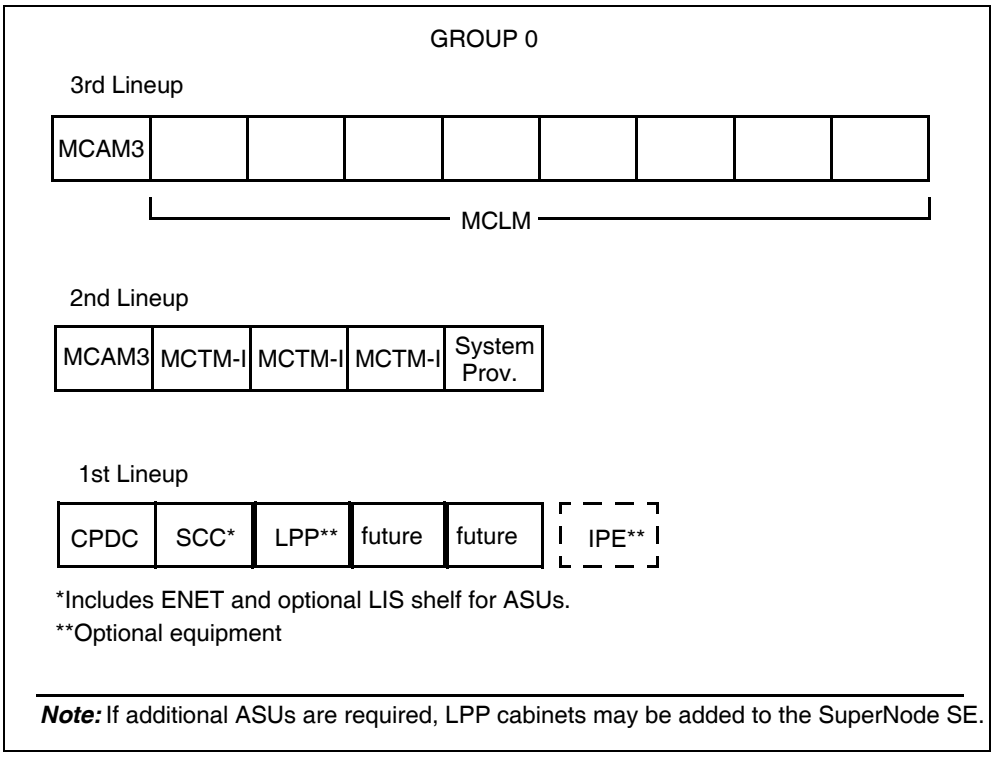
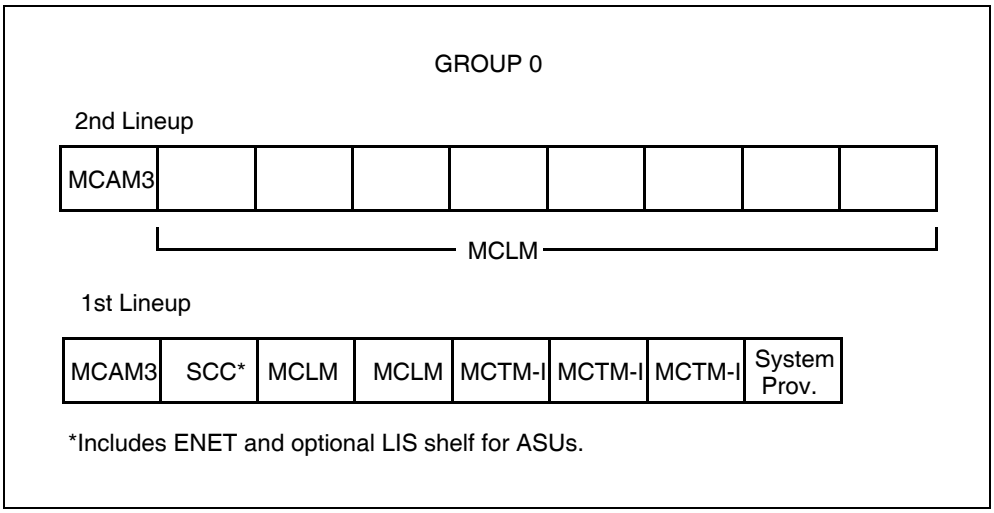


Figure 66
Primary group – SuperNode SE powered by MCAM



SuperNode SE system powered by an MCAM3

For SuperNode SE systems powered by an MCAM3, the first lineup consists of the MCAM3 followed by the SCC, three MCTM-Is, and a system provisionable cabinet (see Figure 66 on page 148). The SuperNode SE cabinet (SCC) contains an ENET shelf, therefore, MCNMs are not provisioned with the system.

The second lineup consists of the MCAM3, plus up to eight MCLMs or up to ten IPECs, or a combination of MCLMs and IPECs, as needed (Figure 66 on page 148).

If an IPE, LPP, or both are added to the system, a third lineup must be provisioned containing these cabinets, plus a CPDC to supply power to the lineup.

Secondary group lineups

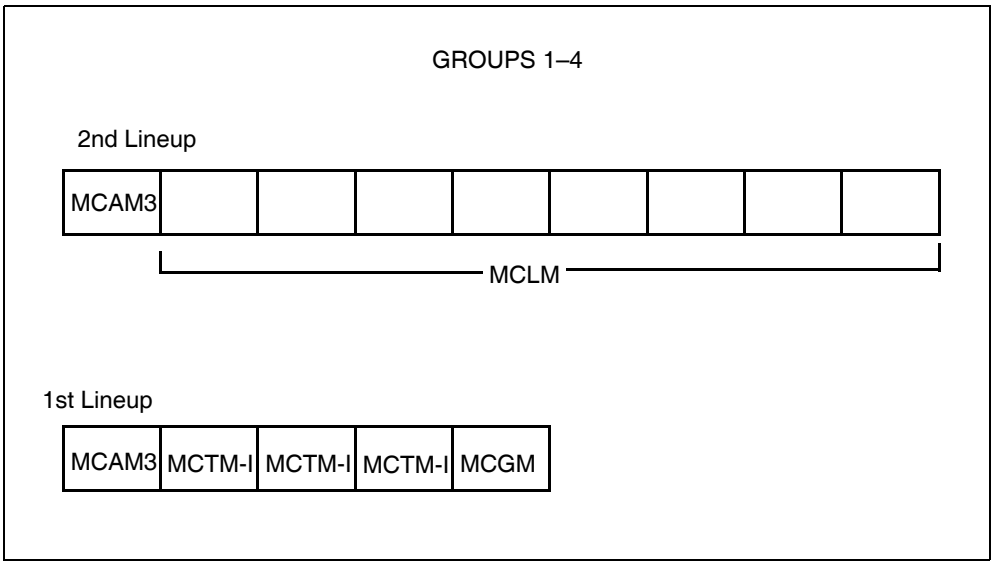
The other four secondary groups (Groups 1 to 4) are alike and use a similar two-lineup configuration for the SuperNode and SuperNode SE systems.

Note: This document presents examples of typical configurations. Your configuration may vary slightly. For SuperNode and SuperNode SE systems with ENET, the MCNM cabinet shown in Figure 67 on page 150 would not be provisioned.

The first lineup of a secondary group in a typical configuration contains the MCAM3 followed by MCTM-Is (Figure 67 on page 150).

The second lineup of a secondary group consists of the MCAM3 plus MCLMs. It supports up to ten cabinets for each lineup (Figure 67 on page 150).

Figure 67
Cabinet lineups for secondary groups



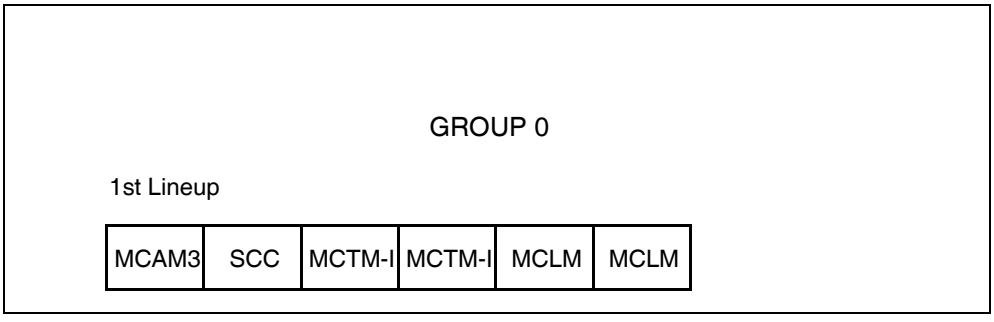
Merged lineups or non-standard configurations

A standard floor plan is not appropriate under the following conditions:

- when configuring a small switch of 2000 lines or less
- when lineups can be merged to make efficient use of floor space and cabling

For example, initial SuperNode SE systems of 2000 lines or less can have the lineups within a primary group merged into a single lineup as shown in Figure 68.

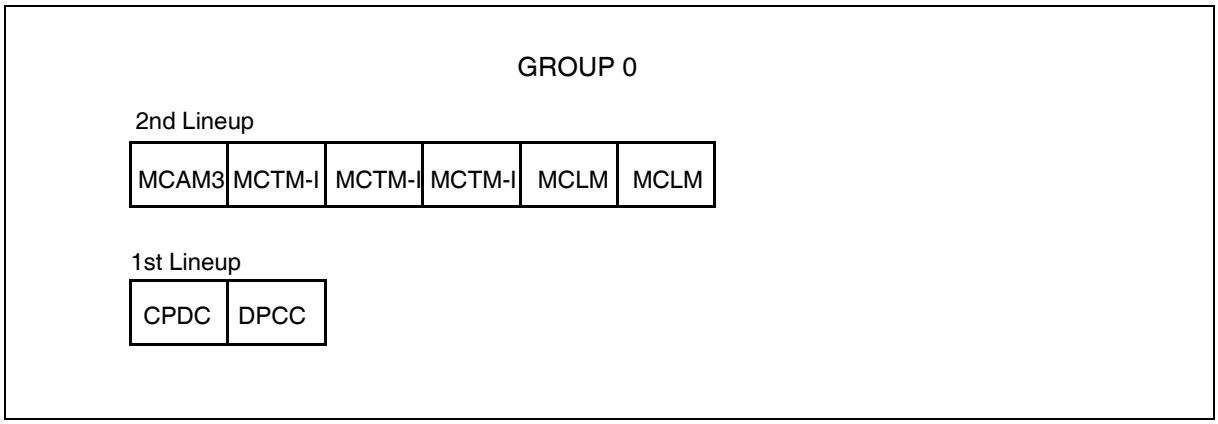
Figure 68
SuperNode SE Group 0 merged into a single lineup



A single lineup can be engineered only if the MCAM3 is used as the power source. If a CPDC is used to power the SCC, a second lineup is required. Additionally, if an IPE, LPP, or both are added, a second lineup must be provisioned consisting of these cabinets, plus a CPDC to supply power.

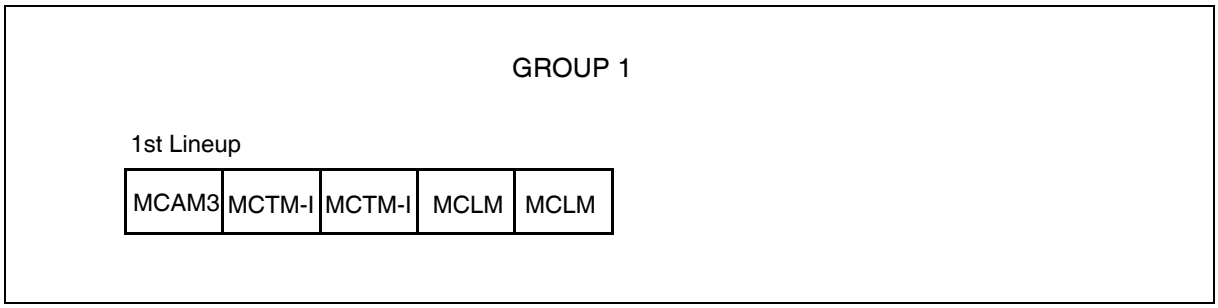
For initial SuperNode systems, the primary group can be merged into two lineups to minimize the amount of floor space used (Figure 69).

Figure 69
SuperNode Group 0 merged into two lineups



Secondary group lineups can also be merged for floor space efficiencies. Lineups 1 and 2 of a secondary group consisting of an MCAM3, MCTM-I, and MCLM can be merged into a single lineup as shown in Figure 70.

Figure 70
Secondary group merged into a single lineup



System performance

This chapter describes the requirements for the following system performance factors:

- power consumption
- floor loading
- temperature and humidity environment

This chapter also describes the features that require special provisioning and the features that require minimal customizing.

Power consumption

The Meridian SuperNode cabinets operate in the voltage range, 42 to 56 V dc. Table 13 shows the typical power requirements for the cabinet modules.

Table 13
Typical power requirements for cabinets (Sheet 1 of 2)

Module	Current at -48 V dc
SuperNode cabinet: Dual Plane Combined Core (DPCC)	 46 A
SuperNode SE cabinet: SuperNode Combined Core (SCC)	 48 A
Trunk cabinets: Meridian Cabinet Trunk Module-ISDN (MCTM-I) Cabinetized Integrated Services Module (CISM) (see note)	 30 A 0 A
Note: The MCDM is manufacture discontinued (MD) and is replaced by the IPEC. The MCPM is MD and is replaced by the MCAM3. The MCGM is MD and is replaced by the MCAM3 and the CISM. The MCSS is MD and is replaced by the CMSS.	

Table 13
Typical power requirements for cabinets (Sheet 2 of 2)

Module	Current at -48 V dc
Line cabinets:	
Meridian Cabinet Line Module (MCLM)	30 A
Meridian Cabinet Line Module-ISDN (MCLM-E)	30 A
Meridian Cabinet Digital Module (MCDM) (see note)	30 A
Intelligent Peripheral Equipment Column (IPEC) (see note)	27 A
Link Peripheral Processor cabinet:	
Link Peripheral Processor (LPP)	64 A
Cabinetized Multi-Vendor Interface:	
Cabinetized Multi-Vendor Interface (CMVI)	30A
Network cabinets:	
Meridian Cabinet Network Module (MCNM)	20 A
Enhanced Network (ENET)	95 A
Meridian Cabinet Network Interface (MCNI)	100 A
Spectrum Peripheral Module cabinet:	
Spectrum Peripheral Module (SPM)	64 A
International Peripheral Equipment cabinet:	
Cabinetized International Peripheral Equipment (CIPE)	64 A
Maintenance and administration cabinets:	
Meridian Cabinet Power Module (MCPM) (see note)	16 A
Meridian Cabinet Service Module (MCSM)	16 A
Meridian Cabinet Auxiliary Module phase 3 (MCAM3)	11 A
Meridian Cabinet General Module (MCGM) (see note)	15 A
Meridian Cabinet Spares Storage (MCSS) (see note)	0 A
Cabinetized Miscellaneous Spares Storage (CMSS) (see note)	0 A
Note: The MCDM is manufacture discontinued (MD) and is replaced by the IPEC. The MCPM is MD and is replaced by the MCAM3. The MCGM is MD and is replaced by the MCAM3 and the CISM. The MCSS is MD and is replaced by the CMSS.	

Typical lineup current drains can be calculated.

Floor loading

The increased area of the cabinet base reduces spot floor loading by 25 percent in comparison to equivalent standard equipment frames. For a cabinet weighing 1200 lb, floor loading is 240 lb/sq ft, if resting on the base instead of the leveling feet.

Environmental requirements

The temperatures and relative humidity conditions listed in Table 14 and Table 15 are based on a maximum duration of 72 continuous hours and a total duration of 15 days per year.

The maximum rate of temperature excursion should not exceed 1 degree Celsius per minute.

Table 14
Temperature and humidity specifications (Meridian SuperNode cabinets)

Temperature range	Relative humidity
Minimum: 41° F (5° C)	*Minimum:* 20% (noncondensing)
Maximum: 120° F (48° C)	*Maximum:* 80% (noncondensing)
Recommended: 50° to 86° F (10° to 30° C)	*Recommended:* 20% to 50% (noncondensing)

Table 15
Temperature and humidity specifications (IPEC)

Temperature range	Relative humidity
Minimum: 40° F (4° C)	*Minimum:* 20% (noncondensing)
Maximum: 113° F (45° C)	*Maximum:* 80% (noncondensing)
Recommended: 59° to 86° F (15° to 30° C)	*Recommended:* 20% to 50% (noncondensing)

Standard features

All Meridian SL-100 system features and capabilities are available for the cabinet model. Most can be ordered through a supercode. However, special customer requirements are arranged on an as-needed basis.

The following features do not require special provisioning:

- all features other than hardware-dependent features
- any terminal-dependent features
- single Digital Recorded Announcement Machines (DRAM)
- Music on Hold
- Paging, Radio Paging
- Multiline Test Unit (MTU)
- Transmission Test Unit (TTU)
- Transmission Test Trunk (TTT)
- 101, 103 test lines

The following features require minimal customizing:

- additional Magnetic Tape Drive (MTD)
- analog trunk interface

The following are some of the features that can be provided with the Meridian SL-100 system:

- Remote Office Test Line (ROTL)
- Automatic Number Announcer (ANA)

For more information about features available for the Meridian SL-100 system, refer to the *Feature Description Manual*.

OAM&P for Meridian SL-100 networks

This chapter contains the following section:

- **Maintenance and Administration Position**

Maintenance and Administration Position

Overview

The Maintenance and Administration Position (MAP) provides an interface between telecommunications personnel and the Meridian SL-100 system. This section provides an overview of the following MAP workstation tasks:

- general maintenance
- line maintenance
- trunk maintenance
- administration

General maintenance

The Meridian SL-100 maintenance system provides complete maintenance of the hardware and software by monitoring key functional areas and by detecting, analyzing, correcting and reporting errors occurring in these areas.

User interface

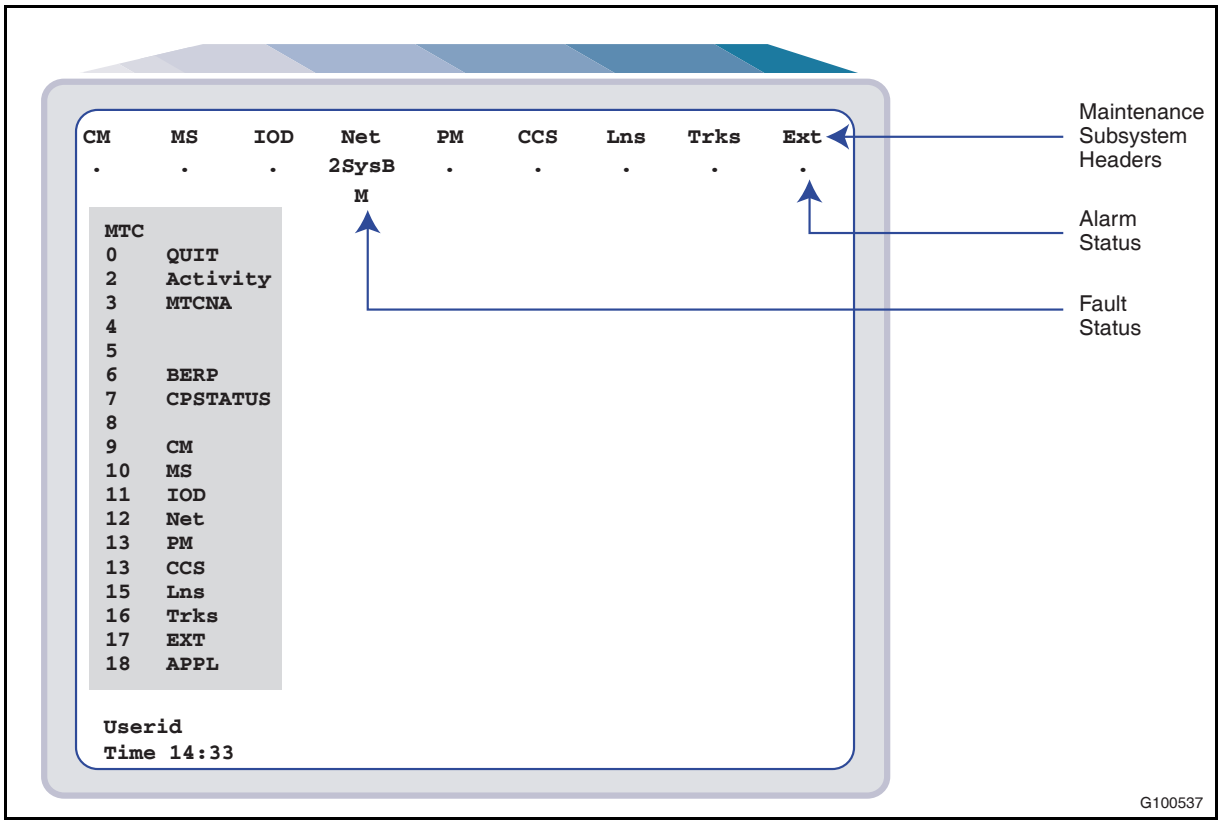
To perform the various maintenance tasks, a sequence of commands is entered on the MAP workstation keyboard. The technician is prompted by responses displayed on the video display unit.

The maintenance system uses menu hierarchies to examine the operation of the Meridian SL-100 system. A hierarchy of menus presented on the MAP workstation permits details to be obtained about system status or trouble. Displays start at the maintenance subsystem (top) level and descend to lower levels, until the fault is eventually traced to a replaceable component or system malfunction.

Figure 71 shows a sample MAP workstation display screen at the first maintenance level on the Meridian SL-100 with SL-100 core.

Note: Maintenance headings shown in the figure are for documentation example purposes only. The headings on another MAP workstation display screen may be different.

Figure 71
MAP maintenance (MTC) system status display



A dot beneath a header indicates that the status of the subsystem is satisfactory. Any other code indicates that an out-of-service or alarm condition exists.

In the example above, the code shown under the “Net” heading indicates that two network modules are out-of-service (busy), because of faults that originated in the Meridian SL-100 system (2SysB) and that a major alarm (M) condition exists.

To examine the problem in the Net subsystem, enter the Net maintenance level by selecting Option 12 on the input position at the bottom of the screen. Using the appropriate user interface and command menus, proceed from menu level to menu level until the reference, location and status of the defective network element are displayed. Problems occurring in any of the other maintenance subsystems are handled similarly.

Maintenance subsystems

Table 16 describes the areas of responsibility covered by the various maintenance subsystems.

Table 16
Descriptions of maintenance subsystems

Subsystem header	Description of maintenance subsystem
CM	The Computing Module (CM) is the part of the core that performs the call processing function.
MS	The Message Switch (MS) subsystem monitors the Message Controller (MC) and the message links to the Network Module and Input/Output Controller (IOC).
IOD	The Input/Output Device (IOD) subsystem monitors the IOC, including the device controller, the input/output devices and the recording devices.
Net	The Network (Net) subsystem monitors the Network Module and the speech links to the Peripheral Modules.
PM	The Peripheral Module (PM) subsystem monitors all types of Peripheral Modules up to, but not including, the line or trunk voice circuits.
CCS	The Common Channel Signaling (CCS) subsystem monitors the independent signaling network for transmitting telephony messages related to groups of speech circuits.
Lns	The Lines (Lns) subsystem monitors the Line Concentrating Module (LCM) line circuits and the transmission facilities (lines) to the station sets.
Trks	The Trunks (Trks) subsystem monitors the Digital Trunk Controller (DTC) DS-1 circuits and the transmission facilities over the DS-1 carrier equipment and monitors service circuits for receivers, senders and modems.
Ext	The External (Ext) subsystem monitors the alarm circuits of all outside equipment connected to the Meridian SL-100 system. This subsystem sends alarm indications to the visual display unit and to the alarm hardware.

Alarm system

The alarm system consists of hardware and software elements that monitor key points in the system and audible or visual indicating devices. The indicating devices respond to alarm inputs detected by the monitoring elements.

Detected trouble conditions are classified in decreasing order of severity, such as critical, major and minor. Indications of current alarm classes existing in the various maintenance subsystems are displayed on the MAP workstation. Usually only critical and major alarm classes activate visual or audible alarm devices.

The alarm class is also printed on any log message concerning maintenance occurrences. If no alarm is associated with the log, the “information only” classification is printed.

The alarm system can also be affected by commands given as input at the MAP workstation. For example, the SIL command can be input to silence an audible alarm while troubleshooting is in progress.

Log system

The log system records and prints messages concerning maintenance-related events. As output reports are generated, they are stored in the Meridian SL-100 log system in log buffers. Each subsystem has a log buffer dedicated to it. Logs stored in these buffers can be displayed on the MAP workstation or printed.

For more information about logs, refer to the *Meridian SL-100 Log Report Reference Manual*.

Line maintenance

The MAP can also be used to perform line testing. These tests are performed by entering the Line Test Position (LTP) menu. There is a short and a long diagnostic for Line Concentrating Module (LCM) line circuits. The short diagnostic performs a transmission test that is designed to detect 85 percent of the failures, whereas the long diagnostic detects virtually 100 percent of the failures.

The tests that can be performed fall under the following categories:

Line Test Position

The LTP provides the tools and functions required to locate and verify faults and checks that corrective action is successful.

The LTP consists of the following four MAP workstation levels:

- LTP – line circuit oriented
- LTPLTA – facility tests
- LTPDATA – line transmission test tools for ISDN BRI lines
- LTPMAN – line transmission test tools

Automatic Line Test

The Automatic Line Test (ALT) provides a simple method for testing a large numbers of lines. There are four tests available as follows:

- transmission hybrid loss test
- line card diagnostic
- line insulation test
- on-hook balance network

These tests can be run immediately or scheduled for daily operation over a specified range of lines identified by a Line Equipment Number (LEN). No technician-active MAP workstation is required during scheduled operation.

For more information about line maintenance, see the *Meridian SL-100 Routine Maintenance Procedures*.

Trunk maintenance

Trunk maintenance has two main areas: diagnostics and test lines. Diagnostics are procedures that do the following:

- check whether diagnostics exist for the circuit in question
- check to see if test equipment is required
- format the information into a message that is sent to one of the diagnostic processes
- wait for the resulting message

When the test line process is invoked by the Trunk Test Position (TTP) or Automatic Trunk Test (ATT) module, a call is made to run a test line. The modules called to perform specific functions are described in the following paragraphs.

Trunk Test Position

The TTP handles the following four levels of testing:

- diagnostic test, performed by the diagnostic test process
- monitor level test, which allows all trunks to be monitored in both talk path directions
- test line tests, performed by the test line process
- manual test connections, performed by the TTP process

Automatic Trunk Test

The ATT is the prime method for detecting operational failures during light or no-traffic periods when per-call failure detection is inactive.

The objective of automatic trunk testing is to generate sufficient test calls during low traffic periods so that failures can be detected in the voice or data path modules, such as Peripheral Modules, Network Modules, facility routes (cable and carrier) and the distant switching system.

For more information about trunk maintenance, see the *Meridian SL-100 Routine Maintenance Procedures*.

Administration subsystems

The MAP can also be used in administration modes to perform Meridian SL-100 system management through the following subsystems:

- Automatic Message Accounting (AMA)
- Station Message Detail Recording (SMDR)
- Network Management (NWM)
- Operational Measurements (OMs)

The data from these sources are filed on magnetic recording devices. Data from Automatic Message Accounting, Station Message Detail Recording and Operational Measurements subsystems is routed to an appropriate device (disk or tape) by a software module called the Device Independent Recording Package (DIRP).

Automatic Message Accounting

The AMA subsystem collects the necessary call data and automatically records it on a data storage device. Periodically this stored data is extracted from the data files for retrieval of the information necessary for accounting purposes, call analysis, or both.

Station Message Detail Recording

SMDR records details of billable and non-billable calls for each business group.

SMDR is similar to AMA, but operates independently using its own recording format. If a Meridian SL-100 is equipped with AMA and SMDR, two records are generated: one in AMA format and one in SMDR format.

Network management

NWM provides controls that can be applied through the MAP to maintain optimum transmission capacity and to offset the effects of traffic variations or component failures. Network management controls are either expansive or protective as follows:

- Expansive controls manipulate routing patterns to use alternate capacities not normally selected as the shortest route pattern in a switch hierarchy.
- Protective controls restrict certain kinds of traffic to prevent system degradation (NET delays) resulting from overload.

Note: Matching loss is defined as the average probability of a call not being completed due to congestion in the NET or in the line concentration.

Operational Measurements

System performance is constantly and automatically recorded by the Operational Measurement (OM) system. The measurements are stored in OM registers, either individually every time an event occurs (a peg count) or on the basis of a scan that is conducted at regular intervals, regardless of the time of occurrence of the event (a usage measurement).

Using a computer system, the recorded OM data can be manipulated in various ways to generate statistics on aspects of Meridian SL-100 system performance, such as the following:

- office maintenance
- provisioning new equipment
- analysis of traffic through trends on marginal conditions
- balancing of traffic load through operable equipment
- determining fluctuating service capacities
- testing line and trunk performance and transmission

For more information about Operational Measurements, see the *Meridian SL-100 Operational Measurements Reference Manual*.

Access control system

Access to the Meridian SL-100 system data through the MAP is controlled, for security purposes, through logon procedures and access rights according to user class.

Logon

Each authorized user is assigned a user name and password. No user interface activity can be performed until the proper identification has been entered and acknowledged by the MAP workstation. User names and passwords can only be changed by the proper level of authorized user.

Command and terminal access

Authorized users are divided into user classes, depending on the functions that these users are required to perform. For example, one user may do trunk maintenance and another may do network management. Each user can only access the menus of commands associated with that user's particular function and can only use those terminals associated with that user's user class.

System configuration

Although Meridian SL-100s in an enterprise's network can be managed from MAPs co-located with each switch, organizations with multiple Meridian SL-100s at distributed campuses can co-ordinate OAM&P activities from a central location. MAP pass through allows an administrator at a remote MAP terminal to log on to one, or more, Meridian SL-100 switch simultaneously, and be presented with the standard MAP CI interface for access to switch capabilities in the same way as a directly-connected MAP terminal.

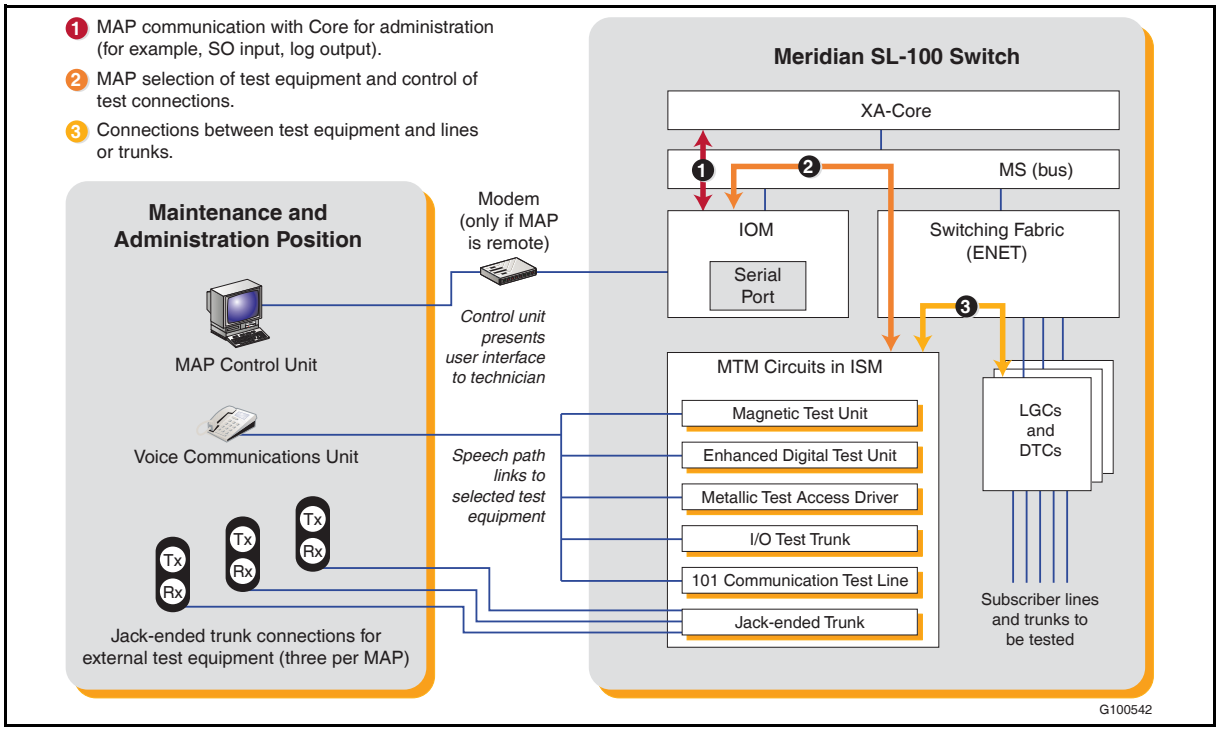
For the Meridian SL-100, terminal access is usually further enhanced by using GUI applications as a front end to the MPA CI interface, making it easier to use the capabilities of underlying menus. Once logged on, a technician or administrator can use the MAP CI to communicate with the Core.

Testing can also be initiated by a remote user. The special circuit cards used in Meridian SL-100 line and trunk testing are installed in the ISM to provide a common pool of test equipment. A given circuit is selected through the MAP CI when required, and is connected to the line or trunk to be tested. When the test is complete, the circuit is released and returned to the common pool.

For the Communication Server 2100, the equivalent of the MAP CI capabilities are provided by GUIs. Access to equipment for testing trunks and lines is not relevant to the Communication Server 2100 configuration, because the Communication Server 2100 does not directly handle any bearer channels. In a hybrid Communication Server 2100 configuration, however, Meridian SL-100 test circuits can be connected to the packet network bearer paths by means of loop around trunks.

Figure 72 illustrates the MAP interfaces and their use.

Figure 72
MAP interfaces and their use



Telephones

Overview

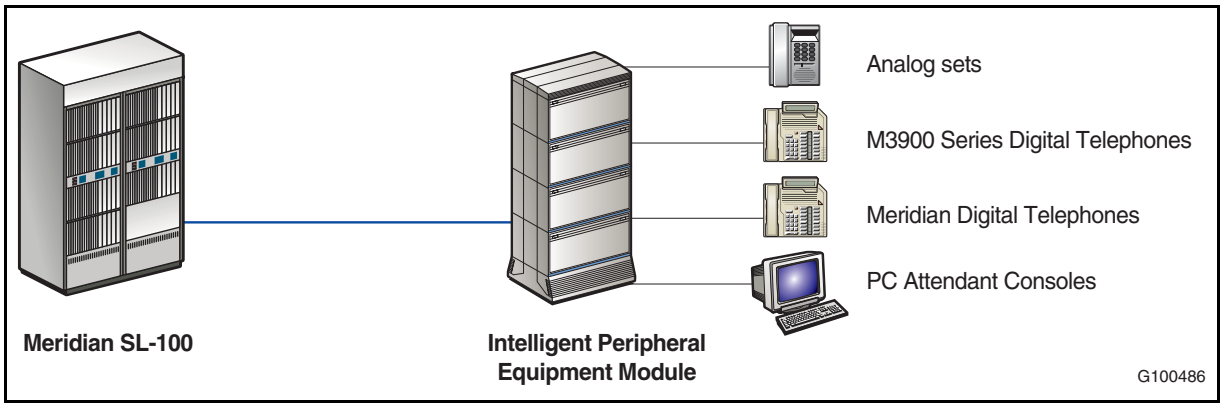
This section describes the traditional TDM telephones supported on Meridian SL-100 switches. It also describes some of the unique time and cost-saving applications that operate on TDM sets, as well as various accessories designed to provide additional functionality or key capacity.

The Meridian SL-100 supports two types of TDM terminals: terminals that work off of an Intelligent Peripheral Equipment (IPE) Module; and terminals that work of DMS-based Line Peripheral Modules.

IPE telephones

Figure 73 shows the telephones that work off an Intelligent Peripheral Equipment Module.

Figure 73
IPE telephones network configuration



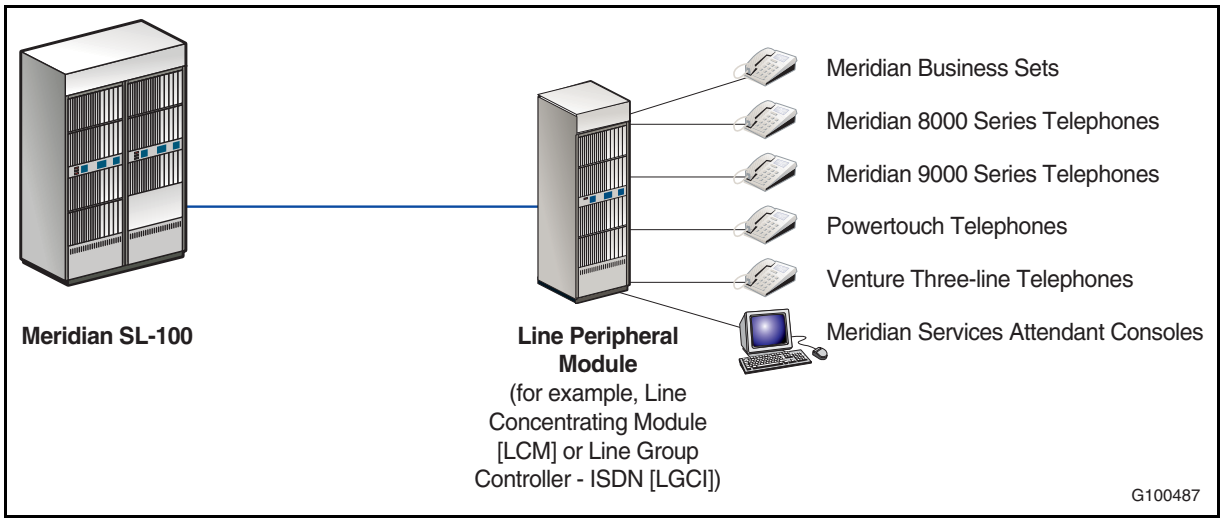
Supported IPE telephones can be broken down into the following families:

- “M3900 Series Digital Telephones” on page 168
- “Meridian Digital Telephones” on page 176

Line Peripheral Module telephones

Figure 74 shows the sets that work off an a DMS-based Line Peripheral Module.

Figure 74
Line Peripheral Module telephones network configuration



Supported Line Peripheral Module telephones can be broken down into the following families:

- “Meridian Business Sets” on page 181
- “Additional analog sets” on page 184

M3900 Series Digital Telephones

The Nortel M3900 Series Digital Telephones include five digital telephones for use on Meridian SL-100s. This portfolio establishes a standard for a display-based user interface, enhancing the users’ experience with a wide choice of features and capabilities.

The M3900 series offers a full range of features that can significantly enhance day-to-day productivity. The portfolio also includes a full range of accessories, providing the flexibility to add new features and capabilities easily and cost-effectively. Both the telephones and accessories are available in two colors: dark charcoal and platinum.

Directory services makes calling easier and finding numbers faster. Ultra-large displays on the M3904 and M3905 deliver the best in class display-based interface. The Smart Mute feature ensures that calls are muted regardless if the user is on their handset, headset or handsfree, which ensures privacy when needed. User-friendly options such as customized key labels, the flexibility to change local set options, and a user-selectable ring tone, are easily initiated at the desktop. Ten languages are available for the display-based sets.

With simplified administration and management, the M3900 series contributes to an overall lower cost of system ownership. Self-labeling keys and snap-in cartridge style accessories reduce set installation time and administrative charges. In addition, the telephones are shipped from the factory with pre-installed and threaded handset and line cords. The M3900 portfolio also provides investment protection with software downloadable firmware that offers new features and services as they continue to be introduced.

The M3900 series is supported on software release MSL11 and above with XPM13 and existing Intelligent Peripheral Equipment (IPE) Digital Line Cards (NT8D02) for the Meridian SL-100. The IPE should be upgraded with the Enhanced XPEC (EXPEC) (NT7D07BA) card. Optivity Telephony Manager for Meridian SL-100 (2.0) software is needed for software downloadable firmware.

Table 17 describes the available M3900 models.

Table 17
M3900 Series Digital Telephone summary (Sheet 1 of 3)

Terminal	Description
M3901(Entry) 	• Single-line set with four fixed keys and five programmable features. • An economical, entry-level digital telephone that is suited for lobbies, cafeterias and public hallways. • Supports Feature Access Codes (FACs) and message waiting indication with visual ringing. • Minimum required firmware: N/A.

Table 17
M3900 Series Digital Telephone summary (Sheet 2 of 3)

Terminal	Description
M3902 (Basic) 	• Single-line set with six fixed feature keys and three self-labelled, programmable feature keys. • Provides a two-line by 24-character display, self-labelled keys, handsfree, Smart Mute and snap-in accessories beyond M2006 capabilities. • Provides a graphical status icon, one accessory port and message waiting indication with visual ringing. • Is well suited to lobbies, manufacturing floors, warehouses and conference rooms. • Minimum required firmware: Version 4.0.
M3903 (Enhanced) 	• Multi-line set with 10 fixed feature keys and two self-labelled, programmable line/feature keys (four with the second page functionality). • Provides four context-sensitive softkeys to access the context sensitive softkey features. • Provides a three-line by 24-character display. • Provides handsfree, self-labelled keys, Smart Mute, snap-in accessories, call log and redial list, access to Corporate Directory and a direct connect headset beyond M2008 capabilities. • Provides a graphical status icon, two accessory ports, message waiting indication with visual ringing, a user-selectable ring tone and Quit and Copy keys for applications. • Is suited for customers that require moderate to heavy voice communications, such as office professionals and technical specialists. • Minimum required firmware: Version 5.2.
M3904 (Professional) 	• Multi-line set with 10 fixed feature keys and six self-labelled, programmable line/feature keys (12 with the second page functionality). • Provides four context-sensitive softkeys to access the context sensitive softkey features. • Provides a five-line by 24-character display, which is the largest display in its class. • Provides handsfree, self-labelled keys, Smart Mute, snap-in accessories, call log and redial list, expansion modules, personal directory, access to Corporate Directory and a direct connect headset beyond M2008 and M2616 capabilities. • Provides a graphical status icon, two accessory ports, message waiting indication with visual ringing, a user-selectable ring tone and Quit and Copy keys for applications. • Is suited for customers that require heavy voice communications, such as managers, executives and administrative assistants. • Minimum required firmware: Version 4.6.

Table 17
M3900 Series Digital Telephone summary (Sheet 3 of 3)

Terminal	Description
M3905 (Call Center) 	• Call center set with six Automatic Call Distribution (ACD) fixed feature keys and eight self-labelled, programmable line/feature keys (one key pre-assigned as Options key). • Provides four context-sensitive softkeys to access the context sensitive softkey features. • Provides a four-line by 24-character display, pre-programmed call center keys, self-labelled keys, snap-in accessories and a supervisor plug-in key beyond M2216 capabilities. • Provides a graphical status icon, two accessory ports, message waiting indication with visual ringing, a user-selectable ring tone, Quit and Copy keys for applications, access to Corporate Directory and dual headset jacks. • Is suited to call center applications (both agents and supervisors). • Minimum required firmware: Version 4.8.

Table 18 lists the features that work with the M3900 Series Digital Telephones.

Table 18
M3900 Series DIgital Telephone features (Sheet 1 of 2)

Function	M3901	M3902	M3903	M3904	M3905
Power (see Note 1)	L	L	L	L	L
Handsfree	N	Y	Y	Y	Y
Display	N	Y	Y	Y	Y
Message Waiting Lamp	Y	Y	Y	Y	Y
Americans with Disabilities Act (ADA) Compliant	Y	Y	Y	Y	Y
Hearing Aid Compatible	Y	Y	Y	Y	Y
Programmable Feature/DN keys	5	3	4	12	8
CLASS Compatible	Y (see Note 2)	Y (see Note 3)	Y (see Note 3)	Y (see Note 3)	Y (see Note 3)
Call Waiting Display	N	N	N	N	N
Volume Control	Y	Y	Y	Y	Y

Table 18
M3900 Series DIgital Telephone features (Continued) (Sheet 2 of 2)

Function	M3901	M3902	M3903	M3904	M3905
Analog Display Services Interface (ADSI) Compatible	N	N	N	N	N
Cordless	N	N	N	N	N
Call Logging (Entries)	N/A	N/A	10	100	100 (see Note 4)
Single-line telephone	Y	Y	N	N	N
Multi-line telephone	N	N	Y	Y	Y
Personal Directory (Entries)	N/A	N/A		100	100 (see Note 4)
Corporate Directory	N	N	Y	Y	Y

Note 1: L = Loop Powered, A = AC powered, AL = AC powered and Loop powered set.
Note 2: Supports CLASS features except Calling name and Number Display and CLASS Message Waiting.
Note 3: Supports a limited set of CLASS features
Note 4: Available with M3900 Release 3 firmware

Table 19 shows where you can find additional information about M3900 Series Digital Telephones.

Table 19
References

Document title	Document number
M3900 Series Meridian Digital Telephones Reference Manual	555-4001-136
Aastra Telecom now manufactures these telephones. Aastra Telecom can be reached at 905-760-4200, or their web site at www.aastra.com. For a listing of user guides and quick reference cards, see the *Enterprise Documentation Catalog* that is available at Nortel Networks.com.	Varies by set.
Getting Started with Optivity Telephony Manager User Guide (technicians use Optivity for firmware downloads and maintenance operations).	555-4001-316

M3900 Series Digital Telephones accessories

Table 20 describes the accessories that are available with M3900 Series Digital Telephones.

Table 20
M3900 Series Digital Telephones accessories (Sheet 1 of 2)

Accessory	Description
Accessory Connection Module (ACM) 	The ACM is an optional hardware module that installs into the telephone footstand. The ACM provides a port(s) to connect to the accessory cartridge interface. The M3902 set has one accessory port. The M3903, M3904, and M3905 have two accessory ports. The plug-in cartridge allows the M3900 series sets to use the following accessories: • Analog Terminal Adapter • external alerter and recording interface • personal directory PC utility (M3904 and M3905) • full duplex handsfree cartridge (M3904 Release 3)
Alternate Key Caps	The M3905 set provides an alternate key cap kit to customize the telephone. Use the Key Cap Tool with the M3905 set to remove the four middle programmable keys and replace them with alternate keys.
Analog Terminal Adapter (ATA)	The ATA connects an analog device such as a fax machine or modem to the telephone. This allows simultaneous use of the telephone and the analog device.
Display-based Expansion Module (DBA)	The DBA is an optional add-on module for the M3904 and M3905 sets exclusively. The module attaches to a set to increase the number of programmable feature keys on the set by 24 for a total of 56 keys.
Meridian External Alerter/Recorder Interface (MEARI)	The MEARI provides a remote ringer device installed in a location separate from the telephone. The MEARI provides access to a standard, off-the-shelf remote ringer, call status relay, audio recorder or visual indicator. Program the MEARI interface to activate a ringer (or light) when the telephone rings or activate a recorder when the telephone is in use. The MEARI requires an Accessory Connection Module (ACM).
Key-based Expansion Module 	The KBA has 22 keys which function as additional keys to the physical and self-labeled programmable feature keys on the M3900 series sets. You can use these additional keys as DN or feature keys. The sets and modules attach in such a way as they look and feel like one integrated unit. Only the M3904 and M3905 sets use the KBA.

Table 20
M3900 Series Digital Telephones accessories (Sheet 2 of 2)

Accessory	Description
Personal Directory PC Utility	The Personal Directory PC Utility provides a faster, easier way to create or modify a personal directory. Enter names and numbers into a personal directory file on a PC. Download the file directly from the PC to the M3904 or M3905 telephone. Upload a directory from the M3904 or M3905 set to a PC to modify the directory.
Full Duplex Handsfree Accessory	The Full Duplex Handsfree Accessory (simultaneous two-way conversation) is a cartilage accessory that provides full duplex handsfree capability for the M3904 Release 3 (NTMN34GA or later) telephone set. You insert the cartridge into the M3904's ACM.

Table 21 lists the optional hardware accessories available for each M3900 Series Digital Telephone.

Table 21
M3900 Series Digital Telephone optional hardware accessories

Accessory	M3901	M3902	M3903	M3904	M3905
Accessory Connection Module	N/A	Supports	Supports	Supports	Supports
Alternate Key Caps	N/A	N/A	N/A	N/A	Supports
Amplified Headset Accessory connected through Handset Jack (except connected through headset jack on M3905)	Supports	Supports	Supports	Supports	Supports
Analog Terminal Adapter	N/A	Supports	Supports	Supports	Supports
Display-based Expansion Module	N/A	N/A	N/A	Supports	Supports
External Alerter/Recorder Interface	N/A	Supports	Supports	Supports	Supports
Handset	Standard	Standard	Standard	Standard	Optional
Key-based Expansion Module	N/A	N/A	N/A	Supports	Supports
Non-amplified Headset Accessory connected through Headset Jack	N/A	N/A	Supports	Supports	Supports
Personal Directory PC Utility	N/A	N/A	N/A	Supports	Supports
Full Duplex Handsfree Accessory	N/A	N/A	N/A	Release 3 Supports	N/A

Table 22 shows where you can find additional information about M3900 Series Digital Telephone accessories.

Table 22
References

Document title	Document number
M3900 Series Meridian Digital Telephones Reference Manual	555-4001-136
User Guides and quick reference cards (ship in box with the accessory). For more information see the *Enterprise Documentation Catalog* that is available at Nortel Networks.com.	Varies by set.

Corporate Directory Application

With the Corporate Directory Application, M3903, M3904, and M3905 users have the ability to access and query corporate directory entries from their own terminal. Once the user finds the desired entry, the entry's name, department number (or other identifier) and DN are displayed. If the user chooses, the entry can be dialed by pressing the "Dial" softkey, which is displayed when an entry is found, and the entry can be copied to the user's personal directory.

The Corporate Directory Application provides the following benefits and values for users with a M3903, M3904 or M3905 telephone set:

- Ability to access and query Corporate Directory entries.
- Convenience to dial directly from the Corporate Directory Application.
- Time savings with the capability to copy corporate directory entries to their personal directory

Figure 75 on page 176 shows a Corporate Directory Application sample network configuration.

Figure 75
Corporate Directory Application configuration

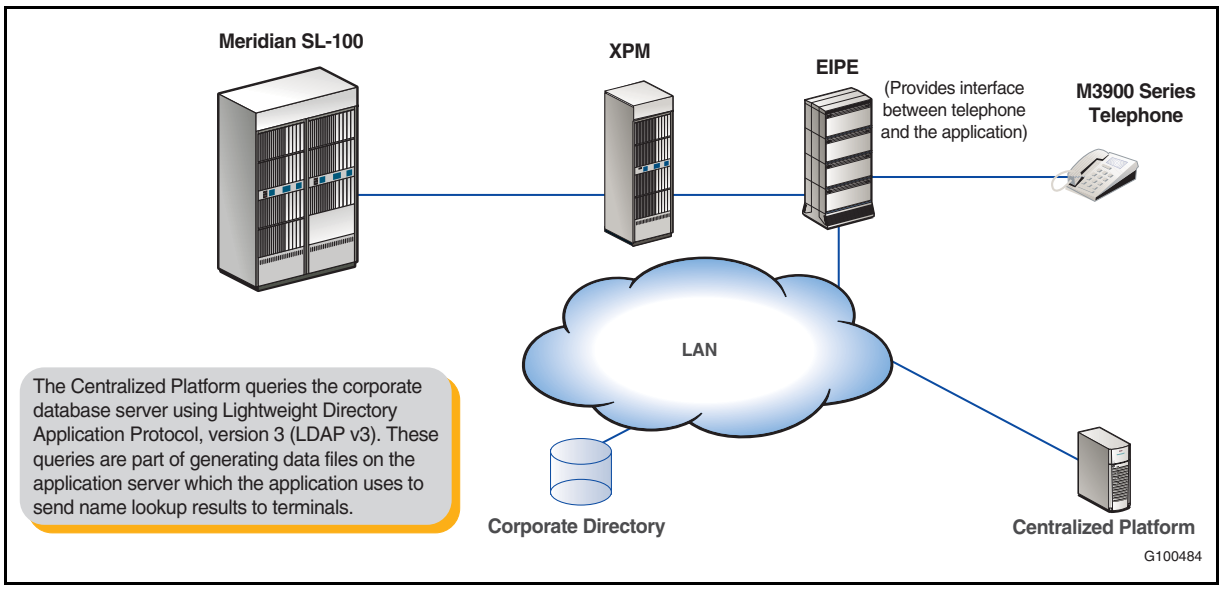


Table 23 shows where you can find additional information about the Corporate Directory Application.

Table 23
References

Document title	Document number
Corporate Directory Application User Guide	555-4001-131

Meridian Digital Telephones

The Meridian Digital Telephones, or M2000 Series Telephones, are designed to provide cost-effective Integrated Voice and Data (IVD) communications capability. These telephone sets communicate with the switch using digital transmission over standard twisted-pair wiring. The telephones interface with the Meridian SL-100 using the Enhanced Digital Port Card (EDPC), which has 16 ports that support 16 digital telephones and data units. No additional hardware is required in the loop circuit to provide data communications. Analog-to-digital and digital-to-analog conversion of voice signals are accomplished at the telephone set by a codec.

Meridian Digital Telephones connect to the system through a two-wire loop carrying two independent 64-kbps Pulse Code Modulation (PCM) channels with two associated 8-kbps signaling channels. One of the two PCM channels is dedicated to voice and the other channel is dedicated to data traffic. Line cords and handset cords on all Meridian Digital Telephones are equipped with snap-in TELADAPT connectors for easy and quick connection.

Asynchronous ASCII terminals and personal computers can be connected through an RS-232-C interface directly to any Meridian Digital Telephone at speeds from 110 bps to 19.2 kbps asynchronous and 56 or 64 kbps synchronous to allow for data calls. Data capability is provided by the optional Meridian Communication Adapter (MCA), which is a single Printed Circuit Pack (PCP) mounted within the telephone and works in conjunction with the digital interface chip also residing in the telephone. The firmware in the MCA serves as an interface between the user and the Meridian SL-100 for establishing data calls.

Table 24 describes the Meridian Digital Telephones that the Meridian SL-100 supports.

Table 24
Meridian Digital Telephones summary (Sheet 1 of 2)

Terminal	Description
M2006 	Single line telephone with five programmable feature keys and a Primary Directory Number (PDN) key.
M2008 and M2008HF 	Multiline telephone with seven programmable feature keys and a PDN key. The M2008HF is a multiline digital telephone with the same features, functionality, and attributes as the M2008 set, plus the addition of a built-in two-way speakerphone. On the M2008HF, key seven functions as the Handsfree/Mute key.

Table 24
Meridian Digital Telephones summary (Sheet 2 of 2)

Terminal	Description
M2216 	Multiline digital set for Automatic Call Distribution (ACD) applications with 15 feature keys and a PDN key, a factory-installed display module and two RJ-32 jacks for modular Electret headsets.
M2317 	The M2317 (NT1F21) is designed for managers and executives who need a performance orientated telephone. The heart of the M2317 is a context sensitive (meaning features appear in the display at the precise time you want to use them) LCD display that guides you through a variety of calling routines.
M2616 	High performance multiline telephone with 15 programmable feature keys, a PDN key and an integrated handsfree unit.

Table 25 lists the features that work with the Meridian Digital Telephones.

Table 25
Meridian Digital Telephone features (Sheet 1 of 2)

Function	M2006	M2008	M2008HF	M2216	M2317	M2616
Power (see Note 1)	L	L	L	L	L	L
Handsfree	N	N	Y	N	Y	Y
Display	N	Y	Y	Y	Y	Y
Message Waiting Lamp	Y	Y	Y	Y	Y	Y
ADA Compliant	Y	Y	Y	Y	Y	Y

Table 25
Meridian Digital Telephone features (Sheet 2 of 2)

Function	M2006	M2008	M2008HF	M2216	M2317	M2616
Hearing Aid Compatible	Y	Y	Y	Y	Y	Y
Programmable Feature/DN keys	6	8	8	16	12	16
CLASS Compatible	Y (see Note 3)	Y (see Note 3)	Y (see Note 3)	Y (see Note 3)	Y (see Note 3)	Y (see Note 3)
Call Waiting Display	N	N	N	N	Y	N
Volume Control	Y	Y	Y	Y	Y	Y
ADSI Compatible	N	N	N	N	N	N
Cordless	N	N	N	N	N	N
Single-line telephone	Y	N	N	N	N	N
Multi-line telephone	N	Y	Y	Y	Y	Y

Note 1: L = Loop Powered, A = AC powered, AL = AC powered and Loop powered set.
Note 2: Supports CLASS features except Calling name and Number Display and CLASS Message Waiting.
Note 3: Supports a limited set of CLASS features.

Table 26 shows where you can find additional information about Meridian Digital Telephones.

Table 26
References

Document title	Document number
Meridian Modular Telephones Reference Manual	555-4001-114
Aastra Telecom now manufactures these telephones. Aastra Telecom can be reached at 905-760-4200, or their web site at www.aastra.com. For a listing of user guides and quick reference cards, see the *Enterprise Documentation Catalog* that is available at Nortel Networks.com.	Varies by set.

Meridian Digital Telephone accessories

Table 27 describes the accessories that are available with Meridian Digital Telephones.

Table 27
Meridian Digital Telephone accessories

Accessory	Description
Meridian Communications Adapter (MCA)	The Meridian Communications Adapter (MCA) is an option available on the Meridian Digital Telephones that is used for data access from the telephone using the built-in RS232 connector to ASCII terminals, PC, Macintosh or video equipment. The MCA fits into the base of all models of the Meridian Digital Telephones.
Meridian Programmable Data Adapter (MPDA)	This MPDA circuit card mounts in a Meridian Modular Telephone and provides integrated voice and data. Users can access all MPDA call processing functions, and feature activations or deactivations, through keypad or keyboard dialing.
Analog Terminal Adapter (ATA)	The Analog Terminal Adapter (ATA) is offered as a purchasable option on all M2006, M2008, M2008HF, M2216, and M2616 telephones.The ATA provides an analog link to the desktop or laptop computer users (with modems) in the digital telephone environment. A typical office worker who has a PC and digital phone can use the ATA to connect their high speed, off-the-shelf modem to the analog (voice) network. For Meridian Digital Telephones (M2000 series), the ATA connects to the digital telephone through its serial interface connector (same connector as used for the MCA) by a flat RJ-45 cable. The ATA module resides inside the footstand housing unit.

Table 28 lists the optional hardware accessories available for each Meridian Digital Telephone set.

Table 28
Meridian Digital Telephone optional hardware accessories

Accessory	M2006	M2008	M2008HF	M2216	M2317	M2616
2x24 Display	No	Yes	Yes	Standard	Yes	Yes
MCA (AC Power)	Yes	Yes	Yes	Yes	Yes	Yes
External Alerter Interface (AC Power)	Yes	Yes	Yes	No	Yes	Yes
Power Supply Board (MCA and External Alerter Interface)	Yes	Yes	Yes	Yes	Yes	Yes
AC Transformer (MCA and External Alerter Interface)	Yes	Yes	Yes	Yes	Yes	Yes
Meridian Key Expansion Module	No	No	No	Yes	Yes	Yes

Table 29 shows where you can find additional information about Meridian Digital Telephone accessories.

Table 29
References

Document title	Document number
Meridian Communications Adapter (MCA) Reference Manual	555-4001-123
Meridian Programmable Data Adapter (MPDA) User Guide	555-4001-122

Meridian Business Sets

The M5000 series of Meridian Business Sets, available in ash, gray and black, is a comprehensive line of featured voice telephones offering solutions for businesses. Table 30 describes the Meridian Business Sets that the Meridian SL-100 supports.

Table 30
Meridian Business Set summary (Sheet 1 of 3)

Terminal	Description
M5008 	• Includes eight programmable line/feature keys. • Has conveniently placed, color-coded Hold and Release keys for improved efficiency and better call processing. • Has a built-in speaker that permits on-hook dialing and makes it easy to access voice mail. • Is perfect for a reception area, construction floor, secondary department phone or other low-volume calling applications where a display is unimportant, but reliability and ease of use are priorities.
M5208 	• Provides the same capabilities as the M5008, but includes a two-line by 24-character display. • Is suitable when occasional call coverage and exceptional reliability are important. • Is designed to maximize the use of business features.

Table 30
Meridian Business Set summary (Sheet 2 of 3)

Terminal	Description
M5216 	• Is recommended for ACD support and Enhanced Answering Position (EAP) applications. • Has 14 programmable line/feature keys. • Offers unique functionality, making it the perfect solution for call centers or other high-volume calling applications. • Combined with the M522 Meridian Mate add-on units, can also function as a mini-console. The M5216 supports up to two M522 add-on units. • Is headset compatible. It is designed especially for the Nortel Liberation headset, but will also work with Electret-equivalent compatible headsets from other manufacturers. • Has a two-line by 24-character display that delivers call information such as call progress, queue status, and calling name and number. • Is suited for agents or the attendant who can use the displayed data to greet callers and speed transactions.
M5316 	• Features a display, 16 line/feature keys, handsfree and the capability to add up to two Meridian Mate 22 add-on units. • Can also be used in combination with the M522 Meridian Mate add-on unit as a mini-console or answering position. • Gives the user one-button access to the business features used most, including Speed Call. • Has a built-in Call Timer making it easy to monitor calls. • Has a speaker that allows convenient on-hook dialing and access to voice mail. • Has a two-line by 24-character display that ensures easy access to call information, including date and time.
M522 Add-on Unit 	• Is a 22-button expansion unit, with associated LCD indicators. • Is compatible with both the M5216 and M5316. • Provides additional keys for lines or features. Up to two expansion units can be used, for a total of 44 extra programmable buttons.

Table 30
Meridian Business Set summary (Sheet 3 of 3)

Terminal	Description
M5317TDE ISDN 	• Has EKTS Virtual Keys to allow customized call flow to increase call handling speed. • Offers high speed asynchronous data up to 230.4 kbps. • Offers powerful features such as directory dialing, call forward enhancements (such as call forward reminder notification), calling name and number delivery, privacy, and automatic call back and recall. • Is National ISDN-compatible and can work with the switches of other vendors, allowing more flexibility in the choice of equipment. Using the M5317TDE telephone and Nortel's ISDN services off the robust and proven Meridian SL-100 platform can reduce costs and the need to maintain expensive equipment. • Single-line telephone with multi-line functionality; extra wide, two-line by 40-character display. • Async circuit switched data with multilink Point-to-Point Protocol (PPP) for Internet access. • Call directory and caller list up to 100 locations. • Single or shared DN for packet and circuit services.

Table 31 lists the features that work with the Meridian Business Sets.

Table 31
Meridian Business Set features (Sheet 1 of 2)

Function	M5008	M5208	M5216	M5316	M5317TDE
Power (see Note 1)	L	L	L	L	L
Handsfree	N	N	N	Y	Y
Display	N	Y	Y	Y	Y
Message Waiting Lamp	N	Y	Y	Y	Y
ADA Compliant	N	N	Y	Y	Y
Hearing Aid Compatible	Y	Y	Y	Y	Y
Programmable Feature/DN keys	8	8	16	16	11
CLASS Compatible	N	Y	Y	Y	N
Call Waiting Display	N	N	N	N	N
Volume Control	Y	Y	Y	Y	Y

Table 31
Meridian Business Set features (Sheet 2 of 2)

Function	M5008	M5208	M5216	M5316	M5317TDE
Analog or Digital	A	A	A	A	A
ADSI Compatible	N	N	N	N	N
Cordless	N	N	N	N	N
Single-line telephone	N	N	N	N	N
Multi-line telephone	Y	Y	Y	Y	Y
Note 1: L = Loop Powered, A = AC powered, AL = AC powered and Loop powered set.					

Table 32 shows where you can find additional information about Meridian Business Sets.

Table 32
References

Document title	Document number
M5008 Meridian Business Set Description, Installation, Operation, and Maintenance Manual	297-2011-207
M5208 Meridian Business Set Description, Installation, Operation, and Maintenance Manual	297-2011-213
M522 Add-On Module Description, Installation, Operation, and Maintenance Manual	297-2011-208
M5316 Meridian Business Set Description, Installation, Operation, and Maintenance Manual	297-2011-214

Additional analog sets

Aastra Telecom manufactures a range of analog sets for use on the Meridian SL-100. Additional information about these sets is available at www.aastra.com.

Meridian Services Attendant Console

A number of third-party vendors provide compatibility-tested, direct replacements for the Nortel manufacture discontinued Meridian Services Attendant Console (MSAC). These Attendant Consoles provide the same functionality as the MSAC, but operate on the screen of a PC.

List of terms

3WC	Three-Way Calling
ABS	Alarm Battery Supply
ac	alternating current
AC	Announcement Controller
AC	Access Point
ACD	Automatic Call Distribution
ACD-ACDNR	Automatic Call Distribution Not Ready
ADSL	Asymmetrical Digital Subscriber Loop
AIU	Application Interface Unit
ALC	Analog Line Card
ALT	Automatic Line Test
AMA	Automatic Message Accounting
AMADNS	Automatic Message Accounting Data Networking System
AMATEST	Automatic Message Accounting Test Call Capability
ANA	Automatic Number Announcer
API	Application Programming Interface
ASCII	American Standard Code for Information Interchange
ASU	Application Specific Unit
ATC	Applied Technology Council
ATC	Automatic Time and Charges
ATM	Autovon Trunk Module
ATT	Automatic Trunk Test
AUI	Application Unit Interface
BHCA	Busy Hour Call Attempts
BIC	Bus Interface Card

BIP	Breaker Interface Panel
BPG	Building Principle Ground
BR	Battery Return
BRI	Basic Rate Interface
BRISC	BNR Reduced Instruction Set Computing
CallP	Call Processing
CBN	Common Bonding Network
CCPE	Cabinetized Control Peripheral Equipment
CCS	Centi-Call Seconds
CCS7	Common Channel Signaling #7
CDN	Called Party Number
CDTE	Cabinetized Digital Trunk Equipment
CE	Common Equipment
CEM	Common Equipment Module
CFB	Call Forward Busy
CFD	Call Forward Do Not Answer
CFNA	Call Forward No Answer
CFP	Channel Frame Processor
CFU	Call Forward Universal
CIPE	Cabinetized International Peripheral Equipment
CISM	Cabinetized Integrated Services Module
CLASS	Custom Local Area Signaling Service
CLGE	Cabinetized Line Group Equipment
CLI	Command Line Interface
CLI or CLID	Calling Line Identification
CM	Computing Module
CMSS	Cabinetized Miscellaneous Spares Storage
CMVI	Cabinetized Multi-Vendor Interface
CNF	Station Controlled Conference
CONF	Preset Conference
CoS	Class of Service
CP	Control Processor
CPE	Customer Premises Equipment
CPU	Central Processing Unit

CPU	Call Pickup
CR	Centralized Replicator
CTI	Computer Telephony Integration
CTM	Conference Trunk Module
CTME	Cabinetized Trunk Module Equipment
CTR	Continuity Tone Detector
CWT	Call Waiting
CXR	Call Transfer
DAT	Digital Audio Tape
dc	direct current
DCC	Digroup Control Card
DCC	Data Control Card
DCE	Distributed Computing Environment
DCM	Digital Carrier Module
DCPK	Directed Call Park
DCPU	Directed Call Pickup
DDMS	DMS Data Management System
DDU	Disk Drive Unit
DIRP	Device Independent Recording Package
DLC	Data Link Controller
DLC	Digital Line Card
DLM	Digital Line Module
DMS	Digital Multiplex System
DN	Directory Number
DNS	Domain Name System
DPCC	Dual Plane Common Core
DRAM	Digital Recorded Announcement Machine
DS0	Digital Signal, Level 0
DS1	Digital Signaling Level 1
DS3	Digital Signaling Level 3
DSP	Digital Signaling Processor
DTC	Digital Trunk Controller
DTC(I)	Digital Trunk Controller-ISDN
DTC7	SS7 Digital Trunk Controller

DTE	Data Terminating Equipment
DTM	Digital Trunk Module
DTMF	Dual-tone Multifrequency
EBAF	Extended Bellcore Automatic Message Accounting Format
EBIP	Electrical Breaker Interface Panel
EBS	Electronic Business Set
ECAN	Echo Cancellation
EDC	Extended Distance Capability
EDCH	Enhanced D-channel Handler
EDRAM	Enhanced Digital Recorded Announcement Machine
EIPE	Enhanced Intelligent Peripheral Equipment
EISP	Enhanced ISDN Signaling Preprocessor
EIU	Ethernet Interface Unit
ELCM	Enhanced Line Concentrating Module
ELM	Enhanced Line Module
EMC	Electromagnetic Compatibility
EMC	Enhanced Multi-purpose Cabinet
EMI	Electromagnetic Interference
EMW	Network Executive Message Waiting
ENET	Enhanced Network
ESA	Emergency Stand Alone
ESD	Electrostatic Discharge
ESMA	Enhanced Subscriber Carrier Module Access
ETS	Electronic Telephone Sets
ETSI	European Telecommunications Standards Institute
EXPEC	Enhanced IPE Controller
FBus	Frame Bus
FCAPS	Fault, Configuration, Accounting, Performance, and Security
FCC	Federal Communications Commission (United States)
FCOT	Fiber Central Office Terminal
FE	far end
FG	Ground
FGE	Frame Ground Equalizer
FLIS	FiberLink Interface Shelf

FLPP	Fiber Link Peripheral Processor
FRIU	Frame Relay Interface Unit
FSP	Frame Supervisory Panel
FTP	File Transfer Protocol
FX	Foreign Exchange
FXS	Foreign Exchange Service
GPS	Global Positioning System
GPS	Global Product Support
GTR	Global Tone Receiver
GUI	Graphic User Interface
HIE	Host Interface Equipment
HIOP	High-capacity Input/Output Processor
HSC	Hot Swap Controller
HSDU	High-Speed Data Unit
HVAC	Heating, Ventilation and Air Conditioning
IAD	Integrated Access Device
IBN	Isolated Bonding Network
IDT	Integrated Digital Terminal
IE	Information Element
IEEE	Institute of Electrical and Electronic Engineers
IGW	Integrated Gateway Access (Generation 1 IP-enabled is supported from an LTCI)
INTPIC	International Primary Carrier
IOC	Input/Output Controller
IOM	Input/Output Module
IOP	Input/Output Processor. A card that occupies one or two slots in the XA-Core shelf.
IPCM	IP Client Manager
IPCM-EM	IP Client Manager Element Manager
IPE	Intelligent Peripheral Equipment
IPEC	Intelligent Peripheral Equipment Column
IPF	Integrated Processor FBus card
IS	In Service
ISA	Integrated Services Access
ISDN	Integrated Services Digital Network

ISM	Integrated Services Module. A replacement for the Maintenance Trunk Module (MTM).
ISUP	ISDN User Part
ITU	International Telecommunications Union
JNET	Junctored Network
kbps	Kilobits per second
LAN	Local Area Network. A network that connects computers to share data storage devices and printers.
LCAP	Local Craft Access Panel
LCC	Line Class Code
LCD	Liquid Crystal Display
LCM	Line Concentrating Module
LCME	Line Concentrating Module-Enhanced
LED	Light Emitting Diode
LEN	Line Equipment Number
LFC	LIS F-bus Controller
LFI	LIS Fiber Interface
LGC	Line Group Controller
LGC(I)	Line Group Controller ISDN
LIM	Link Interface Module
LIS	Link Interface Shelf
LIU7	SS7 Link Interface Unit (requires 32M processor)
LM	Line Module
LMM	Line Maintenance Manager
LMM	Line Management and Maintenance
LMS	Local Message Switch
LNR	Last Number Redial
LPP	Link Peripheral Processor
LR	Logic Return
LSDU	Low-Speed Data Unit
LTC	Line Trunk Controller
LTC(I)	Line Trunk Controller ISDN
LTI	Line Side T1 IPE Interface
LTM	Line Test Manager

LTP	Line Test Position
MADN (MCA)	Multiple Appearance Directory Number (MADN) Multiple Call Arrangement (MCA)
MADN (SCA)	Multiple Appearance Directory Number (MADN) Single Call Arrangement (SCA)
MAP	Maintenance and Administration Position
MAPCI	Maintenance and Administration Position Command Interpreter
Mbps	Megabits per second
MCAM	Meridian Cabinet Auxiliary Module
MCAM3	Meridian Cabinet Auxiliary Module phase 3
MCDM	Meridian Cabinet Digital Module
MCGM	Meridian Cabinet General Module
MCLM	Meridian Cabinet Line Module
MCLM-E	Meridian Cabinet Line Module-Enhanced
MCNI	Meridian Cabinet Network Interface
MCNM	Meridian Cabinet Network Module
MCPM	Meridian Cabinet Power Module
MCRM-S	Meridian Power Remote Module-SONET
MCRU	Meridian Cabinet Remote Unit
MCSM	Meridian Cabinet Service Module
MCSS	Meridian Cabinet Spares Storage
MCTM-I	Meridian Cabinet Trunk Module-ISDN
MDF	Main Distribution Frame
MDM	Multi-Service Data Manager
MDP	Management Data Provider
MES	Miscellaneous Equipment Frame
MF	Multi Frequency
MFIO	Multi-Function Input/Output
MLC	Message-waiting Line Card
ms	micro-second
MS	Message Switch
MSB	Make Set Busy
MSP	Modular Supervisory Panel
MSR	Message Storage and Retrieval
MTA	Metallic Test Access
MTBF	Mean Time Between Failures

MTD	Magnetic Tape Drive
MTM	Maintenance Trunk Module
MTM OAU	Maintenance Trunk Module Office Alarm Unit
MTU	Multiline Test Unit
MWI	Message Waiting Indication
MWT	Message Waiting
NE	Network Element
NE	near end
NEBS	Network Equipment Building Standard
NEMW	Network Executive Message Waiting
NFS	Network File System
NI-1	National ISDN 1 (also known as NTNA)
NI-2	National ISDN 2
NIC	Network Interface Card
NIU	Network Interface Unit
NM	Network Module
NMS	Network Management System
NMWI	Network Message Waiting Indicator
NPM	Network Patch Manager
NRAG	Network Ring Again
NSF	Network Specific Facilities
NWM	Network Management
OAM&P	Operations, Administration, Maintenance and Provisioning
OAU	Office Alarm Unit
OC-3	Optical Carrier Level 3: the SONET transmission rate of 155.52 Mbps.
OM	Operational Measurement
OMD	Operational Measurement Delivery
ONP	One Night Process
OOS	Out of Service
OPAC	Outside Plant Access Cabinet
OPM	Outside Plant Module
P-Bus	Processor Bus
PBX	Private Branch Exchange
PC	Personal Computer

PCL	Product Computing-module Load
PCM	Pulse Code Modulation
PDP	Power Distribution Panel
PDS	Power Distribution Shelf
PDTC	PCM-30 Digital Trunk Controller
PE	Processor Element
PEPS	Peripheral Equipment Power Supply
PIU	Port Interface Unit
PM	Peripheral Module
PMC	Peripheral Message Controller
POTS	Plain Ordinary Telephone Service
PP	Peripheral Processor
PRI	Primary Rate Interface
PRK	Call Park
PRL	Peripheral/Remote Loader
PRL	Privacy Release
P-side	Peripheral-side
PSM	Power Supply Module
PSTN	Public Switched Telephone Network
PTM	Packaged Trunk Module
PTS	Per Trunk Signaling
QoS	Quality of Service
RAG	Ring Again
RAID	Redundant Array of Inexpensive Disks
RCC	Remote Cluster Controller
RCC2	Remote Cluster Controller 2
RDT	Remote Digital Terminal
RLCM	Remote Line Concentration Module
RLM	Remote Line Module
RMM	Remote Maintenance Module
RND	Redirecting Number Delivery
ROTL	Remote Office Test Line
RSC	Remote Switching Center
RSC-S	Remote Switching Center-Second series

RTOS	Real Time Operating System
RTU	Right-To-Use
RW	Read/Write
SBA	SuperNode Billing Application
SBC	Single Board Computer
SC	Shelf Controller
SCC	SuperNode Combined Core
SCOCS	Selective Class of Call Screening
SCSI	Small Computer System Interface
SCU	Speed Calling User
SERVORD	Service Order
SIM	Serial Interface Module
SIMRING	Simultaneous Ringing
SLG	SuperNode Data Manager Log Generation
SM	Shared Memory
SMA2	Subscriber Carrier Module-100 Access, Second Version
SMDR	Station Message Detail Recording
SML	Service Management Layer
SMS-R	Subscriber Carrier Module Remote
SNPA	Serving Numbering Plan Area
SNSE	SuperNode Size Enhanced
SONET	Synchronous Optical Network
SPCS	Stored Program Control Switch
SPG	Single Point Ground
SPM	Spectrum Peripheral Module
SPVC	Switched Permanent Virtual Connection
SSLPP	Single-Shelf Link Peripheral Processor
STM	Service Trunk Module
STM-1	Synchronous Transport Mode 1
STR	Special Tone Receiver
SWACT	Switch Activity
TAPI	Telephony Application Programming Interface
TBB	Transmission Bonding Bar
T-Bus	Transaction Bus

TDM	Time Division Multiplexing
TM	Trunk Module
TM8	Trunk Module, 8-Wire
TMM	Trunk Maintenance Manager
TMM	Trunk Management and Maintenance
TOD	Time of Day
TSP	TAPI Service Provider
TTP	Trunk Test Position
TTT	Transmission Test Trunk
TTU	Transmission Test Unit
UBC	Uniform Building Codes
UEM	Universal Equipment Module
UP	Universal Processor
UPS	Uninterruptible Power Supply
USB	Universal Serial Bus
UTR	Universal Tone Receiver
V	volt(s)
VoIP	Voice over IP
VPN	Virtual Private Network
VRU	Voice Response Unit
WAN	Wide Area Network
XA-Core	Extended Architecture Core
XAI	Extended Architecture Interconnect
XLIU	Enhanced Link Interface Unit
XPM	Extended Peripheral Module
XSM	Extended System Monitor

Meridian SL-100

Product Guide

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