



## Configuring T1 or E1 Interfaces

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This chapter provides the information about how to configure a T1 or E1 interface.

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### Setting the Card Type

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

```
enable
configure terminal
card type t1 0 1
exit
```

### Configuring the Controller

To configure T1 interface, use the following commands:

```
enable
configure terminal
controller t1 0/1/0
clock source internal
framing esf
cablelength short 110
linecode b8zs
no shut
exit
```



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

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To configure E1 interface, use the following commands:

```

enable
configure terminal
controller e1 0/1/0
clock source internal
framing crc4
linecode hdb3
no shut
exit

```



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

Starting with Cisco IOS XE Cupertino 17.7.1, the cable length short values are modified for the following interface modules:

- A900-IMA48D-C
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**Table 1: Cable Length Short Values**

Cable Length Short (in ft)	Range (in ft)
110	0–133
220	134–266
330	267–399
440	400–533
550	534–655

For the following interface modules, the cable length short values remain the same:

**Table 2: IM Port Support - Cable Length Short**

Port Supported	IM
T1 Port	<ul style="list-style-type: none"> <li>• A900-IMA8D</li> <li>• A900-IMA16D</li> <li>• A900-IMA32D</li> </ul>

**Table 3: Cable Length Short Values - IMs**

Cable Length Short (in ft)	Range (in ft)
110	0–110
220	111–220
330	221–330

Cable Length Short (in ft)	Range (in ft)
440	331–440
550	441–550

## Verifying the Controller Configuration

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

```
Router# show controller e1 0/2/0
E1 0/2/0 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 ESF, FDL is ansi, Line Code is B8ZS, Clock Source is Line.
BER thresholds: SF = 10e-3 SD = 10e-6
Data in current interval (230 seconds elapsed):
Near End
  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 Unavailable Secs
  0 Path Failures, 0 SEF/AIS Secs
Far End
  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 Unavailable Secs
  0 Path Failures
Data in Interval 1:
Near End
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 14 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 15 Unavailable Secs
  1 Path Failures, 0 SEF/AIS Secs
Far End Data
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 4 Fr Loss Secs, 2 Line Err Secs, 0 Degraded Mins
  4 Errored Secs, 0 Bursty Err Secs, 4 Severely Err Secs, 0 Unavailable Secs
  0 Path Failures
Total Data (last 1 15 minute intervals):
Near End
  0 Line Code Violations, 0 Path Code Violations,
  0 Slip Secs, 0 Fr Loss Secs, 14 Line Err Secs, 0 Degraded Mins,
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 15 Unavailable Secs
  1 Path Failures, 0 SEF/AIS Secs
Far End
  0 Line Code Violations, 0 Path Code Violations,
  0 Slip Secs, 4 Fr Loss Secs, 2 Line Err Secs, 0 Degraded Mins,
  4 Errored Secs, 0 Bursty Err Secs, 4 Severely Err Secs, 0 Unavailable Secs
  0 Path Failures
```

Use the **show platform** command to verify the router information:

# 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 t10/1/0
cem-group 0 unframed
exit
```




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

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## Verifying CEM Configuration for SAToP

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

```
Router# show cem circuit interface CEM 0/1/0

CEM0/1/0, ID: 0, Line: UP, Admin: UP, Ckt: ACTIVE
Controller state: up, T1 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
```

## Configuring Framed SAToP




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**Note** Framing type should be maintained same in all routers end to end.

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To configure framed SAToP:

```
enable
configure terminal
controller t1 0/1/0
framing esf
cem-group 0 framed
exit
```

## Verifying Framed SAToP Configuration

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

```
Router# show cem circuit interface cem 0/1/0

CEM0/1/0, ID: 0, Line: UP, Admin: UP, Ckt: ACTIVE
Mode :T1, CEM Mode: T1-SAToP
Controller state: up, T1 state: up
Idle Pattern: 0xFF, Idle CAS: 0x8
Dejitter: 5 (In use: 0)
Payload Size: 192
Framing: Framed SAToP
CEM Defects Set
None

Signalling: No CAS
RTP: No RTP

Ingress Pkts: 7836 Dropped: 0
Egress Pkts: 7836 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
```

## Verifying CEM Statistics for Framed SAToP

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

- **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.

```
Router# show cem circuit

<0-4294967295>      CEM ID
detail              Detailed information of cem ckt(s)
interface           CEM Interface
summary            Display summary of CEM ckts
|                  Output modifiers
Router# show cem circuit

CEM Int. ID Ctrlr Admin Circuit AC
-----
CEM0/1/0 1   UP    UP    Active UP
CEM0/1/1 2   UP    UP    Active UP
CEM0/1/2 3   UP    UP    Active UP
```

```
CEM0/1/3 4   UP   UP   Active UP
CEM0/1/4 5   UP   UP   Active UP
```

- **show cem circuit *cem-id*** — Displays the detailed information about that particular circuit.

```
Router# show cem circuit 0
CEM0/1/2, ID: 0, Line: UP, Admin: UP, Ckt: ACTIVE
Mode :T1, CEM Mode: T1-SAToP
Controller state: up, T1 state: up
Idle Pattern: 0xFF, Idle CAS: 0x8
Dejitter: 5 (In use: 0)
Payload Size: 192
Framing: Framed SAToP
CEM Defects Set
None

Signalling: No CAS
RTP: No RTP

Ingress Pkts: 167027103 Dropped: 0
Egress Pkts: 167027102 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
```

- **show cem circuit summary** — Displays the number of circuits which are up or down per interface basis.

```
Router# show cem circuit summary

CEM Int. Total Active Inactive
-----
CEM0/1/0    1      1      0
CEM0/1/1    1      1      0
CEM0/1/2    1      1      0
CEM0/1/3    1      1      0
CEM0/1/4    1      1      0
```

## Verifying CEM Statistics for SAToP

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

- **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.

```
Router# show cem circuit

<0-32000>      CEM ID
detail         Detailed information of cem ckt(s)
interface      CEM Interface
summary        Display summary of CEM ckts
|              Output modifiers
```

```
Router# show cem circuit
```

CEM Int.	ID	Line	Admin	Circuit	AC
CEM0/1/0	1	UP	UP	ACTIVE	--/--
CEM0/1/0	2	UP	UP	ACTIVE	--/--
CEM0/1/0	3	UP	UP	ACTIVE	--/--
CEM0/1/0	4	UP	UP	ACTIVE	--/--
CEM0/1/0	5	UP	UP	ACTIVE	--/--

- **show cem circuit *cem-id*** — Displays the detailed information about that particular circuit.

```
Router# show cem circuit 0
```

```
CEM0/1/2, ID: 0, Line: UP, Admin: UP, Ckt: ACTIVE
Controller state: up, T1 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:    11060      Dropped:      0
Egress Pkts:    11061      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
```

- **show cem circuit summary** — Displays the number of circuits which are up or down per interface basis.

```
Router# show cem circuit summary
```

CEM Int.	Total	Active	Inactive
CEM0/1/0	1	1	0

## Configuring CEM Group for SAToP for T1 Interfaces

To configure a CEM group for SAToP.

```
enable
configure terminal
controller t1 0/1/0
cem-group 0 unframed
end
```



**Note** You need metroaggrservice license to configure CEM group on the Interface Module.

## 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
controller t1 0/1/32
cem-group 0 timeslots 1-10
```

Configure cross-connect:

```
enable
configure terminal
interface cem 0/1/32
cem 0
xconnect 10.2.2.2 10 encapsulation mpls
```

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

```
show running-config | sec 0/1/16
controller t1 0/1/16
 framing esf
 linecode b8zs
 cablelength short 110
  cem-group 0 timeslots 1-10
interface CEM0/1/16
 no ip address
 cem 0
  xconnect 10.2.2.2 10 encapsulation mpls
```

Check for cross-connect configuration using the following command:

```
Router#show xconnect all | i 0/1/32
UP pri ac CE0/1/32:0 (CESoPSN Basic) UP mpls 10.2.2.2:10 UP

Router#sh controllers t1 0/1/32
T1 0/1/32 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
CE0/1/32	CESoPSN Basic 0	10.2.2.2	10	UP

```
PE1#sh mpls l2 vc 10 detail
```

```
Local interface: CE0/1/32 up, line protocol up, CESoPSN Basic 0 up
Destination address: 10.2.2.2, VC ID: 10, VC status: up
Output interface: Te0/0/0, imposed label stack {650}
Preferred path: not configured
Default path: active
Next hop: 209.165.202.129
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 10.2.2.2:0 up
Targeted Hello: 10.1.1.1(LDP Id) -> 10.2.2.2, 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: 10.2.2.2/10, 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
```

## Configuring DS1 Local Connet

The following section describes how to configure first segment for DS1 local connection:

```
enable
configure terminal
controller T1 0/1/0
framing unframed
clock source internal
linecode b8zs
```

```
cablelength short 110
cem-group 0 unframed
description TO_CE1_0/1/0
```

The following section describes how to configure second segment for DS1 local connection:

```
enable
configure terminal
controller T1 0/1/3
framing unframed
clock source recovered 0
linecode b8zs
cablelength short 110
cem-group 0 unframed
description TO_CE1_0/1/1
```

The following section describes how to create a DS1 local connection:

```
enable
configure terminal
connect dsl_connect CEM0/1/0 0 CEM0/1/3 0
```

## Verifying DS1 Local Connect

Use the following commands to verify the DS1 local connection:

- show connection name—Displays information about the connection state and segment state.

```
Router#show connection name dsl_connect

Connection: 673 - dsl_connect
Current State: UP
Segment 1: CEM0/1/0 SATOP T1 0 up
Segment 2: CEM0/1/3 SATOP T1 0 up
```