

# Configuring HSSIs

# 7

Use the procedures described in this chapter to configure high-speed serial interfaces (HSSIs).

Topic	Page
Overview	7-1
Numbering Scheme	7-2
Before You Configure an Interface	7-3
Configuration Tasks	7-4
Monitoring Interfaces	7-8

## Overview

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HSSIs support high-speed WAN switching services such as Frame Relay and SMDS (SMDS trunk encapsulation). For example, a HSSI in the ERX system can connect to an SMDS switch in a service provider's network (see *Chapter 20, Configuring SMDS*).

The HSSI protocol is based on data communication equipment (DCE) and data terminal equipment (DTE) technology. You can configure a HSSI on the ERX system to act as data communication equipment (DCE) or data terminal equipment (DTE). The DCE on a HSSI connection controls the clock by changing its speed or deleting clock pulses. The flexibility of the HSSI clock and signaling technique allow the allocation of bandwidth to different devices in a network.

### *ERX Models*

The ERX-700 series and the ERX-1410 system support the HSSI line module and I/O module. The ERX-1440 system does not support the HSSI line module and I/O module.

### *Features*

The HSSI line module and I/O module support the following:

- DCE and DTE operation
- Maximum data rate of 44.736 Mbps
- Up to three HSSI lines

### *Interface Stack*

The HSSI stack comprises an HDLC layer. You can configure other protocols over this HDLC. See *Higher-Level Protocols* later in this chapter for a list of the protocols that HSSIs support.

### *Higher-Level Protocols*

See the *Release Notes* for information about the higher-level protocols that HSSI interfaces support.

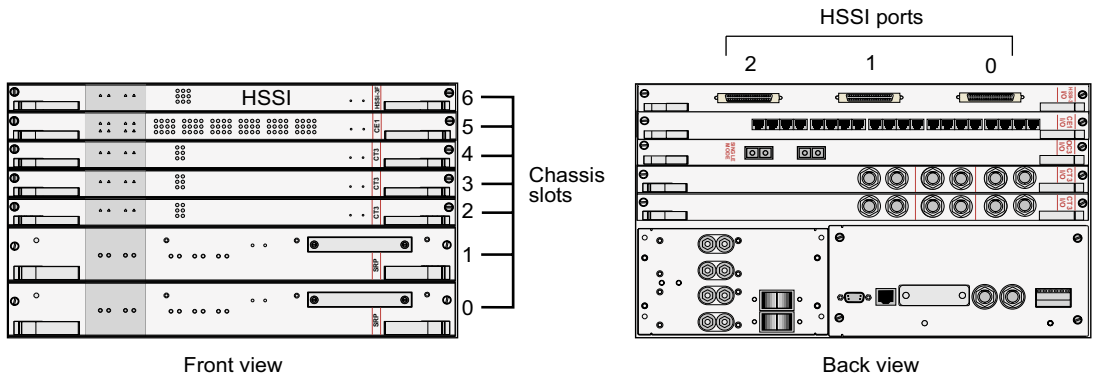
## Numbering Scheme

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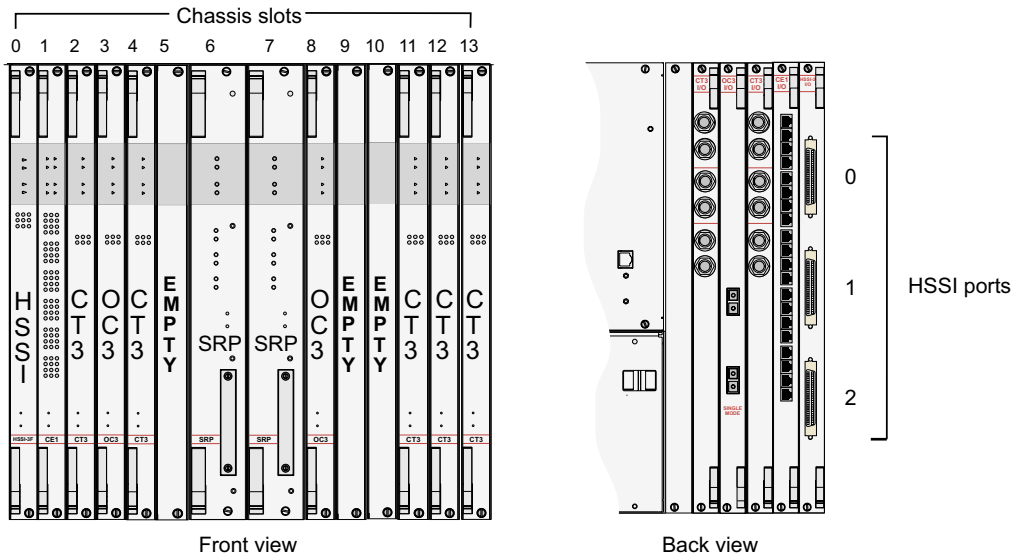
A HSSI I/O module contains three ports. Interfaces are numbered using *slot/port* format, where:

- *slot* – number of the slot in which the line module resides in the chassis. In the ERX-700 series, line module slots are numbered 2-6 (slots 0 and 1 are reserved for SRP modules). In an ERX-1410 system, line module slots are numbered 0-5 and 8-13 (slots 6 and 7 are reserved for SRP modules).
- *port* – number of the port on the I/O module

See Figure 7-1 and Figure 7-2.



**Figure 7-1** HSSI-3F line modules and HSSI-3 I/O modules in the ERX-700 series



**Figure 7-2** HSSI-3F line modules and HSSI-3 I/O modules in the ERX-1410 system

## Before You Configure an Interface

Before you configure a HSSI, verify the following:

- You have installed the line module and the I/O module correctly.
- Each configured line can transmit data to and receive data from your switch connections.

For more information on preconfiguration and hardware diagnostic procedures, see the *ERX Installation and User Guide*.

You should also have the following information available:

- The type of cyclic redundancy check (CRC) required for the HDLC channel.
- The maximum receive unit (MRU) and maximum transmission unit (MTU) required.

## Configuration Tasks

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When you install a HSSI line module in the system, the interfaces are automatically enabled as DTE with default parameters. You can accept these default parameters or customize them for your application.

If you want the interface to operate as DCE, you must enable the DCE internal clock. By default, the maximum clock rate for DCE is 44.736 MHz, the T3 line rate. You can change the maximum clock rate to 34.368 MHz, the E3 line rate. The actual data rate depends on the external data service unit (DSU) and the type of service connected to the interface.

### *Configuring DTE*

To configure a HSSI as DTE, follow these steps:

- 1 Select the HSSI.
- 2 (Optional) Specify the cyclic redundancy check.
- 3 (Optional) Enable data rate inversion.
- 4 (Optional) Specify the time interval at which the system calculates bit and packet rate counters.
- 5 (Optional) Specify the MRU.
- 6 (Optional) Specify the MTU.
- 7 (Optional) Enable or disable SNMP link status processing.
- 8 (Optional) Enable the interface to send DTE acknowledge signals for compatibility with other vendors' software.

### Configuring DCE

To configure a HSSI as DCE, follow these steps:

- 1 Select the HSSI.
- 2 Enable the internal clock for DCE operation.
- 3 (Optional) Set the rate of the internal clock for DCE operation.
- 4 Follow steps 2–7 in *Configuring DTE* above to configure optional parameters.

### Disabling a HSSI

To disable a HSSI, follow these steps.

- 1 Select the HSSI.
- 2 Disable the HSSI.

### HSSI Commands

Use the following commands for HSSI configuration.

#### **clock rate**

- Use to set the rate of the internal clock in MHz.
- Specify a rate of 34 (34.368 MHz) or 44 (44.736 MHz).
- Example  

```
host1(config-if)#clock rate 34
```
- Use the **no** version to restore the default, 44.736 MHz.

#### **crc**

- Use to configure the size of the CRC.
- The CRC is an error-checking technique that uses a calculated numeric value to detect errors in transmitted data.
- Specify the size of the CRC in bits (16 or 32). Both the sender and receiver must use the same setting.
- Use a 32-bit CRC to protect longer streams at faster rates and, therefore, provide better ongoing error detection.
- Example  

```
host1(config-if)#crc 32
```
- Use the **no** version to restore the default, 16 bits per frame.

### ***hssi force-dte-acknowledge***

- Use to provide compatibility with DCE devices that wait for the DTE side to set the acknowledge bit first. Issue this command if the HSSI is configured as DTE, if both sides of the connection are correctly configured, and the link does not come up.
- By default, when the HSSI is configured as DTE, it will set the acknowledge bit only when it detects a valid clock and acknowledge bit from the DCE.
- Example

```
host1(config-if)#hssi force-dte-acknowledge
```
- Use the **no** version to prevent the HSSI from sending acknowledgment signals when in DTE mode.

### ***hssi internal-clock***

- Use to enable the internal clock for DCE mode.
- Example

```
host1(config-if)#hssi internal-clock
```
- Use the **no** version to disable the internal clock for DCE mode.

### ***interface hssi***

- Use to select a HSSI.
- Example

```
host1(config)#interface hssi 3/1
```
- Use the **no** version to clear the configuration on a HSSI.

### ***invert data***

- Use to enable data stream inversion for the interface.
- Enable data stream inversion only if it is turned on at the other end of the line.
- Example

```
host1(config-if)#invert data
```
- Use the **no** version to disable the feature.

### ***load-interval***

- Use to set the time interval at which the system calculates bit and packet rate counters.
- Specify a multiple of 30 seconds in the range 30–300 seconds.
- Example

```
host1(config-if)#load-interval 100
```
- Use the **no** version to restore the default, 300 seconds.

***mrp***

- Use to configure the MRU size for the interface.
- Coordinate this value with the network administrator for the device on the other end of the line.
- Specify a value in the range 4–32768 bytes.
- If you set the MRU for another protocol, such as IP, the system uses the lower value. This inconsistency could produce unexpected behavior in your network.
- Example

```
host1(config-if)#mrp 1600
```
- Use the **no** version to restore the default, 4770 bytes.

***mtu***

- Use to configure the MTU size for the interface.
- Coordinate this value with the network administrator for the device on the other end of the line.
- Specify a value in the range 4–32768 bytes.
- If you set the MTU for another protocol, such as IP, the system uses the lower value. This inconsistency could produce unexpected behavior in your network.
- Example

```
host1(config-if)#mtu 1500
```
- Use the **no** version to restore the default, 4770 bytes.

***shutdown***

- Use to disable a HSSI.
- HSSIs are enabled by default.
- Example

```
host1(config-if)#shutdown
```
- Use the **no** version to restart a disabled interface.

***snmp trap link-status***

- Use to enable SNMP link status processing for a HSSI.
- By default, SNMP link status processing is disabled.
- Example

```
host1(config-if)#snmp trap link-status
```
- Use the **no** version to disable SNMP link status processing for a HSSI.

### Configuration Examples

The following examples show how to configure a HSSI as either a DTE or DCE.

**Example 1** This example shows how to use the HSSI as a DTE, with a 32-bit CRC, an MTU of 1200 bytes, and SNMP trap link-status processing.

```
host1(config)#interface hssi 3/0
host1(config-if)#crc 32
host1(config-if)#mtu 1200
host1(config-if)#snmp trap link-status
```

**Example 2** This example shows how to configure a HSSI as a DCE, with a maximum line rate of 34.368 MHz, a 32-bit CRC, an MTU of 1200 bytes, and SNMP trap link-status processing.

```
host1(config)#interface hssi 3/0
host1(config-if)#hssi internal-clock
host1(config-if)#clock rate 34
host1(config-if)#crc 32
host1(config-if)#mtu 1200
host1(config-if)#snmp trap link-status
```

**Example 3** This example shows how to disable a HSSI.

```
host1(config)#interface hssi 3/0
host1(config-if)#shutdown
```

### Monitoring Interfaces

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You can monitor HSSIs using the **show interfaces hssi** command.

#### **show interfaces hssi**

- Use to display settings and statistics for a HSSI.
- Field descriptions
  - › HSSI – location of a HSSI in slot/port format
  - › ifOperStatus – physical status of the interface
    - ifOperUp – interface is functioning
    - ifOperTesting – interface is being tested
    - ifOperNotPresent – module has been removed from the chassis
    - ifOperDown – interface is not functioning
  - › snmp trap link-status – enabled or disabled
  - › Crc type checking – size of the CRC
  - › Hdlc mru – current size of the MRU
  - › Hdlc mtu – current size of the MTU

- › Hdlc interface speed – for DTE, the display reads [line clock recovery] to indicate that the DCE at the other end of the line controls the line speed; for DCE, the current line speed of the interface in bps
- › Invert data disabled – status of the data inversion feature
- › Hssi clock mode – type of clock that this connection uses: line (DTE) or internal (DCE)
- › Hssi clock rate – rate of the HSSI in DCE mode. In DTE mode, this rate shows the clock rate that the interface would have in DCE mode.
- › 5 minute input rate – data rates based on the traffic received in the last five minutes
- › 5 minute output rate – data rates based on the traffic transmitted in the last five minutes
- › Interface statistics
  - Packets received – number of packets received on the interface
  - Bytes received – number of bytes received on the interface
  - Errored packets received – number of packets with errors received on the interface
  - Packets sent – number of packets sent on the interface
  - Bytes sent – number of bytes sent on the interface
  - Errored packets sent – number of packets with errors sent from the interface
- Example 1: In this example, the HSSI is configured as DTE.

```
RX-10-03-80#show interfaces hssi 2/0
Hssi Interface at 2/0
ifOperStatus = ifOperUp
snmp trap link-status = disabled
Crc type checking - CRC16
Hdlc mru = 1600
Hdlc mtu = 1600
Hdlc interface speed = [line clock recovery]
Invert data disabled
Hssi clock mode = line
Hssi clock rate = 44.736 Mhz
Hssi force DTE acknowledge = disabled
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
```

```
Interface statistics
Packets received          0
Bytes received            0
Errored packets received  0
Packets sent              0
Bytes send                 0
Errored packets sent      0
```

- Example 2: In this example, the HSSI is configured as DCE.

```
RX-10-03-80#show interfaces hssi 2/1
Hssi Interface at 2/1
ifOperStatus = ifOperUp
snmp trap link-status = disabled
Crc type checking - CRC16
Hdlc mru = 1600
Hdlc mtu = 1600
Hdlc interface speed = 44736000
Invert data disabled
Hssi clock mode = internal
Hssi clock rate = 44.736 Mhz
Hssi force DTE acknowledge = disabled
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec

Interface statistics
Packets received          0
Bytes received            0
Errored packets received  0
Packets sent              0
Bytes send                0
Errored packets sent      0
```