Alcatel-Lucent 5620

SERVICE AWARE MANAGER | RELEASE 9.0 R2

OPTICAL USER GUIDE

3HE 06511 AAAB TQZZA Edition 01

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8.3 If any provision of this Agreement is held to be invalid, illegal or unenforceable, it shall be severed and the remaining provisions shall continue in full force and effect.

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8.5 Alcatel-Lucent shall have the right, at its own expense and upon reasonable written notice to Customer, to periodically inspect Customer's premises and such documents as it may reasonably require, for the exclusive purpose of verifying Customer's compliance with its obligations under this Agreement.

8.6 All notices shall be sent to the parties at the addresses listed above, or to any such address as may be specified from time to time. Notices shall be deemed to have been received five days after deposit with a post office when sent by registered or certified mail, postage prepaid and receipt requested.

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8.10 This Agreement shall be governed by and construed in accordance with the laws of the Province of Ontario. The application of the United Nations Convention on Contracts for the International Sale of Goods is hereby expressly excluded.

Preface

The Preface provides general information about the 5620 Service Aware Manager documentation suite.

Note — You can use the Search function of Acrobat Reader (File→Search) to find a term in a PDF of this document. To refine your search, use appropriate search options (for example, search for whole words only or enable case-sensitive searching). You can also search for a term in multiple PDFs at once. For more information, see the Help for Acrobat Reader.

5620 SAM documentation suite

The 5620 SAM documentation suite describes the 5620 SAM and the associated network management of its supported devices. Contact your Alcatel-Lucent support representative for information about specific network or facility considerations.

Table 1 lists the documents in the 5620 SAM documentation suite.

Table 1 5620 SAM customer documentation suite

Guide	Description
5620 SAM core documentation	
5620 SAM Planning Guide	The *5620 SAM Planning Guide* provides information about 5620 SAM scalability and recommended hardware configurations.

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Guide	Description
5620 SAM | 5650 CPAM Installation and Upgrade Guide	The *5620 SAM | 5650 CPAM Installation and Upgrade Guide* provides OS considerations, configuration information, and procedures for the following: • installing, upgrading, and uninstalling 5620 SAM and 5650 CPAM software in standalone and redundant deployments • 5620 SAM system migration to a different system • conversion from a standalone to a redundant 5620 SAM system
5620 SAM User Guide	The *5620 SAM User Guide* provides information about using the 5620 SAM to manage the service-aware IP/MPLS network, including GUI basics, commissioning, service configuration, and policy management. The *5620 SAM User Guide* uses a task-based format. Each chapter contains: • a workflow that describes the steps for configuring and using the functionality • detailed procedures that list the configurable parameters on the associated forms 5620 SAM management information specific to LTE network elements is covered in the *5620 SAM LTE ePC User Guide* and *5620 SAM LTE RAN User Guide*. 5620 SAM management information specific to 1830 PSS network elements is covered in the *5620 SAM Optical User Guide*.
5620 SAM Parameter Guide	The *5620 SAM Parameter Guide* provides: • parameter descriptions that include value ranges and default values • parameter options and option descriptions • parameter and option dependencies • parameter mappings to the 5620 SAM-O XML equivalent property names There are dynamic links between the procedures in the *5620 SAM User Guide* and the parameter descriptions in the *5620 SAM Parameter Guide*. See Procedure 2 for more information. Parameters specific to LTE network elements are covered in the *5620 SAM LTE Parameter Reference*. Parameters specific to 1830 PSS network elements are covered in the *5620 SAM Optical Parameter Reference*.
5620 SAM Statistics Management Guide	The *5620 SAM Statistics Management Guide* provides information about how to configure performance and accounting statistics collection and how to view counters using the 5620 SAM. Network examples are included.
5620 SAM Scripts and Templates Developer Guide	The *5620 SAM Scripts and Templates Developer Guide* provides information that allows you to develop, manage, and execute CLI-based or XML-based scripts or templates. The guide is intended for developers, skilled administrators, and operators who are expected to be familiar with the following: • CLI scripting, XML, and the Velocity engine • basic scripting or programming • 5620 SAM functions

5620 SAM Troubleshooting Guide	The *5620 SAM Troubleshooting Guide* provides task-based procedures and user documentation to:
	• help resolve issues in the managed and management networks
	• identify the root cause and plan corrective action for:
	  • alarm conditions on a network object or customer service
	  • problems on customer services with no associated alarms
	• list problem scenarios, possible solutions, and tools to help check:
	  • network management LANs
	  • network management platforms and operating systems
	  • 5620 SAM client GUIs and client OSS applications
	  • 5620 SAM servers
	  • 5620 SAM databases

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Guide	Description
5620 SAM Maintenance Guide	The *5620 SAM Maintenance Guide* provides procedures for: • generating baseline information for 5620 SAM applications • performing daily, weekly, monthly, and as-required maintenance activities for 5620 SAM-managed networks
5620 SAM Integration Guide	The *5620 SAM Integration Guide* provides procedures to allow the 5620 SAM to integrate with additional components.
5620 SAM System Architecture Guide	The *5620 SAM System Architecture Guide* is intended for technology officers and network planners to increase their knowledge of the 5620 SAM software structure and components. It describes the system structure, software components, and interfaces of the 5620 SAM. In addition, 5620 SAM fault tolerance, security, and network management capabilities are discussed from an architectural perspective.
5620 SAM Supervision Module User Guide	The *5620 SAM Supervision Module User Guide* provides information about how to configure and use the web-based 5620 SAM Supervision Module for fault management and at-a-glance network element monitoring.
5620 SAM Network Element Compatibility Guide	The *5620 SAM Network Element Compatibility Guide* provides release-specific information about the compatibility of managed device features in 5620 SAM releases.
5620 SAM Release Description	The *5620 SAM Release Description* provides information about the new features associated with a 5620 SAM software release.
5620 SAM Glossary	The *5620 SAM Glossary* defines terms and acronyms used in all of the 5620 SAM documentation, including 5620 SAM LTE documentation.
5620 SAM XML OSS Interface Developer Guide	The *5620 SAM XML OSS Interface Developer Guide* provides information that allows you to: • use the 5620 SAM XML OSS interface to access network management information • learn about the information model associated with the managed network • develop OSS applications using the packaged methods, classes, data types, and objects necessary to manage 5620 SAM functions
5620 SAM LTE documentation	
5620 SAM LTE ePC User Guide	The *5620 SAM LTE ePC User Guide* describes how to discover, configure, and manage LTE ePC devices using the 5620 SAM. The guide is intended for LTE ePC network planners, administrators, and operators. Alcatel-Lucent recommends that you review the entire *5620 SAM LTE ePC User Guide* before you attempt to use the 5620 SAM in your LTE network.
5620 SAM LTE RAN User Guide	The *5620 SAM LTE RAN User Guide* describes how to discover, configure, and manage the eNodeB using the 5620 SAM. The guide is intended for LTE RAN network planners, administrators, and operators. Alcatel-Lucent recommends that you review the entire *5620 SAM LTE RAN User Guide* before you attempt to use the 5620 SAM in your LTE network.
5620 SAM LTE Parameter Reference	The *5620 SAM LTE Parameter Reference* provides a list of all LTE ePC and LTE RAN parameters supported in the 5620 SAM.
5620 SAM LTE Alarm Reference	The *5620 SAM LTE Alarm Reference* provides a list of LTE ePC and LTE RAN alarms that can be reported in the 5620 SAM GUI.
5620 SAM 3GPP OSS Interface Developer Guide	The *5620 SAM 3GPP OSS Interface Developer Guide* describes the components and architecture of the 3GPP OSS interface to the 5620 SAM. It includes procedures and samples to assist OSS application developers to use the 3GPP interface to manage LTE devices.
5620 SAM 3GPP OSS Interface Compliance Statements	The *5620 SAM 3GPP OSS Interface Compliance Statements* document describes the compliance of the 5620 SAM 3GPP OSS interface with the 3GPP standard.
5620 SAM LTE RAN Release Description	The *5620 SAM LTE RAN Release Description* provides information about the LTE RAN features associated with the release.

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Guide	Description
5620 SAM optical documentation	
5620 SAM Optical User Guide	The *5620 SAM Optical User Guide* describes how to discover, configure, and manage optical devices using the 5620 SAM. The guide is intended for optical network planners, administrators, and operators. Alcatel-Lucent recommends that you review the entire *5620 SAM Optical User Guide* before you attempt to use the 5620 SAM in your network.
5620 SAM Optical Parameter Reference	The *5620 SAM Optical Parameter Reference* provides a list of all optical device parameters supported in the 5620 SAM.
5620 SAM Optical Alarm Reference	The *5620 SAM Optical Alarm Reference* provides a list of optical device alarms that can be reported in the 5620 SAM GUI.

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Procedure 1 To find the 5620 SAM user documentation

The user documentation is available from the following sources:

- the User_Documentation directory on the product DVD-ROM
- Help→5620 SAM User Documentation in the 5620 SAM client GUI main menu

Note — Users of Mozilla browsers may receive an error message when using the User Documentation Index page (index.html) to open the PDF files in the 5620 SAM documentation suite. The offline storage and default cache values used by the browsers are the cause of the error message.

Alcatel-Lucent recommends changing the offline storage (Mozilla Firefox) or cache (Mozilla 1.7) values to 100 Mbytes to eliminate the error message.

Procedure 2 To view parameter descriptions from the *5620 SAM User Guide*

You can click on a parameter name in a *5620 SAM User Guide* procedure to open the matching parameter description in the *5620 SAM Parameter Guide*. Ensure the following conditions are true beforehand:

- the *5620 SAM Parameter Guide* and *5620 SAM User Guide* are located in the same directory
- Adobe Reader Release 5.0 or later is installed

1. To view a parameter description when both the *5620 SAM User Guide* and the *5620 SAM Parameter Guide* are open in Adobe Acrobat, click on the parameter name in the *5620 SAM User Guide*.

   The parameter description is displayed in the *5620 SAM Parameter Guide*.

2. To view a parameter description when only the *5620 SAM User Guide* is open in Adobe Acrobat:

   i. Click on a parameter name in a procedure in the *5620 SAM User Guide*. The *5620 SAM User Guide* closes and the *5620 SAM Parameter Guide* opens to display the parameter description.

   ii. Double-click on the Previous View button in Adobe Acrobat (or press Alt + ←) to re-open the *5620 SAM User Guide*. The *5620 SAM User Guide* opens and displays the parameter from step i.

Prerequisites

Readers of the 5620 SAM documentation suite are assumed to be familiar with the following:

- 5620 SAM software structure and components
- 5620 SAM GUI operations and tools
- typical 5620 SAM management tasks and procedures
- device and network management concepts

Conventions

Table 2 lists the conventions that are used throughout the documentation.

Table 2 Documentation conventions

Convention	Description	Example
Key name	Press a keyboard key	Delete
Italics	Identifies a variable	*hostname*

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Convention	Description	Example
Key+Key	Type the appropriate consecutive keystroke sequence	CTRL+G
Key–Key	Type the appropriate simultaneous keystroke sequence	CTRL–G
*	An asterisk is a wildcard character, which means “any character” in a search argument.	log_file*.txt
↵	Press the Return key	↵
—	An em dash indicates there is no information.	—
→	Indicates that a cascading submenu results from selecting a menu item	Policies→Alarm Policies

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Procedures with options or substeps

When there are options in a procedure, they are identified by letters. When there are substeps in a procedure, they are identified by Roman numerals.

Example of options in a procedure

At step 1, you can choose option a or b. At step 2, you must do what the step indicates.

1 This step offers two options. You must choose one of the following.

- **a** This is one option.
- **b** This is another option.

2 You must perform this step.

Example of substeps in a procedure

At step 1, you must perform a series of substeps within a step. At step 2, you must do what the step indicates.

1 This step has a series of substeps that you must perform to complete the step. You must perform the following substeps.

- **i** This is the first substep.
- **ii** This is the second substep.
- **iii** This is the third substep.

2 You must perform this step.

Measurement conventions

Measurements in this document are expressed in metric units and follow the Système international d’unités (SI) standard for abbreviation of metric units. If imperial measurements are included, they appear in brackets following the metric unit.

Table 3 lists the measurement symbols used in this document.

Table 3 Bits and bytes conventions

Measurement	Symbol
bit	b
byte	byte
kilobits per second	kb/s

Important information

The following conventions are used to indicate important information:

Warning — Warning indicates that the described activity or situation may, or will, cause equipment damage or serious performance problems.

Caution — Caution indicates that the described activity or situation may, or will, cause service interruption.

Note — Notes provide information that is, or may be, of special interest.

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1.1 Overview of the 1830 PSS

The 5620 SAM supports the 1830 PSS product family of devices which includes:

- 1830 PSS 32—central office device, Release 2.5 and 2.5.1
- 1830 PSS 16—end office device, Release 2.5 and 2.5.1
- 1830 PSS 1—edge aggregation devices that collect lower rate signals for input to the 1830 PSS network. These include:
  - 1830 PSS 1 GBE edge device, Release 2.5
  - 1830 PSS 1 MD4H edge device, Release 1.5
  - 1830 PSS 1 AHP amplifier, Release 1.0

The 1830 Photonic Service Switch (PSS) product family provides increased network flexibility and operational automation using zero-touch, transparent photonic networking. Photonic networks use simplified and accelerated operations to transform WDM into true transport networking with advanced flexibility, performance, automation, and integration.

1830 PSS 32 central office device/1830 PSS 16 end office device

The 1830 PSS 32 and 1830 PSS 16 are closely related shelves. The shelves are referred to collectively as the 1830 PSS 32/1830 PSS 16. They are scalable optical transport platforms for regional and metropolitan network transport and services delivery. The 1830 PSS 32 central office device provides a 32-slot platform for core, central office applications. The 1830 PSS 16 end office device provides a 16-slot platform that can be used for end office or smaller core office applications.

For specific information about the hardware and capabilities supported by the shelves, see the *1830 Photonic Service Switch 32/16 Product Information and Planning Guide*.

The 1830 PSS 32 is designed as a highly modular metropolitan WDM platform to cost-effectively meet the requirements of initial network demands while simultaneously ready for upgrade to meet future demands. At the same time, it employs advanced "Zero Touch Photonics" management and control features, simplifying WDM system management so that it approaches the ease-of-use associated only with SDH/SONET technology.

The 1830 PSS 32 network consists of single, standalone NE, or two or more interconnected NEs that provide SDH/SONET/GigE aggregation and transport, 10G, FC (R1.1), or transponderless wavelength services in a metropolitan or regional networking environment

1830 PSS 1 GBE edge device

The 1830 PSS 1 GBE edge device is a 1-Rack-Unit (1-RU) device for installation in 19-in., ANSI, or ETSI racks. The device is based on a 12xGBE optical transponder that supports optional coarse wavelength division multiplexing (CWDM) filters.

The 1830 PSS 1 GBE edge device provides an optimized WDM access platform that includes the following features:

- 1-RU height
- dc power (ac power adapter available)

- standard or temperature-hardened versions
  - standard 1830 PSS 1 GBE
  - hardened 1830 PSS 1 GBEH
- Black & White (B&W), CWDM, or DWDM optics
- in-band management using GCC
- stackable as a single NE
- alignment with the 1830 PSS service cards and operations
- support for single-fiber bidirectional transmission

See the *1830 Photonic Service Switch 1 (PSS-1) Release 2.5.0 GBEH Edge Device User Guide* for more information.

1830 PSS 1 MD4H edge device

The 1830 PSS 1 MD4H edge device is a 1-RU device for installation in 19-in., ANSI, or ETSI racks. The MD4H designation represents the device as a multiservice dual module unit with 4 client ports per module, which is temperature hardened. The device is based on two 1830 PSS 32 4DPA4 optical transponders, which are remapped into an external device that also supports optional CWDM filters.

The 1830 PSS 1 MD4H edge device provides an optimized WDM access platform that includes the following features:

- 1-RU height
- dc power (ac power adapter available)
- standard or temperature-hardened versions
- Black & White (B&W), CWDM, or DWDM optics
- in-band management using GCC
- alignment with the 1830 PSS service cards and operations
- support for single-fiber bidirectional transmission

See the *1830 Photonic Service Switch 1 (PSS-1) Release 1.5.0 MD4H Edge Device User Guide* for more information.

1830 PSS 1 AHP amplifier

The 1830 PSS 1 AHP is a 1-RU edge device that supports a specially adapted amplifier. Two 1830 PSS 1 AHP devices can be used to provide a low cost in-line amplifier (ILA) node solution for the 1830 PSS. The 1830 PSS 1 AHP amplifier software provides the following enhanced capabilities:

- multi-shelf NE management
- IP routing (OSPF) over OSC links
- wave key assignment distribution over OSPF LSAs
- automatic/manual power management between nodes
- keyed-unkeyed DWDM OCH XC provisioning and OCH trail management
- DCM shelf/card/port management

See the *1830 Photonic Service Switch 1 (PSS-1) Release 1.0.0 AHP Amplifier User Guide* for more information.

1.2 About this guide

This document provides information about how to access the 5620 SAM to configure and manage the 1830 PSS network. The 5620 SAM guides describe the GUI operations associated with each function, and indicate whether the function is available using the OSSI. See the *5620 SAM-O OSS Interface Developer Guide* for information about using the OSSI to perform a 5620 SAM function.

This document describes the features, and configurations, for the 1830 PSS 32 and 1830 PSS 16 as well as their hardware components, NEs, and networks. See the *1830 Photonic Service Switch 32/16 Product Information and Planning Guide* for more information.

A high-level overview of the 1830 PSS 1 edge devices is included. For more information about the 1830 PSS 1 edge devices, see the *Alcatel-Lucent 1830 Photonic Service Switch 1 (PSS-1) Release 2.5.0 GBEH Edge Device User Guide*, the *Alcatel-Lucent 1830 Photonic Service Switch 1 (PSS-1) Release 1.5.0 MD4H Edge Device User Guide*, and the *Alcatel-Lucent 1830 Photonic Service Switch 1 (PSS-1) Release 1.0.0 AHP Amplifier User Guide*.

The *5620 SAM User Guide* procedures that contain configurable parameters have links to parameter descriptions in the *5620 SAM Parameter Guide*, where appropriate.

Note — The *5620 SAM Optical User Guide* parameter links can function only when the guide is in the same directory as the *5620 SAM Optical Parameter Reference*.

This guide contains the following volumes:

- Getting started—contains the following general 1830 PSS information:
  - a system overview
  - features supported
  - GUI map management
- 1830 PSS system management using the 5620 SAM contains the following information:
  - system configuration
  - system and user security
- Device management—contains information about device functions that are not directly related to networking, such as the following:
  - device support
  - preparing devices for 5620 SAM management
  - 5620 SAM device and equipment management functions
- Network management—contains the following information about network functions:
  - general routing and forwarding
  - fault management

- Service management—contains information about managing customer services, such as the following:
  - service creation and configuration
  - customer and subscriber management
  - service verification, troubleshooting, and root-cause analysis
  - scheduling of routine, service-related operations

1.3 1830 PSS reference documentation

See the following documents for more information about the 1830 PSS:

- *Alcatel-Lucent 1830 Photonic Service Switch 1 (PSS-1) Release 2.5.0 GBEH Edge Device User Guide*
- *Alcatel-Lucent 1830 Photonic Service Switch 1 (PSS-1) Release 1.5.0 MD4H Edge Device User Guide*
- *Alcatel-Lucent 1830 Photonic Service Switch (PSS-1) Release 1.0.0 AHP Amplifier User Guide*
- *Alcatel-Lucent 1830 32/16 (PSS-32/PSS-16) Release 2.5.0 User Provisioning Guide*
- *Alcatel-Lucent 1830 Photonic Service Switch 32/16 (PSS-32/PSS-16) Release 2.5.0 Product Information and Planning Guide*
- *Alcatel-Lucent 1830 Photonic Service Switch 32/16 (PSS-32/PSS-16) Release 2.5.0 Maintenance and Trouble-Clearing Guide*
- *Alcatel-Lucent 1830 Photonic Service Switch 32/16 (PSS-32/PSS-16) Release 2.5.0 Installation and System Turn-Up Guide*
- *Alcatel-Lucent 1830 Photonic Service Switch (PSS) Release 2.5.0 Safety Guide*
- *Alcatel-Lucent 1830 Photonic Service Switch (PSS) Release 2.5.0 Command Line Interface Guide*
- *Alcatel-Lucent 1830 Photonic Service Switch (PSS) Release 2.5.0 TL1 Commands and Messages Guide*
- *Alcatel-Lucent 1830 Photonic Service Switch (PSS) Release 2.5.0 Engineering and Planning Tool User Guide*

2 — 5620 SAM release 1830 PSS features and functionality

2.1 1830 PSS features for 5620 SAM Release 8.0 R7 *2-2*

2.1 1830 PSS features for 5620 SAM Release 8.0 R7

Table 2-1 lists the 1830 PSS features and functionality added in the 5620 SAM Release 8.0 R7.

Table 2-1 5620 SAM Release 8.0 R7 1830 PSS features

Feature or function	Description	Reference for more information
Release 8.0 R7 1830 PSS features		
1830 PSS security	The 5620 SAM supports span of control for the 1830 PSS optical transport service nodes.	See chapter 5 for information about span of control. See the *5620 SAM User Guide* for more information about span of control and user security.
Map management	The 5620 SAM supports: • the display of optical wavelength devices on physical topology maps • the filtering of links to display only optical links	See chapter 3 for information about map management. See the *5620 SAM User Guide* for more information about map management.
Equipment management of the 1830 PSS 32/16/1 GBEH, MD4H and AHP devices	The 5620 SAM supports: • shelf management • card slot management • ports management	See chapter 9 for information about equipment management. See the *5620 SAM User Guide* for more information about equipment management.
Network management of the 1830 PSS 32/16/1 GBEH, MD4H and AHP devices	The 5620 SAM supports: • 1830 PSS 32/16/1 device discovery • 1830 PSS 32/16/1 GBEH, MD4H and AHP management • Device CLI sessions • Out-of-band and In-band management • Switching modes between SONET and SDH • SNMP management	See chapters 8, 9, 13 for more information about Network management. See the *5620 SAM User Guide* for more information about network management.
Performance management of the 1830 PSS 32/16/1 GBEH, MD4H and AHP devices	The 5620 SAM supports: • performance monitoring • performance statistics • threshold crossing alarms • bins and intervals	See chapter 9 for more information about performance management. See the *5620 SAM User Guide* for more information about performance management.
Fault management of the 1830 PSS 32/16/1 GBEH, MD4H and AHP devices	The 5620 SAM supports: • usage logging • dry contacts	See chapter 13 for information about fault management. See the *5620 SAM User Guide* for more information about fault management.
Alarm management of the 1830 PSS 32/16/1 GBEH, MD4H and AHP devices	The 5620 SAM supports: • tagging of service and non-service affecting alarms • alarm status, severity and aggregation • alarm suppression	See the *5620 SAM Optical Alarm Reference* guide for information about alarm management and see chapter 13 for more information about alarms. See the *5620 SAM User Guide* for more information about alarm management.

(1 of 2)

Feature or function	Description	Reference for more information
Licensing	The 5620 SAM supports management of licensed 1830 PSS 32/16/1 devices	See chapter 4 for information about licensing and the 1830 PSS family of devices. See the *5620 SAM User Guide* for more information about viewing license keys and changing license keys.
Optical transport service	The 5620 SAM supports: • optical transport service configuration • optical subrate service configuration • port-timeslot assignment • discovery of optical transport service • unmanaging optical transport service	See chapter 11 for more information.
Backup and restore	Backup and restore of 1830 PSS NEs	See chapter 6 for more information.
Power management on ports and services	The 5620 SAM supports power management on optical ports and optical transport services using the wavelength tracker tool.	See chapter 12 for more information.

(2 of 2)

3 — 1830 PSS map management

3.1 5620 SAM network topology maps *3-2*

3.1 5620 SAM network topology maps

This section describes the network topology and grouping in the 5620 SAM that applies to the 1830 PSS. The 5620 SAM uses map windows to visually represent network objects and paths. For the 1830 PSS, the 5620 SAM supports physical network topology maps. Each map displays network objects and information, and provides contextual menus to open forms that display additional information. See the *5620 SAM User Guide* for more information about network topology.

Physical topology map

When the 5620 SAM client GUI starts, the physical topology map is open in the working panel by default. The default view displays the interconnections between IP and optical devices. The 5620 SAM allows you to filter the view to display only optical interconnections or IP interconnections. Procedure 3-1 describes how to view only the optical interconnections on the physical topology map. See the *5620 SAM Parameter Guide* for descriptions of the parameters. For more information about network topology maps, see the map management chapter in the *5620 SAM User Guide*.

Procedure 3-1 To view optical interconnections only

1. Open a physical topology map.
2. Click on the Filter button. The Topology Filter - Physical Topology form opens.
3. Choose Optical Link from the Object Filter drop-down menu.

Note — To view only devices with IP interconnections, choose Physical Link from the Object Filter drop-down menu before proceeding.

4. Click on the Add Object Filter button. The selected Optical Link filter is displayed in the Filter panel.
5. Click on the Apply button to apply the Optical Link filter and not save the filter. The Topology Filter - Physical Topology form closes and the map view is refreshed to display only devices with optical interconnections.

4 — 1830 PSS component configuration

4.1 Component configuration overview *4-2*

4.1 Component configuration overview

The 1830 PSS family of network devices require software license keys to operate. License keys provide access to the following 5620 SAM information:

- customer name and the active license key value
- host name and IP address of the main server
- number of supported operator positions
- status of the primary and standby servers
- supported 5620 SAM modules and packages
- configuration information for redundant Solaris installations

For more information about viewing and changing license keys, see the software configuration procedures section in the 5620 SAM component configuration chapter in the *5620 SAM User Guide*.

5 — 1830 PSS user security

5.1 User security overview *5-2*

5.2 5620 SAM user and user group security *5-2*

5.1 User security overview

The 5620 SAM provides security functions for user groups, devices, and paths.

5.2 5620 SAM user and user group security

You can use the 5620 SAM to configure user accounts, user groups, and spans of control that define the 5620 SAM objects that users can view and manage. For more information about user security in the 5620 SAM, see the *5620 SAM User Guide*.

Span of control

Span of control allows you to assign access permissions to a functional group of 5620 SAM server objects; for example a group of NEs or services.

You can use the 5620 SAM to create a span of control, or to copy an existing span of control and modify the list of associated objects to create a span of control. The objects that are in a span of control, or that can be added to a span of control, are called span objects. The 5620 SAM has several pre-defined spans of control. Each new 5620 SAM object, for example, a discovered NE, is added to the corresponding pre-defined span of control. Optical objects, such as the wavelength service on the 1830 PSS, are added to the Default Transport Span.

For more information about span of control see the user security chapter in the *5620 SAM User Guide*. For more information about how to configure span of control see the To create a span of control procedure in the user security chapter in the *5620 SAM User Guide*.

You can filter the objects that a map or list displays, based on the user span of control. By default, the GUI displays only the objects that are in the View Access and Edit Access spans of control of the user. See the GUI configuration and GUI search procedures in the GUI overview chapter in the *5620 SAM User Guide* for more information.

1830 PSS device management using the 5620 SAM

6 — 1830 PSS device management

7 — 1830 PSS discovery

8 — 1830 PSS CLI sessions

9 — 1830 PSS equipment management

10 — 1830 PSS equipment navigation tree

6 — 1830 PSS device management

6.1 Device management overview *6-2*

6.2 Out-of-band and in-band management *6-2*

6.3 Switching modes between SONET and SDH *6-4*

6.4 Backup and restore on 1830 PSS NEs *6-4*

6.1 Device management overview

The 1830 PSS device must be commissioned and pre-configured before the 5620 SAM can manage the device. When the pre-configuration is complete, the 5620 SAM can discover the device. See the *5620 SAM User Guide* for more information about device discovery.

6.2 Out-of-band and in-band management

The 5620 SAM supports in-band and out-of-band management of devices for the 1830 PSS.

Out-of-band management

When you configure a device for out-of-band management only, management traffic between the 5620 SAM and the 1830 PSS device is transmitted through the management port of the device. The 5620 SAM sends management traffic to the management IP address of the 1830 PSS device.

When you configure a device for in-band and out-of-band management, one method provides redundancy for the other method. If the IP addresses are the same, redundancy is not supported. The out-of-band connection is called the primary connection and the in-band connection is called the secondary connection.

See the device commissioning and management chapter in the *5620 SAM User Guide* for out-of-band management support.

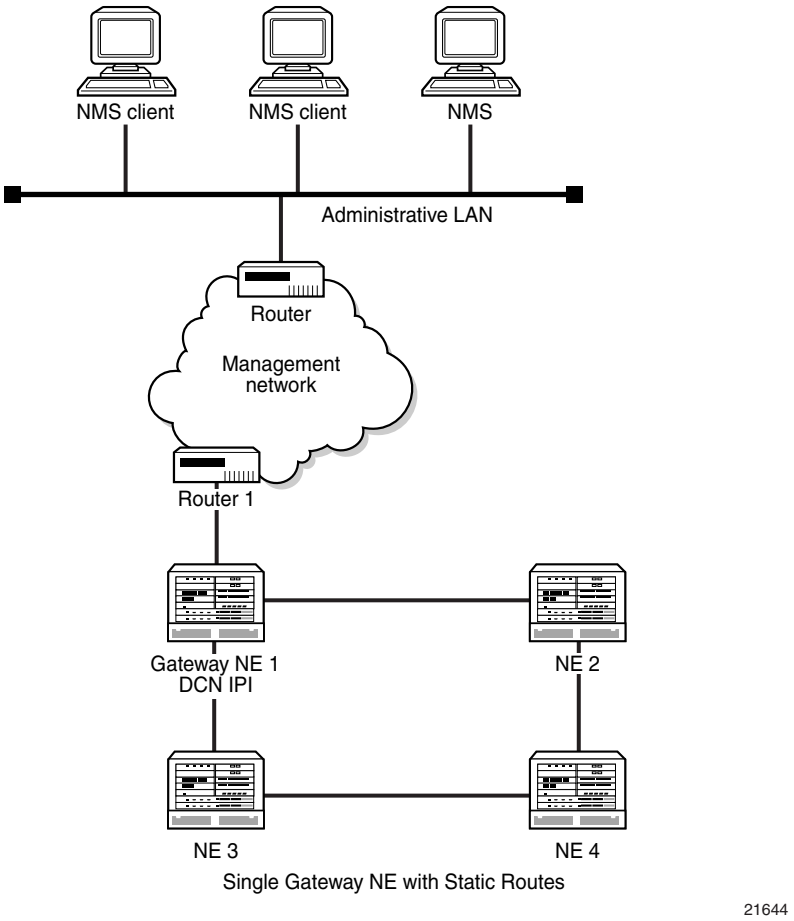
In-band management

The network management system can manage an 1830 PSS 32 network by connecting to a single 1830 PSS 32 NE that is called a GNE. The GNE provides management connectivity to the other 1830 PSS 32 NEs in the network. The GNE communicates externally using an IP address. Non-GNE nodes are only in-band to each other. The network system does not specifically manage or configure the GNE.

SONET, SDH, and OTN architectures support DCC and GCC, which are in-band channels that can be used for management. IP over DCC/GCC is an in-band management channel which can be used if a device is connected to a TRX-24000 client port.

Figure 6-1 shows NE 1 as the Gateway NE for the ring. Interconnecting the cards which support OSC ports between the NEs provides inter-NE communication for network management.

Figure 6-1 In-band management



Prerequisites

You must configure the following on the 1830 PSS for a gateway NE with static routes:

- OAMP IP address
- OAMP IP address subnet mask
- Default route gateway IP address (which is redistributed)
- NE loopback IP address and subnet mask

The non-gateway NEs require the following:

- NE loopback IP address and mask

Although the 1830 PSS NEs do not exchange routing information with operating organization routers, an operating organization router that is attached to the gateway NE requires the following:

- The operating company router must have auto-negotiation enabled, or should be running in 10Mpbs half-duplex mode
- static route for the NE loopback IP address subnet

To configure the1830 PSS to use in-band, out-of-band, or in-band and out-of-band polling at the intervals specified in a mediation policy. See the Device commissioning and management chapter in the *5620 SAM User Guide* for more information about in-band and out-of-band polling intervals. See the Device discovery chapter in the *5620 SAM User Guide* for information about configuring mediation policies.

6.3 Switching modes between SONET and SDH

The 1830 PSS can be set to SONET or SDH mode using the CLI command.

Caution — If the NE mode is changed to SONET or SDH, the configurations on the shelf, card, and port NE are lost. After the NE is re-started, the new mode must be reconfigured.

See the Equipment Management chapter in the *5620 SAM User Guide* for more information about the SONET and SDH modes. See the *1830 Photonic Service Switch (PSS-1) Release 2.5.0 Command Line Interface Guide* for the CLI commands. To access the CLI using the 5620 SAM GUI, see the Device CLI Sessions chapter in the *5620 SAM User Guide*.

Note 1 — You cannot change the SONET or SDH mode using the 5620 SAM GUI.

Note 2 — If you switch modes between SONET and SDH, and the mode value is changed, you would need to do a full manual resync of the NE in the 5620 SAM GUI.

Note 3 — When the mode is changed using a tnSysSonetSdhMode CLI command, the 5620 SAM recognizes the NE mode change and raises an alarm. The alarm must be manually cleared by the user. See the Alarm management chapter in the *5620 SAM User Guide* to clear alarms.

6.4 Backup and restore on 1830 PSS NEs

Encrypted File Transfer with SFTP

Both Database Backup and Restore now support SFTP (Secure File Transfer Protocol) /TFTP data transfer. In this case, the NE communicates to an external SSH server running on the DB backup and software repository machine, which in this case, is the machine on which the 5620 SAM server is running.

All previous configuration supported in the CLI remains valid for both the operations, for example, configuration software or configuration database. The option 'sftp' is now available under the 'server protocol' field, and must be used to initiate an SFTP based transfer. An SSH server must be configured using port 22.

For software and database downloads, the applications running on the NE are SSH (or SFTP) clients which connect to an external SSH server. Authentication is password based only. No public key based authentication is performed in this release. As a result, it is possible to initiate SFTP based database and software download operations even when no encryption key is generated. Note that the SFTP based operation may be somewhat slower than traditional tftp/ftp based transfers.

For more information, refer to the NE Maintenance chapter in the *5620 SAM User Guide*.

7 — 1830 PSS discovery

7.1 1830 PSS device discovery *7-2*

7.2 SNMP management *7-2*

7.1 1830 PSS device discovery

The 5620 SAM discovers the 1830 PSS devices and reconciles their properties with the contents of the database. The 5620 SAM discovers the devices using SNMP. During the discovery process, the IP address used to discover a device is the system IP address, also called the system ID, management is considered in-band. When the IP address used to discover the device is the management IP address of the device management port, management is considered out-of-band. See chapter 6 for more information about in-band and out-of-band management.

To discover the 1830 PSS devices, you must use the 5620 SAM Discovery Manager to create discovery rules and scan the network as specified by the rules.

See the Device Discovery chapter in the *5620 SAM User Guide* to discover, manage, and create a mediation policy for the 1830 PSS device on the 5620 SAM.

7.2 SNMP management

SNMP provides a message format to facilitate communication between SNMP managers and agents. SNMP provides a standard framework to monitor and manage NEs from a central location.

An SNMP NE manager controls and monitors the activities of network hosts that use SNMP. An SNMP manager uses a get operation to obtain a value from an SNMP agent, and uses a set operation to store the value in the agent. The manager uses definitions from a MIB to perform operations on the managed device; for example, retrieving data values, replying to requests, and processing SNMP notifications called traps.

The SNMPv1 and SNMPv2c do not provide security, authentication, or encryption. Without authentication, an unauthorized user can perform SNMP network management functions and eavesdrop on management information as the information moves between systems.

The SNMPv3 requires that an authentication and encryption method, such as SSH, be assigned to each user for validation by the NE. The authentication and encryption allow an NE to validate the system that issues an SNMP message and to determine whether another system has tampered with the message.

The SNMP communications occur over the 1830 PSS control network for the following entities: management network elements (managers) and managed network elements (agents). The agent uses traps to notify the manager about an event without first receiving a request from the manager. The traps are asynchronous messages from a network element agent to a network manager to signal an event that may require user attention.

In the 1830 PSS network, the 5620 SAM is the management network element or manager. The 1830 PSS network element is a managed network element or network element agent. Traps are messages that the 1830 PSS network element sends to the 5620 SAM or an external management system on an as-needed basis to notify the manager of events that a network element has experienced. In addition to autonomous messages (such as traps), the SNMP manager can retrieve or modify the NE configuration (using the GET or SET functions).

Note — The 1830 PSS supports SNMP v1, v2c, and v3.

The 1830 PSS 32/1830 PSS 16 supports the following SNMP functions:

- provisioning interface for equipment and parameters using SNMP v2c and v3
- alarm and trap reporting
- trap destination definition

For information about the 1830 PSS SNMP support, see the *1830 Photonic Service Switch 32/16 Product Information and Planning Guide* and the *1830 Photonic Service Switch 32/16 User Provisioning Guide*. For information about SSH security, see the device discovery chapter in the *5620 SAM User Guide*.

To configure admin SNMP users using the CLI or the WebUI, see the *1830 Photonic Service Switch (PSS-1) Release 2.5.0 Command Line Interface Guide* or the *1830PSS_R2.5_R2.6_R2.9_WebUIRRS_Ed1.12 Guide* for more information.

8 — 1830 PSS CLI sessions

8.1 Device CLI sessions *8-2*

8.1 Device CLI sessions

You can perform most NE management functions using the 5620 SAM client GUI. The functions that require CLI access to a managed NE include:

- validating GUI configuration actions
- configuring items that cannot be configured using the GUI; for example, creating a community on the NE
- troubleshooting using device debug files

The 5620 SAM client GUI provides CLI access to the managed NEs from the main menu, and from NE contextual menus in topology maps and navigation trees. See the Device CLI sessions chapter in the *5620 SAM User Guide* and the Security, DCN, and DB Management commands chapter (config snmpserver community section) in the *1830 Photonic Service Switch (PSS-1) Release 2.5.0 Command Line Interface Guide* for more information.

9 — 1830 PSS equipment management

9.1 Equipment management overview *9-2*

9.2 Workflow to manage equipment using the navigation tree *9-2*

9.3 Workflow to manage equipment using the equipment window *9-3*

9.4 Working with objects *9-4*

9.5 Shelf management overview *9-4*

9.6 Card slot management *9-9*

9.7 Ports management *9-11*

9.8 Performance monitoring overview *9-12*

9.9 Performance statistics *9-13*

9.10 Workflow for performance statistics collection *9-14*

9.11 PM profile types supported for line ports on amplifier cards *9-14*

9.12 TCAs *9-14*

9.1 Equipment management overview

The 5620 SAM equipment management interface consists of:

- a main menu
- contextual menus
- a navigation tree
- managed objects
- an equipment window
- property forms to configure object parameters

The 5620 SAM is used to create, configure, and manage a device with the various child objects that need to be part of a network. Equipment such as the routers, which are at the top of the hierarchy, have properties that are configured using the CLI and are discovered when the 5620 SAM discovery process is run.

After the device is discovered, you use properties forms to configure specific parameters for the child objects of the discovered device. The properties forms are opened as follows:

- from the contextual menus that are available for each created object in the Equipment view of the navigation tree
- from the equipment window display tab after you choose an object and click on a Properties button, a Configure button
- from the equipment window display tab when you double-click an object

See the *5620 SAM User Guide* for more information.

9.2 Workflow to manage equipment using the navigation tree

1. Use the 5620 SAM to discover the 1830 PSS device.
2. Right-click on the Discovered NEs topology group in the Equipment view of the navigation tree and choose List from the contextual menu, or double-click on the Discovered NEs icon on the topology map to open the Discovered NEs form.
3. Choose the discovered NEs and drag and drop them to the network icon in the equipment view of the navigation tree or to the topology map.
4. Right-click on the device in the navigation tree to open the contextual menu.
5. Choose an option. See the Equipment navigation tree chapter in the *5620 SAM User Guide* for a list of contextual menu options.
6. Perform any of the following, as required.
   a. Modify the device parameters, as required, using the Properties option from the contextual menu.
   b. Create card objects in the shelf using the Properties option from the contextual menu in the Equipment view.

c View the parameters of the port objects that were created automatically with the daughter card object using the Properties option from the contextual menu in the Equipment view.

d Modify the parameters of the created objects, as required, using the Properties option from the contextual menu in the Equipment view.

9.3 Workflow to manage equipment using the equipment window

1 Verify that the devices are configured before they are discovered by the 5620 SAM.

2 Access the devices and begin configuration and management.

a Choose Application→Equipment Window from the 5620 SAM main menu.

b Use the equipment window to modify or view objects, and to configure parameters.

c Modify the properties of objects as required in equipment window.

From the 5620 SAM equipment window, network administrators and operators can:

- filter different views and information for the managed devices using the equipment window filter
- view and use a graphical representation of the shelf to configure equipment
- view objects and get statistical information about the nodes in their administrative domain
- view the services that traverse or terminate on equipment
- provision and pre-provision equipment to prepare the equipment for the creation of subscriber services
- view, configure, monitor the state of, and manage the following physical elements of the hardware:
  - a managed device
  - each device has one physical shelf
  - internal and external storage devices (flash memory)
  - physical links
  - OLC State
- configure network and access policies for network objects, such as ingress buffer policies for a port
- view and manage APS groups
- manage hardware fault conditions

9.4 Working with objects

Objects in the 5620 SAM are considered to have parent/child relationships that are contained within a hierarchy. For example, a card in a card slot is the parent object of a daughter card. The parameters for each object are configured for a specific function. The parameters can be managed to meet the needs of the service. Objects are created and managed using the properties forms from the contextual menus of the equipment view and using the forms from the equipment window.

The network is the top object in the navigation tree. The device object is the discovered device at the top of the hierarchy in the navigation tree, directly below the network icon. The child objects are created automatically in the navigation tree after the device is discovered.

9.5 Shelf management overview

The 1830 PSS 32 and 1830 PSS 16 shelves provide the framework for the configuration of the 1830 PSS 32/1830 PSS 16 NEs. A universal shelf provides card slots, fiber management trays, backplane, power distribution, and cooling for the NE. The NEs can be deployed in a shelf or expanded to multiple interconnected universal shelves.

The first universal shelf of an NE becomes the master shelf, which provides the management and control connections to the operations systems for the cluster of shelves in a multi-shelf NE. Expansion shelves connect to the master self using a protected internal LAN communication link. The shelves provide extended slot capacity managed by the database that resides in the master shelf.

The universal shelf is the basic building block for the 1830 PSS 32 NE. The shelf provides a framework for the active modules in a system (such as a controller and interface cards).

Each universal shelf has a shelf ID number that can be configured using a physical mechanism (such as a rotary dial) on the backplane. Up to eight bits of information can be set. The shelf ID determines the identity of each universal shelf in the cluster. The most significant bit of the rotary dial determines whether the shelf is the main shelf or an extension shelf.

Each shelf contains mandatory modules equipped; some of the shelves can also have optional modules equipped.

The mandatory equipment must be automatically provisioned regardless of whether the equipment is present. Each shelf includes the following mandatory equipment:

- one shelf controller (EC) in slot 1 or 18
- two power modules (PF)
- a fan module (FAN)

The user interface panel (USRPNL) is mandatory and can only reside on the main shelf. Mandatory equipment is provisioned without an AINS state. The AINS allows newly provisioned entities to be inserted at a later time without generating alarms. If mandatory equipment is not installed, alarms are generated.

A DCM enclosure can hold up to 16 DCMs. The system manages each DCM as a separate shelf.

See the Technical specifications chapter in the *1830 Photonic Service Switch 32/16 Product Information and Planning Guide* and the Equipment provisioning chapter in the *1830 Photonic Service Switch 32/16 User Provisioning Guide* for more information.

1830 PSS 32 shelves

The 1830 PSS 32 system supports three types of shelves: Universal, DCM, and ITLB. The 1830 PSS 32 universal shelf contains 32 replaceable slots.

The SFD44 (44-channel DWDM static filter) is modelled as an OMD shelf with a SFD44 card. Other shelves that can be configured from 5620 SAM are, SFD40, SFD40B, SFD44B and ITLB.

The DCM and OMD shelves are passive module shelves that can contain DCMs and SFD44 modules. These modules provide dispersion compensation and the optical mux/demux function that is associated with core optics modules (line drivers and CWR8, respectively) that are installed in the universal shelf. Each 1830 PSS 32 NE includes up to 8 universal shelves, and up to 24 DCM and OMD shelves.

Each 1830 PSS 32 universal shelf contains 32 function card slots. Two additional slots are reserved for controller cards that are configured for redundant control. Two more slots are reserved for the power filter cards. The top of the shelf contains a fan tray for cooling, a customer interface panel, and two timing interface cards that provide a redundant connection to synchronization references. See the *1830 Photonic Service Switch 32/16 Product Information and Planning Guide* and the *1830 Photonic Service Switch 32/16 User Provisioning Guide* for more information.

1830 PSS 16 shelves

In addition to the slots for the two power filters and two controller cards, the 1830 PSS 16 shelf contains 16 function card slots. The 1830 PSS 16 supports three types of shelves: PSS 16, DCM, ITLB. The slots at the top of the shelf can hold two function cards or the user interface panel on units that are used as main shelves. A fan tray for cooling is located at the bottom of the shelf. See the *1830 Photonic Service Switch 32/16 Product Information and Planning Guide* and the *1830 Photonic Service Switch 32/16 User Provisioning Guide* for more information.

1830 PSS 1 AHP shelves

The 1830 PSS 1 AHP system supports two types of shelves: Universal and DCM.

Working with shelves on the 1830 PSS

Shelf objects represent the hardware that is configured on a shelf. When you choose the shelf object in the navigation tree and click on Properties in the contextual menu, you can view the following information about the shelf:

- general information
- fan tray state and speed
- power supply tray statuses
- statistics
- dry contacts
- faults

- LED statuses
- card slots
- hardware environment information
- timing
- port segregation
- software control module
- software bank information
- cross connects

Table 9-1 Cards supported by the 1830 PSS universal shelf

Cards	Description	Slots for 1830 PSS 32	Slots for 1830 PSS 16	Slots for 1830 PSS 1
R2.0 cards				
USRPNL	User interface panel	40	10 (occupies also 20)	—
PFDCxx (xx=20k,30k, 50k,70k)	(1)	19, 36	1,11	2,3
FAN	Fan subsystem –There is one fan tray for each universal shelf.	37	"21" – this "slot" is the whole width of the 1830 PSS 16 shelf	6
EC	Equipment controller	1, 18	2	1
11STAR1	11G single port tunable anyrate transponder (1 client)	2 to 17, 20 to 35	3 to 9,1 to 20	—
11STGE12	11G single port tunable GBE Mux transponder (12 clients)	2 to 17	3 to 9	—
11STMM10	11G single port tunable multirate mux transponder (10 universal clients)	2 to 17	3 to 9	—
43STX4	43G single port tunable mux (4 clients)	2 to 15	3 to 7	—
4DPA4 DualTran(FC4 00)	4G dual port pluggable anyrate (4 clients)	2 to 17, 20 to 35	3 to 9,12 to 20	—
4DPA4 Flex Mux	4G dual port pluggable anyrate (4 clients)	2 to 17, 20 to 35	3 to 9,12 to 20	—
AHPHG	High power high gain amp	2 to 17	3 to 9	—
AHPLG	High power low gain amp	2 to 17	3 to 9	—
ALPHG	Low power high gain amp	2 to 17	3 to 9	—
CWR8	8 channel colorless wavelength router (44 channel)	2 to 16	3 to 8	—
CWR8-88	8 channel colorless wavelength router (88 channel)	2 to 16	3 to 8	—
OPSA	Bidirectional optical protection switch	2 to 17, 20 to 35	3 to 9,12 to 20	—
SVAC	Single port variable attenuator card	2 to 17, 20 to 35	3 to 9, 12 to 20	—
SFD5x	5 channel static DWDM filter	2 to 17, 20 to 35	3 to 9, 12 to 20	—
SFC1x	1 channel static CWDM filter	—	3 to 9, 12 to 20	4,5,7,8

(1 of 2)

Cards	Description	Slots for 1830 PSS 32	Slots for 1830 PSS 16	Slots for 1830 PSS 1
SFC2x	2 channel static CWDM filter	2 to 17, 20 to 35	3 to 9, 12 to 20	
SFC4x	4 channel static CWDM filter	2 to 17, 20 to 35	3 to 9, 12 to 20	
SFC8	8 channel static CWDM filter	2 to 17	3 to 9	
R2.5 cards				
43STA1P	40G SPT anyrate -optimized for 88 channels, C-band, PDPSK	2 to 15	3 to 7	—
43STX4P	40G single port tunable mux (4 client), optimized for 88 channels in C-band, PDPSK	2 to 15	3 to 7	—
4DPA2	4G dual port pluggable anyrate (2 clients)	2 to 17, 20 to 35	3 to 9,12 to 20	—
ALPFGT	Low power fixed gain amp with total power Mon unkeyed. This is a one slot wide, 1/2 height pack, note that in the 1830 PSS 16 universal shelf the packs go sideways into this shelf – so width is the vertical measurement.	2 to 17. Although this is a 1/2 height pack, it is limited to being auto-placed in the top half of the shelf. Manual placement is also allowed on 20 to 35.	3 to 9	—
OSCT	Opt supervisory card with total power Mon Unkeyed	2 to 17, 20 to 35(Although this is a 1/2 height pack, it is limited to being auto-placed in the top half of this shelf. Manual placement is allowed on 20 to 35 as well.)	3 to 9,12 to 20	—
SFD8x	8-channel static DWDM filter	2 to 17	3 to 9, 12 to 20	—
R2.5 and R2.3 extension cards				
A2325A	23dBm power. 25dBm flat gain Amp	2 to 17 (full height pack)(ILA only)	3 to 9(ILA only)	—
11QPA4	11G Quad line Port, 4 client port	2 to 17	3 to 9	—
11DPE12	11G Dual line Port, 12 1GbE client ports	2 to 17	3 to 9	—
PFDCAxx (xx= 30, 50, 70)	Power Filter	19, 36	1,11	2,3

(2 of 2)

Note

(1) PFDC20K can only go in the 1830 PSS 16 universal shelf. The PFDC20, which was added in R2.0, can only go in the 1830 PSS 32 universal shelf.

Procedure 9-1 To view a shelf

1 Choose Equipment from the navigation tree view selector. The navigation tree displays the Equipment view.

2 Choose Network→NE.

3 Right-click on the NE and choose Properties. The Network Element window is displayed.

4 Click on View Shelf, the Equipment window is displayed for the selected NE. You can modify information in the tabs.

Procedure 9-2 To configure a shelf

Note — During the creation of an ITLB shelf, one ITLB card slot is automatically provisioned.

1 Choose Equipment from the navigation tree view selector. The navigation tree displays the Equipment view.

2 Choose Network→NE.

3 Right-click on the NE and choose Configure Shelf. The Shelf [Create] form opens.

4 Configure the parameters:

- Name
- Shelf Description
- Serial Number

Select:

- Shelf Type
- AINS Enabled
- Expected PF Amps
- Create Shelf ID, and click on the Select button. The Select Shelf to Provision form opens. Choose the Shelf ID and click on the OK button.

5 Click on the OK button. The Shelf [Create] form closes.

Procedure 9-3 To remove a shelf

1 Choose Equipment from the navigation tree view selector. The navigation tree displays the Equipment view.

2 Choose Network→NE.

3 Right-click on the shelf and choose Remove Shelf. A dialog box opens.

4 Click on View Dependencies, an Information window displays the dependencies that will affect the removal of the shelf.

5 Select “I understand the implications of this action” check box and click on Yes. The shelf is removed from the network object.

9.6 Card slot management

This section describes the procedures for slot and card-level provisioning. The 5620 SAM GUI supports view, modify, create, and delete card-level functions, and the pre-provisioning of a card in an empty slot. For the cards supported on the universal shelf, see Table 9-1 for more information.

Note 1 — You must use filler blanks in slots that are not used to ensure proper airflow and cooling.

Note 2 — To provision two-slot height cards and two-slot width cards, the adjacent slots must be empty.

Procedure 9-4 To configure a card

1 Choose Equipment from the navigation tree view selector. The navigation tree displays the Equipment view.

2 Select an empty slot from the equipment tree to provision a card. Choose Network→NE→Shelf→Card Slot (EMPTY), OK.

3 Right-click on the Card Slot (EMPTY) and choose Configure Card. The Card Slot [Create] form opens.

4 Configure the parameters:

- Assigned Card Type
- Assigned Card Sub Type
- OLC State

5 Click on the OK button to save the changes. The Card Slot [Create] form closes.

Procedure 9-5 To remove a card

1 Choose Equipment from the navigation tree view selector. The navigation tree displays the Equipment view.

2 Right-click on the card to be removed and choose Remove Card.

3 A dialog box opens. Select the “I understand the implications of this action” check box and click Yes. The card is removed from the navigation tree.

Procedure 9-6 To modify a card

1 Choose Equipment from the navigation tree view selector. The navigation tree displays the Equipment view.

2 Right-click on the card to be modified and choose Properties. The Card Slot [Edit] form is displayed.

3 Modify the parameters, as required. Click on the OK button to save the changes and exit the Card Slot [Edit] form.

Dry contacts

Dry contact refers to a contact of a relay that does not make or break a current. Usually another relay or device starts or stops the current. For example, a reed relay matrix switch is usually switched with all contacts dry. After the contacts are connected, a wire spring relay connects a supervisory scan point through which the current flows.

Procedure 9-7 To configure 1830 PSS dry contact sensors

1 Choose Equipment from the navigation tree view selector. The navigation tree displays the Equipment view.

2 Choose Network→NE→Shelf→Card Slot (USRPNL - User Interface Panel)

3 Right-click on the card slot and choose Properties. The Card Slot (User Interface Panel) [Edit] form is displayed.

4 Click on the External Control tab button. Choose a dry contact ID from the list. Double-click on the dry contact ID. The DryContact [Edit] form is displayed for the selected ID.

5 Configure the parameters:

- Control Status
- Control Type
- Slot ID

6 Click on the OK button. The DryContact form closes.

7 Click on the OK button. The Card Slot User Interface Panel [Edit] form closes.

9.7 Ports management

The 5620 SAM supports a physical topology view that allows you to create a fiber connection by selecting two ports on the displayed shelves. The connection can be made between two ports on the same or different shelves.

Note — You can create a fiber connection only with ports that are not already part of a fiber connection.

For an interface (that is a shelf, slot, or port), you can specify that the interface is:

- connected to another on the network element
- connected to an external within or outside of the 1830 PSS network
- unconnected

To define the network topology, you first configure the fiber topology on each network element in the network. You can then connect the external interfaces on each of the network elements to create the network.

Procedure 9-8 To create an optical link between ports

1 Perform one of the following to create an optical link between two ports on the same shelf:

   a Choose Create→Equipment→Create Optical Link.

   b Click on Network→NE→Shelf→Card→Port (Select two ports, use the Ctrl key or the Shift key to select the second port) and right-click on the selected ports and choose Create Optical Link.

2 The Optical Link [Create] form opens.

3 Configure the parameters:

   - Name
   - Direction
   - Endpoint A - Port
   - Endpoint B- Port

Note — When you choose two ports from the Equipment tree, the port properties are automatically populated for endpoint A and B.

4 Click on the OK button to save the changes and exit the Optical Link [Create] form.

See the Equipment management and Equipment navigation tree chapters in the *5620 SAM User Guide* for more information.

Procedure 9-9 To delete an optical link

1 Perform one of the following to delete an optical link:

   a Choose Manage→Equipment→Equipment. The Manage Equipment form opens.

      i Choose Optical Link (Optical Specifics) from the Filter for Object Type drop-down menu.

      ii Click on the Search button. The search result displays the connected ports.

      iii Choose the optical link ports that you need to delete and click on the Delete button. The optical link between two ports is deleted.

   b From the Physical Topology - Network view:

      i Double-click on an optical link.

      ii The Physical Link Group List form opens.

      iii Choose the port that you need to delete

      iv Click on the Delete button.

2 The optical link between the selected ports is deleted.

Port properties

To configure timeslots on ports, see the Equipment navigation tree chapter in the *5620 SAM User Guide* and the Slot/card provisioning chapter in the 1830 Photonic Service Switch 32/16 User Provisioning Guide for more information.

9.8 Performance monitoring overview

PM refers to the in-service, non-intrusive monitoring of transmission quality and equipment health. The 1830 PSS tracks the signal quality and equipment health through continuous collection and analysis of performance data. The user can retrieve current and past values for an overview of the health of the system. The PM capability applies to optical lines, channels, and equipment. The user has the ability to provision threshold parameters to the level of performance degradation.

Proactive maintenance refers to following up on a performance degradation before a failure and alarms are raised. Reactive maintenance refers to following up on a system alarm. Crossing a performance parameter threshold indicates a potential network quality or performance degradation while the transported services are not impacted. If performance degradation continues, alarms are raised to resolve or repair the problem.

PM statistics are collected for all service cards and for all interface ports that perform OEO conversions or protection switching. The statistics are grouped by functional category. Each category has several monitored parameters for which you can configure TCAs. A threshold is the mechanism for generating a notification in response to changes in PM parameter values. The 1830 PSS allows you to provision performance parameter thresholds, which can be set by the user to indicate degraded performance. You can configure how much data is collected, how the data is stored, and how and when you are notified if generic thresholds levels are crossed. For information about performance management requirements see the Performance Monitoring chapter in the *1830 Photonic Service Switch 32/16 User Provisioning Guide* and the Operations, administration, maintenance and provisioning chapter in the *1830 Photonic Service Switch 32/16 Product Information and Planning Guide*.

PM process

The 1830 PSS 32/1830 PSS 16 provides the following PM processing functions:

- monitors and accumulates digital and analog parameters for a physical or logical access point
- stores and manages history accumulation data (up to thirty-three 15-min and seven 1-day accumulation registers can be stored)
- validates threshold crossing processing
- manages threshold values by assigning to profile port entities
- uses free-running counters for monitored points

PM functions are performed on physical and logical points within the 1830 PSS 32/1830 PSS 16 NE that represent the boundary with other NEs or an external system. A user can define and monitor QoS at individual points in which a local NE interacts with other network entities.

9.9 Performance statistics

The 5620 SAM can be configured to collect statistics counters from managed Alcatel-Lucent NEs and 5620 SAM servers. Statistics collection requires the configuration and deployment of various policies. See the Statistics collection configuration chapter in the *5620 SAM Statistics Management Guide* for more information.

The 5620 SAM supports the following:

- statistics policies for the collection of any or all counters available from the node
- policies for time intervals supported by the NEs
- counters collected by files (TFTP) for historical statistics and by SNMP polling for real-time statistics
- demand collection of statistics from the NE using direct access to the MIB

- display of real-time statistics for statistics collected on the node
- collection interval for the minimum interval that the node supports
- node configuration to perform binning and retrieving historical statistics from the node

9.10 Workflow for performance statistics collection

1. Configure the MIB statistics policy for NEs, specific objects and polling intervals, see the Performance statistics collection chapter in the *5620 SAM Statistics Management Guide* for more information.
2. If required, use a 5620 SAM client to view on-demand, scheduled, and real-time performance statistics. See the Statistics presentation overview chapter in the *5620 SAM Statistics Management Guide* for information about viewing statistics.
3. Use the 5620 SAM-O interface to retrieve the performance statistics records from the 5620 SAM for processing by a third-party application. See the 5620 SAM-O OSS Interface Developer Guide for information about using the 5620 SAM-O to transfer statistics records from the 5620 SAM database to an OSS client application.

9.11 PM profile types supported for line ports on amplifier cards

Internode management and control information is communicated over the Amplifier. The Amplifier card line ports support their own statistics profiles. The Amplifier is a separate optical channel that operates at the STM-1/OC-3 rate of 155 Mb/s. The Amplifier transfers management and control information between the ECs of two adjacent nodes, regardless of whether any of the DWDM payload channels are terminated between the two nodes. The channel transports IP and OSI PDUs. See the *1830 Photonic Service Switch 32/16 Product Information and Planning Guide* for more information.

9.12 TCAs

The 5620 SAM supports all TCAs that are provided by the NE. The support includes configuring thresholds, distributing TCA profiles, and reporting on crossings (for example, raising and clearing of appropriate alarms). See the PM chapter in the *1830 Photonic Service Switch 32/16 User Provisioning Guide* for more information about TCA support on the 1830 PSS.

TCA profiles

You can configure and assign a profile to an interval to monitor the value of each parameter in the active bin and raise a log event if a specific threshold level is reached. If a specified threshold is crossed, a log event is raised.

You can configure each PM group with up to eight profiles, each profile can have different threshold levels. The 5620 SAM allows you to modify the TCA profiles. The threshold levels that you configure depend on the following factors:

- the interval length — for example, to gather statistics for an interface over 15-min and 24-h intervals you need to define two profiles, one profile that defines for the 15-min interval and another profile for the 24-h interval
- the service level of the traffic using the interface

Procedure 9-10 To configure thresholds for TCA profiles

1 Choose Equipment from the navigation tree view selector. The navigation tree displays the Equipment view.

2 Choose Tools→1830 PSS TCA Profiles. The 1830 PSS TCA Profiles form to open a list of TCA profiles.

Note 1 — These profiles are always on the 1830 PSS and cannot be deleted. Each profile contains a set of counters and parameters for which threshold values can be configured.

Note 2 — The global policy should be released for all discovered 1830 PSS NEs. To modify only a specific node, modify only local definitions.

3 Choose a profile type and a profile ID from 1 to 8 and click on the Properties button. The NE TCA Profiles [Edit] form opens.

4 Click on the TCA Thresholds tab button to display a list of TCA variable names with their threshold value.

5 Choose a TCA variable name and click on the Properties button. The NE TCA Thresholds [Edit] form opens.

6 Enter a threshold value and click on the OK button. The NE TCA Profiles [Edit] form is displayed.

7 Click the OK button. A dialog box is displayed.

8 Click on the Yes button to accept the changes.

Note — By default, profile ID 7 contains threshold values that can be applied to the 15-min interval, and profile ID 8 contains threshold values that can be applied to the 24-hr interval.

Procedure 9-11 To assign TCA profiles to an EC card or port

After the profiles are assigned to an EC card or a port, see Procedure 9-10 for more information.

Note 1 — Only EC cards can be assigned to a PM TCA profile.

Note 2 — You can assign unique profiles for 15-min intervals and 24-hr intervals for each EC card and port.

1. Choose Equipment from the navigation tree view selector. The navigation tree displays the Equipment view.
2. Choose Network→NE→Shelf→Card or Port (EC: Equipment Controller Card).
3. Right-click on the card slot or port and choose Properties from the menu. The Card slot/Physical port form opens.
4. Click on the Card Specifics/Port Specifics tab and the 1830 TCA tab button.
5. Click on the Profile Type, choose a profile, and click on the Properties button. The TCA Profile Assignment form opens.
6. Configure the parameters as required.
7. Click on the OK button. The TCA Profile Assignment form closes.
8. Click on the OK button. The Card Slot/Physical port form closes.

Configuring PM

The prerequisites to configure PM are:

- Determine the interfaces and cards that you need to configure to collect PM data.
- Configure the profiles to specify the threshold levels at which log events are generated for the PM groups to be monitored on the NE.
- Configure each of the interfaces and cards on the NE for which you need to collect PM statistics. Configure the PM statistics to collect, the interval period over which they are collected, and the profile used for each interval period.

Viewing PM data

PM data is recorded in logs or bins. Logs record all of the TCAs that occur on the NE. The bins store data collected on a specific card or interface over a specific interval. In addition a raw bin for each PM group collects data until the data is cleared.

Note — When PM data is not available, PM parameter names are displayed with blank values.

Cards and ports that support PM data

Table 9-2 lists the cards and ports that support PM data.

Note — The 11STMM10 hardware does not support GbE PM statistics in the egress direction. TX side of the PM data is not displayed for the 4DPA2 client or line ports.

Table 9-2 Cards and Ports

Cards	Ports
11STAR1	L1 ,C1
11STGE12	L1, C (1 to 10)
11STMM10	L1, C (1 to 10)
11DPE12	L (1,2), VA (1,2), C (1 to 12)
11QPA4	L (1 to 4), VA (1 to 4), C (1 to 4)
43STA1P	L1, C1
43STX4/43STX4P	L1, C (1 to 4)
4DPA2	L (1,2), C (1,2)
4DPA4 (Card Mode = FlexMux)	L (1,2), C (1 to 4), VA (1,2)
4DPA4 (Card Mode = DualTran)	L (1,2), C (1,3), VA (1,2)
ALPHG AHPHG AHPLG	OSC, LINE, LINE- {9170~9605}
ALPFGT	OSCSFP, LINE, LINE- {9170~9605}
EC	No port, PM data collected on the EC card and not on the port level
OSCT	OSCSFP, LINE, LINE- {9170~9605}
SVAC	L1, C1
A2325A	OSC, LINE
ALPFGT	OSC, LINE

Displaying PM data for EC Card

You can display PM data only for an EC card.

Note — Card-level PM is not supported for other card types.

Bins and intervals

The 1830 PSS statistics counters are always turned on and in the process of collecting data. The time interval for the interval bins is 15-min or 24-h. The 24-h bins collect data from midnight to midnight based on UTC, not the local time. Performance data is also stored into a raw bin. The statistics in the raw bin accumulate until the contents of the raw bin are cleared. A number of bins are saved on the node so that if there are missed intervals, the data can be retrieved from the node. See the PM chapter in the *1830 Photonic Serve Switch 32/16 User Provisioning Guide* for more information.

Note — You can set up to 50 historical bins with a 24-h and a 15-min interval.

Procedure 9-12 Set and clear bins for the EC card

1. Choose Equipment from the navigation tree view selector. The navigation tree displays the Equipment view.
2. Choose Network→NE→Shelf→Card or Port (EC: Equipment Controller Card).
3. Right-click on the card slot or port and choose Properties from the menu.
4. The Card Slot/Physical port form opens. Click on the Card Specifics/Port Specifics tab button and the 1830 TCA tab button.
5. Choose the profile type, select a profile, and click on the Properties button. The TCA Profile Assignment form opens.
6. Configure the number of bins for each interval and the option to clear bins. You can also assign a profile ID for each interval. See Procedure 9-11 to assign a profile ID.
7. Click on the OK button. The TCA Profile Assignment form closes.
8. Click on the OK button. The Card Slot/Physical port form closes.

10 — 1830 PSS equipment navigation tree

10.1 Equipment navigation tree overview *10-2*

10.1 Equipment navigation tree overview

The view selector in the 5620 SAM navigation tree is a drop-down menu that lists the physical and logical network views that are available. You can use the contextual menu for an object in the navigation tree to create, configure, and manage specific parameters for the object and child objects.

Using the 1830 PSS external element manager

You can start the 1830 PSS external element manager, Zero Install Craft (ZIC) interface, from the 5620 SAM GUI. The ZIC interface provides a web-based user interface (WebUI) to access the NE. The WebUI supports provisioning, administration, performance monitoring, and displaying alarms and conditions from the NE. For more information about using the WebUI with the 1830 PSS, see the *1830 PSS-32/PSS-16 User provisioning guide* and the *1830 PSS R2.5, R2.6 and R2.9 WebUI (WEBUI) RRS*. Procedure 10-1 describes how to start the 1830 PSS external element manager from the 5620 SAM GUI.

Procedure 10-1 To launch the 1830 PSS external EMS browser

1. Choose Equipment from the view selector in the navigation tree. The navigation tree displays the Equipment view.
2. Right-click on a discovered 1830 PSS device in the Equipment view and choose Launch External EMS Browser from the contextual menu. The ZIC main view screen appears.

Note 1 — The 1830 PSS external EMS browser is only supported on Internet Explorer 6.0 or later.

Note 2 — If the 1830 PSS device is in encrypted mode, you cannot launch a web session.

Note 3 — If the 1830 PSS device is in secure mode, the Launch External EMS Browser is disabled.

See the appropriate 1830 PSS guide for information about using the ZIC external element manager.

1830 PSS optical transport service management

11 — 1830 PSS optical transport service management

11 — 1830 PSS optical transport service management

11.1 Optical transport service overview *11-2*

11.2 Workflow to configure optical transport services *11-2*

11.1 Optical transport service overview

An optical transport service is a wavelength that traverses the network between two endpoints, which can be tandem wavelengths in some cases.

The path the service takes through the network is defined by 5620 SAM using shortest path algorithm and the knowledge of the node adjacencies.

The path the service takes through an NE is called a cross-connect (XC).

A cross-connect is defined by the ingress and egress points for the service on the NE.

The NE physical topology defines the internal path that the service takes through the NE.

The 5620 SAM recognizes the adjoining XCs and manages linked XCs as an optical transport service.

Each service is assigned a trail identifier and a pair of Wavelength Tracker wave keys. The trail identifier, the ITU channel number (wavelength) and wave key pair are unique in the network.

Optical transport services create transport connectivity between router ports and hence they must be created before any IP services.

Services are created by selecting the end points, the 5620 SAM is then applied to complete the service creation.

The 5620 SAM supports optical transport services between:

- 1830 PSS
- SR to SR NEs
- alien wavelengths and 1830 PSS client ports

Protection schemes:

- diverse route no protection
- protection (Y-cable, OPS, ESNCP), discovery of services
- discovery of Regenerated service

11.2 Workflow to configure optical transport services

1. The Engineering and Planning Tool (EPT), and Commissioning and Power Balancing Tool (CPB) are non 5620 SAM tools which first must be used for transport network power balancing and commissioning tasks.
2. Using the 5620 SAM:
   - Create optical links that represent the external 1830 PSS/SR adjacencies and also the internal topological links within the 1830 PSS NEs.

Procedure 11-1 To create an optical transport service using configuration forms

1 Choose Create→Service→Optical→Transport Service from the 5620 SAM main menu. The Optical Transport Service Subscriber (Create) form opens.

2 Click on the Select button to choose a customer to associate with the Optical Transport Service service. The Select Customer - Optical Transport Service form opens

3 Choose a customer for the Optical Transport Service service and click on the OK button. The Select Customer - Optical Transport Service form closes and the Optical Transport Service (Create) form reappears with the customer information displayed on the General tab.

4 Configure the parameters:

- Service Name
- Description
- Rate
- Protection Type
- Direction
- Wavekey Assign Mode
- Administrative State

a To configure a subrate service, choose SubGigE for the Rate parameter value.

b Configure the following parameters:

- VTS Number (Endpoint A)
- VTS Number (Endpoint B)
- Committed Information Rate (Mbps)
- Excess Information Rate(Mbps)
- Committed Burst Rate (Kbytes)
- Excess Burst Rate (Kbytes)

c If the chosen value for Protection Type is Diverse Route, the Use Existing Unprotected Services check box appears.

d By clicking on the check box, the user can choose two existing unprotected services, then click on Apply.

e A new Diverse Route service is created and the existing unprotected services are deleted.

Note 1 — Diverse Route service can also be created by choosing two termination points on the A end Site, and two more termination points on the Z End site.

Note 2 — Diverse Route services can be created only by using the 5620 SAM and are not part of the service discovery operation.

Note 3 — If you unmanage a diverse route and run the Discover Transport Services operation, the 5620 SAM discovers two unprotected services instead of a diverse route service.

5 Click on the Components tab.

6 Right-click on Sites and choose Create Optical Site. The Select Network Elements - Optical Transport Service form opens with a list of available sites.

7 Choose sites by choosing a first site, then hold down the Ctrl key and choose another site. Click on the OK button. The Site (Create) form opens with the General tab displayed.

8 Expand the site icon, the Termination Point button appears.

9 Right-click on Termination Point, the Create Termination Point button appears. Click on the Create Termination Point button.The Termination Point (Create) form appears.

10 Click on the Select button. The Select Port Termination Port form appears.

11 Choose the termination ports. Click on the OK button.The Select Port Termination Port form closes.

Note 1 — In this form, only the termination points that can be configured with the specified service rate will be shown.

Note 2 — If a termination point is already being used in another service, it is not displayed.

Note 3 — If a termination point is configured with another valid rate, it is not displayed.

12 Repeat Steps 8 to 11 for the other chosen sites.

Note — A maximum of two sites can be selected for the creation of an optical transport service. These are respectively named an A end site and a Z end site by the 5620 SAM.

13 Click on the Path Constraints tab. The Constraint (Create) form opens.

14 Configure the Excluded Element parameter. Click on the Select button. If Port has been selected as the Excluded Element, the Select Port Constraint form opens. If Site has been selected as the Excluded Element, the Select Site Constraint form opens.

15 Select the Ports or Sites to be excluded.

16 Click on the OK button. The Port Constraint or Site Constraint form closes.

Transport Service Administrative State represents the aggregate value of the following:

- administrative states of all OCH Cross Connects in the service
- administrative state of OT ports on the end sites of the service
- administrative state of the OCH Trail end points

If one of the administrative state values is maintenance, the service admin state is set to maintenance. If one of the administrative state values is Down and there is no administrative NE state value of maintenance, the service admin state value is set to Down. If all of the admin state values are Up, the service admin state value is Up. The user cannot change the administrative state of the service if there is a missing OCH Cross Connect for the service.

The transport service operational state represents the aggregate operational state of the OCH Cross Connects of the service. For a protected service, the operational state is Down if

- there is a missing cross connect for the service.
- both working and protecting paths have an OCH Cross Connect with operational state = Down.
- the working path has OCH Cross Connects with operational State= Up, but there is a wavekey mismatch on the working path, and the protecting path has OCH Cross Connects with Operational State = Down.
- the protecting path has OCH Cross Connects with operational State= UP, but there is a wavekey mismatch on the protecting path, and the working path has OCH Cross Connects with Operational State = Down.

State Cause provides the reasons for service being operationally Down.

The Complete Service button recreates the cross connections if there are missing Cross Connections and completes the service creation.

Note 1 — For OSPF configuration, refer to the Protocol Configuration chapter in the core 5620 SAM User Guide.

Note 2 — After an optical transport service is created, the user can view the hops (ports) and OCH Cross Connects on the service path under Working Path, and Protecting Path tab buttons.

Procedure 11-2 To configure a port-timeslot assignment

For channelized cards, whose port-timeslots are unassigned, use the following procedure.

1. Select a channelized port. Right-click on the port. Select Properties.The Physical Port (Edit) form opens in the General tab.
2. Select the Port Specifics tab.
3. Configure the Assigned Rate parameter.
4. Click on the Configure Time Slots button. The Configure Timeslots form opens.
5. Select the required time slot configuration. Click on the OK button. The Configure Timeslots form closes.
6. The Physical Port (Edit) form opens.
7. Click on the OK button. The Physical Port (Edit) form closes.

Procedure 11-3 Discovery of optical transport services

Transport Services do not get discovered automatically during network element discovery. To discover the transport services do the following:

1. Wait until all the network elements are in synch in the 5620 SAM.
2. Choose Manage→Service→Services from the 5620 SAM main menu.
3. Select Optical Transport Service from the drop down menu.
4. The Discover Transport Services button appears.

5 Click on the Discover Transport Services button. Choose the Topology Group.

6 Click on the OK button.

Note 1 — For very large networks, this process may take some time to complete.

Note 2 — The following services can be discovered by the 5620 SAM:

- unprotected
- ESNCP protected
- Y-Cable protected
- Regenerated service, if already configured outside of the 5620 SAM

Note 3 — For information about regenerated service discovery, see the *1830 Photonic Service Switch 32/16 Product Information and Planning Guide*.

Note 4 — For more information on different service configurations, refer to the 1830 PSS Service CFG document.

Procedure 11-4 To unmanage an optical transport service

The user can unmanage an optical transport service using the 5620 SAM. The Unmanage Service operation will remove the Transport Service from the 5620 SAM. The service configuration on the NE is maintained as is.

1 Choose Manage→Service→Services from the 5620 SAM main menu.

2 Choose Optical Transport Service from the drop down menu.

3 The Unmanage Service button appears.

4 Select Transport service(s), and click on the Unmanage Services button.

Note — Before unmanaging the 1830 PSS NE, the user must unmanage or delete all transport services on that NE.

Procedure 11-5 To create a Y-link

- The user needs to create the Y-Link objects in the 5620 SAM to discover Y-Cable protected services from SR-SR.
- The Y-link represents the Y cable connected to two 1830 PSS NEs and one SR NE. The Y-link has A1, A2 and Z1 ends.

- A1 and A2 are on the same 1830 PSS NE and Z1 is on the SR NE. If A1 / A2 / Z1 is involved in a Y-link connection, the 5620 SAM will not allow the creation of another Y-link on any of these ports.
- Y-link creation or deletion does not deploy anything on the NE.

1 Choose Create → Equipment →Optical Y-Link from the 5620 SAM main menu. The Optical Y-Link (Create) form opens.

Note 1 — The Y-link can be deleted from the 5620 SAM if there is no Y-cable protected service starting or ending on Z1 of the Y-link.

Note 2 — The Y-link is deleted if the A end NE or Z end NE is unmanaged by the 5620 SAM.

Note 3 — SAM discovers 1830 PSS-1830 PSS Y-cable service as the first step.There are Y-links at the A end and Z end, the 5620 SAM builds this service as SR-1830 PSS-SR service. If there is no Y-link at one end, the 5620 SAM builds this service as 1830 PSS-1830 PSS service.

2 Using the Select buttons for the A1, A2 and Z1 ends.

3 Click on the OK button. The Optical Y-Link (Create) form closes.

1830 PSS maintenance using the 5620 SAM

12 — 1830 PSS maintenance

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12.1 Managing optical power levels using the Wavelength Tracker *12-2*

12.2 Managing optical power levels procedures *12-8*

12.1 Managing optical power levels using the Wavelength Tracker

The wavelength tracker is an Alcatel-Lucent technology that allows the 1830 PSS NE to manage wavelengths at different stages of an optical path.

Each wavelength can be traced as it passes through the network, which allows you to ensure that the network connections are correct. A unique identifier, known as a wave key pair, is encoded onto each wavelength that enters the network through a 1830 PSS device. By detecting and identifying the encoded wave keys, the wavelength can be traced through the network. Tables 12-1, 12-2, and 12-3 list the ITU channel numbers and corresponding ALU wave keys for the L-band, C-band, and S-band channels.

Table 12-1 L-band channel wavekeys

ITU channel number (THz)	nm	ALU wave key	ITU channel number (THz)	nm	ALU wave key
100 GHz Grid			**50 GHz Offset**		
186.00	1611.79	8600	186.05	1611.35	8605
186.10	1610.92	8610	186.15	1610.49	8615
186.20	1610.06	8620	186.25	1609.62	8625
186.30	1609.19	8630	186.35	1608.76	8635
186.40	1608.33	8640	186.45	1607.90	8645
186.50	1607.47	8650	186.55	1607.04	8655
186.60	1606.60	8660	186.65	1606.17	8665
186.70	1605.74	8670	186.75	1605.31	8675
186.80	1604.88	8680	186.85	1604.46	8685
186.90	1604.03	8690	186.95	1603.60	8695
187.00	1603.17	8700	187.05	1602.74	8705
187.10	1602.31	8710	187.15	1601.88	8715
187.20	1601.46	8720	187.25	1601.03	8725
187.30	1600.60	8730	187.35	1600.17	8735
187.40	1599.75	8740	187.45	1599.32	8745
187.50	1598.89	8750	187.55	1598.47	8755
187.60	1598.04	8760	187.65	1597.62	8765
187.70	1597.19	8770	187.75	1596.76	8775
187.80	1596.34	8780	187.85	1595.91	8785
187.90	1595.49	8790	187.95	1595.06	8795
188.00	1594.64	8800	188.05	1594.22	8805
188.10	1593.79	8810	188.15	1593.37	8815

(1 of 2)

ITU channel number (THz)	nm	ALU wave key	ITU channel number (THz)	nm	ALU wave key
100 GHz Grid			**50 GHz Offset**		
188.20	1592.95	8820	188.25	1592.52	8825
188.30	1592.10	8830	188.35	1591.68	8835
188.40	1591.26	8840	188.45	1590.83	8845
188.50	1590.41	8850	188.55	1589.99	8855
188.60	1589.57	8860	188.65	1589.15	8865
188.70	1588.73	8870	188.75	1588.30	8875
188.80	1587.88	8880	188.85	1587.46	8885
188.90	1587.04	8890	188.95	1586.62	8895
189.00	1586.20	8900	189.05	1585.78	8905
189.10	1585.36	8910	189.15	1584.95	8915
189.20	1584.53	8920	189.25	1584.11	8925
189.30	1583.69	8930	189.35	1583.27	8935
189.40	1582.85	8940	189.45	1582.44	8945
189.50	1582.02	8950	189.55	1581.60	8955
189.60	1581.18	8960	189.65	1580.77	8965
189.70	1580.35	8970	189.75	1579.93	8975
189.80	1579.52	8980	189.85	1579.10	8985
189.90	1578.69	8990	189.95	1578.27	8995
190.00	1577.86	9000	190.05	1577.44	9005
190.10	1577.03	9010	190.15	1576.61	9015
190.20	1576.20	9020	190.25	1575.78	9025
190.30	1575.37	9030	190.35	1574.95	9035
190.40	1574.54	9040	190.45	1574.13	9045
190.50	1573.71	9050	190.55	1573.30	9055
190.60	1572.89	9060	190.65	1572.48	9065
190.70	1572.06	9070	190.75	1571.65	9075
190.80	1571.24	9080	190.85	1570.83	9085
190.90	1570.42	9090	190.95	1570.01	9095

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Table 12-2 C-band channel wavekeys

ITU channel number (THz)	nm	ALU wave key	ITU channel number (THz)	nm	ALU wave key
100 GHz Grid			**50 GHz Offset**		
191.00	1569.59	9100	191.05	1569.18	9105
191.10	1568.77	9110	191.15	1568.36	9115
191.20	1567.95	9120	191.25	1567.54	9125
191.30	1567.13	9130	191.35	1566.72	9135
191.40	1566.31	9140	191.45	1565.90	9145
191.50	1565.50	9150	191.55	1565.09	9155
191.60	1564.68	9160	191.65	1564.27	9165
191.70	1563.86	9170	191.75	1563.45	9175
191.80	1563.05	9180	191.85	1562.64	9185
191.90	1562.23	9190	191.95	1561.83	9195
192.00	1561.42	9200	192.05	1561.01	9205
192.10	1560.61	9210	192.15	1560.20	9215
192.20	1559.79	9220	192.25	1559.39	9225
192.30	1558.98	9230	192.35	1558.58	9235
192.40	1558.17	9240	192.45	1557.77	9245
192.50	1557.36	9250	192.55	1556.96	9255
192.60	1556.55	9260	192.65	1556.15	9265
192.70	1555.75	9270	192.75	1555.34	9275
192.80	1554.94	9280	192.85	1554.54	9285
192.90	1554.13	9290	192.95	1553.73	9295
193.00	1553.33	9300	193.05	1552.93	9305
193.10	1552.52	9310	193.15	1552.12	9315
193.20	1551.72	9320	193.25	1551.32	9325
193.30	1550.92	9330	193.35	1550.52	9335
193.40	1550.12	9340	193.45	1549.72	9345
193.50	1549.32	9350	193.55	1548.91	9355
193.60	1548.51	9360	193.65	1548.11	9365
193.70	1547.72	9370	193.75	1547.32	9375
193.80	1546.92	9380	193.85	1546.52	9385
193.90	1546.12	9390	193.95	1545.72	9395
194.00	1545.32	9400	194.05	1544.92	9405
194.10	1544.53	9410	194.15	1544.13	9415
194.20	1543.73	9420	194.25	1543.33	9425

(1 of 2)

ITU channel number (THz)	nm	ALU wave key	ITU channel number (THz)	nm	ALU wave key
100 GHz Grid			**50 GHz Offset**		
194.30	1542.94	9430	194.35	1542.54	9435
194.40	1542.14	9440	194.45	1541.75	9445
194.50	1541.35	9450	194.55	1540.95	9455
194.60	1540.56	9460	194.65	1540.16	9465
194.70	1539.77	9470	194.75	1539.37	9475
194.80	1538.98	9480	194.85	1538.58	9485
194.90	1538.19	9490	194.95	1537.79	9495
195.00	1537.40	9500	195.05	1537.00	9505
195.10	1536.61	9510	195.15	1536.22	9515
195.20	1535.82	9520	195.25	1535.43	9525
195.30	1535.04	9530	195.35	1534.64	9535
195.40	1534.25	9540	195.45	1533.86	9545
195.50	1533.47	9550	195.55	1533.07	9555
195.60	1532.68	9560	195.65	1532.29	9565
195.70	1531.90	9570	195.75	1531.51	9575
195.80	1531.12	9580	195.85	1530.72	9585
195.90	1530.33	9590	195.95	1529.94	9595

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Table 12-3 S-band channel wavekeys

ITU channel number (THz)	nm	ALU wave key	ITU channel number (THz)	nm	ALU wave key
100 GHz Grid			**50 GHz Offset**		
196.00	1529.55	9600	196.05	1529.16	9605
196.10	1528.77	9610	196.15	1528.38	9615
196.20	1527.99	9620	196.25	1527.60	9625
196.30	1527.22	9630	196.35	1526.83	9635
196.40	1526.44	9640	196.45	1526.05	9645
196.50	1525.66	9650	196.55	1525.27	9655
196.60	1524.89	9660	196.65	1524.50	9665
196.70	1524.11	9670	196.75	1523.72	9675
196.80	1523.34	9680	196.85	1522.95	9685
196.90	1522.56	9690	196.95	1522.18	9695
197.00	1521.79	9700	197.05	1521.40	9705

(1 of 3)

ITU channel number (THz)	nm	ALU wave key	ITU channel number (THz)	nm	ALU wave key
100 GHz Grid			**50 GHz Offset**		
197.10	1521.02	9710	197.15	1520.63	9715
197.20	1520.25	9720	197.25	1519.86	9725
197.30	1519.48	9730	197.35	1519.09	9735
197.40	1518.71	9740	197.45	1518.32	9745
197.50	1517.94	9750	197.55	1517.55	9755
197.60	1517.17	9760	197.65	1516.78	9765
197.70	1516.40	9770	197.75	1516.02	9775
197.80	1515.63	9780	197.85	1515.25	9785
197.90	1514.87	9790	197.95	1514.49	9795
198.00	1514.10	9800	198.05	1513.72	9805
198.10	1513.34	9810	198.15	1512.96	9815
198.20	1512.58	9820	198.25	1512.19	9825
198.30	1511.81	9830	198.35	1511.43	9835
198.40	1511.05	9840	198.45	1510.67	9845
198.50	1510.29	9850	198.55	1509.91	9855
198.60	1509.53	9860	198.65	1509.15	9865
198.70	1508.77	9870	198.75	1508.39	9875
198.80	1508.01	9880	198.85	1507.63	9885
198.90	1507.25	9890	198.95	1506.87	9895
199.00	1506.49	9900	199.05	1506.12	9905
199.10	1505.74	9910	199.15	1505.36	9915
199.20	1504.98	9920	199.25	1504.60	9925
199.30	1504.23	9930	199.35	1503.85	9935
199.40	1503.47	9940	199.45	1503.10	9945
199.50	1502.72	9950	199.55	1502.34	9955
199.60	1501.97	9960	199.65	1501.59	9965
199.70	1501.21	9970	199.75	1500.84	9975
199.80	1500.46	9980	199.85	1500.09	9985
199.90	1499.71	9990	199.95	1499.34	9995
200.00	1498.96	2000	200.05	1498.59	2000
200.10	1498.21	2001	200.15	1497.84	2001
200.20	1497.46	2002	200.25	1497.09	2002
200.30	1496.72	2003	200.35	1496.34	2003
200.40	1495.97	2004	200.45	1495.60	2004

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ITU channel number (THz)	nm	ALU wave key	ITU channel number (THz)	nm	ALU wave key
100 GHz Grid			**50 GHz Offset**		
200.50	1495.22	2005	200.55	1494.85	2005
200.60	1494.48	2006	200.65	1494.11	2006
200.70	1493.73	2007	200.75	1493.36	2007
200.80	1492.99	2008	200.85	1492.62	2008
200.90	1492.25	2009	200.95	1491.88	2009

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In addition, the Wavelength Tracker can measure the optical power level at each detection point for each encoded channel that passes through a port on a 1830 PSS device. The 5620 SAM power management feature uses the wavelength tracker feature and other equipment readings to provide a graphical representation of power levels and a mechanism to track changes in the network.

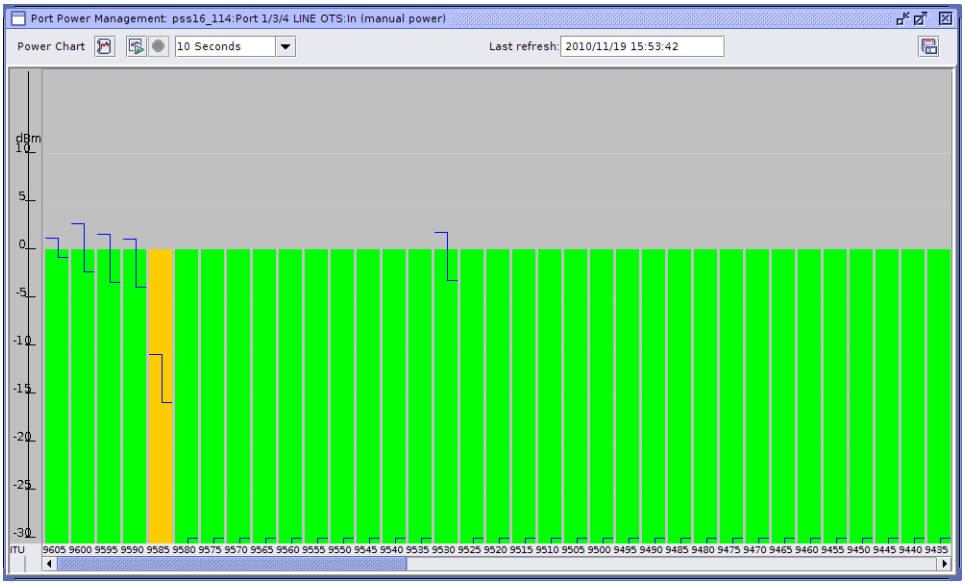
The port power graph displays three power values for each wavelength (direction (IN or OUT) and a port) as follows:

- present power—a measurement that provides the current power level
- expected power—a provisioned value that indicates to the NE what power level should be achieved
- expected power deviation—a provisioned value that represents the deviation from the expected power level that is considered healthy

In automatically powered equipment, the expected power and deviation values are determined by SCOT. In manually powered equipment, the user can change these values.

Optical power levels are represented by bars, and the high and low watermarks are represented by a Z bar. Figure 12-1 shows a typical port optical power graph.

Figure 12-1 Port optical power graph



For more information about the Wavelength Tracker tool, see the Wavelength Tracker chapter in the *1830 Photonic Service Switch 32/16 (PSS-32/PSS-16) User Provisioning Guide* and the Wavelength Tracker section in the Features chapter in the *1830 Photonic Service Switch 32/16 (PSS-32/PSS-16) Product Information and Planning Guide.*

12.2 Managing optical power levels procedures

The following procedures describe how to manage optical power levels.

Procedure 12-1 To display optical power levels along a service path

1. Choose Manage→Service→Services from the 5620 SAM main menu. The Manage Services form opens.
2. Select Optical Transport Service from the object type drop-down list and click on the Search button. A list of currently managed optical transport services is displayed.
3. Select one of the services in the list and click on the Properties button. The Optical Transport Service form opens.
4. Click on the Power A to Z or Power Z to A button. The optical power level graph opens.

Procedure 12-2 To refresh the optical power graph display

1 Open an optical power graph. See Procedure 12-1 for more information.

2 Select the number of seconds between refreshes from the Real-Time Polling Interval drop-down list.

3 Perform one of the following:

   a To configure automatic refresh, select the number of seconds between refreshes from the Real-Time Polling Interval drop-down list and click on the Auto-refresh power chart icon.

      The optical power graph updates at the configured time interval.

   b To manually refresh the optical power graph, click on the Stop auto-refresh chart button if required and click on the Refresh power chart button

      The optical power graph is refreshed and Last refresh time is displayed.

Procedure 12-3 To manage expected power level and deviation at a Wavelength Tracker detection point

1 Choose Equipment from the view selector in the navigation tree. The navigation tree displays the Equipment view.

2 Right-click on a port object in the Equipment view and choose Properties from the contextual menu. The Physical Port (Edit) form opens with the General tab displayed.Table 12-4 lists the ports that support the Wavelength Tracker.

Table 12-4 Wavelength Tracker-enabled ports

Card	Port	Direction
A2325A AHPHG AHPLG ALPHG AM2017B AM2325B	LINE	IN, OUT
	SIG	OUT
	DCM	OUT
AM2125A	LINEIN	IN
	LINEOUT	OUT
CWR8 CWR8-88	SIG	IN, OUT
	THRU	OUT
	OMD	IN
	CLS (1 to 8)	IN, OUT

(1 of 2)

Card	Port	Direction
OPSA, Protection Mode = OCHP or OMSP only	SIG	IN
	A	IN
	B	IN

(2 of 2)

3 Perform one of the following:

a Click on the Power Management In button to view the detection point power levels for the inbound optical light path. The Port Power Management power chart for the inbound optical light path opens.

b Click on the Power Management Out button to view the detection point power levels for the outbound optical light path. The Port Power Management power chart for the outbound optical light path opens.

4 To set the expected power level for a channel, right-click on the Z bar and drag the Z bar to the appropriate expected power level such that the expected power level value falls in the middle of the Z bar.

5 Right-click on the Z bar and choose Set Power Deviation from the contextual menu. The Set Power Deviation for channel window is displayed.

6 To set the power deviation, perform one of the following:

a Enter a deviation value between 0 and 5 and click the Apply button.

b Drag the slide bar left or right to select a deviation value and click the Apply button.

The Set Power Deviation for channel window closes and the size of the Z bar increases or decreases to reflect the configured deviation value.

Procedure 12-4 To export optical power graph data to a CSV file

1 Choose Equipment from the view selector in the navigation tree. The navigation tree displays the Equipment view.

2 Right-click on a port object in the Equipment view and choose Properties from the contextual menu. The Physical Port (Edit) form opens with the General tab displayed.

3 Perform one of the following:

a Click on the Power Management In button to view the detection point power levels for the inbound optical light path. The Port Power Management power chart for the inbound optical light path opens.

b Click on the Power Management Out button to view the detection point power levels for the outbound optical light path. The Port Power Management power chart for the outbound optical light path opens.

4 Click on the Export power values to CSV file button. The Save As window opens.

5 Choose the appropriate location for the file and click the Save button. The Save As window closes and the CSV file that contains the optical power level data is saved.

13 — 1830 PSS troubleshooting

13.1 Troublshooting overview *13-2*

13.2 Fault management *13-2*

13.3 Alarm management *13-3*

13.1 Troublshooting overview

Fault management is a set of functions that allows detection, isolation, and correction of abnormal operations in a telecommunication network. Alarm reporting is the notification sent to external management systems for internally detected faults. The fault processing and alarm reporting functions are part of the supervision function of the NE that monitors and manages the NE transmission resources (logical or physical facilities and the associated equipment modules).

13.2 Fault management

The 1830 PSS 32/1830 PSS 16 is provisionable on a per-port basis to detect process, report faults, failures, and performance. Equipment faults can be diagnosed down to an FRU or interface.

There is one system default alarm profile that contains all alarms or conditions supported in the system and their severity, Critical, Major, Minor. The user can change the severity of alarms on each port or facility independently or point to the system profile. The system profile can be modified or reset to factory defaults.

The 5620 SAM converts SNMP traps from network routers to events and alarms.

The 5620 SAM correlates the events and alarms against the managed equipment and configured services and policies. The 5620 SAM applies the alarms against the appropriate equipment and services. See the OAMP chapter in the 1830 Photonic Service Switch 32/16 Product Information and Planning Guide and the Alarm management chapter in the *5620 SAM User Guide* for more information about Fault and alarm management.

A correlated alarm refers to an alarm that causes fault conditions for many objects. For example, if an alarm occurs because a port goes down, all services that use the port receive notification of the alarm. You can view the alarm from the service configuration form or from the subscriber information form that lists the affected service. All object information forms contain a faults tab, which lists the alarms that affect the object. All alarms appear in the alarm list of the 5620 SAM GUI. See the *5620 SAM-O OSS Interface Developer Guide* for more information about fault management.

Note 1 — See the 5620 SAM Troubleshooting Guide for more information about the alarm elements and types that are associated with the 5620 SAM-O fault management package.

Note 2 — You can find specific alarm descriptions in the following locations:

- Installation_directory/nms/User_Documentation/5620_SAM-O_documentation/XML_Reference/alarmDetails.xml, where Installation_directory is the client installation folder or directory
- User_Documentation/5620_SAM-O_documentation/XML_Reference/alarmDetails.xml directory on the product DVD-ROM
- http://server address:8085/5620 SAM-O documentation/XML Reference/alarmDetails.xml, where server address is the address of the server

Usage logging

The 5620 SAM supports usage logging of all operations that take place on the 1830 PSS. You can configure the Log Policy and specify how much data to collect and store in the log or whether to turn off the logging operation. To configure client usage and activity logging, see the 5620 SAM user security chapter in the *5620 SAM User Guide* for more information.

13.3 Alarm management

The alarm-based fault management system provides the following:

- the correlation of alarms with equipment- and service-affecting faults
- updates to the managed-object operational status of equipment, services and interfaces in near-real-time
- alarm policy control that allows a network administrator to specify how to process alarms and how to create and store the alarm logs
- point-and-click alarm management using the 5620 SAM GUI dynamic alarm list and object properties forms
- the ability to log the actions taken to correct the associated fault by adding notes to the alarm
- an alarm history for performing trend analysis

See the Alarm management chapter in the *5620 SAM User Guide* and the SNMP procedures chapter in the *1830 Photonic Service Switch 32/16 User Provisioning Guide*.

Alarm status, severity, and aggregation

Alarm status for the network is indicated in the navigation tree, the dynamic alarm list, and on the topology maps. You can use the navigation tree to view the status of an alarm raised against a specific object and to view the aggregated alarm status. The aggregated alarm status is also available on the Faults tab of an object property form. See the Alarm management chapter in the *5620 SAM User Guide* for more information about aggregation and object alarms.

Alarm serverity profiles can be configured at the NE, shelf, card slot and interface level. See the Alarm management chapter in the *5620 SAM User Guide* for more information.

Alarm suppression

The 5620 SAM does not raise alarms when numerous SNMP traps are sent in quick succession for the same type of event. This prevents alarm storms during intermittent outages in the network caused by bouncing NEs; for example, when links go up and down rapidly. The 5620 SAM continues to resynchronize the network, and if the bouncing NEs continue to send down state SNMP traps, the 5620 SAM eventually receives the trap and generates the appropriate alarm.

To indicate how often an alarm is raised, the number of occurrences of each instance of the alarm is tracked within the alarm record of the initial alarm. Click on the Statistics tab of an individual Alarm Info form to see how often the alarm was raised. See the *5620 SAM User Guide* for more information.

Appendix

A. 1830 PSS statistics counters ***A-1***

A. 1830 PSS statistics counters

A.1 1830 PSS statistics counters *A-2*

A.1 1830 PSS statistics counters

The following tables list the statistics counters that the 5620 SAM supports for the following 1830 PSS devices:

- 1830 PSS 1:
  - GBE edge device, Release 2.5
  - MD4H edge device, Release 1.5
  - AHP amplifier, Release 1.0
- 1830 PSS 16, Release 2.5.1
- 1830 PSS 32, Release 2.5.1

Each 5620 SAM counter entry in a table contains the name and description of the corresponding device MIB counter.

The 5620 SAM counter name in a table entry is the internal counter identifier that is required for statistics retrieval through the 5620 SAM OSSI. The displayed counter name in the 5620 SAM GUI is typically an expansion of this identifier. For example, the receivedBroadcastPackets counter name in the equipment table corresponds to the Received Broadcast Packets counter name on the Log Record form for an Ethernet port.

Note 1 — The tables list the 5620 SAM-supported statistics counters for the current release of the device. Counters that are supported for a previous device release, but not for the current release, are not listed.

Note 2 — A statistics counter in the 5620 SAM GUI whose displayed name ends with “Periodic” is a counter that records the difference between the current and previous values of an associated 5620 SAM counter. The OSS equivalent name for a Periodic counter is the name of the 5620 SAM counter with a “Periodic” suffix. The tables in this appendix do not list Periodic counters.

Table A-1 lists each statistics package and the associated statistics counter table.

Table A-1 Statistics packages and counter tables

Package name	See
equipment	Table A-2
optical	Table A-3

Table A-2 equipment statistics

5620 SAM counter name	Type	MIB counter name	Description
InterfaceAdditionalStats MIB table name: IF-MIB.ifXTable Monitored classes: equipment.PhysicalPort; equipment.ManagementPort; lag.Interface; bundle.Interface; sonetequipment.Sts1Channel; sonetequipment.Sts3Channel; sonetequipment.Sts12Channel; sonetequipment.Sts48Channel; sonetequipment.Sts192Channel; tdmequipment.DS3E3Channel; tdmequipment.DS1E1Channel; tdmequipment.DS0ChannelGroup; ccag.CcagPathCcNetSap; ccag.CcagPathCcSapNet; ccag.CcagPathCcSapSap; sonetequipment.Tu3Channel; sonetequipment.TributaryChannel			
receivedBroadcastPackets	UINT128	ifHCInBroadcastPkts	The number of packets, delivered by this sub-layer to a higher (sub-)layer, which were addressed to a broadcast address at this sub-layer. This object is a 64-bit version of ifInBroadcastPkts. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime.
receivedMulticastPackets	UINT128	ifHCInMulticastPkts	The number of packets, delivered by this sub-layer to a higher (sub-)layer, which were addressed to a multicast address at this sub-layer. For a MAC layer protocol, this includes both Group and Functional addresses. This object is a 64-bit version of ifInMulticastPkts. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime.
receivedTotalOctets	UINT128	ifHCInOctets	The total number of octets received on the interface, including framing characters. This object is a 64-bit version of ifInOctets. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime.
receivedUnicastPackets	UINT128	ifHCInUcastPkts	The number of packets, delivered by this sub-layer to a higher (sub-)layer, which were not addressed to a multicast or broadcast address at this sub-layer. This object is a 64-bit version of ifInUcastPkts. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime.
transmittedBroadcastPackets	UINT128	ifHCOutBroadcastPkts	The total number of packets that higher-level protocols requested be transmitted, and which were addressed to a broadcast address at this sub-layer, including those that were discarded or not sent. This object is a 64-bit version of ifOutBroadcastPkts. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime.

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5620 SAM counter name	Type	MIB counter name	Description
transmittedMulticastPackets	UINT128	ifHCOutMulticastPkts	The total number of packets that higher-level protocols requested be transmitted, and which were addressed to a multicast address at this sub-layer, including those that were discarded or not sent. For a MAC layer protocol, this includes both Group and Functional addresses. This object is a 64-bit version of ifOutMulticastPkts. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime.
transmittedTotalOctets	UINT128	ifHCOutOctets	The total number of octets transmitted out of the interface, including framing characters. This object is a 64-bit version of ifOutOctets. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime.
transmittedUnicastPackets	UINT128	ifHCOutUcastPkts	The total number of packets that higher-level protocols requested be transmitted, and which were not addressed to a multicast or broadcast address at this sub-layer, including those that were discarded or not sent. This object is a 64-bit version of ifOutUcastPkts. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime.
InterfaceStats MIB table name: IF-MIB.ifTable Monitored classes: equipment.PhysicalPort; equipment.ManagementPort; lag.Interface; bundle.Interface; sonetequipment.Sts1Channel; sonetequipment.Sts3Channel; sonetequipment.Sts12Channel; sonetequipment.Sts48Channel; sonetequipment.Sts192Channel; tdmequipment.DS3E3Channel; tdmequipment.DS1E1Channel; tdmequipment.DS0ChannelGroup; ccag.CcagPathCcNetSap; ccag.CcagPathCcSapNet; ccag.CcagPathCcSapSap; sonetequipment.Tu3Channel; sonetequipment.TributaryChannel			
outboundBadPackets	long	ifOutErrors	For packet-oriented interfaces, the number of outbound packets that could not be transmitted because of errors. For character-oriented or fixed-length interfaces, the number of outbound transmission units that could not be transmitted because of errors. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime.

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5620 SAM counter name	Type	MIB counter name	Description
outboundPacketsDiscarded	long	ifOutDiscards	The number of outbound packets which were chosen to be discarded even though no errors had been detected to prevent their being transmitted. One possible reason for discarding such a packet could be to free up buffer space. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime.
receivedBadPackets	long	ifInErrors	For packet-oriented interfaces, the number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol. For character- oriented or fixed-length interfaces, the number of inbound transmission units that contained errors preventing them from being deliverable to a higher-layer protocol. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime.
receivedOctets	long	ifInOctets	The total number of octets received on the interface, including framing characters. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime.
receivedPacketsDiscarded	long	ifInDiscards	The number of inbound packets which were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher-layer protocol. One possible reason for discarding such a packet could be to free up buffer space. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime.
receivedUnicastPackets	long	ifInUcastPkts	The number of packets, delivered by this sub-layer to a higher (sub-)layer, which were not addressed to a multicast or broadcast address at this sub-layer. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime.

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5620 SAM counter name	Type	MIB counter name	Description
receivedUnknownProtocolPackets	long	ifInUnknownProtos	For packet-oriented interfaces, the number of packets received via the interface which were discarded because of an unknown or unsupported protocol. For character-oriented or fixed-length interfaces that support protocol multiplexing the number of transmission units received via the interface which were discarded because of an unknown or unsupported protocol. For any interface that does not support protocol multiplexing, this counter will always be 0. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime.
transmittedOctets	long	ifOutOctets	The total number of octets transmitted out of the interface, including framing characters. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime.
transmittedUnicastPackets	long	ifOutUcastPkts	The total number of packets that higher-level protocols requested be transmitted, and which were not addressed to a multicast or broadcast address at this sub-layer, including those that were discarded or not sent. Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime.

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Table A-3 optical statistics

5620 SAM counter name	Type	MIB counter name	Description
CardRawStats MIB table name: TROPIC-STATISTICS-MIB.tnCardRawCountStatsTable Monitored class: equipment.BaseCard			
rawCpuAverage	long	tnCardRawCountStatCpuAverage	The average CPU usage as a percentage.
rawHeapUsage	long	tnCardRawCountStatHeapUsage	The heap usage as a percentage.
rawPoolUsage	long	tnCardRawCountStatPoolUsage	The pool usage as a percentage.
rawStartTime	String	tnCardRawCountStatStartTime	This attribute is the bin collection start date and time.
CardStats MIB table name: TROPIC-STATISTICS-MIB.tnCardStatsTable Monitored class: equipment.BaseCard			

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5620 SAM counter name	Type	MIB counter name	Description
binStatus	int	tnCardStatsBinStatus	This attribute indicates the validity of the bin.
cpuAverage	long	tnCardStatCpuAverage	The average CPU usage as a percentage.
heapUsage	long	tnCardStatHeapUsage	The heap usage as a percentage.
poolUsage	long	tnCardStatPoolUsage	The pool usage as a percentage.
startTime	String	tnCardStatsStartTime	This attribute is the bin collection start date and time.
DigitalWrapper64BitRawStats MIB table name: TROPIC-STATISTICS-MIB.tnDigitalWrapper64BitRawCountStatsTable Monitored class: optical.OpticalPortSpecifics			
rxPMBEIErrCnt	UINT128	tnDw64BitRawCountStatRxPMBEIErrCnt	Provides a count of the path monitor backward error indication (BEI) errors detected at the receiver.
rxPMBIP8ErrCnt	UINT128	tnDw64BitRawCountStatRxPMBIP8ErrCnt	Provides a count of the path monitor bit interleaved parity (BIP-8) errors detected at the receiver.
rxPMES	UINT128	tnDw64BitRawCountStatRxPMES	Provides a count of the path monitor errored seconds.
rxPMSES	UINT128	tnDw64BitRawCountStatRxPMSES	Provides a count of the path monitor severely errored seconds.
rxPMUAS	UINT128	tnDw64BitRawCountStatRxPMUAS	Provides a count of the path monitor unavailable seconds.
rxRsCorrCnt	UINT128	tnDw64BitRawCountStatRxRSCorrCnt	Provides a count of the number of bits corrected at the receiver.
rxRSSES	UINT128	tnDw64BitRawCountStatRxRSSES	RX RS Severely Errored Second (SES): A one-second period which contains 15 errored blocks or at least one defect.
rxRsUncorrCnt	UINT128	tnDw64BitRawCountStatRxRSUncorrCnt	Provides a count of the number of blocks detected at the receiver which have uncorrectable errors.
rxSMBEIErrCnt	UINT128	tnDw64BitRawCountStatRxSMBEIErrCnt	Provides a count of the section monitor backward error indication (BEI) errors detected at the receiver.
rxSMBIP8ErrCnt	UINT128	tnDw64BitRawCountStatRxSMBIP8ErrCnt	Provides a count of the section monitor bit interleaved parity (BIP-8) errors detected at the receiver.
rxSMES	UINT128	tnDw64BitRawCountStatRxSMES	Provides a count of the section monitor errored seconds.
rxSMSES	UINT128	tnDw64BitRawCountStatRxSMSES	Provides a count of the section monitor severely errored seconds.
rxSMUAS	UINT128	tnDw64BitRawCountStatRxSMUAS	Provides a count of the section monitor unavailable seconds.
startTime	String	tnDw64BitRawCountStatStartTime	This attribute is the bin collection start date and time.
DigitalWrapper64BitStats MIB table name: TROPIC-STATISTICS-MIB.tnDigitalWrapper64BitStatsTable Monitored class: optical.OpticalPortSpecifics			

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5620 SAM counter name	Type	MIB counter name	Description
binStatus	int	tnDw64BitStatsBinStatus	This attribute indicates the validity of the bin.
rxPMBEIErrCnt	UINT128	tnDw64BitStatRxPMBEIErrCnt	Provides a count of the path monitor backward error indication (BEI) errors detected at the receiver.
rxPMBIP8ErrCnt	UINT128	tnDw64BitStatRxPMBIP8ErrCnt	Provides a count of the path monitor bit interleaved parity (BIP-8) errors detected at the receiver.
rxPMES	UINT128	tnDw64BitStatRxPMES	Provides a count of the path monitor errored seconds.
rxPMSES	UINT128	tnDw64BitStatRxPMSES	Provides a count of the path monitor severely errored seconds.
rxPMUAS	UINT128	tnDw64BitStatRxPMUAS	Provides a count of the path monitor unavailable seconds.
rxRsCorrCnt	UINT128	tnDw64BitStatRxRSCorrCnt	Provides a count of the number of bits corrected at the receiver.
rxRSSES	UINT128	tnDw64BitStatRxRSSES	Rx RS Severely Errored Second (SES): A one-second period which contains 15 errored blocks or at least one defect.
rxRsUncorrCnt	UINT128	tnDw64BitStatRxRSUncorrCnt	Provides a count of the number of blocks detected at the receiver which have uncorrectable errors.
rxSMBEIErrCnt	UINT128	tnDw64BitStatRxSMBEIErrCnt	Provides a count of the section monitor backward error indication (BEI) errors detected at the receiver.
rxSMBIP8ErrCnt	UINT128	tnDw64BitStatRxSMBIP8ErrCnt	Provides a count of the section monitor bit interleaved parity (BIP-8) errors detected at the receiver.
rxSMES	UINT128	tnDw64BitStatRxSMES	Provides a count of the section monitor errored seconds.
rxSMSES	UINT128	tnDw64BitStatRxSMSES	Provides a count of the section monitor severely errored seconds.
rxSMUAS	UINT128	tnDw64BitStatRxSMUAS	Provides a count of the section monitor unavailable seconds.
startTime	String	tnDw64BitStatsStartTime	This attribute is the bin collection start date and time.
EtherRawStats MIB table name: TROPIC-STATISTICS-MIB.tnEtherRawCountStatsTable Monitored class: optical.OpticalPortSpecifics			
rawEtherStatRxBcastPkts	UINT128	tnEtherRawCountStatRxBcastPkts	Provides a count of the total number of good packets received that were directed to the broadcast address. This does not include multicast packets.
rawEtherStatRxCollisions	UINT128	tnEtherRawCountStatRxCollisions	Provides a count of the total number of collisions on the port.

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5620 SAM counter name	Type	MIB counter name	Description
rawEtherStatRxCrcAlignErrs	UINT128	tnEtherRawCountStatRxCrcAlignErrs	Provides a count of the total number of packets received that had a length of between 63 and 1518 octets, inclusive, but had either a FCS with an integral number of octets (FCS error) or a bad FCS with a non-integral number of octets (Alignment Error). The packet length excludes framing bits and includes FCS octets.
rawEtherStatRxDropEvents	UINT128	tnEtherRawCountStatRxDropEvents	Provides a count of the total number of events in which packets were dropped by the monitoring entity due to a lack of resources. This value is not necessarily the number of packets dropped; it can be the number of times this condition has been detected.
rawEtherStatRxFragments	UINT128	tnEtherRawCountStatRxFragments	Provides a count of the total number of packets sent or received that were less than 64 octets in length (excluding framing bits but including FCS octets) and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
rawEtherStatRxJabbers	UINT128	tnEtherRawCountStatRxJabbers	Provides a count of the total number of packets sent or received that were longer than 1518 octets (excluding framing bits, but including FCS octets) and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
rawEtherStatRxJumboPkts	UINT128	tnEtherRawCountStatRxJumboPkts	Provides a count of the total number of Jumbo frames sent or received on the port. Jumbo frames are frames which have a packet size greater than 1500 bytes.
rawEtherStatRxMcastPkts	UINT128	tnEtherRawCountStatRxMcastPkts	Provides a count of the total number of good packets received that were directed to a multicast address. This does not include packets directed to the broadcast.
rawEtherStatRxOctets	UINT128	tnEtherRawCountStatRxOctets	Provides a count of the total number of octets of data (including the bad packets) received on the port. Excludes framing bits. Includes Frame Check Sequence (FCS) octets.
rawEtherStatRxOversizedPkts	UINT128	tnEtherRawCountStatRxOversizedPkts	Provides a count of the total number of packets received that were longer than 1518 octets and were otherwise well formed. The packet length excludes framing bits and includes FCS octets.
rawEtherStatRxPktErrRatio	UINT128	tnEtherRawCountStatRxPktErrRatio	Provides a ratio of the total number of errored packets received to the total number of packets received.
rawEtherStatRxPkts	UINT128	tnEtherRawCountStatRxPkts	Provides a count of the total number of packets (including bad packet, broadcast packets, and multicast packets) received.

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5620 SAM counter name	Type	MIB counter name	Description
rawEtherStatRxPktsSize1024to1518	UINT128	tnEtherRawCountStatRxPktsSize1024to1518	Provides a count of the total number of packets (including bad packets) received that were between 1024 and 1518 octets in length inclusive. The packet length excludes framing bits and includes FCS octets.
rawEtherStatRxPktsSize128to255	UINT128	tnEtherRawCountStatRxPktsSize128to255	Provides a count of the total number of packets (including bad packets) received that were between 128 and 255 octets in length inclusive. The packet length excludes framing bits and includes FCS octets.
rawEtherStatRxPktsSize256to511	UINT128	tnEtherRawCountStatRxPktsSize256to511	Provides a count of the total number of packets (including bad packets) received that were between 256 and 511 octets in length inclusive. The packet length excludes framing bits and includes FCS octets.
rawEtherStatRxPktsSize64	UINT128	tnEtherRawCountStatRxPktsSize64	Provides a count of the total number of packets (including bad packets) received that were 64 octets in length inclusive. The packet length excludes framing bits and includes FCS octets.
rawEtherStatRxPktsSize65to127	UINT128	tnEtherRawCountStatRxPktsSize65to127	Provides a count of the total number of packets (including bad packets) received that were between 65 and 127 octets in length inclusive. The packet length excludes framing bits and includes FCS octets.
rawEtherStatRxUndersizedPkts	UINT128	tnEtherRawCountStatRxUndersizedPkts	Provides a count of the total number of packets received that were less than 64 octets long and were otherwise well formed. The packet length excludes framing bits and includes FCS octets.
rawEtherStatTxBcastPkts	UINT128	tnEtherRawCountStatTxBcastPkts	Provides a count of the total number of good packets received that were directed to the broadcast address. This does not include multicast packets.
rawEtherStatTxCollisions	UINT128	tnEtherRawCountStatTxCollisions	Provides a count of the total number of collisions on the port.
rawEtherStatTxCrcAlignErrs	UINT128	tnEtherRawCountStatTxCrcAlignErrs	Provides a count of the total number of packets received that had a length of between 63 and 1518 octets, inclusive, but had either a FCS with an integral number of octets (FCS error) or a bad FCS with a non-integral number of octets (Alignment Error). The packet length excludes framing bits and includes FCS octets.
rawEtherStatTxDropEvents	UINT128	tnEtherRawCountStatTxDropEvents	Provides a count of the total number of events in which packets were dropped by the monitoring entity due to a lack of resources. This value is not necessarily the number of packets dropped; it can be the number of times this condition has been detected.

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5620 SAM counter name	Type	MIB counter name	Description
rawEtherStatTxFragments	UINT128	tnEtherRawCountStatTxFragments	Provides a count of the total number of packets sent or received that were less than 64 octets in length (excluding framing bits but including FCS octets) and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
rawEtherStatTxJabbers	UINT128	tnEtherRawCountStatTxJabbers	Provides a count of the total number of packets sent or received that were longer than 1518 octets (excluding framing bits, but including FCS octets) and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
rawEtherStatTxJumboPkts	UINT128	tnEtherRawCountStatTxJumboPkts	Provides a count of the total number of Jumbo frames sent or received on the port. Jumbo frames are frames which have a packet size greater than 1500 bytes.
rawEtherStatTxMcastPkts	UINT128	tnEtherRawCountStatTxMcastPkts	Provides a count of the total number of good packets received that were directed to a multicast address. This does not include packets directed to the broadcast.
rawEtherStatTxOctets	UINT128	tnEtherRawCountStatTxOctets	Provides a count of the total number of octets of data (including the bad packets) received on the port. Excludes framing bits. Includes Frame Check Sequence (FCS) octets.
rawEtherStatTxOversizedPkts	UINT128	tnEtherRawCountStatTxOversizedPkts	Provides a count of the total number of packets received that were longer than 1518 octets and were otherwise well formed. The packet length excludes framing bits and includes FCS octets.
rawEtherStatTxPktErrRatio	UINT128	tnEtherRawCountStatTxPktErrRatio	Provides a ratio of the total number of errored packets transmitted to the total number of packets transmitted.
rawEtherStatTxPkts	UINT128	tnEtherRawCountStatTxPkts	Provides a count of the total number of packets (including bad packet, broadcast packets, and multicast packets) received.
rawEtherStatTxPktsSize1024to1518	UINT128	tnEtherRawCountStatTxPktsSize1024to1518	Provides a count of the total number of packets (including bad packets) received that were between 1024 and 1518 octets in length inclusive. The packet length excludes framing bits and includes FCS octets.
rawEtherStatTxPktsSize128to255	UINT128	tnEtherRawCountStatTxPktsSize128to255	Provides a count of the total number of packets (including bad packets) received that were between 128 and 255 octets in length inclusive. The packet length excludes framing bits and includes FCS octets.

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5620 SAM counter name	Type	MIB counter name	Description
rawEtherStatTxPktsSize256to511	UINT128	tnEtherRawCountStatTxPktsSize256to511	Provides a count of the total number of packets (including bad packets) received that were between 256 and 511octets in length inclusive. The packet length excludes framing bits and includes FCS octets.
rawEtherStatTxPktsSize64	UINT128	tnEtherRawCountStatTxPktsSize64	Provides a count of the total number of packets (including bad packets) received that were 64 octets in length inclusive. The packet length excludes framing bits and includes FCS octets.
rawEtherStatTxPktsSize65to127	UINT128	tnEtherRawCountStatTxPktsSize65to127	Provides a count of the total number of packets (including bad packets) received that were between 65 and 127 octets in length inclusive. The packet length excludes framing bits and includes FCS octets.
rawEtherStatTxUndersizedPkts	UINT128	tnEtherRawCountStatTxUndersizedPkts	Provides a count of the total number of packets received that were less than 64 octets long and were otherwise well formed. The packet length excludes framing bits and includes FCS octets.
startTime	String	tnEtherRawCountStatStartTime	This attribute is the bin collection start date and time.
EtherStats MIB table name: TROPIC-STATISTICS-MIB.tnEtherStatsTable Monitored class: optical.OpticalPortSpecifics			
binStatus	int	tnEtherStatsBinStatus	This attribute indicates the validity of the bin.
etherStatRxBcastPkts	UINT128	tnEtherStatRxBcastPkts	Provides a count of the total number of good packets received that were directed to the broadcast address. This does not include multicast packets.
etherStatRxCollisions	UINT128	tnEtherStatRxCollisions	Provides a count of the total number of collisions on the port.
etherStatRxCrcAlignErrs	UINT128	tnEtherStatRxCrcAlignErrs	Provides a count of the total number of packets received that had a length of between 63 and 1518 octets, inclusive, but had either a FCS with an integral number of octets (FCS error) or a bad FCS with a non-integral number of octets (Alignment Error). The packet length excludes framing bits and includes FCS octets.
etherStatRxDropEvents	UINT128	tnEtherStatRxDropEvents	Provides a count of the total number of events in which packets were dropped by the monitoring entity due to a lack of resources. This value is not necessarily the number of packets dropped; it can be the number of times this condition has been detected.

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5620 SAM counter name	Type	MIB counter name	Description
etherStatRxFragments	UINT128	tnEtherStatRxFragments	Provides a count of the total number of packets sent or received that were less than 64 octets in length (excluding framing bits but including FCS octets) and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
etherStatRxJabbers	UINT128	tnEtherStatRxJabbers	Provides a count of the total number of packets sent or received that were longer than 1518 octets (excluding framing bits, but including FCS octets) and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
etherStatRxJumboPkts	UINT128	tnEtherStatRxJumboPkts	Provides a count of the total number of Jumbo frames sent or received on the port. Jumbo frames are frames which have a packet size greater than 1500 bytes.
etherStatRxMcastPkts	UINT128	tnEtherStatRxMcastPkts	Provides a count of the total number of good packets received that were directed to a multicast address. This does not include packets directed to the broadcast.
etherStatRxOctets	UINT128	tnEtherStatRxOctets	Provides a count of the total number of octets of data (including the bad packets) received on the port. Excludes framing bits. Includes Frame Check Sequence (FCS) octets.
etherStatRxOversizedPkts	UINT128	tnEtherStatRxOversizedPkts	Provides a count of the total number of packets received that were longer than 1518 octets and were otherwise well formed. The packet length excludes framing bits and includes FCS octets.
etherStatRxPktErrRatio	UINT128	tnEtherStatRxPktErrRatio	Provides a ratio of the total number of errored packets received to the total number of packets received.
etherStatRxPkts	UINT128	tnEtherStatRxPkts	Provides a count of the total number of packets (including bad packet, broadcast packets, and multicast packets) received.
etherStatRxPktsSize1024to1518	UINT128	tnEtherStatRxPktsSize1024to1518	Provides a count of the total number of packets (including bad packets) received that were between 1024 and 1518 octets in length inclusive. The packet length excludes framing bits and includes FCS octets.
etherStatRxPktsSize128to255	UINT128	tnEtherStatRxPktsSize128to255	Provides a count of the total number of packets (including bad packets) received that were between 128 and 255 octets in length inclusive. The packet length excludes framing bits and includes FCS octets.

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5620 SAM counter name	Type	MIB counter name	Description
etherStatRxPktsSize256to511	UINT128	tnEtherStatRxPktsSize256 to511	Provides a count of the total number of packets (including bad packets) received that were between 256 and 511 octets in length inclusive. The packet length excludes framing bits and includes FCS octets.
etherStatRxPktsSize64	UINT128	tnEtherStatRxPktsSize64	Provides a count of the total number of packets (including bad packets) received that were 64 octets in length inclusive. The packet length excludes framing bits and includes FCS octets.
etherStatRxPktsSize65to127	UINT128	tnEtherStatRxPktsSize65t o127	Provides a count of the total number of packets (including bad packets) received that were between 65 and 127 octets in length inclusive. The packet length excludes framing bits and includes FCS octets.
etherStatRxUndersizedPkts	UINT128	tnEtherStatRxUndersized Pkts	Provides a count of the total number of packets received that were less than 64 octets long and were otherwise well formed. The packet length excludes framing bits and includes FCS octets.
etherStatTxBcastPkts	UINT128	tnEtherStatTxBcastPkts	Provides a count of the total number of good packets received that were directed to the broadcast address. This does not include multicast packets.
etherStatTxCollisions	UINT128	tnEtherStatTxCollisions	Provides a count of the total number of collisions on the port.
etherStatTxCrcAlignErrs	UINT128	tnEtherStatTxCrcAlignErr s	Provides a count of the total number of packets received that had a length of between 63 and 1518 octets, inclusive, but had either a FCS with an integral number of octets (FCS error) or a bad FCS with a non-integral number of octets (Alignment Error). The packet length excludes framing bits and includes FCS octets.
etherStatTxDropEvents	UINT128	tnEtherStatTxDropEvents	Provides a count of the total number of events in which packets were dropped by the monitoring entity due to a lack of resources. This value is not necessarily the number of packets dropped; it can be the number of times this condition has been detected.
etherStatTxFragments	UINT128	tnEtherStatTxFragments	Provides a count of the total number of packets sent or received that were less than 64 octets in length (excluding framing bits but including FCS octets) and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).

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5620 SAM counter name	Type	MIB counter name	Description
etherStatTxJabbers	UINT128	tnEtherStatTxJabbers	Provides a count of the total number of packets sent or received that were longer than 1518 octets (excluding framing bits, but including FCS octets) and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
etherStatTxJumboPkts	UINT128	tnEtherStatTxJumboPkts	Provides a count of the total number of Jumbo frames sent or received on the port. Jumbo frames are frames which have a packet size greater than 1500 bytes.
etherStatTxMcastPkts	UINT128	tnEtherStatTxMcastPkts	Provides a count of the total number of good packets received that were directed to a multicast address. This does not include packets directed to the broadcast.
etherStatTxOctets	UINT128	tnEtherStatTxOctets	Provides a count of the total number of octets of data (including the bad packets) received on the port. Excludes framing bits. Includes Frame Check Sequence (FCS) octets.
etherStatTxOversizedPkts	UINT128	tnEtherStatTxOversizedPkts	Provides a count of the total number of packets received that were longer than 1518 octets and were otherwise well formed. The packet length excludes framing bits and includes FCS octets.
etherStatTxPktErrRatio	UINT128	tnEtherStatTxPktErrRatio	Provides a ratio of the total number of errored packets transmitted to the total number of packets transmitted.
etherStatTxPkts	UINT128	tnEtherStatTxPkts	Provides a count of the total number of packets (including bad packet, broadcast packets, and multicast packets) received.
etherStatTxPktsSize1024to1518	UINT128	tnEtherStatTxPktsSize1024to1518	Provides a count of the total number of packets (including bad packets) received that were between 1024 and 1518 octets in length inclusive. The packet length excludes framing bits and includes FCS octets.
etherStatTxPktsSize128to255	UINT128	tnEtherStatTxPktsSize128to255	Provides a count of the total number of packets (including bad packets) received that were between 128 and 255 octets in length inclusive. The packet length excludes framing bits and includes FCS octets.
etherStatTxPktsSize256to511	UINT128	tnEtherStatTxPktsSize256to511	Provides a count of the total number of packets (including bad packets) received that were between 256 and 511octets in length inclusive. The packet length excludes framing bits and includes FCS octets.
etherStatTxPktsSize64	UINT128	tnEtherStatTxPktsSize64	Provides a count of the total number of packets (including bad packets) received that were 64 octets in length inclusive. The packet length excludes framing bits and includes FCS octets.

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5620 SAM counter name	Type	MIB counter name	Description
etherStatTxPktsSize65to127	UINT128	tnEtherStatTxPktsSize65to127	Provides a count of the total number of packets (including bad packets) received that were between 65 and 127 octets in length inclusive. The packet length excludes framing bits and includes FCS octets.
etherStatTxUndersizedPkts	UINT128	tnEtherStatTxUndersizedPkts	Provides a count of the total number of packets received that were less than 64 octets long and were otherwise well formed. The packet length excludes framing bits and includes FCS octets.
startTime	String	tnEtherStatsStartTime	This attribute is the bin collection start date and time.
FibreChannelRawStats MIB table name: TROPIC-STATISTICS-MIB.tnFibreChannelRawCountStatsTable Monitored class: optical.OpticalPortSpecifics			
rxInvalidTxWords	long	tnFibreChannelRawCountStatRxInvalidTxWords	.
rxLinkFailures	long	tnFibreChannelRawCountStatRxLinkFailures	.
rxLossOfSignals	long	tnFibreChannelRawCountStatRxLossOfSignals	.
rxLossOfSynchs	long	tnFibreChannelRawCountStatRxLossOfSynchs	.
startTime	String	tnFibreChannelRawCountStatStartTime	This attribute is the bin collection start date and time.
txInvalidTxWords	long	tnFibreChannelRawCountStatTxInvalidTxWords	.
txLinkFailures	long	tnFibreChannelRawCountStatTxLinkFailures	.
txLossOfSignals	long	tnFibreChannelRawCountStatTxLossOfSignals	.
txLossOfSynchs	long	tnFibreChannelRawCountStatTxLossOfSynchs	.
FibreChannelStats MIB table name: TROPIC-STATISTICS-MIB.tnFibreChannelStatsTable Monitored class: optical.OpticalPortSpecifics			
binStatus	int	tnFibreChannelStatsBinStatus	This attribute indicates the validity of the bin.
rxInvalidTxWords	long	tnFibreChannelStatRxInvalidTxWords	.
rxLinkFailures	long	tnFibreChannelStatRxLinkFailures	.
rxLossOfSignals	long	tnFibreChannelStatRxLossOfSignals	.
rxLossOfSynchs	long	tnFibreChannelStatRxLossOfSynchs	.
startTime	String	tnFibreChannelStatsStartTime	This attribute is the bin collection start date and time.

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5620 SAM counter name	Type	MIB counter name	Description
txInvalidTxWords	long	tnFibreChannelStatTxInvalidTxWords	.
txLinkFailures	long	tnFibreChannelStatTxLinkFailures	.
txLossOfSignals	long	tnFibreChannelStatTxLossOfSignals	.
txLossOfSynchs	long	tnFibreChannelStatTxLossOfSynchs	.
InterfaceRawStats MIB table name: TROPIC-STATISTICS-MIB.tnInterfaceRawCountStatsTable Monitored class: optical.OpticalPortSpecifics			
rawIfStatInBroadcastPkts	UINT128	tnIfRawCountStatInBroadcastPkts	Provides a count of the total number of good packets detected at the IN port of the interface that were directed to the broadcast address. Does not include multicast packets.
rawIfStatInDiscards	UINT128	tnIfRawCountStatInDiscards	Provides a count of the number of packets discarded at the IN port of the interface.
rawIfStatInErrors	UINT128	tnIfRawCountStatInErrors	Provides a count of the errored frames detected at the IN port of the interface. For Ethernet traffic, this value is a sum of the following counts: tnEtherStatRxCrcAlignErrs tnEtherStatRxOversizedPkts tnEtherStatRxUndersizedPkts tnEtherStatRxFragments.
rawIfStatInMulticastPkts	UINT128	tnIfRawCountStatInMulticastPkts	Provides a count of the total number of good packets detected at the IN port of the interface that were directed to a multicast address. Does not include packets directed to the broadcast.
rawIfStatInOctets	UINT128	tnIfRawCountStatInOctets	Provides a count of the number of octets that passed through the IN port of the interface.
rawIfStatInPacketsNotClassified	UINT128	tnIfRawCountStatInPacketsNotClassified	Provides a count of the number of unclassified packets received at the IN port of the interface.
rawIfStatInUcastPkts	UINT128	tnIfRawCountStatInUcastPkts	Provides a count of the number of unicast packets that passed through the IN port of the interface.
rawIfStatInUnknownProtos	UINT128	tnIfRawCountStatInUnknownProtos	Provides a count of the number of packets received at the IN port of the interface for which the protocol is unknown.
rawIfStatOutBroadcastPkts	UINT128	tnIfRawCountStatOutBroadcastPkts	Provides a count of the total number of good packets detected at the OUT port of the interface that were directed to the broadcast address. Does not include multicast packets.
rawIfStatOutDiscards	UINT128	tnIfRawCountStatOutDiscards	Provides a count of the number of packets discarded at the OUT port of the interface.

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5620 SAM counter name	Type	MIB counter name	Description
rawIfStatOutErrors	UINT128	tnIfRawCountStatOutErrors	Provides a count of the errored frames detected at the OUT port of the interface. For Ethernet traffic, this value is a sum of the following counts: tnEtherStatTxCrcAlignErrs tnEtherStatTxOversizedPkts tnEtherStatTxUndersizedPkts tnEtherStatTxFragments.
rawIfStatOutMulticastPkts	UINT128	tnIfRawCountStatOutMulticastPkts	Provides a count of the total number of good packets detected at the OUT port of the interface that were directed to a multicast address. Does not include packets directed to the broadcast.
rawIfStatOutOctets	UINT128	tnIfRawCountStatOutOctets	Provides a count of the number of octets that passed through the OUT port of the interface.
startTime	String	tnIfRawCountStatStartTime	This attribute is the bin collection start date and time.
InterfaceStats MIB table name: TROPIC-STATISTICS-MIB.tnInterfaceStatsTable Monitored class: optical.OpticalPortSpecifics			
binStatus	int	tnIfStatsBinStatus	This attribute indicates the validity of the bin.
ifStatInBroadcastPkts	UINT128	tnIfStatInBroadcastPkts	Provides a count of the total number of good packets detected at the IN port of the interface that were directed to the broadcast address. Does not include multicast packets.
ifStatInDiscards	UINT128	tnIfStatInDiscards	Provides a count of the number of packets discarded at the IN port of the interface.
ifStatInErrors	UINT128	tnIfStatInErrors	Provides a count of the errored frames detected at the IN port of the interface. For Ethernet traffic, this value is a sum of the following counts: tnEtherStatRxCrcAlignErrs tnEtherStatRxOversizedPkts tnEtherStatRxUndersizedPkts tnEtherStatRxFragments.
ifStatInMulticastPkts	UINT128	tnIfStatInMulticastPkts	Provides a count of the total number of good packets detected at the IN port of the interface that were directed to a multicast address. Does not include packets directed to the broadcast.
ifStatInOctets	UINT128	tnIfStatInOctets	Provides a count of the number of octets that passed through the IN port of the interface.
ifStatInPacketsNotClassified	UINT128	tnIfStatInPacketsNotClassified	Provides a count of the number of unclassified packets received at the IN port of the interface.
ifStatInUcastPkts	UINT128	tnIfStatInUcastPkts	Provides a count of the number of unicast packets that passed through the IN port of the interface.

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5620 SAM counter name	Type	MIB counter name	Description
ifStatInUnknownProtos	UINT128	tnIfStatInUnknownProtos	Provides a count of the number of packets received at the IN port of the interface for which the protocol is unknown.
ifStatOutBroadcastPkts	UINT128	tnIfStatOutBroadcastPkts	Provides a count of the total number of good packets detected at the OUT port of the interface that were directed to the broadcast address. Does not include multicast packets.
ifStatOutDiscards	UINT128	tnIfStatOutDiscards	Provides a count of the number of packets discarded at the OUT port of the interface.
ifStatOutErrors	UINT128	tnIfStatOutErrors	Provides a count of the errored frames detected at the OUT port of the interface. For Ethernet traffic, this value is a sum of the following counts: tnEtherStatTxCrcAlignErrs tnEtherStatTxOversizedPkts tnEtherStatTxUndersizedPkts tnEtherStatTxFragments.
ifStatOutMulticastPkts	UINT128	tnIfStatOutMulticastPkts	Provides a count of the total number of good packets detected at the OUT port of the interface that were directed to a multicast address. Does not include packets directed to the broadcast.
ifStatOutOctets	UINT128	tnIfStatOutOctets	Provides a count of the number of octets that passed through the OUT port of the interface.
ifStatOutUcastPkts	UINT128	tnIfStatOutUcastPkts	Provides a count of the number of unicast packets that passed through the OUT port of the interface.
startTime	String	tnIfStatsStartTime	This attribute is the bin collection start date and time.
L1ProtRawStats MIB table name: TROPIC-STATISTICS-MIB.tnL1ProtRawCountStatsTable Monitored class: optical.OpticalPortSpecifics			
l1ProtStatActiveTime	long	tnL1ProtRawCountStatActiveTime	Protection switch duration (seconds). Provides a count of the number of seconds the protection switch has been in its current configuration.
l1ProtStatPsc	long	tnL1ProtRawCountStatPsc	Protection switch count. Provides a count of the number of protection switches that occurred during the interval.
startTime	String	tnL1ProtRawCountStatStartTime	This attribute is the bin collection start date and time.
L1ProtStats MIB table name: TROPIC-STATISTICS-MIB.tnL1ProtStatsTable Monitored class: optical.OpticalPortSpecifics			
binStatus	int	tnL1ProtStatsBinStatus	This attribute indicates the validity of the bin.
l1ProtStatActiveTime	long	tnL1ProtStatActiveTime	Protection switch duration (seconds). Provides a count of the number of seconds the protection switch has been in its current configuration.

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5620 SAM counter name	Type	MIB counter name	Description
l1ProtStatPsc	long	tnL1ProtStatPsc	Protection switch count. Provides a count of the number of protection switches that occurred during the interval.
startTime	String	tnL1ProtStatsStartTime	This attribute is the bin collection start date and time.
OpInRawStats MIB table name: TROPIC-STATISTICS-MIB.tnOpInRawCountStatsTable Monitored class: optical.OpticalPortSpecifics			
rawAvgPower	long	tnOpInRawCountStatAverage Power	Average optical DC power in the In direction (mBm).
rawMaxPower	long	tnOpInRawCountStatMax Power	Maximum optical DC power in the In direction (mBm).
rawMinPower	long	tnOpInRawCountStatMinP ower	Minimum optical DC power in the In direction (mBm).
startTime	String	tnOpInRawCountStatStart Time	This attribute is the bin collection start date and time.
OpInStats MIB table name: TROPIC-STATISTICS-MIB.tnOpInStatsTable Monitored class: optical.OpticalPortSpecifics			
avgPower	long	tnOpInStatAveragePower	Average optical DC power in the In direction (mBm).
binStatus	int	tnOpInStatsBinStatus	This attribute indicates the validity of the bin.
maxPower	long	tnOpInStatMaxPower	Maximum optical DC power in the In direction (mBm).
minPower	long	tnOpInStatMinPower	Minimum optical DC power in the In direction (mBm).
startTime	String	tnOpInStatsStartTime	This attribute is the bin collection start date and time.
OpOchInRawStats MIB table name: TROPIC-STATISTICS-MIB.tnOpOchInRawCountStatsTable Monitored class: optical.OpticalPortSpecifics			
rawAvgPower	long	tnOpOchInRawCountStat AveragePower	Average optical WT power in the In direction (mBm).
rawMaxPower	long	tnOpOchInRawCountStat MaxPower	Maximum optical WT power in the In direction (mBm).
rawMinPower	long	tnOpOchInRawCountStat MinPower	Minimum optical WT power in the In direction (mBm).
startTime	String	tnOpOchInRawCountStatS tartTime	This attribute is the bin collection start date and time.
OpOchInStats MIB table name: TROPIC-STATISTICS-MIB.tnOpOchInStatsTable Monitored class: optical.OpticalPortSpecifics			
avgPower	long	tnOpOchInStatAveragePo wer	Average optical WT power in the In direction (mBm).
binStatus	int	tnOpOchInStatsBinStatus	This attribute indicates the validity of the bin.

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5620 SAM counter name	Type	MIB counter name	Description
maxPower	long	tnOpOchInStatMaxPower	Maximum optical WT power in the In direction (mBm).
minPower	long	tnOpOchInStatMinPower	Minimum optical WT power in the In direction (mBm).
startTime	String	tnOpOchInStatsStartTime	This attribute is the bin collection start date and time.
OpOchOutRawStats MIB table name: TROPIC-STATISTICS-MIB.tnOpOchOutRawCountStatsTable Monitored class: optical.OpticalPortSpecifics			
rawAvgPower	long	tnOpOchOutRawCountStatAveragePower	Average optical WT power in the Out direction (mBm).
rawMaxPower	long	tnOpOchOutRawCountStatMaxPower	Maximum optical WT power in the Out direction (mBm).
rawMinPower	long	tnOpOchOutRawCountStatMinPower	Minimum optical WT power in the Out direction (mBm).
startTime	String	tnOpOchOutRawCountStatStartTime	This attribute is the bin collection start date and time.
OpOchOutStats MIB table name: TROPIC-STATISTICS-MIB.tnOpOchOutStatsTable Monitored class: optical.OpticalPortSpecifics			
avgPower	long	tnOpOchOutStatAveragePower	Average optical WT power in the Out direction (mBm).
binStatus	int	tnOpOchOutStatsBinStatus	This attribute indicates the validity of the bin.
maxPower	long	tnOpOchOutStatMaxPower	Maximum optical WT power in the Out direction (mBm).
minPower	long	tnOpOchOutStatMinPower	Minimum optical WT power in the Out direction (mBm).
startTime	String	tnOpOchOutStatsStartTime	This attribute is the bin collection start date and time.
OpOutRawStats MIB table name: TROPIC-STATISTICS-MIB.tnOpOutRawCountStatsTable Monitored class: optical.OpticalPortSpecifics			
rawAvgPower	long	tnOpOutRawCountStatAveragePower	Average optical DC power in the Out direction (mBm).
rawMaxPower	long	tnOpOutRawCountStatMaxPower	Maximum optical DC power in the Out direction (mBm).
rawMinPower	long	tnOpOutRawCountStatMinPower	Minimum optical DC power in the Out direction (mBm).
startTime	String	tnOpOutRawCountStatStartTime	This attribute is the bin collection start date and time.
OpOutStats MIB table name: TROPIC-STATISTICS-MIB.tnOpOutStatsTable Monitored class: optical.OpticalPortSpecifics			
avgPower	long	tnOpOutStatAveragePower	Average optical DC power in the Out direction (mBm).

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5620 SAM counter name	Type	MIB counter name	Description
binStatus	int	tnOpOutStatsBinStatus	This attribute indicates the validity of the bin.
maxPower	long	tnOpOutStatMaxPower	Maximum optical DC power in the Out direction (mBm).
minPower	long	tnOpOutStatMinPower	Minimum optical DC power in the Out direction (mBm).
startTime	String	tnOpOutStatsStartTime	This attribute is the bin collection start date and time.
OprRawStats MIB table name: TROPIC-STATISTICS-MIB.tnOprRawCountStatsTable Monitored class: optical.OpticalPortSpecifics			
rawAvgPower	long	tnOprRawCountStatAveragePower	Average optical DC power in the RX direction (mBm).
rawMaxPower	long	tnOprRawCountStatMaxPower	Maximum optical DC power in the RX direction (mBm).
rawMinPower	long	tnOprRawCountStatMinPower	Minimum optical DC power in the RX direction (mBm).
startTime	String	tnOprRawCountStatStartTime	This attribute is the bin collection start date and time.
OprStats MIB table name: TROPIC-STATISTICS-MIB.tnOprStatsTable Monitored class: optical.OpticalPortSpecifics			
avgPower	long	tnOprStatAveragePower	Average optical DC power in the RX direction (mBm).
binStatus	int	tnOprStatsBinStatus	This attribute indicates the validity of the bin.
maxPower	long	tnOprStatMaxPower	Maximum optical DC power in the RX direction (mBm).
minPower	long	tnOprStatMinPower	Minimum optical DC power in the RX direction (mBm).
startTime	String	tnOprStatsStartTime	This attribute is the bin collection start date and time.
OptRawStats MIB table name: TROPIC-STATISTICS-MIB.tnOptRawCountStatsTable Monitored class: optical.OpticalPortSpecifics			
rawAvgPower	long	tnOptRawCountStatAveragePower	Average optical DC power in the TX direction (mBm).
rawMaxPower	long	tnOptRawCountStatMaxPower	Maximum optical DC power in the TX direction (mBm).
rawMinPower	long	tnOptRawCountStatMinPower	Minimum optical DC power in the TX direction (mBm).
startTime	String	tnOptRawCountStatStartTime	This attribute is the bin collection start date and time.
OptStats MIB table name: TROPIC-STATISTICS-MIB.tnOptStatsTable Monitored class: optical.OpticalPortSpecifics			

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5620 SAM counter name	Type	MIB counter name	Description
avgPower	long	tnOptStatAveragePower	Average optical DC power in the TX direction (mBm).
binStatus	int	tnOptStatsBinStatus	This attribute indicates the validity of the bin.
maxPower	long	tnOptStatMaxPower	Maximum optical DC power in the TX direction (mBm).
minPower	long	tnOptStatMinPower	Minimum optical DC power in the TX direction (mBm).
startTime	String	tnOptStatsStartTime	This attribute is the bin collection start date and time.
PathSummaryRawStats MIB table name: TROPIC-STATISTICS-MIB.tnPathSummaryRawCountStatsTable Monitored class: optical.OpticalPortSpecifics			
rxNpjcPDet	long	tnPathSummaryRawCount StatRxNpjcPDet	RX Negative Pointer Justification Count - Path Detected.
rxNpjcPGen	long	tnPathSummaryRawCount StatRxNpjcPGen	RX Negative Pointer Justification Count - Path Generated.
rxPjcDiffP	long	tnPathSummaryRawCount StatRxPjcDiffP	RX Pointer Justification Count Difference - Path.
rxPjcsPDet	long	tnPathSummaryRawCount StatRxPjcsPDet	RX Pointer Justification Count Seconds - Path Detect.
rxPjcsPGen	long	tnPathSummaryRawCount StatRxPjcsPGen	RX Pointer Justification Count Seconds - Path Generate.
rxPpjcPDet	long	tnPathSummaryRawCount StatRxPpjcPDet	RX Positive Pointer Justification Count - Path Detected.
rxPpjcPGen	long	tnPathSummaryRawCount StatRxPpjcPGen	RX Positive Pointer Justification Count - Path Generated.
startTime	String	tnPathSummaryRawCount StatStartTime	This attribute is the bin collection start date and time.
txNpjcPDet	long	tnPathSummaryRawCount StatTxNpjcPDet	TX Negative Pointer Justification Count - Path Detected.
txNpjcPGen	long	tnPathSummaryRawCount StatTxNpjcPGen	TX Negative Pointer Justification Count - Path Generated.
txPjcDiffP	long	tnPathSummaryRawCount StatTxPjcDiffP	TX Pointer Justification Count Difference - Path.
txPjcsPDet	long	tnPathSummaryRawCount StatTxPjcsPDet	TX Pointer Justification Count Seconds - Path Detect.
txPjcsPGen	long	tnPathSummaryRawCount StatTxPjcsPGen	TX Pointer Justification Count Seconds - Path Generate.
txPpjcPDet	long	tnPathSummaryRawCount StatTxPpjcPDet	TX Positive Pointer Justification Count - Path Detected.
txPpjcPGen	long	tnPathSummaryRawCount StatTxPpjcPGen	TX Positive Pointer Justification Count - Path Generated.
PathSummaryStats MIB table name: TROPIC-STATISTICS-MIB.tnPathSummaryStatsTable Monitored class: optical.OpticalPortSpecifics			

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5620 SAM counter name	Type	MIB counter name	Description
binStatus	int	tnPathSummaryStatsBinStatus	This attribute indicates the validity of the bin.
rxNpjcPDet	long	tnPathSummaryStatRxNpjcPDet	RX Negative Pointer Justification Count - Path Detected.
rxNpjcPGen	long	tnPathSummaryStatRxNpjcPGen	RX Negative Pointer Justification Count - Path Generated.
rxPjcDiffP	long	tnPathSummaryStatRxPjcDiffP	RX Pointer Justification Count Difference - Path.
rxPjcsPDet	long	tnPathSummaryStatRxPjcsPDet	RX Pointer Justification Count Seconds - Path Detect.
rxPjcsPGen	long	tnPathSummaryStatRxPjcsPGen	RX Pointer Justification Count Seconds - Path Generate.
rxPpjcPDet	long	tnPathSummaryStatRxPpjcPDet	RX Positive Pointer Justification Count - Path Detected.
rxPpjcPGen	long	tnPathSummaryStatRxPpjcPGen	RX Positive Pointer Justification Count - Path Generated.
startTime	String	tnPathSummaryStatsStartTime	This attribute is the bin collection start date and time.
txNpjcPDet	long	tnPathSummaryStatTxNpjcPDet	TX Negative Pointer Justification Count - Path Detected.
txNpjcPGen	long	tnPathSummaryStatTxNpjcPGen	TX Negative Pointer Justification Count - Path Generated.
txPjcDiffP	long	tnPathSummaryStatTxPjcDiffP	TX Pointer Justification Count Difference - Path.
txPjcsPDet	long	tnPathSummaryStatTxPjcsPDet	TX Pointer Justification Count Seconds - Path Detect.
txPjcsPGen	long	tnPathSummaryStatTxPjcsPGen	TX Pointer Justification Count Seconds - Path Generate.
txPpjcPDet	long	tnPathSummaryStatTxPpjcPDet	TX Positive Pointer Justification Count - Path Detected.
txPpjcPGen	long	tnPathSummaryStatTxPpjcPGen	TX Positive Pointer Justification Count - Path Generated.
PhyCodeSubLayerRawStats MIB table name: TROPIC-STATISTICS-MIB.tnPhyCodeSublayerRawCountStatsTable Monitored class: optical.OpticalPortSpecifics			
rxCV	long	tnPhyCodeSublayerRawCountStatRxCV	Coding violation.
rxES	long	tnPhyCodeSublayerRawCountStatRxES	Errored second.
rxSEFS	long	tnPhyCodeSublayerRawCountStatRxSEFS	Severely errored frame second.
rxSES	long	tnPhyCodeSublayerRawCountStatRxSES	Severely errored second.
startTime	String	tnPhyCodeSublayerRawCountStatStartTime	This attribute is the bin collection start date and time.
txCV	long	tnPhyCodeSublayerRawCountStatTxCV	Coding violation.

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5620 SAM counter name	Type	MIB counter name	Description
txES	long	tnPhyCodeSublayerRawCountStatTxES	Errored second.
txSEFS	long	tnPhyCodeSublayerRawCountStatTxSEFS	Severely errored frame second.
txSES	long	tnPhyCodeSublayerRawCountStatTxSES	Severely errored second.
PhyCodeSubLayerStats MIB table name: TROPIC-STATISTICS-MIB.tnPhyCodeSublayerStatsTable Monitored class: optical.OpticalPortSpecifics			
binStatus	int	tnPhyCodeSublayerStatsBinStatus	This attribute indicates the validity of the bin.
rxCV	long	tnPhyCodeSublayerStatRxCV	Coding violation.
rxES	long	tnPhyCodeSublayerStatRxES	Errored second.
rxSEFS	long	tnPhyCodeSublayerStatRxSEFS	Severely errored frame second.
rxSES	long	tnPhyCodeSublayerStatRxSES	Severely errored second.
startTime	String	tnPhyCodeSublayerStatsStartTime	This attribute is the bin collection start date and time.
txCV	long	tnPhyCodeSublayerStatTxCV	Coding violation.
txES	long	tnPhyCodeSublayerStatTxES	Errored second.
txSEFS	long	tnPhyCodeSublayerStatTxSEFS	Severely errored frame second.
txSES	long	tnPhyCodeSublayerStatTxSES	Severely errored second.
SdhRawStats MIB table name: TROPIC-STATISTICS-MIB.tnSdhRawCountStatsTable Monitored class: optical.OpticalPortSpecifics			
sdhStatRxMSEB	long	tnSdhRawCountStatRxMSEB	Multiplex section - errored block. Provides a count of the number of B2 BIP violations.
sdhStatRxMSES	long	tnSdhRawCountStatRxMSES	Multiplex section - errored second. Provides a count of the number of one second intervals in which any of the following conditions are true: - at least one B2 BIP error was detected. - an alarm indicating signal (MS-AIS) defect was present.

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5620 SAM counter name	Type	MIB counter name	Description
sdhStatRxMSSES	long	tnSdhRawCountStatRxMSSES	Multiplex section - severely errored second. Provides a count of the number of one second intervals in which any of the following conditions are true: - the number of multiplex section layer B2 errors detected exceeded the value defined in GR-253-CORE. - an alarm indicating signal (MS-AIS) defect was present.
sdhStatRxMSUAS	long	tnSdhRawCountStatRxMSUAS	Multiplex section - unavailable second. Provides a count of the number of seconds that a line is unavailable. A multiplex section is deemed to be unavailable when 10 consecutive severely errored seconds (SESs) are detected. The period of unavailability begins at the onset the 10 consecutive SESs (back in time). Availability is declared after a period of 10 consecutive non-SESs. The period of availability begins at the onset of the 10 consecutive non-SESs (back in time).
sdhStatRxRSEB	long	tnSdhRawCountStatRxRSEB	Regenerator section - errored block. Provides a count of the number of B1 violations.
sdhStatRxRSES	long	tnSdhRawCountStatRxRSES	Regenerator section - errored second. Provides a count of the number of one second intervals in which any of the following conditions are true: - at least one B1 BIP-8 error was detected. - a loss of signal (LOS) defect was present. - a severely errored frame (SEF) defect was present.
sdhStatRxRSSES	long	tnSdhRawCountStatRxRSSES	Regenerator section - severely errored second. Provides a count of the number of one second intervals in which any of the following conditions are true: - the number of regenerator section layer BIP errors detected exceeded the value defined in GR-253-CORE. - a loss of signal (LOS) defect was present. - a severely errored frame (SEF) defect was present.
sdhStatRxRSUAS	long	tnSdhRawCountStatRxRSUAS	Regenerator section - unavailable second. Provides a count of the number of seconds that a line is unavailable. A regenerator section is deemed to be unavailable when 10 consecutive severely errored seconds (SESs) are detected. The period of unavailability begins at the onset the 10 consecutive SESs (back in time). Availability is declared after a period of 10 consecutive non-SESs. The period of availability begins at the onset of the 10 consecutive non-SESs (back in time).
sdhStatTxMSEB	long	tnSdhRawCountStatTxMSEB	Multiplex section - errored block. Provides a count of the number of B2 BIP violations.

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5620 SAM counter name	Type	MIB counter name	Description
sdhStatTxMSES	long	tnSdhRawCountStatTxMSES	Multiplex section - errored second. Provides a count of the number of one second intervals in which any of the following conditions are true: - at least one B2 BIP error was detected. - an alarm indicating signal (MS-AIS) defect was present.
sdhStatTxMSSES	long	tnSdhRawCountStatTxMSSES	Multiplex section - severely errored second. Provides a count of the number of one second intervals in which any of the following conditions are true: - the number of multiplex section layer B2 errors detected exceeded the value defined in GR-253-CORE. - an alarm indicating signal (MS-AIS) defect was present.
sdhStatTxMSUAS	long	tnSdhRawCountStatTxMSUAS	Multiplex section - unavailable second. Provides a count of the number of seconds that a line is unavailable. A multiplex section is deemed to be unavailable when 10 consecutive severely errored seconds (SESs) are detected. The period of unavailability begins at the onset the 10 consecutive SESs (back in time). Availability is declared after a period of 10 consecutive non-SESs. The period of availability begins at the onset of the 10 consecutive non-SESs (back in time).
sdhStatTxRSEB	long	tnSdhRawCountStatTxRSEB	Regenerator section - errored block. Provides a count of the number of B1 violations.
sdhStatTxRSES	long	tnSdhRawCountStatTxRSES	Regenerator section - errored second. Provides a count of the number of one second intervals in which any of the following conditions are true: - at least one B1 BIP-8 error was detected. - a loss of signal (LOS) defect was present. - a severely errored frame (SEF) defect was present.
sdhStatTxRSSES	long	tnSdhRawCountStatTxRSSES	Regenerator section - severely errored second. Provides a count of the number of one second intervals in which any of the following conditions are true: - the number of regenerator section layer BIP errors detected exceeded the value defined in GR-253-CORE. - a loss of signal (LOS) defect was present. - a severely errored frame (SEF) defect was present.
sdhStatTxRSUAS	long	tnSdhRawCountStatTxRSUAS	Regenerator section - unavailable second. Provides a count of the number of seconds that a line is unavailable. A regenerator section is deemed to be unavailable when 10 consecutive severely errored seconds (SESs) are detected. The period of unavailability begins at the onset the 10 consecutive SESs (back in time). Availability is declared after a period of 10 consecutive non-SESs. The period of availability begins at the onset of the 10 consecutive non-SESs (back in time).

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5620 SAM counter name	Type	MIB counter name	Description
startTime	String	tnSdhRawCountStatStart Time	This attribute is the bin collection start date and time.
SdhStats MIB table name: TROPIC-STATISTICS-MIB.tnSdhStatsTable Monitored class: optical.OpticalPortSpecifics			
binStatus	int	tnSdhStatsBinStatus	This attribute indicates the validity of the bin.
sdhStatRxMSEB	long	tnSdhStatRxMSEB	Multiplex section - errored block. Provides a count of the number of B2 BIP violations.
sdhStatRxMSES	long	tnSdhStatRxMSES	Multiplex section - errored second. Provides a count of the number of one second intervals in which any of the following conditions are true: - at least one B2 BIP error was detected. - an alarm indicating signal (MS-AIS) defect was present.
sdhStatRxMSSES	long	tnSdhStatRxMSSES	Multiplex section - severely errored second. Provides a count of the number of one second intervals in which any of the following conditions are true: - the number of multiplex section layer B2 errors detected exceeded the value defined in GR-253-CORE. - an alarm indicating signal (MS-AIS) defect was present.
sdhStatRxMSUAS	long	tnSdhStatRxMSUAS	Multiplex section - unavailable second. Provides a count of the number of seconds that a line is unavailable. A multiplex section is deemed to be unavailable when 10 consecutive severely errored seconds (SESs) are detected. The period of unavailability begins at the onset the 10 consecutive SESs (back in time). Availability is declared after a period of 10 consecutive non-SESs. The period of availability begins at the onset of the 10 consecutive non-SESs (back in time).
sdhStatRxRSEB	long	tnSdhStatRxRSEB	Regenerator section - errored block. Provides a count of the number of B1 violations.
sdhStatRxRSES	long	tnSdhStatRxRSES	Regenerator section - errored second. Provides a count of the number of one second intervals in which any of the following conditions are true: - at least one B1 BIP-8 error was detected. - a loss of signal (LOS) defect was present. - a severely errored frame (SEF) defect was present.

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5620 SAM counter name	Type	MIB counter name	Description
sdhStatRxRSSES	long	tnSdhStatRxRSSES	Regenerator section - severely errored second. Provides a count of the number of one second intervals in which any of the following conditions are true: - the number of regenerator section layer BIP errors detected exceeded the value defined in GR-253-CORE. - a loss of signal (LOS) defect was present. - a severely errored frame (SEF) defect was present.
sdhStatRxRSUAS	long	tnSdhStatRxRSUAS	Regenerator section - unavailable second. Provides a count of the number of seconds that a line is unavailable. A regenerator section is deemed to be unavailable when 10 consecutive severely errored seconds (SESs) are detected. The period of unavailability begins at the onset the 10 consecutive SESs (back in time). Availability is declared after a period of 10 consecutive non-SESs. The period of availability begins at the onset of the 10 consecutive non-SESs (back in time).
sdhStatTxMSEB	long	tnSdhStatTxMSEB	Multiplex section - errored block. Provides a count of the number of B2 BIP violations.
sdhStatTxMSES	long	tnSdhStatTxMSES	Multiplex section - errored second. Provides a count of the number of one second intervals in which any of the following conditions are true: - at least one B2 BIP error was detected. - an alarm indicating signal (MS-AIS) defect was present.
sdhStatTxMSSES	long	tnSdhStatTxMSSES	Multiplex section - severely errored second. Provides a count of the number of one second intervals in which any of the following conditions are true: - the number of multiplex section layer B2 errors detected exceeded the value defined in GR-253-CORE. - an alarm indicating signal (MS-AIS) defect was present.
sdhStatTxMSUAS	long	tnSdhStatTxMSUAS	Multiplex section - unavailable second. Provides a count of the number of seconds that a line is unavailable. A multiplex section is deemed to be unavailable when 10 consecutive severely errored seconds (SESs) are detected. The period of unavailability begins at the onset the 10 consecutive SESs (back in time). Availability is declared after a period of 10 consecutive non-SESs. The period of availability begins at the onset of the 10 consecutive non-SESs (back in time).
sdhStatTxRSEB	long	tnSdhStatTxRSEB	Regenerator section - errored block. Provides a count of the number of B1 violations.

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5620 SAM counter name	Type	MIB counter name	Description
sdhStatTxRSES	long	tnSdhStatTxRSES	Regenerator section - errored second. Provides a count of the number of one second intervals in which any of the following conditions are true: - at least one B1 BIP-8 error was detected. - a loss of signal (LOS) defect was present. - a severely errored frame (SEF) defect was present.
sdhStatTxRSSES	long	tnSdhStatTxRSSES	Regenerator section - severely errored second. Provides a count of the number of one second intervals in which any of the following conditions are true: - the number of regenerator section layer BIP errors detected exceeded the value defined in GR-253-CORE. - a loss of signal (LOS) defect was present. - a severely errored frame (SEF) defect was present.
sdhStatTxRSUAS	long	tnSdhStatTxRSUAS	Regenerator section - unavailable second. Provides a count of the number of seconds that a line is unavailable. A regenerator section is deemed to be unavailable when 10 consecutive severely errored seconds (SESs) are detected. The period of unavailability begins at the onset the 10 consecutive SESs (back in time). Availability is declared after a period of 10 consecutive non-SESs. The period of availability begins at the onset of the 10 consecutive non-SESs (back in time).
startTime	String	tnSdhStatsStartTime	This attribute is the bin collection start date and time.
SonetRawStats MIB table name: TROPIC-STATISTICS-MIB.tnSonetRawCountStatsTable Monitored class: optical.OpticalPortSpecifics			
sonetStatRxCVL	long	tnSonetRawCountStatRxCVL	Coding violation - line. Provides a count of the number of B2 BIP violations.
sonetStatRxCVS	long	tnSonetRawCountStatRxCVS	Coding violation - section. Provides a count of the number of B1 violations.
sonetStatRxESL	long	tnSonetRawCountStatRxESL	Errored second - line. Provides a count of the number of one second intervals in which any of the following conditions are true: - at least one B2 BIP error was detected. - an alarm indicating signal (AIS-L) defect was present.
sonetStatRxESS	long	tnSonetRawCountStatRxESS	Errored second - section. Provides a count of the number of one second intervals in which any of the following conditions are true: - at least one B1 BIP-8 error was detected. - a loss of signal (LOS) defect was present. - a severely errored frame (SEF) defect was present.

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5620 SAM counter name	Type	MIB counter name	Description
sonetStatRxFCL	long	tnSonetRawCountStatRxFCL	Failure count - line. Provides a count of the number of line failures. A failure event begins when a AIS-L failure is declared and ends when the failure is cleared. A failure event that begins in one period and ends in another period is counted only in the period where it begins.
sonetStatRxSEFSS	long	tnSonetRawCountStatRxSEFSS	Severely errored frame second - section. Provides a count of the number of one second intervals in which any of the following conditions is true: - a loss of frame (LOF) defect was present. - a severely errored frame (SEF) defect was present.
sonetStatRxSESL	long	tnSonetRawCountStatRxSESL	Severely errored second - line. Provides a count of the number of one second intervals in which any of the following conditions are true: - the number of line layer B2 errors detected exceeded the value defined in GR-253-CORE. - an alarm indicating signal (AIS-L) defect was present.
sonetStatRxSESS	long	tnSonetRawCountStatRxSESS	Severely errored second - section. Provides a count of the number of one second intervals in which any of the following conditions are true: - the number of section layer BIP errors detected exceeded the value defined in GR-253-CORE. - a loss of signal (LOS) defect was present. - a severely errored frame (SEF) defect was present.
sonetStatRxUASL	long	tnSonetRawCountStatRxUASL	Unavailable second - line. Provides a count of the number of seconds that a line is unavailable. A line is deemed to be unavailable when 10 consecutive severely errored seconds (SESs) are detected. The period of unavailability begins at the onset the 10 consecutive SESs (back in time). Availability is declared after a period of 10 consecutive non-SESs. The period of availability begins at the onset of the 10 consecutive non-SESs (back in time).
sonetStatRxUASS	long	tnSonetRawCountStatRxUASS	Unavailable second - section. Provides a count of the number of seconds that a section is unavailable. A section is deemed to be unavailable when 10 consecutive severely errored seconds (SESs) are detected. The period of unavailability begins at the onset the 10 consecutive SESs (back in time). Availability is declared after a period of 10 consecutive non-SESs. The period of availability begins at the onset of the 10 consecutive non-SESs (back in time).
sonetStatTxCVL	long	tnSonetRawCountStatTxCVL	Coding violation - line. Provides a count of the number of B2 BIP violations.

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5620 SAM counter name	Type	MIB counter name	Description
sonetStatTxCVS	long	tnSonetRawCountStatTxCVS	Coding violation - section. Provides a count of the number of B1 violations.
sonetStatTxESL	long	tnSonetRawCountStatTxESL	Errored second - line. Provides a count of the number of one second intervals in which any of the following conditions are true: - at least one B2 BIP error was detected. - an alarm indicating signal (AIS-L) defect was present.
sonetStatTxESS	long	tnSonetRawCountStatTxESS	Errored second - section. Provides a count of the number of one second intervals in which any of the following conditions are true: - at least one B1 BIP-8 error was detected. - a loss of signal (LOS) defect was present. - a severely errored frame (SEF) defect was present.
sonetStatTxFCL	long	tnSonetRawCountStatTxFCL	Failure count - line. Provides a count of the number of line failures. A failure event begins when a AIS-L failure is declared and ends when the failure is cleared. A failure event that begins in one period and ends in another period is counted only in the period where it begins.
sonetStatTxSEFSS	long	tnSonetRawCountStatTxSEFSS	Severely errored frame second - section. Provides a count of the number of one second intervals in which any of the following conditions is true: - a loss of frame (LOF) defect was present. - a severely errored frame (SEF) defect was present.
sonetStatTxSESL	long	tnSonetRawCountStatTxSESL	Severely errored second - line. Provides a count of the number of one second intervals in which any of the following conditions are true: - the number of line layer B2 errors detected exceeded the value defined in GR-253-CORE. - an alarm indicating signal (AIS-L) defect was present.
sonetStatTxSESS	long	tnSonetRawCountStatTxSESS	Severely errored second - section. Provides a count of the number of one second intervals in which any of the following conditions are true: - the number of section layer BIP errors detected exceeded the value defined in GR-253-CORE. - a loss of signal (LOS) defect was present. - a severely errored frame (SEF) defect was present.
sonetStatTxUASL	long	tnSonetRawCountStatTxUASL	Unavailable second - line. Provides a count of the number of seconds that a line is unavailable. A line is deemed to be unavailable when 10 consecutive severely errored seconds (SESs) are detected. The period of unavailability begins at the onset the 10 consecutive SESs (back in time). Availability is declared after a period of 10 consecutive non-SESs. The period of availability begins at the onset of the 10 consecutive non-SESs (back in time).

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5620 SAM counter name	Type	MIB counter name	Description
startTime	String	tnSonetRawCountStatStartTime	This attribute is the bin collection start date and time.
SonetStats MIB table name: TROPIC-STATISTICS-MIB.tnSonetStatsTable Monitored class: optical.OpticalPortSpecifics			
binStatus	int	tnSonetStatsBinStatus	This attribute indicates the validity of the bin.
sonetStatRxCVL	long	tnSonetStatRxCVL	Coding violation - line. Provides a count of the number of B2 BIP violations.
sonetStatRxCVS	long	tnSonetStatRxCVS	Coding violation - section. Provides a count of the number of B1 violations.
sonetStatRxESL	long	tnSonetStatRxESL	Errored second - line. Provides a count of the number of one second intervals in which any of the following conditions are true: - at least one B2 BIP error was detected. - an alarm indicating signal (AIS-L) defect was present.
sonetStatRxESS	long	tnSonetStatRxESS	Errored second - section. Provides a count of the number of one second intervals in which any of the following conditions are true: - at least one B1 BIP-8 error was detected. - a loss of signal (LOS) defect was present. - a severely errored frame (SEF) defect was present.
sonetStatRxFCL	long	tnSonetStatRxFCL	Failure count - line. Provides a count of the number of line failures. A failure event begins when a AIS-L failure is declared and ends when the failure is cleared. A failure event that begins in one period and ends in another period is counted only in the period where it begins.
sonetStatRxSEFSS	long	tnSonetStatRxSEFSS	Severely errored second - section. Provides a count of the number of one second intervals in which any of the following conditions are true: - the number of section layer BIP errors detected exceeded the value defined in GR-253-CORE. - a loss of signal (LOS) defect was present. - a severely errored frame (SEF) defect was present.
sonetStatRxSESL	long	tnSonetStatRxSESL	Severely errored second - line. Provides a count of the number of one second intervals in which any of the following conditions are true: - the number of line layer B2 errors detected exceeded the value defined in GR-253-CORE. - an alarm indicating signal (AIS-L) defect was present.

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5620 SAM counter name	Type	MIB counter name	Description
sonetStatRxSESS	long	tnSonetStatRxSESS	Severely errored second - section. Provides a count of the number of one second intervals in which any of the following conditions are true: - the number of section layer BIP errors detected exceeded the value defined in GR-253-CORE. - a loss of signal (LOS) defect was present. - a severely errored frame (SEF) defect was present.
sonetStatRxUASL	long	tnSonetStatRxUASL	Unavailable second - line. Provides a count of the number of seconds that a line is unavailable. A line is deemed to be unavailable when 10 consecutive severely errored seconds (SESs) are detected. The period of unavailability begins at the onset the 10 consecutive SESs (back in time). Availability is declared after a period of 10 consecutive non-SESs. The period of availability begins at the onset of the 10 consecutive non-SESs (back in time).
sonetStatRxUASS	long	tnSonetStatRxUASS	Unavailable second - section. Provides a count of the number of seconds that a section is unavailable. A section is deemed to be unavailable when 10 consecutive severely errored seconds (SESs) are detected. The period of unavailability begins at the onset the 10 consecutive SESs (back in time). Availability is declared after a period of 10 consecutive non-SESs. The period of availability begins at the onset of the 10 consecutive non-SESs (back in time).
sonetStatTxCVL	long	tnSonetStatTxCVL	Coding violation - line. Provides a count of the number of B2 BIP violations.
sonetStatTxCVS	long	tnSonetStatTxCVS	Coding violation - section. Provides a count of the number of B1 violations.
sonetStatTxESL	long	tnSonetStatTxESL	Errored second - line. Provides a count of the number of one second intervals in which any of the following conditions are true: - at least one B2 BIP error was detected. - an alarm indicating signal (AIS-L) defect was present.
sonetStatTxESS	long	tnSonetStatTxESS	Errored second - section. Provides a count of the number of one second intervals in which any of the following conditions are true: - at least one B1 BIP-8 error was detected. - a loss of signal (LOS) defect was present. - a severely errored frame (SEF) defect was present.
sonetStatTxFCL	long	tnSonetStatTxFCL	Failure count - line. Provides a count of the number of line failures. A failure event begins when a AIS-L failure is declared and ends when the failure is cleared. A failure event that begins in one period and ends in another period is counted only in the period where it begins.

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5620 SAM counter name	Type	MIB counter name	Description
sonetStatTxSEFSS	long	tnSonetStatTxSEFSS	Severely errored frame second - section. Provides a count of the number of one second intervals in which any of the following conditions is true: - a loss of frame (LOF) defect was present. - a severely errored frame (SEF) defect was present.
sonetStatTxSESL	long	tnSonetStatTxSESL	Severely errored second - line. Provides a count of the number of one second intervals in which any of the following conditions are true: - the number of line layer B2 errors detected exceeded the value defined in GR-253-CORE. - an alarm indicating signal (AIS-L) defect was present.
sonetStatTxSESS	long	tnSonetStatTxSESS	Severely errored second - section. Provides a count of the number of one second intervals in which any of the following conditions are true: - the number of section layer BIP errors detected exceeded the value defined in GR-253-CORE. - a loss of signal (LOS) defect was present. - a severely errored frame (SEF) defect was present.
sonetStatTxUASL	long	tnSonetStatTxUASL	Unavailable second - line. Provides a count of the number of seconds that a line is unavailable. A line is deemed to be unavailable when 10 consecutive severely errored seconds (SESs) are detected. The period of unavailability begins at the onset the 10 consecutive SESs (back in time). Availability is declared after a period of 10 consecutive non-SESs. The period of availability begins at the onset of the 10 consecutive non-SESs (back in time).
startTime	String	tnSonetStatsStartTime	This attribute is the bin collection start date and time.
WaveTrackerKeyEntryStats MIB table name: TROPIC-WAVEKEY-MIB.tnWtKeyTable Monitored class: optical.WaveTrackerKeyEntry			
wtkExpectedPower	float	tnWtKeyExpectedPower	The power, expressed in units of mBm, associated with the expected Wave Keys. It is the average power of the Wave Keys. Current configurable range: -9900 to 1100.
wtkExpectedPowerDeviation	float	tnWtKeyExpectedPowerDev	The allowed deviation of the expected power, expressed in units of mB. Current configurable range: 0 to 1000.
wtkPresentPower	float	tnWtKeyPresentPower	The power, expressed in units of mBm, associated with the received Wave Keys. The value will be the average, over the sampling interval, of the Wave Keys.

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Customer documentation and product support

Customer documentation

http://www.alcatel-lucent.com/myaccess

Product manuals and documentation updates are available at alcatel-lucent.com. If you are a new user and require access to this service, please contact your Alcatel-Lucent sales representative.

Technical Support

http://support.alcatel-lucent.com

Documentation feedback

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