Alarms

This chapter provides information about alarms supported for SONET and SDH, and their maintenance.

Alarms are triggered when a component fails or does not perform as expected. Alarms are triggered by the chassis.

Alarms can be defined using the following two terms:

- Alarm State—It is the state the chassis enters when a certain event occurs. For example, the state of the chassis when the ambient temperature is beyond the specified limits.

- Alarm Indication—It is a visual signal to indicate the alarm state. For example, the TEMP LED glows red if the ambient temperature is beyond the specified limits, and it turns green if the ambient temperature is within specified limits.

  Typically, a failure condition detected by a chassis results in one or more error conditions sent both upstream and downstream on the network.

  - Alarm Indication Signal (AIS)—AIS alarms are reported downstream from a detecting device, and to prevent consequential downstream failures or alarms from being raised.

  - Remote Defect Indicator (RDI)—RDI alarms are always reported upstream from the detecting device.

Note Even when the controller is in the down state with alarms, the cross connection between the controllers is up.

Restrictions for Alarms

- In T3, an AIS alarm is supported only in the framed mode and not supported in the unframed mode.

- When the T3 RAI alarm is asserted, the propagation of the RAI alarm is stopped on the T1 interface.

  This behaviour is applicable for the following interface modules:

  - NCS4200-48T3E3-CE

- NCS4200-3GMS

- NCS4200-1T8S-20CS

- NCS4200-1T8S-10CS

SONET Alarms

Alarms at SONET Layers

SONET equipment detects events and alarms at each of the three layers — section, line and path. A SONET chassis sends alarms in both upstream and downstream directions in order to notify other devices of the problem condition.

The interface of an active alarm or defect is maintained in a down/down state. The process used to troubleshoot down/down SONET interfaces is similar to that of digital interfaces, such as T1 and T3.

The following table lists the types and sub types of SONET Alarms.

Table 1: SONET Supported Alarms

Alarm Type	Sub Alarm Type
Section Alarms	• LOS — Loss of Signal • LOF — Loss of Frame • SEF — Severely Error Frame
Line Alarms	• AIS-L — Line AIS • REI-L — Line Remote Error Indication • RDI-L — Line Remote Defect Indication • B2 — Line BIP Error (SF/SD) • TCA for B2

Alarm Type	Sub Alarm Type
Path Alarms	• AIS-P — STS Path AIS • LOP-P — STS Path Loss of Pointer • B3 (SF/SD) — STS Path BIP Error • UNEQ-P — STS Path unequipped • REI-P — STS Path Remote Error • RDI-P — STS Path Remote Defect Indication • PLM-P — STS path Payload Label Mismatch • LOM — Loss of MultiFrame • TCA for B3
VT Alarms	• AIS-V — VT Path AIS • LOP-V — VT Loss of Pointer • V-BIP (SF/SD) — VT Path BIP error • UNEQ-V — VT Path Unequipped • REI-V — VT Path Remote Error • RDI-V — VT Path Remote Defect Indication • PLM-V — VT path Payload Label Mismatch • TCA for VT Level BIP
T1 Alarms	• LOS — DS1/E1 Line loss of Signal • AIS — DS1/E1 Path Alarm Indication Signal • AIS-CI — DS1/E1 Path Alarm Indication Signal Customer Installation • LOF — DS1/E1 Path Loss of Frame • RDI/RAI — Remote Defect Indication or Remote Alarm Indication • RAI-CI — Remote Alarm Indication Customer Installation • TCA for Line and Path DS1

Alarm Type	Sub Alarm Type
T3 Alarms	• LOS — DS3/E3 Line Loss of Signal • OOF — DS3/E3 Path Loss of Frame • SEF — DS3/E3 Path Severely Errored Frame • AIS — DS3/E3 Path Alarm Indication Signal • SEF/AIS-FE — Far End SEF/AIS • TCA for Line and Path DS3

SONET Alarms for APS

Table 2: Feature History

Feature Name	Release Information	Description
SONET Alarms for APS	Cisco IOS XE 17.15.1	• With Automatic Protection Switching (APS), SONET alarms soaking as per the recommendation from GR-253. • Alarm is raised or cleared during APS manual, force, and lock out switch actions. • When traffic is switched to an alternate link in the APS group, the severity of the alarms is affected based on service impact.

SONET APS Alarm Compliance Standard

On APS ports, the SONET section and line alarms are soaked as per the GR-253 compliance standard. These SONET alarms are soaked with an assertion time of 2.5 seconds and a clearing time of 10 seconds.

SONET APS Alarm Severity

- **Service Not Affected**—When traffic is switched to an alternate link in the APS group and the service is not impacted, the critical alarms are set with severity as Minor or NSA.

  Service Affected—When both the work and protection links in APS are down, the alarms are marked with severity as Critical or Major, since the service is affected. This scenario is also applicable for Card Protection Group (CPG) groups.

Note To display the service affecting or nonservice affecting flag in the alarm, ensure that you enable the Telcordia profile. For more information on the Alarm profile, see Alarm Profiling.

Supported APS Switch Actions for Alarms

Alarm is raised or cleared during the following SONET APS switch actions:

- Manual

- Force

- Lock out

Supported SONET Alarms for APS

The following are the list of alarms introduced for Cisco IOS XE 17.15.1 release:

Alarm	Description
APS_NE_LOCKOUT_REQ	Lockout Switch Request
APS_FE_LOCKOUT_REQ	Far End Lockout of Protection
APS_NE_FORCE_WK_REQ	Forced Switch from Work
APS_NE_FORCE_PR_REQ	Forced Switch from Protect
APS_FE_FORCE_WK_REQ	Far end Forced Switch from Work
APS_FE_FORCE_PR_REQ	Far End Forced Switch from Protect
APS_NE_MANUAL_WK_REQ	Manual Switch from Work
APS_NE_MANUAL_PR_REQ	Manual switch from Protect
APS_FE_MANUAL_WK_REQ	Far End Manual switch from work
APS_FE_MANUAL_PR_REQ	Far End Protect switch from protect
K1BYTE_APS_CHANNEL_MISMATCH	APS channel mismatch alarm
K2BYTE_APS_MODE_MISMATCH	APS Mode mismatch alarm
APS_FAIL_TO_SWITCH	Failed to switch for protection channel

SDH Alarm

The following table lists the types and sub types of SDH Alarms.

Table 3: SDH Supported Alarms

Alarm Type	Sub Alarm Type
Section Alarms	• LOS — Loss of Signal • LOF — Loss of Frame • RS-BIP — Bit Interleaved Parity

Alarm Type	Sub Alarm Type
Line Alarms	• MS-BIP — Multiplex Section-Bit Interleaved Parity • MS-REI — Multiplex Section-Remote Error Indication • MS-AIS — Multiplex Section-Alarm Indication Signal • MS-RDI — Multiplex Section-Remote Defect Indication • AU-AIS — Administrative Unit-Alarm Indication Signal • AU-LOP — Administrative Unit-Loss of Pointer
STS Path Alarms	• HP-UNEQ — High order Path-Unequipped • HP-PLM — High order Path-Payload Label Mismatch • HP-RDI — High order Path-Remote Defect Indication • HP-BIP — High order Path-Bit Interleaved Parity • HP-REI — High order Path-Remote Error Indication • TU-LOM — Tributary Unit-Loss of Multiframe • TU-AIS — Tributary Unit-Alarm Indication Signal • TU-LOP — Tributary Unit-Loss of Pointer
VT Path Alarms	• LP-UNEQ — Low order Path-Unequipped • LP-PLM — Low order Path-Payload Label Mismatch • LP-RDI — Low order Path-Remote Defect Indication • LP-RFI — Low order Path-Remote Failure Indication • LP-BIP — Low order Path-Bit Interleaved Parity • LP-REI — Low order Path-Remote Error Indication

Note TIM alarms are not supported.