Product Overview

Functional description

The Spectrum Peripheral Module (SPM) is the base platform for telephone applications requiring high performance and a flexible feature set. The hardware and software of the SPM enables such applications through:

- modularity, by insulating the frameworks and architecture from a specific implementation.
- re-usable generic functions, such as resource module (RM) loading, node and link maintenance.
- generic frameworks ready to accept device specific implementations.
- generic services such as log and alarm reporting subsystems.

In such an environment, introduction of new services means development of:

- real-time applications software on the RM
- agents for configuration and provisioning
- diagnostic and audit services for new capabilities
- device maintenance targets

The 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. 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 modules which plug into the backplane. The 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 modules also provide call processing and high speed carrier capabilities.

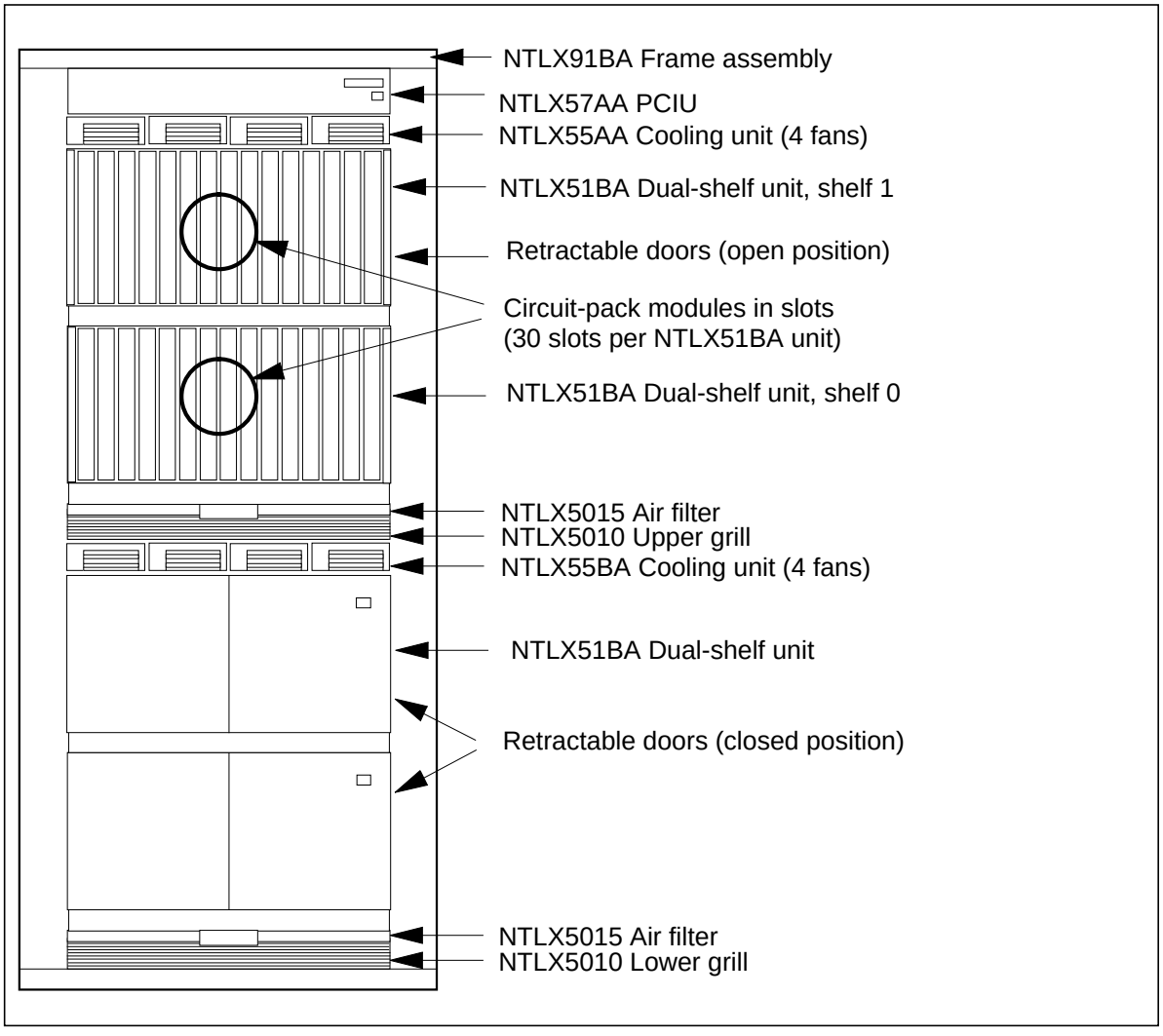
The dual shelf assembly of a SPM contains all the components required to represent an element or a node in the optical transport network. A standard equipment frame contains two dual shelf assemblies that provide two SPM nodes.

Hardware

Description of components

As shown in the following figure, the NTLX91BA frame assembly contains two NTLX51BA dual-shelf assemblies (two complete SPMs) and the necessary support equipment.

Figure 1 The SPM frame



Each dual-shelf assembly provides 30 slots to accommodate

- two NTLX61AA shelf interface modules (SIMs)—one SIM needs to be on each shelf of the dual-shelf assembly

  The NTLX61AA shelf interface module (SIM) is the DC power conditioner for the dual-shelf assembly for the SPM. It is also the alarm interface between the common equipment modules (CEMs) and the NTLX57AA power connection interface unit (PCIU). The SIM also provides SPM test bus access.

- two NTLX82AA or NTLX82BA common equipment modules (CEMs) for each dual-shelf assembly

  The CEM contains the circuitry required to control the operation of the SPM. The CEM controls the signal processing and provides the system clock. The front of the CEM has four optical links points that connect the fiber to the ENET paddle boards through DS-512 links.

- two NTLX71AA OC3 interface modules for each dual-shelf assembly

  The OC3 interface module is a synchronous optical network (SONET) OC3 trunk interface module for the SPM. It allows the SPM to terminate SONET OC3 transmission systems carrying DS3, asynchronous VT1.5, and byte-synchronous VT1.5 payloads.

- one NTLX44AA synchronization resource module (SRM)

  The SRM provides a timing and synchronization interface for the SPM. It receives clocking information via DS1 input links from a Timing Signal Generator (TSG) which provides Stratum 1 level accuracy. Stratum 1 level is the highest quality of timing signals directly derived from the TSG.

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

  Note: The SRM should be provisioned in slot 6 on the Interworking Spectrum 0.

- two NTLX72AA or NTLX72BA data link controller (DLC) RMs for each dual-shelf assembly

  The DLC RM provides data-link layer protocol termination for multiple-port data communications using HDLC-based frame structures, such as LAPD for ISDN PRI.

- 0 to 24 NTLX65AA or NTLX65BA digital signal processor (DSP) resource modules (RMs) or NTLX66AA, NTLX66BA, NTLX85AA, or

NTLX86AA voice signal processor (VSP) RMs for each dual-shelf assembly

Note: Support exists for any combination of up to 24 DSP and VSP RMs. Typically, the number of necessary DSP and VSP RMs will be less than this.

The DSP RM provides digital signal processing services such as dual-tone multi-frequency (DTMF) receiver, continuity tone transceiver (COT), programmable tone synthesizer (TONESYN), A/B bit handler (ABBIT), and multi-frequency (MF) receiver for the SPM.

The VSP RM provides resources for call processing such as echo cancellation (ECAN) for the SPM.

ATTENTION
Not all modules apply to all markets.

The NTLX55AA cooling unit provides forced-air cooling to the SPM equipment by four NTLX56AA fan assemblies.

The NTLX57AA PCIU serves as a central gathering point for all power and alarm cabling used within the NTLX91BA frame assembly.

The 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.

Description of tools and utilities

All tools and utilities for SPM hardware 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

  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 all of the Resource Modules (RMs). When no OC3 signal

is present, the SPM reverts back to internal timing from the MS clock.

The SONET/SDH NE providing the OC3 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".

- OC3 line timing

  The OC3 line timing mode allows the SPM to be the timing source for the MS clock, thus a SONET quality clock synchronization is distributed to the entire DMS office.

  This configuration requires two SPMs, one as the active reference and the other as the standby reference to the MS clock. Both SPMs are equipped with OC3 RMs. The MS clock card NT9X53AD is the baseline H/W used for this configuration.

  Field CLKREF in table MNNODE must be set to "INTERNAL" to allow line timing. Table SYNCLK is provisioned in Slave mode using SPMs with OC3 RMs as the timing references.

- back-to-back timing

  In this configuration, SPMs connect two offices with a point to point connection over OC3 fiber. This configuration is not SONET compliant, but compliance is unnecessary because the SPMs communicate directly. The SPMs that are directly interconnected must be configured for internal-timing operation.

  In table MNNODE, field CLKREF must be set to "INTERNAL".

- external synchronization interface (ESI) timing

  SPM ESI line Timing is an alternative timing to the current OC3 line timing or OC3 loop timing implemented on the SPMs. Like its predecesor, it takes advantage of the high phase resolution and sampling frequency provided by the SPM in order to improve synchronization performance and meet the SONET standards on the SPM’s OC3 output. The main benefits of SPM ESI Timing are to allow timing directly from the Building Integrated Timing Supply (BITS) network and to provide Stratum 3E holdover performance when the BITS links are lost.

  The introduction of the SRM in an SPM will permit the MS in a slave line timing configuration to derive its timing from incoming BITS carriers terminated on a 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. This will enable the MS clock to benefit from the SRM's high phase resolution and more frequent sampling of the incoming BITS reference carrier. As a result, SPMs timed to the MS will retain SONET quality synchronization performance.

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

In table MNNODE, 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 OC3 line timing or OC3 loop timing. Timing information pases to the SRM (refer to the synchronization resource module previously discussed in this document) through DS1 links from a TSG which provides Stratum-1 quality timing. Stratum 1 level is the highest quality of timing signals directly derived from the TSG.

  The output reference signal is tracked to each CEM in the SPM frame. The CEM messages the phase information up 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 - OC3 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 letter (A through Z)

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

N
is numeric (0 through 9)

The following table explains the meaning communicated by each SPM load file name.

Table 1 Explanation of SPM load file names for patchable loads

Character position	Explanation	Examples
1 through 3 (ZZA)	(processor type) Character positions 1 through 3 indicate the processor type. The processor type remains constant over software releases.	CEM DLC DSP OC3 SRM
4 and 5 (NN)	(milestone release number) Character positions 4 and 5 indicate the milestone release number. The milestone release 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, DLC16AF_010005, DSP16AJ_010009A1, OC316AL_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 would have a patchable load release of AA. The last two letters of the postfix index would be 00. Thus, the first SP16 load file name for CEM would be CEM16AA_010000. Subsequent SP16 load file names for CEM loads would increment to CEM16AB_010001, CEM16AC_010002, and so on.

Table 1 Explanation of SPM load file names for patchable loads

Character position	Explanation	Examples
6 and 7 (ZZ)	(patchable load release) Character positions 6 and 7 increment with each patchable load released.	AA AB
8 (_)	Character position 8 is the delimiter for the postfix index.	_
9 through 14 (NNNNNN)	(postfix index) Character positions 9 through 14 indicate the postfix index. The postfix index changes when Nortel Networks releases a new maintenance or emergency load.	010001 010002
16 through 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, DLC16AF_010005, DSP16AJ_010009A1, OC316AL_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 would have a patchable load release of AA. The last two letters of the postfix index would be 00. Thus, the first SP16 load file name for CEM would be CEM16AA_010000. Subsequent SP16 load file names for CEM loads would increment to CEM16AB_010001, CEM16AC_010002, and so on.

Use the following figures to help explain the SPM load file naming standards. Use these CEM load file names as examples only. The same naming standards apply to patchable RMs.

Figure 2 SPM load file naming standards for patchable base loads

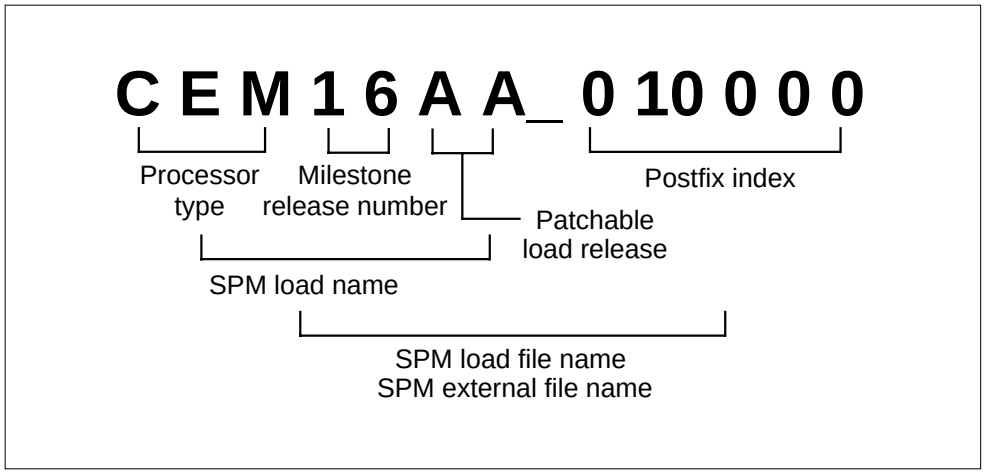
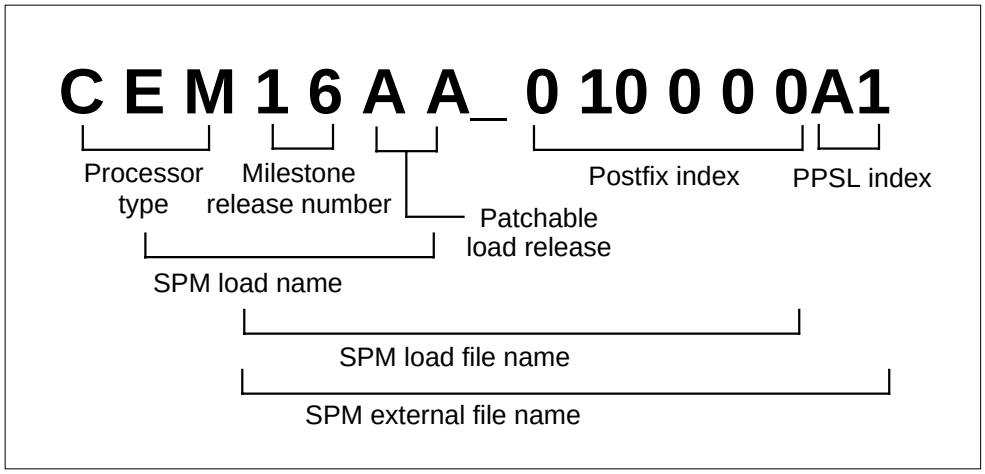


Figure 3 SPM load file naming standards for PPSLs



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 through Z)

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

N
is numeric (0 through 9)

The following table explains the meaning communicated by each SPM load file name.

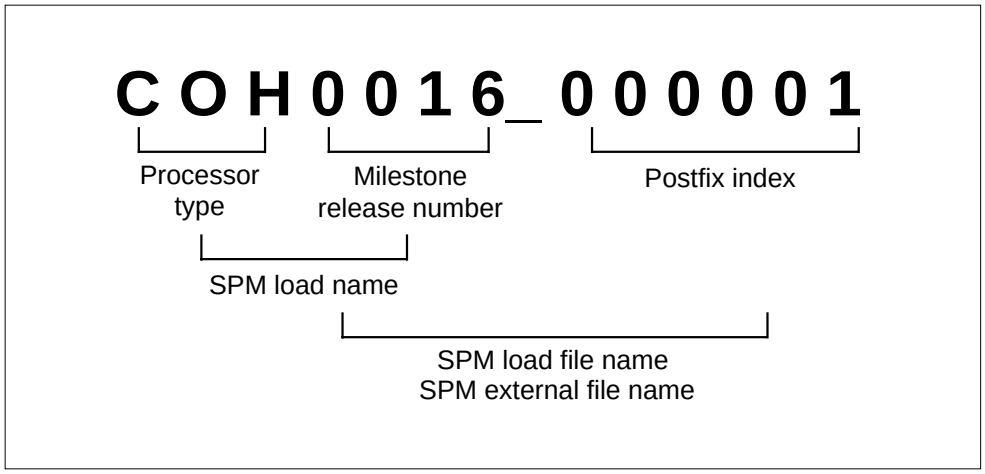
Table 2 Explanation of SPM load file names for nonpatchable loads

Character position	Explanation	Examples
1 through 3 (ZZA)	(processor type) Character positions 1 through 3 indicate the processor type. The processor type remains constant over software releases.	COH
4 through 7 (NNNN)	(milestone release number) Character positions 4 through 7 indicate the milestone release number. The milestone release number changes when Nortel Networks releases a new milestone load.	0016
8 (_)	Character position 8 is the delimiter for the postfix index.	_
9 through 14 (NNNNNN)	(postfix index) Character positions 9 through 14 indicate the postfix index. The postfix index changes when Nortel Networks releases a new maintenance or emergency load.	000001 000002

Note: The SPM load file name must contain all 14 characters, for example, COH0016_000001.

Use the following figure to help explain the nonpatchable SPM load file naming standards. Use this COH load file name for example only.

Figure 4 SPM load file naming standards for nonpatchable loads



Delivery and ordering processes

The addition of an SPM frame or a PCL upgrade to a site with in-service SPMs triggers Nortel to schedule/provision the applicable SPM non-computing module load (NCL). The required SPM NCL is determined by pre-defined 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. This milestone is fed to the Satellite Distribution Center. A load tape 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 via 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)
- optical carrier rate 3 (OC3)
- synchronization resource module (SYN)

Note 1: The DSP load contains the LX66 VSP, as well as the DSP upgrade software.

Note 2: At this time, Nortel Networks has no plans to extend patching functionality to the LX85 and LX86 (COH) loads.

OAM&P strategy

Operations, adminstration, maintenance, and provisioning for the SPM is available through the MAP commands.

Interfaces

Network interfaces and protocols

SPM nodes directly terminate an OC-3 SONET carrier and feed 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 breaks down 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 can route the signals to other modules via 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 acts as 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 documentation but have high urgency. The following procedure demonstrates how to access SPM Customer Advisory Bulletins (CABs) and Emergency Warning Bulletins (EWBs).

Procedure 1 Accessing SPM technical bulletins

In a WWW browser

1 Go to “http://www.nortelnetworks.com/”

2 Click on on the left side for “Customer Support.”

3 Click on the link for “Customer Service Requests.”

4 In the “Select a Product” pulldown menu, select “Spectrum Peripheral Module (SPM)” and press the Go button.

5 When the User Certificate message appears, click the “OK” button.

6 Enter your NAIL username and password when prompted.

Note: You must have a valid NAIL user account to access SPM technical bulletins.

7 From this point, two options are available for finding bulletins: Performance Search and Product Bulletins.

Ifyou choose	Do
“Performance Search”	Procedure 8
“Product Bulletins”	Procedure 12

8 Once the “Performance Search” page opens, enter “SPM” in the first “Search Criteria” field.

9 In the “Documents” field, select “GBS”.

10 Click the “Submit Search” button.

11 Click on the link in the “Id” field to read the bulletin. Go to Procedure 16.

12 Once the “Product Bulletins” page opens, click on the “Global Bulletin System” link.

13 In the “Bulletin Type” field, select one or more of the following:

- DMS-250 CUSTOMER ADVISORY BULLETIN
- DMS-250 EMERGENCY WARNING BULLETIN
- DMS-500 CUSTOMER ADVISORY BULLETIN
- DMS-500 EMERGENCY WARNING BULLETIN

Note: To select multiple items, hold down the Control key when clicking the left mouse button.

14 Click the Submit button to continue.

15 Click on the link in the “Number” field to read the bulletin.

16 You have completed this procedure.

SPM training courses

Nortel Networks offers several training courses for the SPM. They are listed in the table below.

Table 3 SPM training courses

Course number	Course name
301	SPM Maintenance Overview (CBT)
303	SPMConfiguration and Datafill for the SPM
306	SPM ISDN Primary Rate Interface Trunking App
1931	SPM Connectivity and REMLOGIN
4367	SPM Installation and Commissioning

To schedule a training course, contact Nortel Networks at 1-877-662-5669.