Chapter 14
Configuring Cisco HDLC

Cisco High-Level Data Link Control (HDLC) is an encapsulation protocol that governs information transfer. This chapter describes how to configure Cisco HDLC on E-series routers.

This chapter contains the following sections:

Overview

Cisco HDLC is a bit-oriented synchronous data-link layer protocol developed by the International Organization for Standardization (ISO). It specifies a data encapsulation method on synchronous serial links using frame characters and checksums.

By default, synchronous serial lines use the HDLC serial encapsulation method, which provides the synchronous framing-detection and error-detection functions of HDLC without windowing or retransmission.

Cisco HDLC monitors line status on a serial interface by exchanging keepalive request messages with peer network devices. It also enables routers to discover IP addresses of neighbors by exchanging Serial Line Address Resolution Protocol (SLARP) address-request and address-response messages with peer network devices.

The router responds to a SLARP address-request message from a remote peer with a SLARP address-response message, which indicates that it cannot participate in a SLARP session.

Cisco HDLC is compatible with Cisco Systems Cisco-HDLC protocol, the default protocol for all Cisco serial interfaces.

Framing

The router supports the following framing features:

- HDLC for data-link framing
- 18,000-byte information field size

Error Frames

All Cisco HDLC error frames are discarded.

SLARP Keepalive

One feature of Cisco HDLC is the exchange of keepalive messages. A keepalive message is a signal from one endpoint to the other that the first endpoint is still active. Keepalives are used to identify inactive or failed connections.

Platform Considerations

You can configure Cisco HDLC on the following E-series routers:

- E120 router
- E320 router
- ERX-1440 router
- ERX-1410 router
- ERX-710 router
- ERX-705 router
- ERX-310 router

Module Requirements

For information about the modules that support Cisco HDLC on ERX-14xx models, ERX-7xx models, and the ERX-310 router:

- See *ERX Module Guide, Table 1, Module Combinations* for detailed module specifications.
- See *ERX Module Guide, Appendix A, Module Protocol Support* for information about the modules that support Cisco HDLC.

For information about the modules that support Cisco HDLC on the E120 router and the E320 router:

- See *E120 and E320 Module Guide, Table 1, Modules and IOAs* for detailed module specifications.
- See *E120 and E320 Module Guide, Appendix A, IOA Protocol Support* for information about the modules that support Cisco HDLC.

Interface Specifiers

The configuration task examples in this chapter use the *slot*/*port* format to specify the physical interface on which you configure Cisco HDLC. However, the interface specifier format that you use depends on the router that you are using.

For ERX-7xx models, ERX-14xx models, and ERX-310 routers, use the *slot*/*port* format. For example, the following command specifies a POS interface on slot 0, port 1 of an ERX-7xx model, ERX-14xx model, or ERX-310 router.

```
host1(config)#interface pos 0/1
```

For E120 and E320 routers, use the *slot*/*adapter*/*port* format, which includes an identifier for the bay in which the I/O adapter (IOA) resides. In the software, adapter 0 identifies the right IOA bay (E120 router) and the upper IOA bay (E320 router); adapter 1 identifies the left IOA bay (E120 router) and the lower IOA bay (E320 router). For example, the following command specifies a POS interface on slot 5, adapter 0, port 0 of an E320 router.

```
host1(config)#interface pos 5/0/0
```

For more information about supported interface types and specifiers on E-series routers, see *Interface Types and Specifiers* in *JUNOSe Command Reference Guide, About This Guide*.

Before You Configure Cisco HDLC

Before you configure a Cisco HDLC interface, you need to configure the physical interface over which Cisco HDLC traffic flows, described in the following chapters:

- *JUNOSe Physical Layer Configuration Guide, Chapter 1, Configuring Channelized T3 Interfaces*
- *JUNOSe Physical Layer Configuration Guide, Chapter 2, Configuring T3 and E3 Interfaces*

The procedures described in this chapter assume that a physical interface has been configured.

Configuration Tasks

To configure a Cisco HDLC interface:

1. Configure the physical interface on which you want to configure Cisco HDLC.

   host1(config)#**interface serial 3/1:2/1**

2. Select Cisco HDLC as the encapsulation method for the interface.

   host1(config-if)#**encapsulation hdlc**

3. Assign a local IP address to the interface.

   host1(config-subif)#**ip address 192.32.10.2 255.255.255.0**

4. (Optional) Use the appropriate **show hdlc interface** command to verify that the configuration changes are correct.

encapsulation hdlc

- Use to specify Cisco HDLC as the encapsulation method for the interface.
- Example

  host1(config-if)#**encapsulation hdlc**

- Use the **no** version to disable Cisco HDLC on the interface.

interface serial

- Use to configure a serial interface in the appropriate format by selecting a previously configured physical interface on which you want to configure Cisco HDLC. For example, to specify a channelized T3 interface, use the format *slot/port:channel/subchannel.subinterface*.
  - *slot*—Router chassis slot
  - *port*—Port on CT3, T3, or E3 I/O module
  - *channel*—T1 (DS1) channel
  - *subchannel*—Set of DS0 subchannels. For information about T1 subchannels, see *Fractional T1* in *JUNOSe Physical Layer Configuration Guide, Chapter 1, Configuring Channelized T3 Interfaces*.
  - *subinterface*—User-assigned number that identifies a subinterface
- Example

  host1(config)#**interface serial 3/1:2/1**

- Use the **no** version to remove the interface or subinterface.

ip address

- Use to assign an IP address and subnet mask to the interface.
- Example

  host1(config-subif)#**ip address 192.32.10.2 255.255.255.0**

- Use the **no** version to remove the IP address of the interface.

Optional Tasks

The following tasks are optional.

1. Configure the SLARP keepalive interval.

   host1(config-if)#**hdlc keepalive 10**

2. Enable loopback detection on an interface.

   host1(config-if)#**hdlc down-when-looped**

3. Disable an interface.

   host1(config-if)#**hdlc shutdown**

hdlc down-when-looped

- Use to enable loopback detection on a Cisco HDLC interface.
- By default, loopback detection is disabled.
- Example

  host1(config-if)#**hdlc down-when-looped**

- Use the **no** version to disable loopback detection on a Cisco HDLC interface.

hdlc keepalive

- Use to specify the keepalive timeout value.
- When the keepalive timer expires, the interface increments its own counter; then it compares the value of this counter with the last value received from a peer. If the difference between the values of the two counters is greater than three, the Cisco HDLC interface is declared down. After that, the interface sends a keepalive message containing the value of its counter and the last received value of the peer's counter.
- The router stores the values received in keepalive messages from a peer interface. If the interface is down, the router compares the received value of its own counter with the value from the peer. If the difference between the values of the two counters is less than four, the router declares the interface to be up. Both sides have to configure the same value for the keepalive interval.
- If the keepalive interval is 10 seconds, then a failed link is detected between 30 and 40 seconds after failure.
- The range is 0–6553 seconds. A value of 0 turns keepalive off.
- The default is 10 seconds.

- Example

  host1(config-if)#**hdlc keepalive 10**

- Use the **no** version to turn off the keepalive feature.

hdlc shutdown

- Use to terminate a Cisco HDLC session.
- This command administratively disables the interface.
- Example

  host1(config-if)#**hdlc shutdown**

- Use the **no** version to restart a disabled session. The default for each **hdlc shutdown** command is the **no** version.

Configuration Example

This example shows how to configure Cisco HDLC over an unchannelized DS3 interface on a cOCx/STMx line module. The example shows the complete configuration procedure, from configuring the SONET interface to assigning an IP address to the Cisco HDLC interface.

1. Create or select a virtual router, vr1.

   host1(config)#**virtual-router vr1**

2. Configure SONET controller, slot 13, port 0.

   host1:vr1(config)#**controller sonet 13/0**

3. Set the SONET clock source to internal.

   host1:vr1(config-controll)#**clock source internal module**

4. Create an OC1 path.

   host1:vr1(config-controll)#**path 1 oc1 1**

5. Create an unchannelized DS3 interface.

   host1:vr1(config-controll)#**path 1 ds3 1 unchannelized**

6. Set the DS3 interface clock source to internal.

   host1:vr1(config-controll)#**path 1 ds3 1 clock source internal module**

7. Exit Controller Configuration mode.

   host1:vr1(config-controll)#**exit**

8. Create or select a serial interface over the DS3 interface.

   host1:vr1(config)#**interface serial 13/0:1/1**

9. Set the encapsulation to Cisco HDLC.

   host1:vr1(config-if)#**encapsulation hdlc**

10. Enable loopback detection on the interface.

    host1:vr1(config-if)#**hdlc down-when-looped**

11. Assign an IP address to the interface.

    host1:vr1(config-if)#**ip address 160.1.0.1 255.255.255.0**

Monitoring Cisco HDLC

You can monitor Cisco HDLC interfaces using the **show hdlc interface** command.

You can set a statistics baseline for Cisco HDLC interfaces, subinterfaces, or circuits using the **baseline hdlc interface serial** command.

You can use the filtering feature of the **show** command to include or exclude lines of output based on a text string you specify. For details, see *show Commands* in *JUNOSe System Basics Configuration Guide, Chapter 2, Command-Line Interface*.

NOTE: The E120 router and E320 router output for **monitor** and **show** commands is identical to output from other E-series routers, except that the E120 and E320 router output also includes information about the adapter identifier in the interface specifier (*slot/adapter/port*).

baseline hdlc interface

- Use to set a statistics baseline for Cisco HDLC interfaces. The router implements the baseline by reading and storing the statistics at the time the baseline is set and then subtracting this baseline whenever baseline-relative statistics are retrieved.
- Example

  host1#**baseline hdlc interface serial 2/0:1/1**

- There is no **no** version.

show hdlc interface

- Use to display statistics for the specified HDLC interfaces.
- You can specify the following keywords:
  - **statistics**—Displays interface statistics
  - **delta**—Specifies that baselined statistics are to be shown
  - **status**—Displays the operational status of all configured interfaces
  - **closed**—Displays interfaces with administrative status Closed
  - **config**—Displays configuration information

- **down**—Displays interfaces with operational status Down
- **lower-layer-down**—Displays interfaces with operational status LowerLayerDown
- **not-present**—Displays interfaces with operational status NotPresent
- **open**—Displays interfaces with administrative status Open
- **up**—Displays interfaces with operational status Up
- **full**—Displays configuration information, status, and statistics
- **filter**—Specifies a CLI output filter

- Field descriptions
  - interface status—State of the interface:
    - Up—Traffic can flow on the interface
    - Down—Traffic cannot flow because of a problem in the interface at the current protocol layer
    - LowerLayerDown—Traffic cannot flow because of a problem in an interface at a lower protocol layer
    - NotPresent—Traffic cannot flow because hardware is unavailable
  - Interface administrative status—Configured state of the interface:
    - Open—**no hdlc shutdown** command is operative
    - Closed—**hdlc shutdown** command is operative
  - Interface maximum-transmission-unit—Configured MTU size
  - Interface keepalive time—Configured keepalive interval value
  - Interface loop detection—Status of loopback detection: enabled, disabled
  - Interface statistics:
    - packets in—Number of inbound packets received on the interface
    - packets out—Number of outbound packets transmitted on the interface
    - octets in—Number of inbound octets received on the interface
    - octets out—Number of outbound octets transmitted on the interface
    - errors in—Number of inbound errors received on the interface
    - errors out—Number of outbound errors transmitted on the interface
    - discards in—Number of inbound packets discarded on the interface
    - discards out—Number of outbound packets discarded on the interface

- Example 1

```
host1#show hdlc interface serial 5/1:5/1
Cisco-HDLC interface serial 5/1:5/1 is LowerLayerDown
```

- Example 2

```
host1#show hdlc interface full
Cisco-HDLC interface serial 4/0:2 is Up
Interface administrative status is open
Interface maximum-transmission-unit is 1596
Interface keepalive time is 10 seconds
Interface loop detection is disabled
Interface statistics              in                  out
   packets                        0                   0
   octets                         242                 242
   errors                         0                   0
   discards                       0                   0
Cisco-HDLC interface serial 5/0:1/1 is NotPresent
2 Cisco-HDLC interfaces found
```