



CHAPTER 16

Overview of the Serial SPAs

This chapter provides an overview of the release history, features, and supported MIBs for the following SPAs:

- Cisco 7600 SIP-200 with the 2- and 4-Port T3/E3 SPAs, the 8-Port Channelized T1/E1 SPA, the 1-Port Channelized OC-3/STM-1 SPA, and the -2 or 4-Port CT3 SPA
- Cisco 7600 SIP-400 with the 1-Port Channelized OC-12/STM-4 SPA

This chapter includes the following sections:

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Release History

Release	Modification
Cisco IOS Release 12.2(33)SRD1	Support for 1-Port Channelized OC-12/STM-4 SPA
Cisco IOS Release 12.2(33)SRC	Support for the following software features was introduced on the Cisco 7600 SIP-200 on the Cisco 7600 series router: <ul style="list-style-type: none">• Programmable BERT pattern enhancements for the 1-Port Channelized OC-3/STM-1 SPA and the 2- and 4-Port CT3 SPAs

Cisco IOS Release 12.2(33)SRA	Support for the following hardware was introduced on the Cisco 7600 SIP-200 on the Cisco 7600 series router: <ul style="list-style-type: none"> 1-Port Channelized OC-3/STM-1 SPA
Cisco IOS Release 12.2(18)SXE	Support for the following hardware was introduced on the Cisco 7600 SIP-200 on the Cisco 7600 series router and Catalyst 6500 series switch: <ul style="list-style-type: none"> 2-Port T3/E3 SPA (SPA-2XT3/E3) 4-Port T3/E3 SPA (SPA-4XT3/E3) 8-Port T1/E1 SPA (SPA-8XCHT1/E1) 2-Port CT3 SPA (SPA-2XCT3/DS0) 4-Port CT3 SPA (SPA-4XCT3/DS0)

Supported Features

This section provides a list of some of the primary features supported by the Cisco 7600 SIP-200 and SPA hardware and software.

- Online insertion and removal (OIR).
- Supports up to four single-height or two double-height Shared Port Adaptors (SPAs).
- Field Programmable Gate Array (FPGA) upgrade support.
- The SIP-200 supports the standard FPGA upgrade methods for the Cisco 7600 series router.

Restrictions

This section provides a list of Cisco 7600 SIP-200 configuration restrictions.



Note

For other SIP-specific features and restrictions see also [Chapter 3, “Overview of the SIPs and SSC”](#) in this guide.

- On a 2-port or 4-port Channelized T3 SPA, when one of the T3 ports is configured as DS3 clear channel interface and the other T3s are configured with large number (greater than or equal to 400) of low bandwidth channels (NxDS0, N=1, 2, 3, or 4), the DS3 clear channel interface is not able to run at 100% DS3 line rate when those low bandwidth channels are idle (that is, not transmitting or receiving packets). This issue does not occur if those low bandwidth channels are not idle.
- On a 2-Port and 4-Port Channelized T3 SPA or 1-Port Channelized OC-3/STM-1 SPA, the maximum number of channels is limited to 1023 per SPA.
- On a 2-Port and 4-Port Channelized T3 SPA or 1-Port Channelized OC-3/STM-1 SPA, the maximum number of FIFO buffers is 4096. The FIFO buffers are shared among the interfaces; how they are shared is determined by speed. If all the FIFO buffers have been assigned to existing interfaces, a new interface cannot be created, and the "%Insufficient FIFOs to create channel group" error message is seen. FIFO allocation information is provided in [Table 16-1](#).

To find the number of available FIFO buffers, use the **show controller t3** command:

```
Router# show controller t3 3/0/0
```

```
T3 3/0/0 is up.
Hardware is SPA-4XCT3/DS0
IO FPGA version: 2.6, HDLC Framer version: 0
T3/T1 Framer(1) version: 2, T3/T1 Framer(2) version: 2
SUBRATE FPGA version: 1.4
HDLC controller available FIFO buffers 3112
```

Table 16-1 FIFO Allocation

Number of Timeslots	Number of FIFO Buffers
1-6 DS0	4
7-8 DS0	6
9 DS0	6
10-12 DS0	8
13-23 DS0	12
1-6 E1 TS	4
7-9 E1 TS	6
11-16 E1 TS	8
17-31 E1 TS	16
T1	12
E1	16
DS3	336

- On the 1-Port Channelized OC-12/STM-4 SPA, the SDH, E1/E3 modes are not supported.
- On the 1-Port Channelized OC-12/STM-4 SPA, the MFR, FRF.12 (in sync with other channelized SPAs on SIP400) is not supported

SPA Features

The following is a list of some of the significant software features supported by the 2- and 4-Port T3/E3 SPA, the 8-Port Channelized T1/E1 SPA, the 1-Port Channelized OC-3/STM-1 SPA, and the 2- and 4-Port CT3 SPAs.

- Software selectable between T1, E1, T3 or E3 framing on each card (ports are configured as all T1, E1, T3, or E3). Applies to the 2- and 4-Port T3/E3 SPA and 8-Port Channelized T1/E1 SPA.
- Layer 2 encapsulation support:
 - Point-to-Point Protocol (PPP)
 - High-level Data Link Control (HDLC)
 - Frame Relay
- Internal or network clock (selectable per port)
- Online insertion and removal (OIR)
- Hot standby router protocol (HSRP)
- Alarm reporting: 24-hour history maintained, 15-minute intervals on all errors
- 16- and 32-bit cyclic redundancy checks (CRC) supported (16-bit default)

- Local and remote loopback
- Bit error rate testing (BERT) pattern generation and detection per port

**Note**

BERT is not supported on the 8-Port Channelized T1/E1 SPA.

- Programmable BERT patterns enhancements

**Note**

The programmable BERT patterns enhancements are not supported on the 2- and 4-Port T3/E3 SPAs or the 8-Port Channelized T1/E1 SPA.

- Dynamic provisioning—Dynamic provisioning allows for the addition of new customer circuits within a channelized interface without affecting other customers.
- FPD (field programmable device upgrades)
- End-to-end FRF.12 fragmentation support
- Link Fragmentation and Interleaving (LFI) support
- Compressed Real-Time Protocol (cRTP)—8-Port Channelized T1/E1 SPA and 2-Port and 4-Port Channelized T3 SPA only. For more information about configuring cRTP, see the [“Configuring Compressed Real-Time Protocol”](#) section on page 4-4.
- T1 features
 - All ports can be fully channelized down to DS0
 - Data rates in multiples of 56 Kbps or 64 Kbps per channel
 - Maximum 1.536 Mbps for each T1 port
 - D4 Superframe (SF) and Extended Superframe (ESF) support for each T1 port
 - ANSI T1.403 and AT&T TR54016 CI FDL support
 - Internal and receiver recovered clocking modes
 - Short haul and long haul channel service unit (CSU) support
 - Binary eight-zero substitution (B8ZS) and alternate mark inversion (AMI) line encoding

**Note**

B8ZS and AMI line encoding are not configurable for TW on the 2-Port and 4-Port Channelized T3 SPA.

- Support for Multilink Point to Point Protocol (MLPPP) for full T1s on the same SPA (hardware based) and across SPAs (software based)
- Support for Multilink Frame Relay (MLFR)
- E1 features
 - Maximum 1.984 Mbps for each E1 port in framed mode and a 2.048 Mbps in unframed E1 mode
 - All ports can be fully channelized down to DS0
 - Compliant with ITU G7.03, G.704, ETSI and ETS300156
 - Internal and receiver recovered clocking modes
 - Hi-density bipolar with three zones (HDB3) and AMI line encoding

- Support for MLPPP for full E1s on the same SPA (hardware based) and across SPAs (software based).
- Support for MLFR
- E3 features
 - Full-Duplex connectivity at E3 rate (34.368 MHz)
 - Supports ITU-T G.751 or G.832 framing (software selectable)
 - HD3B line coding
 - Compliant with E3 pulse mask
 - Line build-out: configured for up to 450 feet (135 m) of type 728A or equivalent coaxial cable
 - Loopback modes: data terminal equipment (DTE), local, dual, and network
 - E3 alarm/event detection (once per second polling)
 - Alarm indication signal (AIS)
 - Loss of frame (LOF)
 - Remote alarm indication (RAI)
 - Subrate and scrambling features for these data service unit (DSU) vendors:
 - Digital Link
 - ADC Kentrox
- T3 features
 - Binary 3-zero substitution (B3ZS) line coding
 - Compliant with DS3 pulse mask per ANSI T1.102-1993
 - DS3 far-end alarm and control (FEAC) channel support
 - Full-Duplex connectivity at DS3 rate (44.736 MHz)
 - 672 DS0s per T3
 - Loopback modes: DTE, local, remote, dual, and network
 - C-bit or M23 framing (software selectable)
 - Line build-out: configured for up to 450 feet (135 m) of type 734A or equivalent coaxial cable
 - DS3 alarm/event detection (once per second polling)
 - AIS
 - Out of frame (OOF)
 - Far-end receive failure (FERF)
 - Generation and termination of DS3 Maintenance Data Link (MDL) in C-bit framing
 - Full FDL support and FDL performance monitoring
 - Subrate and scrambling features for these DSU vendors:
 - Digital Link
 - ADC Kentrox
 - Adtran
 - Verilink
 - Larscom

**Note**

On a 2-port or 4-port Channelized T3 SPA, when one of the T3 ports is configured as DS3 clear channel interface and the other T3s are configured with large number (greater than or equal to 400) of low bandwidth channels (NxDS0, N=1, 2, 3, or 4), the DS3 clear channel interface is not able to run at 100% DS3 line rate when those low bandwidth channels are idle (that is, not transmitting or receiving packets). This issue does not occur if those low bandwidth channels are not idle.

The following features are supported on the 1-Port Channelized OC-12/STM-4 SPA:

- CCAT POS, DS3/E3, VCAT POS/Ethernet interfaces
- Maximum of 128 VCAT groups (VCG)
- Each VCG configurable for HDLC, GFP Framing (Layer 1)
- Each VCG can carry POS (hdlc/ppp/frame-relay) or Ethernet payload (Layer 2)
- Bandwidth on each VCG can be NxSTS-1/NxVT1.5/NxVT2
- Maximum of 48 high-order (STS-1) members in a VCG
- Maximum of 64 low-order (VT1.5/VT2) members in a VCG
- Maximum of 336 VT1.5/252 VT2 members per SPA
- Link Capacity Adjustment Scheme (LCAS)

Supported MIBs

The following MIBs are supported in Cisco IOS Release 12.2S for the serial SPAs on the Cisco 7600 series router.

All serial SPAs:

- CISCO-ENTITY-ALARM-MIB
- CISCO-CLASS-BASED-QOS-MIB
- CISCO-ENVMON-MIB (For NPEs, NSEs, line cards, and SIPs only)
- CISCO-ENTITY-ASSET-MIB
- CISCO-ENTITY-FRU-CONTROL-MIB
- CISCO-ENTITY-SENSOR-MIB
- ENTITY-MIB
- IF-MIB
- RMON-MIB
- MPLS-LDP-MIB
- MPLS-LSR-MIB
- MPLS-TE-MIB
- MPLS-VPN-MIB

2- and 4-Port T3/E3 SPAs:

- DS3/E3 MIB

8-Port Channelized T1/E1 SPA:

- DS1/E1 MIB

2- or 4-Port CT3 SPA:

- DS1-MIB
- DS3-MIB
- CISCO-FRAME-RELAY-MIB
- IANAifType-MIB
- RFC1381-MIB

1-Port Channelized OC-12/STM-4 SPA:

- Cisco Optical MIB
- SONET MIB (RFC 2558)
- Performance Statistics for Timed Intervals (RFC 1595)
- SONET/SDH MIB (RFC 1595)
- DS-3/E3 MIB (RFC 1407)
- DS1/E1 MIB (RFC1406)
- MIB-II
- Ethernet MIB
- Cisco Extended Asset MIB

For more information about MIB support on the Cisco 7600 series router, refer to the *Cisco 7600 Series Internet Router MIB Specifications Guide* found at the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/core/cis7600/7600mibs/index.htm>

To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:

<http://tools.cisco.com/ITDIT/MIBS/servlet/index>

If Cisco MIB Locator does not support the MIB information that you need, you can also obtain a list of supported MIBs and download MIBs from the Cisco MIBs page at the following URL:

<http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>

To access Cisco MIB Locator, you must have an account on Cisco.com. If you have forgotten or lost your account information, send a blank e-mail to cco-locksmith@cisco.com. An automatic check will verify that your e-mail address is registered with Cisco.com. If the check is successful, account details with a new random password will be e-mailed to you. Qualified users can establish an account on Cisco.com by following the directions found at this URL:

<http://www.cisco.com/register>

Displaying the SPA Hardware Type

To verify the SPA hardware type that is installed in your Cisco 7600 series router, you can use the **show diagbus** command or the **show interface** command (once the interface has been configured). There are several other commands on the Cisco 7600 series router that also provide SPA hardware information.

Table 16-2 shows the hardware description that appears in the **show** command output for each type of SPA that is supported on the Cisco 7600 series router.

Table 16-2 SPA Hardware Descriptions in show Commands

SPA	Description in show interfaces and show controllers Commands
4-Port T3/E3 SPA	“Hardware is SPA-4XT3/E3”
2-Port T3/E3 SPA	“Hardware is SPA-2XT3/E3”
8-Port Channelized T1/E1 SPA	“Hardware is SPA-T1E1”
2-Port CT3 SPA	“Hardware is 2 ports CT3 SPA”
4-Port CT3 SPA	“Hardware is 4 ports CT3 SPA”
1-Port Channelized OC12/STM-4 SPA	“Hardware is 1 port CHOC12/STM-4 SPA”

Virtual Tributary Alarms

Seven circuit emulation alarm types on the virtual tributary are introduced with the Cisco IOS Release 12.2(33)SRE and Cisco IOS Release 12.2(33)SRC4 on the 1-Port Channelized STM-1/OC-3 SPA . The alarm details are displayed with the **show controller** output on the 1-Port Channelized STM-1/OC-3 SPA .

These are described in the following table:

Alarm	Description
LP-LOP	Indicates an LOP on the virtual tributary level
LP-AIS	Indicates an AIS on the virtual tributary level
LP-RFI	Remote Defect Indication on the virtual tributary level
LP-UNEQ	Indicates that the virtual tributary sizes are not the same, like VT-E1 and VT-T1
LP-MIS	Indicates that there is a mismatch on the virtual tributaries
LP-T_MIS	Indicates that there is a SONET trace mismatch on the virtual tributary level
LP-RDI	Remote Failure Indication on the virtual tributary level

Examples of the show interface Command

The following example shows output from the **show interface serial 5/0/0** command on a Cisco 7600 series router with a 4-Port T3/E3 SPA installed in slot 5:

```
Serial5/0/0 is up, line protocol is up
Hardware is SPA-4XT3/E3[3/0]
MTU 4470 bytes, BW 44210 Kbit, DLY 200 usec,
reliability 248/255, txload 1/255, rxload 1/255
Encapsulation HDLC, crc 16, loopback not set
Keepalive set (10 sec)
Last input 00:00:06, output 00:00:07, output hang never
Last clearing of ''show interface'' counters 00:00:01
Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
```

```

Queueing strategy: fifo
Output queue: 0/40 (size/max)
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
0 packets input, 0 bytes, 0 no buffer
Received 0 broadcasts (0 IP multicast)
0 runts, 0 giants, 0 throttles
0 parity
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
0 packets output, 0 bytes, 0 underruns
0 output errors, 0 applique, 0 interface resets
0 output buffer failures, 0 output buffers swapped out
0 carrier transitions

```

The following example shows output from the **show interface serial 6/0/1** command on a Cisco 7600 series router with a 8-Port Channelized T1/E1 SPA installed in slot 6:

```

Serial6/0/1:0 is up, line protocol is up
Hardware is SPA-T1E1
MTU 1500 bytes, BW 1536 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
Encapsulation PPP, crc 16, loopback not set
Keepalive set (10 sec)
LCP Open, multilink Open
Last input 00:00:03, output 00:00:03, output hang never
Last clearing of "show interface" counters 5d17h
Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 3194905708
Queueing strategy: fifo
Output queue: 0/40 (size/max)
30 second input rate 0 bits/sec, 0 packets/sec
30 second output rate 0 bits/sec, 0 packets/sec
74223 packets input, 1187584 bytes, 0 no buffer
Received 0 broadcasts (0 IP multicast)
0 runts, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
74227 packets output, 1187751 bytes, 0 underruns
0 output errors, 0 collisions, 2 interface resets
0 output buffer failures, 0 output buffers swapped out
4 carrier transitions no alarm present
Timeslot(s) Used:1-24, subrate: 64Kb/s, transmit delay is 0 flags

```

Examples of the show controllers Command

The following example shows output from the **show controller serial** command on a Cisco 7600 series router with a 4-Port T3/E3 SPA installed in slot 5:

```

Router# show controllers serial 5/0/2
Serial5/0/2 -
Framing is c-bit, Clock Source is Line
Bandwidth limit is 44210, DSU mode 0, Cable length is 10
rx FEBE since last clear counter 0, since reset 0
Data in current interval (807 seconds elapsed):
0 Line Code Violations, 0 P-bit Coding Violation
0 C-bit Coding Violation
0 P-bit Err Secs, 0 P-bit Sev Err Secs
0 Sev Err Framing Secs, 306 Unavailable Secs
500 Line Errored Secs, 0 C-bit Errored Secs, 0 C-bit Sev Err Secs
Data in Interval 1:
0 Line Code Violations, 0 P-bit Coding Violation
0 C-bit Coding Violation
0 P-bit Err Secs, 0 P-bit Sev Err Secs
0 Sev Err Framing Secs, 0 Unavailable Secs

```

```

564 Line Errored Secs, 0 C-bit Errored Secs, 0 C-bit Sev Err Secs
Data in Interval 2:
  0 Line Code Violations, 0 P-bit Coding Violation
  0 C-bit Coding Violation
  0 P-bit Err Secs, 0 P-bit Sev Err Secs
  0 Sev Err Framing Secs, 0 Unavailable Secs
564 Line Errored Secs, 0 C-bit Errored Secs, 0 C-bit Sev Err Secs

```

[output omitted]

The following example shows output from the **show controller** command on a Cisco 7600 series router with a 8-Port Channelized T1/E1 SPA installed in slot 6:

```

Router# show controllers t1
T1 6/0/0 is up.
  Applique type is Channelized T1
  Cablelength is long gain36 0db
  No alarms detected.
  alarm-trigger is not set
  Framing is ESF, Line Code is B8ZS, Clock Source is Line.
  Data in current interval (394 seconds elapsed):
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
  Total Data (last 24 hours)
    0 Line Code Violations, 0 Path Code Violations,
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
T1 6/0/1 is up.
  Applique type is Channelized T1
  Cablelength is long gain36 0db
  No alarms detected.
  alarm-trigger is not set
  Framing is ESF, Line Code is B8ZS, Clock Source is Line.
  Data in current interval (395 seconds elapsed):
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
  Total Data (last 24 hours)
    0 Line Code Violations, 0 Path Code Violations,
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs

```

The following example shows output from the **show controllers** command on a Cisco 7600 series router with a 4-Port CT3 SPA installed in slot 3:

```

Router# show controllers t3
T3 3/1/2 is up. Hardware is 4 ports CT3 SPA
  ATLAS FPGA version: 0, FREEDM336 version: 0
  TEMUX84(1) version: 0, TEMUX84(1) version: 0
  SUBRATE FPGA version: 0
  Applique type is Channelized T3
  No alarms detected.
  Framing is M23, Line Code is B3ZS, Clock Source is Internal
  Equipment customer loopback
  Data in current interval (146 seconds elapsed):
    0 Line Code Violations, 0 P-bit Coding Violation
    0 C-bit Coding Violation, 0 P-bit Err Secs
    0 P-bit Severely Err Secs, 0 Severely Err Framing Secs
    0 Unavailable Secs, 0 Line Errored Secs
    0 C-bit Errored Secs, 0 C-bit Severely Errored Secs
    0 Severely Errored Line Secs
    0 Far-End Errored Secs, 0 Far-End Severely Errored Secs
    0 CP-bit Far-end Unavailable Secs

```

```

0 Near-end path failures, 0 Far-end path failures
0 Far-end code violations, 0 FERF Defect Secs
0 AIS Defect Secs, 0 LOS Defect Secs

T1 1 is up
timeslots: 1-24
FDL per AT&T 54016 spec.
No alarms detected.
Framing is ESF, Clock Source is Internal
Data in current interval (104 seconds elapsed):
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
  0 Unavail Secs, 0 Stuffed Secs
  0 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs
Total Data (last 2 15 minute intervals):
  0 Line Code Violations,0 Path Code Violations,
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins,
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
  0 Unavail Secs, 0 Stuffed Secs
  0 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs

```

The following example shows the output from the **show controller sonet** command on a Cisco 7600 series router with a 1-Port Channelized OC-12/STM-4 SPA installed:

```

Router# show controllers sonet 2/0/0
Router#show controller sonet
SONET 2/0/0 is up.
  Hardware is SPA-1XCHOC12/DS0
  Applique type is Channelized Sonet/SDH
  Clock Source is Line
  Medium info:
    Type: Sonet, Line Coding: NRZ,
    SECTION:
      LOS = 1          LOF = 0          BIP(B1) = 234
  SONET/SDH Section Tables
    INTERVAL      CV      ES      SES      SEFS
    04:30-04:40  0      72     72     72
  LINE:
    AIS = 0          RDI = 0          REI = 12755371  BIP(B2) = 3062
  Active Defects: None
  Active Alarms: None
  Alarm reporting enabled for: SLOS SLOF
  Defect reporting enabled for: SF B1-TCA B2-TCA
  BER thresholds: SF = 10e-3 SD = 10e-6
  TCA thresholds: B1 = 10e-6 B2 = 10e-6
  SONET/SDH Line Tables
    INTERVAL      CV      ES      SES      UAS
    04:30-04:40  19706  72     2      0
  High Order Path:
  PATH 1:
    AIS = 0          RDI = 0          REI = 238693    BIP(B3) = 65856
    LOP = 0          PSE = 248        NSE = 268      NEWPTR = 0
    LOM = 0          PLM = 0          UNEQ = 0
  Active Alarms: None
  Active Defects: None
  Alarm/Defect reporting enabled for: PLOP LOM B3-TCA
  TCA threshold: B3 = 10e-6
  Rx: S1S0 = 00, C2 = 02
    K1 = 00, K2 = 00
    J0 = 01
  Tx: S1S0 = 00, C2 = 02
    K1 = 00, K2 = 00
    J0 = 01

```

```

PATH TRACE BUFFER : STABLE
PATH TRACE BUFFER : STABLE
STS-1 1, VTG 1, T1 1 (VT1.5 1/1/1) is down
VT Receiver has LP-T_MIS.
timeslots: 1-24
FDL per AT&T 54016 spec.
Transmitter is sending LOF Indication.
Receiver is getting AIS.
Framing is ESF, Clock Source is Internal
Data in current interval (0 seconds elapsed):
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
  0 Unavail Secs, 0 Stuffed Secs

```

The following example shows the output from the show controller sonet command on a Cisco 7600 series router with a 1-Port Channelized OC-12/STM-4 SPA installed:

```

Router# show controllers sonet 2/0/0
Router#show controller sonet
SONET 2/0/0 is up.
  Hardware is SPA-1XCHOC12/DS0
  Applique type is Channelized Sonet/SDH
  Clock Source is Line
  Medium info:
    Type: Sonet, Line Coding: NRZ,
    SECTION:
      LOS = 1          LOF = 0          BIP(B1) = 234
SONET/SDH Section Tables
  INTERVAL      CV    ES    SES  SEFS
  04:30-04:40   0    72   72   72
LINE:
  AIS = 0          RDI = 0          REI = 12755371  BIP(B2) = 3062
Active Defects: None
Active Alarms: None
Alarm reporting enabled for: SLOS SLOF
Defect reporting enabled for: SF B1-TCA B2-TCA
BER thresholds:  SF = 10e-3  SD = 10e-6
TCA thresholds:  B1 = 10e-6  B2 = 10e-6
SONET/SDH Line Tables
  INTERVAL      CV    ES    SES  UAS
  04:30-04:40  19706  72    2    0
High Order Path:
PATH 1:
  AIS = 0          RDI = 0          REI = 238693    BIP(B3) = 65856
  LOP = 0          PSE = 248        NSE = 268       NEWPTR = 0
  LOM = 0          PLM = 0          UNEQ = 0
Active Alarms: None
Active Defects: None
Alarm/Defect reporting enabled for: PLOP LOM B3-TCA
TCA threshold:  B3 = 10e-6
Rx: S1S0 = 00, C2 = 02
   K1 = 00,  K2 = 00
   J0 = 01
Tx: S1S0 = 00, C2 = 02
   K1 = 00,  K2 = 00
   J0 = 01
PATH TRACE BUFFER : STABLE
OC3.STS1 2/2/0.1 is down.
  Hardware is SPA-1CHOC3-CE-ATM

  Applique type is VT1.5

  STS-1 1, VTG 1, T1 1 (VT1.5 1/1/1)

```

```
STS-1 1, VTG 1, T1 2 (VT1.5 1/1/2)
  Not configured.

STS-1 1, VTG 1, T1 3 (VT1.5 1/1/3)
  Not configured.

STS-1 1, VTG 1, T1 4 (VT1.5 1/1/4)
  Not configured.
STS-1 1, VTG 5, T1 1 (VT1.5 1/5/1) is down
VT Receiver has no alarm.
  timeslots: 1-24
  FDL per AT&T 54016 spec.
  Transmitter is sending LOF Indication.
  Receiver is getting AIS.
  Framing is ESF, Clock Source is Internal
  Data in current interval (0 seconds elapsed):
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs
    0 Unavail Secs, 0 Stuffed Secs
```

