Volume

5

The Speedlink™ System

Maintenance & Testing

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Speedlink Documentation

Introduction   Speedlink documentation provides complete detailed instructions on how to install, test, and turn-up a Speedlink System. This documentation complies with all requirements in Bellcore Technical Reference TR-TSY-000454 *Supplier Documentation for Network Elements* and IP 0260 *Standards for Task Oriented Practices (TOPS)* requirements.

Target Audience   Speedlink documentation volumes are written at different levels of detail based on the reader's needs. Below is a list of the various volumes and the intended target audience for each.

VOLUME	TITLE	TARGET AUDIENCE
Volume 1	General	Anyone with a need to understand more about the Speedlink System and planning requirements.
Volume 2	Installation	Installation and Testing Technicians, and Engineers (Detailed Level Procedures)
Volume 3	Acceptance Testing	Testing Technicians and Engineers (Detailed Level Procedures)
Volume 4	Provisioning	Provisioning Technicians and Engineers (Detailed Level Procedures)
Volume 5	Maintenance and Testing	Maintenance and Testing Technicians and Engineers (Detailed Level Procedures)
Volume 6	DiamondView	Network Management Technicians (Tutorial and Reference Manual for DiamondView)
Volume 7	DiamondCraft	Testing and Installation Technicians and Engineers (Tutorial and Reference Manual for DiamondCraft)

Information Mapping Style	All documents are written in Information Mapping style, which presents information in small units or blocks. Each information block is identified by a "subject label" in the left margin and is separated from the next information block by a horizontal line. "Subject labels" make the document easy for the reader to scan and to find information.
	Each Detailed Level Procedure states the required equipment and tools to perform the job, provides step by step instructions, with integrated graphics, to help the reader perform each task.

SECTION 1   SYSTEM MONITORING

Chapter 1   Routine Maintenance

Introduction   The Fan Tray filter element is the only part of the Speedlink system that requires regular maintenance. This procedure describes how to perform this regular maintenance item.

Maintenance frequency will depend on local conditions. Fan Tray filters should be *inspected* every three months.

NOTE: There are two LED lights on the front of the Fan Tray: PWR (green) and FAIL (red). The FAIL light will go on when a fan stops or slows below the established threshold; it will NOT go on to signal the need for filter replacement.

Fan Tray Filter   Fan Tray filters should be replaced every six months in a central office, and every
Replacement   three months in a less protected environment. Again, adjust your replacement intervals to reflect environmental conditions.

Follow these steps to replace the filter for a Fan Tray:

Table 1: Fan Tray Filter Replacement

STEP	PROCEDURE
1	Locate the Fan Tray area at the bottom of the Master Control Shelf or Line Card Shelf. Figure 1: Assembly with Fan Tray
2	Unlock the Fan Tray using the latches on either side. Slide both latches toward the center and pull the Fan Tray out of the MCS or LCS.
3	Turn the Fan Tray over, the filter element is exposed on the underside of the Fan Tray. Slide the filter element out towards the back of the Fan Tray. Slide a new filter element in its place. **NOTE:** The filter element will have an arrow or other marker that shows the direction it should be inserted into the Fan Tray. This direction is important; the fans in the Fan Tray will work more efficiently in one direction than the other.
4	Lift the Fan Tray, hold it level and slide it into position. **NOTE:** Make sure the Fan Tray is inserted with the fans up. (Check the LED labels on the front of the Fan Tray.)
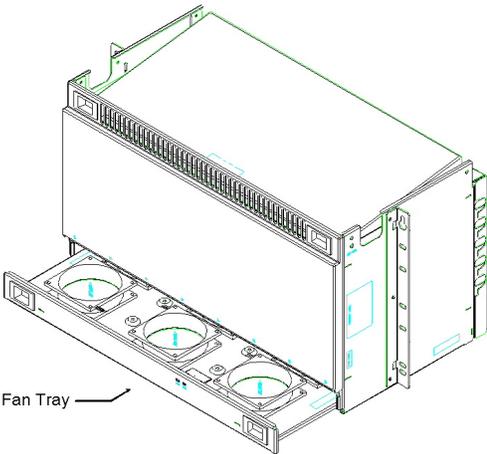
Table 1: Fan Tray Filter Replacement (continued)

STEP	PROCEDURE
5	Flanges on the Fan Tray ride in plastic guides on the assembly. Push the Fan Tray in until you feel a solid connection at the backplane. The Fan Tray connection is "keyed" so it plugs into its correct position on the backplane. **CAUTION:** <u>Do not</u> force the Fan Tray into position. If it does not plug in easily, slide it back out and check for any obstructions or bent pins on the connector that might prevent it from sliding easily into place.
6	Lock the Fan Tray into position using the latches on either side. Slide both latches toward the center and release to lock into place. The front panel of the Fan Tray should be recessed with the front panel of the MCS. Slide Fan Tray latches towards the center and release to lock in place. Figure 2: Fan Tray Latches
7	The Fan Tray Filter Replacement procedure is complete.
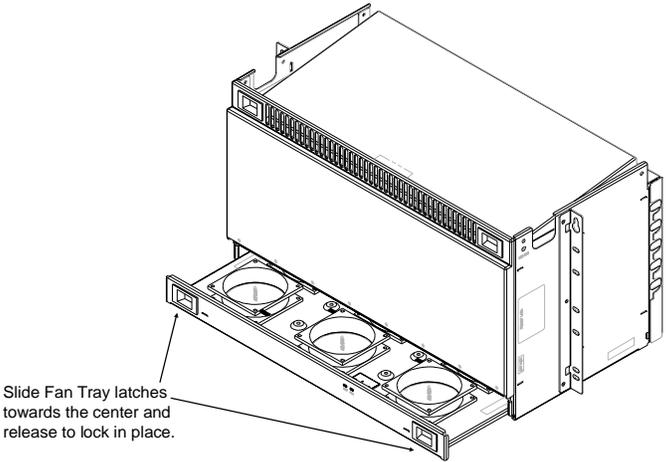
Chapter

2

SECTION 1   SYSTEM MONITORING

Chapter 2   Conditions

Introduction

During normal operation of the Speedlink system, various conditions may arise that require attention. This chapter describes how to:

- Recognize conditions
- Isolate the equipment or facility with a condition
- Perform the appropriate corrective action

Recognizing A Condition

When a Speedlink system generates a condition on DiamondView, the Speedlink Multiplexer graphical window opens up to the shelf with the "alarm" condition status. The Master Control Shelf or Line Card Shelf graphical window indicates by color which card and port has the condition against it—orange indicates a service degraded condition, red indicates a service affecting condition.

Isolating and Correcting Conditions

The Speedlink system hierarchy for isolating and correcting conditions is as follows:

High	Trunk Card
	Trunk Port
	MLA Card
	MLA Port
	LSM2 Card
	LSM2 Port
	Line Card
Low	Line Card Port
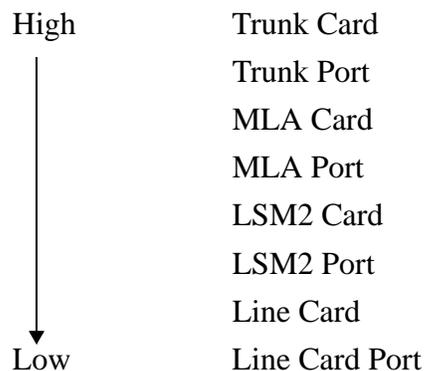
Follow these steps to isolate and correct conditions:

1. Locate the highest level card or port indicating a condition.

2. Right-click on the card or port to bring up its dialog window.

3. Find the condition for the card or port in the dialog window conditions list box.

4. Use the Conditions and Recommended Action tables on the following pages to correct conditions. Page numbers for Conditions and Recommended Action tables are listed below:

   NMP or MCP card, page 7.

   DS3T Trunk card or DS3T Trunk port, page 11.

   OC3T Trunk card or OC3T Trunk port, page 16.

   MLA card or MLA port, page 23.

   LSM2 card or LSM2 port, page 27.

   Line card or Line card port, page 32.

NOTE: Always start correcting conditions at the highest level—a condition at the next lower card/port level may be corrected as a result. Continue working from the highest level down to the lowest level to isolate and correct conditions.

NMP and MCP Conditions and Recommended Action

Follow the Recommended Actions listed below to correct error conditions received for a Network Management Processor (NMP) or Master Control Processor (MCP) card:

NOTE: The Condition column indicates if an event is generated in DiamondView.

Table 2: NMP and MCP Conditions and Recommended Action

#	IF THE CONDITION IS THIS...	THEN DO THIS...
1	Diagnostic Test Failure: this exists when a card fails the diagnostic test. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Hardware diagnostic: ■ Verify that the card is properly seated and locked in place. ■ Replace bad NMP or MCP card if diagnostic test failure condition continues.
2	Software Diagnostic Failure: This occurs when a transaction from the MCP to the database has failed. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Software diagnostic, replace bad MCP card.
3	Loss of Signal (LOS): This exists when a port detects a loss of signal.	Not applicable.
4	Loss of Power (LPR): This exists when a valid "dying gasp" is received from the CPE prior to LOS. Indicates that the CPE (i.e., computer, etc.) has been turned off.	Not applicable.
5	Loss of Frame (LOF): This exists when a port detects a loss of frame.	Not applicable.
6	Bit Error Rate (BER): This indicates the BER condition on the port.	Not applicable.
7	Overflow: This indicates that the system is running out of resource (memory, etc.).	Not applicable.
8	AIS: Alarm Indication Signal	Not applicable.
9	RDI: Remote Defect Indicator	Not applicable.
10	LCD rate: This indicates a loss of cell delineation.	Not applicable.
11	Rate degraded: This indicates that the line card port has a rate drop.	Not applicable.
12	Loopback: This indicates that loopback is activated on the interface.	Not applicable.

Table 2: NMP and MCP Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
13	Unequipped: This indicates the card is not in the slot. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Departed: equipment has been removed.	■ Place an NMP card in slot #4 or ■ Place an MCP card in slots #5 and #6.
14	Failed: This indicates a failure with the card. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Replace bad NMP or MCP card.
15	Dependent resource disabled: This exists when a resource has a dependency on another resource that is disabled.	Not applicable.
16	Standby from a protection group: This indicates that the card in the protection group meets the operation/availability criteria for fulfilling the standby role. **Operational State:** Enabled. **Availability Status:** Operational: fully capable of providing service.	■ Not applicable for NMP card. ■ No action required, normal reading for the "standby" MCP card.
17	Primary service provider: This indicates that the card in the protection group is fulfilling the role of the primary service provider. **Operational State:** Enabled. **Availability Status:** Operational: fully capable of providing service.	No action required: ■ Normal reading for NMP card. ■ Normal reading for "primary" MCP card.

Table 2: NMP and MCP Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
18	Attribute fail condition: This indicates that the system attributes recorded by the equipment reveal a fatally flawed parameter value. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Replace bad NMP or MCP card.
19	Attribute incomplete: This indicates that the equipment has not completed updating the system attributes. **Operational State:** Disabled. **Availability Status:** Unknown.	Replace bad NMP or MCP card if condition does not clear within 2 to 3 minutes. May be a hardware problem or indicate NMP or MCP software is not the latest version.
20	Attribute Down Revisioned: This indicates that the NMP card or standby MCP card has an older software version than the active MCP card. **Operational State:** Enabled. **Availability Status:** Temporarily Inoperable.	No action required, this condition should not affect service permanently. The older software will be upgraded by the active MCP card. Service will be interrupted for a few minutes after the upgrade to allow the system to reboot (except in the case of the standby MCP card).
21	Attribute Mismatch: This exists when the analysis of system attributes results in software or hardware incompatibility (i.e., incorrect card type, card with newer software than active MCP card, or damaged card). **Operational State:** Disabled. **Availability Status:** Inoperable.	Examine the card to determine which problem exists, then insert an NMP or standby MCP card as necessary.
22	Uninitialized: This indicates that the operational state, availability state and other status are not yet initialized. **Operational State:** Disabled. **Availability Status:** Unknown.	Check NMP or MCP card configuration using DiamondCraft. Are all attributes listed? ■ If YES, wait for initialization to complete. Replace the NMP or MCP card if it can not complete initialization. ■ If NO, replace the bad NMP or MCP card.
23	Bad Provisioning Data.	Not applicable.

Table 2: NMP and MCP Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
24	Standby MCP Synch Pending: This indicates that the standby MCP is synchronizing its database and MIB with the active MCP. **Operational State:** Disabled. **Availability Status:** Temporarily Inoperable.	No action required, this condition will clear after several minutes, when the two MCPs have synchronized. If the condition does not clear, abort synchronization by locking the standby MCP card in DiamondView, and then unlock again and re-attempt synchronization.

DS3T Trunk Conditions and Recommended Action

Follow the Recommended Actions listed below to correct error conditions received for a DS3T trunk card:

NOTE: The Condition column indicates if an event is generated in DiamondView.

Table 3: DS3T Trunk Conditions and Recommended Action

#	IF THE CONDITION IS THIS...	THEN DO THIS...
1	Diagnostic Test Failure: this exists when a card fails the diagnostic test. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Hardware diagnostic: ■ Verify that the card is properly seated and locked in place. ■ Replace bad DS3 trunk card if diagnostic test failure condition continues.
2	Software Download Failure: This exists when a card experiences an invalid software download. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Software diagnostic, replace bad DS3 trunk card.

Table 3: DS3T Trunk Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
3	Loss of Signal (LOS): This exists when a port detects a loss of signal. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	LOS indicates a physical connection failure: ■ Check DS3 interface Tx/Rx reversal at the MCS backplane by reversing the coax cable connections. ■ If the condition clears, then the connections were reversed. ■ If the condition does not clear, then connect a coax cable jumper between the Tx and Rx connections on the backplane. Set DS3 Line Timing parameter from "Loop" to "Internal". ■ If the LOS condition clears, then the DS3 Tx and Rx are working, the problem is in the ATM Network (router or network). Report as appropriate and coordinate with an ATM Network Technician to isolate and fix the problem. ■ If the LOS condition does not clear, there is a problem with the DS3 card. Replace the DS3 card and test the connections again.
4	Loss of Power (LPR): This exists when a valid "dying gasp" is received from the CPE prior to LOS. Indicates that the CPE (i.e., computer, etc.) has been turned off.	Not applicable.
5	Loss of Frame (LOF): This exists when a port detects loss of frame. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	■ Check DS3 interface connections at the MCS backplane and DS3 cross connect panel. ■ If DS3 connections are good, then there is an ATM Network (router or network) problem. Report as appropriate and coordinate with an ATM Network Technician to isolate and fix the problem.
6	Bit Error Rate (BER): This indicates the BER condition on the port.	Not applicable.
7	Overflow: This indicates that the system is running out of resource (memory).	Not applicable.

Table 3: DS3T Trunk Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
8	AIS: Alarm Indication Signal. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	■ Indicates a problem on the far end of the DS3 trunk. ■ Report as appropriate and coordinate with an ATM Network Technician to isolate and fix the problem.
9	RDI: Remote Defect Indicator. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	■ Indicates a far-end problem on the "transmit" side of the DS3 trunk or a Speedlink "transmit" problem. ■ Report as appropriate and coordinate with an ATM Network Technician to isolate and fix the problem.
10	LCD rate: This indicates a loss of cell delineation. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	Indicates a DS3 line type mismatch. The line type at the Speedlink and at the other end of the DS3 signal must be set the same (ATM Cell Mapping or PLCP Cbit Parity). Use DiamondCraft to re-check the DS3 port line type. Follow instructions in Volume 3—*Acceptance Testing*, Chapter 7—"Using DiamondCraft for Test and Turn-up" for DS3 configuration settings.
11	Rate degraded: This indicates that the line card port has a rate drop.	Not applicable.
12	Loopback: This indicates that loopback is activated on the interface. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	Not an error condition. Use DiamondCraft to remove the loopback mode from the DS3 trunk port and put the card back in service.
13	Unequipped: This indicates the card is not in the slot. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Departed: equipment has been removed.	Place a DS3 trunk card in slot #7 (standby) and slot #8 (active).

Table 3: DS3T Trunk Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
14	Failed: This indicates a failure with the card. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	■ Hardware Diagnostic: ■ Verify that the card is properly seated and locked in place. ■ Replace bad DS3 trunk card if failed condition continues.
15	Dependent resource disabled: This exists when a resource has a dependency on another resource that is disabled.	Not applicable.
16	Standby from a protection group: This indicates that the card in the protection group meets the operation/availability criteria for fulfilling the standby role. **Operational State:** Enabled. **Availability Status:** Operational: fully capable of providing service.	No action required. Normal reading for the "standby" DS3 trunk card.
17	Primary service provider: This indicates that the card in the protection group is fulfilling the role of the primary service provider. **Operational State:** Enabled. **Availability Status:** Operational: fully capable of providing service.	No action required. Normal reading for the "active" or "primary" DS3 trunk card.
18	Attribute fail condition: This indicates that the system attributes recorded by the equipment reveal a fatally flawed parameter value. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Replace bad DS3 trunk card.
19	Attribute incomplete: This indicates that the equipment has not completed updating the system attributes. **Operational State:** Disabled. **Availability Status:** Unknown.	Replace bad DS3 trunk card if condition does not clear within 2 to 3 minutes. May be a hardware problem or indicate DS3 trunk card software is not the latest version.

Table 3: DS3T Trunk Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
20	Attribute Down Revisioned: This indicates that the DS3 card has an older software version than the active MCP card. **Operational State:** Enabled. **Availability Status:** Temporarily Inoperable.	No action required, this condition should not affect service permanently. The older software will be upgraded by the active MCP card. Service will be interrupted for a few minutes after the upgrade to allow the system to reboot.
21	Attribute Mismatch: This exists when the analysis of system attributes results in software or hardware incompatibility (i.e., incorrect card type, card with newer software than active MCP card, or damaged card). **Operational State:** Disabled. **Availability Status:** Inoperable.	Examine the card to determine which problem exists, then insert a DS3 card as necessary.
22	Uninitialized: This indicates that the operational state and other status are not initialized yet. **Operational State:** Disabled. **Availability Status:** Unknown.	Check DS3 trunk card configuration using DiamondCraft. Are all attributes listed? ■ If YES, wait for initialization to complete. Replace the DS3 trunk card if it can not complete initialization. ■ If NO, replace the DS3 trunk card.
23	Bad Provisioning Data.	Not applicable.
24	Standby MCP Synch Pending.	Not applicable.

OC3T Trunk Conditions and Recommended Action

Follow the Recommended Actions listed below to correct error conditions received for an OC3T trunk card:

NOTE: The Condition column indicates if an event is generated in DiamondView.

Table 4: OC3T Trunk Conditions and Recommended Action

#	IF THE CONDITION IS THIS...	THEN DO THIS...
1	Diagnostic Test Failure: this exists when a card fails the diagnostic test. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Hardware diagnostic: ■ Verify that the card is properly seated and locked in place. ■ Replace bad OC3 trunk card if diagnostic test failure condition continues.
2	Software Download Failure: This exists when a card experiences an invalid software download. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Software diagnostic, replace bad OC3 trunk card.

Table 4: OC3T Trunk Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
3	Loss of Signal (LOS): This exists when a port detects a loss of signal. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	LOS indicates a physical connection failure: ■ Check for reversed fiber optic cable. Always use Duplex fiber optic cables with SC duplex connections to ensure connections are not reversed. ■ If the condition clears, then the connections were reversed. ■ If the condition does not clear, then connect a fiber optic jumper between the Tx and Rx connections on the OC3 trunk card. Set the OC3 Line Timing parameter from "Loop" to "Internal". ■ If the LOS condition clears, then the OC3 Tx and Rx is OK, the problem is in the ATM Network (router or network). Report as appropriate and coordinate with an ATM Network Technician to isolate and fix the problem. ■ If the LOS condition does not clear, there is a problem with the OC3 card. Replace the OC3 card and test the connections again.
4	Loss of Power (LPR): This exists when a valid "dying gasp" is received from the CPE prior to LOS. Indicates that the CPE (i.e., computer, etc.) has been turned off.	Not applicable.
5	Loss of Frame (LOF): This exists when a port detects loss of frame. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	■ Check the fiber optic interface connection at the face plate of the trunk card and at the Optical Distribution Frame (ODF). ■ If OC3 connections are good, then there is an ATM Network (router or network) problem. Report as appropriate and coordinate with ATM Network Technician to isolate and fix the problem.

Table 4: OC3T Trunk Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
6	Bit Error Rate (BER): This indicates the BER condition on the port. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	■ Check the Near Sonet Performance window in DiamondView. The problem may be a Signal Failure or Signal Degrade condition. ■ Use DiamondCraft to re-check OC3 port timing source, should be set to "Loop". Follow instructions in Volume 3—*Acceptance Testing*, Chapter 7—"Using DiamondCraft for Test and Turn-up" for OC3 configuration settings. ■ Check the fiber optic interface connection at the face plate of the trunk card and at the Optical Distribution Frame (ODF). Be sure the fiber optic cable is single-mode. ■ If OC3 connections are good, then there is an ATM Network (router or network) problem. Report as appropriate and coordinate with ATM Network Technician to isolate and fix the problem.
7	Overflow: This indicates that the system is running out of resource (memory).	Not applicable.
8	UNEQ-P/PLM-P **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	■ Check sender side of ATM switch or router. Be sure it is configured for ATM payload.
9	Trace Identifier Mismatch—Path **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	■ Check receive path trace data and expected path trace data in DiamondView. Verify that the path trace is accurate.
10	Trace Identifier Mismatch—Section **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	■ Check receive section trace data and expected section trace data in DiamondView. Verify that the section trace is accurate.

Table 4: OC3T Trunk Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
11	Loss of Pointer, Path **Operational State:** Operational State: Enabled. **Availability Status:** Availability Status: Operational: fully capable of providing service	■ Check both the Speedlink and the ATM switch router OC3 facility provisioning. Both should have the same facility type either: SONET or sdh.
12	AIS-L: Alarm Indication Signal, Line. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	■ Indicates a problem on the far end of the OC3 trunk. ■ Report as appropriate and coordinate with ATM Network Technician to isolate and fix the problem.
13	AIS-P: Alarm Indication Signal, Path. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	■ Indicates a problem on the far end of the OC3 trunk. ■ Report as appropriate and coordinate with ATM Network Technician to isolate and fix the problem.
14	RDI-L: Remote Defect Indicator, Line. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	■ Indicates a far-end problem on the "transmit" side of the OC3 trunk or a Speedlink "transmit" problem. ■ Report as appropriate and coordinate with ATM Network Technician to isolate and fix the problem.
15	RDI-P: Remote Defect Indicator, Path. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	■ Indicates a far-end problem on the "transmit" side of the OC3 trunk or a Speedlink "transmit" problem. ■ Report as appropriate and coordinate with ATM Network Technician to isolate and fix the problem.

Table 4: OC3T Trunk Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
16	AIS: Alarm Indication Signal. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	■ Indicates a problem on the far end of the OC3 trunk. ■ Report as appropriate and coordinate with ATM Network Technician to isolate and fix the problem.
17	RDI: Remote Defect Indicator. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	■ Indicates a far-end problem on the "transmit" side of the OC3 trunk or a Speedlink "transmit" problem. ■ Report as appropriate and coordinate with ATM Network Technician to isolate and fix the problem.
18	LCD rate: This indicates a loss of cell delineation. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	Indicates an OC3 facility type mismatch. The facility type at the Speedlink and at the other end of the OC3 signal must be set the same (SONET or sdh). Use DiamondCraft to re-check the OC3 port line type. Follow instructions in Volume 3—*Acceptance Testing*, Chapter 7—"Using DiamondCraft for Test and Turn-up" for OC3 configuration settings.
19	Rate degraded: This indicates that the line card port has a rate drop.	Not applicable.
20	Loopback: This indicates that loopback is activated on the interface. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	Not an error condition. Use DiamondCraft to remove the loopback mode from the OC3 trunk port and put the card back in service.
21	Unequipped: This indicates the card is not in the slot. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Departed: equipment has been removed.	Place a OC3 trunk card in slot #7 (standby) and slot #8 (active).

Table 4: OC3T Trunk Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
22	Failed: This indicates a failure with the card. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Hardware Diagnostic: ■ Verify that the card is properly seated and locked in place. ■ Replace bad OC3 trunk card if failed condition continues.
23	Dependent resource disabled: This exists when a resource has a dependency on another resource that is disabled.	Not applicable.
24	Standby from a protection group: This indicates that the card in the protection group meets the operation/availability criteria for fulfilling the standby role. **Operational State:** Enabled. **Availability Status:** Operational: fully capable of providing service.	No action required. Normal reading for the "standby" OC3 trunk card.
25	Primary service provider: This indicates that the card in the protection group is fulfilling the role of the primary service provider. **Operational State:** Enabled. **Availability Status:** Operational: fully capable of providing service.	No action required. Normal reading for the "active" OC3 trunk card.
26	Attribute fail condition: This indicates that the system attributes recorded by the equipment reveal a fatally flawed parameter value. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Replace bad OC3 trunk card.
27	Attribute incomplete: This indicates that the equipment has not completed updating the system attributes. **Operational State:** Disabled. **Availability Status:** Unknown.	Replace bad OC3 trunk card if condition does not clear within 2 to 3 minutes. May be a hardware problem or indicate OC3 trunk card software is not the latest version.

Table 4: OC3T Trunk Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
28	Attribute Down Revisioned: This indicates that the OC3 card has an older software version than the active MCP card. **Operational State:** Enabled. **Availability Status:** Temporarily Inoperable.	No action required, this condition should not affect service permanently. The older software will be upgraded by the active MCP card. Service will be interrupted for a few minutes after the upgrade to allow the system to reboot.
29	Attribute Mismatch: This exists when the analysis of system attributes results in software or hardware incompatibility (i.e., incorrect card type, card with newer software than active MCP card, or damaged card). **Operational State:** Disabled. **Availability Status:** Inoperable.	Examine the card to determine which problem exists, then insert an OC3 card as necessary.
30	Uninitialized: This indicates that the operational state and other status are not initialized yet. **Operational State:** Disabled. **Availability Status:** Unknown.	Check OC3 trunk card configuration using DiamondCraft. Are all attributes listed? ■ If YES, wait for initialization to complete. Replace the OC3 trunk card if it can not complete initialization. ■ If NO, replace the OC3 trunk card.
31	Bad Provisioning Data.	Not applicable.
32	Standby MCP Synch Pending.	Not applicable.

MLA Conditions and Recommended Action

Follow the Recommended Actions listed below to correct error conditions received for a Master Line Card Adapter (MLA) card:

NOTE: The Condition column indicates if an event is generated in DiamondView.

Table 5: MLA Conditions and Recommended Action

#	IF THE CONDITION IS THIS...	THEN DO THIS...
1	Diagnostic Test Failure: this exists when a card fails the diagnostic test. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Hardware diagnostic: ■ Verify that the card is properly seated and locked in place. ■ Replace bad MLA card if diagnostic test failure condition continues.
2	Software Download Failure: This exists when a card experiences an invalid software download. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Software diagnostic, replace bad MLA card.
3	Loss of Signal (LOS): This exists when a port detects a loss of signal. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	The MLA card is not receiving a signal from the LSM2 card: ■ Check fiber optic connections. Clean fiber connections following local procedures[a]. ■ Check for reversed fiber optic cable. Always use Duplex fiber optic cables with SC duplex connections to ensure connections are not reversed. ■ Check for defective fiber optic cable, connections or bad LSM2 card. Follow the "Test LSM2 Transmit and MLA Receive" procedure on page 37.
4	Loss of Power (LPR): This exists when a valid "dying gasp" is received from the CPE prior to LOS. Indicates that the CPE (i.e., computer, etc.) has been turned off.	Not applicable.

Table 5: MLA Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
5	Loss of Frame (LOF): This exists when a port detects loss of frame. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	There is a problem with the MLA "receive" connector, or the LSM2 "transmit" connector, or the fiber optic cable between them. Refer to the "Test LSM2 Transmit and MLA Receive" procedure on page 37, and the "Test LSM2 and MLA Tx/Rx without Optical Meter" procedure on page 39.
6	Bit Error Rate (BER): This indicates the BER condition on the port.	Not applicable.
7	Overflow: This indicates that the system is running out of resource (memory). **Operational State:** Enabled. **Availability Status:** Degraded.	This condition should not appear during test and turn-up procedures. Indicates that the "ingress" threshold is exceeded, severe buffering congestion.
8	AIS: Alarm Indication Signal. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Replace bad LSM2 card.
9	RDI: Remote Defect Indicator. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	■ Check fiber optic connections. Clean fiber connections following local procedures[a]. ■ Check for reversed fiber optic cable. Always use Duplex fiber optic cables with SC duplex connections to ensure connections are not reversed. ■ Check for defective fiber optic cable connections, or bad LSM2 card. Follow the "Test LSM2 Transmit and MLA Receive" procedure on page 37.
10	LCD rate: This indicates a loss of cell delineation. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	Indicates a problem in either the MLA card or the LSM2 card. Replace one of these cards (i.e., the MLA card) to see if the condition is corrected. If not, replace the other card (i.e., the LSM2 card).

Table 5: MLA Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
11	Rate degraded: This indicates that the line card port has a rate drop.	Not applicable.
12	Loopback: This indicates that loopback is activated on the interface. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	Not an error condition. Use DiamondCraft to remove the loopback mode from the MLA port and put the card back in service.
13	Unequipped: This indicates the card is not in the slot. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Departed: equipment has been removed.	■ Place an MLA card in slot #9 through #20 as required based on the number of Line Card Shelves (LSM2 cards). ■ Make "transmit" and "receive" fiber optic cable connections to corresponding LSM2 card(s).
14	Failed: This indicates a failure with the card. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Replace bad MLA card.
15	Dependent resource disabled: This exists when a resource has a dependency on another resource that is disabled.	Not applicable.
16	Standby from a protection group: This indicates that the card in the protection group meets the operation/availability criteria for fulfilling the standby role.	Not applicable.
17	Primary service provider: This indicates that the card in the protection group is fulfilling the role of the primary service provider. **Operational State:** Enabled. **Availability Status:** Operational: fully capable of providing service.	No action required, normal reading for MLA card.

Table 5: MLA Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
18	Attribute fail condition: This indicates that the system attributes recorded by the equipment reveal a fatally flawed parameter value. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Replace bad MLA card.
19	Attribute incomplete: This indicates that the equipment has not completed updating the system attributes. **Operational State:** Disabled. **Availability Status:** Unknown.	Replace bad MLA card if condition does not clear within 2 to 3 minutes. May be a hardware problem or indicate MLA card software is not the latest version.
20	Attribute Down Revisioned: This indicates that the MLA card has an older software version than the active MCP card. **Operational State:** Enabled. **Availability Status:** Temporarily Inoperable.	No action required, this condition should not affect service permanently. The older software will be upgraded by the active MCP card. Service will be interrupted for a few minutes after the upgrade to allow the system to reboot.
21	Attribute Mismatch: This exists when the analysis of system attributes results in software or hardware incompatibility (i.e., incorrect card type, card with newer software than active MCP card, or damaged card). **Operational State:** Disabled. **Availability Status:** Inoperable.	Examine the card to determine which problem exists, then insert an MLA card as necessary.
22	Uninitialized: This indicates that the operational state and other status are not initialized yet. **Operational State:** Disabled. **Availability Status:** Unknown.	Indicates a communication path problem: ■ Verify that the card is properly seated and locked in place. ■ Call Technical Support, may need to replace the card if initialization can't complete.
23	Bad Provisioning Data.	Not applicable.
24	Standby MCP Synch Pending.	Not applicable.

[a] Suggested fiber connection cleaning materials include oil-free compressed air, lint-free wipes, isopropyl alcohol, cotton swabs, and lint-free pipe cleaners.

LSM2 Conditions and Recommended Action	Follow the Recommended Actions listed below to correct error conditions received for a Line Card Shelf Multiplexer (LSM2) card

NOTE: The Condition column indicates if an event is generated in DiamondView.

Table 6: LSM2 Conditions and Recommended Action

#	IF THE CONDITION IS THIS...	THEN DO THIS...
1	Diagnostic Test Failure: this exists when a card fails the diagnostic test. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Hardware diagnostic: - Verify that the card is properly seated and locked in place. - Replace bad LSM2 card if diagnostic test failure condition continues.
2	Software Download Failure: This exists when a card experiences an invalid software download. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Software diagnostic, replace bad LSM2 card.
3	Loss of Signal (LOS): This exists when a port detects a loss of signal. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	The LSM2 card is not receiving a signal from the MLA card: - Check fiber optic connections. Clean fiber connections following local procedures[a]. - Check for reversed fiber optic cable. Always use Duplex fiber optic cables with SC duplex connections to ensure connections are not reversed. - Check for defective fiber optic cable. Follow the "Test MLA Transmit and LSM2 Receive" procedure on page 38, and the "Test LSM2 and MLA Tx/Rx without Optical Meter" procedure on page 39.
4	Loss of Power (LPR): This exists when a valid "dying gasp" is received from the CPE prior to LOS. Indicates that the CPE (i.e., computer, etc.) has been turned off.	Not applicable.

Table 6: LSM2 Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
5	Loss of Frame (LOF): This exists when a port detects loss of frame. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	There is a problem with the LSM2 "receive" connector, or the MLA "transmit" connector, or the fiber optic cable between them. Refer to the "Test MLA Transmit and LSM2 Receive" procedure on page 38.
6	Bit Error Rate (BER): This indicates the BER condition on the port.	Not applicable.
7	Overflow: This indicates that the system is running out of resource (memory). **Operational State:** Enabled. **Availability Status:** Degraded.	This condition should not appear during test and turn-up procedures. Indicates that the "ingress" threshold is exceeded, severe buffering congestion.
8	AIS: Alarm Indication Signal **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	Replace bad MLA card.
9	RDI: Remote Defect Indicator **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	■ Check fiber optic connections. Clean fiber connections following local procedures[a]. ■ Check for reversed fiber optic cable. Always use Duplex fiber optic cables with SC duplex connections to ensure connections are not reversed. ■ Check for defective fiber optic cable. Follow the "Test MLA Transmit and LSM2 Receive" procedure on page 38.
10	LCD rate: This indicates a loss of cell delineation. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	Indicates a problem in either the LSM2 card or the MLA card. Replace one of these cards (i.e., the LSM2 card) to see if the condition is corrected. If not, replace the other card (i.e., the MLA card).
11	Rate degraded: This indicates that the line card port has a rate drop.	Not applicable.

Table 6: LSM2 Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
12	Loopback: This indicates that loopback is activated on the interface. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	Not an error condition. Use DiamondCraft to remove the loopback mode from the LSM2 port and put the card back in service.
13	Unequipped: This indicates the card is not in the slot. NOTE: An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Departed: equipment has been removed.	■ Place an LSM2 card in LCS slot #25. ■ Make "transmit" and "receive" fiber optic cable connection to corresponding MLA card.
14	Failed: This indicates a failure with the card. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Replace bad LSM2 card.
15	Dependent resource disabled: This exists when a resource has a dependency on another resource that is disabled. **Operational State:** Disabled. **Availability Status:** Unreachable: resource cannot be accessed due to failure or removal of a resource on which it is dependent.	Use DiamondCraft to check condition status at the LSM2 "port" level. A dependent resource condition at the LSM2 port level indicates that the LSM2 cannot communicate with the MLA port. Follow the "Test MLA Transmit and LSM2 Receive" procedure on page 38 to check for bad fiber optic cable connections or to determine if the MLA card is bad.
16	Standby from a protection group: This indicates that the card in the protection group meets the operation/availability criteria for fulfilling the standby role.	Not applicable.

Table 6: LSM2 Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
17	Primary service provider: This indicates that the card in the protection group is fulfilling the role of the primary service provider. **Operational State:** Enabled. **Availability Status:** Operational: fully capable of providing service.	No action required, normal reading for LSM2 card.
18	Attribute fail condition: This indicates that the system attributes recorded by the equipment reveal a fatally flawed parameter value. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Replace bad LSM2 card.
19	Attribute incomplete: This indicates that the equipment has not completed updating the system attributes. **Operational State:** Disabled. **Availability Status:** Unknown.	Replace bad LSM2 card if condition does not clear within 2 to 3 minutes. May be a hardware problem or indicate LSM2 card software is not the latest version.
20	Attribute Down Revisioned: This indicates that the LSM2 card has an older software version than the active MCP card. **Operational State:** Enabled. **Availability Status:** Temporarily Inoperable.	No action required, this condition should not affect service permanently. The older software will be upgraded by the active MCP card. Service will be interrupted for a few minutes after the upgrade to allow the system to reboot.
21	Attribute Mismatch: This exists when the analysis of system attributes results in software or hardware incompatibility (i.e., incorrect card type, card with newer software than active MCP card, or damaged card). **Operational State:** Disabled. **Availability Status:** Inoperable.	Examine the card to determine which problem exists, then insert an LSM2 card as necessary.

Table 6: LSM2 Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
22	Uninitialized: This indicates that the operational state and other status are not initialized yet. **Operational State:** Disabled. **Availability Status:** Unknown.	Indicates communication path problem: ■ Verify that the card is properly seated and locked in place. ■ Call Technical Support, may need to replace the card if initialization can't complete.
23	Bad Provisioning Data.	Not applicable.
24	Standby MCP Synch Pending.	Not applicable.

a   Suggested fiber connection cleaning materials include oil-free compressed air, lint-free wipes, isopropyl alcohol, cotton swabs, and lint-free pipe cleaners.

Line Card Conditions and Recommended Action

Follow the Recommended Actions listed below to correct error conditions received for a line card

NOTE: The Condition column indicates if an event is generated in DiamondView.

Table 7: Line Card Conditions and Recommended Action

#	IF THE CONDITION IS THIS...	THEN DO THIS...
1	Diagnostic Test Failure: this exists when a card fails the diagnostic test. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Hardware diagnostic: - Verify that the card is properly seated and locked in place. - Replace bad line card if diagnostic test failure condition continues.
2	Software Download Failure: This exists when a card experiences an invalid software download. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Software diagnostic, replace bad line card.
3	Loss of Signal (LOS): This exists when a port detects a loss of signal not preceded by a valid "dying gasp". **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	Bad connection at end user equipment (NIC or modem). Possible causes: - Subscriber[a] may have powered off CPE; CO or CPE does not support "dying gasp". - Bad end user equipment. - Problem in the local loop; i.e. cable cut.
4	Loss of Power (LPR): This exists when a valid "dying gasp" is received from the CPE prior to LOS. Indicates that the CPE (i.e., computer, etc.) has been turned off. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	No action required, service will resume when customer turns on CPE. Applicable to CAP4 and DMT4 only.

Table 7: Line Card Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
5	Loss of Frame (LOF): This exists when a port detects loss of frame. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	Bad connection at end user equipment (NIC or modem). Possible causes: ■ Subscriber[a] may have powered off CPE; CO or CPE does not support "dying gasp". ■ Bad end user equipment. ■ Problem in the local loop; i.e. cable cut.
6	Error Rate: This indicates a high bit error rate (BER) on the port.	The provisioned Error Rate alarm threshold is exceeded. Do one or more of the following: ■ Increase the Error Rate alarm threshold. ■ Increase the provisioned noise Margin. ■ Reduce the data rate ■ Check the quality of the loop, and adjust provisioning if necessary. **NOTE:** Applicable to CAP4 and DMT4 only.
7	Overflow: This indicates that the system is running out of resource (memory). **Operational State:** Enabled. **Availability Status:** Degraded.	This condition should not appear during test and turn-up procedures. Indicates that the "egress" threshold is exceeded, severe buffering congestion.
8	AIS: Alarm Indication Signal	Not applicable.
9	RDI: Remote Defect Indicator	Not applicable.
10	LCD rate: This indicates a loss of cell delineation. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	Bad connection at end user equipment (NIC or modem). Possible causes: ■ Subscriber[a] may have powered off CPE; CO or CPE does not support "dying gasp". ■ Bad end user equipment. ■ Problem in the local loop; i.e. cable cut. **NOTE:** Applicable to CAP4 and DMT4 only.

Table 7: Line Card Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
11	Rate degraded: This indicates that the line card port has a rate drop. **NOTE:** An event is generated in DiamondView. **Operational State:** Enabled. **Availability Status:** Operational.	The actual upstream or downstream data rate is below the minimum rate provisioned for the subscriber.
12	Loopback: This indicates that loopback or test is activated on the interface. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable: incapable of providing service.	Not an error condition. Use DiamondCraft to remove the loopback mode from the line card port and put the card back in service. Applicable to CAP4 and DMT4 only.
13	Unequipped: This indicates the card is not in the slot. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Departed: equipment has been removed.	Place a line card in LCS slot 1 through 24 as required.
14	Failed: This indicates a failure with the card. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Replace bad line card.
15	Dependent resource disabled: This exists when a resource has a dependency on another resource that is disabled. **Operational State:** Disabled. **Availability Status:** Unreachable: resource cannot be accessed due to failure or removal of a resource on which it is dependent.	Use DiamondCraft to check condition status at the LSM2 "port" level. A dependent resource condition at the line card port level indicates that the line card cannot communicate with the LSM2 port.

Table 7: Line Card Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
16	Standby from a protection group: This indicates that the card in the protection group meets the operation/availability criteria for fulfilling the standby role.	Not applicable.
17	Primary service provider: This indicates that the card in the protection group is fulfilling the role of the primary service provider.	Not applicable.
18	Attribute fail condition: This indicates that the system attributes recorded by the equipment reveal a fatally flawed parameter value. **Operational State:** Disabled. **Availability Status:** Failed: failed (not removed or unreachable).	Replace the bad line card.
19	Attribute incomplete: This indicates that the equipment has not completed updating the system attributes. **Operational State:** Disabled. **Availability Status:** Unknown.	Replace bad line card if condition does not clear within 2 to 3 minutes. May be a hardware problem or indicate line card software is not the latest version.
20	Attribute Down Revisioned: This indicates that the line card has an older software version than the active MCP card. **Operational State:** Enabled. **Availability Status:** Temporarily Inoperable.	No action required, this condition should not affect service permanently. The older software will be upgraded by the active MCP card. Service will be interrupted for a few minutes after the upgrade to allow the system to reboot.
21	Attribute Mismatch: This exists when the analysis of system attributes results in software or hardware incompatibility (i.e., incorrect card type, card with newer software than active MCP card, or damaged card). **Operational State:** Disabled. **Availability Status:** Inoperable.	Examine the card to determine which problem exists, then insert a line card as necessary.

Table 7: Line Card Conditions and Recommended Action (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
22	Uninitialized: This indicates that the operational state and other status are not initialized yet. **Operational State:** Disabled. **Availability Status:** Unknown.	Indicates communication path problem: ■ Verify that the card is properly seated and locked in place. ■ Call Technical Support, may need to replace the card if initialization can't complete.
23	Bad Provisioning Data: This indicates that invalid setup information has been passed to the line card. **NOTE:** An event is generated in DiamondView. **Operational State:** Disabled. **Availability Status:** Inoperable.	Set valid provisioning information for the line card. See Volume 4—*Provisioning*: ■ for CAP2 cards, Chapter 1—"CAP2 ADSL Provisioning." ■ for CAP4 cards, Chapter 2—"CAP4 ADSL Provisioning." ■ for DMT4 cards, Chapter 3—"DMT ADSL Provisioning." ■ for SDSL8 cards, Chapter 4—"SDSL Provisioning."
	For the IDSL8 card only: indicates one of the following: ■ more than one PPP connection ■ a mix of PPP and Frame Relay connections ■ more than 24 connections	Set valid provisioning information for the IDSL8 card. See Volume 4—*Provisioning*, Chapter 5—"IDSL Provisioning."
24	Standby MCP Synch Pending.	Not applicable.
25	Error Rate Alarm: This indicates that the Near End or Far End errored frames per second threshold for Data mode has been exceeded. **Operational State:** Enabled. **Availability Status:** Operational.	Check Near End or Far End errored frames threshold.

[a] LOS condition will not generate an alarm event unless the service is provisioned for "managed service". If the service is provisioned for "managed service" an LOS condition will generate an alarm event.

Test LSM2 Transmit and MLA Receive

Follow these steps to determine cause of "loss of signal" at an MLA card.

Table 8: Test LSM2 Transmit and MLA Receive

STEP	PROCEDURE
1	Disconnect the fiber optic cable from the MLA connectors.
2	Connect an optical meter to the end of the LSM2 "transmit" connector.
3	Set the optical meter to dBm and wavelength setting to 1300 nm.
4	Is the output signal between -14 and -20 dBm? ■ If YES, the LSM2 signal is good to the end of the fiber optic cable. Replace bad MLA card. ■ If NO, go to STEP 5 to determine if the fiber optic cable or LSM2 card is bad.
5	Disconnect the fiber optic cable from the LSM2 connectors.
6	Connect a fiber optic jumper in the LSM2 "transmit" connector to verify the output power signal at the LSM2 transmitter.
7	Connect an optical meter to the end of the fiber optic jumper. Use the same meter settings as in STEP 3.
8	Is the output signal between -14 and -20 dBm? ■ If YES, replace bad fiber optic cable. ■ If NO, replace bad LSM2 card.
9	The Test LSM2 Transmit and MLA Receive procedure is complete.

**Test MLA
Transmit and
LSM2 Receive**

Follow these steps to determine cause of "Loss of Signal" or "Dependent Resource Disabled" condition at an LSM2 card.

Table 9: Test MLA Transmit and LSM2 Receive

STEP	PROCEDURE
1	Disconnect the fiber optic cable from the LSM2 connectors.
2	Connect an optical meter to the end of the MLA "transmit" connector.
3	Set the optical meter to dBm and wavelength setting to 1300 nm.
4	Is the output signal between -14 and -20 dBm? ■ If YES, the MLA signal is good to the end of the fiber optic cable. Replace bad LSM2 card. ■ If NO, go to STEP 5 to determine if the fiber optic cable or MLA card is bad.
5	Disconnect the fiber optic cable from the MLA connectors.
6	Connect a fiber optic jumper in the MLA "transmit" connector to verify the output power signal at the MLA transmitter.
7	Connect an optical meter to the end of the fiber optic jumper. Use the same meter settings as in STEP 3.
8	Is the output signal between -14 and -20 dBm? ■ If YES, replace bad fiber optic cable. ■ If NO, replace bad MLA card.
9	The Test MLA Transmit and LSM2 Receive procedure is complete.

Test LSM2 and MLA Tx/Rx without Optical Meter

Follow these steps to determine the cause of a "Loss of Signal" condition at the LSM2 or MLA "transmit" and "receive" connectors:

Table 10: Test LSM2 and MLA Tx/Rx without Optical Meter

STEP	PROCEDURE
1	Disconnect the fiber optic cable from the MLA connectors.
2	Connect a fiber optic jumper to the MLA "transmit" and "receive" connectors.
3	Does the LOS condition clear at the MLA card? ■ If YES, the MLA transceivers are functioning. Continue to STEP 4. ■ If NO, the MLA transceivers are bad. Replace the MLA card.
4	Disconnect the fiber optic cable from the LSM2 connectors.
5	Connect the fiber optic jumper to the LSM2 "transmit" and "receive" connectors.
6	Does the LOS condition clear at the LSM2 card? ■ If YES, the LSM2 transceivers are functioning. Continue to STEP 7. ■ If NO, the LSM2 transceivers are bad. Replace the LSM2 card.
7	If the LOS condition clears, then the fiber optic cable is bad. Replace the fiber optic cable.
8	The Test LSM2 and MLA Tx/Rx without Optical Meter procedure is complete.

SECTION 1   SYSTEM MONITORING

Chapter 3   Performance Monitoring

Introduction   The Speedlink system provides performance monitoring information at the port level for the trunk cards and line cards. DiamondView[1] displays this information on the following windows:

- Near DS3 Performance
- Far DS3 Performance
- Near Sonet Performance
- Far Sonet Performance
- ATM Performance
- DSL Performance

Thresholds for some of the DS3, OC3, and DSL performance parameters can be provisioned using DiamondView[2]. DS3 performance parameters and fixed and provisionable threshold settings are provided on pages 42 through 44. OC3 Sonet performance parameters and fixed and provisionable threshold settings are provided on pages 47 through 54. DSL performance parameters are explained in detail in Volume 4—*Provisioning*, Chapters 1 through 5.

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[1]   Refer to Volume 6—*DiamondView Software,* Chapter 2—"The DiamondView Reference Manual" for detailed information about how to use DiamondView.

[2]   Performance thresholds can also be established using DiamondCraft.

DS3 Performance Parameters and Thresholds	Near and Far performance "threshold crossings" are reported as system events in DiamondView's System Event window.

DS3 Near and Far performance parameters are set and displayed in DiamondView's DS3 Port Thresholds dialog window: |
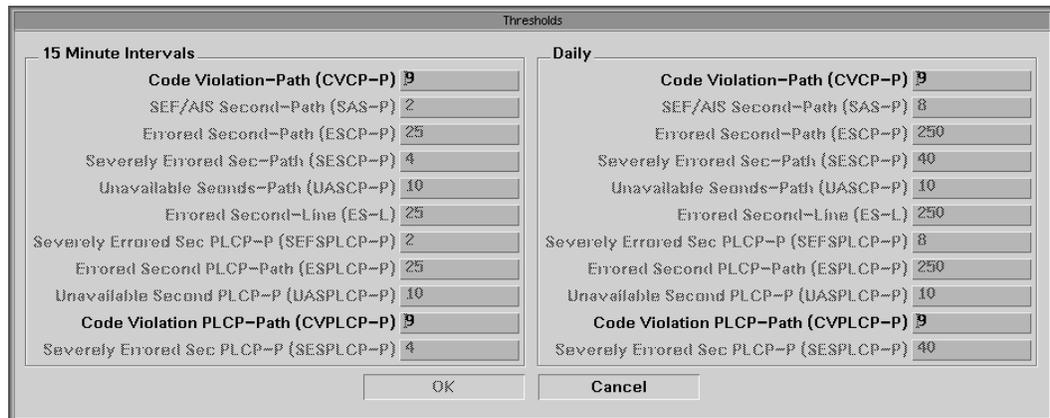
Figure 3: DiamondView DS3 Port Thresholds Dialog Window

The table below provides a list of DS3 Near and Far performance parameters, and their respective meanings and <u>default</u> threshold values for Daily and 15 Minute intervals. Provisionable thresholds for CVCP-P and CVPLCP-P are shown on page 44.

Table 11: DS3 Performance Parameters

Acronym	Meaning	Daily Interval	15 Minute Interval
CVCP-P	**Code Violation-Path:** Count of CP-Bit parity errors occurring in the accumulation period.	3820 **Provisionable**	382 **Provisionable**
ESCP-P	**Errored Second-Path:** Count of seconds containing one or more CP-Bit parity errors, one or more SEF defects, or one or more AIS defects.	250 Fixed Value	25 Fixed Value
SESCP-P	**Severely Errored Second-Path:** Count of seconds containing more than 44 (equates to a BER of 10-6) CP-Bit parity errors, one or more SEF defects, or one or more AIS defects.	40 Fixed Value	4 Fixed Value
SAS-P	**SEF/AIS Second-Path:** Count of seconds containing one or more SEF defects or one or more AIS defects.	8 Fixed Value	2 Fixed Value

Table 11: DS3 Performance Parameters (continued)

Acronym	Meaning	Daily Interval	15 Minute Interval
UASCP-P	**Unavailable Second-Path:** Count of one second intervals during which the DS3 path is unavailable.	10 Fixed Value	10 Fixed Value
ES-L	**Errored Second-Line:** Count of seconds containing one or more BPVs (which are not part of a zero substitution code), one or more Excessive Zeros (EXZ), or one or more LOS defects.	250 Fixed Value	25 Fixed Value
CVPLCP-P	**Code Violation PLCP:** Count of BIP-8 code errors in the accumulation period.	3584 **Provisionable**	359 **Provisionable**
ESPLCP-P	**Errored Second PLCP:** Count of seconds containing one or more BIP-8 coding errors, or one or more SEF defects.	250 Fixed Value	25 Fixed Value
SESPLCP-P	**Severely Errored Second PLCP:** Count of seconds containing more than 4 (equates to a BER of 10-7) BIP-8 coding errors, or one or more SEF defects.	40 Fixed Value	4 Fixed Value
SEFSPLCP-P	**Severely Errored Framing Second PLCP:** Count of seconds containing one or more SEF defects. A SEF defect is declared when an error in the A1 octet and an error in the A2 octet of a framing octet pair or two consecutive invalid or nonsequential Path Overhead Identifier octets are detected.	8 Fixed Value	2 Fixed Value
UASPLCP-P	**Unavailable Second PLCP:** Count of one second intervals during which the DS3 PLCP path is unavailable.	10 Fixed Value	10 Fixed Value

Thresholds for two of these DS3 performance parameters, CVCP-P and CVPLCP-P, can be provisioned. The tables below provide threshold settings for both daily and 15 minute intervals. Change the thresholds for these parameters by overwriting the default settings in DiamondView's DS3 Port Thresholds window.

CVCP-P Provisionable Thresholds

The threshold range is 10^{-6} to 10^{-10} BER; the default setting is 9 or 10^{-9} BER:

Table 12: CVCP-P Provisionable Thresholds

BER	Thresholds / Daily Count	Thresholds / 15 Minute Count
10^{-10}	382	38
10^{-9}	3820 (default setting)	382 (default setting)
10^{-8}	38196	3820
10^{-7}	381799	38180
10^{-6}	3801881	380188

CVPLCP-P Provisionable Thresholds

The threshold range is 10^{-6} to 10^{-10} BER; the default setting is 9 or 10^{-9} BER:

Table 13: CVPLCP-P Provisionable Thresholds

BER	Thresholds / Daily Count	Thresholds / 15 Minute Count
10^{-10}	358	36
10^{-9}	3584 (default setting)	359 (default setting)
10^{-8}	35830	3583
10^{-7}	358132	35813
10^{-6}	3564673	356467

Near and Far DS3 performance "threshold crossings" are reported as system events in DiamondView's System Event window.

**DS3 Port
Performance
Monitoring**

The DS3 trunk card maintains fourteen counters to monitor Near and Far DS3 performance parameters: Previous Day, Current Day, Current 15 Minute, and up to eleven Previous 15 Minute interval counters. Performance parameters are monitored using DiamondView's DS3 Performance window.
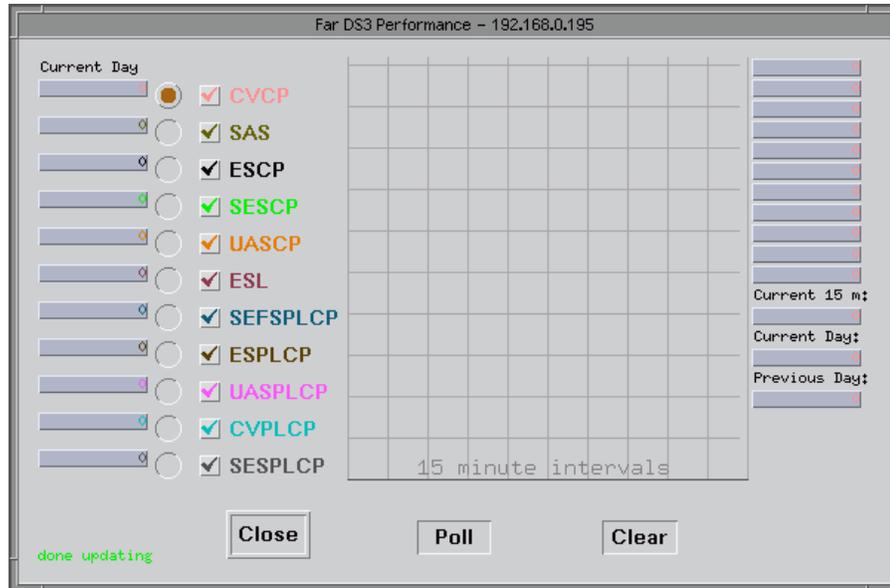

Figure 4: DiamondView DS3 Performance Window

The DS3 trunk card also maintains fourteen counters to monitor ATM performance parameters: Rx Cell Count, Tx Cell Count, Header Error Checksum (HEC) and Out of Cell Delineation (OCD). ATM performance parameters are monitored using DiamondView's DS3 ATM Performance window.
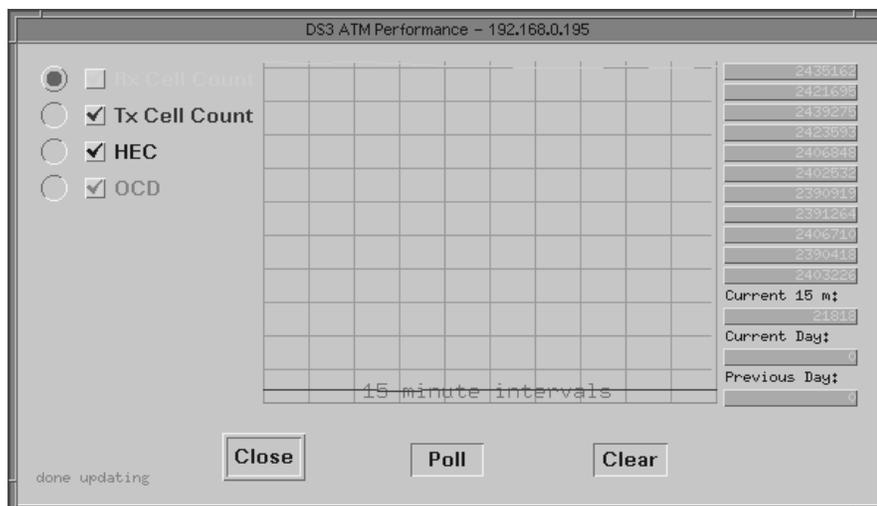
Figure 5: DiamondView DS3 ATM Performance Window

How to Correct DS3 Port Performance Errors

A "threshold crossing" event is displayed in DiamondView's Systems Event window when a DS3 port parameter threshold is exceeded. Follow these steps to find out what is causing the DS3 port performance errors:

1. Check for any conditions reported against the DS3 port. Refer to the DS3 Trunk Conditions Matrix beginning on page 11. Follow the recommended actions listed to correct an error condition.

2. Check DS3 Line Parameter settings. These settings configure the DS3 signal on the DS3 trunk port and <u>must</u> match the settings at the other end of the DS3 connection (DS3/ATM router or switch). Correct DS3 port configuration as required.

    ■ Line Type – Direct Mapping or **PLCPC Bit**

    ■ Line Timing – **Loop** or Internal

    ■ Line Build Out – Low or **High**

    ■ Cell Scrambling – Disable or **Enable**

    ■ Hec Coset – Disable or **Enable**

    NOTE: Default settings are in bold.

3. Contact your ATM network provider—to determine the source of errors—if all DS3 configuration settings have been verified as correct and the "threshold crossing" condition continues.

OC3 Near Sonet Performance Parameters

Near and Far Sonet performance "threshold crossings" are reported as system events in DiamondView's System Event window.

The OC3T trunk card maintains fourteen counters to monitor Near Sonet performance parameters: Previous Day, Current Day, Current 15 Minute, and up to eleven Previous 15 Minute interval counters. Performance parameters are monitored using DiamondView's Near Sonet Performance window.


Figure 6: DiamondView OC3 Near Sonet Performance Window

Sonet Section, Line and Path thresholds are set using DiamondView's OC3T Thresholds dialog window:
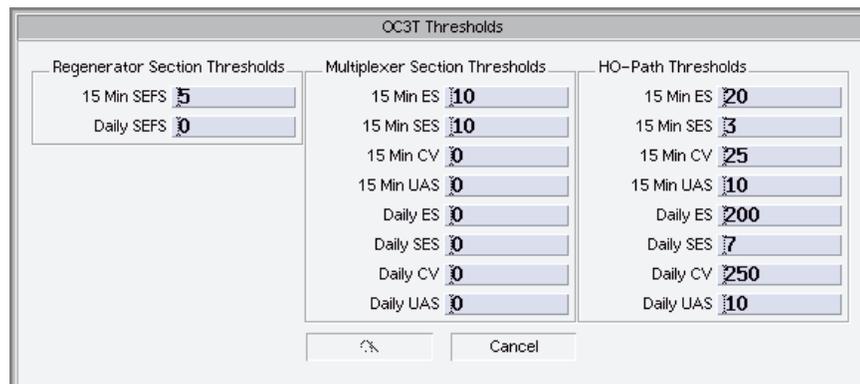
Figure 7: DiamondView OC3T Thresholds Dialog Window

The table below provides a list of Near Sonet Section, Line and Path performance parameters—their respective meanings and <u>default</u> threshold values for Daily and 15 Minute intervals. Provisionable thresholds for Line and Path Coding Violations (CV) are on page 44.

Table 14: Near Sonet Performance Parameters

Acronym	Meaning	Daily Interval	15 Minute Interval
SECTION			
ES	**Section Errored Second**: Count of seconds containing one or more Section Layer BIP errors, one or more Severely Errored Framing (SEF) defect, or one or more Loss Of Signal (LOS) defects.	0-65535 Default setting is 200	0-900 Default setting is 20
SEFS	**Section Severely Errored Framing Second:** Count of seconds containing one or more Severely Errored Framing (SEF) defect (defined as a time at which the incoming signal has a minimum of four consecutive errored framing patterns). A SEF defect is terminated upon detecting two successive error-free framing patterns.	0-65535 Default setting is 0 (inactive)	0-900 Default setting is 0 (inactive)
LINE			
ES	**Line Errored Second**: Count of seconds containing one or more Line Layer BIP errors or an AIS-L defect was present.	0-65535 Default setting is 0 (inactive)	0-900 Default setting is 0 (inactive)
SES	**Line Severely Errored Second**: Count of seconds containing 2,500 or more Line Layer BIP errors or an AIS-L defect was present.	0-65535 Default setting is 0 (inactive)	0-900 Default setting is 0 (inactive)
CV	**Line Code Violation-Path**: Count of BIP errors (using B2 byte) occurring in the accumulation period. Up to 8XN BIP errors can be detected per STS-N frame, with each error incrementing the CV-L current second register.	0-1, 048, 575 Default setting is 0 (inactive)	0-16383 Default setting is 0 (inactive)

Table 14: Near Sonet Performance Parameters (continued)

Acronym	Meaning	Daily Interval	15 Minute Interval
UAS	**Line Unavailable Second**: Count of one second intervals during which the Line is unavailable. The Line is unavailable at the onset of 10 contiguous SES-Ls. The 10 SES-Ls are included in unavailable time and so since it is not known until the tenth second that unavailable time started ten seconds ago the counts for all the parameters must be adjusted back to what they were ten seconds ago. Once unavailable the Line becomes available at the onset of 10 contiguous seconds with no SES-Ls. The ten seconds with no SES-Ls are excluded from available time so the counts of the parameters do not need to be adjusted.	0-65535 Default setting is 0 (inactive)	0-900 Default setting is 0 (inactive)
PATH			
ES	**Path Errored Second**: Count of seconds containing one or more Path Layer BIP errors or an AIS-P or LOP-P defect was present.	200	25
SES	**Path Severely Errored Second**: Count of seconds containing 2,400 or more Line Layer BIP errors or an AIS-P or LOP-P defect was present.	0-65535 Default setting is 7	0-900 Default setting is 3
CV	**Path Code Violation**: Count of BIP errors (using B3 byte) occurring in the accumulation period. Up to 8 BIP errors can be detected per frame, with each error incrementing the CV-P current second register.	0-1, 048, 575 Default setting is 250	0-16383 Default setting is 25

Table 14: Near Sonet Performance Parameters (continued)

Acronym	Meaning	Daily Interval	15 Minute Interval
UAS	**Path Unavailable Second**: Count of one second intervals during which the Path is unavailable. The Path is unavailable at the onset of 10 contiguous SES-Ps. The 10 SES-Ps are included in unavailable time and so since it is not known until the tenth second that unavailable time started ten seconds ago the counts for all the parameters must be adjusted back to what they were ten seconds ago. Once unavailable the Path becomes available at the onset of 10 contiguous seconds with no SES-Ps. The ten seconds with no SES-Ps are excluded from available time so the counts of the parameters do not need to be adjusted.	0-65535 Default setting is 10	0-900 Default setting is 10

OC3 Far Sonet Performance Parameters

Near and Far Sonet performance "threshold crossings" are reported as system events in DiamondView's System Event window.

The OC3T trunk card maintains fourteen counters to monitor Far Sonet performance parameters: Previous Day, Current Day, Current 15 Minute, and up to eleven Previous 15 Minute interval counters. Performance parameters are monitored using DiamondView's Far Sonet Performance window.
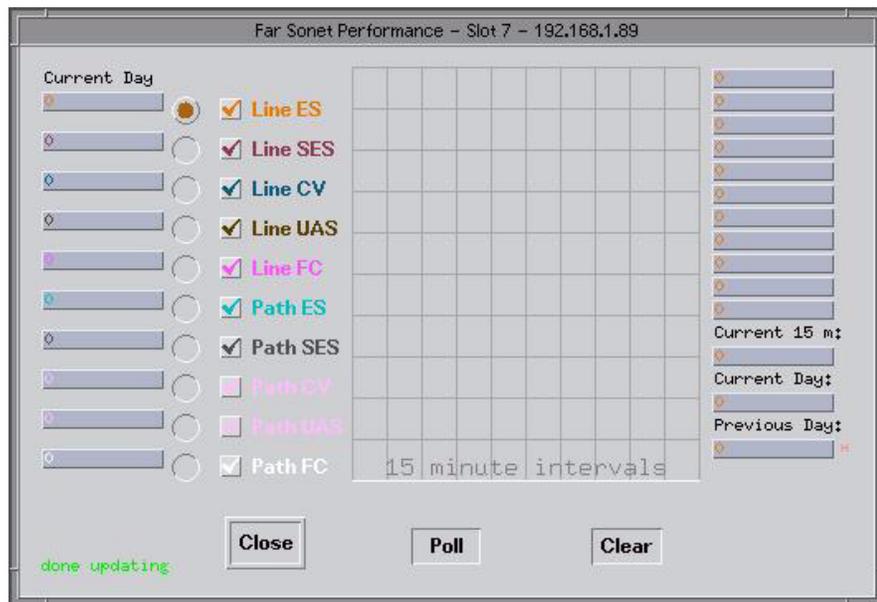
Figure 8: DiamondView Far Sonet Performance Window

Far Sonet Line and Path thresholds are set using DiamondView's OC3T Thresholds dialog window:
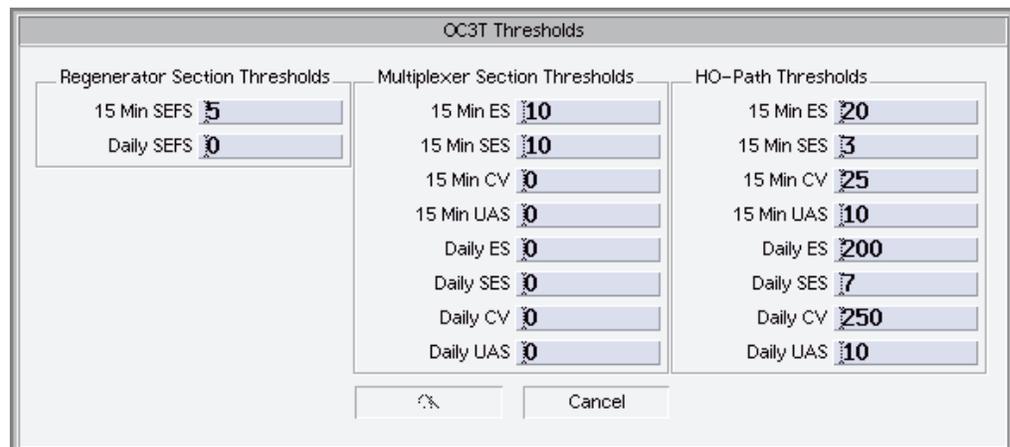
Figure 9: DiamondView OC3T Thresholds Dialog Window

The table below provides a list of Far Sonet performance parameters—their respective meanings and <u>default</u> threshold values for Daily and 15 Minute intervals. Provisionable thresholds for Line and Path Coding Violations (CV) are on page 44.

Table 15: Far Sonet Performance Parameters

Acronym	Meaning	Daily Interval	15 Minute Interval
LINE			
ES	**Line Errored Second**: Count of seconds containing one or more Line Layer BIP errors was reported by the far-end LTE (using the REI-L indication) or an RDI-L defect was present.	0-65535 Default setting is 0 (inactive)	0-900 Default setting is 0 (inactive)
SES	**Line Severely Errored Second**: Count of seconds containing 2,500 or more Line Layer BIP errors reported by the far-end LTE (using the REI-L indication) or an RDI-L defect was present.	0-65535 Default setting is 0 (inactive)	0-900 Default setting is 0 (inactive)
CV	**Line Code Violation-Path**: Count of BIP errors (using REI-L indication in the Line Overhead) detected by the far-end LTE. Up to 8XN BIP errors can be indicated by the REI-L, with each error incrementing the CV-LFE current second register.	0-1, 048, 575 Default setting is 0 (inactive)	0-16383 Default setting is 0 (inactive)
UAS	**Line Unavailable Second**: Count of one second intervals during which the OC3C Line is unavailable at the far-end. The far-end Line is unavailable at the onset of 10 contiguous SES-LFEs. The 10 SES-LFEs are included in unavailable time and so since it is not known until the tenth second that unavailable time started ten seconds ago the counts for all the parameters must be adjusted back to what they were ten seconds ago. Once unavailable the Line becomes available at the onset of 10 contiguous seconds with no SES-LFEs. The ten seconds with no SES-LFEs are excluded from available time so the counts of the parameters do not need to be adjusted.	0-65535 Default setting is 0 (inactive)	0-900 Default setting is 0 (inactive)

Table 15: Far Sonet Performance Parameters (continued)

Acronym	Meaning	Daily Interval	15 Minute Interval
PATH			
ES	**Path Errored Second**: Count of seconds containing one or more Path Layer BIP errors was reported by the far-end PTE (using the REI-P indication) or an RDI-P defect was present.	0-65535 Default setting is 200	0-900 Default setting is 20
SES	**Path Severely Errored Second**: Count of seconds containing 2400 or more Path Layer BIP errors reported by the far-end PTE (using the REI-P indication) or an RDI-P defect was present.	0-65535 Default setting is 7	0-900 Default setting is 3
CV	**Path Code Violation-Path**: Count of BIP errors (using REI-P indication in the Path Overhead) detected by the far-end PTE. Up to 8 BIP errors can be indicated by the REI-P, with each error incrementing the CV-PFE current second register.	0-1, 048, 575 Default setting is 250	0-16383 Default setting is 25
UAS	**Path Unavailable Second**: Count of one second intervals during which the Path is unavailable at the far-end. The Path is unavailable at the onset of 10 contiguous SES-PFEs. The 10 SES-PFEs are included in unavailable time and so since it is not known until the tenth second that unavailable time started ten seconds ago the counts for all the parameters must be adjusted back to what they were ten seconds ago. Once unavailable the Line becomes available at the onset of 10 contiguous seconds with no SES-PFEs. The ten seconds with no SES-PFEs are excluded from available time so the counts of the parameters do not need to be adjusted.	0-65535 Default setting is 10	0-900 Default setting is 10

Change the thresholds for these parameters by overwriting the default settings in DiamondView's OC3 Thresholds window.

ATM Performance Parameters

The OC3 trunk card also maintains fourteen counters to monitor ATM performance parameters: Rx Cell Count, Tx Cell Count, Header Error Checksum (HEC) and Out of Cell Delineation (OCD). ATM performance parameters are monitored using DiamondView's ATM Performance Window.
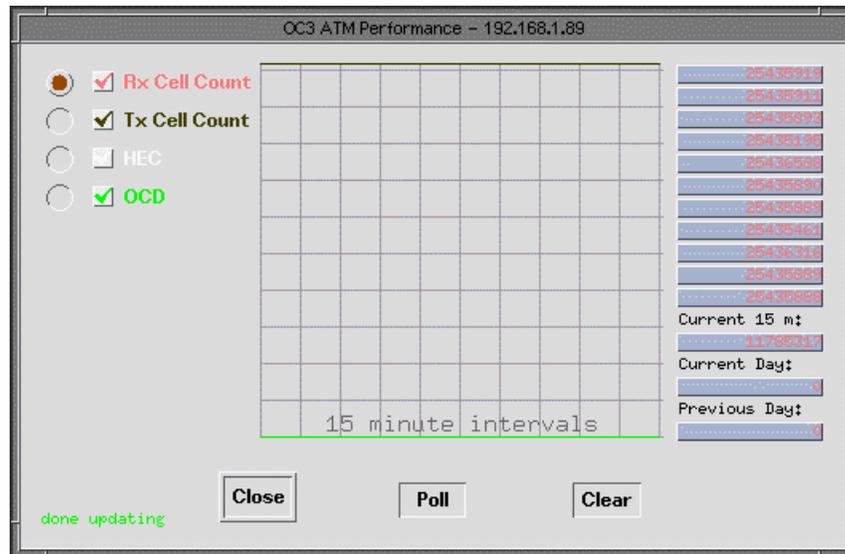
Figure 10: DiamondView OC3 ATM Performance Window

How to Correct OC3 Port Performance Errors

A "threshold crossing" event is displayed in DiamondView's Systems Event window when a OC3 threshold is exceeded. Follow these steps to find out what is causing the OC3 performance errors:

1.   Check for any conditions reported against the OC3 port. Refer to the OC3 Trunk Conditions Matrix beginning on page 16. Follow the recommended action listed to correct an error condition.

2.   Check OC3 Facility Type setting (Sonet or sdh). This setting <u>must</u> match the setting at the other end of the OC3 connection (ATM router or switch). Correct OC3 port configuration as required.

■   Facility Type: **Sonet** or sdh

     Disable RDI on loss of cell: Enable or **Disable**

     Disable RDI on Label Mismatch: Enable or **Disable**

     Disable RDI on Trace Mismatch: Enable or **Disable**

■   Timing: **Loop**

■   Error Rate:

3 Signal fail

6 Signal degrade

NOTE: The default settings are in bold.

NOTE: It is critical that the Facility Type setting match at both ends of the OC3 connection (the network router or ATM switch).

3. Contact your ATM network provide to determine the source of errors, if all OC3 configuration settings have been verified as correct and the "threshold crossing" condition continues.

CAP2 DSL Performance Parameters and Thresholds

CAP2 DSL performance parameters are displayed in DiamondView's Advanced DSL Parameters window:
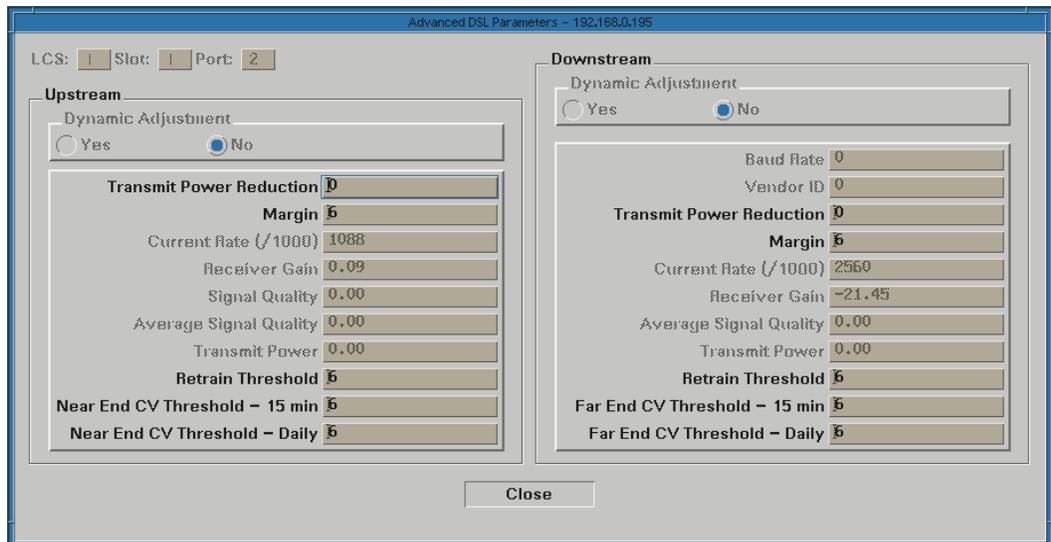
Figure 11: DiamondView CAP2 Advanced DSL Parameters Window

Transmit Power Reduction, Margin, Retrain Threshold, and Near End CV Thresholds (15 minute and Daily) are provisionable. Refer to Volume 4—*Provisioning*, Chapter 1—"CAP2 DSL Provisioning" for detailed information about threshold settings.

CAP4 DSL Performance Parameters and Thresholds

CAP4 DSL performance parameters are displayed in DiamondView's CAP Advanced Configuration Parameters window:

CAP Advanced Configuration Parameters – 192.168.1.108

LCS: 1   Slot: 1   Port: 1
ATUC & ATUR

ATUC
LOF 15min Threshold 0
LOS 15min Threshold 0
LPR 15min Threshold 0
Errored Seconds 15min 0
FE Errored Seconds 15min 0
Coding Violations 15min 0
FE Coding Violations 15min 0
LOF Daily Threshold 0
LOS Daily Threshold 0
LPR Daily Threshold 0
Errored Seconds Daily 0
FE Errored Seconds Daily 0
Coding Violations Daily 0
FE Coding Violations Daily 0
Signal/Noise Margin 6
Transmit Power Reduction 0
Interleave Depth 9
Rate Degraded Threshold 0
Error Retrain Threshold 0
FE Error Retrain Threshold 0
Error Alarm Threshold 0
FE Alarm Threshold 0

ATUR
Signal/Noise Margin 6
Transmit Power Reduction 0
Rate Degraded Threshold 0

Close

Figure 12: DiamondView CAP Advanced Configuration Parameters Window

All displayed parameters are provisionable. Refer to Volume 4—*Provisioning*, Chapter 2—"CAP4 DSL Provisioning" for detailed information about threshold settings.

DMT4 DSL Performance Parameters and Thresholds

DMT4 DSL performance parameters are displayed in DiamondView's DMT Advanced Configuration Parameters window:
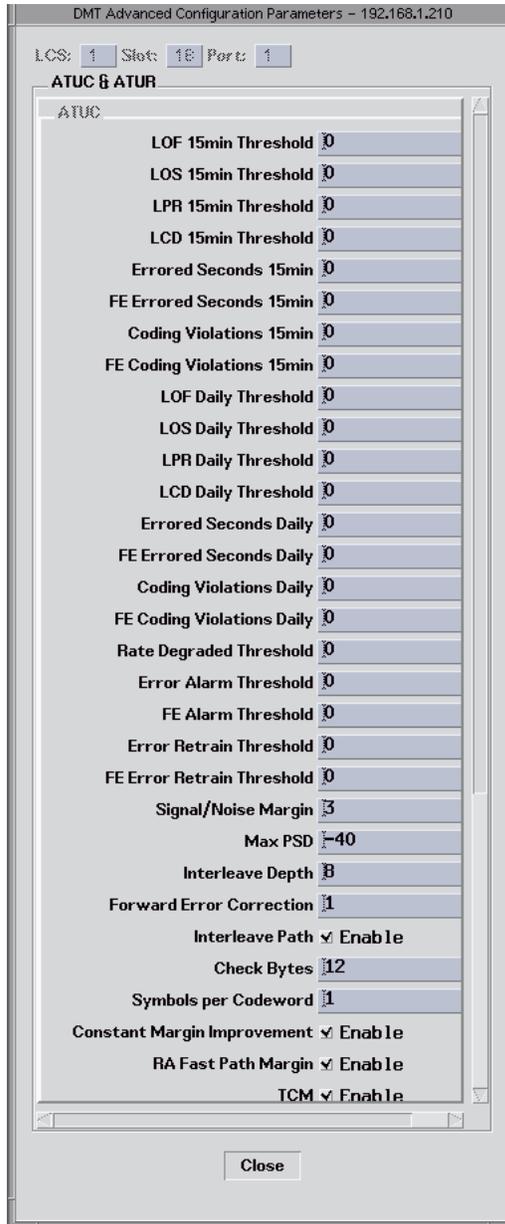
Figure 13: DiamondView DMT Advanced Configuration Parameters Window

All deployed parameters are provisionable. Refer to Volume 4—*Provisioning*, Chapter 3—"DMT4 DSL Provisioning" for detailed information about threshold settings.

SDSL Performance Parameters and Thresholds

SDSL performance parameters are displayed in DiamondView's Advanced DSL Parameters window:
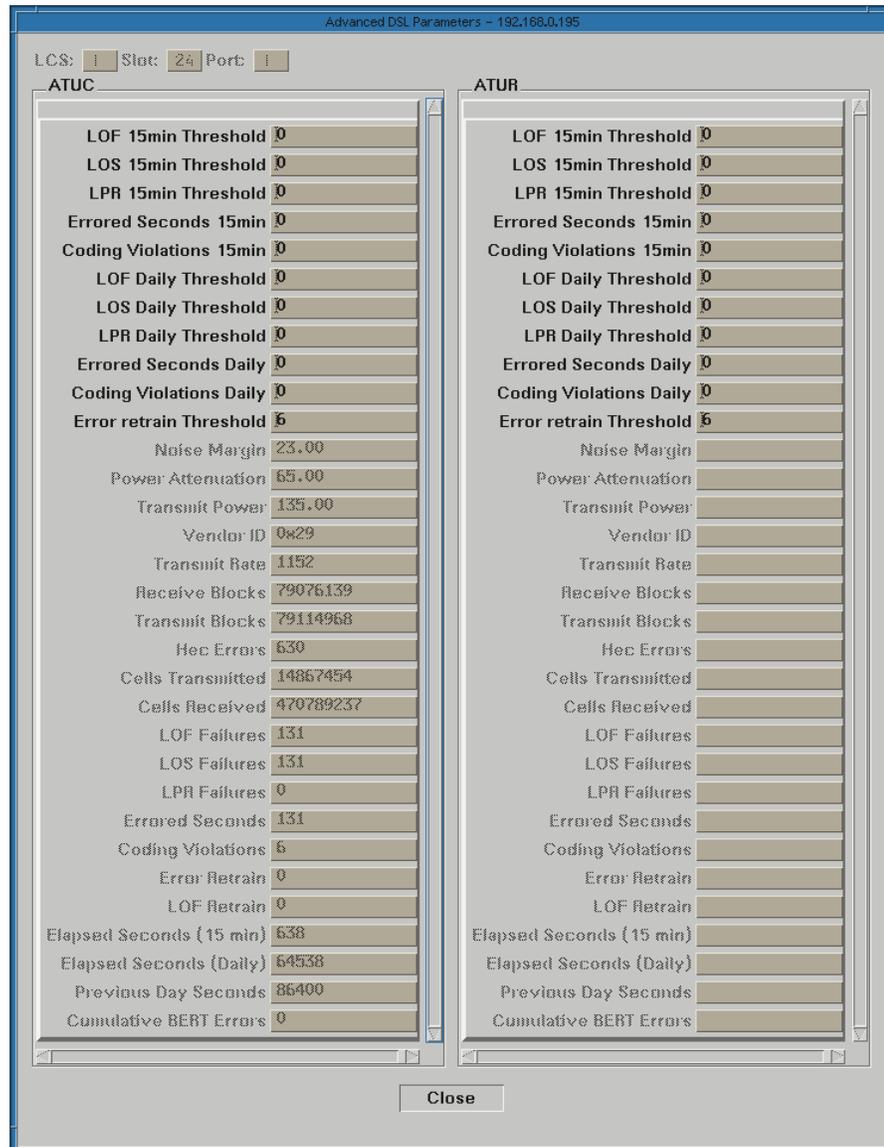
Figure 14: DiamondView SDSL Advanced DSL Parameters Window

Loss of Frame (LOF), Loss of Signal (LOS), Loss of Power[3] (LPR), Errored Seconds, Coding Violations, and Error Retrain Thresholds are provisionable. Refer to Volume 4—*Provisioning*, Chapter 4—"SDSL Provisioning" for detailed information about threshold settings.

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[3] LPR Signal threshold is planned for a future release.

IDSL Performance Parameters and Thresholds

IDSL performance parameters are deployed in DiamondView's IDSL Advanced Configuration Parameters window:
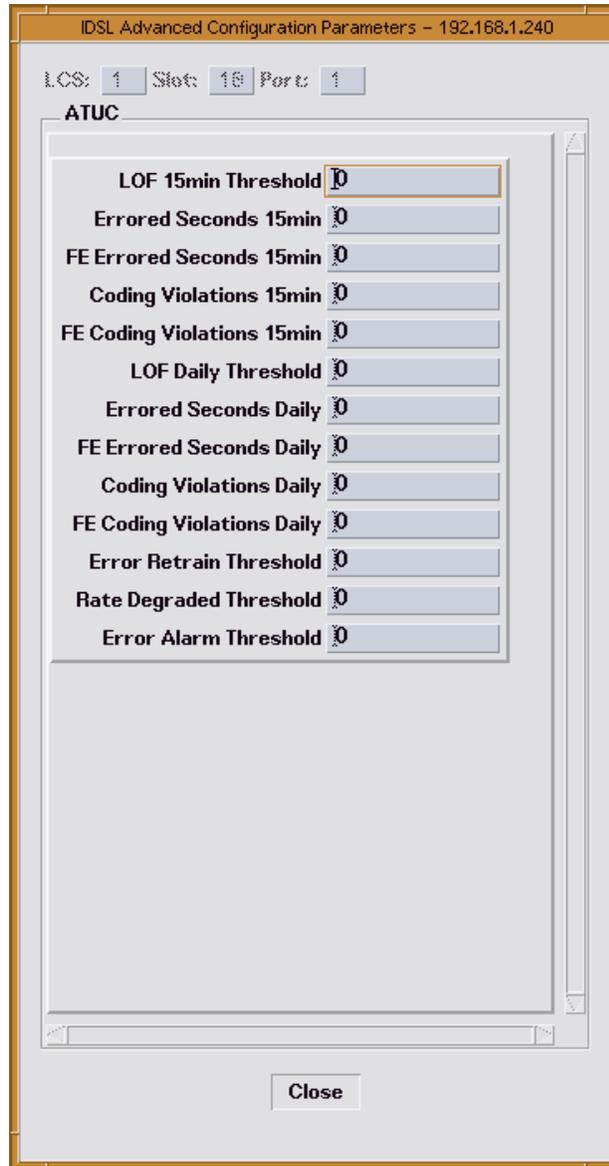
Figure 15: DiamondView IDSL Advanced Configuration Parameters Window

All deployed parameters are provisionable. Refer to Volume 4—*Provisioning*, Chapter 5—"IDSL Provisioning" for detailed information about threshold settings.

**DSL
Performance
Monitoring**

The line card maintains fourteen counters to monitor DSL performance parameters: Previous Day, Current Day, Current 15 Minute, and up to eleven Previous 15 Minute interval counters. CAP2 DSL performance parameters are monitored using DiamondView's DSL Performance windows.

Figure 16: DiamondView CAP2 DSL Performance Window
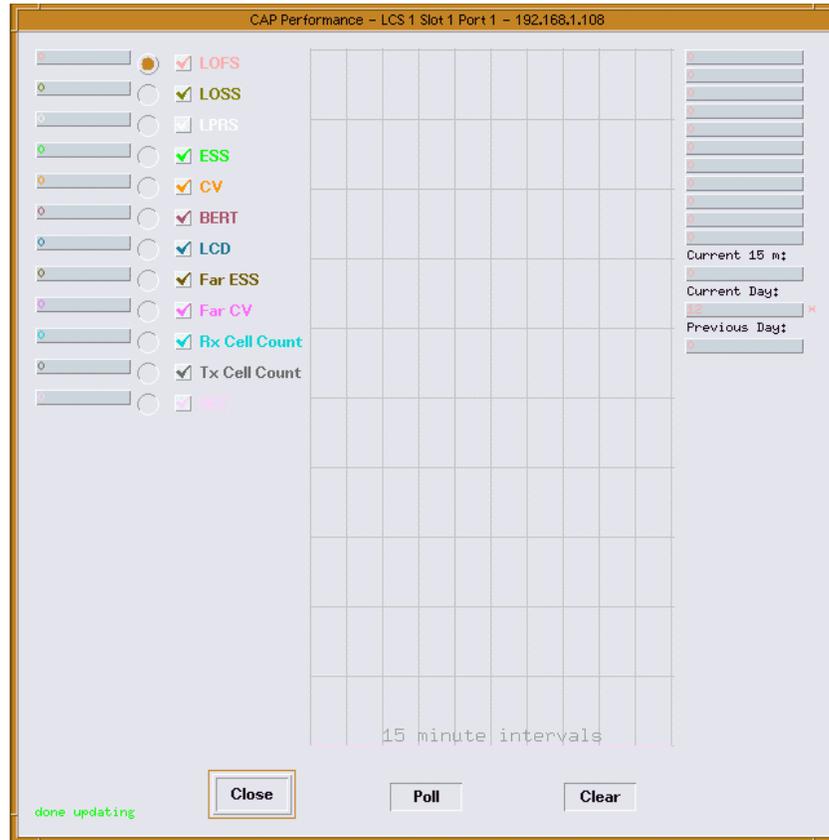
Figure 17: DiamondView CAP4 CAP Performance Window
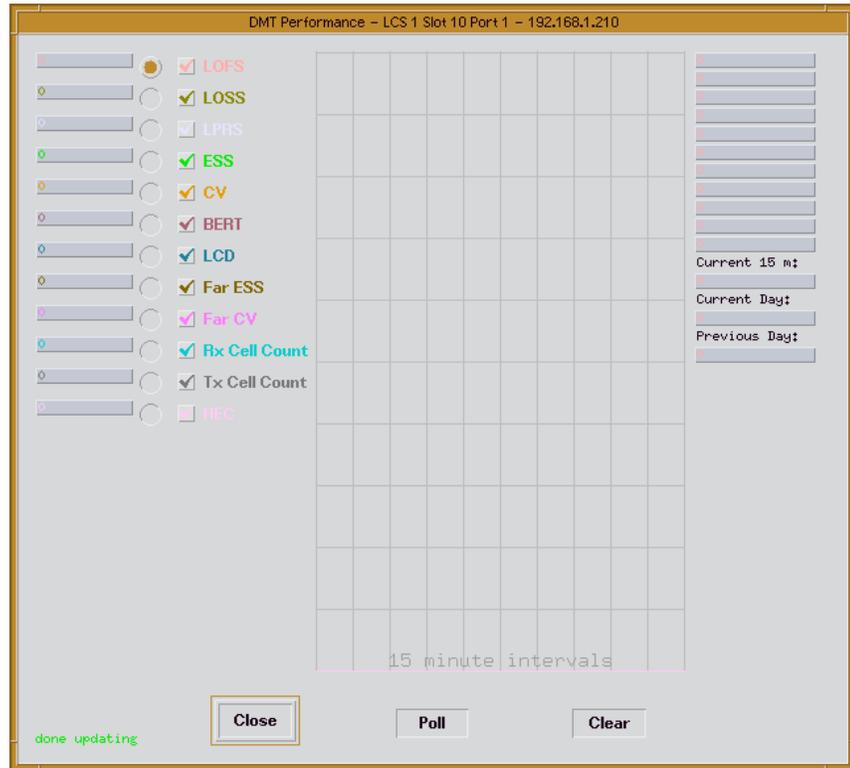
Figure 18: DiamondView DMT4 DMT Performance Window
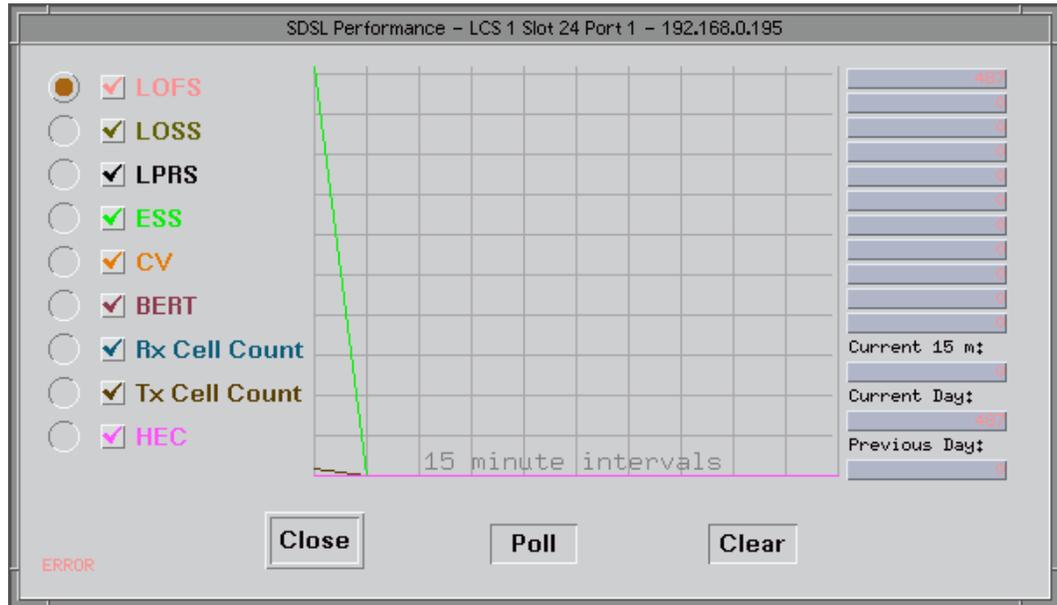
Figure 19: DiamondView SDSL Performance Window
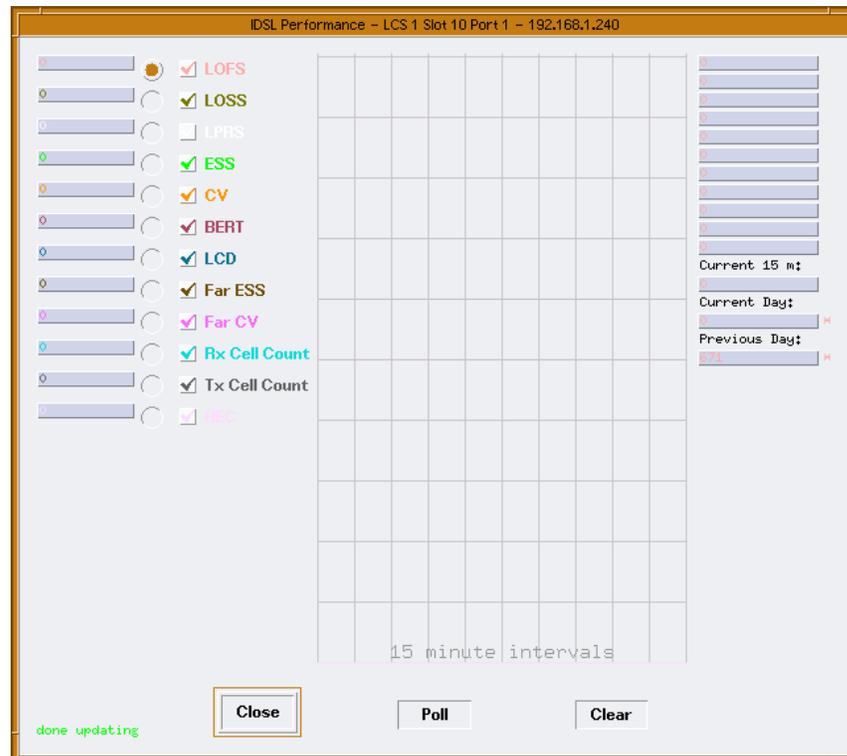
Figure 20: DiamondView IDSL Performance Window

How to Correct DSL Performance Errors

A "threshold crossing" event is displayed in DiamondView's Systems Event window when a DSL parameter threshold is exceeded. Follow these steps to find out what is causing the DSL performance errors:

1. Check for any conditions reported against the line card port. Refer to the Line Card Conditions Matrix beginning on page 32. Follow the recommended actions listed to correct an error condition.

2. Check threshold settings to make sure Coding Violation Thresholds are not overly sensitive. Refer to Volume 4—*Provisioning*, Chapters 1 through 5 for detailed information about threshold settings.

For CAP2 DSL only:

1. CAP2 DSL Near End and Far End Coding Violations indicate noise on the line. Check the Average Signal Quality (ASQ) reading in the line card port Advanced DSL Parameters window. An ASQ in the high forties is excellent and indicates a loop with very little attenuation or noise. An ASQ in the twenties indicates a poor quality line and adjustments to Margin and Transmit Power Reduction settings may be required to improve the signal.

2. Increase the Margin to a higher dB setting to improve noise immunity and the signal quality[4] of the line.

3. Try to balance the ASQ between the Downstream and Upstream channels by <u>decreasing</u> the Transmit Power Reduction setting on the channel with the low ASQ reading. This will increase the transmit power and signal for that channel and increase the ASQ[5].

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[4] Increasing the Margin number will decrease the data rate.

[5] Decreasing the Transmit Power Reduction setting on one channel will decrease the ASQ for the opposite channel.

SECTION 2   TROUBLESHOOTING

Chapter 4   Diagnostic Test Modes

Introduction   The Speedlink system supports seven types of Diagnostic Test Modes:

- Line and Terminal Loopback

- Bit Error Rate Test (BERT)

- Spectrum

- Analog

- Cyclic Redundancy Check (CRC)

- HEC

- Tone

IMPORTANT: All of these diagnostic tests <u>interrupt</u> data flow through the system, <u>do not</u> perform them on a Speedlink system that is providing service. Only use diagnostic tests during acceptance testing and turn-up procedures or in a lab environment to isolate trouble in the system.

Loopback Tests   DiamondView[1] is used to set up a loopback test at different points in the Speedlink system. Loopback tests can be set up at the port level of the Trunk, MLA, LSM2 or Line Cards. DiamondView sets the loopback point or "pathway" for the test. An external test box is required to send data (ATM test cells) and to take loopback readings to determine if the test cells are looping back successfully.

There are two types of loopback tests, terminal and line. The terms "terminal" and "line" refer to the direction of the loop based on the loopback point. A terminal

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[1] Diagnostic Test Modes can also be set using DiamondCraft.

loopback loops the signal from the test point back through the card. A line loopback loops the signal from the test point back over the "line".

How to Perform Loopback Tests

Follow these steps using DiamondView to perform a loopback test:

1. Bring up a Master Control Shelf or Line Card Shelf graphical window.

2. Click the **port** on the Trunk, MLA, LSM2 or Line Card to bring up the Port Details dialog window.

3. Select the Diagnostic Test Mode required, click the **Line** or **Terminal** radio button.

    NOTE: Not all cards support both line and terminal loopback, see diagrams beginning on the following page.

4. For the Input Test Duration period, you can overwrite the default settings. Default test durations are as follows:
    - DS3T trunk and LSM2 Loopback Duration Default = 60 seconds
    - OC3T trunk Loopback Duration Default = 480 seconds
    - MLA and Line Card Loopback Duration Default = 28800 seconds (8 hours)

5. Click the **Activate** Test Command radio button.

6. Click the **Apply/Poll** button to start the loopback.

7. A "Loopback" and then "Loss of Signal" condition is displayed during the test.

8. The loopback test will continue for the duration period input. Click the **Deactivate** Test Command radio button and **Apply/Poll** button to stop the loopback test before the duration period runs out.

Loopback Points

The following diagrams show the different loopback points supported by the Speedlink system:

DS3 and OC3 Trunk Line and Terminal Loopback Points
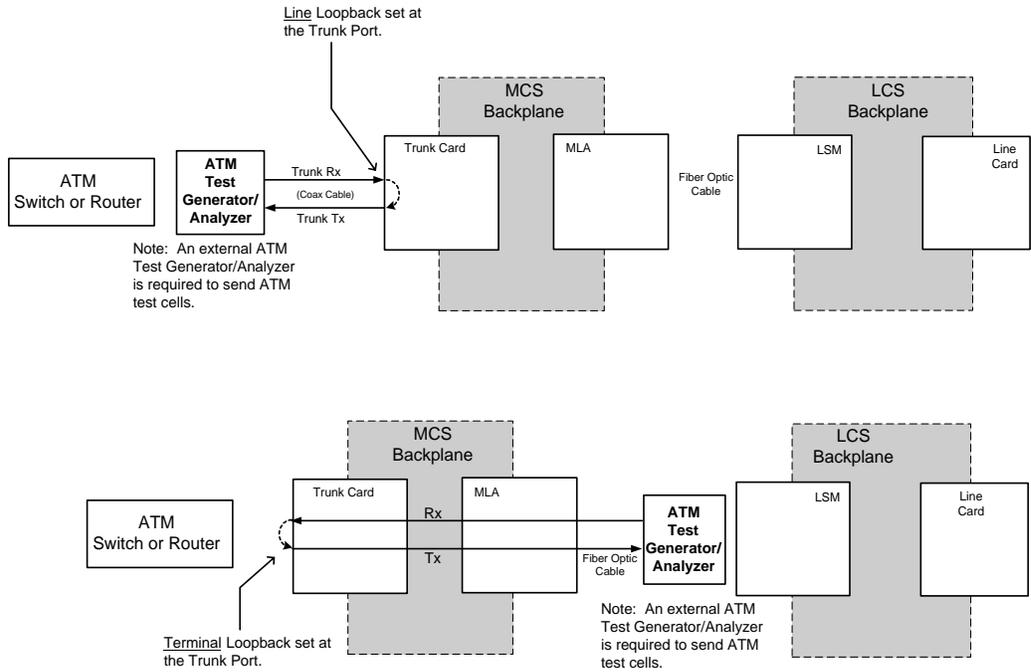
Figure 21: DS3 and OC3 Trunk Line and Terminal Loopback Points

MLA Terminal Loopback Point
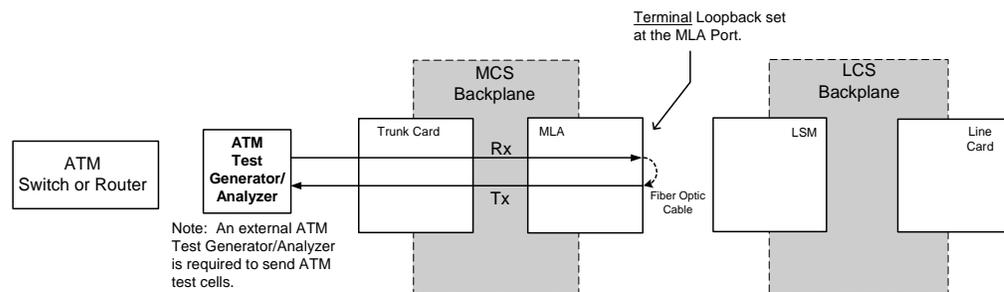
Figure 22: MLA Terminal Loopback Points

LSM Line and Terminal Loopback Points
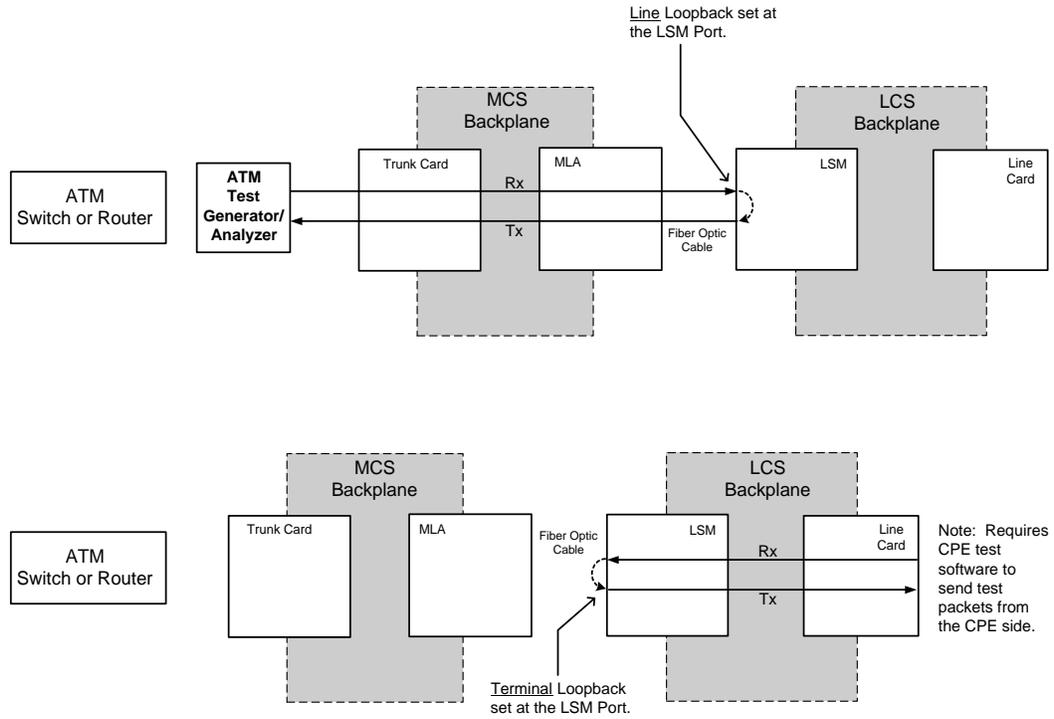
Figure 23: LSM Line and Terminal Loopback Points

Line Card Terminal Loopback Point
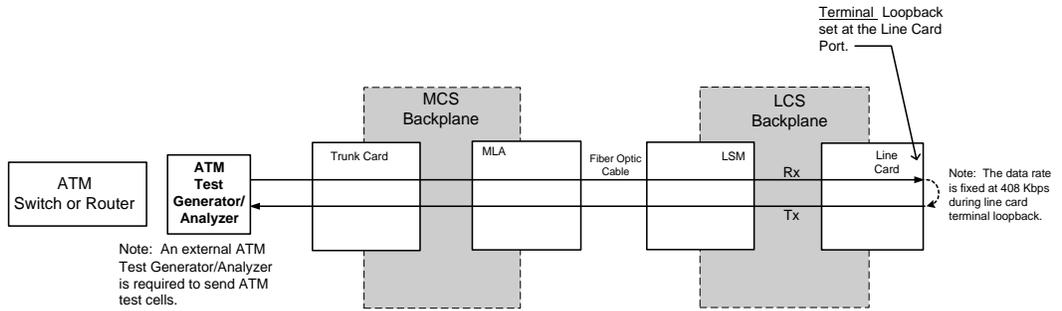
Figure 24: Line Card Terminal Loopback Points

Line Card Test Modes

The following Diagnostic Test modes are supported at the line card ports:

- **Terminal** - loops back the data from the LSM to test the port's interface to the LSM.
  Supported by: CAP2, CAP4, SDSL8, and IDSL8 line cards.

- **Bit Error Rate Test (BERT)** - determines the ratio of received bits that are in error to the number of bits received. The DSL transceiver initiates training and goes into BER test mode upon completion of training. During test mode the DSL transceiver sends a BER test pattern out to the CPE and looks for a BER test pattern in return.
  Supported by: CAP2, CAP4, and SDSL8 line cards.

- **Spectrum** - puts out the same signal (the same frequency spectral composition) that it would if linked with a CPE unit—this does not require any CPE on the line. The DSL transmitter is turned on and sends out a spectrum test signal similar to a normal operational signal to the CPE. A spectrum analyzer is required at the DSL port to display the frequency spectrum of the test signal. Settings for baud rate and transmit power affect the output signal. High baud rates occupy more frequency spectrum.
  Supported by: CAP2, CAP4, DMT4, and SDSL8 line cards.

- **Analog** - loops back the data from the LSM, like the Terminal test, but the data passes through the port's transceiver also, testing the analog components of the port.
  Supported by: CAP4, and IDSL8 line cards.

- **Cyclic Redundancy Check (CRC)** - sends CRC errors to the CPE. The line card transceiver sends a CRC test pattern out to the CPE and looks for a CRC test pattern in return.
  Supported by: CAP4, DMT4, and IDSL8 line cards.

- **Header Error Control (HEC)** - sends HEC errors to the CPE.
  Supported by CAP4 line cards.

- **Tone** - sends a port ID tone out the loop to keep the loop active. The tone is used to help identify the far end port connection.
  Supported by IDSL8 line cards.

How to Perform Diagnostic Tests

Follow these steps using DiamondView to perform diagnostic tests[2]:

1. Bring up a Line Card Shelf graphical window.

2. Click the Line Card **port** to bring up the Port Details dialog window.

3. Click the Diagnostic Test Mode radio button for the type of test: Terminal, BERT, Spectrum, Analog, CRC, HEC, or Tone.

4. Input Test Duration period: overwrite the displayed default setting of 28800 seconds (8 hours).

5. Click the **Activate** Test Command radio button.

6. Click the **Apply/Poll** button to start the test.

7. A "Loss of Signal" condition is displayed during the test.

    The number of errors received during the test are displayed in the following performance monitoring windows:

    - CAP2: DSL Performance

    - CAP4: CAP Performance

    - DMT4: DMT Performance

    - SDSL8: SDSL Performance

    - IDSL8: IDSL Performance

8. The test will continue for the duration period input. Click the **Deactivate** Test Command radio button and the **Apply/Poll** button to stop the test before the duration period runs out.

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[2] BERT diagnostic test mode support in CPE is planned for a future release.

SECTION 2   TROUBLESHOOTING

Chapter 5   OAM Loopback Test

Introduction   The Speedlink supports Operations and Maintenance (OAM) testing on the trunk or the "Virtual Link Z" side of a Permanent Virtual Circuit (PVC).

DiamondView[1] is used to set up loopback tests on a PVC[2]. There are three types of OAM loopback tests:

- **Segment -** The Speedlink performs a loopback from the trunk out to the next ATM network "Segment" point.

- **End to End** - The Speedlink performs a loopback test from the trunk out to the ATM network end point, "End to End".

- **Intermediate Point using a Destination ID -** The Speedlink performs a loopback test from the trunk to an intermediate point specified by a Loopback Destination ID.

OAM loopback tests are diagrammed on page 76.

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[1] OAM Loopback Tests can also be set up using DiamondCraft.
[2] The PVC is taken out of service during loopback testing.

Loopback Results   The Speedlink sends up to three OAM test cells out on a PVC over a period of 15 seconds. One of the following Loopback Results is returned:

Unknown	Succeeded	Resources
Time Out	Invalid	No OAM
Error	Already Active	Non-Default
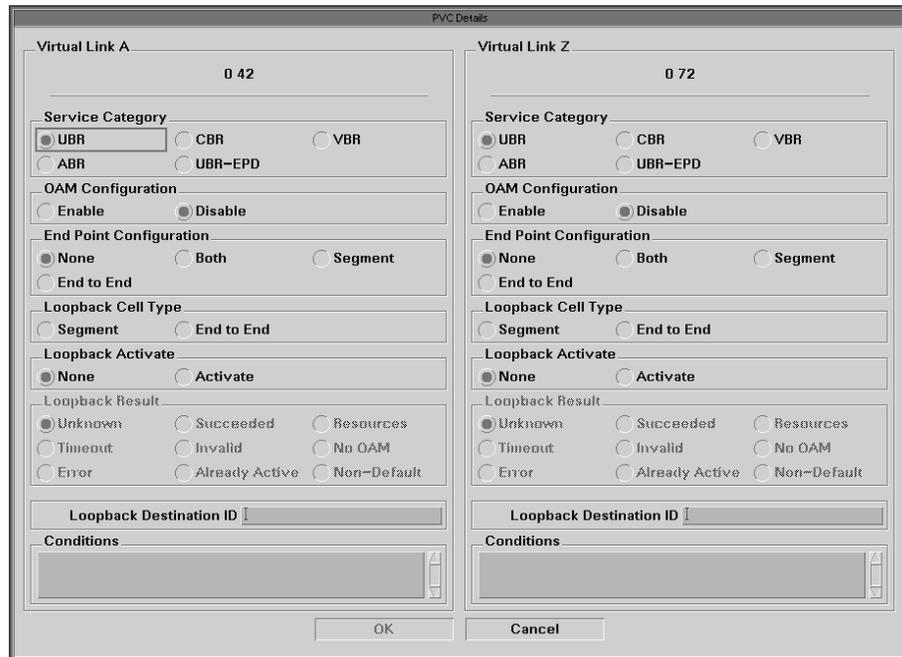
Figure 25: DiamondView PVC Details Dialog Window

**How to Perform
Loopback Tests**

Follow these steps using DiamondView to perform an OAM Loopback Test:

4. Bring up a Master Control Shelf graphical window.

5. From the Tools pull down menu, select **Connections...**

6. Select the **VPI/VCI** you want to test in the System Connections window.

7. Click **Edit PVC's…** to bring up the PVC Details dialog window.

8. Click the OAM Configuration **Enable** radio option button.

9. Click the End Point Configuration radio option button for the test loopback desired. End Point Configuration options control how the virtual link processes OAM test cells:

None	Loopback test cells are sent to an "intermediate" point, not a segment or end to end point. Testing with "None" end point configuration requires a Loopback Destination ID. See the "Intermediate" Loopback Point diagram on page 76.
Segment	Loopback test cells are sent out and looped back at the <u>next</u> ATM network "segment". See the "Segment" Loopback Point diagram on page 76.
End to End	Loopback test cells are sent out all the way to the <u>end</u> of the ATM network and looped back at the end point. See the "End to End" Loopback Point diagram on page 76.
Both	Both Segment and End to End loopback tests are performed.

10. Click the Loopback Cell Type radio option button that corresponds to the End Point Configuration selected: **Segment** or **End to End**.

11. Enter a **Loopback Destination ID** for the network element, required to loopback test cells at an "intermediate" point destination. A Loopback Destination ID is required when sending "None" or "End to End" loopback test cells to an intermediate point. See the "Intermediate" Loopback using Destination ID diagram on page page 76. Loopback cells are sent to the selected End Point Configuration "Segment", or "End to End" if this field is left blank.

12. Click the **Activate** radio option button.

13. Click the **OK** button to send the OAM loopback test request.

**Segment and
End to End
Loopback Cell
Types**

"Segment" Loopback Cell
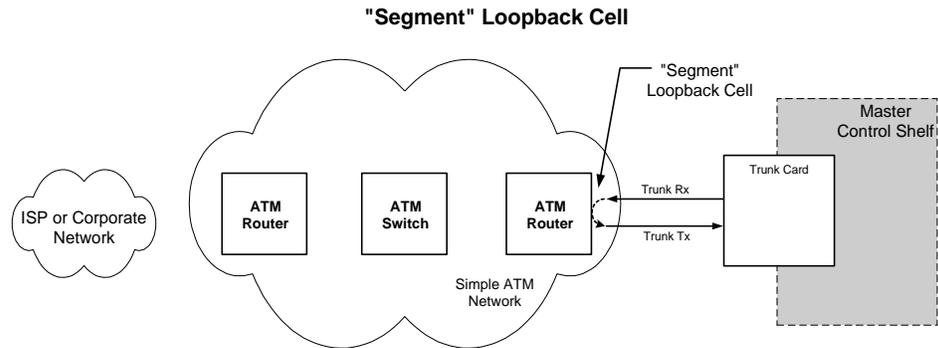
Figure 26: "Segment" Loopback Cell Diagram

"End to End" Loopback Cell
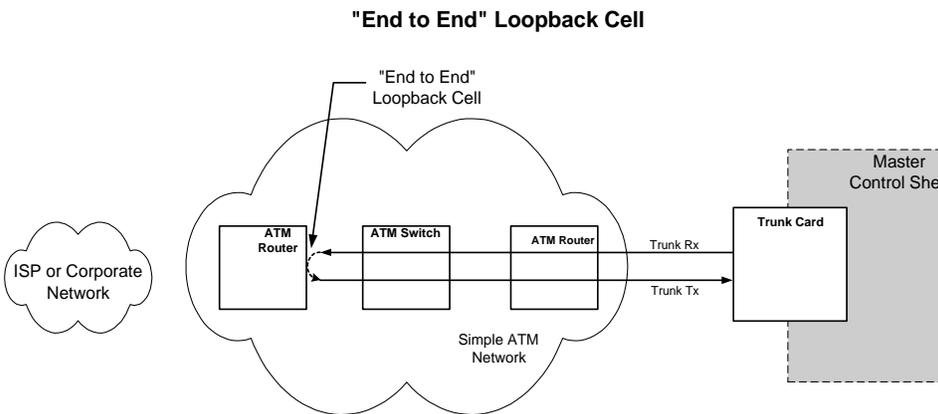
Figure 27: "End to End" Loopback Cell Diagram

**Intermediate Point Loopback
End to End Cell with specific Destination ID**
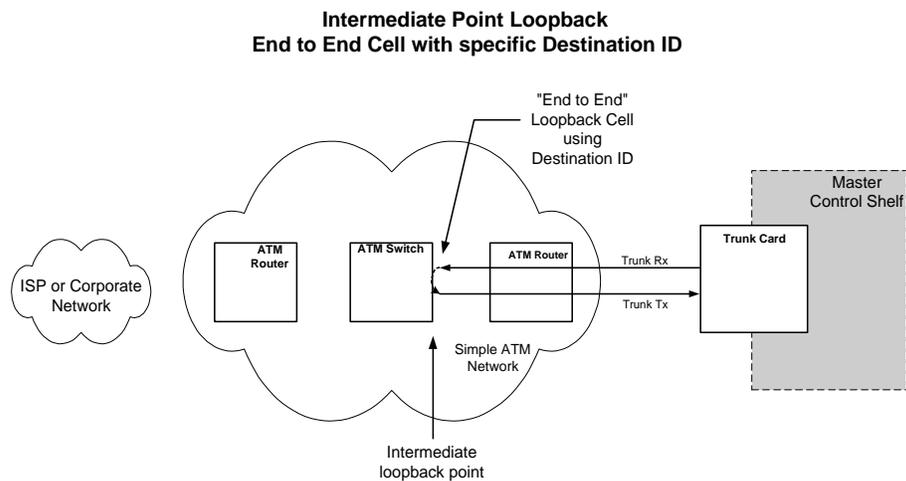
Figure 28: "Intermediate" Loopback Point Using Destination ID Diagram

How to View Loopback Results

Click **Edit PVC's…** to return to the PVC Details dialog window to view the Loopback Result.
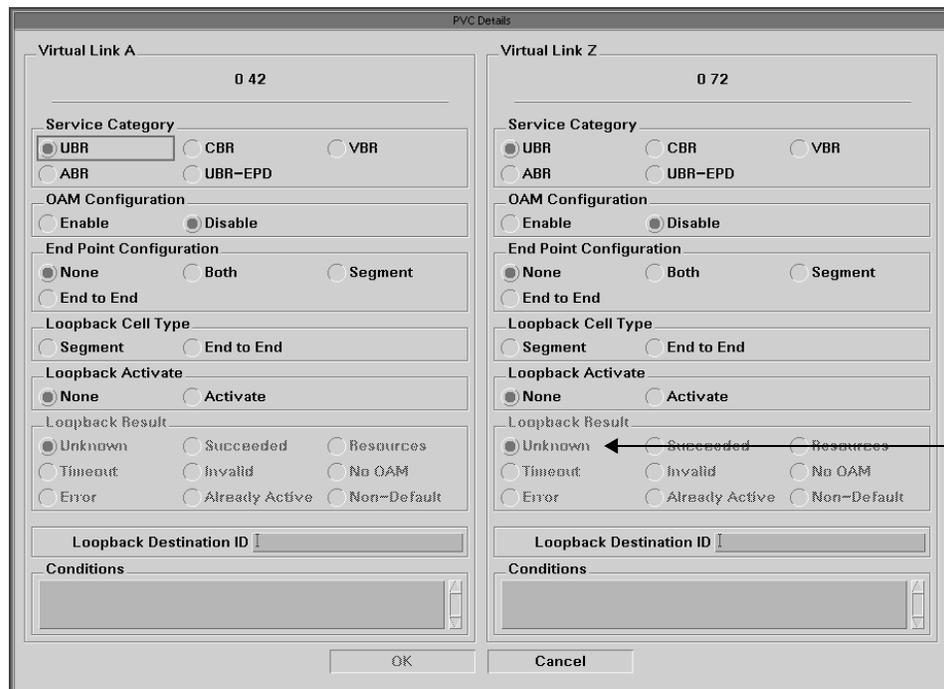
Figure 29: PVC Details Dialog Window

Definitions for possible **Loopback Results** are listed below:

Unknown	The loopback result is not known.
Timeout	Loopback cells were sent out but they did not come back within the timeout interval.
Error	A unknown loopback failure was detected.
Succeeded	The loopback cell successfully returned.
Invalid	The user specified an invalid destination for the loopback cell or the loopback cell could not reach its intended destination.
Already Active	A loopback is already active, you cannot start another one until it is complete.
Resources	There are no more loopbacks available on this multiplexer.
No OAM	OAM cell traffic is not enabled for this connection.
Non-Default	This link is an intermediate point, and you are attempting to use a default network element ID value for the loopback. You must enter a loopback destination ID.

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SECTION 2   TROUBLESHOOTING

Chapter 6   System Recovery Procedures

Introduction This chapter provides system recovery procedures to correct these problems:

- DiamondView cannot communicate with the Speedlink, page 79.
- DiamondCraft cannot communicate with the Speedlink, page 81.

DiamondView Cannot Communicate with the Speedlink

This procedure describes how to troubleshoot the situation where DiamondView cannot communicate with a Speedlink system:

Table 16: DiamondView Cannot Communicate with Speedlink

STEP	PROCEDURE
1	If DiamondView is unable to communicate with the Speedlink system—because of a LAN connection or system "timeout" problem—it will give a "timeout" error message when you attempt to *open* a connection or *apply* changes.
2	Run the `ping` program to see if the network connection between your DiamondView PC and the Speedlink system is working. Open a command shell on your DiamondView workstation, and run the following command: - `ping` *IPaddr* (*IPaddr* refers to the Speedlink system's IP address, for example: `ping 192.168.1.4`)

Table 16: DiamondView Cannot Communicate with Speedlink (continued)

STEP	PROCEDURE
3	The network will respond with a series of "Reply from" messages if it is able to "ping" the Speedlink's IP Address. Did you receive a series of "Reply from" messages from the network? ■ If YES, the network connection to the Speedlink system is working, continue to STEP 4. ■ If NO, skip to STEP 5.
4	The network connection to the Speedlink system is working. The problem must be in the Speedlink system. Contact Diamond Lane Technical Support for further instructions.
5	The "Request timed out" messages indicate the Speedlink system is not responding. This may indicate a LAN connection problem or a Speedlink problem. Continue to STEP 6.
6	Contact your local Network Administrator to verify LAN connectivity to the Speedlink system. Continue to STEP 7 after correcting any problems with the LAN connection.
7	If the "ping" command still fails, the problem must be in the Speedlink system. Contact Diamond Lane Technical Support for further instructions.
8	The DiamondView Cannot Communicate with the Speedlink procedure is complete.

DiamondCraft Cannot Communicate with the Speedlink	This procedure describes how to troubleshoot the situation where DiamondCraft cannot communicate with a Speedlink system:

Table 17: DiamondCraft Cannot Communicate with Speedlink

STEP	PROCEDURE
1	If DiamondCraft is unable to communicate with the Speedlink, it will give a "timeout" error message when you attempt to *open* a connection or *apply* changes.
2	Open the Dial-Up Networking command by running (from the Windows NT Taskbar): **Start**->**Programs**->**Accessories**->**Dial-Up Networking**. If a **Hangup** button appears, continue to STEP 3. If a **Dial** button appears, continue to STEP 4. If neither button appears contact Diamond Lane Technical Support for further instructions.
3	DiamondCraft may not have hung up correctly the last time you connected to the Speedlink system. Click the **Hangup** button. If the **Hangup** button goes away, close **Dial-Up Networking** and attempt to open a connection from DiamondCraft to the Speedlink system again. If the **Hangup** button does not go away, contact Diamond Lane Technical Support for further instructions.
4	The Speedlink system may be experiencing problems, or there may be a problem with the serial port or cable. Click the **Dial** button. You may see an error message that tells you what to check next. If **Dial** does not work and gives you no useful error messages, continue to STEP 5.
5	The serial port cable may be loose or disconnected. Make sure that the serial port cable is connected to the correct RS-232 connector and repeat Steps 1–4. If this does not solve the problem, contact Diamond Lane Technical Support for further instructions.

Table 17: DiamondCraft Cannot Communicate with Speedlink (continued)

STEP	PROCEDURE
6	The DiamondCraft Cannot Communicate with the Speedlink procedure is complete.

Diamond Lane Communications
Glossary and Acronyms

Asymmetric Digital Subscriber Line (ADSL)

Asymmetrical data signals for Internet access that share twisted pairs with POTS and that use modern signal modulation techniques to accomplish the data communications task.

Alarm

A signal used to indicate that an abnormality, a fault, or a failure has been detected. Alarms may be distinguished by type and by the severity of the event that caused the alarm.

Alarm Indication Signal (AIS)

A downstream signal in a digital network that replaces the normal traffic signal when a maintenance alarm indication has been activated (indicating an upstream failure detection – error or alarm on the network). It is used in the OSI network management model.

ATM Adaptation Layer (AAL)

ATM Adaptation Layer is located above ATM and converts non-ATM bit streams into ATM cells. The AAL protocol supports higher-layer service requirements.

Asynchronous Transfer Mode (ATM)

A multiplexed information transfer and switching process (cell-switched technology) in which data is organized into fixed length (53 octet) cells and transmitted according to each application's requirement. ATM is generally deployed in enterprise networks, which often connect LANs over wide areas that require large amounts of data to be transported over great distances.

Auxiliary Common Systems Interface Panel (CSIP)

Each Auxiliary CSIP connects and distributes central office power to up to four Line Card Shelves (LCS). Auxiliary CSIPs are required for Speedlink Systems with over five Line Card Shelves.

Bit Error Rate (BER)

A measurement of transmission quality expressed as a ratio (ratio of error bits to the total number of bits transmitted – erroneous bits per million). The BER indicates how many bits are incorrectly transmitted in a given bit stream. The BER depends on the type and length of transmission.

CAP2

Carrierless Amplitude and Phase (CAP) ADSL line card, 2 ports per line card.

CAP4

Carrierless Amplitude and Phase (CAP) ADSL line card, 4 ports per line card.

CBR (Constant Bit Rate)

Data that are transmitted at a constant rate on an ATM network.

CELL

In general, fast packet-switching technologies—such as ATM (Asynchronous Transfer Mode). The ATM Cell has a 5-byte header and contains 48 bytes of payload.

Central Office (CO)

The Local Exchange switch that terminates individual local telephone subscriber lines for switching and connection to the public network (locally and long distance).

Common Management Information Protocol (CMIP)

An OSI network management/service interface protocol created and standardized by ISO. Based on the basic data storage concept in which management information is collected and stored for subsequent retrieval by a management application. Provides for the transmission of event notifications and the transmission of operations directed toward managed objects.

Common Systems Interface Panel (CSIP) Power and Distribution Board

The CSIP Power and Distribution Board is located in the Master Control Shelf (MCS). Central office power is terminated at the CSIP and is distributed to the Master Control Shelf and up to four Line Card Shelves.

Common Systems Interface Panel (CSIP) Alarm Board

All Speedlink alarm connections are made at the CSIP Alarm Board; central office visual, audible, remote Bay Alarm and remote input alarms. The Alarm Board has LEDs to display Speedlink alarm status.

Constant Bit Rate (CBR)

Applications or services in a digital network that are to be the same bandwidth for the duration of the call.

CPE (Customer Premise Equipment)

Refers to telephone and related equipment located on the customer's premises (office or home).

Customer Network Management (CNM)

A feature of ATM, Frame Relay and SMDS which allows customers to directly view and manage their public data service (communications networks) in the same way they view and manage their local area networks.

Digital Loop Carrier (DLC)

Network transmission equipment used to provide a pair gain function. DLC equipment is deployed in situations in which the cost of the equipment is more than offset by the savings in copper distribution accomplished by eliminating need for as many copper pairs. Digital loop carrier systems consist of two parts—a Central Office Terminal (COT) and a Remote Terminal. The COT provides the multiplexing/demultiplexing function of individual voice signals to the composite multiplexed signal at the interface between the switching equipment and the DLC. The Remote Terminal provides the multiplexing/demultiplexing function at the interface between the individual subscriber pairs and the DLC equipment.

DiamondCraft™

DiamondCraft is the Speedlink's stand-alone craft interface application. It communicates directly with a Speedlink through a serial port connection using Point-to Point Protocol (PPP).

DiamondView™

DiamondView is the Speedlink's Element Management System (EMS). It is a HP Open View® application and operates on a UNIX workstation.

DS1 (Digital Signal Level One)

1.544 Mb/s digital signal.

DS3 (Digital Signal Level Three)

44.736 Mb/s digital signal − equivalent of 28 T-1 channels (also referred to as T-3).

DS3T

The DS3 trunk card provides the interface between ATM backbone facility and the Speedlink. It multiplexes and de-multiplexes up to 12 broadband ATM cell streams from the MLA cards and sends this "payload" out over the ATM network. The Speedlink has two DS3T cards in a 1:1 protection group.

DSLAM (Digital Subscriber Line Access Multiplexer)

An ATM access mux/concentrator that grooms traffic from multiple low rate lines into a high rate trunk (DS1, DS3, OC3, OC12).

Egress

Outgoing direction to a network or network device, as opposed to the ingress (or entrance).

Element Management Systems (EMS)

Software used to manage and monitor components of a telecommunication system at the lower levels of the Telecommunications Management Network.

Graphical User Interface (GUI)

A generic name for the computer interface that substitutes graphics for characters. The GUI permits users to directly manipulate graphical objects displayed on the monitor.

HDSL (High bit rate Digital Subscriber Line)

HDSL provides a DS1 on two copper wire pairs (without the loop engineering and repeaters required for a standard T1 system).

HEC (Header Error Control)

An 8-bit field (the last byte) of the ATM-cell header, whose purpose is to allow a receiver to detect, and possibly correct, transmission errors in the cell header. It is used for checking integrity only.

IEEE (Institute of Electrical and Electronics Engineers)

An international engineering organization that defines standards related to networking and other areas.

IETF (Internet Engineering Task Force)

One of two technical engineering bodies of the Internet Architecture Board. The IETF is responsible for solving short-term engineering needs and standards of the Internet.

Ingress

Incoming direction to a network or network device, as opposed to the egress (or exit).

IP (Internet Protocol)

A component of the TCP/IP protocol suite. IP operates at the Layer 3 of the OSI Reference model.

ISO (International Standards Organization)

The International Standards Organization is an international organization founded in 1946 to facilitate the development of international data communication standards.

ITU (International Telecommunications Union)

An organization established by the United Nations. The ITU sets telecommunications standards and allocates frequencies to various uses worldwide.

LAN (Local Area Network)

A privately owned and administered network for data communications, usually within a building or campus environment, used to connect computers and peripheral devices. Communication is typically accomplished by broadcasting on a connectionless basis over a shared medium.

Line Card

A line card serves as the interface between a line and a communications device.

Line Card Shelf (LCS)

The Speedlink System is made up of one Master Control Shelf and up to twelve Line Card Shelves. Each LCS has 24 mounting slots for line cards, a Line Card Shelf Multiplexer (LSM or LSM2) card, and an optional LSM or LSM2 card for Remote Line Card Shelf protection group application.

Line Card Shelf Multiplexer (LSM or LSM2) card

The LSM or LSM2 card communicates with the Master Line Card Adapter (MLA) card over multi-mode optical cable at OC-3 rates. The LSM or LSM2 multiplexes and demultiplexes ATM cell streams for up to 24 line cards in a Line Card Shelf.

Low Pass Filter Shelf (LPFS)

Data plus voice frequency signals are received from the customer at the Low Pass Filter Shelf. the LPF card "splits" the low frequency voice signal from the high frequency ADSL signal. The voice signal is sent onto the voice switch unimpeded; while data signal is received by the CAP2 line card.

LOF (Loss of Frame)

A condition that can occur in digital transmissions when the receiving equipment loses frame alignment data (used to determine channel assignments and channel boundaries).

LPF2

Low Pass Filter card, 2 ports per card.

LPF4

Low Pass Filter card, 4 ports per card.

Master Control Shelf (MCS)

The MCS contains the central control and communication functions for the Speedlink System and serves as the ATM network interface.

Master Control Processor (MCP) card

The MCP card is the central control and communications for the Speedlink, it stores program and provisioning database information. The Speedlink has two MCP cards in a 1:1 protection group.

Master Line Card Adapter (MLA) card

Each MLA card provides the broadband interface to one Line Card Shelf at OC-3 rates over optical fiber. There are up to twelve MLA cards in a Master Control Shelf providing the broadband interface for up to twelve Line Card Shelves and up to 288 line cards.

Management Information Base (MIB)

The MIB contains all the provisioning information for the Speedlink Multiplexer. (The MIB contains data available to a network management program. The network manager queries the MIB.)

Multiplexer

Equipment that aggregates two or more channels onto a single transmission channel.

NEBS (Network Equipment Building System)

NEBS is the Network Equipment Building System specification authored by Bellcore. NEBS compliance is required by many carrier customers; the Speedlink System shipping today is already NEBS-compliant.

NIC (Network Interface Card)

An electronic circuitry board that usually fits into an expansion slot of a PC whose purpose is to connect to a Local Area Network. A NIC is designed to comply with both a specific LAN Medium Access Control procedure (CSMA/CD for Ethernet) and a specific physical medium (e.g. twisted pair wire, coax, or multi-mode fiber). Associated with the NIC is a unique address called the MAC address. It works with the network software and computer operating system to transmit and receive messages on the network.

NID (Network Interface Device)

The Diamond Lane NID ADSL Splitter divides the ADSL and POTS signals and works in conjunction with the router at the subscriber end. The splitter installs on the outside of a home or building, and is enclosed in a weatherproof wall mount enclosure. It features primary lighting and AC power fault protection, and is a passive device, requiring no power or management from the central office or subscriber.

Network Management Processor (NMP) card

The NMP card controls the Speedlink's network management interfaces and provides the protocol support for communication for DiamondView and DiamondCraft.

OC-1 (Optical Carrier Level-1)

A SONET line rate of 51.840 Mb/s. Direct electrical-to-optical mapping of the STS signal with frame synchronous scrambling.

OC-3 (Optical Carrier Level-3)

A SONET line rate of 155.520 Mb/s. 3 x OC-1. Direct electrical-to-optical mapping of the STS signal with frame synchronous scrambling.

OC-12

Sonet channel of 622.08 Mbps.

OSI (Open System Interconnection Reference Model)

An internationally accepted set of standards for communication between various systems manufactured by different vendors. The OSI Reference Model is a seven-layer model developed by the ISO (International Standardization Organization) to describe how to connect any combination of devices to communicate.

PCI (Peripheral Component Interconnect)

Bus of an Intel PC. PCI transfers data between the PC's main microprocessor and peripherals at up to 132Mbps.

PCR (Peak Cell Rate)

PDR (Protocol Data Unit)

In data communication protocols, a unit of data created by a given protocol layer at one place and logically transferred to the same layer at another place called a peer. This is the OSI terminology for "packet".

PLCP (Physical Layer Convergence Protocol)

The part of the physical layer that adapts the transmission facility to handle DQDB functions as defined in IEEE 802.6-1990.

POP (Point-of-Presence)

The physical place within a LATA (the long distance carrier's local office) where the IEC provides services to the LEC, and perhaps directly to end-users.

POTS (Plain Old Telephone Service)

A term used to describe analog, voice-only basic telephone service. All POTS lines work on loop start signaling.

PPP (Point-to-Point Protocol)

A layer 2 protocol (relative to the OSI reference model) that allows a computer to use TCP/IP with a standard telephone line and a high-speed modem.

PVC (Permanent Virtual Circuit)

A permanent association between two DTEs established by configuration (established administratively via a service order process). A PVC uses a fixed logical channel to maintain a connection between the DTEs. After a PVC is defined, it requires no setup operation before data is sent and no disconnect operation after. The concept of a PVC is included in Networks supporting X.25, Frame Relay and ATM.

QoS (Quality of Service)

In ATM networks, a set of parameters for describing a transmission. These parameters include values such as allowable cell loss. The parameters apply to virtual channel connections and virtual path connections.

Remote Line Card Shelf (RLCS)

A RLCS allows customers served off of long loops — beyond 18,000 ft from the central office — access to xDSL service. The RLCS is located remotely from the central office in an outside cabinet and connected to the central office Master Control Shelf via fiber optic extensions.

Remote Low Pass Filter (RLPF)

The RLPF is a remote passive low pass filter "splitter" device. It splits the high frequency ADSL data signal from the voice signal at the customer end just like the Low Pass Filter card in the central office. There are two types of RLPF – a retrofit RLPF available a standard Network Interface Device housing and a standalone RLPF.

RFC (Request for Comments)

In the Internet community, a series of documents that contain protocol and model descriptions, experimental results, and reviews. All Internet standard protocols are written up as RFCs.

SDSL (Symmetric Digital Subscriber Line)

Also referred to as Single-Line Digital Subscriber Line, SDSL supports symmetrical T1/E1 transmissions. It uses a single copper-pair wire and has a maximum operating range of 10,000 feet. It is capable of accommodating applications that require identical downstream and upstream speeds, such as video conferencing.

Serial Port

A hardware input/output port in which only one pin is available for data transmission in a given direction – bits are transmitted in sequence (one bit at a time). The wiring for a port is associated with a particular physical interface (i.e., RS-232). A serial port is most commonly used for a modem or a mouse.

Service Provider

A service provider is an organization or individual that provides telephone access to a network or to another service, such as the Internet.

SNMP (Simple Network Management Protocol)

The network management protocol used within TCP/IP-based internets. Defines the protocol for managers (clients) to communicate with agents (servers). The agent interfaces directly with the networking layers on the monitored network device to obtain the network management information. An agent is installed on every network device that will be managed or monitored. A client is a application program that is installed at the network operations center. It communicates with the SNMP agents to collect information in the form of MIB variables. SNMP is a request/reply protocol that uses the operations of Set or Get on data items in a agents MIB.

SNR (Signal-to-Noise Ratio)

In a transmission, SNR is the ratio between the signal and noise levels at a given point, usually at the receiving end of the transmission. The SNR value is generally expressed

in decibels (dB). The SNR can be used to determine how long a cable segment can before the signal loss is unacceptably high. The SNR also helps determine whether a particular type of cable is appropriate for the intended use.

SOHO (Small Office – Home Office)

SONET (Synchronous Optical NETwork)

SONET is a high-speed, fiber-optic system, which provides an interface and mechanism for optical transmission of digital information. At the interface, signals are converted from electrical to optical form (and back to electrical form at the destination). SONET is an ANSI standard. Transmission rates range from 51.84Mbps to 13.22Gbps.

Speedlink Multiplexer

The Speedlink Multiplexer is classified as a Digital Subscriber Line Access Multiplexer (DSLAM). The Speedlink Multiplexer uses Digital Subscriber Line (xDSL) and Asynchronous Transfer Mode (ATM) technologies to deliver high speed data rates over the exiting copper network.

SVC (Switched Virtual Circuit)

A virtual connection set up on demand via a signaling protocol connection that is established for a communications session that is terminated after the session is over. This is in contrast to a permanent virtual circuit (PVC), which is a connection that is always established.

T1

DS1 rate electrical signal (two pair). T1 is suited for voice, data and image transmissions. T1 has a bandwidth of 1.544 megabits per second (Mbps), which comes from two dozen 64 kilobit per second (Kbps) channels, together with one 8Kbps framing channel.

TCP/IP (Transmission Control Protocol / Internet Protocol)

TCP/IP is a suite of several networking protocols developed for use on the Internet.

Telnet

Telnet is the terminal-remote host protocol developed for ARPAnet in 1974. On the Internet, it is a service program that allows you to connect to other computers at another site permitting you to interact with applications as if by a local terminal.

Trap

A method used to isolate an abnormal condition or operation.

TMN (Telecommunications Management Network)

A concept where all Operation and Maintenance Centers are linked together to form a network.

UBR (Unspecified Bit Rate)

In ATM networks, a UBR connection transmits at variable rates.

UNI (User-to-Network Interface)

In ATM networks, one of three levels of interface. A UNI specification which defines Layer 1 and Layer 2 protocols required for CPE and carrier equipment to interoperate. UNI specifications provide physical media and line rate implementation options.

VBR (Variable Bit Rate)

In ATM networks, a VBR connection transmits in bursts, at variable speeds.

VDSL (Very-high-speed Digital Subscriber Line)

VDSL provides DSL service at a data rate in excess of 10Mbps (up to 52Mbps). VDSL has a maximum operating range from 1,000 feet to 4,500 feet on 24-gauge wire.

VPI (Virtual Path Identifier)

An identifier (value) in an ATM cell that identifies the data of one Virtual Path connection from the data of another connection.

Diamond Lane Communications Corporation Proprietary Data

WAN (Wide Area Network)

A WAN is a network of computers and related communications equipment whose elements may be in dispersed sites with distances great enough to require common carrier provided communication lines.

xDSL (all forms of Digital Subscriber Lines)

The "x" represents the various types of digital subscriber lines: ADSL, RADSL, SDSL, HDSL, or VDSL.

GLOSSARY AND ACRONYMS

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