Synchronous Serial Port Setup Commands

This chapter describes the commands available to configure synchronous serial interfaces for dial-up solutions on your router.

For information about configuring synchronous serial interfaces for dial-up solutions, see the "Configuring Synchronous Serial Ports" chapter of the *Dial Solutions Configuration Guide*.

bandwidth

To communicate the bandwidth value of an interface to the higher-level protocols, use the **bandwidth** interface configuration command. Use the **no** form of this command to restore the default values.

bandwidth *kilobits*
no bandwidth

Syntax Description

kilobits	Intended bandwidth in kilobits per second.

Default

Default bandwidth values are set during startup and can be displayed with the EXEC command **show interfaces**.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

The **bandwidth** command sets an informational parameter to communicate the current bandwidth to the higher-level protocols.

IGRP uses the minimum path bandwidth to determine a routing metric. The TCP protocol adjusts initial retransmission parameters based on the apparent bandwidth of the outgoing interface.

At higher bandwidths, the value you configure with the **bandwidth** command is not what is displayed by the **show interface** command. The value shown is that used in IGRP updates and also used in computing load.

Note This is a routing parameter only; it does not affect the physical interface.

Example

The following example sets the full bandwidth for DS3 transmissions:

```
interface serial 0
 bandwidth 44736
```

clock rate

Use the **clock rate** interface configuration command to configure the clock rate for the hardware connections on serial interfaces such as network interface modules (NIMs) and interface processors to an acceptable bit rate. Use the **no** form of this command to remove the clock rate if you change the interface from a DCE to a DTE device. Using the **no** form of this command on a DCE interface sets the clock rate to the hardware-dependent default value.

clock rate *bps*
no clock rate

Syntax Description

bps	Desired clock rate in bits per second: 1200, 2400, 4800, 9600, 19200, 38400, 56000, 64000, 72000, 125000, 148000, 250000, 500000, 800000, 1000000, 1300000, 2000000, 4000000, or 8000000. For the synchronous serial port adapters (PA-8T-V35, PA-8T-X21, PA-8T-232, and PA-4T+), a nonstandard clock rate can be used. You can enter any value from 300 to 8000000 bps. The clock rate you enter is rounded (adjusted), if necessary, to the nearest value your hardware can support except for the following standard rates: 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 56000, 64000, 128000, or 2015232.

Default

No clock rate is configured.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

This command was modified in Cisco IOS Release 11.3 to include nonstandard clock rates for the PA-8T-V35, PA-8T-X21, PA-8T-232, and PA-4T+ synchronous serial port adapters.

Cable Length

Be aware that the fastest speeds might not work if your cable is too long, and that speeds faster than 148,000 bits per second are too fast for EIA/TIA-232 signaling. It is recommended that you only use the synchronous serial EIA/TIA-232 signal at speeds up to 64,000 bits per second. To permit a faster speed, use EIA/TIA-449 or V.35.

Synchronous Serial Port Adapters

For the synchronous serial port adapters (PA-8T-V35, PA-8T-X21, PA-8T-232, and PA-4T+) on Cisco 7200 series routers, on second-generation Versatile Interface Processors (VIP2s) in Cisco 7500 series routers, and on Cisco 7000 series routers with RSP7000 and 7000 Series Chassis Interface (RSP7000CI), the clock rate you enter is rounded (if needed) to the nearest value that your hardware can support. To display the clock rate value for the port adapter, use the **show running-configuration** command.

If you plan to netboot your router over a synchronous serial port adapter interface and have a boot image prior to Cisco IOS Release 11.1(9)CA that does not support nonstandard (rounded) clock rates for the port adapters, you must use one of the following standard clock rates:

1200, 2400, 4800, 9600, 19200, 38400, 56000, 64000

Examples

The following example sets the clock rate on the first serial interface to 64,000 bits per second:

```
interface serial 0
 clock rate 64000
```

The following example sets the clock rate on a synchronous serial port adapter in slot 5, port 0 to 1234567. In this example, the clock rate is adjusted to 1151526 bps.

```
interface serial 5/0
 clock rate 1234567
%clock rate rounded to nearest value that your hardware can support.
%Use Exec Command 'show running-config' to see the value rounded to.
```

The following example configures serial interface 5/0 with a clock rate that is rounded to the nearest value that is supported by the hardware:

```
Router# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)# interface serial 5/0
Router(config-if)# clock rate 1234567
%clock rate rounded to nearest value that your hardware can support.
%Use Exec Command 'show running-config' to see the value rounded to.
Router(config-if)# exit
Router(config)#
```

The following example shows how to determine the exact clock rate that the serial interface was rounded to using the **show running-config** command. This example shows only the relevant information displayed by the **show running-config** command; other information was omitted.

```
Router# show running-config
Building configuration...
...
!
interface Serial5/0
 no ip address
 clock rate 1151526
!
...
```

clock source (interface)

To control which clock a G.703 E1 interface will use to clock its transmitted data, use the **clock source** interface configuration command. Use the **no** form of this command to restore the default value.

clock source {line | internal}
no clock source

Syntax Description

line	Specifies that the interface will clock its transmitted data from a clock recovered from the line's receive data stream (default).
internal	Specifies that the interface will clock its transmitted data from its internal clock.

Default

By default, the clock source is the line's receive data stream.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.3.

This command applies to a Cisco 4000 router or Cisco 7000 series routers with RSP7000 and Cisco 7500 series router. A G.703-E1 interface

can clock its transmitted data from either its internal clock or from a clock recovered from the line's receive data stream.

Example

The following example specifies the G.703-E1 interface to clock its transmitted data from its internal clock:

```
clock source internal
```

compress

To configure software compression for Link Access Procedure, Balanced (LAPB), and High-Level Data Link Control (HDLC) encapsulations, use the **compress** interface configuration command. To disable compression, use the **no** form of this command.

compress [**predictor** | **stac**]
no compress [**predictor** | **stac**]

Syntax Description

predictor	(Optional) Specifies that a predictor compression algorithm will be used.
stac	(Optional) Specifies that a Stacker (LZS) compression algorithm will be used.

Default

Compression is disabled.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0 (as **compress predictor**). The command, **compress predictor stac** first appeared in Cisco IOS Release 10.3.

Point-to-Point Compression

You can configure point-to-point software compression for all LAPB, PPP, and HDLC encapsulations. Compression reduces the size of frames via lossless data compression. The compression algorithm used is a predictor algorithm (the RAND compression algorithm), which uses a compression dictionary to predict what the next character in the frame will be.

HDLC Encapsulations

For HDLC encapsulations, you can specify a Stacker compression algorithm by using the **stac** keyword. PPP and LAPB encapsulations support both predictor and Stacker compression algorithms.

System Performance

Compression is performed in software and may significantly affect system performance. We recommend that you disable compression if CPU load exceeds 65 percent. To display the CPU load, use the **show process cpu** EXEC command.

If the majority of your traffic is already compressed files, we recommend that you not use compression. If the files are already compressed, the additional processing time spent in attempting unsuccessfully to compress them again will slow system performance.

Note The best performance data compression algorithms adjust their compression methodology as they identify patterns in the data. To prevent data loss and support this adjustment process, the compression algorithm is run over LAPB to ensure that everything is sent in order, with no missing data and no duplicate data.

Public Data Network Connections

Compression requires that both ends of the serial link be configured to use compression. You should never enable compression for connections to a public data network.

Table 36 provides general guidelines for deciding which compression type to select for LAPB encapsulations.

Table 36 Compression Guidelines for LAPB Encapsulations

Compression Type to Use	Situation
Predictor	The bottleneck is caused by the load on the router or access server.
Stacker	The bottleneck is the result of line bandwidth.
None	Most files are already compressed.

Stacker compression for LAPB encapsulations reaches its performance ceiling on T1 lines; it is not recommended for faster lines because the added processing slows their performance. Stacker compression processing might be slower on other systems than on the Cisco 4500 routers.

When using predictor compression, you can adjust the MTU for the serial interface and the LAPB maximum bits per frame (N1) parameter, as shown in the first example, to avoid informational diagnostics regarding excessive MTU or N1 sizes. However, you should not change those parameters when you use Stacker compression.

Examples

The following example enables predictor compression on serial interface 0 for a LAPB link:

```
interface serial 0
 encapsulation lapb
 compress predictor
 mtu 1509
 lapb n1 12072
```

The following example enables Stacker compression on serial interface 0 for a LAPB link. This example does not set the MTU size and the maximum bits per frame (N1); we recommend that you do not change those LAPB parameters for Stacker compression:

```
interface serial 0
 encapsulation lapb
 compress predictor
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

encapsulation lapb
encapsulation x25
show compress
show processes

crc4

To enable generation of CRC4 on the G.703 E1 port adapter on the FSIP, use the **crc4** interface configuration command. To disable this feature, use the **no** form of this command.

crc4
no crc4

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command applies to a Cisco 4000 router or Cisco 7000 series and Cisco 7500 series router. It is useful for checking data integrity while operating in framed mode. CRC4 provides additional protection for a frame alignment signal under noisy conditions. Refer to CCITT Recommendation G.704 for a definition of CRC4.

This command does not apply to the Cisco 7200 series.

Example

The following example enables CRC4 generation on the G.703 E1 port adapter on the FSIP:

```
crc4
```

crc bits 5

To enable generation of CRC5 (per ITU Recommendation G.704 and G.703) to improve data integrity, use the **crc bits 5** interface configuration command. To disable this feature, use the **no** form of this command.

crc bits 5
no crc bits 5

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.1 CA.

This command is available for the JT2 6.3-MHz serial port adapter (PA-2JT2) on second-generation Versatile Interface Processor (VIP2) in Cisco 7500 series routers and in Cisco 7000 series routers with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI).

This command is useful for checking data integrity while operating in framed mode. CRC5 provides additional protection for a frame alignment signal under noisy conditions. For data transmission at JT2 (6.312 Mbps), the G.704 standard suggests 5 bits CRC. Refer to ITU Recommendation G.704 for a definition of CRC5.

You can also use the **crc bits 5** command to set the CRC size for the HDLC controllers.

Example

The following example enables CRC 5 generation on the PA-2JT2 port adapter and also sets the CRC size to 32 bits:

```
interface Serial 0/0
 crc 32
 crc bits 5
```

dce-terminal-timing enable

When running the line at high speeds and long distances, use the **dce-terminal-timing enable** interface configuration command to prevent phase shifting of the data with respect to the clock. If SCTE is not available from the DTE, use **no** form of this command, which causes the DCE to use its own clock instead of SCTE from the DTE.

dce-terminal-timing enable
no dce-terminal-timing enable

Syntax Description

This command has no keywords or arguments.

Default

DCE uses its own clock.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

On the Cisco 4000 platform, you can specify the serial Network Interface Module timing signal configuration. When the board is operating as a DCE and the DTE provides terminal timing (SCTE or TT), the **dce-terminal-timing enable** command causes the DCE to use SCTE from the DTE.

Example

The following example prevents phase shifting of the data with respect to the clock:

```
interface serial 0
 dce-terminal-timing enable
```

description (interface)

To add a description to an interface configuration, use the **description** interface configuration command. Use the **no** form of this command to remove the description.

description *string*
no description

Syntax Description

string	Comment or a description to help you remember what is attached to this interface.

Default

No description is added.

Command Mode

Interface configuration

Usage Guidelines

The **description** command is meant solely as a comment to be put in the configuration to help you remember what certain interfaces are used for. The description appears in the output of the following EXEC commands: **show startup-config**, **show interfaces**, and **show running-config**.

Example

The following example shows how to add a description for a T1 interface:

```
interface serial 0
 description Fractional T1 line to Mountain View -- 128 Kb/s
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

show interfaces
show running-config
show startup-config

dte-invert-txc

On the Cisco 4000 series, you can specify the serial Network Processor Module timing signal configuration. When the board is operating as a DTE, the **dte-invert-txc** command inverts the TXC clock signal it gets from the DCE that the DTE uses to transmit data. Use the **no** form of this command if the DCE accepts SCTE from the DTE.

dte-invert-txc
no dte-invert-txc

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Use this command if the DCE cannot receive SCTE from the DTE, the data is running at high speeds, and the transmission line is long. This prevents phase shifting of the data with respect to the clock.

If the DCE accepts SCTE from the DTE, use **no dte-invert-txc**.

Example

The following example inverts the TXC on serial interface 0:

```
interface serial 0
 dte-invert-txc
```

encapsulation

To set the encapsulation method used by a serial interface, use the **encapsulation** interface configuration command.

encapsulation *encapsulation-type*

Syntax Description

encapsulation-type — Encapsulation type; one of the following keywords:

hdlc—High-Level Data Link Control (HDLC) protocol for serial interface. This encapsulation method provides the synchronous framing and error detection functions of HDLC without windowing or retransmission. This is the default.

ppp—Point-to-Point Protocol (PPP) (for serial interface).

Default

The default depends on the type of interface. For example, synchronous serial interface defaults to HDLC.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

To use PPP, the router or access server must be configured with an IP routing protocol or with the **ip host-routing** command.

Examples

The following example resets HDLC serial encapsulation on serial interface 1:

```
interface serial 1
 encapsulation hdlc
```

The following example enables PPP encapsulation on serial interface 0:

```
interface serial 0
 encapsulation ppp
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

keepalive
ppp
ppp authentication

ignore-dcd

Use the **ignore-dcd** interface configuration command to configure the serial interface to monitor the DSR signal (instead of the DCD signal) as the line up/down indicator. Use the **no** form of this command to restore the default behavior.

ignore-dcd
no ignore-dcd

Syntax Description

This command has no arguments or keywords.

Default

The serial interface, operating in DTE mode, monitors the DCD signal as the line up/down indicator.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.0.

This command applies to Quad Serial NIM interfaces on the Cisco 4000 series routers and Hitachi-based serial interfaces on the Cisco 2500 and 3000 series routers.

Serial Interfaces in DTE Mode

When the serial interface is operating in DTE mode, it monitors the Data Carrier Detect (DCD) signal as the line up/down indicator. By default, the attached DCE device sends the DCD signal. When the DTE interface detects the DCD signal, it changes the state of the interface to up.

SDLC Multidrop Environments

In some configurations, such as an SDLC multidrop environment, the DCE device sends the Data Set Ready (DSR) signal instead of the DCD signal, which prevents the interface from coming up. Use this command to tell the interface to monitor the DSR signal instead of the DCD signal as the line up/down indicator.

Example

The following example configures serial interface 0 to monitor the DSR signal as the line up/down indicator:

```
interface serial 0
 ignore-dcd
```

invert txclock

Use the **invert txclock** interface configuration command to invert the transmit clock signal. To return to the transmit clock signal to its initial state, use the **no** form of this command.

invert txclock
no invert txclock

Syntax Description

This command has no arguments or keywords.

Default

Transmit clock signal is not inverted.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

This command was modified in Cisco IOS Release 11.3 to change the command from **invert-transmit-clock** to **invert txclock**.

Delays between the SCTE clock and data transmission indicate that the transmit clock signal might not be appropriate for the interface rate and length of cable being used. Different ends of the wire can have variances that differ slightly.The **invert txclock** command compensates for these variances. This command replaces the **invert data** command.

This command applies only to the Cisco 7000 series routers equipped with the Cisco 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI), Cisco 7200 series, and Cisco 7500 series routers.

Systems that use long cables or cables that are not transmitting the TxC signal (transmit echoed clock line, also known as TXCE or SCTE clock) can experience high error rates when operating at the higher transmission speeds. For example, if a PA-8T synchronous serial port adapter is reporting a high number of error packets, a phase shift might be the problem. Inverting the clock might correct this shift.

When a PA-8T or PA-4T+ port adapter interface is DTE, the **invert txclock** command inverts the TxC signal it received from the remote DCE. When the PA-8T or PA-4T+ port adapter interface is DCE, this command changes the signal back to its original phase.

Example

In the following example, the clock signal on serial interface 3/0 is inverted:

```
interface serial 3/0
 invert txclock
```

nrzi-encoding

Use the **nrzi-encoding** interface configuration command to enable nonreturn-to-zero inverted (NRZI) line-coding format. Use the **no** form of this command to disable this capability.

nrzi-encoding
no nrzi-encoding

nrzi-encoding [**mark**] (Cisco 7000 series routers with RSP7000, Cisco 7200 series routers, and Cisco 7500 series routers)

Syntax Description

mark	(Optional) Specifies that NRZI mark encoding is required on the PA-8T and PA-4T+ synchronous serial port adapters on the Cisco 7000 series routers with RSP7000, Cisco 7200 and 7500 series routers. If mark is not specified, NRZI space encoding is used.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

This command was modified in Cisco IOS Release 11.3 to include the **mark** keyword.

All FSIP, PA-8T, and PA-4T+ interface types support nonreturn-to-zero (NRZ) and nonreturn-to-zero inverted (NRZI) format. This is a line-coding format that is required for serial connections in some environments. NRZ encoding is most common. NRZI encoding is used primarily with EIA/TIA-232 connections in IBM environments.

Examples

In the following example, serial interface 1 is configured for NRZI encoding:

```
interface serial 1
 nrzi-encoding
```

In the following example, serial interface 3/1/0 is configured for NRZI mark encoding:

```
interface serial 3/1/0
 nrzi-encoding mark
```

pulse-time

To enable pulsing DTR signal intervals on the serial interfaces, use the **pulse-time** interface configuration command. Use the **no** form of this command to restore the default interval.

pulse-time *seconds*
no pulse-time

Syntax Description

seconds	Integer that specifies the DTR signal interval in seconds.

Default

0 seconds

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

When the serial line protocol goes down (for example, because of loss of synchronization) the interface hardware is reset and the DTR signal is held inactive for at least the specified interval. This function is useful for handling encrypting or other similar devices that use the toggling of the DTR signal to resynchronize.

Example

The following example enables DTR pulse signals for three seconds on serial interface 2:

```
interface serial 2
 pulse-time 3
```

timeslot

To enable framed mode serial interface on a G.703 E1 port adapter on an FSIP, use the **timeslot** interface configuration command. To restore the default, use the **no** form of this command or set the start slot to 0.

timeslot *start-slot* **–** *stop-slot*
no timeslot

Syntax Description

start-slot	The first subframe in the major frame. Range is 1 to 31 and must be less than or equal to *stop-slot*.
stop-slot	The last subframe in the major frame. Range is 1 to 31 and must be greater than or equal to *start-slot*.

Default

A G.703 E1 interface is configured for unframed mode.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.3.

This command applies to a Cisco 4000 router or Cisco 7000 series and Cisco 7500 series router. G.703 E1 interfaces have two modes of operation, framed and unframed. When in framed mode, the range from *start-slot* to *stop-slot* gives the number of 64-kbps slots in use. There are 32 64-kbps slots available.

Example

The following example enables framed mode on a serial interface on a G.703 E1 port adapter:

```
timeslot 1-3
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

ts16

transmit-clock-internal

When a DTE does not return a transmit clock, use the **transmit-clock-internal** interface command to enable the internally generated clock on a serial interface on a Cisco 7000 series, Cisco 7200 series, or Cisco 7500 series. Use the **no** form of this command to disable the feature.

transmit-clock-internal
no transmit-clock-internal

Syntax Description

This command has no keywords or arguments.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

Example

In the following example, the internally generated clock is enabled on serial interface 3/0 on a Cisco 7000 series or Cisco 7200 series router:

```
interface serial 3/0
 transmit-clock-internal
```

transmitter-delay

To specify a minimum dead-time after transmitting a packet, use the **transmitter-delay** interface configuration command. The **no** form of this command restores the default.

transmitter-delay {*delay*}
no transmitter-delay

Syntax Description

delay	On the FSIP, HSSI, and on the IGS router, the minimum number of HDLC flags to be sent between successive packets. On all other serial interfaces and routers, approximate number of microseconds of minimum delay after transmitting a packet. The valid range is 0 to 131071.

Default

0 flags or microseconds

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

This command is especially useful for serial interfaces that can send back-to-back data packets over serial interfaces faster than some hosts can receive them.

The transmitter delay feature is implemented for the following Token Ring cards: CSC-R16, CSC-R16M, CSC-1R, CSC-2R, and CSC-CTR. For the first four cards, the command syntax is the same as the existing command and specifies the number of milliseconds to delay between sending frames that are generated by the router. Transmitter delay for the CSC-CTR uses the same syntax, but specifies a relative time interval to delay between transmission of all frames.

Example

The following example specifies a delay of 300 microseconds on serial interface 0:

```
interface serial 0
 transmitter-delay 300
```

ts16

To control the use of time slot 16 for data on a G.703 E1 interface, use the **ts16** interface configuration command. To restore the default, use the **no** form of this command.

ts16
no ts16

Syntax Description

This command has no arguments or keywords.

Default

Time slot 16 is used for signaling.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.3.

This command applies to a Cisco 4000 router or Cisco 7000 series and Cisco 7500 series router. By default, time slot 16 is used for signaling. Use this command to configure time slot 16 to be used for data. When in framed mode, in order to get all possible subframes or timeslots, you must use the **ts16** command.

Example

The following example configures time slot 16 to be used for data on a G.703 E1 interface:

```
ts16
```

Related Commands

You can use the master indexes or search online to find documentation of related commands.

timeslot