Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards

The second-generation 1- and 2-port T1/E1 multiflex trunk (MFT) voice/WAN interface cards (multiflex VWICs) support data and voice applications in Cisco multiservice routers. The multiflex VWIC combines WAN interface card (WIC) and voice interface card (VIC) functionality to provide the following improvements:

- Support for both T1 and E1—T1/E1 MFT VWIC2 cards provide additional flexibility in configuring the MFT VWIC2 cards by supporting T1, fractional T1, E1, and fractional E1 for both voice and WAN applications.
- Drop and insert capability on all versions—All MFT VWIC2 modules now include the drop and insert multiplexing capability, which eliminates external third party CSU/DSUs and drop and insert multiplexers.
- Enhanced clocking capabilities—The 2-port MFT VWIC2s can enable each port to be clocked from independent clock sources for data applications. This independent clocking capability is not supported for voice applications and not supported with the AIM-ATM-VOICE-30 module.
- Dedicated echo cancellation option—MFT VWIC2s have an onboard slot for a multiflex trunk dedicated echo cancellation module (EC-MFT-32 and EC-MFT-64), offering an enhanced echo cancellation capability for demanding network conditions. For more information about this feature, refer to the "Hardware Echo Cancellation" chapter in the *Voice Port Configuration Guide*.

Feature History for the Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards

Release	Modification
12.3(14)T	This feature was introduced on the following platforms: Cisco 2600XM series, Cisco 2691, Cisco 2800 series, Cisco 3662 (telco models), Cisco 3700 series, and Cisco 3800 series.

Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at http://www.cisco.com/go/fn. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

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Contents

- Restrictions for Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards, page 2
- Information About Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards, page 3
- How to Configure Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards, page 4
- Configuration Examples for Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards, page 11
- Additional References, page 13
- Command Reference, page 14
- Glossary, page 18

Restrictions for Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards

Cisco IOS Image

To run these features on T1/E1 interfaces, you must install an IP Plus or IP Voice image (minimum) of Cisco IOS Release 12.3(14)T or a later release.

VWIC Support

The multiflex VWIC cards are supported on Cisco 2600XM series, Cisco 2691, Cisco 2800 series, Cisco 3700 series, and Cisco 3800 series routers when installed on the network modules listed in Table 2. The multiflex VWIC cards can also be installed in any VIC slot on the router.

Independent Clocking Mode

The independent clocking mode is supported only on these modules:

- VWIC2-1MFT-G703
- VWIC2-2MFT-G703
- VWIC2-2MFT-T1/E1
- VWIC2-1MFT-T1/E1

To enable independent clocking mode, use the keyword **independent** in the **clock source** command. The **independent** keyword expands on the **clock source internal** and **clock source line** commands to specify that the port can operate on an independent clocking domain. Prior to the addition of the **independent** keyword, port 0 was the default primary clock source, and port 1 was the default secondary clock source and is loop-timed. With independent clocking enabled, this dependency no longer exists, so the **independent** keyword means that both ports can be independently clocked.

When independent clocking is configured, the controller will support only one channel group and no voice applications. If more than one channel group is configured, the following error message occurs:

```
channel-group 2 timeslots 3
%Channel-group already created.
%Only 1 channel-group can be configured with independent clocking.
%Insufficient resources to create channel group
```

When you are configuring the **clock source independent** and **no clock source independent** commands, the channel group has to be removed from the configuration.

Information About Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards

This section provides information about the following:

- Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards Key Features, page 3
- Integrated Drop and Insert Capability, page 4
- Network Module Support for the Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards, page 4

Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards Key Features

The second-generation 1- and 2-port T1/E1 multiflex trunk voice/WAN interface cards have the following key features:

- Full support for T1 Facility Data Link (FDL)
- Controller local loopbacks
- Controller remote loopbacks
- RFC 1406 and integrated CSU/DSU MIB
- MIB and Simple Network Management Protocol (SNMP) management
- Firmware to support T1 and E1 Layer 1 homologation
- User-initiated VWIC reset and field-programmable gate array (FPGA) download
- Voice support (includes DS0-group and PRI-group configuration)

Table 1 lists the names and descriptions of the modules available for this feature.

Table 1 Modules with Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards

Module Name[1]	Description
VWIC2-1MFT-T1/E1	1-port RJ-48 multiflex voice/WAN trunk (T1/E1)
VWIC2-2MFT-T1/E1	2-port RJ-48 multiflex voice/WAN trunk (T1/E1)
VWIC2-1MFT-G703[2]	1-port RJ-48 multiflex trunk (E1 G.703)
VWIC2-2MFT-G703	2-port RJ-48 multiflex trunk (E1 G.703)

1. These baseboards can also provide hardware echo cancellation if there is a daughter card (EC-MFT-32 or EC-MFT-64) mounted on the baseboard. For more information, refer to the Voice Port Configuration Guide on Cisco.com.
2. Although unstructured G.703 operation is particular to E1 operation, the VWIC2-1/2MFT-G703 cards also support structured T1 operation.

Integrated Drop and Insert Capability

The drop and insert feature enables the removal of DS0 time slots from one E1 interface and insertion into time slots of the other E1 interface. This feature is available in VWIC applications. If you configure drop and insert, be sure that the E1 framing under the controllers involved (the tdm-groups configuration location) is the same. If you use different frame types, the signaling bits may not be read properly. This failure occurs during the drop of a channel from one controller and insertion into a channel from another controller. Drop and insert time slots do not need to be contiguous.

Network Module Support for the Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards

Table 2 summarizes the network modules supported by the second-generation 1- and 2-port T1/E1 multiflex trunk voice/WAN interface cards.

Table 2 Network Module Support for the Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards

Network Module[1]	VWIC Options	Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards
NM-HDV	Choose zero or one	VWIC2-1MFT-T1/E1 VWIC2-2MFT-T1/E1 VWIC2-2MFT-G703
NM-HDV2	Choose zero or one	VWIC2-1MFT-T1/E1 VWIC2-2MFT-T1/E1 VWIC2-1MFT-G703 VWIC2-2MFT-G703
NM-HD-2VE	Choose zero, one, or two	VWIC2-1MFT-T1/E1 VWIC2-2MFT-T1/E1
NM-2W NM-1FE1R2W NM-1FE2W-V2 NM-2FE2W-V2	Choose zero, one, or two	VWIC2-1MFT-T1/E1 VWIC2-2MFT-T1/E1 VWIC2-1MFT-G703 VWIC2-2MFT-G703

1. For this feature to work properly, the network modules listed here must be installed in one of the following platforms: Cisco 2600XM series, Cisco 2691, Cisco 2800 series, Cisco 3662 (telco models), Cisco 3700 series, and Cisco 3800 series

How to Configure Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards

To configure the second-generation 1- and 2-port T1/E1 multiflex trunk voice/WAN interface cards feature, perform the task described in the following section:

- Configuring the Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards, page 5

Configuring the Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards

Perform this task to configure a T1 or E1 interface with independent clocking enabled and integrated drop and insert on a multiflex trunk voice/WAN interface card.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **card type** {**e1** | **t1**} *slot subslot*
4. **voice-card** *slot*
5. **codec complexity** {**flex** [**reservation-fixed** {**high** | **medium**}] | **high** | **medium**}
6. **controller** {**e1** | **t1**} *slot*/*port*
7. **framing** {**sf** | **esf**}
   or
   framing {**crc4** | **no-crc4**}
8. **linecode** {**ami** | **b8zs**}
   or
   linecode {**ami** | **hdb3**}
9. **clock source** {**line** [**primary** | **bits** | **independent**] | **internal** [**independent**] | **free-running**}
10. **ds0-group** *ds0-group-number* **timeslots** *timeslot-list* **type** {**e&m-delay-dial** | **e&m-fgd** | **e&m-immediate-start** | **e&m-wink-start** | **ext-sig** | **fgd-eana** | **fxo-ground-start** | **fxo-loop-start** | **fxs-ground-start** | **fxs-loop-start**}
    or
    pri-group [**timeslots** *range*]
11. **voice-port** {*slot-number*/*subunit-number*/*port* | *slot*/*port*:*ds0-group-number*}
12. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.

	Command or Action	Purpose
Step 3	**card type** {**e1** | **t1**} *slot subslot* **Example:** `Router(config)# card type t1 0 0`	Sets or changes the card type to E1 or T1. • *slot*—Specifies the slot number. Range can be 0 to 6, depending on the platform. • *subslot*—Specifies the VWIC slot number. Range can be 0 to 3, depending on the host module or platform. • When the command is used for the first time, the configuration takes effect immediately. A subsequent change in the card type will not take effect unless you enter the **reload** command or reboot the router. **Note** When you are using the **card type** command to change the configuration of an installed card, you must enter the **no card type** {**e1 | t1**} *slot subslot* command first. Then enter the **card type** {**e1 | t1**} *slot subslot* command for the new configuration information.
Step 4	**voice-card** *slot* **Example:** `Router(config)# voice card 1`	Enters voice card interface configuration mode. • Specify the slot location using a value from 0 to 5.

	Command or Action	Purpose
Step 5	**codec complexity** {**flex** [**reservation-fixed** {**high** | **medium**}] | **high** | **medium**} **Example:** `Router(config-voicecard)# codec complexity flex`	Specifies the codec complexity based on the codec standard you are using. • **flex**—Up to 16 calls can be completed per DSP. The number of supported calls varies from 6 to 16, depending on the codec used for a call. In this mode, reservation for analog VICs may be needed for certain appplications such as CAMA E-911 calls because oversubscription of DSPs is possible. If this is true, then the **reservation-fixed** option may be enabled. There is no reservation by default. – **reservation-fixed**—Not applicable to the VWIC or the T1/E1 VIC. • **high**—Up to six voice or fax calls can be completed per DSP, using the following codecs: G.711, G.726, G.729, G.729 Annex B, G.723.1, G.723.1 Annex A, G.728, and GSMEFR. **Note** High-complexity codecs support lower call density than do medium-complexity codecs. • **medium**—Up to eight voice or fax calls can be completed per DSP, using the following codecs: G.711, G.726, G.729 Annex A, G.729 Annex B with Annex A, GSMFR, and fax relay. **Note** All medium-complexity codecs are supported in high-complexity codecs. • The keyword that you specify for the **codec complexity** command affects the codecs available when you use the **codec** dial peer voice configuration command. If you select a codec that is not available, an error message appears. • You cannot change codec complexity while DS0 groups are defined. If they are already set up, follow these steps: 1. Shut down the voice port associated with the controller. 2. Remove the DS0 group or PRI group under the T1 or E1 controller. 3. Enter the **voice-card** *slot* command, and then change the codec complexity. **Note** This procedure to change codec complexity applies only to T1 and E1 controllers. This is not valid for analog voice ports.
Step 6	**controller** {**e1** | **t1**} *slot/port* **Example:** `Router(config-voicecard)# controller t1 0/0`	Enters controller configuration mode for the VWIC. • Valid values for *slot* are 0 through 5 and for *port* are 0 and 1.

	Command or Action	Purpose

Step 7	**framing** {**sf** | **esf**}
	or
	framing {**crc4** | **no-crc4**}
	
	Example:
	`Router(config-controller)# framing esf`
	
	Example:
	`Router(config-controller)# framing crc4`
		Specifies a frame type.
		• The **controller** command must be entered before this command can be used.
		• The frame type for T1 controllers can be specified as **sf** for superframe or **esf** for extended superframe.
		• The frame type for E1 controllers can be specified as **crc4** or **no-crc4**.

Step 8	**linecode** {**ami** | **b8zs**}
	or
	linecode {**ami** | **hdb3**}
	
	Example:
	`Router(config-controller)# linecode b8zs`
	
	Example:
	`Router(config-controller)# linecode hdb3`
		Specifies a line encoding for a controller.
		• The **controller** command must be entered before this command can be used.
		• Line-code value for T1 can be **ami** or **b8zs**.
		• Line-code value for E1 can be **ami** or **hdb3**.

	Command or Action	Purpose

Step 9	**clock source** {**line** [**primary** | **bits** | **independent**] | **internal** [**independent**] | **free-running**}
	
	Example:
	`Router(config-controller)# clock source line independent`
		Specifies the clock source.
		• 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** 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.
		– The optional keywords **primary** and **bits** appear in the command-line interface, but they have no impact on this particular configuration.
		– The **independent** keyword expands on the **clock source internal** and **clock source line** to specify that the port can operate on an independent clocking domain. Port 0 is the default primary clock source, and port 1 is the default secondary clock source and is loop-timed. With independent clocking enabled, this dependency no longer exists, so the **independent** keyword means that both ports can be independently clocked.
		Note When independent clocking is configured, the controller will support only one channel group and no voice applications. If more than one channel group is configured, the following error message occurs:
		`channel-group 2 timeslots 3`
		`%Channel-group already created.`
		`%Only 1 channel-group can be configured with independent clocking.`
		`%Insufficient resources to create channel group`
		When you are configuring the **clock source independent** and **no clock source independent**, the channel group has to be removed from this configuration.
		– The **free-running** keyword specifies a free-running clock derived from the oscillator on the motherboard, which is used only for testing and back-to-back connections.

	Command or Action	Purpose

Step 10	**ds0-group** *ds0-group-number* **timeslots** *timeslot-list* **type** {**e&m-delay-dial** | **e&m-fgd** | **e&m-immediate-start** | **e&m-wink-start** | **ext-sig** | **fgd-eana** | **fxo-ground-start** | **fxo-loop-start** | **fxs-ground-start** | **fxs-loop-start**}
	
	or
	
	pri-group [**timeslots** *range*]
	
	Example:
	`Router(config-controller)# ds0-group 12 timeslots 1-3 type fxs-loop-start`
	
	or
	
	Example:
	`Router(config-controller)# pri-group timeslots 1-5`
		(Voice only) Defines the T1 channels for use by compressed voice calls and the signaling method the router uses to connect to the PBX or central office.
		• Set up DS0 groups after you have specified codec complexity in the voice-card configuration.
		• *ds0-group-number*—Value from 0 to 23 that identifies the DS0 group.
		• The **ds0-group** command automatically creates a logical voice port that is numbered as follows: *slot*/*port*:*ds0-group-number*. Although only one voice port is created, applicable calls are routed to any channel in the group.
		• The *timeslot-list* argument is a single number, numbers separated by commas, or a pair of numbers separated by a hyphen to indicate a range of time slots.
		• The signaling method selection for the **type** keyword depends on the connection that you are making:
		– The E&M interface allows connection for PBX trunk lines (tie lines) and telephone equipment.
		– The FXS interface allows connection of basic telephone equipment and PBX.
		– The FXO interface is for connecting the CO to a standard PBX interface where permitted by local regulations; it is often used for off-premises extensions (OPXs).
		
		or
		
		Specifies that the controller should be set up as a PRI interface.
		• For T1, the last defined channel is the D channel.
		• If a controller is configured as PRI, individual channel groups cannot be configured on that controller.
		• The **controller** command must be entered before this command can be used.
		
		Note To use this command to create a PRI group, you must first enter the **isdn switch-type** command in global configuration mode.

	Command or Action	Purpose
Step 11	**voice-port** {*slot-number*/*subunit-number*/*port* | *slot*/*port*:*ds0-group-number*} **Example:** `Router(config-controller)# voice-port 3/0:0`	Enters voice port configuration mode and specifies the voice port. • The *slot-number* argument identifies the slot where the VIC is installed. Valid entries are from 0 to 3, depending on the slot in which it has been installed. • The *subunit-number* identifies the subunit on the VIC where the voice port is located. Valid entries are 0 or 1. • The *port* argument identifies the voice port number. Valid entries are 0 and 1. or • The *slot* argument is the slot in which the voice port adapter is installed. Valid entries are from 0 to 3. • The *port* argument is the voice interface card location. Valid entries are 0 to 3. • The *ds0-group-number* argument indicates the defined DS0 group number. Each defined DS0 group number is represented on a separate voice port. This allows you to define individual DS0s on the digital T1/E1 card.
Step 12	**exit** **Example:** `Router(config-voiceport)# exit`	Exits controller cofiguration mode and returns the router to privileged EXEC mode.

Configuration Examples for Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards

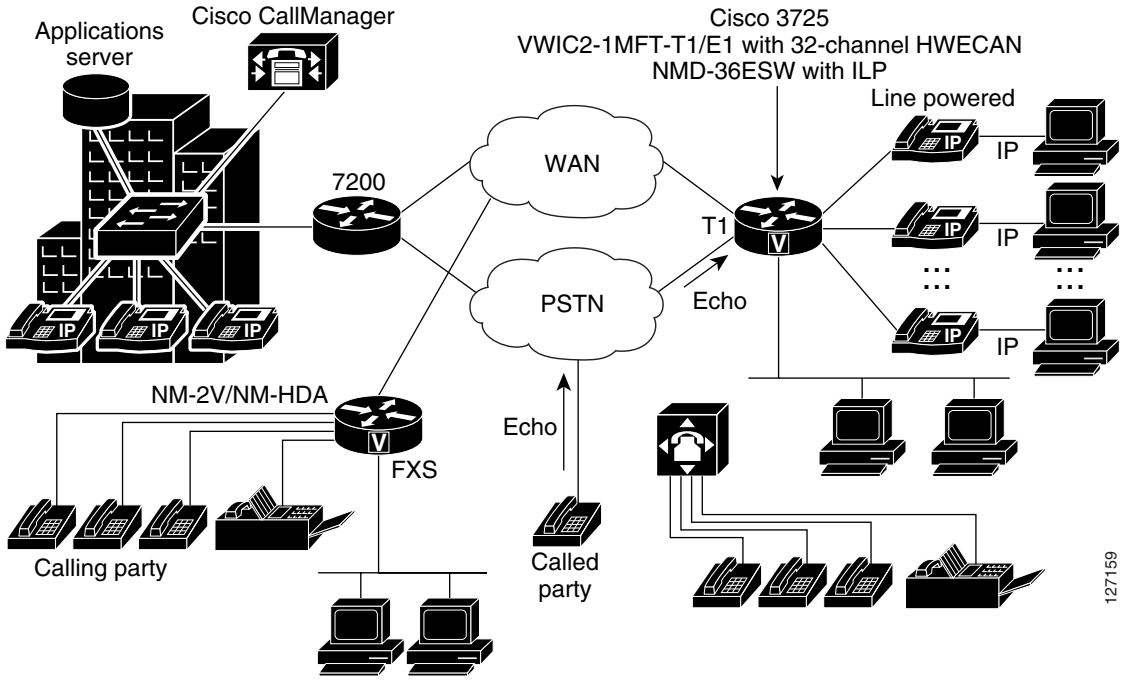
This section provides the following information:

- Sample Network Topology for the Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards, page 11
- Sample Configuration for the Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards

Sample Network Topology for the Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards

Figure 1 shows a sample network topology that is provided for reference purposes.

Figure 1 Sample Network Topology for the Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards



Sample Configuration for the Second-Generation 1- and 2-Port T1/E1 Multiflex Trunk Voice/WAN Interface Cards

This section shows a sample configuration for a T1 controller configured for data and drop-and-insert capability:

```
card type t1 0 0
!
no network-clock-participate wic 0
ip subnet-zero
ip cef
!
no ip dhcp use vrf connected
!
controller t1 0/0
 framing esf
 linecode b8zs
 channel-group 1 timeslots 1-12 speed 64
 tdm-group 2 timeslots 13-24
!
controller t1 0/1
 framing esf
 linecode b8zs
 channel-group 1 timeslots 1-12 speed 64
 tdm-group 2 timeslots 13-24
!
!
interface Serial0/0:1
 ip address 10.0.0.1 255.255.255.0
!
```

```
interface Serial0/1:1
 ip address 10.0.0.2 255.255.255.0
!
connect t1-xconnect T1 0/0 2 T1 0/1 2
 !
!
```

More detailed syntax information about the commands used with this feature is documented in the *Cisco IOS Release 12.3 Voice Command Reference*.

Additional References

The following sections provide references related to the second-generation 1- and 2-port T1/E1 multiflex trunk voice/WAN interface cards.

Related Documents

Related Topic	Document Title
Hardware installation instructions for network modules	*Cisco Network Module Hardware Installation Guide*
General information about voice configuration and command reference	*Cisco IOS Voice Command Reference,* Release 12.3 T
Information and instructions for voice port configuration and hardware echo cancellation	*Cisco IOS Voice Port Configuration Guide,* Release 12.3 T

Standards

Standards	Title
ITU-T G.164	*Echo Suppressors*
ITU-T G.165	*Echo Cancellers*
ITU-T G.168	*Digital Network Echo Cancellers*

MIBs

MIBs	MIBs Link
• RFC 1406 MIB • T1 CSU MIB Support • Port Module MIB • T1/E1 Line Status Reporting	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

RFCs

RFCs	Title
RFC 1406	*Definitions of Managed Objects for the DS1 and E1 Interface Types*

Technical Assistance

Description	Link
The Cisco Technical Support website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/techsupport

Command Reference

This section documents one modified command.

- **clock source (T1/E1 controller)**

clock source (T1/E1 controller)

To set clocking for individual T1 or E1 links, use the **clock source** command in controller configuration mode. To return to the default, use the **no** form of this command.

clock source {**line** [**primary** | **bits** | **independent**] | **internal** [**independent**] | **free-running**}

no clock source

Syntax Description

line	Specifies that the phase-locked loop (PLL) on this controller derives its clocking from the external source to which the controller is connected, which is generally the telephone company central office (CO).
primary	(Optional) Specifies that the PLL on this controller derives its clocking from the external source to which the controller is connected. This option also puts a second port, which is generally connected to the PBX, into looped-time mode. Both ports are configured with line, but only the port connected to the external source is configured with primary.
bits	(Optional) Specifies that the controller will derive clocking from the Building Integrated Timing Supply (BITS).
independent	(Optional) Specifies that the port can operate on an independent clocking domain. Before this capability was added, on a 2-port VWIC-MFT, if both ports were configured as **clock source line**, the 2-port was really looped, which meant that it was getting the clock from the first port. With independent clocking mode, this dependency no longer exists, so the keyword **independent** means that both ports can be independently clocked.
internal	Specifies that the clock is generated from the T1 or E1 controller's internal PLL.
free-running	Specifies a free-running clock derived from the oscillator on the motherboard, which is used only for testing and back-to-back connections.

Defaults

The default is **line**.

Command Modes

Controller configuration

Command History

Release	Modification
12.2(2)XB	This command was introduced in controller configuration mode for Cisco 2600 series and Cisco 3660 routers.
12.2(8)T	This command was integrated into Cisco IOS Release 12.2(8)T.
12.2(15)T	This command was implemented on the Cisco 2691 and the Cisco 3700 series.
12.3(4)XD	The **bits** keyword was added.

Release	Modification
12.3(7)T	The **bits** keyword was integrated into Cisco IOS Release 12.3(7)T.
12.3(14)T	This command was integrated into Cisco IOS Release 12.3(14)T and the **independent** keyword was added.

Usage Guidelines

For a detailed discussion of clock sources on individual ports, refer to "Clock Sources on Digital T1/E1 Voice Ports" in the "Configuring Voice Ports" chapter of the *Cisco IOS Voice, Video, and Fax Configuration Guide*, Release 12.3.

Examples

The following example shows the router providing clock source to two controllers:

```
Router(config)# controller E1 1/0
Router(config-controller)# framing crc
Router(config-controller)# linecoding hdb3
Router(config-controller)# clock source internal
Router(config-controller)# ds0-group timeslots 1-15 type e&m-wink-start
!
Router(config)# controller E1 1/1
Router(config-controller)# framing esf
Router(config-controller)# linecoding b8zs
Router(config-controller)# clock source internal
Router(config-controller)# ds0-group timeslots 1-15 type e&m-wink-start
```

The following example shows the digital voice hardware receiving clocking for the PLL from E1 1/0 and using this clock as a reference to clock E1 1/1. If controller E1 1/0 fails, the PLL internally generates the clock reference to drive E1 1/1.

```
Router(config)# controller E1 1/0
Router(config-controller)# framing crc
Router(config-controller)# linecoding hdb3
Router(config-controller)# clock source line
Router(config-controller)# ds0-group timeslots 1-15 type e&m-wink-start
!
Router(config)# controller E1 1/1
Router(config-controller)# framing crc4
Router(config-controller)# linecoding hdb3
Router(config-controller)# clock source internal
Router(config-controller)# ds0-group timeslots 1-15 type e&m-wink-start
```

The following example shows the router being configured to receive clocking from the BITS.

```
Router(config)# network-clock-participate slot 1
Router(config)# network-clock-select 1 E1 1/1
Router(config)# controller E1 1/1
Router(config-controller)# clock source line bits
```

Related Commands

Command	Description
controller	Configures a T1 or E1 controller and enters controller configuration mode.

Glossary

a-law—A companding technique commonly used in Europe. Standardized as a 64-kbps codec in G.711.

cancelled end—The side of an echo canceller that contains the echo path on which this echo canceller is intended to operate. This includes all transmissions facilities and equipment (including the hybrid and terminating telephone set) included in the echo path.

CAS—channel-associated signaling. RBS on a T1 interface; R2, SS1, or P7 on an E1 interface.

combined loss—The sum of echo return loss, echo return loss enhancements, and nonlinear processing loss (if present).

comfort noise—Insertion of pseudorandom noise during the silent interval when the NLP operates or allowance of some of the background or idle channel noise to pass through the NLP in order to prevent the annoyance of intervals of speech with background noise followed by intervals of silence.

composite echo—Consists of electric echoes and acoustic echoes caused by reflected signals at hybrids and acoustic environments (for example, analog hands-free telephones).

convergence—Process of developing a model of echo path, which will be used in the echo estimator to produce the estimate of the circuit echo.

convergence time—For a defined echo path, the interval between the instant a defined test signal is applied to the receive-in port of an echo canceller with the estimated echo path impulse response initially set to zero, and the instant the returned echo level at the send-out port reaches a defined level.

E1—European equivalent of T1. E1 provides 32 64-kbps channels include 1 channel for framing and 1 channel for D-channel information. 2.048-MHz clock rate.

echo path—The transmission path between Rout and Sin of an EC. This term is intended to describe the signal path of the echo.

echo path capacity—The maximum echo path delay for which an echo canceller is designed to operate.

echo path delay—The delay between the receive-out port Rout and the send-in port Sin ports of the echo canceller.

ERL—echo return loss. The attenuation of the signal between the receive-out port Rout and the send-in port Sin ports of the echo canceller.

ERLE—echo return loss enhancement. The amount of echo attenuation provided by the echo canceller.

ESF—extended superframe: T1 framing technique with 24 frames per superframe, which allows additional signaling.

FXO—Foreign Exchange Office. An FXO interface connects to a central office.

FXS—Foreign Exchange Station. An FXS interface connects directly to a standard telephone, supplying basics such as ring voltage and dial tone.

G.168—ITU-T standard that establishes the minimum performance requirements for echo cancellers.

ground-start—Used for PBX and other services that must have ground signal to indicate when a dial tone is applied by the serving switching system or is used to avoid glare. Ground-start minimizes the possibility of glare and provides far-end disconnect supervision (for example, the remote user can disconnect and the local FXO can be made aware of this disconnection and also disconnect).

H register—The register within the echo canceller that stores the impulse response model of the echo path.

H.323—An Internet standard that defines a common set of codecs, call setup and negotiating procedures, and basic data transport methods.

IMA—inverse multiplexing for ATM.

immediate-start—In the immediate start protocol, the originating side does not wait for a wink before sending addressing information. After receiving addressing digits, the terminating side goes off-hook for the duration of the call. The originating endpoint maintains off-hook state for the duration of the call.

leak time—The interval between the instant a test signal is removed from the receive-in port of a fully converged echo canceller and the instant the echo path model in the EC changes such that, when a test signal is reapplied to Rin with the convergence circuitry inhibited, the returned echo is at a defined level.

loop-start—Used for ordinary telephone key systems. The advantage is no need for accurate ground reference between the CO or FXS and the telephone or FXO. The disadvantage is poor glare resolution and no far-end disconnect supervision. When the remote handset or line hangs up, there is no provision for the local CO or FXS to notify the FXO of the disconnection.

noncancelled end—The side of an EC that does not contain the echo path on which this EC is intended to operate.

NLP—Nonlinear Processor. A component of the echo canceller that provides additional ERLE.

open echo path—An echo path with infinite echo return loss.

OOF—Out of Frame (G.706) consecutive frame alignment signals received in error.

PRI—Primary Rate Interface. ISDN interface to 64-kbps D channel plus 23 (T1) or 30 (E1) B channels for voice or data.

pure delay—The delay from Rout port to Sin port due to the delays inherent in the near-end echo path transmission facilities, not including dispersion time due to the network elements.

RAI—remote alarm indication.

R2—a non-ISDN signaling method for E1 interfaces.

RBS—robbed bit signaling. A form of signaling that “robs” a bit from the user’s data stream to provide supervisory and signaling information to and from the switch. RBS emulates older analog trunk and line signaling methods by providing a 1:1 mapping of analog supervisory signaling to the signaling bits (A, B, C, D).

residual echo level—The level of the echo signal that remains at the send-out port of an operating EC after imperfect cancellation of the circuit echo.

SF—Superframe, or D4 framing, 12 frames per superframe for in-band signaling extraction.

Sgen—Signal coming from the near end.

tail length—The maximum delay between the source signal transmitted by the voice module and the echo signal returned by the hybrid in the tail circuit. In other words, tail length specifies the length of time that the echo canceller stores its approximation of an echo in memory (that is, the echo canceller’s cache). It is the maximum echo delay that an echo canceller will be able to eliminate.

T1—Provides 24 64-kbps time slots on a 1.544-Mbps serial interface.

TE—Terminal equipment mode of IOM-2 bus. Timing is supplied from the line or WIC.

VWIC—voice/WAN interface card.

wink—Telco terminology for a specific transition of the signaling bits on a T1 line. If the originating state of the signaling bits indicates on-hook, then a “wink” is an on-hook to off-hook to on-hook transition. The timing of the wink and the values of the signaling bits for on-hook and off-hook can depend on signaling type.

wink-start—The terminating side responds to an off-hook from the originating side with a short wink. This wink tells the originating side that the terminating side is ready to receive addressing digits. After receiving addressing digits, the terminating side then goes off-hook for the duration of the call.

Note Refer to *Internetworking Terms and Acronyms* for terms not included in this glossary.

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