# Configuring Cisco G.SHDSL EFM HWICs in Cisco Routers

This document describes how to configure Cisco G.SHDSL Ethernet first mile (EFM) high-speed WAN interface cards (HWICs). Cisco G.SHDSL EFM HWICs connect Cisco integrated services routers (ISR) with central office digital subscriber line access multiplexers (DSLAMs) and provide as many as four lines of G.SHDSL (ITU-T 991.2) connectivity.

### 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.

# Contents

# Prerequisites for Cisco G.SHDSL EFM HWICs

- Ensure that you have the appropriate Cisco router to serve as the host router.
  The following Cisco routers support Cisco G.SHDSL EFM HWICs:
    - Cisco 1841 Integrated Series Routers (ISR)
    - Cisco 1861 ISR
    - Cisco 1941 ISR
    - Cisco 1941W ISR
    - Cisco 2801 ISR
    - Cisco 2821 ISR
    - Cisco 2851 ISR
    - Cisco 2901 ISR
    - Cisco 2911 ISR
    - Cisco 2921 ISR
    - Cisco 2951 ISR
    - Cisco 3845 ISR
    - Cisco 3845 NOVPN ISR
    - Cisco 3925 ISR
    - Cisco 3945 ISR

- Use the **show version** command to ensure that the router is running Cisco IOS Release 15.1(1)T or a later release.

> **Note** When minimum release requirements are met, you can change images on the router without affecting performance.

- Install the Cisco G.SHDSL EFM HWIC on the router, using the directions provided in *Cisco Interface Cards Hardware Installation Guide* and *Cisco Network Modules and Interface Cards Regulatory Compliance and Safety Information*.

# Information About Cisco G.SHDSL EFM HWICs

Cisco G.SHDSL EFM HWICs support up to four pairs of digital subscriber lines (DSL). The four DSL pairs are bundled in groups and configured in the Cisco IOS command-line interface (CLI) by using the **dsl-group** command.

See the "Command Reference" section on page 26 for more information about commands used with Cisco G.SHDSL EFM HWICs.

# Cisco G.SHDSL EFM HWICs

The Cisco HWIC-G.SHDSL EFM provides four lines of connectivity through one *RJ-45* connector.

Figure 1 shows the Cisco G.SHDSL EFM HWIC.

***Figure 1***         ***Cisco HWIC-4SHDSL-E Faceplate***
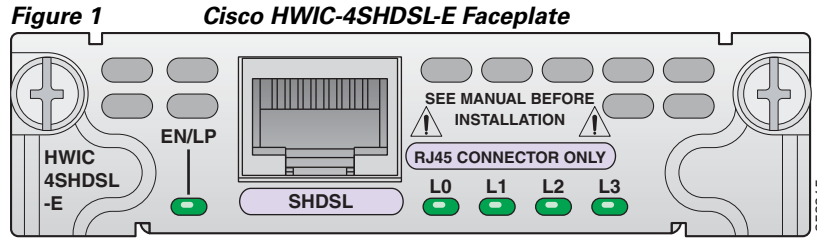


**Note**    The Cisco HWIC-4SHDSL-E provides support for the Dying Gasp feature. The term dying gasp refers to power status as defined in ITU-T standard G.991.2, section 7.1.2.5.3.

| | |
|---|---|
| **EN/LP** | Status of the system: |
| | Green—Operating system is running. |
| | Amber—Loopback mode. |
| **L0, L1, L2, L3** | Status of link: |
| | Green on—Link is active. |
| | Off—Link is inactive or not configured. |
| | Amber—Link alarm |
| | Blinking green—Link is training. |
| | Amber and green blinking simultaneously—Loopback mode. EN/LP is also amber. |

## What to do next

See the"Connecting Cisco G.SHDSL EFM HWICs to the Network" section on page 3 for cable information.

# Connecting Cisco G.SHDSL EFM HWICs to the Network

Connect Cisco G.SHDSL EFM HWICs through a standard *RJ-45* straight-through cable to establish connection between the HWIC and a network device.

Figure 2 shows the *RJ-45* pin assignment. Table 1 identifies the *RJ-45* signal assignment by pin.

**Caution**    Inserting an *RJ-11* connector into the Cisco HWIC-4SHDSL-E port may deform pins 1 and 8, which may prevent solid contact between the connector and the plug in subsequent connections. If solid contact is prevented, line -1 tip and line -3 ring do not work properly.

*Figure 2*        *RJ-45 Pin Assignment*
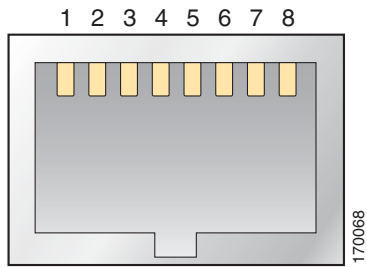


*Table 1*        *RJ-45 Signal Assignment by Pin*

| Pin | Signal |
|-----|--------|
| 1 | Line 1 tip |
| 2 | Line 1 ring |
| 3 | Line 2 tip |
| 4 | Line 0 tip |
| 5 | Line 0 ring |
| 6 | Line 2 ring |
| 7 | Line 3 tip |
| 8 | Line 3 ring |

**Note**    Do not plug in RJ-11 cable into HWIC-SHDSL-E because it may damage the pins on the RJ-45 connector

To connect the Cisco HWIC-4SHDSL-E with a DSLAM that supports two or four *RJ-11* connections, modify the standard *RJ-45* cable, using one of the following diagrams as applicable:

- Figure 3 shows how to modify the cable and connect the Cisco HWIC-4SHDSL-E with a DSLAM that supports four *RJ-11* cable connections.

- Figure 4 shows how to modify the cable and connect the Cisco HWIC-4SHDSL-E with a DSLAM that supports two *RJ-11* cable connections.

*Figure 3*        *Standard RJ-45 Connector to Four Standard RJ-11 Connectors*
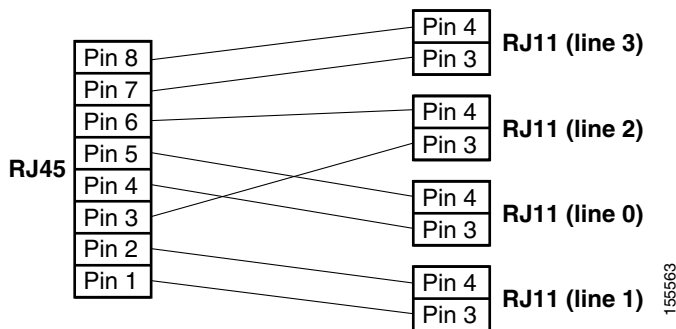
*Figure 4*          *Standard RJ-45 Connector to Two Standard RJ-11 Connectors*
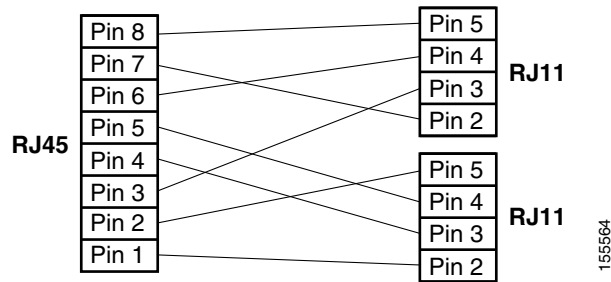


## What to Do Next

See the "Configuring Cisco G.SHDSL EFM HWICs" section on page 5 for information about configuring DSL groups.

# Configuring Cisco G.SHDSL EFM HWICs

Configure DSL groups on the Cisco G.SHDSL EFM HWIC using the Cisco IOS CLI on the router in privileged configuration mode.

- Configuring EFM-Bonding Groups, page 5
- Configuring 1-pair Groups, page 6
- Configuring the G.SHDSL Service on a Cisco Router, page 8

## Configuring EFM-Bonding Groups

Use the Cisco IOS CLI on the router in global configuration mode to configure an EFM-Bonding group on the Cisco HWIC-4SHDSL-E.

**Note**    To ensure a successful efm-bonding group configuration, confirm that the central office (CO) network equipment that is connected with the Cisco HWIC-4SHDSL-E supports efm-bonding.

**SUMMARY STEPS**

1. **controller shdsl** *slot number / slot number / 0*
2. **dsl-group** *number* **pairs** *link* [**efm-bond**]
3. **shdsl annex** {**standard**}
4. **shdsl rate** {*number* | **auto**}
5. **exit**
6. **exit**

**DETAILED STEPS**

| | Command | Purpose |
|---|---|---|
| Step 1 | **controller shdsl** *slot number/subslot number/0*<br><br>**Example:**<br>Router (config)# controller shdsl 0/2/0<br>Router (config-controller)# | Selects the controller and enters config-controller mode.<br><br>See the "controller shdsl" section on page 32 for more information. |
| Step 2 | **dsl-group** *number* **pairs** *link* [**efm-bond**]<br><br>**Example:**<br>Router (config-controller)# dsl-group pairs 0-1<br>**efm-bond** | Creates a DSL group and enters config-controller-dsl-group mode.<br><br>See the "dsl-group" section on page 35 for more information. |
| Step 3 | **shdsl annex** {standard}<br><br>**Example:**<br>Router (config-controller-dsl-group)# shdsl annex B | Defines the SHDSL annex.<br><br>See the "shdsl annex" section on page 40 for more information. |
| Step 4 | **shdsl rate** {*number* \| auto}<br><br>**Example:**<br>Router (config-controller)# shdsl rate 2048 | Defines the SHDSL rate.<br><br>See the "shdsl rate" section on page 44 for more information. |
| Step 5 | **exit**<br><br>**Example:**<br>Router (config-controller-dsl-group)# exit | Exits config-controller-dsl-group mode. |
| Step 6 | **exit**<br><br>**Example:**<br>Router (config-controller)# exit | Exits config-controller mode. |

## Examples

The following example use the G.SHDSL commands to configure an efm-bonding group on a HWIC-4SHDSL-E.

```
Router(config)#
Router(config)# controller shdsl 0/2/0
Router(config-controller)# dsl-group pairs 0-1 efm-bond
Router(config-controller-dsl-group)#
*Oct 1 10:49:03.331: %LINK-3-UPDOWN: Interface Ethernet0/2/0, changed state to down
*Oct 1 10:49:04.331: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2/0,
changed state to down
Router(config-controller-dsl-group)# shdsl annex b
Router(config-controller-dsl-group)# shdsl rate 2048
Router(config-controller-dsl-group)# exit
Router(config-controller)# exit
Router(config)#
```

# Configuring 1-pair Groups

To configure a 1-Pair group on a Cisco HWIC-4SHDSL-E, use the Cisco IOS CLI on the router in global configuration mode.

## SUMMARY STEPS

1. **controller shdsl** *slot number/subslot number/0*

2. **dsl-group pairs** *link number*

3. **shdsl annex** {**standard**}

4. **shdsl rate** {*number* | **auto**}

5. **exit**

6. **exit**

## DETAILED STEPS

|        | Command | Purpose |
|--------|---------|---------|
| **Step 1** | **controller shdsl** *slot number/subslot number/0*<br><br>**Example:**<br>`Router (config)# controller shdsl 0/2/0`<br>`Router (config-controller)#` | Selects the controller and enters config-controller mode.<br><br>See the "controller shdsl" section on page 32 for more information. |
| **Step 2** | **dsl-group pairs** *link number*<br><br>**Example non-EFM bonding group (single link)**<br>`Router (config-controller)# dsl-group pairs 0`<br><br>**Example EFM bonding group (one or multiple links):**<br>`Router (config-controller)# dsl-group pairs 0-3`<br>`efm-bond` | Creates a DSL group and enters config-controller-dsl-group mode.<br><br>See the "dsl-group" section on page 35 for more information. |
| **Step 3** | **shdsl annex** {standard}<br><br>**Example:**<br>`Router (config-controller-dsl-group)# shdsl annex B` | Defines the SHDSL annex.<br><br>See the "shdsl annex" section on page 40 for more information. |
| **Step 4** | **shdsl rate** {*number* | **auto**}<br><br>**Example:**<br>`Router (config-controller-dsl-group)# shdsl rate 2048` | Defines the SHDSL rate.<br><br>See the "shdsl rate" section on page 44 for more information. |
| **Step 5** | **exit**<br><br>**Example:**<br>`Router (config-controller-dsl-group)# exit` | Exits config-controller-dsl-group mode. |
| **Step 6** | **exit**<br><br>**Example:**<br>`Router (config-controller)# exit` | Exits config-controller mode. |

## Examples

The following examples use the G.SHDSL commands to configure a 1-Pair group on a HWIC-4SHDSL-E.

### 1-Pair Group Configuration

```
Router(config)# controller shdsl 0/2/0

Router(config-controller)# dsl-group pairs 0

Router(config-controller-dsl-group)#
```

```
*Oct 1 10:49:03.331: %LINK-3-UPDOWN: Interface Ethernet0/2/0, changed state to down
*Oct 1 10:49:04.331: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/2/0,
changed state to down

Router(config-controller-dsl-group)# shdsl annex ?
A Annex A of G.991.2 standard
A-B-F-G Annex A/B/F/G of G.991.2 standard
A-F Annex A/F of G.991.2 standard
B Annex B of G.991.2 standard
B-G Annex B/G of G.991.2 standard
F Annex F of G.991.2 standard
G Annex G of G.991.2 standard

Router(config-controller-dsl-group)# shdsl annex B
Router(config-controller-dsl-group)# shdsl rate ?
<192-2304> DSL Rate in kbps(line will train at the rate + 16kbps overhead)
auto auto rate mode
Router(config-controller-dsl-group)# shdsl rate 2304
Router(config-controller-dsl-group)# exit
Router(config-controller)# exit
```

# Configuring the G.SHDSL Service on a Cisco Router

To configure the G.SHDSL service on the Cisco access router using the Cisco IOS CLI in global configuration mode follow these steps:

**SUMMARY STEPS**

1. **controller shdsl** *slot number/subslot number/0*

2. **dsl-group pairs** *link number*

3. **shdsl annex** {**standard**}

4. **shdsl rate** {*number* | **auto**}

5. **exit**

6. **exit**

7. **interface Ethernet** <slot>/< subslot>/<0>

8. **ip address** <IP-address> <Subnet mask>

9. **exit**

10. **exit**

11. **show interface ethernet** [**type slot/**port-adapter/port]

## DETAILED STEPS

| | Command | Purpose |
|---|---|---|
| **Step 1** | **controller shdsl** *slot number/subslot number/0*<br><br>**Example:**<br>`Router#conf t`<br>`Router(config)#controller shdsl 0/0/0` | Selects controller and enter DSL group configuration mode.<br><br>**Note** See "Configuring Cisco G.SHDSL EFM HWICs" section on page 5 for details about creating and configuring DSL groups. |
| **Step 2** | **dsl-group pairs** *link number*<br><br>**Example:**<br>`Router(config-controller)#dsl-group pairs 0`<br>`Router(config-controller-dsl-group)#` | Selects DSL pair link number. |
| **Step 3** | **shdsl annex** {**standard**}<br><br>**Example:**<br>`Router(config-controller-dsl-group)# shdsl annex B` | Selects annex type for controller. |
| **Step 4** | **shdsl rate** {*number* \| **auto**}<br><br>**Example:**<br>`Router(config-controller-dsl-group)# shdsl rate 2304` | Selects rate for controller. |
| **Step 5** | **exit**<br><br>**Example:**<br>`Router(config-controller-dsl-group)# exit`<br>`Router(config-controller)#` | Exits dsl-group configuration mode. |
| **Step 6** | **exit**<br><br>**Example:**<br>`Router(config-controller)#exit`<br>`Router(config)#` | Exits controller configuration mode. |
| **Step 7** | **interface Ethernet** <**slot**>/< **subslot**>/<0><br><br>**Example:**<br>`Router(config)#interface ethernet 0/0/0`<br>`Router#` | Enters the interface configuration mode. |
| **Step 8** | **ip address** <**IP-address**> <**Subnet mask**><br><br>**Example:**<br>`Router(config)#ip address <IP-address> <subnet-mask>`<br>`Router(config-if)#` | Assigns an IP address to the DSL Ethernet interface. |
| **Step 9** | **exit**<br><br>**Example:**<br>`Router(config-if)# exit`<br>`Router(config)#` | Exits from interface configuration mode. |

|  | Command | Purpose |
|---|---|---|
| **Step 10** | `exit`<br><br>**Example:**<br>`Router(config)# exit`<br>`Router#` | Exits from global configuration mode. |
| **Step 11** | `show interface ethernet` [`type`<br>`slot/`port-adapter/port]<br><br>**Example:**<br>`Router# show interface ethernet 0/0/0` | Verifies the ethernet interface configuration. |

### Default dsl-group configurations

Annex - B

shdsl rate - auto (This command chooses the best data rate possible for the given configurations at CO and CPE)

## Examples

```
Router#sh interfaces ethernet 0/0/0
Ethernet0/0/0 is up, line protocol is up
  Hardware is HWIC_MAC110_FE, address is 0015.f98f.6df3 (bia 0015.f98f.6df3)
  MTU 1500 bytes, BW 9216 Kbit/sec, DLY 1000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output 00:36:31, output hang never
  Last clearing of "show interface" counters 00:32:33
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 input packets with dribble condition detected
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 unknown protocol drops
     0 babbles, 0 late collision, 0 deferred
     1 lost carrier, 0 no carrier
     0 output buffer failures, 0 output buffers swapped out
Router#


Router#sh controllers shdsL 0/0/0
Controller SHDSL 0/0/0 is UP
  Hardware is HWIC-4SHDSL-E, rev 0 on slot 0, hwic slot 0
  Capabilities: EFM, 2-wire, Annex A, B, F & G, CPE termination
  cdb=0x64E6763C, plugin=0x64E4C86C, ds=0x64E4C8B8 base=0x43800000
  FPGA Version is REL.3.3.1,
  Vendor: Conexant, Chipset: CX98124, Firmware version: G88,
  Number of pairs:  4, number of groups configured: 1
  Group info:
       Type: EFM bond g.shdsl, status: Up
       Interface: Ethernet0/0/0, hwidb: 0x64F29518
       Configured/active num links: 4/4, bit map: 0xF/0xF
```

```
Line termination: CPE, Annex: B
Line coding: 16-TCPAM group data rate is 9216 kbps
 EFM bonding group is configured
 EFM bonding group stats:
         Tx Pkts: 0, Rx Pkts: 0
         Frag Loss: 0, Bad Frag: 0, Buffer Overflow: 0
         SOP Loss: 0, EOP Loss: 0
Loopback type: None
Dying Gasp: Present
Mode: Fixed
SHDSL wire-pair (0) is in DSL UP state
        LOSW Defect alarm: none
        CRC per second alarm: none
        Termination: CPE, Line mode: EFM bond, Annex: B
        Line coding: 16-TCPAM,
        Configured data rate/actual data rate: 2304/2304
        Modem status: GTI_DATA_OP
        Last Failed State: None
        Framer Sync Status: 1
        Loop Attenuation: 0 dB
        Transmit Power: 8.5 dB
        SNR margin: 39 dB
        Current 15 minute statistics (Time elapased 67 seconds)
                ES:1, SES:0, CRC:3, LOSW:0, UAS:26
        Previous 15 minute statistics
                ES:0, SES:0, CRC:0, LOSW:0, UAS:0
        Current 24 hr statistics
                ES:1, SES:0, CRC:3, LOSW:0, UAS:26
        Previous 24 hr statistics
                ES:0, SES:0, CRC:0, LOSW:0, UAS:0
        EFM stats:
                Receive stats:
                        Pkts:0
                        CRC:0
                Transmit stats:
                        Pkts:0
SHDSL wire-pair (1) is in DSL UP state
        LOSW Defect alarm: none
        CRC per second alarm: none
        Termination: CPE, Line mode: EFM bond, Annex: B
        Line coding: 16-TCPAM,
        Configured data rate/actual data rate: 2304/2304
        Modem status: GTI_DATA_OP
        Last Failed State: None
        Framer Sync Status: 1
        Loop Attenuation: 0 dB
        Transmit Power: 8.5 dB
        SNR margin: 39 dB
        Current 15 minute statistics (Time elapased 70 seconds)
                ES:1, SES:0, CRC:3, LOSW:0, UAS:26
        Previous 15 minute statistics
                ES:0, SES:0, CRC:0, LOSW:0, UAS:0
        Current 24 hr statistics
                ES:1, SES:0, CRC:3, LOSW:0, UAS:26
        Previous 24 hr statistics
                ES:1, SES:0, CRC:2, LOSW:0, UAS:26
        Previous 24 hr statistics
                ES:0, SES:0, CRC:0, LOSW:0, UAS:0
        EFM stats:
                Receive stats:
                        Pkts:0
                        CRC:0
                Transmit stats:
                        Pkts:0
```

```
            SHDSL wire-pair (3) is in DSL UP state
                    LOSW Defect alarm: none
                    CRC per second alarm: none
                    Termination: CPE, Line mode: EFM bond, Annex: B
                    Line coding: 16-TCPAM,
                    Configured data rate/actual data rate: 2304/2304
                    Modem status: GTI_DATA_OP
                    Last Failed State: None
                    Framer Sync Status: 1
                    Loop Attenuation: 0 dB
                    Transmit Power: 8.5 dB
                    SNR margin: 39 dB
                    Current 15 minute statistics (Time elapased 111 seconds)
                            ES:1, SES:0, CRC:2, LOSW:0, UAS:26
                    Previous 15 minute statistics
                            ES:0, SES:0, CRC:0, LOSW:0, UAS:0
                    Current 24 hr statistics
                            ES:1, SES:0, CRC:2, LOSW:0, UAS:26
                    Previous 24 hr statistics
                            ES:0, SES:0, CRC:0, LOSW:0, UAS:0
                    EFM stats:
                            Receive stats:
                                    Pkts:0
                                    CRC:0
                            Transmit stats:
                                    Pkts:0
Router#


Router#sh controllers shdsL 0/0/0 detailed
Controller SHDSL 0/0/0 is UP
  Hardware is HWIC-4SHDSL-E, rev 0 on slot 0, hwic slot 0
  Capabilities: EFM, 2-wire, Annex A, B, F & G, CPE termination
  cdb=0x64E6763C, plugin=0x64E4C86C, ds=0x64E4C8B8 base=0x43800000
  FPGA Version is REL.3.3.1,
  Vendor: Conexant, Chipset: CX98124, Firmware version: G88,
  Number of pairs:  4, number of groups configured: 1
  Group info:
        Type: EFM bond g.shdsl, status: Up
        Interface: Ethernet0/0/0, hwidb: 0x64F29518
        Configured/active num links: 4/4, bit map: 0xF/0xF
        Line termination: CPE, Annex: B
        Line coding: 16-TCPAM group data rate is 9216 kbps
         EFM bonding group is configured
         EFM bonding group stats:
                Tx Pkts: 0, Rx Pkts: 1
                Frag Loss: 0, Bad Frag: 0, Buffer Overflow: 0
                SOP Loss: 0, EOP Loss: 0
        Loopback type: None
        Dying Gasp: Present
        Mode: Fixed
        SHDSL wire-pair (0) is in DSL UP state
                LOSW Defect alarm: none
                CRC per second alarm: none
                Termination: CPE, Line mode: EFM bond, Annex: B
                Line coding: 16-TCPAM,
                Configured data rate/actual data rate: 2304/2304
                Modem status: GTI_DATA_OP
                Last Failed State: None
                Framer Sync Status: 1
                Loop Attenuation: 0 dB
                Transmit Power: 8.5 dB
                SNR margin: 39 dB
                Current 15 minute statistics (Time elapased 215 seconds)
```

```
                        ES:1, SES:0, CRC:3, LOSW:0, UAS:26
              Previous 15 minute statistics
                        ES:0, SES:0, CRC:0, LOSW:0, UAS:0
              Current 24 hr statistics
                        ES:1, SES:0, CRC:3, LOSW:0, UAS:26
              Previous 24 hr statistics
                        ES:0, SES:0, CRC:0, LOSW:0, UAS:0
              EFM stats:
                        Receive stats:
                                Pkts:1
                                CRC:0
                        Transmit stats:
                                Pkts:0
SHDSL wire-pair (1) is in DSL UP state
              LOSW Defect alarm: none
              CRC per second alarm: none
              Termination: CPE, Line mode: EFM bond, Annex: B
              Line coding: 16-TCPAM,
              Configured data rate/actual data rate: 2304/2304
              Modem status: GTI_DATA_OP
              Last Failed State: None
              Framer Sync Status: 1
              Loop Attenuation: 0 dB
              Transmit Power: 8.5 dB
              SNR margin: 41 dB
              Current 15 minute statistics (Time elapased 218 seconds)
                        ES:1, SES:0, CRC:3, LOSW:0, UAS:26
              Previous 15 minute statistics
                        ES:0, SES:0, CRC:0, LOSW:0, UAS:0
              Current 24 hr statistics
                        ES:1, SES:0, CRC:3, LOSW:0, UAS:26
              Previous 24 hr statistics
                        ES:0, SES:0, CRC:0, LOSW:0, UAS:0
              EFM stats:
                        Receive stats:
                                Pkts:0
                                CRC:0
                        Transmit stats:
                                Pkts:0
SHDSL wire-pair (2) is in DSL UP state
              LOSW Defect alarm: none
              CRC per second alarm: none
              Termination: CPE, Line mode: EFM bond, Annex: B
              Line coding: 16-TCPAM,
              Configured data rate/actual data rate: 2304/2304
              Modem status: GTI_DATA_OP
              Last Failed State: None
              Framer Sync Status: 1
              Loop Attenuation: 0 dB
              Transmit Power: 9.5 dB
              SNR margin: 38 dB
              Current 15 minute statistics (Time elapased 247 seconds)
                        ES:1, SES:0, CRC:2, LOSW:0, UAS:26
              Previous 15 minute statistics
                        ES:0, SES:0, CRC:0, LOSW:0, UAS:0
              Current 24 hr statistics
                        ES:1, SES:0, CRC:2, LOSW:0, UAS:26
              Previous 24 hr statistics
                        ES:0, SES:0, CRC:0, LOSW:0, UAS:0
              EFM stats:
                        Receive stats:
                                Pkts:0
                                CRC:0
                        Transmit stats:
```

```
                                        Pkts:0
                SHDSL wire-pair (3) is in DSL UP state
                        LOSW Defect alarm: none
                        CRC per second alarm: none
                        Termination: CPE, Line mode: EFM bond, Annex: B
                        Line coding: 16-TCPAM,
                        Configured data rate/actual data rate: 2304/2304
                        Modem status: GTI_DATA_OP
                        Last Failed State: None
                        Framer Sync Status: 1
                        Loop Attenuation: 0 dB
                        Transmit Power: 8.5 dB
                        SNR margin: 39 dB
                        Current 15 minute statistics (Time elapsed 248 seconds)
                                ES:1, SES:0, CRC:2, LOSW:0, UAS:26
                        Previous 15 minute statistics
                                ES:0, SES:0, CRC:0, LOSW:0, UAS:0
                        Current 24 hr statistics
                                ES:1, SES:0, CRC:2, LOSW:0, UAS:26
                        Previous 24 hr statistics
                                ES:0, SES:0, CRC:0, LOSW:0, UAS:0
                        EFM stats:
                                Receive stats:
                                        Pkts:0
                                        CRC:0
                                Transmit stats:
                                        Pkts:1
                xMII stats
                 Tx Stats:
                        Bytes: 81, Pkts: 1
                        Pause frames: 0
                        FCS Err: 0, Undersize Pkt Err: 0, Oversize Pkt Err: 0
                 Rx Stats:
                        Bytes: 81, Pkts: 1
                        Pause frames: 0
                        FCS Err: 0, Undersize Pkt Err: 0, Oversize Pkt Err: 0
                        Alignment Err: 0, Framelength Err: 0
                        Fragment Err: 0, Drops: 0
        Router#
```

# Troubleshooting Cisco G.SHDSL EFM HWICs

To troubleshoot Cisco G.SHDSL EFM HWICs, use the following new and published Cisco IOS commands. All other Cisco IOS software commands used with G.SHDSL EFM HWICs are documented in the Cisco IOS Release 15.1(1)T command reference publication at Cisco.com:

http://www.cisco.com/en/US/products/ps6441/tsd_products_support_series_home.html

**SUMMARY STEPS**

1. **show controllers shdsl**

2. **Show interface ethernet**

3. **Show controllers ethernet**

**DETAILED STEPS**

|        | Command | Purpose |
|--------|---------|---------|
| **Step 1** | **show controllers shdsl** *slot number/subslot number/0* [**detailed** \| **brief**]<br><br>**Example:**<br>Router# show controllers shdsl 0/2/0 detailed | Displays the status of SHDSL controllers.<br><br>See the "show controllers shdsl" section on page 49 for more information. |
| **Step 2** | **show interface ethernet[***slot/subslot number***/0]**<br><br>**Example:**<br>Router# show interface ethernet 0/1/0 | Displays ethernet interface status. |
| **Step 3** | **show controllers ethernet[***slot/subslot number***/0]**<br><br>**Example:**<br>Router# show controllers ethernet 0/1/0 | Displays information about the ethernet controller. |

## Examples

The following example uses the **show controllers shdsl** command to display the controller status on a HWIC-4SHDSL-E.

### show controllers shdsl

```
Router#show controller SHDSL 0/3/0 detailed
Controller SHDSL 0/3/0 is UP
  Hardware is HWIC-4SHDSL-E, rev 0 on slot 0, hwic slot 3
  Capabilities: EFM, 2-wire, Annex A, B, F & G, CO termination
  cdb=0x679B83DC, plugin=0x67793B9C, ds=0x6799D660 base=0x50000000
  FPGA Version is REL.3.3.1,
  Vendor: Conexant, Chipset: CX98124, Firmware version: G88,
  Number of pairs:  4, number of groups configured: 1
  Group info:
    Type: EFM bond g.shdsl, status: Up
    Interface: Ethernet0/3/0, hwidb: 0x67A0DF1C
    Configured/active num links: 4/4, bit map: 0xF/0xF
    Line termination: CO, Annex: B
    Line coding: 16-TCPAM group data rate is 9216 kbps
     EFM bonding group is configured
     EFM bonding group stats:
         Tx Pkts: 1, Rx Pkts: 1
         Frag Loss: 0, Bad Frag: 0, Buffer Overflow: 0
         SOP Loss: 0, EOP Loss: 0
    Loopback type: None
    Dying Gasp: Present
    Mode: Fixed
    SHDSL wire-pair (0) is in DSL UP state
        LOSW Defect alarm: none
        CRC per second alarm: none
        Termination: CO, Line mode: EFM bond, Annex: B
        Line coding: 16-TCPAM,
        Configured data rate/actual data rate: 2304/2304
        Modem status: GTI_DATA_OP
        Last Failed State: None
        Framer Sync Status: 1
        Loop Attenuation: 0 dB
        Transmit Power: 10.5 dB
```

```
                SNR margin: 40 dB
                Current 15 minute statistics (Time elapsed 561 seconds)
                    ES:1, SES:0, CRC:2, LOSW:0, UAS:28
                Previous 15 minute statistics
                    ES:0, SES:0, CRC:0, LOSW:0, UAS:0
                Current 24 hr statistics
                    ES:1, SES:0, CRC:2, LOSW:0, UAS:28
                Previous 24 hr statistics
                    ES:0, SES:0, CRC:0, LOSW:0, UAS:0
                EFM stats:
                    Receive stats:
                        Pkts:1
                        CRC:0
                    Transmit stats:
                        Pkts:1
        SHDSL wire-pair (1) is in DSL UP state
                LOSW Defect alarm: none
                CRC per second alarm: none
                Termination: CO, Line mode: EFM bond, Annex: B
                Line coding: 16-TCPAM,
                Configured data rate/actual data rate: 2304/2304
                Modem status: GTI_DATA_OP
                Last Failed State: None
                Framer Sync Status: 1
                Loop Attenuation: 0 dB
                Transmit Power: 10.5 dB
                SNR margin: 41 dB
                Current 15 minute statistics (Time elapsed 564 seconds)
                    ES:1, SES:0, CRC:1, LOSW:0, UAS:28
                Previous 15 minute statistics
                    ES:0, SES:0, CRC:0, LOSW:0, UAS:0
                Current 24 hr statistics
                    ES:1, SES:0, CRC:1, LOSW:0, UAS:28
                Previous 24 hr statistics
                    ES:0, SES:0, CRC:0, LOSW:0, UAS:0
                EFM stats:
                    Receive stats:
                        Pkts:0
                        CRC:0
                    Transmit stats:
                        Pkts:0
        SHDSL wire-pair (2) is in DSL UP state
                LOSW Defect alarm: none
                CRC per second alarm: none
                Termination: CO, Line mode: EFM bond, Annex: B
                Line coding: 16-TCPAM,
                Configured data rate/actual data rate: 2304/2304
                Modem status: GTI_DATA_OP
                Last Failed State: None
                Framer Sync Status: 1
                Loop Attenuation: 0 dB
                Transmit Power: 9.5 dB
                SNR margin: 39 dB
                Current 15 minute statistics (Time elapsed 566 seconds)
                    ES:1, SES:0, CRC:2, LOSW:0, UAS:28
                Previous 15 minute statistics
                    ES:0, SES:0, CRC:0, LOSW:0, UAS:0
                Current 24 hr statistics
                    ES:1, SES:0, CRC:2, LOSW:0, UAS:28
                Previous 24 hr statistics
                    ES:0, SES:0, CRC:0, LOSW:0, UAS:0
                EFM stats:
                    Receive stats:
                        Pkts:0
```

```
                       CRC:0
                  Transmit stats:
                       Pkts:0
SHDSL wire-pair (3) is in DSL UP state
     LOSW Defect alarm: none
     CRC per second alarm: none
     Termination: CO, Line mode: EFM bond, Annex: B
     Line coding: 16-TCPAM,
     Configured data rate/actual data rate: 2304/2304
     Modem status: GTI_DATA_OP
     Last Failed State: None
     Framer Sync Status: 1
     Loop Attenuation: 0 dB
     Transmit Power: 9.5 dB
     SNR margin: 40 dB
     Current 15 minute statistics (Time elapased 568 seconds)
          ES:1, SES:0, CRC:3, LOSW:0, UAS:28
     Previous 15 minute statistics
          ES:0, SES:0, CRC:0, LOSW:0, UAS:0
     Current 24 hr statistics
          ES:1, SES:0, CRC:3, LOSW:0, UAS:28
     Previous 24 hr statistics
          ES:0, SES:0, CRC:0, LOSW:0, UAS:0
     EFM stats:
          Receive stats:
               Pkts:0
               CRC:0
          Transmit stats:
               Pkts:0
xMII stats
 Tx Stats:
     Bytes: 81, Pkts: 1
     Pause frames: 0
     FCS Err: 0, Undersize Pkt Err: 0, Oversize Pkt Err: 0
 Rx Stats:
     Bytes: 81, Pkts: 1
     Pause frames: 0
     FCS Err: 0, Undersize Pkt Err: 0, Oversize Pkt Err: 0
     Alignment Err: 0, Framelength Err: 0
     Fragment Err: 0, Drops: 0
```

The following example uses the **show controllers shdsl** command in case of 2-wire mode.

### Sample show controllers shdsl output in case of 2-wire mode

```
Router#show controller SHDSL 0/3/0 detailed
Controller SHDSL 0/3/0 is UP
  Hardware is HWIC-4SHDSL-E, rev 0 on slot 0, hwic slot 3
  Capabilities: EFM, 2-wire, Annex A, B, F & G, CO termination
  cdb=0x679B83DC, plugin=0x67793B9C, ds=0x6799D660 base=0x50000000
  FPGA Version is REL.3.3.1,
  Vendor: Conexant, Chipset: CX98124, Firmware version: G88,
  Number of pairs:  4, number of groups configured: 1
  Group info:
    Type: EFM bond g.shdsl, status: Up
    Interface: Ethernet0/3/0, hwidb: 0x67A0DF1C
    Configured/active num links: 4/4, bit map: 0xF/0xF
    Line termination: CO, Annex: B
    Line coding: 16-TCPAM group data rate is 9216 kbps
     EFM bonding group is configured
     EFM bonding group stats:
        Tx Pkts: 1, Rx Pkts: 1
        Frag Loss: 0, Bad Frag: 0, Buffer Overflow: 0
        SOP Loss: 0, EOP Loss: 0
    Loopback type: None
    Dying Gasp: Present
    Mode: Fixed
    SHDSL wire-pair (0) is in DSL UP state
        LOSW Defect alarm: none
        CRC per second alarm: none
        Termination: CO, Line mode: EFM bond, Annex: B
        Line coding: 16-TCPAM,
        Configured data rate/actual data rate: 2304/2304
        Modem status: GTI_DATA_OP
        Last Failed State: None
        Framer Sync Status: 1
        Loop Attenuation: 0 dB
        Transmit Power: 10.5 dB
        SNR margin: 40 dB
        Current 15 minute statistics (Time elapsed 561 seconds)
            ES:1, SES:0, CRC:2, LOSW:0, UAS:28
        Previous 15 minute statistics
            ES:0, SES:0, CRC:0, LOSW:0, UAS:0
        Current 24 hr statistics
            ES:1, SES:0, CRC:2, LOSW:0, UAS:28
        Previous 24 hr statistics
            ES:0, SES:0, CRC:0, LOSW:0, UAS:0
        EFM stats:
            Receive stats:
                Pkts:1
                CRC:0
            Transmit stats:
                Pkts:1
    SHDSL wire-pair (1) is in DSL UP state
        LOSW Defect alarm: none
        CRC per second alarm: none
        Termination: CO, Line mode: EFM bond, Annex: B
        Line coding: 16-TCPAM,
        Configured data rate/actual data rate: 2304/2304
        Modem status: GTI_DATA_OP
        Last Failed State: None
        Framer Sync Status: 1
        Loop Attenuation: 0 dB
        Transmit Power: 10.5 dB
        SNR margin: 41 dB
```

```
            Current 15 minute statistics (Time elapased 564 seconds)
                ES:1, SES:0, CRC:1, LOSW:0, UAS:28
            Previous 15 minute statistics
                ES:0, SES:0, CRC:0, LOSW:0, UAS:0
            Current 24 hr statistics
                ES:1, SES:0, CRC:1, LOSW:0, UAS:28
            Previous 24 hr statistics
                ES:0, SES:0, CRC:0, LOSW:0, UAS:0
            EFM stats:
                Receive stats:
                    Pkts:0
                    CRC:0
                Transmit stats:
                    Pkts:0
        SHDSL wire-pair (2) is in DSL UP state
            LOSW Defect alarm: none
            CRC per second alarm: none
            Termination: CO, Line mode: EFM bond, Annex: B
            Line coding: 16-TCPAM,
            Configured data rate/actual data rate: 2304/2304
            Modem status: GTI_DATA_OP
            Last Failed State: None
            Framer Sync Status: 1
            Loop Attenuation: 0 dB
            Transmit Power: 9.5 dB
            SNR margin: 39 dB
            Current 15 minute statistics (Time elapased 566 seconds)
                ES:1, SES:0, CRC:2, LOSW:0, UAS:28
            Previous 15 minute statistics
                ES:0, SES:0, CRC:0, LOSW:0, UAS:0
            Current 24 hr statistics
                ES:1, SES:0, CRC:2, LOSW:0, UAS:28
            Previous 24 hr statistics
                ES:0, SES:0, CRC:0, LOSW:0, UAS:0
            EFM stats:
                Receive stats:
                    Pkts:0
                    CRC:0
                Transmit stats:
                    Pkts:0
        SHDSL wire-pair (3) is in DSL UP state
            LOSW Defect alarm: none
            CRC per second alarm: none
            Termination: CO, Line mode: EFM bond, Annex: B
            Line coding: 16-TCPAM,
            Configured data rate/actual data rate: 2304/2304
            Modem status: GTI_DATA_OP
            Last Failed State: None
            Framer Sync Status: 1
            Loop Attenuation: 0 dB
            Transmit Power: 9.5 dB
            SNR margin: 40 dB
            Current 15 minute statistics (Time elapased 568 seconds)
                ES:1, SES:0, CRC:3, LOSW:0, UAS:28
            Previous 15 minute statistics
                ES:0, SES:0, CRC:0, LOSW:0, UAS:0
            Current 24 hr statistics
                ES:1, SES:0, CRC:3, LOSW:0, UAS:28
            Previous 24 hr statistics
                ES:0, SES:0, CRC:0, LOSW:0, UAS:0
            EFM stats:
                Receive stats:
                    Pkts:0
                    CRC:0
```

```
           Transmit stats:
                 Pkts:0
       xMII stats
        Tx Stats:
             Bytes: 81, Pkts: 1
             Pause frames: 0
             FCS Err: 0, Undersize Pkt Err: 0, Oversize Pkt Err: 0
         Rx Stats:
             Bytes: 81, Pkts: 1
             Pause frames: 0
             FCS Err: 0, Undersize Pkt Err: 0, Oversize Pkt Err: 0
             Alignment Err: 0, Framelength Err: 0
             Fragment Err: 0, Drops: 0
```

The following example uses the **show interface ethernet** command.

### show interface ethernet

```
RRouter#show interface ethernet 0/3/0
Ethernet0/3/0 is up, line protocol is up
  Hardware is HWIC_MAC110_FE, address is 0017.95c1.5cc6 (bia 0017.95c1.5cc6)
  Internet address is 60.0.0.1/24
  MTU 1500 bytes, BW 9216 Kbit/sec, DLY 1000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:39:04, output 00:00:00, output hang never
  Last clearing of "show interface" counters 00:37:21
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  30 second input rate 0 bits/sec, 0 packets/sec
  30 second output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 input packets with dribble condition detected
     1123 packets output, 67448 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 unknown protocol drops
     0 babbles, 0 late collision, 0 deferred
```

The following example uses the **show controllers ethernet** command to display detailed information about an ethernet interface.

### show controllers ethernet

```
Router#show controllers ethernet 0/3/0
IOS DS Rx/Tx Counters:
-------------------------:
Tx Head    = 35
Tx Tail    = 35
Tx Count   = 0
Rx Head    = 0
Rx Tail    = 0

 IOS DS Misc counters
 ---------------------
HWIC Host Reg Addr  = 0x50800000
HWIC Common Reg Addr = 0x50000000
HW Namestring       = Ethernet0/3/0
Tx Ring Entries     = 64
Rx Ring Entries     = 64
```

```
IRQ 1 Count        = 0
DDR Tx CRC         = 0
DDR Clock Miss     = 0
DDR Tx Overrun     = 0
MAC Tx Underrun    = 0
MAC Rx Overrun     = 0
MAC Large Frame    = 0
MAC Rx CRC         = 0

 Multicast related information
 ------------------------------
 Software MAC address filter(hash:length/addr/mask/hits):
 -----------------------------------------------------------
0x00:  0  ffff.ffff.ffff  0000.0000.0000        0
0x53:  0  0017.95c1.5cc6  0000.0000.0000        0
0xC0:  0  0180.c200.0002  0000.0000.0000        0
0xC0:  1  0100.0ccc.cccc  0000.0000.0000        0
0xC5:  0  0180.c200.0007  0000.0000.0000        0
Hardware MAC address filter table:
----------------------------------
Multicast ingress filter control reg is  0x1F

 Exact filter at address: address to be filtered
 --------------------------------------------------
0x50002104: 0017.95C1.5CC6
0x5000210A: FFFF.FFFF.FFFF
0x50002110: 0180.C200.0007
0x50002116: 0180.C200.0002
0x5000211C: 0100.0CCC.CCCC
0x50002122: 0000.0000.0000
0x50002128: 0000.0000.0000
0x5000212E: 0000.0000.0000
0x50002134: 0000.0000.0000
0x5000213A: 0000.0000.0000
 Exact filter at address 0x67A121C0 5 free, in_use: 1 1 1 1 1 0 0 0 0 0
 Multicast@0x67A1223C hash:
 hash table 0 : 0000
 hash table 1 : 0000
 hash table 2 : 0000
 hash table 3 : 0000
 Multicast hash key instances:
 0 0 0 0 0 0 0 0  0 0 0 0 0 0 0 0  0 0 0 0 0 0 0 0  0 0 0 0 0 0 0 0
 0 0 0 0 0 0 0 0  0 0 0 0 0 0 0 0  0 0 0 0 0 0 0 0  0 0 0 0 0 0 0 0
MAC110 general registers
Control Register (0x8030):
 MAC Enable  1  Short Packet Padding  0
 Loopback Mode  0  TXCRC Gen  1

Status Register (0x0000):
 TX MAC pause 0  RX MAC pause 0

MAC110 Frame statistics registers
---------------------------------
Egress frame counters:
---------------------
Frame Count      35
Byte Count     2835
Abort Count      0
Tx64 Bytes Packet Count0
Tx65_to_127 Bytes Packet Count35
Tx128_to_255 Bytes Packet Count0
Tx256_to_511  Bytes Packet Count 0
Tx512_to_1023 Bytes Packet Count 0
Tx1024_to_1518 Bytes Packet Count 0
```

```
TxUndersize Packet Count  0
TxOversize  Packet Count  0

Ingress frame counters:
------------------------
Frame Count          36
Byte  Count          2916
Multicast Filt Drops 36
Multicast Frames     36
CRC Error Count       0
Congestion Drop Count 0
Oversize Drop Count   0
Pause Frame Count     0
Rx64 bytes Packet Count  0
Rx65_to_127 bytes Packet Count 36
Rx128_to_255 bytes Packet Count  0
Rx256_to_511 bytes Packet Count  0
Rx512_to_1023 bytes Packet Count  0
Rx1024_to_1518 bytes Packet Count 0
RxUndersize Packet Count   0
RxOversize  Packet  Count  0

******* HWIC Host Registers at 50800000 *******
Status (0x00):
    Card Present Low          0       Graceful Stop Tx Complete  0
Config (0x0000120E):
    Hwic Reset                0       Hwic Host Reset            0
    Hwic IRQ2 Type            Net     Hwic IRQ1 Type             Err
    Rx Queue Watermark Enable 0       Auto XOFF When Full        0
    Rx Int On Last            0       Graceful Stop Tx           0
    Generic Rx Enable         1       Generic Tx Enable          1
    DDR Enable                1       Loopback                   0
Error Interrupt Enable (0x3DDFF):
    Rx Done Error Int         1       Card Present Change Int    1
    Hwic Int Frame Error Int  0x0D    Tx First Last Error Int    1
    Tx Done Error Int         1       IRQ2 Int                   0
    IRQ1 Int                  1       Host Specific Error Int    1
    Rx Overrun Int            1       DDR RxClk Missing Int      1
    Reg RW Timeout Int        1       Reg RW Error Int           1
    Rx CRC Int                1       Rx Format Error Int        1
    DMA Error Int             1
Management Interrupt Enable (0x7000):
    Hwic Int Frame Mgmt Int   0x07
    IRQ2 Int                  0
    IRQ1 Int                  0       Graceful Stop Tx Int       0
Network Interrupt Enable (0x1800):
    Rx Frame Drop Int         0       Generic Frame Tx Int       1
    Generic Frame Rx Int      1       DMA Write Int              0
    IRQ2 Int                  0       IRQ1 Int                   0
    Int Frame Network Int     0x00
HWICRegisterOffset        0x0000       HWICRegisterErrorAddress  0x00000000
HWICRegisterTimeout       0x0000C350
TxControlFrameCounter     0x033B77     RxControlFrameCounter     0x017F25
TxDataFrameCounter        0x000000     RxDataFrameCounter        0x000000
RegisterRWErrorCounter    0x0000       RxOverrunErrorCounter     0x0000
RxCRCErrorCounter         0x0000       RxFrameDropCounter        0x0000
TxBufferExtension         0x00         RxBufferExtension         0x00
HWICQueueBaseExtension    0x00         HWICQueueBase             0x162D
TXQueueTailBase Register  0x9118
TxQueueBase               0x12         TxQueueTail               0x23
TxQueueSize               0x40         TxQueueHead               0x23
RxQueueHeadBase Register  0x9800
RxQueueBase               0x13         RxQueueHead               0x00
RxQueueSize               0x40         RxQueueTail               0x00
```

```
RxBufferSize            0x060C         RxQueueHighWaterMark     0x00
RxQueueLowWaterMark     0x00           DMAOffsetExtension       0x00
DMAOffset               0x0000         DMAWindow                0x0000

******* HWIC Common Registers at 50000000 *******
HWIC ID:       0x2
HWIC Revision: 0x0
HWIC Status:   0x0
HWIC DDR TXCRC:0x0
HWIC Control:  0x8040
    DDR  Enable            1       Software Reset          0
    Interrupt Module Reset  0       GDF Module Reset        0
    DMA Module Reset        0       Flow Control Reset      0
    IRQ2 Global Int Mask    0       IRQ1 Global Int Mask    1
    DDR TXCRC Int Mask      0       DDR TXClk Loss Int Mask 0
    TX Fifo Overrun Int Mask 0
HWIC Interrupt Event: 0x0
    DDR TXCRC Int          0       DDR TXClk Loss Int      0
    TX Fifo Overrun Int    0
HWIC Diag 1: 0x0
HWIC Diag 2: 0x5

******* HWIC Rx/Tx Rings *******
 rxr @(162D9800) head (0) tail (0) entries (64) serviced (0)
 txr @(162D9000) head (35) tail (35) entries (64) serviced (35) count (0)
  bd(162D9800): flags 0000 length 0000 address 15E19FA0
  bd(162D9808): flags 0000 length 0000 address 15E19920
  bd(162D9810): flags 0000 length 0000 address 15E192A0
  bd(162D9818): flags 0000 length 0000 address 15E18C20
  bd(162D9820): flags 0000 length 0000 address 15E185A0
  bd(162D9828): flags 0000 length 0000 address 15E17F20
  bd(162D9830): flags 0000 length 0000 address 15E178A0
  bd(162D9838): flags 0000 length 0000 address 15E17220
  bd(162D9840): flags 0000 length 0000 address 15E16BA0
  bd(162D9848): flags 0000 length 0000 address 15E16520
  bd(162D9850): flags 0000 length 0000 address 15E15EA0
  bd(162D9858): flags 0000 length 0000 address 15E15820
  bd(162D9860): flags 0000 length 0000 address 15E151A0
  bd(162D9868): flags 0000 length 0000 address 15E14B20
  bd(162D9870): flags 0000 length 0000 address 15E144A0
  bd(162D9878): flags 0000 length 0000 address 15E13E20
  bd(162D9880): flags 0000 length 0000 address 15E137A0
  bd(162D9888): flags 0000 length 0000 address 15E13120
  bd(162D9890): flags 0000 length 0000 address 15E12AA0
  bd(162D9898): flags 0000 length 0000 address 15E12420
  bd(162D98A0): flags 0000 length 0000 address 15E11DA0
  bd(162D98A8): flags 0000 length 0000 address 15E11720
  bd(162D98B0): flags 0000 length 0000 address 15E110A0
  bd(162D98B8): flags 0000 length 0000 address 15E10A20
  bd(162D98C0): flags 0000 length 0000 address 15E103A0
  bd(162D98C8): flags 0000 length 0000 address 15E0FD20
  bd(162D98D0): flags 0000 length 0000 address 15E0F6A0
  bd(162D98D8): flags 0000 length 0000 address 15E0F020
  bd(162D98E0): flags 0000 length 0000 address 15E0E9A0
  bd(162D98E8): flags 0000 length 0000 address 15E0E320
  bd(162D98F0): flags 0000 length 0000 address 15E0DCA0
  bd(162D98F8): flags 0000 length 0000 address 15E0D620
  bd(162D9900): flags 0000 length 0000 address 15E0CFA0
  bd(162D9908): flags 0000 length 0000 address 15E0C920
  bd(162D9910): flags 0000 length 0000 address 15E0C2A0
  bd(162D9918): flags 0000 length 0000 address 15E0BC20
  bd(162D9920): flags 0000 length 0000 address 15E0B5A0
  bd(162D9928): flags 0000 length 0000 address 15E0AF20
  bd(162D9930): flags 0000 length 0000 address 15E0A8A0
```

```
bd(162D9938): flags 0000 length 0000 address 15E29FE0
bd(162D9940): flags 0000 length 0000 address 15E29960
bd(162D9948): flags 0000 length 0000 address 15E292E0
bd(162D9950): flags 0000 length 0000 address 15E28C60
bd(162D9958): flags 0000 length 0000 address 15E285E0
bd(162D9960): flags 0000 length 0000 address 15E27F60
bd(162D9968): flags 0000 length 0000 address 15E278E0
bd(162D9970): flags 0000 length 0000 address 15E27260
bd(162D9978): flags 0000 length 0000 address 15E26BE0
bd(162D9980): flags 0000 length 0000 address 15E26560
bd(162D9988): flags 0000 length 0000 address 15E25EE0
bd(162D9990): flags 0000 length 0000 address 15E25860
bd(162D9998): flags 0000 length 0000 address 15E251E0
bd(162D99A0): flags 0000 length 0000 address 15E24B60
bd(162D99A8): flags 0000 length 0000 address 15E244E0
bd(162D99B0): flags 0000 length 0000 address 15E23E60
bd(162D99B8): flags 0000 length 0000 address 15E237E0
bd(162D99C0): flags 0000 length 0000 address 15E23160
bd(162D99C8): flags 0000 length 0000 address 15E22AE0
bd(162D99D0): flags 0000 length 0000 address 15E22460
bd(162D99D8): flags 0000 length 0000 address 15E21DE0
bd(162D99E0): flags 0000 length 0000 address 15E21760
bd(162D99E8): flags 0000 length 0000 address 15E210E0
bd(162D99F0): flags 0000 length 0000 address 15E20A60
bd(162D99F8): flags 0000 length 0000 address 15E203E0
bd(162D9000): flags 000F length 004D address 1631038A
bd(162D9008): flags 000F length 004D address 16310A0A
bd(162D9010): flags 000F length 004D address 15E03A4A
bd(162D9018): flags 000F length 004D address 15E04DCA
bd(162D9020): flags 000F length 004D address 15E03D8A
bd(162D9028): flags 000F length 004D address 15E0614A
bd(162D9030): flags 000F length 004D address 15E0474A
bd(162D9038): flags 000F length 004D address 15E0440A
bd(162D9040): flags 000F length 004D address 163113CA
bd(162D9048): flags 000F length 004D address 16310A0A
bd(162D9050): flags 000F length 004D address 15E0544A
bd(162D9058): flags 000F length 004D address 15E04DCA
bd(162D9060): flags 000F length 004D address 15E0578A
bd(162D9068): flags 000F length 004D address 15E0614A
bd(162D9070): flags 000F length 004D address 1630FD0A
bd(162D9078): flags 000F length 004D address 15E05E0A
bd(162D9080): flags 000F length 004D address 1630F9CA
bd(162D9088): flags 000F length 004D address 15E0370A
bd(162D9090): flags 000F length 004D address 163113CA
bd(162D9098): flags 000F length 004D address 163106CA
bd(162D90A0): flags 000F length 004D address 15E0544A
bd(162D90A8): flags 000F length 004D address 16310A0A
bd(162D90B0): flags 000F length 004D address 15E03A4A
bd(162D90B8): flags 000F length 004D address 15E0544A
bd(162D90C0): flags 000F length 004D address 15E05ACA
bd(162D90C8): flags 000F length 004D address 1630FD0A
bd(162D90D0): flags 000F length 004D address 15E0510A
bd(162D90D8): flags 000F length 004D address 163113CA
bd(162D90E0): flags 000F length 004D address 15E040CA
bd(162D90E8): flags 000F length 004D address 15E0440A
bd(162D90F0): flags 000F length 004D address 15E040CA
bd(162D90F8): flags 000F length 004D address 1631038A
bd(162D9100): flags 000F length 004D address 15E04DCA
bd(162D9108): flags 000F length 004D address 16310D4A
bd(162D9110): flags 000F length 004D address 16310A0A
bd(162D9118): flags 0001 length 0000 address 00000000
bd(162D9120): flags 0001 length 0000 address 00000000
bd(162D9128): flags 0001 length 0000 address 00000000
bd(162D9130): flags 0001 length 0000 address 00000000
```

```
bd(162D9138): flags 0001 length 0000 address 00000000
bd(162D9140): flags 0001 length 0000 address 00000000
bd(162D9148): flags 0001 length 0000 address 00000000
bd(162D9150): flags 0001 length 0000 address 00000000
bd(162D9158): flags 0001 length 0000 address 00000000
bd(162D9160): flags 0001 length 0000 address 00000000
bd(162D9168): flags 0001 length 0000 address 00000000
bd(162D9170): flags 0001 length 0000 address 00000000
bd(162D9178): flags 0001 length 0000 address 00000000
bd(162D9180): flags 0001 length 0000 address 00000000
bd(162D9188): flags 0001 length 0000 address 00000000
bd(162D9190): flags 0001 length 0000 address 00000000
bd(162D9198): flags 0001 length 0000 address 00000000
bd(162D91A0): flags 0001 length 0000 address 00000000
bd(162D91A8): flags 0001 length 0000 address 00000000
bd(162D91B0): flags 0001 length 0000 address 00000000
bd(162D91B8): flags 0001 length 0000 address 00000000
bd(162D91C0): flags 0001 length 0000 address 00000000
bd(162D91C8): flags 0001 length 0000 address 00000000
bd(162D91D0): flags 0001 length 0000 address 00000000
bd(162D91D8): flags 0001 length 0000 address 00000000
bd(162D91E0): flags 0001 length 0000 address 00000000
bd(162D91E8): flags 0001 length 0000 address 00000000
bd(162D91F0): flags 0001 length 0000 address 00000000
bd(162D91F8): flags 0001 length 0000 address 00000000

    0 lost carrier, 0 no carrier
    0 output buffer failures, 0 output buffers swapped out
```

- To display link training related events as they are generated, use the **debug shdsl-efm training** command.

- To enable firmware logs, use the **debug shdsl-efm firmware** command. To display firmware logs, use the **show shdsl-efm firmware** command.

- To dump the chipset memory, follow the steps below.

  – debug shdsl-efm firmware

  – enable "service internal" in configuration terminal prompt

  – show shdsl-efm dspreg

Use the following debug commands for further debugging:

- **debug shdsl-efm error**

- **debug shdsl-efm driver**

- **debug shdsl-efm eoc**

**Note**    For the **debug shdsl-efm eoc** command, we recommended that the debugs are buffered using the **no logging console** and **logging buffered** commands in privileged configuration mode, otherwise the IOS console is flooded with eoc messages.

# Command Reference

This section documents the following new and modified Cisco IOS commands. All other Cisco IOS software commands used with this HWIC are documented in the Cisco IOS Release 15.1(1)T command reference publication at Cisco.com:

http://www.cisco.com/en/US/products/ps6441/tsd_products_support_series_home.html

**New Commands**

- efm-grp
- termination

**Modified Commands**

- controller shdsl
- dsl-group
- shdsl annex
- shdsl rate
- show controllers shdsl

# efm-grp

The **efm-grp** command is used to perform the necessary link operations (add, delete, and shutdown) of a single link after the creation of efm-bonding group. To perform the link operations in the **efm-grp** command, enter the config-controller-dsl-group mode. Use the no form of the command to shut down the related command.

> **efm-grp** [**add** | **delete** | **shutdown**] *link* {*link number*}

> **no efm-grp** [**add** | **delete** | **shutdown**] *link* {*link number*}

**Syntax Description**

| | |
|---|---|
| *link number* | Designates the pairs link number. |
| **add** | Adds a link to the efm-bonding group. |
| **delete** | Deletes a link from the efm-bonding group |
| **shutdown** | Shuts down a link in the efm-bonding group. |

**Command Default**   No default behavior or values

**Command Modes**   Config-controller-dsl-group

**Command History**

| Release | Modification |
|---|---|
| 15.1(1)T | This command was introduced. |
| 15.3(2)T | This command was modified. The shutdown keyword is not supported. |

**Usage Guidelines**   This command is used to add, delete, or shutdown a link in the efm-bond. Effective with 15.3(2)T, shutdown command is not supported.

**Examples**   The following example shows how **efm-grp** command is used.

```
Router(config-controller-dsl-group)# efm-grp ?
add       Add a link to the EFM Bonding group
delete    Delete a link from the EFM Bonding group
shutdown  Shutdown a link in the EFM Bonding group

Router(config-controller-dsl-group)# efm-grp add ?
link  EFM Bonding group link configuration

Router(config-controller-dsl-group)# efm-grp add link ?
<0-3>  Link pair number
```

| Related Commands | Command | Description |
|---|---|---|
| | **controller shdsl** | Configures a controller for SHDSL mode and enters config-controller mode. |
| | **shdsl annex** | Defines the SHDSL G.991.2 standard. |
| | **shdsl rate** | Defines the SHDSL rate. |
| | **show controller shdsl** | Displays the status of the controller that is configured for SHDSL mode. |

# termination

To configure the termination mode of the controller, use the **termination** command in the controller configuration mode.

**termination** [**co** | **cpe**]

| Syntax Description | | |
|---|---|---|
| | **co** | Set the line termination for the interface as CO (network) |
| | **cpe** | Termination cpe (customer) |

**Command Default**  The command default termination mode is CPE.

**Command Modes**  Controller configuration mode

| Command History | Release | Modification |
|---|---|---|
| | 15.1(1)T | This command was introduced. |

**Usage Guidelines**  This command is used to configure controller termination.

**Examples**  The following example shows the line termination set to co:

```
Router(config-controller)# termination co
```

| Related Commands | Command | Description |
|---|---|---|
| | **controller shdsl** | Configures a controller for single-pair high-bit-rate digital subscriber line (SHDSL) mode. |

# controller shdsl

To configure a controller for single-pair high-bit-rate digital subscriber line (SHDSL) mode, use the **controller shdsl** command in global or controller configuration mode.

### Cisco HWIC-4SHDSL-E, HWIC-4SHDSL, and HWIC-2SHDSL

**controller shdsl** *slot number*/*subslot number*/*port number*

### Cisco IAD2420 Series

**controller shdsl** *number*

| Syntax Description | | |
|---|---|---|
| *number* | Controller number. The valid controller number is 0. | |
| *slot number* | Slot on the router in which the high-speed WAN interface cards (HWIC) is installed. | |
| *subslot number* | Subslot on the router in which the HWIC is installed. | |
| *port number* | Port on the router in which the HWIC is installed. By default, Cisco HWIC-4SHDSL-E, HWIC-4SHDSL, and HWIC-2SHDSL use port number 0. | |

**Command Defaults**

Controller number: 0

Cisco HWIC-4SHDSL-E: none

**Command Modes**

**Cisco HWIC-4SHDSL-E, HWIC-4SHDSL, and HWIC-2SHDSL**

Global configuration

Controller configuration

**Cisco IAD2420 Series**

Global configuration

**Command History**

| Release | Modification |
|---|---|
| 11.3(5)AAA | This command was introduced. |
| 12.2(8)T | This command was implemented on Cisco IAD2420 series IADs. |
| 12.4(15)T | This command was introduced for the Cisco HWIC-4SHDSL and HWIC-2SHDSL running on the Cisco 1841 router, and on the Cisco 2800 and 3800 series access routers. |
| 15.1(1)T | This command was modified. Support for the the Cisco HWIC-SHDSL-E is added. |

**Usage Guidelines**

This command is used to configure the controller mode and the controller number.

**Examples**

**Cisco HWIC-4SHDSL-E, HWIC-4SHDSL, and HWIC-2SHDSL**

The following example uses the **controller shdsl** command to configure a Cisco HWIC-4SHDSL-E or Cisco HWIC-4SHDSL installed in a Cisco access router, controller number 0, subslot 2, port number 0); the example enters controller configuration mode:

```
Router(config)# controller shdsl 0/2/0
Router(config-controller)#
```

**Cisco IAD2420 Series**

The following example uses the **controller shdsl** command to enter SHDSL controller mode on controller number 0; the example also configures ATM mode:

```
Router# controller shdsl 0
Router# mode atm
```

**Related Commands**

| Command | Description |
|---|---|
| **show controller shdsl** | Displays the controller status and statistics. |

# dsl-group

To create and configure a digital subscriber line (DSL) group, and enter config-controller-dsl-group mode, or to automatically configure an ATM group, use the **dsl-group** command in config-controller mode. To disable the DSL group, use the **no** form of this command.

**dsl-group** [**pairs**] [{[*number*] **pairs** *link number* }| **auto**] [**efm-bond**]

**no dsl-group** [**pairs**] [{[*number*] **pairs** *link number* }| **auto**] [**efm-bond**]

| Syntax Description | | |
|---|---|---|
| *number* | Defines the dsl-group number. The dsl-group number can be one of the following numbers: <br>• 0 <br>• 1 | |
| **pairs** | Defines the DSL wire pairs. | |
| **EFM-bond** | Defines the DSL group as Ethernet First Mile (EFM) group bonding group. | |

| | |
|---|---|
| *link number* | Link number of the pair. Link number options are limited to one of the following choices, based on the hardware interface and the desired DSL group. |

**HWIC-4SHDSL-E**

EFM-bond DSL Group

- 0
- 1
- 2
- 3
- Any combination of the numbers 0,1,2,3

1-Pair DSL Group

- 0
- 1
- 2
- 3

In the case of 1-pair DSL group (2-wire) only one pair needs to be configured.

**HWIC-4SHDSL**

IMA DSL Group

- 0
- 1
- 2
- 3
- Any combination of the numbers 0,1,2,3

M-Pair DSL Group

- 0-1
- 0-2
- 0-3

2-Pair DSL Group

- 0-1
- 2-3

1-Pair DSL Group

- 0
- 1
- 2
- 3

|  | **HWIC-2SHDSL** |
|--|------------------|
|  | DSL Group 0 |
|  | • 0 |
|  | • 1 |
|  | • 0-1 |
|  | DSL Group 1 |
|  | • 1 |
| **auto** | Automatically assigns the Central Office (CO) configuration to an ATM dsl-group on the Customer Premise Equipment (CPE). |

**Command Default**    No DSL group is defined or automatically configured

**Command Modes**    Config controller

Config-controller-dsl-group

**Command History**

| Release | Modification |
|---------|-------------|
| 12.4(15)T | This command was introduced for the Cisco HWIC-4SHDSL and HWIC-2SHDSL running on the Cisco 1841 router and the Cisco 2800 and 3800 series access routers. |
| 15.1(1)T | This command was modified to support automatic configuration of Cisco HWIC-4SHDSL and HWIC-2SHDSL running on the Cisco 1841 router and the Cisco 2800 and 3800 series access routers. |
| 15.1(1)T | This command was modified. Added **dsl-group pairs** *link number* [efm-bond] for the Cisco HWIC-4SHDSL-E. |

**Usage Guidelines**    From config-controller mode, use the **dsl-group** command to define the dsl group, and manually configure the DSL group from config-controller-dsl-group mode. Use the **dsl-group auto** command to automatically adopt the Central Office (CO) configuration on an ATM dsl-group. Use the **dsl-group pairs** to define the DSL group as Ethernet First Mile (EFM) group bonding group.

✎
**Note**    Automatic configuration is not supported on IMA groups.

Automatic configuration is limited to only one DSL group and ATM interface. Once a group is automatically configured, no other group can be created. All manually created groups must be deleted before creating an automatic configuration group.

- When the CO is running more than one configuration, the CPE will select the configuration based on the following priority:

    4. M-PAIR

    5. 4-WIRE

    6. 2-WIRE

- When the CO is running more than one configuration of the same type, the CPE selects the configuration with link 0.

**Examples**   The following example uses the **dsl-group** command to create an IMA-DSL group and enter config-controller-dsl-group mode:

```
Router(config-controller)# dsl-group 1 pairs 0-1 ima

Router(config-controller-dsl-group)#

Sep 14 13:15:40.285:%HWIC_SHDSL-5-DSLGROUP_UPDOWN: SHDSL 0/2/0 dsl-group(1) state changed
to down.
Sep 14 13:15:42.285:%LINK-3-UPDOWN: Interface ATM0/2/IMA1, changed state to down
Sep 14 13:15:43.285:%LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/2/IMA1, changed
state to down
```

The following example uses the **dsl-group auto** command to automatically adopt the Central Office (CO) configuration on an ATM group:

```
Router(config-controller)#dsl-group auto

Router(config-controller)#

*May 14 18:56:33.136: %HWIC_SHDSL-5-DSLGROUP_UPDOWN: SHDSL 0/0/0 dsl-group(0) state
changed to down.
*May 14 18:56:35.136: %LINK-3-UPDOWN: Interface ATM0/0/0, changed state to down
*May 14 18:56:36.136: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/0/0,
changed state to down
```

The following example configures a single-pair DSL group and enters the config-controller-dsl-group mode:

```
Router(config-controller)#dsl-group pairs 0
Router(config-controller-dsl-group)#
```

The following example creates a 4-pair efm-bonding group:

```
Router(config-controller)#dsl-group pairs 0-3 efm-bond
Router(config-controller-dsl-group)#
```

**Related Commands**

| Command | Description |
|---|---|
| **controller shdsl** | Configures a controller for SHDSL mode and enters config-controller mode. |
| **ima group** | Defines physical links as IMA group members. |
| **ima group clock-mode** | Sets the clock mode for an IMA group. |
| **ima link** | Defines physical links in an IMA group. |
| **shdsl 4-wire mode enhanced** | Defines the SHDSL to use enhanced mode in a *2*-pair DSL group. |
| **shdsl annex** | Defines the SHDSL G.991.2 standard. |
| **shdsl rate** | Defines the SHDSL rate. |
| **show controller shdsl** | Displays the status of the controller that is configured for SHDSL mode. |

# shdsl annex

To define the single-pair high-bit-rate digital subscriber line (SHDSL) G.991.2 standard, use the **shdsl annex** command in config controller DSL group mode.

**shdsl annex** {*annex* | *standard*}

| | |
|---|---|
| **Syntax Description** | *standard*       Defines the standard for the selected type of DSL group. The following annex standards are supported: |

     *standard*        Defines the standard for the selected type of DSL group. The following annex standards are supported:

- A
- A-B-F-G
- A-F
- B (Default annexure)
- B-G
- F
- G

**IMA Group**

- A
- A-B
- B

**M-PAIR Group**

- A
- A-B
- B
- F {**coding** *16* | *32*}
- F-G {**coding** *16* | *32*}
- G {**coding** *16* | *32*}

**1-PAIR and 2-PAIR Group**

- A
- A-B
- B
- F {**coding** *16* | *32*}
- F-G {**coding** *16* | *32*}
- G {**coding** *16* | *32*}

**Command Default**     SHDSL annex B

| Command Modes | Config controller DSL group |
|---|---|

**Command History**

| Release | Modification |
|---|---|
| 12.4(15)T | This command was introduced for the Cisco HWIC-4SHDSL and HWIC-2SHDSL running on the Cisco 1841 router and on the Cisco 2800 and 3800 series access routers. |
| 15.1(1)T | This command was modified. The argument *annex* was introduced for the Cisco HWIC-4SHDSL-E |

**Usage Guidelines**   Use the **dsl-group** command to create a DSL group, and then use the **shdsl annex** command to define the G.991.2 standard for the DSL group.

**Examples**   The following example uses the **shdsl annex** command to define the annex standard for a 2-Pair DSL group on a Cisco HWIC-4SHDSL:

```
Router(config-controller-dsl-group)# shdsl annex ?

  A    Annex A of G.991.2 standard
  A-B  Annex A/B of G.991.2 standard
  B    Annex B of G.991.2 standard
  F    Annex F of G.991.2 standard
  F-G  Annex F/G of G.991.2 standard
  G    Annex G of G.991.2 standard

Router(config-controller-dsl-group)# shdsl annex g ?

  coding  16-TCPAM or 32-TCPAM line coding

Router(config-controller-dsl-group)# shdsl annex g coding ?

  16-TCPAM  16-TCPAM line coding
  32-TCPAM  32-TCPAM line coding

Router(config-controller-dsl-group)# shdsl annex g coding 16 ?

  <cr>
```
Example

```
Router(config-controller-dsl-group)#shdsl annex ?
  A        Annex A of G.991.2 standard
  A-B-F-G  Annex A/B/F/G of G.991.2 standard
  A-F      Annex A/F of G.991.2 standard
  B        Annex B of G.991.2 standard
  B-G      Annex B/G of G.991.2 standard
  F        Annex F of G.991.2 standard
  G        Annex G of G.991.2 standard

Router(config-controller-dsl-group)#shdsl annex f ?
coding  16-TCPAM, 32-TCPAM line coding or auto-TCPAM line coding
```

The above TCPAM configurations are valid only in case the termination is "co". In case the termination is CPE, user will see the following output

```
Router(config-controller-dsl-group)#shdsl annex f ?
<cr>
```

**Related Commands**

| Command | Description |
|---|---|
| **dsl-group** | Creates a DSL group and enters config controller DSL group mode. |
| **shdsl rate** | Defines the SHDSL rate. |

# shdsl rate

To define the single-pair high-bit-rate digital subscriber line (SHDSL) rate, use the **shdsl rate** command in config-controller-dsl-group mode.

> **shdsl rate** {*number* | **auto**}

| Syntax Description | *number* | SHDSL rate for the digital subscriber line (DSL) group. |
|---|---|---|
| | | **DSL Group with 1 Pair** |
| | | Annex A & B—192-2304 kbps |
| | | Annex F & G (32 TC-PAM)—768-5696 kbps |
| | | Annex F & G (16 TC-PAM)—2304-3840 kbps |
| | | **DSL Group with 2 Pairs** |
| | | Annex A & B—384-4608 kbps |
| | | Annex F & G (32 TC-PAM)—1536-11392 kbps |
| | | Annex F & G (16 TC-PAM)— 4608-7680 kbps |
| | | **DSL Group with 3 Pairs** |
| | | Annex A & B—576-6912 kbps |
| | | Annex F & G (32 TC-PAM)—2304-12288 kbps |
| | | Annex F & G (16 TC-PAM)— 6912-11520 kbps |
| | | **DSL Group with 4 Pairs** |
| | | Annex A & B—768-9216 kbps |
| | | Annex F & G (32 TC-PAM)—3072-16384 kbps |
| | | Annex F & G (16 TC-PAM)— 9216-15360 kbps |

Data rates supported for each Annex and TC-PAM 2-wire configuration. For EFM bonding configuration with multiple links, multiply the data rate ranges by the number of links in the EFM bonding group.

**2-wire, 16-TCPAM**

Annex A—192 – 2304 kbps

Annex B—192 – 2304 kbps

Annex F—2304 – 3840 kbps

Annex G—2304 – 3840 kbps

Annex A & F—192 – 3840 kbps

Annex B & G—192 – 3840 kbps

A & B & F & G—192 – 3840 kbps

**2-wire, 32-TCPAM**

Annex F—768 – 5696 kbps

Annex G—768 – 5696 kbps

Annex A & F—768 – 5696 kbps

Annex B & G—768 – 5696 kbps

Annex A & B & F & G—768 – 5696 kbps

**2-wire Auto-TCPAM**

Annex A—192 – 2304 kbps

Annex B—192 – 2304 kbps

Annex F—768 – 5696 kbps

Annex G—768 – 5696 kbps

Annex A & F—192 – 5696 kbps

Annex B & G—192 – 5696 kbps

Annex A & B & F & G—192 – 5696 kbps

| | |
|---|---|
| **auto** | Sets this SHDSL rate to automatic mode. |

**Command Default**    The command default is the maximum annex rate for the selected DSL group.

**Command Modes**    Config controller DSL group

| Command History | Release | Modification |
|---|---|---|
| | 12.4(15)T | This command was introduced for the Cisco HWIC-4SHDSL and HWIC-2SHDSL running on the Cisco 1841 router and on the Cisco 2800 and 3800 series access routers. |
| | 15.1(1)T | This command was modified. Support for the for the Cisco HWIC-4SHDSL-E is added. |

**Usage Guidelines**  Use the **dsl-group** command to create a DSL group, and then use the **shdsl annex** command to define the G.991.2 standard for the newly created DSL group. Define the SHDSL line rate with the **shdsl rate** command.

**Examples**  The following example defines the SHDSL line rate for DSL group 1, pairs 0-1 (2 pairs) on a Cisco HWIC-4SHDSL:

```
Router(config-controller)# dsl-group 1 pairs 0-1 ima

Router(config-controller-dsl-group)#
Sep 22 14:53:46.481: %HWIC_SHDSL-5-DSLGROUP_UPDOWN: SHDSL 0/2/0 dsl-group(1) state changed
to down.
Sep 22 14:53:48.481: %LINK-3-UPDOWN: Interface ATM0/2/IMA1, changed state to down
Sep 22 14:53:49.481: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/2/IMA1, changed
state to down

Router(config-controller-dsl-group)# shdsl annex ?

  A    Annex A of G.991.2 standard
  A-B  Annex A/B of G.991.2 standard
  B    Annex B of G.991.2 standard

Router(config-controller-dsl-group)# shdsl annex b ?

  <cr>
Router(config-controller-dsl-group)# shdsl rate auto

  <384-4608>  DSL Rate in kbps(line will train at the rate + 16kbps overhead)
  auto        auto rate mode
```

The following example shows adaptive rate configurations.

```
Router(config-controller-dsl-group)#shdsl rate ?
<768-9216>  DSL Rate (excluding DSL overhead) in kbps
auto        auto rate mode

Router(config-controller-dsl-group)#shdsl rate 1024

Router(config-controller-dsl-group)#shdsl rate auto ?
current  Current SNR Margin
snext    Self Near end cross talk

Router(config-controller-dsl-group)#shdsl rate auto current ?
<0 - 10>  0dB to 10dB

Router(config-controller-dsl-group)#shdsl rate auto snext ?
<-10 - 10>  -10dB to 10dB
```

| Related Commands | Command | Description |
|---|---|---|
| | **dsl-group** | Creates a DSL group and enters config controller DSL group mode. |
| | **shdsl annex** | Defines the G.991.2 standard for a DSL group. |

# show controllers shdsl

To display the status of the controller configured for single-pair high-bit-rate digital subscriber line (SHDSL) mode, use the **show controllers shdsl** command in privileged EXEC mode.

### Cisco HWIC-4SHDSL-E, HWIC-4SHDSL, and HWIC-2SHDSL

> **show controllers shdsl** *slot number/subslot number/port number* {**brief** | **detailed**}

### Cisco IAD2420

> **show controller shdsl** *number*

| Syntax Description | | |
|---|---|---|
| | **brief** | Provides a summary of the controller's status. |
| | **detailed** | Provides a detailed report of the controller's status. |
| | *number* | SHDSL controller number. The valid controller number for SHDSL mode is 0. |
| | *slot number* | Slot on the router in which the HWIC is installed. |
| | *subslot number* | Subslot on the router in which the HWIC is installed. |
| | *port number* | Port on the router in which the HWIC is installed. By default, the Cisco HWIC-4SHDSL-E, HWIC-4SHDSL, and HWIC-2SHDSL use port number 0. |

**Command Defaults**    Controller number

**Command Modes**    Privileged EXEC

| Command History | Release | Modification |
|---|---|---|
| | 12.4(15)T | This command was updated for the Cisco HWIC-4SHDSL and HWIC-2SHDSL running on the Cisco 1841 router and on the Cisco 2800 and 3800 series access routers. |
| | 12.2(8)T | This command was introduced on Cisco IAD2420 series. |
| | 15.1(1)T | This command was modified. Support for the Cisco HWIC-SHDSL-E is added. |

**Usage Guidelines**    This command is used to display the controller mode, the controller number, and associated statistics.

**Examples**    **Cisco HWIC-4SHDSL, and HWIC-2SHDSL**

The following example shows the status of a Cisco HWIC-4SHDSL controller in slot 0, subslot 2, port 0 on a Cisco access router:

```
Router# show controllers shdsl 0/2/0 brief

Controller SHDSL 0/2/0 is UP
  Hardware is HWIC-4SHDSL, rev 2 on slot 0, hwic slot 2
  Capabilities: IMA, M-pair, 2/4 wire, Annex A, B, F & G, CPE termination
  cdb=0x43EB384C, plugin=0x43DE9410, ds=0x43E9A1C4 base=0xB8000000
  FPGA Version is REL.3.4.0, NIOSII FW:Ver 2.6, status Running
  SDC-16i HW:Rev 1.2, status UP, FW:Ver 1.2-1.1.3__57, status Running
  SDFE-4 HW:Rev 1.2, status UP, FW:Ver 1.1-1.5.2__001  , status Running
  NIOSII Firmware image: System
  SDC16i Firmware image: System
  SDFE4  Firmware image: System
  Number of pairs 4, number of groups configured 1
  Ignored CLI cmds(0), Event buffer: in use(0), failed(0)
  Group (0) is Not configured.
  Group (1) info:
        Type: M-pair over g.shdsl, status: Configure Firmware
        Interface: ATM0/2/1, hwidb: 0x43F04EA0, UTOPIA phy 1
        Configured/active num links: 2/0, bit map: 0x3/0x0
        Line termination: CPE, line mode: M-pair, Annex-B, PMMS disabled
        Line coding: 16-TCPAM, configured/actual rate: 4608/0 kbps
        SHDSL wire-pair (0) is in DSL DOWN state
        SHDSL wire-pair (1) is in DSL config state
Router#
```

### Cisco HWIC-4SHDSL-E

```
Router# show controller shdsl 0/0/0 brief
Controller SHDSL 0/0/0 is UP
  Hardware is HWIC-4SHDSL-E, rev 0 on slot 0, hwic slot 0
  Capabilities: EFM, 2-wire, Annex A, B, F & G, CO termination
  cdb=0x650DB800, plugin=0x650C09A0, ds=0x650C0A84 base=0x43800000
  FPGA Version is REL.3.3.1,
  Vendor: Conexant, Chipset: CX98124
  Firmware file: System, Firmware version: G88
  Number of pairs:  4, number of groups configured: 1
  Group info:
        Type: EFM bond g.shdsl, status: Up
        Interface: Ethernet0/0/0, hwidb: 0x6519D6DC
        Configured/active num links: 4/4, bit map: 0xF/0xF
        Line termination: CO, Annex: B
        Line coding: 16-TCPAM group data rate is 9216 kbps
        Loopback type: None
        Dying Gasp: Present
        Mode: Fixed
        SHDSL wire-pair (0) is in DSL UP state
                LOSW Defect alarm: none
                CRC per second alarm: none
        SHDSL wire-pair (1) is in DSL UP state
                LOSW Defect alarm: none
                CRC per second alarm: none
        SHDSL wire-pair (2) is in DSL UP state
                LOSW Defect alarm: none
                CRC per second alarm: none
        SHDSL wire-pair (3) is in DSL UP state
                LOSW Defect alarm: none
                CRC per second alarm: none
```

### Cisco IAD2420 Series

The following example displays the status of the controller that is configured for SHDSL mode on a Cisco IAD2420 series IAD:

```
Router# show controller shdsl 0
```

```
SHDSL 0 controller UP
SLOT 3: Globespan xDSL controller chipset
Frame mode: Serial ATM
Configured Line rate: 1160Kbps
Line Re-activated 0 times after system bootup
LOSW Defect alarm: None
CRC per second alarm: None
Line termination: CPE
FPGA Revision: 9
```

**Related Commands**

| Command | Description |
| --- | --- |
| **controller shdsl 0** | Configures the controller status and the controller number. |

# Additional References

The following references provide links to related topics, such as the Cisco IOS software resource center, interface card documentation, and additional hardware documentation.

## Related Documents

| Related Topic | Document Title |
|---|---|
| Cisco IOS software | *Cisco IOS Software*<br><br>http://www.cisco.com/en/US/products/sw/iosswrel/tsd_products_support_category_home.html |
| Interface Cards | *Cisco Interface Cards Install and Upgrade Guides*<br><br>http://www.cisco.com/en/US/products/hw/modules/ps2641/prod_installation_guides_list.html<br><br>*Cisco Network Modules and Interface Cards Regulatory Compliance and Safety Information*<br><br>http://www.cisco.com/en/US/docs/routers/access/interfaces/rcsi/IOHrcsi.html |
| Technical documentation, including feedback and assistance | *What's New in Cisco Product Documentation* (including monthly listings of new and revised documents) at:<br><br>http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html |

## Standards

| Standard | Title |
|---|---|
| • ITU G.991.2 | • Annex A<br>• Annex B<br>• Annex F<br>• Annex G |
| • af-phy-0086.001 | • Inverse Multiplexing over ATM version 1.1 |

## MIBs

| MIB | MIBs Link |
|---|---|
| • Chassis MIB<br>• Entity MIB<br>• HDSL2-SHDSL-LINE MIB<br>• Interface MIB | To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:<br><br>http://www.cisco.com/go/mibs |

# RFCs

| RFC | Title |
|-----|-------|
| • G.SHDSL— RFC# 3276 | *HDSL2-SHDSL-LINE MIB* |

# Technical Assistance

| Description | Link |
|-------------|------|
| The Cisco Technical Support & Documentation 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 |

# Verifying EFM Configuration

Verifying EFM Configuration:

- To verify current configuration, use the **show running-config** command.
- To view ethernet interface statistics, use the **show interface ethernet** command.
- To view Ethernet controller statistics, use the **show controller ethernet** command.
- To view shdsl controller statistic, use the **show controller shdsl** command.
- Debug commands are available with the **debug shdsl-efm** prefix.

# Example

```
Router# sh controllers ethernet 0/0/0

IOS DS Rx/Tx Counters:

--------------------------:

Tx Head    = 0

Tx Tail    = 0

Tx Count   = 0

Rx Head    = 0

Rx Tail    = 0


 IOS DS Misc counters

----------------------

HWIC Host Reg Addr  = 0xB0A00000
```

```
HWIC Common Reg Addr = 0xB0000000

HW Namestring       = Ethernet0/0/0

Tx Ring Entries     = 64

Rx Ring Entries     = 64

IRQ 1 Count         = 0

DDR Tx CRC          = 0

DDR Clock Miss      = 0

DDR Tx Overrun      = 0

MAC Tx Underrun     = 0

MAC Rx Overrun      = 0

MAC Large Frame     = 0

MAC Rx CRC          = 0


 Multicast related information

 ------------------------------

 Software MAC address filter(hash:length/addr/mask/hits):

-------------------------------------------------------

0x00:  0  ffff.ffff.ffff  0000.0000.0000      0

0x0F:  0  001b.d495.ccdb  0000.0000.0000      0

0xC0:  0  0180.c200.0002  0000.0000.0000      0

0xC0:  1  0100.0ccc.cccc  0000.0000.0000      0

0xC5:  0  0180.c200.0007  0000.0000.0000      0

Hardware MAC address filter table:

-----------------------------------

Multicast ingress filter control reg is  0x1F


 Exact filter at address: address to be filtered

--------------------------------------------------

0xB0002104: 001B.D495.CCDB

0xB000210A: FFFF.FFFF.FFFF

0xB0002110: 0180.C200.0007

0xB0002116: 0180.C200.0002
```

```
0xB000211C: 0100.0CCC.CCCC

0xB0002122: 0000.0000.0000

0xB0002128: 0000.0000.0000

 0xB000212E: 0000.0000.0000

0xB0002134: 0000.0000.0000

0xB000213A: 0000.0000.0000

 Exact filter at address 0x45577C80 5 free, in_use: 1 1 1 1 1 0 0 0 0 0

 Multicast@0x45577CFC hash:

 hash table 0 : 0000

 hash table 1 : 0000

 hash table 2 : 0000

 hash table 3 : 0000

 Multicast hash key instances:

 0 0 0 0 0 0 0 0  0 0 0 0 0 0 0 0  0 0 0 0 0 0 0 0  0 0 0 0 0 0 0 0

 0 0 0 0 0 0 0 0  0 0 0 0 0 0 0 0  0 0 0 0 0 0 0 0  0 0 0 0 0 0 0 0

MAC110 general registers

Control Register (0x8030):

 MAC Enable  1  Short Packet Padding  0

 Loopback Mode  0  TXCRC Gen  1



Status Register (0x0000):

 TX MAC pause 0  RX MAC pause 0



MAC110 Frame statistics registers

----------------------------------

Egress frame counters:

----------------------

Frame Count        0

Byte Count        0

Abort Count        0

Tx64 Bytes Packet Count0

Tx65_to_127 Bytes Packet Count0
```

```
Tx128_to_255 Bytes Packet Count0

Tx256_to_511  Bytes Packet Count 0

Tx512_to_1023 Bytes Packet Count 0

Tx1024_to_1518 Bytes Packet Count 0

TxUndersize Packet Count   0

TxOversize  Packet Count   0


Ingress frame counters:

------------------------

Frame Count          0

Byte  Count          0

Multicast Filt Drops  0

Multicast Frames      0

CRC Error Count       0

Congestion Drop Count 0

Oversize Drop Count   0

Pause Frame Count     0

Rx64 bytes Packet Count   0

Rx65_to_127 bytes Packet Count 0

Rx128_to_255 bytes Packet Count  0

Rx256_to_511 bytes Packet Count  0

Rx512_to_1023 bytes Packet Count  0

Rx1024_to_1518 bytes Packet Count 0

RxUndersize Packet Count   0

RxOversize  Packet  Count  0


******* HWIC Host Registers at B0A00000 *******

Status (0x00):

    Card Present Low          0       Graceful Stop Tx Complete   0

Config (0x0000120E):

    Hwic Reset                0       Hwic Host Reset             0

    Hwic IRQ2 Type           Net      Hwic IRQ1 Type             Err
```

```
        Rx Queue Watermark Enable   0        Auto XOFF When Full        0

        Rx Int On Last              0        Graceful Stop Tx           0

        Generic Rx Enable           1        Generic Tx Enable          1

        DDR Enable                  1        Loopback                   0

Error Interrupt Enable (0x3DDFF):

        Rx Done Error Int           1        Card Present Change Int    1

        Hwic Int Frame Error Int    0x0D     Tx First Last Error Int    1

        Tx Done Error Int           1        IRQ2 Int                   0

       Rx Done Error Int            1        Card Present Change Int    1

        Hwic Int Frame Error Int    0x0D     Tx First Last Error Int    1

        Tx Done Error Int           1        IRQ2 Int                   0

        IRQ1 Int                    1        Host Specific Error Int    1

        Rx Overrun Int              1        DDR RxClk Missing Int      1

        Reg RW Timeout Int          1        Reg RW Error Int           1

        Rx CRC Int                  1        Rx Format Error Int        1

        DMA Error Int               1

Management Interrupt Enable (0x7000):

        Hwic Int Frame Mgmt Int     0x07

        IRQ2 Int                    0

        IRQ1 Int                    0        Graceful Stop Tx Int       0

Network Interrupt Enable (0x1800):

        Rx Frame Drop Int           0        Generic Frame Tx Int       1

        Generic Frame Rx Int        1        DMA Write Int              0

        IRQ2 Int                    0        IRQ1 Int                   0

        Int Frame Network Int       0x00

HWICRegisterOffset          0x0000      HWICRegisterErrorAddress  0x00000000

HWICRegisterTimeout         0x0000C350

TxControlFrameCounter       0x34B442    RxControlFrameCounter     0x1363C1

TxDataFrameCounter          0x000000    RxDataFrameCounter        0x000000

RegisterRWErrorCounter      0x0000      RxOverrunErrorCounter     0x0000

RxCRCErrorCounter           0x0000      RxFrameDropCounter        0x0000

TxBufferExtension           0x00        RxBufferExtension         0x00
```

```
HWICQueueBaseExtension   0x00         HWICQueueBase           0x0F6E

TXQueueTailBase Register  0xD000

TxQueueBase              0x1A         TxQueueTail             0x00

TxQueueSize              0x40         TxQueueHead             0x00

RxQueueHeadBase Register  0xD800

RxQueueBase              0x1B         RxQueueHead             0x00

RxQueueSize              0x40         RxQueueTail             0x00

RxBufferSize             0x060C       RxQueueHighWaterMark    0x00

RxQueueLowWaterMark      0x00         DMAOffsetExtension      0x00

DMAOffset                0x0000       DMAWindow               0x0000



******* HWIC Common Registers at B0000000 *******

HWIC ID:      0x2

HWIC Revision: 0x0

HWIC Status:   0x0

HWIC DDR TXCRC:0x0

HWIC Control:  0x8040

    DDR  Enable           1       Software Reset          0

    Interrupt Module Reset  0     GDF Module Reset        0

    DMA Module Reset      0       Flow Control Reset      0

    IRQ2 Global Int Mask  0       IRQ1 Global Int Mask    1

    DDR TXCRC Int Mask    0       DDR TXClk Loss Int Mask 0

    TX Fifo Overrun Int Mask 0

HWIC Interrupt Event: 0x0

    DDR TXCRC Int         0       DDR TXClk Loss Int      0

    TX Fifo Overrun Int   0

HWIC Diag 1: 0x0

HWIC Diag 2: 0x5



******* HWIC Rx/Tx Rings *******

 rxr @(F6ED800) head (0) tail (0) entries (64) serviced (0)

 txr @(F6ED000) head (0) tail (0) entries (64) serviced (0) count (0)
```

```
bd(F6ED800): flags 0000 length 0000 address 0F418D80

bd(F6ED808): flags 0000 length 0000 address 0F418700

bd(F6ED810): flags 0000 length 0000 address 0F418080

bd(F6ED818): flags 0000 length 0000 address 0F417A00

bd(F6ED820): flags 0000 length 0000 address 0F417380

bd(F6ED828): flags 0000 length 0000 address 0F416D00

bd(F6ED830): flags 0000 length 0000 address 0F416680

bd(F6ED838): flags 0000 length 0000 address 0F416000

bd(F6ED840): flags 0000 length 0000 address 0F415980

bd(F6ED848): flags 0000 length 0000 address 0F415300

bd(F6ED850): flags 0000 length 0000 address 0F414C80

bd(F6ED858): flags 0000 length 0000 address 0F414600

bd(F6ED860): flags 0000 length 0000 address 0F413F80

bd(F6ED868): flags 0000 length 0000 address 0F413900

bd(F6ED870): flags 0000 length 0000 address 0F413280

bd(F6ED878): flags 0000 length 0000 address 0F412C00

bd(F6ED880): flags 0000 length 0000 address 0F412580

bd(F6ED888): flags 0000 length 0000 address 0F411F00

bd(F6ED890): flags 0000 length 0000 address 0F411880

bd(F6ED898): flags 0000 length 0000 address 0F411200

bd(F6ED8A0): flags 0000 length 0000 address 0F410B80

bd(F6ED8A8): flags 0000 length 0000 address 0F410500

bd(F6ED8B0): flags 0000 length 0000 address 0F40FE80

bd(F6ED8B8): flags 0000 length 0000 address 0F40F800

bd(F6ED8C0): flags 0000 length 0000 address 0F40F180

bd(F6ED8C8): flags 0000 length 0000 address 0F40EB00

bd(F6ED8D0): flags 0000 length 0000 address 0F40E480

bd(F6ED8D8): flags 0000 length 0000 address 0F40DE00

bd(F6ED8E0): flags 0000 length 0000 address 0F40D780

bd(F6ED8E8): flags 0000 length 0000 address 0F40D100

bd(F6ED8F0): flags 0000 length 0000 address 0F40CA80

bd(F6ED8F8): flags 0000 length 0000 address 0F40C400
```

```
 bd(F6ED900): flags 0000 length 0000 address 0F40BD80

 bd(F6ED908): flags 0000 length 0000 address 0F40B700

 bd(F6ED910): flags 0000 length 0000 address 0F40B080

 bd(F6ED918): flags 0000 length 0000 address 0F40AA00

 bd(F6ED920): flags 0000 length 0000 address 0F40A380

 bd(F6ED928): flags 0000 length 0000 address 0F409D00

 bd(F6ED930): flags 0000 length 0000 address 0F409680

bd(F6ED938): flags 0000 length 0000 address 0F428DC0

 bd(F6ED940): flags 0000 length 0000 address 0F428740

 bd(F6ED948): flags 0000 length 0000 address 0F4280C0

 bd(F6ED950): flags 0000 length 0000 address 0F427A40

 bd(F6ED958): flags 0000 length 0000 address 0F4273C0

 bd(F6ED960): flags 0000 length 0000 address 0F426D40

 bd(F6ED968): flags 0000 length 0000 address 0F4266C0

 bd(F6ED970): flags 0000 length 0000 address 0F426040

 bd(F6ED978): flags 0000 length 0000 address 0F4259C0

 bd(F6ED980): flags 0000 length 0000 address 0F425340

 bd(F6ED988): flags 0000 length 0000 address 0F424CC0

 bd(F6ED990): flags 0000 length 0000 address 0F424640

 bd(F6ED998): flags 0000 length 0000 address 0F423FC0

 bd(F6ED9A0): flags 0000 length 0000 address 0F423940

 bd(F6ED9A8): flags 0000 length 0000 address 0F4232C0

 bd(F6ED9B0): flags 0000 length 0000 address 0F422C40

 bd(F6ED9B8): flags 0000 length 0000 address 0F4225C0

 bd(F6ED9C0): flags 0000 length 0000 address 0F421F40

 bd(F6ED9C8): flags 0000 length 0000 address 0F4218C0

 bd(F6ED9D0): flags 0000 length 0000 address 0F421240

 bd(F6ED9D8): flags 0000 length 0000 address 0F420BC0

 bd(F6ED9E0): flags 0000 length 0000 address 0F420540

 bd(F6ED9E8): flags 0000 length 0000 address 0F41FEC0

 bd(F6ED9F0): flags 0000 length 0000 address 0F41F840

 bd(F6ED9F8): flags 0000 length 0000 address 0F41F1C0
```

```
bd(F6ED000): flags 0001 length 0000 address 00000000

bd(F6ED008): flags 0001 length 0000 address 00000000

bd(F6ED010): flags 0001 length 0000 address 00000000

bd(F6ED018): flags 0001 length 0000 address 00000000

bd(F6ED020): flags 0001 length 0000 address 00000000

bd(F6ED028): flags 0001 length 0000 address 00000000

bd(F6ED030): flags 0001 length 0000 address 00000000

bd(F6ED038): flags 0001 length 0000 address 00000000

bd(F6ED040): flags 0001 length 0000 address 00000000

bd(F6ED048): flags 0001 length 0000 address 00000000

bd(F6ED050): flags 0001 length 0000 address 00000000

bd(F6ED058): flags 0001 length 0000 address 00000000

bd(F6ED060): flags 0001 length 0000 address 00000000

bd(F6ED068): flags 0001 length 0000 address 00000000

bd(F6ED070): flags 0001 length 0000 address 00000000

bd(F6ED078): flags 0001 length 0000 address 00000000

bd(F6ED080): flags 0001 length 0000 address 00000000

bd(F6ED088): flags 0001 length 0000 address 00000000

bd(F6ED090): flags 0001 length 0000 address 00000000

bd(F6ED098): flags 0001 length 0000 address 00000000

bd(F6ED0A0): flags 0001 length 0000 address 00000000

bd(F6ED0A8): flags 0001 length 0000 address 00000000

bd(F6ED0B0): flags 0001 length 0000 address 00000000

bd(F6ED0B8): flags 0001 length 0000 address 00000000

bd(F6ED0C0): flags 0001 length 0000 address 00000000

bd(F6ED0C8): flags 0001 length 0000 address 00000000

bd(F6ED0D0): flags 0001 length 0000 address 00000000

bd(F6ED0D8): flags 0001 length 0000 address 00000000

bd(F6ED0E0): flags 0001 length 0000 address 00000000

bd(F6ED0E8): flags 0001 length 0000 address 00000000

bd(F6ED0F0): flags 0001 length 0000 address 00000000

bd(F6ED0F8): flags 0001 length 0000 address 00000000
```

```
bd(F6ED100): flags 0001 length 0000 address 00000000

bd(F6ED108): flags 0001 length 0000 address 00000000

bd(F6ED110): flags 0001 length 0000 address 00000000

bd(F6ED118): flags 0001 length 0000 address 00000000

bd(F6ED120): flags 0001 length 0000 address 00000000

bd(F6ED128): flags 0001 length 0000 address 00000000

bd(F6ED130): flags 0001 length 0000 address 00000000

bd(F6ED138): flags 0001 length 0000 address 00000000

bd(F6ED140): flags 0001 length 0000 address 00000000

bd(F6ED148): flags 0001 length 0000 address 00000000

bd(F6ED150): flags 0001 length 0000 address 00000000

bd(F6ED158): flags 0001 length 0000 address 00000000

bd(F6ED160): flags 0001 length 0000 address 00000000

bd(F6ED168): flags 0001 length 0000 address 00000000

bd(F6ED170): flags 0001 length 0000 address 00000000

bd(F6ED178): flags 0001 length 0000 address 00000000

bd(F6ED180): flags 0001 length 0000 address 00000000

bd(F6ED188): flags 0001 length 0000 address 00000000

bd(F6ED190): flags 0001 length 0000 address 00000000

bd(F6ED198): flags 0001 length 0000 address 00000000

bd(F6ED1A0): flags 0001 length 0000 address 00000000

bd(F6ED1A8): flags 0001 length 0000 address 00000000

bd(F6ED1B0): flags 0001 length 0000 address 00000000

bd(F6ED1B8): flags 0001 length 0000 address 00000000

bd(F6ED1C0): flags 0001 length 0000 address 00000000

bd(F6ED1C8): flags 0001 length 0000 address 00000000

bd(F6ED1D0): flags 0001 length 0000 address 00000000

bd(F6ED1D8): flags 0001 length 0000 address 00000000

bd(F6ED1E0): flags 0001 length 0000 address 00000000

bd(F6ED1E8): flags 0001 length 0000 address 00000000

bd(F6ED1F0): flags 0001 length 0000 address 00000000

bd(F6ED1F8): flags 0001 length 0000 address 00000000
```

```
Router#sh controller shdsl 0/0/0

Controller SHDSL 0/0/0 is UP

  Hardware is HWIC-4SHDSL-E, rev 0 on slot 0, hwic slot 0

  Capabilities: EFM, 2-wire, Annex A, B, F & G, CPE termination

  cdb=0x454B1D54, plugin=0x45496F40, ds=0x45496FD8 base=0xB0000000

  FPGA Version is REL.3.3.1,

  Vendor: Conexant, Chipset: CX98124, Firmware version: G88,

  Number of pairs:  4, number of groups configured: 1

  Group info:

        Type: EFM bond g.shdsl, status: Up

        Interface: Ethernet0/0/0, hwidb: 0x45573C30

        Configured/active num links: 4/4, bit map: 0xF/0xF

        Line termination: CPE, Annex: B

        Line coding: 16-TCPAM group data rate is 9216 kbps

         EFM bonding group is configured

         EFM bonding group stats:

                Tx Pkts: 0, Rx Pkts: 0

                Frag Loss: 0, Bad Frag: 0, Buffer Overflow: 0

                SOP Loss: 0, EOP Loss: 0

        Loopback type: None

        Dying Gasp: Present

        Mode: Fixed

        SHDSL wire-pair (0) is in DSL UP state

                LOSW Defect alarm: none

                CRC per second alarm: none

                Termination: CPE, Line mode: EFM bond, Annex: B

                Line coding: 16-TCPAM,

                Configured data rate/actual data rate: 2304/2304

                Modem status: GTI_DATA_OP
```

```
                              Last Failed State: None

                              Framer Sync Status: 1

                              Loop Attenuation: 0 dB

                              Transmit Power: 8.5 dB

                              SNR margin: 17 dB

                              Current 15 minute statistics (Time elapased 62 seconds)

                                       ES:1, SES:0, CRC:2, LOSW:0, UAS:32

                              Previous 15 minute statistics

                                       ES:0, SES:0, CRC:0, LOSW:0, UAS:0

                              Current 24 hr statistics

                                       ES:1, SES:0, CRC:2, LOSW:0, UAS:32

                              Previous 24 hr statistics

                                       ES:0, SES:0, CRC:0, LOSW:0, UAS:0

                              EFM stats:

                                       Receive stats:

                                               Pkts:0

                                               CRC:0

                                       Transmit stats:

                                               Pkts:0

              SHDSL wire-pair (1) is in DSL UP state

                              LOSW Defect alarm: none

                              CRC per second alarm: none

                              Termination: CPE, Line mode: EFM bond, Annex: B

                              Line coding: 16-TCPAM,

                              Configured data rate/actual data rate: 2304/2304

                              Modem status: GTI_DATA_OP

                              Last Failed State: None

                              Framer Sync Status: 1

                              Loop Attenuation: 0 dB

                              Transmit Power: 8.5 dB

                              SNR margin: 16 dB

                              Current 15 minute statistics (Time elapased 87 seconds)
```

```
                                        ES:1, SES:0, CRC:2, LOSW:0, UAS:32

                        Previous 15 minute statistics

                                        ES:0, SES:0, CRC:0, LOSW:0, UAS:0

                        Current 24 hr statistics

                                        ES:1, SES:0, CRC:2, LOSW:0, UAS:32

                        Previous 24 hr statistics

                                        ES:0, SES:0, CRC:0, LOSW:0, UAS:0

                        EFM stats:

                                Receive stats:

                                        Pkts:0

                                        CRC:0

                                Transmit stats:

                                        Pkts:0

        SHDSL wire-pair (2) is in DSL UP state

                        LOSW Defect alarm: none

                        CRC per second alarm: none

                        Termination: CPE, Line mode: EFM bond, Annex: B

                        Line coding: 16-TCPAM,

                        Configured data rate/actual data rate: 2304/2304

                        Modem status: GTI_DATA_OP

                        Last Failed State: None

                        Framer Sync Status: 1

                        Loop Attenuation: 0 dB

                        Transmit Power: 8.5 dB

                        SNR margin: 16 dB

                        Current 15 minute statistics (Time elapased 93 seconds)

                                        ES:1, SES:0, CRC:1, LOSW:0, UAS:32

                        Previous 15 minute statistics

                                        ES:0, SES:0, CRC:0, LOSW:0, UAS:0

                        Current 24 hr statistics

                                        ES:1, SES:0, CRC:1, LOSW:0, UAS:32

                        Previous 24 hr statistics
```

```
                                    ES:0, SES:0, CRC:0, LOSW:0, UAS:0

                EFM stats:

                        Receive stats:

                                Pkts:0

                                CRC:0

                        Transmit stats:

                                Pkts:0

        SHDSL wire-pair (3) is in DSL UP state

                LOSW Defect alarm: none

                CRC per second alarm: none

                Termination: CPE, Line mode: EFM bond, Annex: B

                Line coding: 16-TCPAM,

                Configured data rate/actual data rate: 2304/2304

                Modem status: GTI_DATA_OP

                Last Failed State: None

                Framer Sync Status: 1

                Loop Attenuation: 0 dB

                Transmit Power: 8.5 dB

                SNR margin: 16 dB

                Current 15 minute statistics (Time elapsed 145 seconds)

                        ES:1, SES:0, CRC:3, LOSW:0, UAS:32

                Previous 15 minute statistics

                        ES:0, SES:0, CRC:0, LOSW:0, UAS:0

                EFM stats:

                        Receive stats:

                                Pkts:0

                                CRC:0

                        Transmit stats:

                                Pkts:0
#
```

To view the status of all links, use the **show controllers shdsl** command. If the line is down, the following statement appears: "Line is not active". Some of the values may not be accurate. You can also verify whether the equipment type and operating mode configuration are correct for your application.

Cisco and the Cisco Logo are trademarks of Cisco Systems, Inc. and/or its affiliates in the U.S. and other countries. A listing of Cisco's trademarks can be found at www.cisco.com/go/trademarks. Third party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1005R)

Any Internet Protocol (IP) addresses used in this document are not intended to be actual addresses. Any examples, command display output, and figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses in illustrative content is unintentional and coincidental.