

Synchronous Serial Port Adapters

Description

The synchronous serial port adapters (PA-8T-V35, PA-8T-X21, PA-8T-232, and PA-4T+) are available on Cisco 7200 series routers, on second-generation Versatile Interface Processors (VIP2s) in Cisco 7500 series routers, and on Cisco 7000 series routers with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI).

The PA-8T-V35, PA-8T-X21, PA-8T-232 port adapters provide up to eight synchronous serial interfaces and the PA-4T+ provides up to four synchronous serial interfaces. Each port on the PA-4T+ supports any of the available interface types: Electronics Industries Association/Telecommunications Industries Association (EIA/TIA)-232, EIA/TIA-449, V.35, X.21, and EIA-530.

These interfaces support full-duplex operation at T1 (1.544 Mbps) and E1 (2.048 Mbps) speeds.

Platforms

This feature is supported on these platforms:

- Cisco 7200 series
- Cisco 7500 series
- Cisco 7000 series with the RSP7000 and RSP7000C

Configuration Tasks

For information on how to configure the PA-8T and PA-4T+ synchronous serial port adapters, refer to the “Configure a Synchronous Serial Interface” section in the “Configuring Interfaces” chapter of the *Configuration Fundamentals Configuration Guide*.

In addition to the commands in the “Configure a Synchronous Serial Interface” chapter, the **invert data** and **invert txclock** interface commands can be used to configure the PA-8T and PA-4T+ port adapters. Also, the **nrzi-encoding** interface command was modified to allow mark encoding.

For information on other commands that can be used by the PA-8T and PA-4T+ synchronous serial port adapters, refer to the Cisco IOS Release 11.2 configuration guides.

Invert the Data

If the interface on the PA-8T and PA-4T+ synchronous serial port adapters is used to drive a dedicated T1 line that does not have B8ZS encoding, you must invert the data stream on the connecting CSU/DSU or on the interface. Be careful not to invert data on both the CSU/DSU and the interface as two data inversions will cancel each other out.

If the T1 channel on the CT3IP is using AMI line coding, you must invert the data. For more information, see the **t1 linecode** controller command. For more information on the CT3IP, refer to the “Channelized T3 Interface Processor (CT3IP)” chapter in the Feature Guide.

To invert the data stream, complete the following task in interface configuration mode:

Task	Command
Invert the data on an interface.	invert data

Invert the Transmit Clock Signal

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 the interface on the PA-8T and PA-4T+ synchronous serial port adapters is reporting a high number of error packets, a phase shift might be the problem. Inverting the clock signal can correct this shift. To invert the clock signal, complete the following task in interface configuration mode:

Task	Command
Invert the clock signal on an interface.	invert txclock

Use the NRZI Line-Coding Format

All Fast Serial Interface Processor (FSIP) interface types on the Cisco 7000 and the PA-8T and PA-4T+ synchronous serial port adapters on the Cisco 7000 series routers with RSP7000, Cisco 7200 series routers, and Cisco 7500 series routers 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.

The default configuration for all serial interfaces is NRZ format. The default is **no nrzi-encoding**.

To enable NRZI format, complete the following task in interface configuration mode:

Task	Command
Enable NRZI encoding format.	nrzi-encoding or nrzi-encoding [mark] (Cisco 7000 series routers with RSP7000, Cisco 7200 series routers, and Cisco 7500 series routers)

Configuration Examples

The following example inverts data on serial interface 3/1/0:

```
router(config)# interface serial 3/1/0
router(config-if)# invert data
router(config-if)# exit
router(config)#
```

The following example inverts the clock signal on serial interface 3/0:

```
router(config)# interface serial 3/0
router(config-if)# invert txclock
router(config-if)# exit
router(config)#
```

The following example, specifies NRZI mark encoding for serial interface 4/0/2:

```
router(config)# interface serial 4/0/2
router(config-if)# nrzi-encoding mark
router(config-if)# exit
router(config)#
```

Command Reference

This section documents new or modified commands. All other commands used with this feature are documented in the Cisco IOS Release 11.2 command references.

- **invert data**
- **invert txclock**
- **nrzi-encoding**

invert data

To invert the data stream, use the **invert data** interface configuration command. This command applies only to the Cisco 7000 series routers with RSP7000, Cisco 7200 series routers, and Cisco 7500 series routers. Use the **no** form of this command to disable this feature.

invert data
no invert data

Syntax Description

This command has no arguments or keywords.

Default

Data is not inverted.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2 P and 11.1 CA.

If the interface on the PA-8T and PA-4T+ synchronous serial port adapters is used to drive a dedicated T1 line that does not have B8ZS encoding (a method to avoid 15 zeros), the data stream must be inverted (both TXD and RXD) either in the connecting CSU/DSU or the interface.

By inverting the HDLC data stream, the HDLC zero insertion algorithm becomes a ones insertion algorithm that satisfies the T1 requirements. Be careful not to invert data both on the interface and on the CSU/DSU as two data inversions will cancel each other out.

If the interface on the CT3IP uses AMI line coding, you must also invert the data on the T1 channel. For more information, see the **t1 linecode** controller configuration command.

Example

The following example inverts data on serial interface 3/1/0:

```
interface serial 3/1/0
  invert data
```

Related Command

t1 linecode

invert txclock

To invert the transmit clock signal, use the **invert txclock** interface configuration command. This command applies only to the Cisco 7000 series routers with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI), Cisco 7200 series, and Cisco 7500 series routers. 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 11.2 P and 11.1 CA to change the command from **invert-transmit-clock** to **invert txclock**.

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

To enable nonreturn-to-zero inverted (NRZI) line-coding format, use the **nrzi-encoding** interface configuration command. 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 series routers, and Cisco 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 11.2 P and 11.1 CA 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
```

What to Do Next

For more information on the these port adapters, refer to the following publications:

- *PA-8T-V35 Synchronous Serial Port Adapter Installation and Configuration*
- *PA-8T-X21 Synchronous Serial Port Adapter Installation and Configuration*
- *PA-8T-232 Synchronous Serial Port Adapter Installation and Configuration*
- *PA-4T+ Synchronous Serial Port Adapter Installation and Configuration*

