Troubleshooting

This chapter provides information about isolating faults in the Cisco 6015 system. Most problems in a Cisco 6015 system can be traced to one of the following hardware components:

- NI-2 card
  - DS3+T1/E1 inverse multiplexing over ATM (IMA) NI-2 card
  - Industrial temperature (ITEMP) DS3+T1/E1 IMA NI-2 card
  - OC-3c/OC-3c NI-2 card
- Line cards
  - Quad-port flexi ATU-C line card (4xflexi)
  - Octal-port Discrete Multitone (DMT) ATU-C line card (8xDMT)
  - Octal-port DMT ATU-C over ISDN line card (8xDMT over ISDN)
  - Octal-port single-pair high-speed digital subscriber line, also known as symmetric high bit-rate digital subscriber loop (G.SHDSL) line card (8xG.SHDSL)
- Input/Output (I/O) module
- DSL interface module
- DC power entry module (PEM)
- Fan module
- AC/DC converter

Warning **Only trained and qualified personnel should be allowed to install, replace, or service this equipment.**

This chapter consists of three major sections:

- System-Wide Problems, page 6-4: Troubleshooting faults that affect the entire system
- Cisco 6015 Component-Specific Problems, page 6-9: Troubleshooting faults that affect subsystems
- Alarms, page 6-18: Descriptions of alarms that can signal problems or help with troubleshooting

6.1 Hot-Swappable FRUs

The following are the only components in the Cisco 6015 that are both hot-swappable and field-replaceable units (FRUs):

- DS3+T1/E1 IMA NI-2 card
- ITEMP DS3+T1/E1 IMA NI-2 card
- OC-3c/OC-3c NI-2 card
- 4xflexi
- 8xDMT
- 8xDMT over ISDN
- 8xG.SHDSL
- Fan module

However, hot swapping some FRUs causes an interruption in service. See Table 6-1 for information on service interruptions caused by replacing FRUs.

Note The I/O module, DSL interface module, and DC PEM are FRUs; however, they are not hot swappable. The system must be powered down before these modules are replaced. These modules must be installed and removed by a trained technician only.

Table 6-1 Service Interruptions Caused by Replacing FRUs

FRU	Does Hot Swapping Interrupt Service?	Notes
DS3+T1/E1 IMA, ITEMP DS3+T1/E1 IMA, or OC-3c/OC-3c NI-2 card	Yes	Service is interrupted for the entire system until the NI-2 card is replaced.
4xflexi, 8xDMT, 8xDMT over ISDN, or 8xG.SHDSL	Yes	Service is interrupted only for the subscribers assigned to that particular line card.
I/O module	—	The module is not hot swappable. The system must be powered down before this module is replaced.
DSL interface module	—	The module is not hot swappable. The system must be powered down before this module is replaced.
DC PEM	—	The module is not hot swappable. The system must be powered down before this module is replaced.
Fan module	No	—

Note Reseating the 8xDMT over ISDN during simultaneous DSL and ISDN traffic operation results in the ISDN signal being temporarily interrupted.

To reseat the 8xDMT over ISDN in the chassis, shut down all the subscriber ports on the line card, wait one minute, and then replace the line card.

6.2 Basic Checks

Before using the troubleshooting tables in this chapter, make the following basic checks:

- Are the ports properly configured? Refer to these sources for configuration instructions:
  - *Configuration Guide for Cisco DSLAMs with NI-2*
  - *Command Reference for Cisco DSLAMs with NI-2*
  - Cisco IOS Release 12.2 information on the World Wide Web—http://www.cisco.com/univercd/cc/td/doc/product/dsl_prod/ios_dsl/rel122/index.htm
  - *ATM Switch Router Software Configuration Guide*
  - *ATM Switch Router Command Reference Guide*
- Are power leads and data cables firmly connected at both ends?
- Are all cards firmly seated and securely locked in the chassis?
- Is the fan module properly installed and secured to the chassis?
- Are the I/O module, DSL interface module, and DC PEM properly secured to the chassis?

6.3 Contacting the Cisco TAC for Help

In certain situations, the troubleshooting tables in this chapter direct you to contact the Cisco Technical Assistance Center (TAC) for help. If you have a maintenance contract or if your hardware is under warranty, call the TAC at 1 800 553 2447 (North America only), 1 408 526 7209, or visit this URL for a worldwide list of TAC regional telephone numbers:

http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml

6.4 System-Wide Problems

This section offers suggestions for problems that affect the entire Cisco 6015 system.

Symptoms	Steps to Take
System fails to come up.	1. Check the POWER LED on the NI-2 card and the STATUS LEDs on the line cards. If all LEDs are off, troubleshoot the DC PEM. See the "DC PEM Problems" section on page 6-16. 2. If any green LEDs are on, the system has power. Check the STATUS LED on the NI-2 card. If the STATUS LED is off, refer to the "NI-2 Card Problems" section on page 6-9. 3. If the Cisco 6015 is set to boot from a remote device over the network, make sure the remote device is up, that its network connection is solid, and that it contains the boot file. (The Cisco 6015 tries to boot over the network for a configured period, usually 5 to 15 minutes. If it is unable to boot over the network, it will eventually boot from bootflash.) 4. Try to establish a console connection to the Cisco 6015. If you cannot connect, see the steps for the symptom "You cannot establish a console or Telnet connection to the system." 5. If you achieve a console connection: – Examine the command prompt. If the prompt says `rommon 1>`, the problem could be in flash memory, in bootflash, in an incorrectly set boot configuration register, or in an incorrect file name in a **boot system** command in the startup-config file. Refer to the *Configuration Guide for Cisco DSLAMs with NI-2* for information on setting and interpreting configuration registers, configuring flash memory, and editing the startup-config file. To select an image to boot the system from flash, enter **dir flash:**. In the resulting display, find the name of the software image. Then enter **boot flash:***imagename*, replacing *imagename* with the name of the software image. The system boots from flash. – If you see a normal Cisco IOS prompt, which usually contains the name of the system (default is `DSLAM>`), enter **show oir status**. If the results indicate that the line card is loading software, wait a few minutes for the port to come back up.

Symptoms	Steps to Take
You cannot establish a console or Telnet connection to the system.	1. For a console problem, check the terminal settings against the list of settings in the "Connect a Console Terminal" section on page 3-25 (for a Cisco 6015 with a POTS splitter configuration) or the "Connect a Console Terminal" section on page 4-23 (for a Cisco 6015 without a POTS splitter configuration). 2. For a Telnet problem: – Telnet will not connect if the NI-2 card is not booted completely. – If you are connecting to the Cisco 6015 through the Ethernet interface, check the configuration of your LAN for both the Cisco 6015 and the Telnet source. – If you are connecting to the Cisco 6015 through an ATM interface, make sure that PVCs are set up between the two devices and that the map list is correctly configured. Enter the command **show running-config** to display this information. – If the Telnet source and the Cisco 6015 are on different networks, make sure that static routes are configured at both ends so that the two devices can communicate. To check, use the **ping** command to ping each device from the other (that is, ping the Cisco 6015 from the Telnet source, and ping the Telnet source from the Cisco 6015). Alternatively, ping your default gateways from each end of the connection. 3. For both console and Telnet problems: – Check the cabling and connectors between the terminal or Telnet source and the Cisco 6015. Refer to Appendix C, "Connector and Pinout Specifications," to check pinouts. – Press the **Reset** button on the NI-2 card faceplate to reset the card. – If the problem persists, replace the NI-2 card.
System experiences a critical, major, or minor alarm.	1. Enter the command **show facility-alarm status**. Note the affected slot and port, if any, and the description of the problem. 2. If no slot number is indicated, enter **show environment all** and examine the results for an indication of which FRU is at fault. Refer to the "Cisco 6015 Component-Specific Problems" section on page 6-9 for instructions on troubleshooting that FRU. 3. If atm0/0, atm0/1, atm0/2, atm0/3, atm0/4, atm0/5, atm0/6, atm0/7, atm0/8, atm0/9, atm0/ima0, atm0/ima1, atm0/ima2, or atm0/ima3 is indicated: – Enter a **show int** command for the interface (for example, **show int atm0/1**). Results may indicate a physical layer problem (Loss of Signal, for example). Refer to the "NI-2 Card Problems" section on page 6-9 for instructions on troubleshooting the NI-2 card. – Enter **show controllers** commands for all trunk and subtending ports. (The ports are atm0/1, atm0/2, atm0/3, atm0/4, atm0/5, atm0/6, atm0/7, atm0/8, atm0/9, atm0/ima0, atm0/ima1, atm0/ima2, or atm0/ima3.) For example, enter **show controllers atm0/1**. In the resulting display, check that the framing mode is set to the same value on this interface as at the other end of the connection. Also check that cell payload scrambling is on (on DS3 interfaces only). 4. If a line card slot is indicated, consult the "Line Card Problems" section on page 6-10.

Symptoms	Steps to Take

A trunk port fails to come up (DS3 or OC-3c). Or an OC-3c subtending port fails to come up.	1. Verify that the trunk port selection is correct.
	2. Check the cable connections at both ends. Refer to Appendix C, "Connector and Pinout Specifications," to check pinouts.
	3. To check the interface status and configuration, enter **show interface atm** *slot#/port#*. Check the following information in the resulting display:
	– If the port Admin Status is down, enter the commands below to correct the problem, replacing slot/port ID atm 0/1 with your slot/port ID:
	`DSLAM> configure terminal`
	`Enter configuration commands, one per line.`
	`End with CNTL/Z.`
	`DSLAM(config-if)# int atm 0/1`
	`DSLAM(config-if)# no shutdown`
	`DSLAM(config-if)#`
	– If the port IF Status is down, check for disconnected or faulty cables. (Optical cables connect to the NI-2 card; DS3 coaxial cables connect to the I/O module.)
	– If the Line Protocol is down, the line protocol software processes might have determined that the line is unusable; try swapping the cable. Another possibility is that clocking might be misconfigured, or the clocking source might have failed.
	– Check the CRC field. The presence of many CRC errors but not many collisions is an indication of excessive noise. If the number is too high (greater than 0.5 to 2 percent of total traffic on the interface), check the cables to determine if any are damaged.
	If you need more information on interface configuration, refer to the *Configuration Guide for Cisco DSLAMs with NI-2* and the *ATM Switch Router Software Configuration Guide*.
	4. Enter **show controllers atm***slot#/port#*. Check the following information in the resulting display:
	– Framing mode must be the same at both ends of the connection.
	– Cell payload scrambling must be on at both ends of the connection.
	5. Check the status and configuration of the interface at the far end.
	6. If you need to run a loopback test, do the following:
	– In interface configuration mode, enter **loopback diagnostic** (or **loopback line**).
	– Set the external test equipment to loop data through the Cisco 6015 port.
	– Obtain loopback results from your external test equipment.
	– Enter **no loopback diagnostic** (or **no loopback line**) to take the port out of loopback mode.
	7. In interface configuration mode, reset the trunk port by executing the **shutdown** command followed by the **no shutdown** command.
	8. Replace the NI-2 card.
	9. If the problem with a DS3 interface persists, troubleshoot the I/O module. See the "I/O Module Problems" section on page 6-14.

Symptoms	Steps to Take

A trunk or subtending port fails to come up (T1/E1).	**1.** Verify that the trunk port selection is correct.
	2. Check the cable connections at both ends. Refer to Appendix C, "Connector and Pinout Specifications," to check pinouts.
	3. To check the interface status and configuration, enter **show interface atm** *slot#/port#*. Check the following information in the resulting display:
	– If the port Admin Status is down, enter the commands below to correct the problem, replacing slot/port ID atm 0/2 with your slot/port ID (atm 0/2 through atm 0/9):
	`DSLAM> configure terminal`
	`Enter configuration commands, one per line.`
	`End with CNTL/Z.`
	`DSLAM(config-if)# int atm 0/2`
	`DSLAM(config-if)# no shutdown`
	`DSLAM(config-if)#`
	– If the port IF Status is down, check for disconnected or faulty wire. T1/E1 twisted pair wire connects to the I/O module.
	– If the Line Protocol is down, the line protocol software processes might have determined that the line is unusable; try swapping the cable. Another possibility is that clocking might be misconfigured, or the clocking source might have failed.
	– Check the CRC field. The presence of many CRC errors but not many collisions is an indication of excessive noise. If the number is too high (greater than 0.5 to 2 percent of total traffic on the interface), check the cables to determine if any are damaged.
	If you need more information on interface configuration, refer to the *Configuration Guide for Cisco DSLAMs with NI-2* and the *ATM Switch Router Software Configuration Guide*.
	4. Enter **show controllers atm***slot#/port#*. Check the following information in the resulting display:
	– Framing mode must be the same at both ends of the connection.
	– Line coding must be the same at both ends of the connection (T1/E1).
	– Cell payload scrambling must be on at both ends of the connection.
	5. Check the status and configuration of the interface at the far end.
	6. If you need to run a loopback test to troubleshoot the T1/E1 links, do the following:
	– In interface configuration mode, enter **loopback diagnostic** (or **loopback line**).
	– Set the external test equipment to loop data through the Cisco 6015 port.
	– Obtain loopback results from your external test equipment.
	– Enter **no loopback diagnostic** (or **no loopback line**) to take the port out of loopback mode.
	7. In interface configuration mode, reset the trunk port by executing the **shutdown** command followed by the **no shutdown** command.
	8. Replace the NI-2 card.
	9. If the problem with a T1/E1 interface persists, troubleshoot the I/O module. See the "I/O Module Problems" section on page 6-14.

Symptoms	Steps to Take

A trunk or subtending port fails to come up (T1/E1 IMA).	1. Before checking IMA interface problems, troubleshoot the T1/E1 links that are configured in the IMA group, as described in the previous section. Verify that the links are up.
	2. Check an IMA interface status with **show ima interface atm0/ima*X*** command, where *X* is the IMA interface ID (0 through 3). Look at the following items in the resulting display:
	– MinNumLinks (minimum number of links) should be equal to or below the number of links you have configured in your IMA group. You can change the minimum number of links parameter from 1 to 8 in the IMA group.
	– NeTxClkMode (near end transmit clock mode) should match the FeTxClkMode (far end transmit clock mode), which will be either ctc or itc. Both sides of the IMA link must use the same IMA clock mode.
	– DiffDelayMaxObs (maximum observed differential delay) should be less than DiffDelayMax (maximum differential delay configured for the group). If the differential delay observed is more than the maximum allowed, one or more links will not be allowed in the IMA group. Configure more allowable differential delay (up to 69 ms in T1, 55 ms in E1) using T1/E1 lines with less differential delay, or reconfigure similarly-delayed lines into IMA groups if possible.
	– The IMA Link Information table shows the interfaces configured in your IMA group, the near end and far end receive state, and any IMA alarms received at the near end. The NeRxState and FeRxState must both be active for each line to be active in the IMA group. The whole IMA group will be up when the number of active links on both sides are equal to or greater than the minimum number of configured links (MinNumLinks) for that IMA group.
	3. It can take several seconds for an IMA group to synchronize between two IMA systems. Wait several minutes after configuring or reconfiguring a group to allow the synchronization to occur.
	4. If synchronization does not occur in any one link or in the group after several minutes, or links cannot be successfully added to an active group, and the above IMA parameters have been checked and are found to be correct, clear the interface with a **clear interface atm0/ima*X*** command. This will reset the IMA group and start the IMA synchronization process again with all links in the group.
	5. To check the interface status and configuration, enter **show interface atm** *slot#/imagroup#*. Check the following information in the resulting display:
	– If the port Admin Status is down, enter the commands below to correct the problem, replacing slot/port ID atm0/ima2 with your slot/port ID:
	`DSLAM> configure terminal`
	`Enter configuration commands, one per line.`
	`End with CNTL/Z.`
	`DSLAM(config-if)# int atm0/ima2`
	`DSLAM(config-if)# no shutdown`
	`DSLAM(config-if)#`
	If you need more information on interface configuration, refer to the *Configuration Guide for Cisco DSLAMs with NI-2* and the *ATM Switch Router Software Configuration Guide*.

Symptoms	Steps to Take
	6. In interface configuration mode, reset the port by executing the **shutdown** command followed by the **no shutdown** command. 7. Replace the NI-2 card. 8. If the problem with a T1/E1 interface persists, troubleshoot the I/O module. See the "I/O Module Problems" section on page 6-14.
System overheats.	Troubleshoot the fan module. See the "Fan Module Problems" section on page 6-16.
System experiences a clocking problem.	Troubleshoot the NI-2 card. See the "NI-2 Card Problems" section on page 6-9.
System experiences a power problem.	Troubleshoot the DC PEM. See the "DC PEM Problems" section on page 6-16.

6.5 Cisco 6015 Component-Specific Problems

The following sections describe symptoms that might occur and the steps that you need to take if you experience problems with any of the following Cisco 6015 components:

6.5.1 NI-2 Card Problems

Use the following table to diagnose and troubleshoot any problems with the DS3+T1/E1 IMA NI-2 card, the ITEMP DS3+T1/E1 IMA NI-2 card, or the OC-3c/OC-3c NI-2 card.

Note If you need to remove or replace a DS3+T1/E1 IMA NI-2 card, complete the steps in the "DS3+T1/E1 IMA or ITEMP DS3+T1/E1 IMA NI-2 Card Installation and Removal" section on page 7-10.

If you need to remove or replace an OC-3c/OC-3c NI-2 card, complete the steps in the "OC-3c/OC-3c NI-2 Card Installation and Removal" section on page 7-14.

Symptom	Steps to Take
POWER LED is off.	1. Check the STATUS LEDs on the line cards. If all LEDs are off, troubleshoot the DC PEM—see the "DC PEM Problems" section on page 6-16. 2. If the line card STATUS LEDs are lit, remove the NI-2 card from its slot and check for bent or broken pins on both the card and the backplane. If you find damaged pins on the card, replace it. If you find damaged pins on the backplane, contact the Cisco TAC.
STATUS LED is off, indicating that the NI-2 card failed to boot or failed its power-on self test.	Press the **Reset** button on the NI-2 card. If the problem persists, replace the card.
CRITICAL LED, MAJOR LED, or MINOR LED is on.	See the "System-Wide Problems" section on page 6-4.
A trunk or subtending port fails to come up.	See the "System-Wide Problems" section on page 6-4.
NI-2 card cannot be fully inserted into its slot.	Inspect connectors on both the card and the backplane, looking for obstructions, bent pins, or other damage. If you find damage to an NI-2 card connector, replace the card. If you find damage to a backplane connector, contact the Cisco TAC.

6.5.2 Line Card Problems

Use the following table to diagnose and troubleshoot any problems with the line cards (4xflexi, 8xDMT, 8xDMT over ISDN, or 8xG.SHDSL).

Note If you need to remove or replace a 4xflexi, complete the steps in the "4xflexi Installation and Removal" section on page 7-2.

If you need to remove or replace an 8xDMT, complete the steps in the "8xDMT Installation and Removal" section on page 7-4.

If you need to remove or replace an 8xDMT over ISDN, complete the steps in the "8xDMT over ISDN Installation and Removal" section on page 7-6.

If you need to remove or replace an 8xG.SHDSL, complete the steps in the "8xG.SHDSL Installation and Removal" section on page 7-8.

Symptom	Steps to Take
All LEDs are off.	1. Check the POWER LED on the NI-2 card. If it is not lit, troubleshoot the DC PEM—See the "DC PEM Problems" section on page 6-16. 2. If the NI-2 card POWER LED is lit, remove the line card from its slot and check for bent or broken pins on both the line card and the backplane. If you find damaged pins on the line card, replace it. If you find damaged pins on the backplane, contact the Cisco TAC.
All ports on a line card fail to come up (modems do not train). STATUS LED might be red, indicating that the line card failed to boot or failed its power-on self test.	1. Enter the **show ipc nodes** command to find out if there is a communication problem between the line card and the NI-2 card. There should be an entry in the resulting display for each line card ("SMB IP Slot *n*") and for the NI-2 card ("IPC Master"). If there is an entry for each card, go to step 4. 2. If one or more line cards are not listed, enter **show oir status**. If the resulting display indicates that the line card in question is loading new code, wait a few minutes and reenter the command. (Usually, 2 to 3 minutes is long enough to wait.) The line card status should change to `running`. 3. Enter the command **show dsl int atm** *slot#/port#*. If the status says `Microcode downloading`, wait 10 minutes. When the download is complete, the line card will reboot and come up normally. 4. Check the ALARM LEDs on the NI-2 card or enter **show facility-alarm status** to determine the alarm status of the system. If any alarms are indicated, see the "System-Wide Problems" section on page 6-4 for instructions on how to troubleshoot alarms. 5. Enter the command **show dsl status** and examine the results to ensure that the line card is configured to be in its current slot. (In the Names column, the slot number appears as part of the port ID. For example, in ATM19/2, the slot number is 19. Nothing is displayed for slots that are not configured.) If necessary, use the **slot** command to update the configuration, or move the line card to the correct slot. **Note** The 4xflexi will not function unless you use the **slot** command to configure either CAP, DMT, or G.lite operation. 6. Reset the line card by disconnecting it from the backplane and reseating it in its slot. 7. Install the line card in another slot. 8. If the problem persists, replace the line card.

Symptom	Steps to Take
Port fails to come up (modems do not train), or port LED flashes continuously.	1. Enter the command **show dsl int atm** *slot#/port#* to display the port's configuration. Check the display to ensure that the port is properly provisioned. Make sure the port is configured to be running ("no shutdown" or IOS admin state = up). Also check the line status; if this reads "No CPE detected," troubleshoot the CPE device and the loop as described below under the symptom "You suspect a problem with the CPE or the subscriber loop." 2. In interface configuration mode, reset the port by executing the **shutdown** command followed by the **no shutdown** command. 3. Connect the subscriber to another port on the Cisco 6015. If the modems do not train, troubleshoot the CPE device and the loop as described below under the symptom "You suspect a problem with the CPE or the subscriber loop." If the modems train, go to the next step to troubleshoot the port that failed. 4. To test the modem on the line card, enter **dsl test atm***slot#/port#* **self**. Results are displayed automatically after a few seconds. If the modem fails the test, replace the line card.
You suspect a problem with the CPE or the subscriber loop.	1. Disconnect the local loop and replace it with a test setup that consists of a modem or CPE that is known to work and a few thousand feet of wire. If the modems train over the shorter distance, the problem lies in the local loop or in the CPE—see the steps that follow. If the modems do not train, the port is probably at fault. Replace the line card. 2. Make sure that the CPE at the subscriber site is powered up. 3. Make sure that the CPE is compatible with the Cisco 6015, and that the software version that is running on the CPE is compatible with the software version that is running on the Cisco 6015. 4. Turn off the CPE and then turn it back on. When you turn the power on, the WAN Link LED on the CPE should blink. If the LED does not blink, check the CPE's configuration—if the interface is shut down, bring it up. 5. Perform a continuity check to find out if the cabling to the CPE is connected and intact. For example, if there is a phone on the line, check for a dial tone. 6. If there is no POTS, check DC resistance by shorting tip and ring at the remote end. 7. Make sure there are no load coils on the local loop. 8. Determine if the local loop is too long. The maximum length range is 15,000 to 25,000 feet (4572 to 7620 meters). Within that range, wire gauge, cross talk, and multiple bridge taps reduce the distance over which the modems can train. 9. Determine if the local loop is too short. DMT modems train best over loops of several thousand feet. In a test situation with a loop just a few feet in length, the modems may fail to train. Add wire to the loop. 10. Replace the CPE.

Symptom	Steps to Take
Modems train at a low bit rate, or modems retrain continuously, or the line experiences too many errors. **Note** These steps apply to line cards in DMT mode.	**1.** Enter the command **show dsl int atm***slot#/port#* to display the port's configuration. Check the display to ensure that the port is properly provisioned. Look in particular for these statistics: – Attenuation: typically this is 20 to 50 dB. If the attenuation value is higher than 50 dB, it might be depressing the bit rate. Repair or replace the cables and connectors in the loop. – SNR margin: 3 to 6 dB is optimum. Use the **dmt margin** command to adjust SNR margin. – Correction ratio: under DSL Statistics, look at the Received Superframes and Corrected Superframes values. A ratio of more than 1 corrected superframe for every 10 superframes received is too high. One or more of these adjustments might correct the problem: increase the SNR margin using the **dmt margin** command; increase error correction using the **dmt check-bytes** command; or increase interleaving using the **dmt interleaving-delay** command. – Errored seconds: a rate of 10 to 20 errored seconds per minute or more is likely to cause retraining. (1 or 2 errored seconds every 15 minutes is a good rate.) See the steps that follow on cross talk and impulse noise for suggestions on how to compensate. – CRC errors: normal rates vary system by system. If the CRC error rate is higher than usual, it might cause excessive retraining. See the steps that follow on cross talk and impulse noise for suggestions on how to compensate. **2.** Cross talk is caused by interference between services in adjacent cables. It affects random bits rather than chunks of data; upstream and downstream traffic can be affected differently. If cross talk is increasing the bit error rate (BER), you can compensate in several ways: – Reduce the bit rate using the **dmt bitrate** command. (See the *Command Reference for Cisco DSLAMs with NI-2* for information on the **dmt bitrate** command.) – Increase the SNR margin using the **dmt margin** command. (See the *Command Reference for Cisco DSLAMs with NI-2* for information on the **dmt margin** command.) – Turn on or increase error correction. Use the **dmt check-bytes** command. If the code word size is not set to auto, you might need to use the **dmt codeword-size** command to adjust the code word setting. (See the *Command Reference for Cisco DSLAMs with NI-2* for information on these commands.) **3.** If you experience impulse noise or clipping, both of which affect chunks of data rather than random bits, you can compensate by turning on or increasing interleaving and error correction. (However, note that this approach adds delay.) Use the **dmt interleaving-delay** command for interleaving. Use the **dmt encoding-trellis** command or the **dmt check-bytes** command for error correction. If you use **dmt check-bytes** and if the code word size is not set to auto, you might need to use the **dmt codeword-size** command to adjust the code word setting. **4.** If errors or retraining occur while the line is ringing, use the **dmt interleaving-delay** command to turn on interleaving. **5.** In interface configuration mode, reset the port by executing the **shutdown** command followed by the **no shutdown** command.

Symptom	Steps to Take
	6. Connect the customer to a different port on the Cisco 6015. If the modems train, replace the line card with the faulty port. 7. Troubleshoot the CPE device and the loop as described previously under the symptom "You suspect a problem with the CPE or the subscriber loop." 8. Replace the line card.
Line card cannot be fully inserted into its slot.	1. Remove the line card and reinsert it, pushing firmly on both the top and the bottom of the faceplate. (The line card might jam in the slot if you apply pressure to the top only.) If the chassis is full, you might need to push sideways to insert the line card. 2. Inspect connectors on both the line card and the backplane, looking for obstructions, bent pins, or other damage. If you find damage to a line card connector, replace the line card. If you find damage to a backplane connector, contact the Cisco TAC.
Line card experiences problems in one slot but operates normally in another.	There may be a fault in your backplane. Contact the Cisco TAC.

6.5.3 I/O Module Problems

Use the following table to diagnose and troubleshoot any problems with the I/O module.

Note If you need to remove or replace a I/O module, complete the steps in the "OC-3c/OC-3c NI-2 Card Installation and Removal" section on page 7-14.

The I/O module is a FRU; however, it is not hot swappable. The system must be powered down before this module is replaced.

Symptom	Steps to Take
A trunk port fails to come up.	See the "System-Wide Problems" section on page 6-4.
A subtending port fails to come up.	See the "System-Wide Problems" section on page 6-4.
This message appears on the console or in the system log file: `00:00:28:%C6100-4-COOKIE: Corrupt or missing MAC address cookie using random base 007e.eb7d.e700`	1. Make sure the software release that is running on your system is compatible with the hardware. Currently, the Cisco 6015 requires Cisco IOS Release 12.1(4)DA or greater. **Note** See the "Hardware Specifications" section on page A-1 for minimum software and network management release requirements per Cisco 6015 chassis component. 2. Enter the command **show hardware**. In the resulting display, look for data from the I/O module EEPROM. If the system can read the contents of the EEPROM, the I/O module is likely to be functional. 3. Disconnect the cables and use an external loopback. If the diagnostic loopback works and the external loopback does not work, the problem may be on the I/O module and it may need to be replaced. 4. If the I/O module is present, reseat it. First, turn off system power. Use a screwdriver to unfasten the screws that secure the I/O module cover, and pull the card off the connectors. Push it firmly back into place and tighten the screws. 5. If the problem persists, replace the I/O module.

6.5.4 DSL Interface Module Problems

Use the following table to diagnose and troubleshoot any problems with the DSL interface module.

Note If you need to remove or replace a DSL interface module, complete the steps in the "DSL Interface Module Installation and Removal" section on page 7-20.

The DSL interface module is a FRU; however, it is not hot swappable. The system must be powered down before this module is replaced.

Symptom	Steps to Take
Modems do not train	1. Make sure the DSL interface module is properly seated in the chassis and screwed in place. 2. Verify that the cables are connected to the Champ connectors. 3. If the problem persists, replace the I/O module.

6.5.5 DC PEM Problems

Use the following table to diagnose and troubleshoot any problems with the DC PEM.

Note If you need to remove or replace a DC PEM, complete the steps in the "DC PEM Installation and Removal" section on page 7-24.

The DC PEM is a FRU; however, it is not hot swappable. The system must be powered down before this module is replaced. Removing this module will interrupt the service for the entire system until it is replaced.

Symptom	Steps to Take
Input LED on DC PEM is off.	1. Make sure the circuit breaker on the DC PEM is turned to ON (1). 2. Make sure the DC PEM is properly seated in the chassis and screwed in place. 3. Make sure the cable from the fuse and alarm panel or the AC/DC converter is properly connected to the DC PEM. If connections are loose or their polarity is reversed, the chassis does not receive power. 4. Check the power cable for breaks, cracked insulation, loose lugs, and signs of wear. Replace the power cable if it is not in good condition. 5. Check the power source. 6. If the problem persists, replace the DC PEM. **Note** Only trained technicians can replace a DC PEM.
Circuit breaker on DC PEM trips.	A tripped circuit breaker indicates a serious overcurrent situation. The probable cause is a faulty backplane, a faulty power connector on the backplane, or a faulty DC PEM. Contact the Cisco TAC for assistance.

6.5.6 Fan Module Problems

Use the following table to diagnose and troubleshoot any problems with the fan module.

Note If you need to remove or replace a fan module, complete the steps in the "Fan Module Installation and Removal" section on page 7-27.

Symptom	Steps to Take
Fans do not run.	1. Make sure that the fan module is fully inserted into the chassis and screwed in place. 2. Replace the fan module.
Fan module runs but the system overheats.	1. Make sure that the air intake vent at the right of the chassis and the exhaust vent at the left of the chassis are free of blockages. (See the "Ventilation" section on page 2-13.) 2. Make sure that the ambient temperature and other environmental factors that are affecting the system are within the ranges specified in the "Environmental Requirements" section on page 2-11. 3. Make sure that all line cards and blank faceplates are in place. The cooling system cannot operate effectively unless the chassis is fully enclosed. 4. Check the LEDs on the fan module. If an LED is red, one of the fans has failed. Replace the fan module. 5. Reduce the ambient temperature.
Fan module LED is red.	One or more fans have failed. Replace the fan module.
Fan module LED is off.	The fan module has failed or is not receiving power. If other components in the system are receiving power (look for green LEDs), check the DC PEM LED. If the DC PEM LED is off, replace the DC PEM. If the DC PEM LED is green, replace the fan module. **Note** Only trained technicians can replace a DC PEM.

6.5.7 Rear Interface Header Problems

Use the following table to diagnose and troubleshoot any problems with the rear interface header.

Symptom	Steps to Take
An alarm relay or BITS circuit fails.	1. Check the connection at the wire-wrap connector on the back of the Cisco 6015 chassis. See the "Rear Interface Header" section on page 1-36 for the pin assignments of the wire-wrap connector. 2. Check the connection at the other end of the circuit. 3. For a BITS problem, troubleshoot the T1/E1 line at the other end of the circuit.

6.5.8 AC/DC Converter Problems

Use the following table to diagnose and troubleshoot any problems with the AC/DC converter.

Symptom	Steps to Take
Either LED is off.	1. Troubleshoot the AC/DC converter. 2. Troubleshoot the AC input. 3. If the problem persists, replace the power cable. 4. If the problem persists, replace the AC/DC converter. 5. If the problem persists, replace the DC PEM.

6.6 Alarms

Tables 6-2 through 6-11 describe alarms for the Cisco 6015. In each table, the text in the Alarm column is the text that appears in the description field of the alarm message. Alarm messages appear on the console screen as the alarms occur; to see a list of current alarms, enter **show facility-alarm status**.

See the problem tables in this chapter for more detailed troubleshooting instructions.

Table 6-2 Chassis Alarms

Alarm	Severity	Description
Chassis temperature too high	Major	An overtemperature condition has been detected. (Temperature is measured on the NI-2 card.)
Chassis temperature too low	Major	An undertemperature condition has been detected. (Temperature is measured on the NI-2 card.)
Temperature Rating Mismatch	Major	A commercial or outside-plant environment line card or network interface card is installed in a system that has been configured with a different temperature rating. It is also possible that the chassis is incorrectly provisioned for its current environment (commercial or outside-plant). Verify the chassis rating in your management software.

Table 6-3 Line Card Slot Alarms

Alarm	Severity	Description
Provisioned slot is empty	Major	This slot is configured for a line card, but no line card is present.
Line card not equal to provisioning	Minor	The line card in this slot does not match the type that is configured for this slot.
Invalid line card for this slot	Minor	The line card detected in this slot cannot operate in this slot or is incompatible with the system configuration.

Table 6-3 Line Card Slot Alarms (continued)

Alarm	Severity	Description
Module not equal to provisioning	Minor	A 4xflexi line card has been detected in an outside-plant environment. The 4xflexi line cards can be installed only in commercial environments.
Flexi ATU-C line card not provisioned	Info	You must use the **slot** command to configure a 4xflexi as either CAP or DMT.

Table 6-4 Cisco IOS Controller Alarms

Alarm	Severity	Description
Loss of active clock sync	Major	Loss of timing reference. The configured clock source is not available, so the system is using its internal clock.
BITS clock failure	Major	BITS clock failure (LOS or AIS). The configured clock source is not available, so the system is using its internal clock.

Note The alarms form a hierarchy in the system where a higher priority alarm takes precedence over any lower priority alarms. The alarms listed in Table 6-5 through Table 6-9 are in descending order of priority, the highest to lowest. These conditions are viewable through the **show facility-alarm status** command.

The source of the DS3 alarms in Table 6-5 is the ATM0/1 (the trunk).

Table 6-5 DS3 Network Interface Alarms

Alarm	Severity	Description
Non-Trunk	Critical	The DS3 line is not selected as the system trunk.
LOS[1] Detected	Critical	The DS3 line has detected Loss of Signal at the framer.
AIS[2] Received	Critical	The DS3 line is receiving an Alarm Indication Signal.
OOF[3] Received	Critical	The DS3 line has detected an Out of Frame condition.
Yellow Alarm Received	Critical	The DS3 line is receiving a yellow alarm, indicating that another device has detected a possible failure in this device.
RAI[4] Received	Critical	The DS3 line is receiving a remote alarm indication.
PLCP[5] LOF[6] Detected (red alarm)	Critical	The DS3 line has detected a Physical Layer Convergence Procedure Loss of Frame error.
LCD[7]	Critical	The DS3 line is experiencing a loss of cell delineation.

1. LOS = loss of signal
2. AIS = alarm indication signal
3. OOF = out of frame
4. RAI = remote alarm indication
5. PLCP = physical layer convergence procedure
6. LOF = loss of frame
7. LCD = loss of cell delineation

The source of the OC-3c alarms in Table 6-6 is one of the following interfaces: ATM0/1 (the trunk) or ATM0/2 (the subtending interface).

Table 6-6 OC-3c/Synchronous Transfer Mode (STM-1) Network Interface Alarms

Alarm	Severity	Description
Loss of Cell Delineation	Critical	Loss of cell delineation on a SONET line.
Path RDI Received	Critical	Path Remote Defect Indication was received on a SONET line. This is equivalent to Path Far End Receive Failure (FERF).
Path AIS Received	Critical	Path Alarm Indication Signal was received on a SONET line.
Loss of Pointer	Critical	Loss of pointer condition on a SONET line.
Line RDI	Critical	Line Remote Defect Indication received on a SONET line. This is equivalent to line Far End Receive Failure (FERF).
Line AIS Received	Critical	Line Alarm Indication Signal received on a SONET line.
Loss of Frame	Critical	LOF condition on a SONET line.
Loss of Signal	Critical	LOS detected on the SONET line.
Signal Label Mismatch	Minor	Incorrect payload type signal label mismatch on a SONET line.

The source of the T1/E1 alarms in Table 6-7 is the ATM0/2 through ATM0/9 (the trunk).

Table 6-7 T1/E1 Network Interface Alarms

Alarm	Severity	Description
LOS Detected	Critical	The T1/E1 line has detected Loss of Signal at the framer.
AIS Received	Critical	The T1/E1 line is receiving an Alarm Indication Signal.
RAI Received	Critical	The T1/E1 line is receiving a remote alarm indication.
LOF Detected (red alarm)	Critical	The T1/E1 line has detected a Loss of Frame error.
LCD	Critical	The T1/E1 line is experiencing a loss of cell delineation.

The source of the IMA link alarms in Table 6-8 is the ATM0/2 through ATM0/9.

Table 6-8 IMA Link Network Interface Alarms

Alarm	Severity	Description
LOS Detected	Critical	The IMA link has detected Loss of Signal at the framer.
LOF Detected	Critical	The IMA link has detected a Physical Layer Convergence Procedure Loss of Frame error.

Table 6-8 IMA Link Network Interface Alarms (continued)

Alarm	Severity	Description
AIS Received	Critical	The IMA link is receiving an Alarm Indication Signal.
RAI Received	Critical	The IMA link is receiving a remote alarm indication.
LCD	Critical	The IMA link is experiencing a loss of cell delineation.
LIF[1]	Critical	The IMA link is experiencing an LIF defect at the near end.
LODS[2]	Critical	The link differential delay between the link and the other links in the group is over the tolerable link differential delay.
Rx Failed	Critical	A persistent detection of a defect at the receiver. The criteria for entering the condition are implementation specific.
Tx Link Misconnected	Critical	The Tx link is not connected to the same far end IMA unit as the other Tx links in the group. The detection is implementation specific.
Rx Link Misconnected	Critical	The Rx link is not connected to the same far end IMA unit as the other Rx links in the group. The detection is implementation specific.
Persistent NE[3] RDI-IMA	Critical	One of the available remote defect indicators (including IMA link specific defect) is in the link-related “Link Information” field.
Rx Fault	Critical	Implementation specific Rx fault declared at the near end.
Tx Fault	Critical	Implementation specific Tx fault declared at the near end.
Tx Link Unusable—FE[4]	Critical	The far end is reporting that Tx is unusable.
Rx Link Unusable—FE	Critical	The far end is reporting that Rx is unusable.

1. LIF = loss of IMA frame
2. LODS = link out of delay sync
3. NE = near end
4. FE = far end

The source of the IMA group alarms in Table 6-9 is the ATM0/IMA0 through ATM0/IMA3.

Table 6-9 IMA Group Alarms

Alarm	Severity	Description
Start-up—FE	Critical	The far end is starting up—The declaration of this failure alarm may be delayed to ensure that the far end remains in start-up.
Configuration Abort	Critical	The far end is trying to use unacceptable configuration parameters.

Table 6-9 IMA Group Alarms (continued)

Alarm	Severity	Description
Configuration Abort—FE	Critical	The far end is reporting unacceptable configuration parameters.
Insufficient Links	Critical	Fewer than P_{Tx} transmit or P_{Rx} receive links are active.
Insufficient Links—FE	Critical	The far end is reporting that fewer than P_{Tx} transmit or P_{Rx} receive links are active.
Blocked—FE	Critical	The far end is reporting that it is blocked.
Timing Mismatch	Critical	The far end transmit clock mode is different than the near end transmit clock mode.

Table 6-10 Fan Module Alarms

Alarm	Severity	Description
Not detected or missing	Major	The fan module has been removed from the chassis or is missing.
Multiple fan failures	Major	Both fans in the fan module have failed.
Single fan failure	Minor	A single fan (one of two) in the fan module has failed.

Table 6-11 Power Supply Alarms

Alarm	Severity	Description
Voltage alarm	Major	The input voltage is out of range.
Current alarm	Major	An overcurrent condition has been detected.