



Configuring T1/E1 Interfaces on 48-Port T1/E1 Interface Module

This chapter provides information about configuring the T1/E1 interfaces on the 48-Port T1/E1 interface module:



Note

Effective Cisco IOS XE Release 16.5.1S, E1 interface is supported.

T1/E1 is supported only on Cisco ASR 900 RSP3 Module.

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Information About T1/E1 Interfaces

The following sections provide information about T1/E1 interfaces.

Overview of T1/E1 Interfaces

The 48-Port T1/E1 interface module on CEM line card supports generic single or dual-port T1/E1 trunk interfaces for voice, data, and integrated voice or data applications.

Restrictions for Configuring T1/E1 Interfaces

- You can configure CEM to support serial interface configuration.

- The supported BERT patterns are 1s, 2¹¹, 2¹⁵, 2²⁰-O153, 2²⁰-QRSS, and 2²³.
- DS0 level channelization is *not* supported.

How to Configure T1/E1 Interfaces

This section provides information about configuring T1/E1 interfaces on the 48-Port T1/E1 interface module

Recommended Pattern for Linecode

The following pattern for linecode configuration is supported for DS1/E1.

Part Number	Linecode Configuration	T1/E1	Random Pattern
XRT83VSH316 LIU	B8ZS/AMI	T1	QRSS
	HDB3/AMI	E1	PRBS15

Setting the Card Type

To set the card type for the T1/E1 interfaces, complete these steps:

```
enable
configure terminal
card type t1/e1 0 0
exit
```

Configuring the Controller

To configure T1 interface, use the following commands:

```
enable
configure terminal
controller t1 0/3/0
clock source internal
framing esf
cablelength short 110
linecode b8zs
no shut
exit
```



Note

For T1 interface, the default frame mode is Extended Super Frame (ESF).

To configure E1 interface, use the following commands:

```
enable
configure terminal
controller e1 0/3/0
clock source internal
framing crc4
linecode hdb3
```

```
no shut
exit
```



Note For E1 interface, the default frame mode is Cyclic Redundancy Check 4 (CRC4).

Verifying the Controller Configuration

Use the **show controllers** command to verify the controller configuration:

```
Router# show controller e1 0/0/0
E1 0/0/0 is up.
Applique type is ASR903-48T1E1-CE
Cablelength is short 110
No alarms detected.
alarm-trigger is not set
Soaking time: 3, Clearance time: 10
AIS State:Clear LOS State:Clear LOF State:Clear
Framing is unframed, Line Code is B8ZS, Clock Source is Internal.
Data in current interval (230 seconds elapsed):
 0 Line Code Violations, 0 Path Code Violations
 0 Slip Secs, 0 Fr Loss Secs, 9 Line Err Secs, 0 Degraded Mins
 0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs
 0 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs
```

Configuring Structure-Agnostic TDM over Packet - T1/E1 Interfaces

To configure Structure-Agnostic TDM over Packet (SAToP), use the following commands:

```
enable
configure terminal
controller t1/e1 0/0/0
cem-group 0 unframed
exit
interface CEM 0/0/0
cem 0
xconnect 10.10.10.10 200 encapsulation mpls
exit
```



Note To configure SAToP, the framing mode for the port is set to unframed.

Verifying CEM Configuration for SAToP

Use the following command to verify the CEM configuration for T1/E1 interfaces:

```
Router# show cem circuit interface CEM 0/0/0

CEM0/0/0, ID: 0, Line: UP, Admin: UP, Ckt: ACTIVE
Controller state: up, T1/E1 state: up
Idle Pattern: 0xFF, Idle CAS: 0x8
Dejitter: 5 (In use: 0)
Payload Size: 192
Framing: Unframed
CEM Defects Set
None
```

```

Signalling: No CAS
RTP: No RTP

Ingress Pkts:    475471          Dropped:          0
Egress Pkts:    475471          Dropped:          0

CEM Counter Details
Input Errors:    0              Output Errors:    0
Pkts Missing:   0              Pkts Reordered:  0
Misorder Drops: 0              JitterBuf Underrun: 0
Error Sec:      0              Severly Errored Sec: 0
Unavailable Sec: 0             Failure Counts:   0
Pkts Malformed: 0             JitterBuf Overrun: 0

```

Performance Monitoring

You can view the statistics or error count generated on the TDM lines for DS1.

The performance monitoring result is displayed using the **show controller** command for all the modes. The following snippets display the performance monitoring details when **show controller** command is executed:

```

Router# show controllers t1/e1 0/2/1

T1/E1 0/2/1 is down.
  Applique type is ASR903-48T1E1-CE
  Cablelength Short less than 225ft
  Receiver has loss of signal.
  alarm-trigger is not set
  Soaking time: 3, Clearance time: 10
  AIS State:Clear  LOS State:Clear  LOF State:Clear
  Framing is ESF, Line Code is B8ZS, Clock Source is Line.
  Data in current interval (450 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 Severly Err Secs, 449 Unavail Secs
    0 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs
  Data in Interval 1:
    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 Severly Err Secs, 900 Unavail Secs
    0 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs
  Data in Interval 2:
    0 Line Code Violations, 0 Path Code Violations
    0 Slip Secs, 0 Fr Loss Secs, 485 Line Err Secs, 0 Degraded Mins
    0 Errored Secs, 0 Bursty Err Secs, 0 Severly Err Secs, 897 Unavail 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, 485 Line Err Secs, 0 Degraded Mins,
    0 Errored Secs, 0 Bursty Err Secs, 0 Severly Err Secs, 1797 Unavail Secs
    0 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs

```

Circuit Emulation Service over Packet-Switched Network

CESoPSN is a method for encapsulating structured (NxDS0) TDM signals as pseudowires over packet switching networks.

Restrictions for CESoPSN on T1 Interface

- The maximum number of CEM interface supported is 192.

- The DS0 loopback is not supported on the T1 interface.
- The alarm forwarding is not supported on the T1 interface.
- The card protection is not supported on the T1 interface.

Configuring CEM Group for CESoPSN on T1 Interface

The following section describes how to configure a CEM group for CESoPSN.

To configure xconnect over MPLS, use the following commands:

```
enable
configure terminal
control t1 0/4/32
cem-group 0 timeslots 1-10
```

Configure xconnect:

```
enable
configure terminal
interface cem 0/4/32
cem 0
xconnect 2.2.2.2 10 encapsulation mpls
```

Perform a similar configuration on the other end of the pseudowire.

```
sh running-config | sec 0/8/16
controller T1 0/8/16
 framing esf
 linecode b8zs
 cablelength short 110
  cem-group 0 timeslots 1-10
interface CEM0/8/16
 no ip address
 cem 0
  xconnect 2.2.2.2 10 encapsulation mpls
```

Check for xconnect configuration using the following command:

```
PE1#sh xconnect all | i 0/4/32
UP pri ac CE0/4/32:0(CESoPSN Basic) UP mpls 2.2.2.2:10 UP

PE1#sh controllers t1 0/4/32
T1 0/4/32 is up
 Applique type is NCS4200-48T1E1-CE
 Cablelength is short 110
 No alarms detected.
 alarm-trigger is not set
 Soaking time: 3, Clearance time: 10
 AIS State:Clear LOS State:Clear LOF State:Clear
 Framing is ESF, Line Code is B8ZS, Clock Source is Line.
```

Verifying CEM for CESoPSN on T1 Interface

Use the following commands to verify the pseudowire configuration for CESoPSN:

- show cem circuit—Displays information about the circuit state, administrative state, the CEM ID of the circuit, and the interface on which it is configured. If cross connect is configured under the circuit, the command output also includes information about the attachment circuit status.

- show mpls l2 vc—Displays information about the MPLS VC.
- show mpls l2 vc detail—Displays detailed information about the MPLS VC.

```
PE1#show mpls l2 vc 10
```

Local intf	Local circuit	Dest address	VC ID	Status
CE0/4/32	CESoPSN Basic 0	2.2.2.2	10	UP

```
PE1#sh mpls l2 vc 10 det
PE1#sh mpls l2 vc 10 detail
Local interface: CE0/4/32 up, line protocol up, CESoPSN Basic 0 up
  Destination address: 2.2.2.2, VC ID: 10, VC status: up
  Output interface: Te0/0/0, imposed label stack {650}
  Preferred path: not configured
  Default path: active
  Next hop: 123.123.123.2
Create time: 00:21:25, last status change time: 00:21:25
  Last label FSM state change time: 00:21:25
Signaling protocol: LDP, peer 2.2.2.2:0 up
  Targeted Hello: 1.1.1.1(LDP Id) -> 2.2.2.2, LDP is UP
  Graceful restart: configured and not enabled
  Non stop routing: not configured and not enabled
  Status TLV support (local/remote) : enabled/supported
  LDP route watch : enabled
  Label/status state machine : established, LruRru
  Last local dataplane status rcvd: No fault
  Last BFD dataplane status rcvd: Not sent
  Last BFD peer monitor status rcvd: No fault
  Last local AC circuit status rcvd: No fault
  Last local AC circuit status sent: No fault
  Last local PW i/f circ status rcvd: No fault
  Last local LDP TLV status sent: No fault
  Last remote LDP TLV status rcvd: No fault
  Last remote LDP ADJ status rcvd: No fault
MPLS VC labels: local 577, remote 650
Group ID: local 238, remote 276
MTU: local 0, remote 0
Remote interface description:
Sequencing: receive disabled, send disabled
Control Word: On (configured: autosense)
SSO Descriptor: 2.2.2.2/10, local label: 577
Dataplane:
  SSM segment/switch IDs: 6893171/4140658 (used), PWID: 674
VC statistics:
  transit packet totals: receive 0, send 0
  transit byte totals: receive 0, send 0
  transit packet drops: receive 0, seq error 0, send 0
```

```
Router#show cem circuit int cem 0/4/32
```

```
CEM0/4/32, ID: 0, Line: UP, Admin: UP, Ckt: ACTIVE
Mode :T1, CEM Mode: T1-CESoP
Controller state: up, T1/E1 state: up
Idle Pattern: 0xFF, Idle CAS: 0x8
Dejitter: 5 (In use: 0)
Payload Size: 80
Framing: Framed (DS0 channels: 1-10)
CEM Defects Set
None

Signalling: No CAS
RTP: No RTP

Ingress Pkts: 203997 Dropped: 0
Egress Pkts: 203999 Dropped: 0

CEM Counter Details
Input Errors: 0 Output Errors: 0
Pkts Missing: 0 Pkts Reordered: 0
```

```

Misorder Drops: 0          JitterBuf Underrun: 0
Error Sec: 0              Severly Errored Sec: 0
Unavailable Sec: 0        Failure Counts: 0
Pkts Malformed: 0        JitterBuf Overrun: 0
Generated Lbits: 0        Received Lbits: 0
Generated Rbits: 0        Received Rbits: 0
Generated Mbits: 0        Received Mbits: 0

```

Troubleshooting T1/E1 Controllers

You can use the following methods to troubleshoot the T1/E1 controllers:

Running Bit Error Rate Testing for SAToP

Bit error rate testing (BERT) is supported on T1/E1 interfaces. You can run BERTs on 16 controllers out of 48 T1/E1 controllers at a time.

The interface module contains onboard BERT circuitry. With this, the interface module software can send and detect a programmable pattern that is compliant with CCITT/ITU O.151, O.152, O.153 pseudo-random and repetitive test patterns. BERT allows you to test cables and signal problems in the field.

When running a BERT test, your system expects to receive the same pattern that it is transmitting. To help ensure this, two common options are available:

- Use a loopback somewhere in the link or network
- Configure remote testing equipment to transmit the same BERT test pattern at the same time

The following keywords list different BERT keywords and their descriptions.

Table 1: BERT Pattern Descriptions

Keyword	Description
1s	Repeating pattern of ones (...111...).
2^11	Pseudo-random test pattern that is 2,048 bits in length.
2^15	Pseudo-random O.151 test pattern that is 32,768 bits in length.
2^20-O153	Pseudo-random O.153 test pattern that is 1,048,575 bits in length.
2^20-QRSS	Pseudo-random QRSS O.151 test pattern that is 1,048,575 bits in length.
2^23	Pseudo-random 0.151 test pattern that is 8,388,607 bits in length.

The total number of error bits received, and the total number of bits received are available for analysis. You can select the testing period from 1 minute to 24 hours, and you can also retrieve the error statistics anytime during the BERT test.

BERT is supported in two directions:

- Line - supports BERT in TDM direction
- System - supports BERT in PSN direction

**Note**

Before starting system side BERT, you must configure CEM. When the BERT is configured towards system direction, it internally loopbacks the TDM side.

Configuring BERT for SAToP

Before You Begin

Before you run BERT test, you must configure card type and controller.

To run a BERT on T1/E1 interface, perform the following tasks in global configuration mode.

```
enable
configure terminal
controller t1/e1 0/1/1
bert pattern 2^11 interval 5 direction line/system
exit
```

**Note**

To terminate a BERT test during the specified test period, use the **no bert** command.

Verifying BERT Configuration for SAToP

Use the following command to verify the BERT configuration for T1/E1 interfaces:

```
Router# show controllers t1/e1 0/1/1

T1/E1 0/1/1 is up.
  Applique type is ASR903-48T1E1-CE
  Cablelength is short 110
  DSX1 BERT pattern      : 2^11
  DSX1 BERT direction   : Line
  DSX1 BERT sync        : no sync
  DSX1 BERT sync count  : 0
  DSX1 BERT interval    : 5
  DSX1 BERT time remain : 2
  DSX1 BERT total errs  : 0
  DSX1 BERT total k bits: 0
  DSX1 BERT errors (last): 0
  DSX1 BERT k bits (last): 0
  Last clearing of BERT counters never
  No alarms detected.
  alarm-trigger is not set
  Soaking time: 3, Clearance time: 10
  AIS State:Clear  LOS State:Clear  LOF State:Clear
  Framing is unframed, Line Code is B8ZS, Clock Source is Internal.
  Data in current interval (320 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 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs
Total Data (last 3 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 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs

```

You can view the results of a BERT test at the following times:

- After you terminate the test using the **no bert** command
- After the test runs completely
- Anytime during the test (in real time)

Bit Error Rate Testing for CESoPSN

Bit-Error Rate Testing (BERT) is used for analyzing quality and problem resolution of digital transmission equipment. BERT tests the quality of an interface by directly comparing a pseudorandom or repetitive test pattern with an identical locally generated test pattern. BERT is supported at the TDM side and pseudowire side. BERT can be used either at NxDS0 or DS1 but not together.

BERT is supported on following controllers:

- T1 □ NxDS0, DS1
- T3 □ NxDS0, DS1 (channelised), clear channel DS3.
- OCS □ NxDS0, DS1 (channelised), DS3(channelised), clear channel DS3, STS1, STS-nc, VT-1.5, VT1.5 T1

Restrictions for BERT in CESoPSN

- The Cisco ASR 900 Series Router supports only the following BERT patterns: 2¹¹, 2¹⁵, 2²⁰-O153, and 2²⁰-QRSS.
- For the line side BERT to be configured at timeslot level, the first CEM should be configured and it should be present at the same timeslot level where the BERT is configured.
- The system side BERT is not supported on partial timeslots. For the system side BERT, use full timeslots.

Configuring BERT for CESoPSN

Before You Begin

Before you run BERT test, you must configure card type and controller.

To run a BERT on T1/E1 interface for CESoPSN, perform the following tasks in global configuration mode.

```

enable
configure terminal
controller t1/e1 0/1/1
bert pattern 2^11 interval 5 direction line/system timeslots value speed
exit

```



Note To terminate a BERT test during the specified test period, use the **no bert** command.

Verifying BERT Configuration for CESoPSN

Use the following command to verify the BERT configuration for CESoPSN on T1 interfaces:

```
Router# show controllers t1 0/4/32 brief
T1 0/4/32 is up
  Applique type is NCS4200-48T1E1-CE
  Cablelength is short 110
  DS0 Bert enabled on the following timeslots : 1-2
  Speed : 64 kpbs
  DSX1 BERT test result: (running)
  DSX1 BERT pattern      : 2^15
  DSX1 BERT direction   : Line
  DSX1 BERT sync        : sync
  DSX1 BERT sync count  : 1
  DSX1 BERT interval    : 1
  DSX1 BERT time remain : 00:00:55
  DSX1 BERT total errs  : 0
  DSX1 BERT total k bits: 512
  DSX1 BERT errors (last): 0
  DSX1 BERT k bits (last): 512
  Last clearing of BERT counters never
No alarms detected.
alarm-trigger is not set
Soaking time: 3, Clearance time: 10
AIS State:Clear  LOS State:Clear  LOF State:Clear
Framing is ESF, Line Code is B8ZS, Clock Source is Recovered Clock 32.
BER thresholds: SF = 10e-3 SD = 10e-6
Data in current interval (710 seconds elapsed):
  39 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 1 Fr Loss Secs, 1 Line Err Secs, 0 Degraded Mins
  1 Errored Secs, 0 Bursty Err Secs, 1 Severely Err Secs, 0 Unavail Secs
  0 Near-end path failures, 0 Far-end path failures, 1 SEF/AIS Secs
Data in Interval 1:
  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 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs
Data in Interval 2:
  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 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs
Data in Interval 3:
  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 Near-end path failures, 0 Far-end path failures, 0 SEF/AIS Secs
Data in Interval 4:
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
```

You can view the results of a BERT test at the following times:

- After you terminate the test using the **no bert** command
- After the test runs completely
- Anytime during the test (in real time)

Loopback on T1/E1 Interfaces

Loopback Description

You can use the following loopback on the T1/E1 interfaces.

Loopback	Description
loopback diag	Loops the outgoing transmit signal back to the receive signal. This is done using the diagnostic loopback feature in the interface module's framer. The interface transmits AIS in this mode. Set the clock source command to internal for this loopback mode.
loopback local	Loops the incoming receive signal back out to the transmitter. You can specify whether to use the line or payload. Loopback local is supported on E1 interface.
loopback local line	The incoming signal is looped back in the interface using the framer's line loopback mode. The framer does not reclock or reframe the incoming data. All incoming data is received by the interface driver.
loopback local payload	Loops the incoming signal back in the interface using the payload loopback mode of the framer. The framer reclocks and reframes the incoming data before sending it back out to the network. Note Loopback Local Payload support is available only when framing is ESF.
loopback network line	Loops the incoming signal back in the interface module using the line loopback mode of the framer. The framer does not reclock or reframe the incoming data. All incoming data is received by the interface module driver. Loopback network line is supported on E1 interface.

Configuring Loopback

Before You Begin

Before you configure loopback, you must configure the controller and the CEM.

To set a loopback local on the T1 interface, perform the following tasks in global configuration mode:

```
enable
configure terminal
controller t1 0/0/1
```

```
loopback local line
exit
```

To set a loopback diag on the T1 interface, perform the following tasks in global configuration mode:

```
enable
configure terminal
controller t1 0/0/1
loopback diag
exit
```

To set a loopback local on the E1 interface, perform the following tasks in global configuration mode:

```
enable
configure terminal
controller e1 0/0/1
loopback local
exit
```

To set a loopback network on the E1 interface, perform the following tasks in global configuration mode:

```
enable
configure terminal
controller e1 0/0/1
loopback network line
exit
```



Note To remove a loopback, use the **no loopback** command.

Associated Commands

The commands used to configure the Interfaces.

Commands	URL
card type	http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c1.html#wp2336574570
cem-group	http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c1.html#wp2440628600
payload-size dejitter-buffer	https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-o1.html#wp3946673156
class cem	https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c1.html#wp2169323859
controller t1/e1	https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c2.html#wp1472647421

Commands	URL
xconnect	http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-t2.html#wp8578094790
linecode	http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-11.html#wp2312535965
framing	http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-f1.html#wp2853515177
clock source	http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c2.html#wp6081785140
cable length	http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c1.html#wp2492964151
bert pattern	http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-a1.html#wp3620978929
channelized	http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-c1.html#wp7026926390
loopback	http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-11.html#wp1033903426
show controller t1	http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-s3.html#wp2149471094
show controller e1	http://www.cisco.com/c/en/us/td/docs/ios-xml/ios/interface/command/ir-cr-book/ir-s2.html#wp1632676058

Additional References for Configuring 48-Port T1/E1 CEM Interface Module

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Commands List, All Releases

Standards and RFCs

Standard/RFC	Title
—	<i>There are no standards and RFCs for this feature.</i>

MIBs

MIB	MIBs Link
—	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

Technical Assistance

Description	Link
<p>The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.</p> <p>To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds.</p> <p>Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.</p>	http://www.cisco.com/cisco/web/support/index.html