SPM Basics

What's new in SPM basics for (I)SN09 and up.

Feature changes

There are no feature changes in this release.

Other changes

There are no other changes in this release.

SPM description

The Spectrum Peripheral Module (SPM) is a set of information processing modules that provide Digital Multiplex System (DMS) and GSM wireless switches with direct access to optical carrier (OC) networks.

SPM hardware

Dual shelf assembly

The basic mechanical element of the SPM consists of a dual shelf assembly mounted to a common backplane. A shelf assembly contains two identical shelves.

Each shelf contains resource modules (RM) which plug into the backplane.

The resource modules contain circuit cards that perform a variety of functions such as supplying electrical power and providing optical connections to a high speed transport network. SPM resource modules also provide call processing and high speed carrier capabilities. A dual shelf assembly contains 30 slots and can contain 20 RMs.

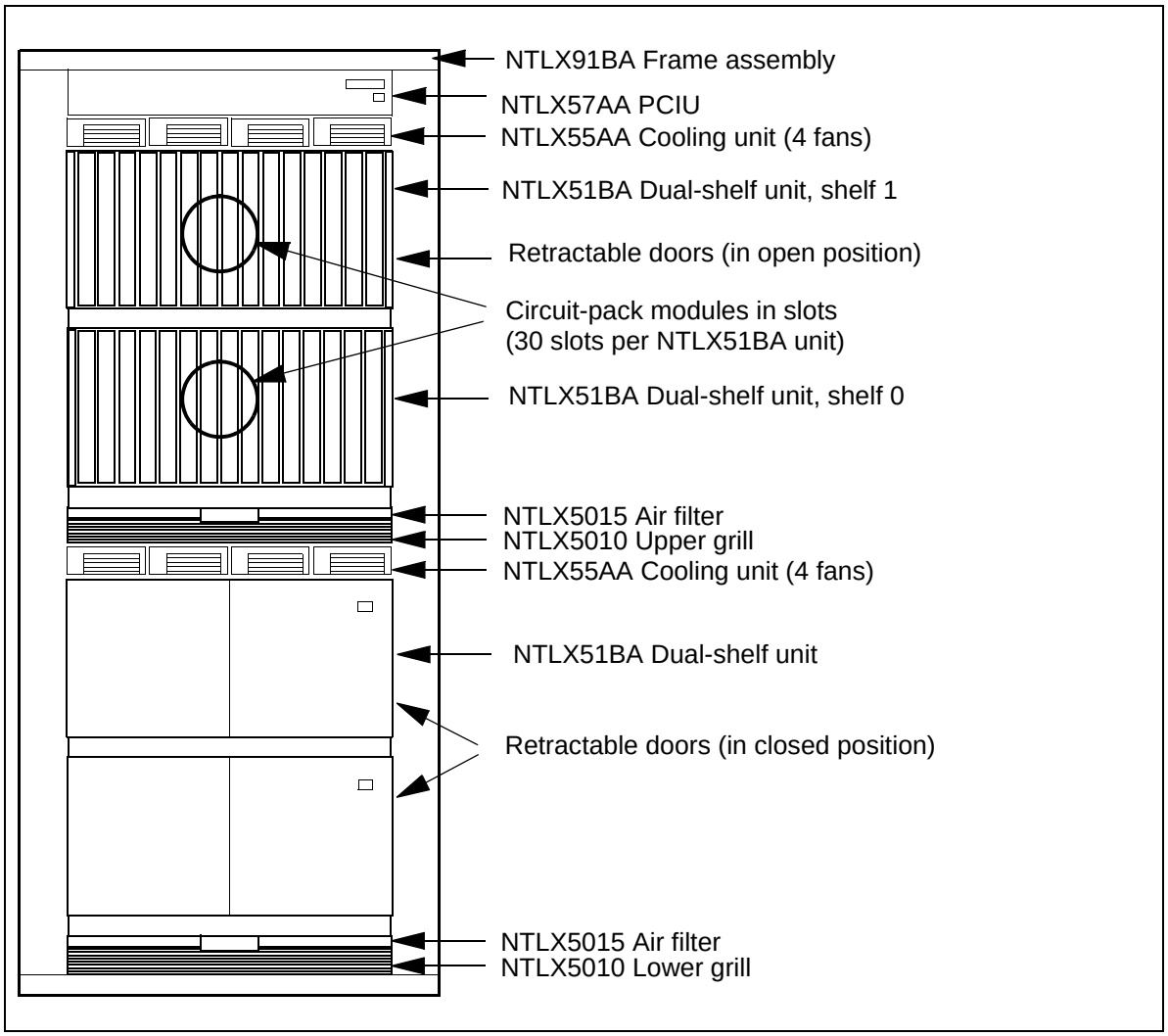
The dual shelf assembly of an SPM contains all of the components required to serve as an element (node) in the optical transport network.

A standard equipment frame contains two dual shelf assemblies that contains two complete SPM nodes.

Description of dual shelf SPM components

The figure below, SPM frame and components, shows the SPM frame and its components. The NTLX91BA frame assembly is comprised of two NTLX51BA dual-shelf assemblies (two complete SPMs) and the necessary support equipment.

SPM frame and components



The table below, SPM components, lists and describes the hardware components and the role of each component used in the SPM..

SPM components (Sheet 1 of 5)

SPM component	Description
NTLX91BA frame assembly	Frame and backplane assembly. Same frame assembly as used in SPM and MG4K network elements.
NTLX51BA dual-shelf assemblies	Each frame assembly contains two identical dual shelf assemblies. Each dual shelf assembly contains 30 slots, 15 slots per shelf, to accept resource modules (RMs). Some slots are reserved for specific RMs, as described below and shown in the figure .
NTLX61AA Shelf Interface Modules (SIMs)	SIMs have dedicated slots in SPM shelves and both SIM RMs must always be provisioned. • Two SIMs are located in each dual shelf assembly with one SIM located in each slot 15 of shelves 0 and 1. • SIMs act as the DC power conditioner for the dual-shelf assembly for the SPM. • SIMs serve as the alarm interface between the common equipment modules (CEMs) and the NTLX57AA power connection interface unit (PCIU). • provides SPM test bus access
Note: Not all resource modules apply to all markets.	

SPM components (Sheet 2 of 5)

SPM component	Description
NTLX82AA or NTLX82BA Common Equipment Modules (CEMs)	CEMs have dedicated slots in the SPM shelves and both must always be provisioned. • Two CEMs are located slots 7 and 8 of each shelf 0 of each dual shelf assembly. • CEMs control the signal processing and provide the system clock. • CEMs have four front mounted optical points to connect fiber to the ENET paddle boards using DS-512 links. • CEMs route the bearer traffic over the S-links through the backplane to the GEMs. ***Note:*** CEMs cannot be returned to service (RTS) if they are located (and datafilled) in slots 1, 2, 7, or 8 of shelf 1 of a high-speed backplane (NTLX51BA).
NTLX71AA OC-3 interface modules	Two NTLX71AA OC-3 interface modules are used for each dual-shelf assembly. The OC-3 interface module is a synchronous optical network (SONET) OC-3 trunk interface module for the SPM. It allows the SPM to terminate SONET OC-3 transmission systems carrying DS3, asynchronous VT1.5, and byte-synchronous VT1.5 payloads. ***Note:*** The OC-3 modules cannot be returned to service (RTS) if they are located (and datafilled) in slots 1, 2, 7, or 8 of shelf 1 of a high-speed backplane (NTLX51BA).
Note: Not all resource modules apply to all markets.	

SPM components (Sheet 3 of 5)

SPM component	Description
NTLX72AA or NTLX72BA data link controller (DLC)	Two NTLX72AA or NTLX72BA data link controller (DLC) resource modules are used for each dual-shelf assembly. The DLC RM provides data-link layer protocol termination for multiple-port data communications. It uses HDLC-based frame structures, such as LAPD for ISDN PRI.
Note: Not all resource modules apply to all markets.	

SPM components (Sheet 4 of 5)

SPM component	Description
Signal processor modules (DSP or VSP)	Each dual frame assembly can contain 0 to 24 DSP or VSP resource modules. Supported RM types: • NTLX65AA or NTLX65BA Digital Signal Processors (DSP) • NTLX66AA, NTLX66BA, NTLX85AA, NTLX86AA DSPs • NTLX86VA (IECAN for wireless market) VSPs The DSP (DSP) resource modules provide digital signal processing services, such as: • multi-frequency (MF) receiver for the SPM • dual-tone multi-frequency (DTMF) receiver • continuity tone transceiver (COT) • programmable tone synthesizer (TONESYN), and • A/B bit handler (ABBIT) Voice Services Processor (VSP) resource modules provide resources for call processing such as echo cancellation (ECAN) for the SPM. ***Note 1:*** Any combination of up to 24 DSP and VSP RMs is supported. Typically, the number of necessary DSP and VSP resource modules is less than 24. ***Note 2:*** DSPs and VSPs cannot be returned to service (RTS) if they are located (and datafilled) in slots 1, 2, 7, or 8 of shelf 1 of a high-speed backplane (NTLX51BA).
Note: Not all resource modules apply to all markets.	

SPM components (Sheet 5 of 5)

SPM component	Description
NTLX44AA Synchronization Resource Module (SRM)	A single SRM provides a timing and synchronization interface. The SRM receives clocking information through DS1 input links from a Timing Signal Generator (TSG) which provides Stratum 1 accuracy. ***Note 1:*** The SRM must be provisioned in slot 6 on the Interworking Spectrum 0. ***Note 2:*** SRMs cannot be returned to service (RTS) if they are located (and datafilled) in slots 1, 2, 7, or 8 of shelf 1 of a high-speed backplane (NTLX51BA).
NTLX55AA cooling unit	The cooling unit provides forced-air cooling to the SPM frame and components using four NTLX56AA fan assemblies.
NTLX57AA power connection interface unit (PCIU)	Serves as a central gathering point for all power and alarm cabling used within the NTLX91BA frame assembly.
NT9X40DA paddleboard	Provides the SPM interface to the DMS switch and the enhanced network (ENET) The paddleboard supports four SPM DS-512 connections to the ENET.
Note: Not all resource modules apply to all markets.	

Description of tools and utilities

All tools and utilities for the SPM are provided through the Maintenance and Administrative Position (MAP) screens. MAP screens and commands help operating company personnel to operate and maintain the SPM at the node level, as well as to maintain the modules (circuit packs) within the SPM.

Timing configurations

The SPM supports several the following timing configurations:

- loop timing
- back-to-back timing
- external synchronization interface (ESI) timing
- Timing Signal Generator (TSG) timing

Loop timing

In loop timing operational mode, each SPM synchronizes to either of the two OC-3 carriers from the SONET/SDH network and is terminated on the active CEM. The active CEM oscillator (SONET Minimum clock) then distributes the timing signal to the Inactive CEM, and to all of the Resource Modules (RMs). When no OC-3 signal is present, the SPM reverts to internal timing from the MS clock.

The SONET/SDH NE that provides the OC-3 signal and the MS clock have to be tracable back to the same reference clock. Failure to comply with this constraint could cause data integrity problems in the system.

The relevant data schema table for this configuration is table MNNODE. To use loop timing, field CLKREF must be set to LOOP.

> ***Note:*** Loop timing should only be used in SP16MR1, SP17, and later releases that contain the *AutoPhase Bleed Feature* or in SP14 and SP15 loads that have the *AutoPhase Bleed Feature* patch applied.

Back-to-back timing

In this configuration, SPMs connect two offices with a point-to-point connection over OC-3 fiber circuits. This configuration is not SONET compliant, as compliance is not required because the SPMs communicate directly. The SPMs that are directly interconnected must be configured for internal-timing operation.

Set the data schema table MNNODE, field CLKREF to INTERNAL.

External synchronization interface (ESI) timing

SPM ESI line Timing is an alternative timing to loop timing. It takes advantage of the high phase resolution and sampling frequency provided by the SPM to improve synchronization performance and meet the SONET standards. The main benefits of SPM ESI Timing are

- allow timing directly from the Building Integrated Timing Supply (BITS) network, and
- provide Stratum 3E holdover performance when the BITS links are lost

The introduction of the SRM in an SPM permits the MS in a slave line timing configuration to derive its timing from incoming BITS carriers terminated on an SRM

- designated as a reference source, and
- an SPM as a reference node to distribute this timing signal to all the peripherals in the office

In this configuration, the MS clock benefits from the SRM high phase resolution and more frequent sampling of the incoming BITS reference carrier. As a result, SPMs timed to the MS retain SONET quality synchronization performance.

This configuration requires 2 SPMs, each configured with a single SRM. The MS clock card NT9X53AD is the baseline hardware used for this configuration.

In table MNNODE, the field CLKREF must be set to INTERNAL. Table SYNCLK is provisioned in Slave mode using SPMs with SRMs as the timing references.

Timing Signal Generator (TSG) timing

SPM TSG timing is another alternative to the current OC-3 line timing or OC-3 loop timing. Timing information passes to the SRM through DS1 links from a TSG. The TSG provides Stratum-1 quality timing, the highest quality of timing signals directly derived from the TSG.

The output reference signal is provided to each CEM in the SPM frame. The CEM sends the phase information to the DMS Message Switch, which distributes a synchronized clock to the rest of the system, including the SPM.

Table NCKTPAK must be datafilled for TSG timing.

For more information on how to configure SPM timing, refer to Installation Method 65-0628, “Upgrading MS Clock to SPM - OC-3 Line/SYNC RM Timing.”

Software

Software loads

Some SPM loads are patchable through corrective post-release software updates (PRSUs). Patchable loads and nonpatchable loads have different file name standards.

SPM load file name standards for patchable loads

There are two types of patchable SPM software loads:

- base SPM software loads, and
- pre-patched SPM loads (PPSLs)

PPSLs have PRSU files built in to the SPM load file. PPSLs do not reduce the number of PRSUs for a given load, but they reduce the number of PRSUs applied manually to the load.

The load file name for base SPM software loads must follow the format ZZANNZZ_NNNNNN.

The load file name for PPSLs must follow the format ZZANNZZ_NNNNNNZN.

where

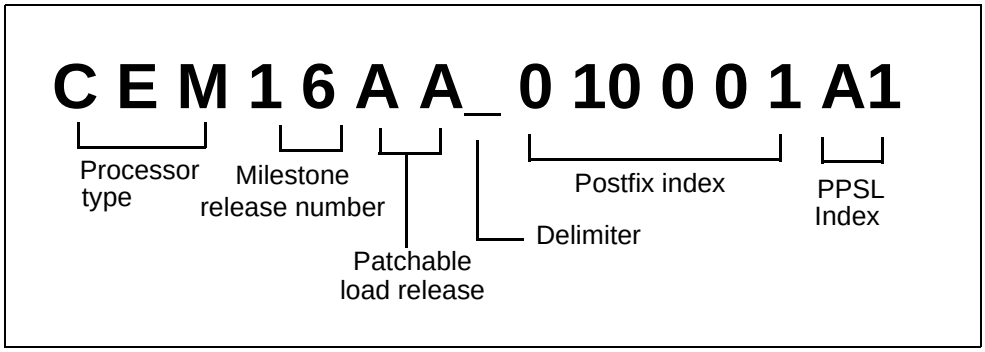
Z is a letter (A to Z)

A is alphanumeric (A to Z, 0 to 9)

N is numeric (0 to 9)

The figure below, SPM load file naming standards for patchable base loads, shows an example of a filename for patchable loads.

SPM load file naming standards for patchable base loads



The table below, SPM load file names for patchable loads, provides an explanation of the SPM patchable load file naming conventions.

SPM load file names for patchable loads (Sheet 1 of 2)

Character position	Explanation (example: ZZANNZZ_NNNNNNZN)	Examples
1 to 3 (ZZA)	**processor type** Character positions 1 to 3 indicate the processor type. The processor type is constant over software releases.	CEM DLC DSP OC-3 SRM
4 to 5 (NN)	**milestone release number** Character positions 4 to 5 indicate the milestone release number. The number changes when Nortel Networks releases a new milestone load.	16

Note 1: Patchable SPM load file names must contain 14 or 17 characters, for example, CEM16AA_010000 and OC-316AL_010011B2.

Note 2: The two letters of the patchable load release increment in unison with the last two numbers of the postfix index. For example, the first SP16 load file name for the CEM load has a patchable load release of AA. The last two letters of the postfix index are 00. As a result, the first SP16 load file name for CEM is CEM16AA_010000. Subsequent SP16 load file names for CEM loads increment to CEM16AB_010001, CEM16AC_010002 . . .

SPM load file names for patchable loads (Sheet 2 of 2)

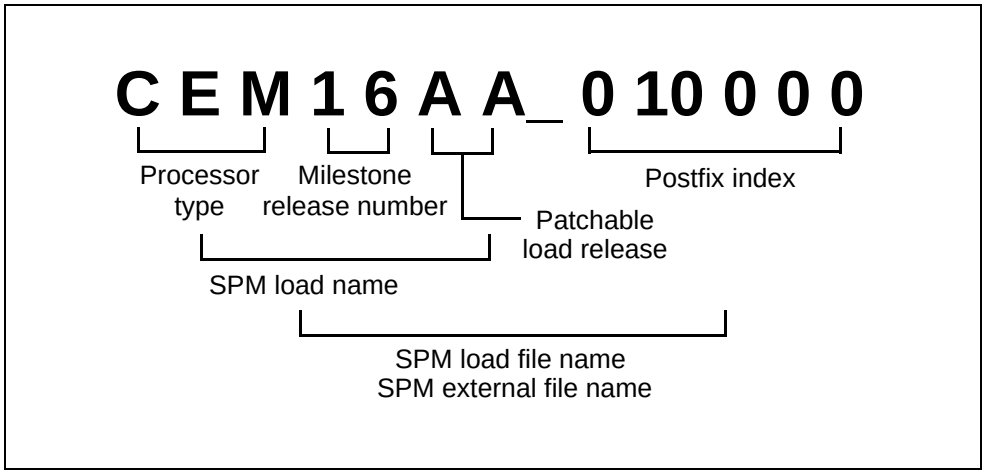
Character position	Explanation (example: ZZANNZZ_NNNNNNZN)	Examples
6 to 7 (ZZ)	**patchable load release** Character positions 6 to 7 increment with each patchable load released.	AA AB
8 (_)	*delimter* Character position 8 is the delimiter for the postfix index.	_
9 to 14 (NNNNNN)	**postfix index** Character positions 9 to 14 indicate the postfix index. The number changes when Nortel Networks releases a new maintenance or emergency load.	010001 010002
16 to 17 (ZN)	**PPSL index** Character positions 16 through 17 indicate the optional PPSL index.	A1 B2

Note 1: Patchable SPM load file names must contain 14 or 17 characters, for example, CEM16AA_010000 and OC-316AL_010011B2.

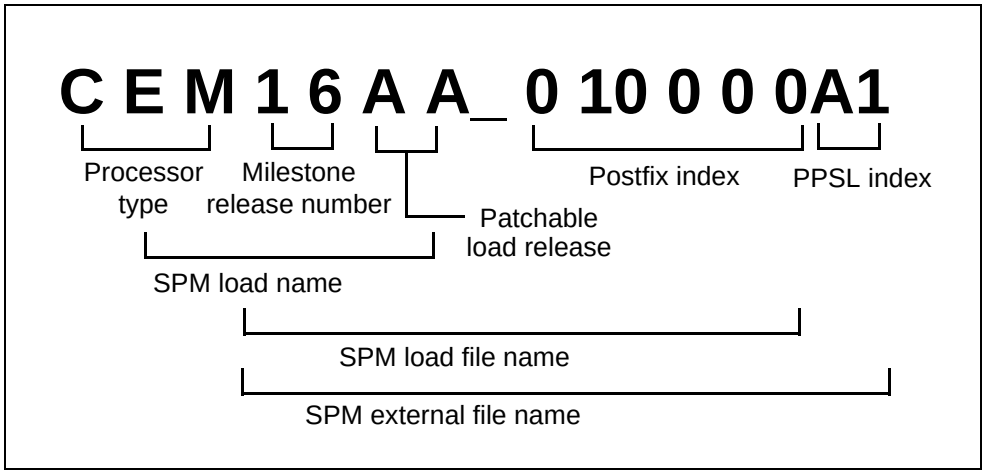
Note 2: The two letters of the patchable load release increment in unison with the last two numbers of the postfix index. For example, the first SP16 load file name for the CEM load has a patchable load release of AA. The last two letters of the postfix index are 00. As a result, the first SP16 load file name for CEM is CEM16AA_010000. Subsequent SP16 load file names for CEM loads increment to CEM16AB_010001, CEM16AC_010002 . . .

Use the figures below, SPM load file naming standards for patchable base loads and SPM load file naming standards for PPSLs, to help understand the load file naming conventions used. The CEM load file names are examples only. The same naming standards apply to patchable RMs.

SPM load file naming standards for patchable base loads



SPM load file naming standards for PPSLs



SPM load file name standards for nonpatchable loads

The load file name for nonpatchable SPM software loads must follow the format ZZANNNN_NNNNNN

where

Z is letter (A to Z)

A is alphanumeric (A to Z, 0 to 9)

N is numeric (0 to 9)

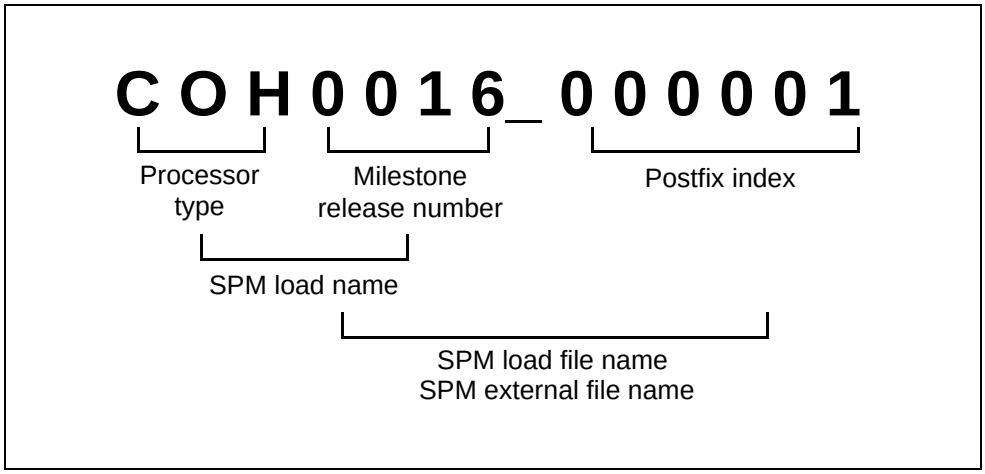
The table below, Explanation of SPM load file names for nonpatchable loads, provides an explanation of the SPM load file name.

Explanation of SPM load file names for nonpatchable loads

Character position	Explanation (example: ZZANNNN_NNNNNN)	Examples
1 to 3 (ZZA)	**processor type** Character positions 1 to 3 indicate the processor type. The processor type is the same for all software releases.	COH
4 to 7 (NNNN)	**milestone release number** Character positions 4 to 7 indicate the milestone release number. The number changes when Nortel Networks releases a new milestone load.	0016
8 (_)	*delimiter* Character position 8 is the delimiter for the postfix index.	_
9 to 14 (NNNNNN)	**postfix index** Character positions 9 to 14 indicate the postfix index. The index changes when Nortel Networks releases a new maintenance or emergency load.	000001 000002
Note: The SPM load file name must contain 14 characters, for example, COH0016_000001.		

The figure below, SPM load file naming standards for nonpatchable loads, shows an example of the nonpatchable SPM load file naming standards. The COH load file name is an example only.

SPM load file naming standards for nonpatchable loads



Delivery and ordering processes

When an SPM frame or a PCL upgrade is ordered for a site with in-service SPMs, Nortel Networks schedules and provisions the applicable SPM non-computing module load (NCL). The required SPM NCL is determined by pre-defined Nortel Engineering rules.

An SPM NCL order scheduled in Software Capacity and Scheduling/Unified Networks Integrated Tool Environment (SCS/UNITE) automatically generates a load shipment milestone. The software load distribution media is manufactured and shipped with the applicable NCL Release Document and Maintenance Release Notes to the SPM NCL shipment address defined in SCS.

Upgrade and patch system

Software upgrades for the SPM are completed by upgrading each circuit pack. This is done using the MAP screen.

At SP16, SPM patching is available for the following loads:

- common equipment modules (CEM)
- data link controller (DLC)
- data link controller 2 (DL2)
- digital signal processor (DSP), including LX66 voice signal processor (VSP)

Note: The DSP load contains the LX66 VSP, as well as the DSP upgrade software.

- optical carrier rate 3 (OC-3)
- synchronization resource module (SYN)

Note: Nortel Networks does not provide patching functionality to the LX85 and LX86 (COH) loads.

OAM&P strategy

Operations, administration, maintenance, and provisioning for the SPM is performed using the MAP commands.

Interfaces

Network interfaces and protocols

SPM nodes directly terminate an OC-3 SONET carrier and route the individual digital-signal-level-zero (DS-0) traffic from the carrier into the Digital Multiplex Switch (DMS). The active OC-3 module in the SPM divides the incoming OC-3 SONET time division multiplex (TDM) signal into digital signal level 0 (DS-0) timeslots.

The OC-3 module sends the signals to the 12K-port time-switch in the SPM common equipment module (CEM). The CEM routes the signals to other modules using serial links (S-links). The CEM also routes signals directly to the DMS enhanced network (ENET) for call processing. The signals pass through four DS-512 host links between the CEM and an ENET paddleboard on the DMS switch.

User interfaces

The MAP is the user interface for data provisioning, alarm surveillance, controls, and performance monitoring.

Customer support

SPM technical bulletins

SPM technical bulletins are available online. They provide information and procedures that are not available in product documentation.

Use the following procedure to access SPM Customer Advisory Bulletins (CABs) and Emergency Warning Bulletins (EWBs).

Accessing technical bulletins

In a Web browser

1 Go to **http://www.nortelnetworks.com/**

2 From the top menu, under **Support and Training**, click **Technical Documentation**.

3 From the left menu, click **log In** to log into Technical Support and enter your username and password.

4 From the top menu, Click the tab **Browse Product Support**.

5 From the link **Product Finder** (default), In step 1, select **Select from Product Families** in the pull-down menu, then select **DMS** from the box.

6 In step 2 (choose a product), select **Spectrum Peripheral Module** from the box.

7 In step 3 (and get the content), select **Bulletins** from the box and click the **Go** link.

8 You have completed this procedure.