



WAN Data Traffic Configuration on Digital T1/E1 Packet Voice Trunk Network Modules

This document explains how you can configure digital T1/E1 packet voice trunk network modules on Cisco 2600 and 3600 routers to route Wide Area Network (WAN) data traffic and includes the following sections:

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Feature Overview

Cisco digital T1/E1 packet voice trunk network modules support voice and data applications in Cisco 2600 and 3600 series routers. With Cisco IOS release 12.1(2)XH, the digital T1/E1 packet voice trunk network modules provide WAN connections in addition to voice connections and digital cross-connect.

The digital T1/E1 packet voice trunk network modules support T1/E1 applications, including fractional use. The T1 version integrates a fully managed data service unit/channel service unit (DSU/CSU), and the E1 version includes a fully managed DSU. The digital T1/E1 packet voice trunk network modules provide per-channel T1/E1 data rates of 64 kbps for WAN services (Frame Relay or leased line)

Benefits

The ability of the digital T1/E1 packet voice trunk network module to support WAN data traffic in addition to voice traffic has the following benefits:

- Allow an efficient transition from data-only applications to both multiplexed voice and data and packet voice applications.
- Are easier to deploy and manage than single-purpose interfaces.

Because the digital T1/E1 packet voice trunk network module support both WAN data traffic and voice traffic, they provide the following benefits of multifunction support for multiplexed voice and data, and voice:

- The basic interfaces
- Might eliminates the need for external Drop-and-Insert multiplexers.
- Supports multiservice offerings from service providers.

Restrictions

The following restrictions apply to digital T1/E1 packet voice trunk network module configurations:

- On all Cisco 2600 and 3600 platforms, digital T1/E1 packet voice trunk network modules only support T1/E1 Multiflex VWICs.
- Drop-and-Insert capability is supported only between two ports on the same digital T1/E1 packet voice trunk network module.
- Interfaces configured for WAN data traffic cannot be configured as PRI groups.

Related Features and Technologies

Digital T1/E1 Packet Voice Trunk Network Modules requires 2-port T1 Multiflex VWIC for operation. For more information about these modules, see *Configuring Digital T1 Packet Voice Trunk Network Modules on Cisco 2600 and 3600 Series Routers* and *Digital E1 Packet Voice Trunk Network Module Interfaces*.

Related Documents

The following documents provide additional information about installing and configuring *digital T1 packet voice trunk network modules*:

- *Cisco 2600 and 3600 Series Network Module Hardware Installation Guide*
- *Cisco 2600 and 3600 Series WAN Interface Cards Hardware Installation Guide*
- *Configuring Digital T1 Packet Voice Trunk Network Modules on Cisco 2600 and 3600 Series Routers*
- *Configuring Digital E1 Packet Voice Trunk Network Modules on Cisco 2600 and 3600 Series Routers*

The following Cisco IOS Release 12.1 documents provide information that can help you use *digital T1 packet voice trunk network modules*:

- *Multiservice Applications Configuration Guide*
- *Multiservice Applications Command Reference*
- *Network Protocols Configuration Guide, Part 1*
- *Cisco IOS Interface Configuration Guide*
- *Cisco IOS Interface Command Reference*
- *Dial Solutions Configuration Guide*

Supported Platforms

This feature is supported on the following platforms:

- Cisco 2600 series routers
- Cisco 3600 series routers

Supported Standards, MIBs, and RFCs

Digital T1 packet voice trunk network modules support the standards, MIBs, and RFCs listed in this section.

T1 Compliance (Partial List)

- ANSI T1.403
- US (UL 1950, T1)
- FCC Part 68
- CS-03
- Canada (CSA 950, T1)
- US (FCC Part 15 Class B, T1)
- U.K. (BS6301, EN60950, EN41003)
- Canada (CSA C108.8 Class A, T1)
- Bellcore---AT&T Accunet (62411)
- ATT 54016
- Japan (VCCI Class 2, VCCI:V-3/97.04, T1, JATE Green Book, IEC950)

E1 Compliance (Partial List)

- Australia (TS 016, AS/NZS 3548:1995)
- Germany (TUV GS, EN60950)
- Germany (VDE 0878 part 3 and 30)
- France (NFC98020, EN60950, EN41003)
- Sweden (SS447-2-22, SS636334, EN60950)
- UK (NTR4)
- Europe (EN55022 Class B, EN55102-1, EN55102-2, CTR12, EN60950, EN50082-1:1992, EN55022:1994)
- CCITT/ITU G.704, I.431
- ETSI NET5, ETS300156
- TBR4
- CTR-13
- ETS 300011
- ITU I.431

RFC

RFC 1406

MIB

- T1 CSU MIB

Other Standards

- ANSI T1.40
- AT&T Publication 62411

Prerequisites

Digital T1 packet voice trunk network modules require specific service, software, and hardware:

- Obtain T1 or E1 service from your service provider.
- Install Cisco IOS Software Release 12.1(2)XH, 12.1(3)T or a later release.
- See the following documents for more information about the module:
 - *Cisco 2600 and 3600 Series Network Module Hardware Installation Guide*
 - *Configuring Digital T1 Packet Voice Trunk Network Modules on Cisco 2600 and 3600 Series Routers*



Note You can install one Digital T1 Packet Voice Trunk Network Module in a Cisco 2600 series router or a Cisco 3620 router. A Cisco 3640 router can support three modules, and you can install as many as six modules in a Cisco 3660 router.

- Establish a working IP network. For more information about configuring IP, see “IP Overview,” “Configuring IP Addressing,” and “Configuring IP Services” chapters in the Cisco IOS Release 12.1 *Cisco IOS IP and IP Routing Configuration Guide*.
- Complete your company’s dial plan.
- Establish a working telephony network based on your company’s dial plan.

Multiservice Applications Configuration Guide and *Multiservice Applications Command Reference* for Cisco IOS Release 12.1 provide information about setting up voice networks.

Configuration Tasks

Follow this procedure to configure your *digital T1 packet voice trunk network module* for WAN data traffic. Skip Steps 1 and 2 if you are already in controller configuration mode.

For detailed information about configuring voice ports on a Digital T1/E1 Packet Voice Trunk Network Module, see the *Configuring Digital T1 Packet Voice Trunk Network Modules on Cisco 2600 and 3600 Series Routers* online document and the *Configuring Digital E1 Packet Voice Trunk Network Modules on Cisco 2600 and 3600 Series Routers* online document.

Repeat the steps following Step 2 for each controller.

	Command	Purpose
Step 1	Router# configure terminal	Skip this step if you are already in controller configuration mode. Enter global configuration mode.
Step 2	Router(config)# controller {T1 E1} <i>slot/port</i>	Skip this step if you are already in controller configuration mode. Enter controller configuration mode for the T1 or E1 controller at the specified <i>slot/port</i> location.
Step 3	Router(config-controller)# channel-group <i>channel-group-no</i> timeslots <i>timeslot-list</i> [speed [48 56 64]]	Enter this command to set up channel groups for WAN data services with a 2-port Multiflex Drop-and-Insert VWIC. <i>channel-group-no</i> is a value from 0 to 23 for T1 and from 0 to 30 for E1. <i>timeslot-list</i> is a single number, numbers separated by commas, or a pair of numbers separated by a hyphen to indicate a range of timeslots. The valid range is from 1 to 24 for T1. For E1, the range is from 1 to 31. The optional speed setting defaults to 56 Kbps for T1 and 64 Kbps for E1.
Step 4	Router(config-controller)# no shutdown	Activate the controller.
Step 5	Router(config-controller)# exit	Exit controller configuration mode.
Step 6	Router(config)# interface serial <i>slot/port:channel-group</i>	Enter interface configuration mode for a serial interface that you specify by slot and port. The <i>:channel-group</i> portion of the command is only required for channelized T1 or E1 interfaces; its value is always 0 for Multiflex VWIC support. (For setting up channelized interfaces, see <i>Dial Solutions Configuration Guide</i> for Cisco IOS Release 12.1.)
Step 7	Router(config-if)# encapsulation {atm-dxi hdlc frame-relay ppp sdlc-primary sdlc-secondary smds stun x25}	Configure synchronous serial encapsulation. See the <i>Dial Solutions Configuration Guide</i> for Cisco IOS Release 12.1 for more information.
Step 8	Router(config-if)# ip address <i>ip-address mask</i>	Assign the IP address and subnet mask to the interface.

Verifying Controller Settings

- Step 1** The privileged EXEC **show controllers t1/e1** command displays the status of T1 or E1 controllers and displays information about clock sources and other settings for the ports:

```
Router# show controller T1 1/0
```

```
T1 1/0 is up.
  Applique type is Channelized T1
  Cablelength is short 133
  Description: T1 WIC card Alpha
  No alarms detected.
Framing is ESF, Line Code is B8ZS, Clock Source is Line Primary.
  Data in current interval (1 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
```

- Step 2** The privileged EXEC **show connection all** command displays the status of T1 or E1 controller groups and how they are set up:

```
Router# show connection all
```

ID	Name	Segment 1	Segment 2	State
1	Test	-T1 1/0 01	-T1 1/1 02	ADMIN UP

Verifying Serial Interface Configuration

To verify serial interface configuration, enter the privileged EXEC command **show interfaces serial**, which shows the status of all serial interfaces or of a specific serial interface, as in the following example. You can use this command to check the encapsulation, IP addressing, and other settings:

```
Router #show interface serial0/0:0
Serial0/0:0 is up, line protocol is up
  Hardware is QUICC Serial
  Internet address is 1.156.1.1/24
  MTU 1500 bytes, BW 1536 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
Encapsulation HDLC, loopback not set
  Keepalive not set
  Last input 00:00:00, output 00:00:00, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
    Conversations 0/1/256 (active/max active/max total)
    Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 1000 bits/sec, 1 packets/sec
  5 minute output rate 1000 bits/sec, 1 packets/sec
    637 packets input, 64736 bytes, 0 no buffer
    Received 181 broadcasts, 0 runts, 5 giants, 0 throttles
    3617 input errors, 1506 CRC, 1646 frame, 0 overrun, 0 ignored, 0 abort
    682 packets output, 67213 bytes, 0 underruns
    0 output errors, 0 collisions, 1070 interface resets
    0 output buffer failures, 0 output buffers swapped out
    13 carrier transitions
  Timeslot(s) Used:1-24, Transmitter delay is 0 flags
```

Configuration Example

This section shows an example of a *digital T1 packet voice trunk network module* configured for WAN data traffic.

**Note**

For additional examples, see *Configuring Digital T1 Packet Voice Trunk Network Modules on Cisco 2600 and 3600 Series Routers*.

The **channel-group 0** command is configured in such a way that the service provider can send Frame-Relay link management information (LMI) on the T1 or E1 controller for Frame-Relay data services. This command automatically creates interface serial 1/0:0.

Interface serial 1/0:0 is where all WAN and Layer 3 protocol details are configured, for example, Frame Relay encapsulation or IP addresses.

T1 Configuration

```

hostname RTR-A
!
controller T1 1/0
framing esf
linecoding b8zs
channel-group 0 timeslots 1-24
!
interface serial 1/0:0
encapsulation frame-relay
!
interface serial 1/0:1.1
ip address 209.165.200.252 255.255.255.224
frame-relay interface-dlci 100
!
interface ethernet 0
ip address 209.165.200.250 255.255.255.224
!
router eigrp 1
network 209.165.200.224
!

```

```

hostname RTR-B
!
controller T1 1/0
framing esf
linecoding b8zs
channel-group 0 timeslots 1-24
!
interface serial 1/0:0
encapsulation frame-relay
!
interface serial 1/0:1.1
ip address 209.165.200.253 255.255.255.224
frame-relay interface-dlci 100
!
interface ethernet 0
ip address 209.165.201.1 255.255.255.224
!
router eigrp 1
network 209.165.200.224
network 209.165.201.0
!

```

E1 Configuration.

```

hostname RTR-A
!
controller E1 1/0
framing crc4
linecoding hdb3
channel-group 0 timeslots 1-31
!
interface serial 1/0:0
encapsulation frame-relay
!
interface serial 1/0:1.1
ip address 209.165.200.252 255.255.255.224
frame-relay interface-dlci 100
!
interface ethernet 0
ip address 209.165.200.250 255.255.255.224
!
router eigrp 1
network 209.165.200.224
!

```

```

hostname RTR-B
!
controller E1 1/0
framing crc4
linecoding hdb3
channel-group 0 timeslots 1-31
!
interface serial 1/0:0
encapsulation frame-relay
!
interface serial 1/0:1.1
ip address 209.165.200.253 255.255.255.224
frame-relay interface-dlci 100
!
interface ethernet 0
ip address 209.165.201.1 255.255.255.224
!
router eigrp 1
network 209.165.200.224
network 209.165.201.0
!

```

Command Reference

New or modified commands are included in the Command Reference section of *Configuring Digital T1 Packet Voice Trunk Network Modules on Cisco 2600 and 3600 Series Routers*. All other commands used with this feature are documented in the Cisco IOS Release 12.1 command references.