



G.703 Configuration for Multiflex Voice/WAN Interface Cards on Cisco 2600 and 3600 Series Routers

This document describes how to configure 1- and 2-port E1 Multiflex Voice/WAN interface cards (VWICs) on Cisco 2600 and 3600 routers for G.703 framing and includes the following sections:

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Feature Overview

Cisco E1 Multiflex Voice/WAN interface cards (VWICs) support voice and data applications in Cisco 2600 and 3600 series routers. The VWICs offer WAN interface card (WIC) and voice interface card (VIC) functionality in a variety of applications for enterprises and for service providers who supply customer premises equipment.

The following Multiflex VWICs are available:

- 1-port E1 Multiflex Trunk Interface with G.703 support (VWIC-1MFT-G703)
- 2-port E1 Multiflex Trunk Interface with G.703 support (VWIC-2MFT-G703)

These Multiflex VWICs provide up to two E1 interfaces, which are compatible with and specified by G.703. These Multiflex VWICs provide the following additional features and capabilities:

- Provide a means of connecting standard serial interfaces such as V.35 to telephone lines or Postal Telephone and Telegraph (PTT) networks.
- Provide unframed (G.703) service access.

- Operate over E1 leased-line services and provide ITU-T G.703 with high-density bipolar of order 3 (HDB3) line encoding.
- Operate with either an external or internal clock signal and run at wire speed.
- Support a 4-bit cyclic redundancy check (CRC-4) to provide and ensure data integrity.

When the Multiflex VWIC is initialized, the Cisco IOS software reads the VWIC's cookie ID to determine that the card is to be used as an E1 card; then the firmware loads the proper configuration onto the card. The cookie also indicates whether the card is single or dual port card. Cisco IOS software recognizes the G.703 cookie ID to permit G.703 operation on E1 cards.

Table 1 shows the possible hardware configurations for the Multiflex VWICs.

Table 1 Multiflex VWIC Support

| VWIC and Application | Cisco 2600 Series | Cisco 3620 and 3640 | Cisco 3660 |
|--|--|--|---|
| 1-port Data only | E1 VWIC in a chassis slot | E1 VWIC in a 1- or 2-port network module (NM-1E2W, NM-2E2W, NM-1E1R2W) | Planned for future availability |
| 2-port Data only | E1 VWIC in a chassis slot. <i>Does not provide packet voice.</i> Can provide two physical WAN connections with both ports supporting up to full E1 speeds. | Planned for future availability | Planned for future availability |
| 1- or 2-port Voice only, no WAN connections | E1 VWIC in a Digital E1 Packet Voice Trunk Network Module | E1 VWIC in a Digital E1 Packet Voice Trunk Network Module | E1 VWIC in a Digital E1 Packet Voice Trunk Network Module |

Benefits

The E1 Multiflex VWICs with G.703 support allows unstructured E1 traffic that conforms to the ITU-T G.703 standard.

Restrictions

The following restrictions apply to E1 Multiflex VWIC configurations:

- On all Cisco 2600 and 3600 platforms, Digital E1 Packet Voice Trunk Network Modules only support E1 Multiflex VWICs.
- E1 VWICs are not supported on Cisco 3660 platforms.

See Table 1 on page 2 for summary information.

Related Features and Technologies

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

Related Documents

The following documents provide additional information about installing and configuring T1/E1 Multiflex VWICs:

- *Cisco 2600 and 3600 Series Network Module Hardware Installation Guide*
- *Cisco 2600 and 3600 Series WAN Interface Cards Hardware Installation Guide*
- *Configuring Digital E1 Packet Voice Trunk Network Modules on Cisco 2600 and 3600 Series Routers* Cisco IOS Release 12.0(7)XK online document
- *Configuring 1- and 2-Port T1/E1 Multiflex Voice/WAN Interface Cards on Cisco 2600 and 3600 Series Routers* Cisco IOS Release 12.0(5)XK online document

The following Cisco IOS Release 12.1 documents provide information that can help you use E1 Multiflex VWICs:

- *Cisco IOS Multiservice Applications Configuration Guide*
- *Cisco IOS Multiservice Applications Command Reference*
- *Cisco IOS Dial Services Configuration Guide: Network Services*
- *Cisco IOS Interface Configuration Guide*
- *Cisco IOS Interface Command Reference*
- *Cisco Dial Services Command Reference*

Supported Platforms

This feature is supported on the following platforms:

- Cisco 2610
- Cisco 2611
- Cisco 2612
- Cisco 2613
- Cisco 2620
- Cisco 2621
- Cisco 3620
- Cisco 3640
- Cisco 3660

Supported Standards, MIBs, and RFCs

T1/E1 Multiflex VWICs support the standards, MIBs, and RFCs listed in this section.

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.703
- CCITT/ITU G.704, I.431
- ETSI NET5, ETS300156
- TBR4
- CTR-13
- ETS 300011
- ITU I.431

RFC

RFC 1406

MIB

- E1 CSU MIB

Other Standards

- ANSI T1.40
- AT&T Publication 62411

Prerequisites

E1 Multiflex VWICs require specific service, software, and hardware:

- Obtain E1 service from your service provider.
- Install Cisco IOS Software Release 12.1(2)XD or a later release.
- See the *Configuring 1- and 2-Port T1/E1 Multiflex Voice/WAN Interface Cards on Cisco 2600 and 3600 Series Routers* Cisco IOS Release 12.0(5)XK online document for more information about configuring the Multiflex VWICs.
- If you are installing Multiflex VWICs in a Digital E1 Packet Voice Trunk Network Module, see the following documents for more information about the module:
 - *Cisco 2600 and 3600 Series Network Module Hardware Installation Guide*
 - *Configuring Digital E1 Packet Voice Trunk Network Modules on Cisco 2600 and 3600 Series Routers*



Note You can install one Digital E1 Packet Voice Trunk Network Module in a Cisco 2600 series router or a Cisco 3620 router. A Cisco 3640 router can support three modules.

- Install the E1 Multiflex VWIC by following the instructions in *Cisco 2600 and 3600 Series WAN Interface Cards Hardware Installation Guide*.
- 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 *Network Protocols Configuration Guide, Part 1*.
- Complete your company’s dial plan.
- Establish a working telephony network based on your company’s dial plan.

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

Configuration Tasks

Configuration for E1 Multiflex VWICs with G.703 support is done when you are setting up the E1 controller.

For more information about configuring a E1 Multiflex VWIC that is installed in a Digital E1 Packet Voice Trunk Network Module, see *Configuring Digital E1 Packet Voice Trunk Network Modules on Cisco 2600 and 3600 Series Routers*.

For more information about configuring a E1 Multiflex VWIC that is installed in a Digital E1 Packet Voice Trunk Network Module, see *Configuring Digital E1 Packet Voice Trunk Network Modules on Cisco 2600 and 3600 Series Routers*.

Follow this procedure to configure E1 controllers. Skip Steps 1 and 2 if you are already in controller configuration mode.

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 E1 slot/port | Skip this step if you are already in controller configuration mode. Enter controller configuration mode for the E1 controller at the specified <i>slot/port</i> location. |

| | Command | Purpose |
|--------|---|---|
| Step 3 | Router(config-controller)# clock source { line [primary] internal } | <p>Specify the clock source. The line keyword specifies that the clock source is derived from the active line—rather than from the free-running internal clock. This is the default setting and is generally more reliable. These rules apply to clock sourcing:</p> <ul style="list-style-type: none"> • When both ports are set to line clocking with no primary specification, port 0 is the default primary clock source and port 1 is the default secondary clock source. • When both ports are set to line and one port is set as the primary clock source, the other port is by default the backup or secondary source and is loop-timed. • If one port is set to clock source line or clock source line primary and the other is set to clock source internal, the internal port recovers clock from the clock source line port if the clock source line port is up. If it is down, then the internal port generates its own clock. • If both ports are set to clock source internal, there is only one clock source—internal. |
| Step 4 | Router(config-controller)# linecode { ami hdb3 } | <p>Set the line encoding according to your service provider's instructions. For E1, set the line coding to either AMI or high-density bipolar 3 (HDB3), the default.</p> <p>Alternate mark inversion (AMI), available for T1 or E1 lines, represents zeros using a 01 during each bit cell, and ones are represented by 11 or 00, alternately, during each bit cell. AMI requires that the sending device maintain ones density. Ones density is not maintained independent of the data stream.</p> |
| Step 5 | Router(config-controller)# line-termination { 75-ohm 120-ohm } | <p>Enter a line-termination value. This command specifies the impedance (amount of wire resistance and reactivity to current) for the E1 termination. Impedance levels are maintained to avoid data corruption over long-distance links.</p> <p>Specify 120-ohm to match the balanced 120-ohm interface. This is the default.</p> <p>75-ohm is for an unbalanced BNC 75-ohm interface.</p> |

| | Command | Purpose |
|--------|---|---|
| Step 6 | Router(config-controller)# channel-group <i>channel-group-no unframed</i> | Enter this command to set up channel groups for WAN data services with a 2-port Multiflex Drop-and-Insert VWIC. Specify unframed for G.703 support. |
| Step 7 | Router(config-controller)# no shutdown | Activate the controller. |

Verifying Controller Settings

The privileged EXEC **show controllers e1** command displays the status of E1 controllers and displays information about clock sources and other settings for the ports:

```
Router# show controller E1 1/0
```

```
E1 1/0 is up.
  Applique type is Channelized E1 - balanced
  Cablelength is short 133
  Description: T1 WIC card Alpha
  No alarms detected.
  Framing is UNFRAMED, Line Code is HDB3, Clock Source is Line.
  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
```

The privileged EXEC **show connection all** command displays the status of E1 TDM controller groups and how they are set up:

```
Router# show connection all
```

```
ID   Name           Segment 1           Segment 2           State
-----
1    Test           -E1 1/0 01         -E1 1/1 02         ADMIN UP
```

Configuration Examples

This section includes a sample configuration of an E1 Multiflex VWIC configured to support G.703.

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

```

version 12.1
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname 3660-1
!
enable password lab
!
!
memory-size iomem 25
voice-card 1
!
voice-card 3
!
voice-card 4
!
ip subnet-zero
no ip domain-lookup
ip host dirt 223.255.254.254
!
isdn switch-type primary-net5
isdn voice-call-failure 0
!
!
controller E1 1/0
pri-group timeslots 1-31
!
controller E1 1/1
pri-group timeslots 1-31
!
controller E1 3/0
channel-group 0 unframed
!
controller E1 3/1
!
controller E1 4/0
clock source internal
channel-group 1 timeslots 1
!
controller E1 4/1
pri-group timeslots 1-31
!
!
interface FastEthernet0/0
mac-address 0010.7bd8.da30
ip address 1.6.44.201 255.255.0.0
no ip mroute-cache
load-interval 30
no keepalive
speed auto
half-duplex
hold-queue 2000 in
!
interface FastEthernet0/1
ip address 10.0.0.250 255.255.255.0

```

```
no ip mroute-cache
load-interval 30
duplex auto
speed auto
!
interface Serial1/0:15
no ip address
ip mroute-cache
no logging event link-status
isdn switch-type primary-net5
isdn incoming-voice voice
isdn guard-timer 3000
fair-queue 64 256 0
no cdp enable
!
interface Serial1/1:15
no ip address
ip mroute-cache
no logging event link-status
isdn switch-type primary-net5
isdn incoming-voice voice
isdn guard-timer 3000
fair-queue 64 256 0
no cdp enable
!
interface Serial3/0:0
ip address 40.0.0.1 255.255.255.0
ip mroute-cache
```

Command Reference

This section documents modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.1 command reference publications.

channel-group

To define the time slots that belong to each T1 or E1 circuit, use the **channel-group** command in controller configuration mode. Use the **no** form of this command to clear the time slots for the T1 or E1 circuit.

channel-group {**unframed** | *channel-number* **timeslots** *range* [**speed** {**48** | **56** | **64**}]}

no channel-group [*channel-number* **timeslots** *range*]

Syntax Description

| | |
|--|--|
| <i>channel-number</i> | Channel-group number. When configuring a T1 data line, channel-group numbers can be values from 0 to 23. When configuring an E1 data line, channel-group numbers can be values from 0 to 30. |
| unframed | (E1 only) Specifies an unframed channel group for G.703 support. |
| timeslots <i>range</i> | One or more time slots or ranges of time slots belonging to the channel group. The first time slot is numbered 1. For a T1 controller, the time slot range is from 1 to 24. For an E1 controller, the time slot range is from 1 to 31. |
| speed { 48 56 64 } | (Optional) The speed of the underlying DS0s. See Usage Guidelines for additional information. |

Defaults

The default line speed when configuring a T1 controller is 56 kbps.

The default line speed when configuring an E1 controller is 64 kbps.

Command Modes

Controller configuration

Command History

| Release | Modification |
|----------|--|
| 11.3MA | This command was introduced. |
| 12.1(1)T | This command was supported on Cisco 2600 and 3600 series routers. The command was modified to support unframed channel groups. |

Usage Guidelines

Use this command in configurations where the router or access server must communicate with a T1 or E1 fractional data line. The channel-group number may be arbitrarily assigned and must be unique for the controller. The time slot range must match the time slots assigned to the channel group. The service provider defines the time slots that comprise a channel group.



Note

Channel groups, CAS voice groups, and TDM groups all use group numbers. All group numbers configured for channel groups, CAS voice groups and TDM groups must be unique on the local Cisco MC3810 concentrator. For example, you cannot use the same group number for a channel group and for a TDM group.

If you specify 56 kbps, the channel group is limited to 14 channels on the Cisco MC3810 MultiFlex Trunk (MFT). Because **56** is the default, you should specify **64** if you need more than 14 channels.

This command also applies to Voice over Frame Relay, Voice over ATM, and Voice over HDLC on the Cisco MC3810.

Examples

The following example defines three channel groups. Channel-group 0 consists of a single time slot, channel-group 8 consists of 7 time slots and runs at a speed of 64 kbps per time slot, and channel-group 12 consists of a single time slot.

```
channel-group 0 timeslots 1
channel-group 8 timeslots 5,7,12-15,20 speed 64
channel-group 12 timeslots 2
```

The following example configures a channel group on controller T1 0 on a Cisco MC3810:

```
controller T1 0
channel-group 10 timeslots10 64
```

The following example configures a channel group on controller E1 1/0 on a Cisco 2600 or 3600 series router that supports G.703:

```
controller E1 1/0
channel-group 0 unframed
```

Related Commands

| Command | Description |
|-------------------------|--|
| force-local-chap | Selects the frame type for the T1 or E1 data line. |
| linecode | Selects the linecode type for T1 or E1 line. |

■ channel-group