

# Hardware Support for Automatic Protection Switching (APS) in Routers and ATM Switches

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## Introduction

This document clarifies support for automatic protection switching (APS) on Cisco routers and enterprise switches. For more information on the APS implementation in each platform, including Cisco IOS® software support, select the link for the required module or card from [table 2](#).

## Prerequisites

### Requirements

There are no specific requirements for this document.

### Components Used

This document is not restricted to specific software and hardware versions.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live,

make sure that you understand the potential impact of any command.

## Conventions

Refer to [Cisco Technical Tips Conventions](#) for more information on document conventions.

## Background Information

Telecordia GR-253 and ITU-T G.783 specify "strict" Synchronous Optical Network (SONET) APS, which defines the protocol between the Add-Drop Multiplexer (ADM) and the Line Terminating Equipment (LTE), in this case a Cisco router or switch port. SONET APS specifies use of the K1 and K2 bytes in the SONET and Synchronous Digital Hierarchy (SDH) frame for status and control communication between line-terminating equipment (LTE). SONET APS is supported on some Cisco ATM interfaces. See [table 1](#) for more information.

Packet-over-SONET/SDH (POS) APS combines SONET APS with a proprietary protocol, known as the Protect Group Protocol (PGP), between working and protective routers, to complement the SONET/SDH protection signaling that occurs with Add/Drop Multiplexers (ADMs). With the help of this protocol, the process, which controls the protect circuit, directs the process that contains the working circuit. The process that contains the working circuit is directed on whether to activate or deactivate the working circuit, in the case of degradation or loss of channel signal, or manual intervention. If communication between the two processes is lost, the working router assumes full control of the working circuit as if no protective circuit existed. PGP is IP-based and uses User Datagram Protocol (UDP) transport (UDP port 172).

[Table 1](#) compares SONET APS and POS APS.

**Table 1 – Comparison Between SONET APS and POS APS**

APS Feature	SONET APS	POS APS
1+1	Yes	Yes
Revertive and non-revertive	Yes	Yes
K1 and K2 bytes communicate current status of the APS connection and convey any requests for action	Yes	Yes
Protect Group Protocol	-	Yes

## APS Over POS and Channelized SONET

Cisco Systems helped pioneer POS technology, and has been at the forefront to deliver high-performance and cost-effective POS solutions for use in service-provider and enterprise networks. POS line cards are very popular on the 12000 Series Internet Router, and also on the Cisco 7200, 7500, 7600 and 10000 Series. The Catalyst® 8500 series of enterprise switches also supports POS interfaces.

## Configuration Guides for Information on POS APS Support on Each Platform

[Table 2](#) provides links to configuration guides for information on POS APS support on each platform.

**Note:** This list is subject to change without notice. Please see the Release Notes for the latest information on each platform.

**Table 2 – Links to Configuration Guides**

Platform	Configuration Guides
<b>7x00 Series and FlexWAN*</b>	
PA-POS-OC3	<p><a href="#">APS Feature Summary</a></p> <p><b>Note:</b> When used in the 7200 Series, the PA-POS-OC3 also supports APS, although the APS Feature Summary document lists support on the 7500 and 12000 Series only.</p> <p><a href="#">Packet-over-SONET/SDH</a></p> <p><a href="#">Cisco IOS Software Release 11.1CC New Features, No. 727</a></p>
<b>7600 Series</b>	
OSM-8OC3-POS-MM, -SI, -SL	<a href="#">Configuration Guide</a>
OSM-16OC3-POS-MM, -SI, -SL	
OSM-4OC12-POS-MM	
OSM-2OC12-POS-MM	
OSM-1OC48-POS-SS, -SI, -SL	
ChOC-12, ChOC-48	<a href="#">Configuration Guide</a>
<b>10000 Series (ESR)</b>	
ESR-1OC12/P-SMI, (POS)	<a href="#">Configuring APS</a>
ESR-6OC3/P-SMI (6-port OC-3 POS)	

ESR-1COC12-SMI, (channelized OC-12 - ChOC-12)	
ESR-4OC3-ChSTM1	
<b>12000 Series (GSR)**</b>	
8OC3/POS-MM=, 8OC3/POS-SM=	<a href="#">APS Feature Summary</a> <a href="#">Packet-over-SONET/SDH</a> <a href="#">Cisco IOS Software Release 11.2GS</a>
16OC3/POS-SM=, 16OC3/POS-MM=	
4OC12E/POS-IR-SC(=), 4OC12E/POS-MM-SC(=)	
OC48E/POS-1550-FC(=), OC48E/POS-1550-SC(=)	
OC48E/POS-SR-FC(=), OC48E/POS-SR-SC(=)	
4OC-48/POS-SR-SC, 4OC-48/POS-SR-FC, 4OC-48/POS-LR-SC, 4OC-48/POS-LR-FC	
OC192/POS-SR-SC, OC192/POS-IR-SC	
CHOC-12/DS3	<a href="#">Data Sheet</a>
<b>Catalyst 8540 MSR</b>	
C85-POSOC12I-64K C85-POSOC12I-256K C85-POSOC12L-64K C85-POSOC12L-256K	<a href="#">Configuring Packet Over SONET</a>

\* The Cisco 7500 Series and the FlexWAN also support the PA-MC-STM-1, which supports Multiplex

Section Protection (MSP).

\*\* On the GSR, all non-channelized POS interfaces support APS. The channelized interfaces do not.

## ATM Over SONET

[Table 3](#) lists the ATM interfaces that support SONET APS. APS is not supported on the PA-A3 port adapter for the Cisco 7x00 Series of platforms, or on ATM line cards for the Cisco 12000 Series.

**Table 3 – ATM Interfaces That Support SONET APS**

Module or Line Card	Configuration Guides
<b>6400</b>	
OC-3 and OC-12 Network Line Cards (NLCs)  <b>Note:</b> SONET APS does not apply to DS3 NLCs.	<a href="#">SONET APS for NLC Port Redundancy</a> (See the <a href="#">Resetting Cards, Slots, and Subslots</a> section).
<b>6130, 6160, and 6260</b>	
OC-3c/2DS3 NI-2 card trunk interfaces and OC-3c/OC-3c NI-2 card trunk and subtend interfaces:  <ul style="list-style-type: none"> <li>• NI-2-DS3-DS3=</li> <li>• NI-2-155SM-155SM=</li> <li>• NI-2-155MM-155MM=</li> <li>• NI-2-155SM-DS3=</li> <li>• NI-2-155MM-DS3=</li> </ul>	<a href="#">NI-2 Card and APS Link Redundancy</a>  <a href="#">Upgrading DSLAMs for NI-2 Card and APS Link Redundancy</a> (See the <a href="#">APS Link Redundancy</a> section).
<b>WAN Switches</b>	
MGX 8850 and BPX 8650	<a href="#">SONET Automatic Protection Switching (APS) on the BPX 8600 Series</a>  <a href="#">SONET APS</a>
<b>10000 Series</b>	
OC-12 ATM and OC-3 ATM Line Cards	<a href="#">Release Notes for Cisco IOS Release 12.0 ST</a>

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## Related Information

- [Optical Technology Support](#)
- [Routing Updates Over APS on POS Interfaces](#)
- [Technical Support & Documentation - Cisco Systems](#)

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