



Broadband Systems  
D50 Documentation

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Volume 3  
Commissioning



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## Introduction to D50 Documentation

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**Introduction** D50 documentation provides complete detailed instructions on how to install, test, and commission a D50. This documentation complies with all requirements in Telcordia Technologies Technical Reference documents GR-454 *Generic Requirements for Supplier-Provided Documentation*, and IP-10260 *Standards for Task Oriented Practices (TOPS)*.

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**Target Audience** D50 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.

Number	Title	Target Audience
Volume 1	General Information	Anyone with a need to understand more about the D50 System and planning requirements.
Volume 2	Installation	Installation and Testing Technicians, and Engineers (Detailed Level Procedures, or DLPs).
Volume 3	Commissioning	Testing Technicians and Engineers (DLPs).
Volume 4	Provisioning	Provisioning Technicians and Engineers (DLPs).
Volume 5	Maintenance and Testing	Maintenance and Testing Technicians and Engineers (DLPs).
Volume 6	Craft Terminal	Testing and Installation Technicians and Engineers (Reference manual for Craft Terminal).

**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 it easy for the reader to scan the document and to find information on a specific subject.

Each DLP lists the required equipment and tools to perform the job, and provides step by step instructions (supported by graphics where appropriate) to help the reader perform each task.

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# SECTION 1 BASIC PROCEDURES

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### Chapter 1

#### Basic Procedures

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# Chapter 1

## Basic Procedures

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### Introduction

The D50 multiplexer consists of the following components: Master Control Shelf (MCS), Line Card Shelves (LCS), Low Pass Filter Shelves (LPFS8), and Auxiliary Common Systems Interface Panels (ACSIP).

This chapter provides detailed instructions for the following procedures:

- **Remove and Replace Panels**, page 1-1.
- **Remove and Replace Top Screen**, page 1-3.
- **Connect ESD Strap**, page 1-4.
- **Insert and Remove Cards**, page 1-5.
- **MCS/LCS/LPFS8 Cable Ports**, page 1-7.

Refer to this chapter as necessary while completing procedures in the following chapters. Use the labels in the left margin to scan this document for the tasks you need to review, or to quickly find specific information.

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### Remove and Replace Panels

Front and back panels can be removed from D50 assemblies to allow access for cabling and card placement.

- Remove front panels to access:
  - MCS card cage, backplane, CSIP Power and Distribution board, and Alarm board.
  - Auxiliary CSIP Power and Distribution board.
  - LCS and LPFS8 card cages.
- Remove back panels to access backplane connectors on the LCS and the LPFS8.

**Important! Front and back panels MUST be replaced after completion of all procedures in the volumes titled Installation and Commissioning, to ensure proper air flow through the D50.**

Follow these steps to open, remove, replace, and close front and back panels on the D50 assemblies:

Table 1-1: Remove and Replace Panels

STEP	PROCEDURE
1	<p>To <u>open</u> a panel, locate latches at the top of the panel. Slide both latches inward to release and lower the panel.</p> <div> <p>The diagram shows a perspective view of a rectangular panel. Two latches are located at the top edge of the panel, one on the left and one on the right. Lines point from the text 'Panel latches' to these two latches. The panel is shown in a slightly open position, with the top edge being the part that would be lowered.</p> </div> <p>Figure 1-1: Panel Latches (MCS Front Panel)</p>
2	<p>To <u>remove</u> a panel after it is opened, hold it on both sides and slide it to the left about ¼ inch. Pull it towards you and release it from the holding clips.</p>
3	<p>To <u>replace</u> a panel, hold it on both sides so it is level with the bottom of the assembly (above the Fan Tray on the MCS and LCS). Insert the hinged portion of the panel between the tabs. Slide the panel straight in and then to the right about ¼ inch to lock in place.</p>
4	<p>To <u>close</u> a panel, raise it into position, then slide both latches toward the center and release to lock in place.</p> <div> </div> <p><b>Warning!</b> Be sure to keep fingers away from panel edges to prevent catching them between the panel edges and the assembly as you close the panel.</p>
5	<p>The <b>Remove and Replace Panels</b> procedure is complete.</p>

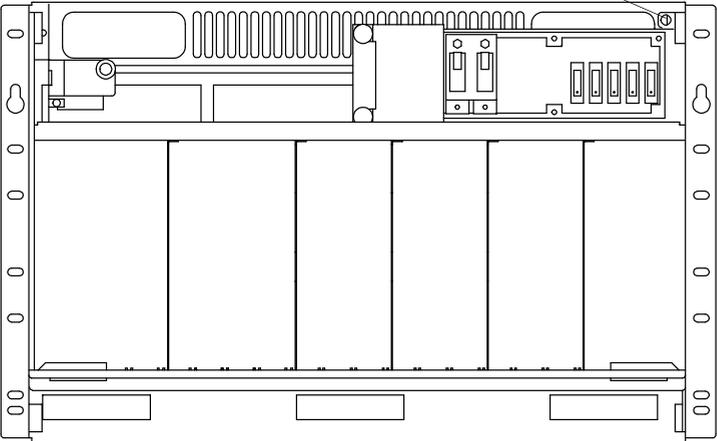
**Remove and Replace Top Screen**

The top screen can be removed from the MCS and the Auxiliary CSIP to access the backplane, the Power and Distribution Board, and the Alarm Board.

**Important! The top screen MUST be replaced after completion of all procedures in the volumes titled Installation and Commissioning, to ensure proper air flow through the D50.**

Follow these steps to remove and replace the top screen:

Table 1-2: Remove and Replace Top Screen

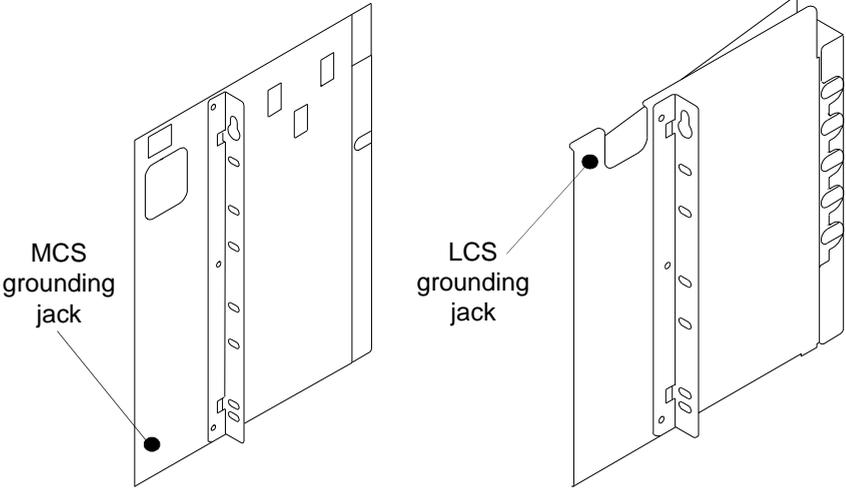
STEP	PROCEDURE
<p><b>1</b></p>	<p>To <u>remove</u> the top screen, pull out on the release pin and slide the top screen out.</p> <div style="text-align: right; margin-right: 100px;"> <p>Top screen release pin</p> </div>  <p style="text-align: center;">Figure 1-2: Top Screen Release Pin (MCS)</p>
<p><b>2</b></p>	<p>To <u>replace</u> the top screen, slide the screen back into position and push in on the release pin to secure.</p>
<p><b>3</b></p>	<p>The <b>Remove and Replace Top Screen</b> procedures are complete.</p>

**Connect ESD Strap**

**Important! A properly grounded Electrostatic Discharge (ESD) wrist strap<sup>1</sup> must be worn at all times to prevent damage to the cards and the MCS and LCS circuitry.**

Follow these steps to connect the ESD wrist strap to the MCS or LCS:

Table 1-3: Connect ESD Wrist Strap

STEP	PROCEDURE
1	Slide the ESD strap over your wrist.
2	<p>Plug the connector end into the grounding jack on the right side panel of the MCS or LCS. The grounding jack is located at the <u>bottom</u> of the panel on the <u>MCS</u>; it is located at the <u>top</u> of the panel on the <u>LCS</u>.</p> <div style="text-align: center;">  </div> <p style="text-align: center;">Figure 1-3: Grounding Jack Locations—MCS and LCS</p>
3	The <b>Connect ESD Strap</b> procedure is complete.

<sup>1</sup> An ESD wrist strap is shipped with each MCS and LCS Installation Kit. An ankle grounding strap can also be used.

**Insert and Remove Cards**

D50 cards are placed in the MCS, LCS, and LPFS8 assemblies.  
 Follow these steps to insert and remove cards:

Table 1-4: Insert and Remove Cards

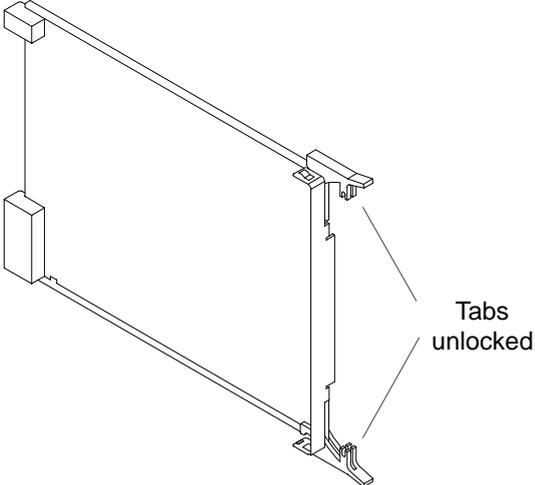
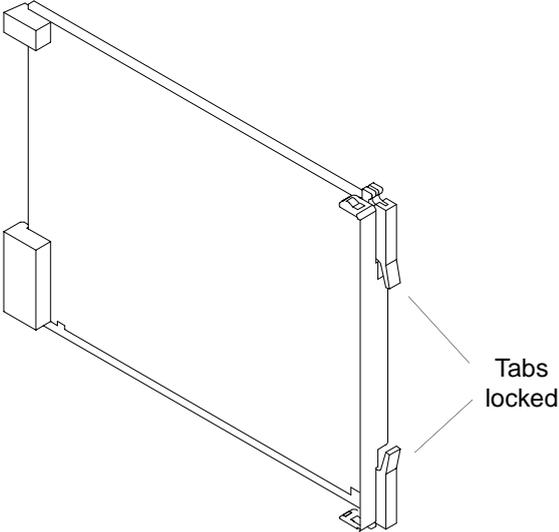
STEP	PROCEDURE
<p><b>1</b></p>	<p>To <u>insert</u> a card, unlock the locking tabs on the card by flipping the tabs out from the card to the unlocked position.</p> <p><b>Note:</b> LPFS8 cards have only one tab, located on the lower edge of the card. All other cards have two tabs, on the upper and lower edges.</p>  <p style="text-align: center;">Figure 1-4: Card with Tabs in the Unlocked Position</p>
<p><b>2</b></p>	<p>Card slots in each assembly are designed with card guides, bottom and top, to properly align cards into position on the backplane. Slide the card into the slot until it plugs into the backplane connector.</p> <p><b>Important! DO NOT force the card into position. If it does not plug in easily, slide it back out and verify that you are placing it in the correct position and that the guides are aligned. Check for any obstructions or bent pins on the connectors that might prevent it from sliding easily into place.</b></p>

Table 1-4: Insert and Remove Cards (continued)

STEP	PROCEDURE
<p><b>3</b></p>	<p>Lock the locking tabs on the card by flipping the tabs in toward the card. Each tab must close around and into the square shaped hole in the assembly rail above and below the card. Press the tab into the locked position until you hear an audible “click.” The “click” indicates that the card is locked into position.</p>  <p style="text-align: center;">Figure 1-5: Card with Tabs in the Locked Position</p> <p>The card is now ready for use.</p>
<p><b>4</b></p>	<p>To <u>remove</u> a card:</p> <ul style="list-style-type: none"> <li>■ Unlock the locking tabs on the card by flipping the tabs out from the card to the unlocked position.</li> <li>■ Slide the card out of the slot.</li> </ul>
<p><b>5</b></p>	<p>The <b>Insert and Remove Cards</b> procedure is complete.</p>

**MCS/LCS/LPFS8  
Cable Ports**

MCS and Auxiliary CSIP cable ports are located on the back and sides of the assemblies:

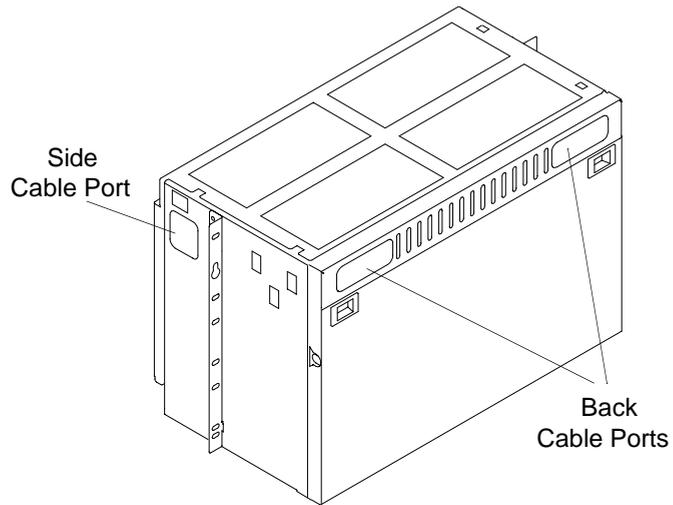


Figure 1-6: Cable Ports (MCS back view)

**Note:** The back cable port on the right side of the Auxiliary CSIP is at the bottom of the back panel.

**Note:** The MCS has a side cable port on the right side (from the front) only; the Auxiliary CSIP has a side cable port on both sides.

LCS and LPFS8 cable ports are located on both sides of the assemblies. Additional cable ports on the LCS are located on top of the assembly:

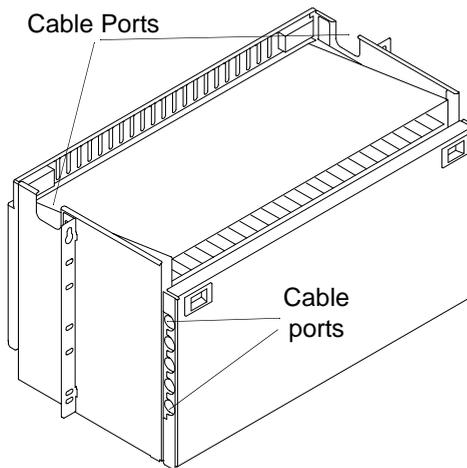


Figure 1-7: Cable Ports (LCS back view)



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## SECTION 2 CARD PLACEMENT

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# Chapter 1

## MCS Card Installation

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**Introduction** The Master Control Shelf (MCS) holds 20 printed circuit boards (cards). The MCS card bay is designed with 20 card guides, bottom and top, to align cards into their correct position.

All cards used in the D50 are designed with top and bottom locking tabs on the outside edge of the card. These tabs lift up during placement and lock down into place to secure the card in its MCS slot.

Each MCS card is “keyed” to its matching backplane connectors to prevent the card from being inserted into the wrong slot. Refer to Figure 2-1: Master Control Shelf Card Layout, page 2-2.

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### Required Equipment and Tools

To begin this task, you must have the following equipment and tools (refer to Section 6—*Appendices*, Appendix H—“D50 Component Part Numbers”):

- Electrostatic Discharge (ESD) Strap<sup>1</sup>.
- (2) Master Timing Unit (MTU) cards.<sup>2</sup>
- (1) Network Management Processor (NMP) card.
- (1) or (2) Master Control Processor cards.
- (1) or (2) trunk cards (both cards must be the same type):
  - DS3T.
  - DS3T2.
  - DS3TQ.
  - OC3T.
  - OC3T2.
  - OC3T2L.
  - OC3T2M.
  - OC3TQS.
  - OC3TQM.
  - OC3TQL.

---

<sup>1</sup> An ESD Strap is included in the MCS/ACSIP Installation Kit.

<sup>2</sup> Two Master Timing Unit (MTU) cards are required for 1:1 unit protection. The optional MTU cards provide a physical interface with external timing input.

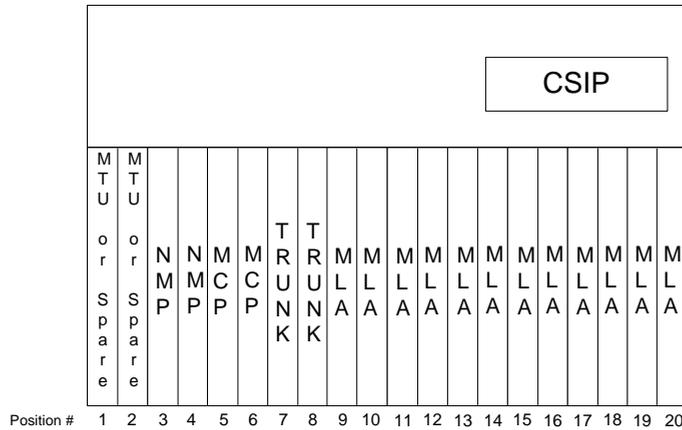
- (1 – 12) Master Line Card Adapter (MLA) or broadband tributary cards:
  - MLA2.
  - MLA2S.
  - MLA2L.
  - MLAT1.
  - MLAT3.
  - DS3L.
  - OC3L.

**Important! All cards must have the same or an older software revision as the MCP cards.**

**MCS Card Layout**

Cards are placed into the Master Control Shelf in the following order, from left to right:

**Note:** Broadband tributary cards (DS3L and OC3L) are inserted into the MLA slots (slots 9 through 20).



**Figure 2-1: Master Control Shelf Card Layout**

Position #:

- 1** Master Timing Unit (MTU) card (optional).
- 2** Master Timing Unit (MTU) card (optional).
- 3** Network Management Processor (NMP) card for I/O extension<sup>3</sup>.
- 4** Network Management Processor (NMP) card.
- 5** Standby Master Control Processor (MCP) card<sup>4</sup>.
- 6** Active Master Control Processor (MCP) card.
- 7** Standby Trunk card (DS3T, DS3T2, DS3TQ, OC3T, OC3T2, OC3T2L, OC3T2M, OC3TQS, OC3TQM, or OC3TQL).

**Important! If you are installing only one trunk card, insert it into Slot 8.**

<sup>3</sup> Planned for future release.

<sup>4</sup> A second MCP card can be installed for 1:1 fault protection.

- 8 Active Trunk card (DS3T, DS3T2, DS3TQ, OC3T, OC3T2, OC3T2L, OC3T2M, OC3TQS, OC3TQM, or OC3TQL).
- 9 Master Line Card Adapter (MLA) card(s): MLA2, MLA2S, MLA2L, MLAT1, or MLAT3  
or  
Broadband tributary card(s): DS3L or OC3L.

through

- 20 Master Line Card Adapter (MLA) card(s): MLA2, MLA2S, MLA2L, MLAT1, or MLAT3  
or  
Broadband tributary card(s): DS3L or OC3L.

**Note:** One MLA card is required to support each Line Card Shelf (LCS). A total of 12 MLA cards are required to support 12 LCSs. The MCS can support any combination of MLA cards as follows:

- the MLA2 card supports an LCS with an LSM2 card.
- the MLA2S card supports an LCS with an LSM2S card.
- the MLA2L card supports an LCS with an LSM2L card.
- the MLAT1 card supports an LCS with an LSMT1 card.
- the MLAT3 card supports an LCS with an LSMT3 card.

**Note:** DS3L and OC3L broadband interface cards do not require corresponding LSM cards.

**Important! Complete all procedures in the volume titled Installation before proceeding with the MCS Card Placement procedure.**

**MCS Card Placement**

Follow these steps to install each MCS card into the MCS:

Table 2-1: MCS Card Placement

STEP	PROCEDURE
1	Refer to Section 1— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures” in this volume to do the following: <ul style="list-style-type: none"> <li>■ Open and close the front panel on the MCS.</li> <li>■ Attach a properly grounded ESD strap (important!).</li> <li>■ Unlock, insert, and lock MCS cards.</li> </ul>
2	<b>Important! MCS card packaging contains IMPORTANT WARNINGS and INSTRUCTIONS on how to correctly handle cards. Follow these warnings and procedures carefully to prevent any electrostatic damage during installation.</b>

Table 2-1: MCS Card Placement (continued)

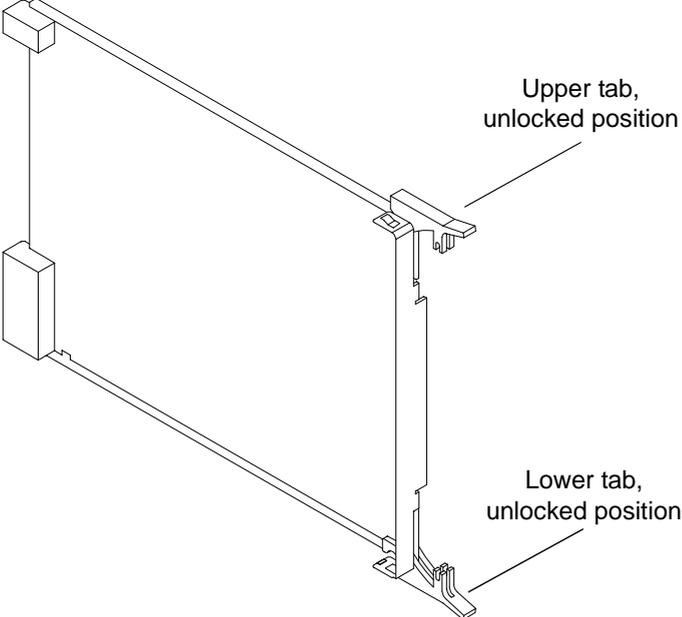
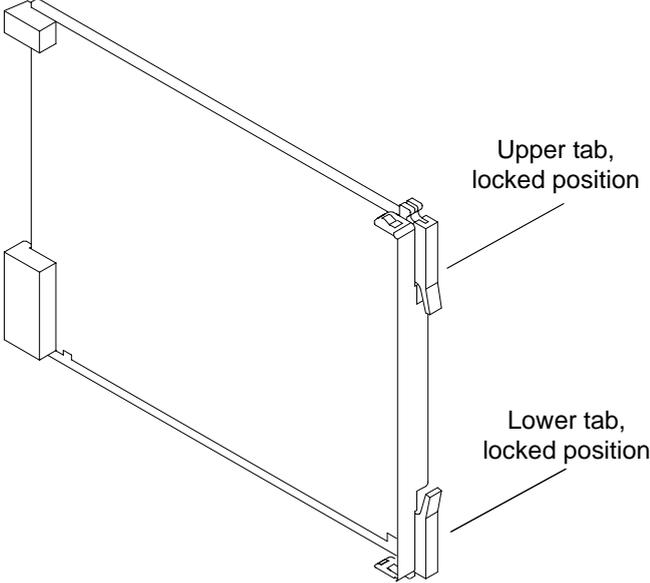
STEP	PROCEDURE
<p><b>3</b></p>	<p>Carefully remove the Master Timing Unit (MTU) cards from their packaging.</p> <p><b>Note:</b> If you are not using MTU cards, begin this procedure with the Network Management Processor (NMP) card, which is inserted into Slot 4.</p>
<p><b>4</b></p>	<p>Flip and hold the locking tabs (located on the outside edge of the card) in their up or unlocked position.</p>  <p style="text-align: center;">Figure 2-2: Card with Locking Tabs in Unlocked Position</p>
<p><b>5</b></p>	<p>Slide the MTU cards in their guides in Slots 1 and 2 until they plug into their backplane connectors. Each card is “keyed” so it will only plug into its correct position on the backplane.</p> <p><b>Important! DO NOT force cards into position. If a card does not plug in easily, slide the card back out and verify you are placing it in the correct position and that the guides are aligned. Check for any obstructions or bent pins on the connectors that might prevent the card from sliding easily into place.</b></p>

Table 2-1: MCS Card Placement (continued)

STEP	PROCEDURE
<p><b>6</b></p>	<p>Flip the locking tabs down until you hear an audible “click.” The “click” indicates the card is locked into position.</p>  <p>Figure 2-3: Card with Locking Tabs in Locked Position</p>
<p><b>7</b></p>	<p>Repeat Steps 3 through 6 for all cards in the MCS, as follows:</p> <ul style="list-style-type: none"> <li>■ Slot 4: Network Management Processor (NMP) card.</li> <li>■ Slot 5: Standby Master Control Processor (MCP) card.</li> <li>■ Slot 6: Working Master Control Processor (MCP) card.</li> <li>■ Slot 7: Standby Trunk card (optional).</li> </ul> <p><b>Important! The trunk cards in Slots 7 and 8 must be the same type.</b></p> <p><b>Important! If you are installing only one trunk card, insert it into Slot 8.</b></p> <ul style="list-style-type: none"> <li>■ Slot 8: Active Trunk card.</li> <li>■ Slots 9–20: Master Line Card Adapter (MLA) or broadband tributary cards.</li> </ul>
<p><b>8</b></p>	<p>The <b>MCS Card Placement</b> procedure is complete.</p>



## Chapter 2

### LCS Card Installation

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#### Introduction

The Line Card Shelf (LCS) holds 26 printed circuit boards (cards). The LCS card bay is designed with 26 card guides, bottom and top, to align cards into their correct position.

All cards used in the D50 are designed with top and bottom locking tabs on the outside edge of the card. These tabs lift up during placement and lock down into place to secure the card in its LCS slot.

Each LCS card is “keyed” to its matching backplane connectors to prevent the card from being inserted into the wrong slot. Refer to Figure 2-4: Line Card Shelf Card (LCS) Layout, page 2-8.

To test and verify the continuity of the cable pairs between the LCS and the Main Distribution Frame (MDF), refer to the volume titled *Installation*, Section 10—*Appendices*, Appendix C—“Testing Cable Pairs Continuity: Data Only,” and Section 10—*Appendices*, Appendix D—“Testing Cable Pairs Continuity: Data Plus Voice.”

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#### Required Equipment and Tools

To begin this task, you must have the following equipment and tools (refer to Section 6—*Appendices*, Appendix H—“D50 Component Part Numbers”)

- Electrostatic Discharge Strap (ESD)<sup>1</sup>.
- (1–24) line cards according to your cabling plan (one type for each six-pack):
  - DS1 quad DS1 line card(s).
  - DMT8a-3 octal ADSL line card(s).
  - DMT8a-4 octal ADSL line card(s).
  - SDSL8 and SDSL8+ octal SDSL line card(s).
  - SHDSL8 octal SHDSL line card(s).
  - IDSL8 octal IDSL line card(s).
- (1) Line Card Shelf Multiplexer (LSM<sup>2</sup>) card:
  - LSM2.
  - LSM2S.
  - LSM2L.
  - LSMT1.
  - LSMT3.

**Important! All cards must have the same or an older software revision as the MCP cards in the MCS.**

---

<sup>1</sup> An ESD Strap is included in the LCS/LPFS8 Installation Kit.

<sup>2</sup> LSM is the generic name used in this chapter for the LSM2, LSM2S, LSM2L, LSMT1, and LSMT3.



**Line Card Specifications**

The Line Card Shelf supports the following line card types:

- DS1 (quad DS1).
- DMT8a-3 (octal ADSL).
- DMT8a-4 (octal ADSL).
- SDSL8 and SDSL8+ (octal SDSL).
- SHDSL8 (octal SHDSL).
- IDSL8 (octal IDSL).

Line Card Shelf cabling must match the requirements of the line card layout.

All line card types (DS1, DMT8a-3, DMT8a-4, SDSL8/SDSL8+, SHDSL8, and IDSL8) can be supported on the same LCS simultaneously, when each card type is placed within its own six-pack (e.g., all DS1 cards in one six-pack, all IDSL8 cards in one six-pack, etc.).

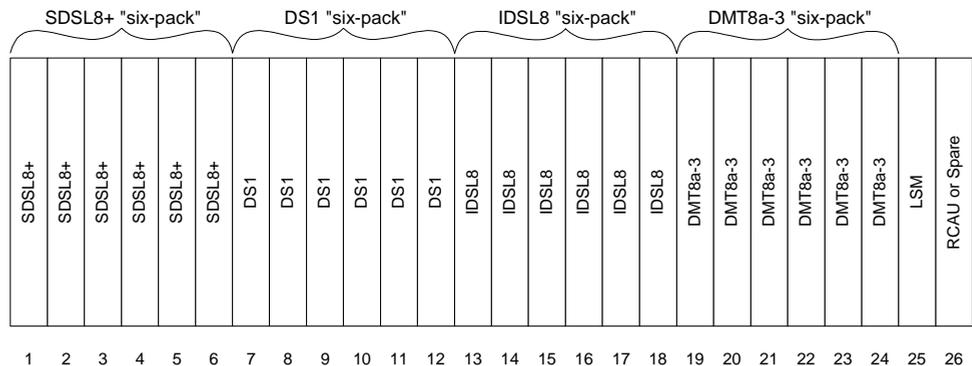


Figure 2-5: LCS with SDSL8+, DS1, IDSL8, & DMT8a-3 Cards

**Important! Complete all procedures in the volume titled Installation before proceeding with the LCS Card Placement procedure.**

**LCS Card Placement**

Follow these steps to install each LCS card into the LCS:

Table 2-2: LCS Card Placement

STEP	PROCEDURE
1	<p>Refer to Section 1—<i>Basic Procedures</i>, Chapter 1—“Basic Procedures” in this volume to do the following:</p> <ul style="list-style-type: none"> <li>■ Open and close the front panel on the LCS.</li> <li>■ Attach a properly grounded ESD strap (important!).</li> <li>■ Unlock, insert, and lock LCS cards.</li> </ul>
2	<p><b>Important! LCS card packaging contains IMPORTANT WARNINGS and INSTRUCTIONS on how to correctly handle cards. Follow these warnings and procedures carefully to prevent any electrostatic damage during installation and adjustment.</b></p>

Table 2-2: LCS Card Placement (continued)

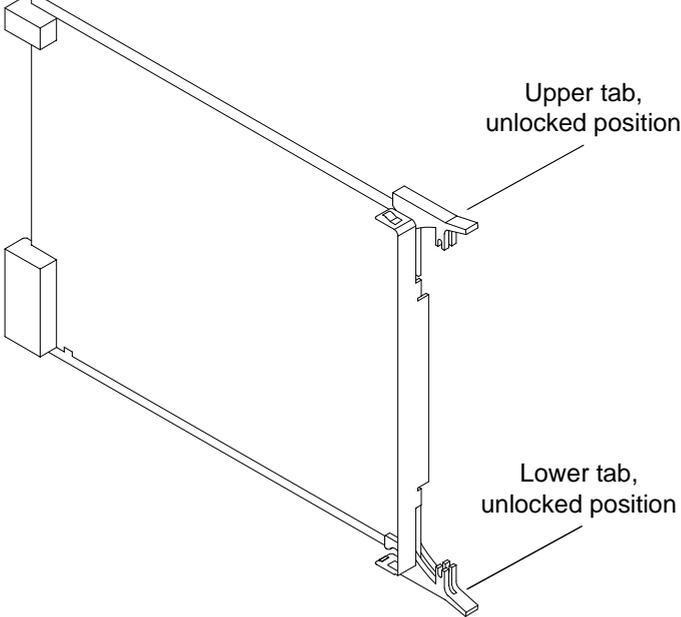
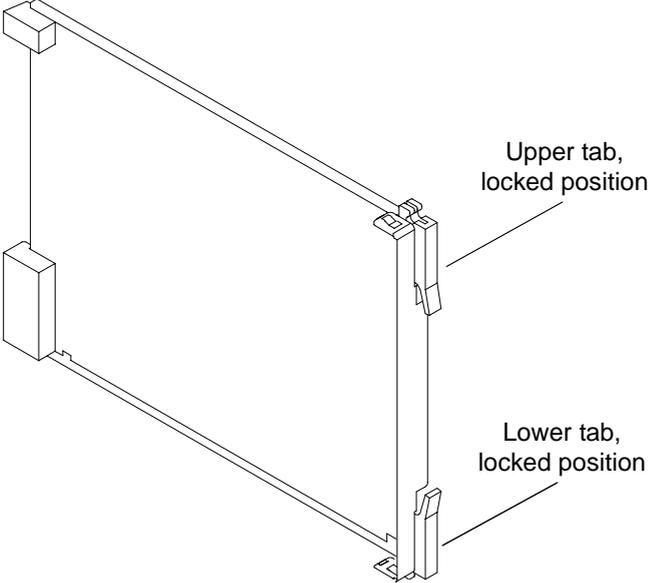
STEP	PROCEDURE
3	Carefully remove the first line card from its packaging.
4	<p>Flip and hold the locking tabs (located on the outside edge of the card) in their up or unlocked position.</p>  <p style="text-align: center;">Figure 2-6: Card with Locking Tabs in Unlocked Position</p>
5	<p>Slide the card in its guide in Slot 1 until it plugs into the backplane connector. Each card is “keyed” so it will only plug into its correct position on the backplane.</p> <p><b>Important! DO NOT force the card into position. If the card does not plug in easily, slide the card back out and verify you are placing it in the correct position and that the guides are aligned. Check for any obstructions or bent pins on the connectors that might prevent the card from sliding easily into place.</b></p>

Table 2-2: LCS Card Placement (continued)

STEP	PROCEDURE
<p><b>6</b></p>	<p>Flip the locking tabs down until you hear an audible “click.” The “click” indicates the card is locked into position.</p>  <p>Figure 2-7: Card with Locking Tabs in Locked Position</p>
<p><b>7</b></p>	<p>Repeat Steps 3 through 6 for all cards in the LCS, as follows:</p> <ul style="list-style-type: none"> <li>■ Slots 2–24: DS1, DMT8a-3, DMT8a-4, SDSL8/SDSL8+, SHDSL8, or IDSL8 line cards, according to your cabling scheme.</li> </ul> <p><b>Note:</b> Be sure that all the cards within a six-pack are of the same type.</p> <ul style="list-style-type: none"> <li>■ Slot 25: Line Card Shelf Multiplexer (LSM) card.</li> <li>■ Slot 26: RCAU or spare.</li> </ul>
<p><b>8</b></p>	<p>The <b>Line Card Specifications</b> procedure is complete.</p>



## Chapter 3

### LPFS8 Card Installation

---

#### Introduction

A Low Pass Filter Shelf (LPFS8) is required if the D50 multiplexer is set up for ADSL data plus voice applications. This procedure provides detailed instructions on how to install LPFS8 cards. If you are installing a system designed for data only, skip to Section 3—*Card Cabling*, Chapter 1—“OC3 Trunk Card Cabling,” page 3-1.

The LPFS8 holds 24 low pass filter boards (cards). The LPFS8 card bay is designed with 24 card guides, bottom and top, to align cards into their correct position.

The LPFS8 supports the LPF8-2 card, which is used with DMT8a-3 ADSL line cards.

**Note:** All references in this chapter to LFP8 refer to the LPF8-2 card.

LPF8 cards are designed with a bottom locking tab on the outside edge of the card. This tab lifts up during placement and locks down into place to secure the card in its LPFS8 slot.

Each LPF8 card is “keyed” to its backplane connector. Refer to Figure 2-8: Low Pass Filter Shelf Card Layout, page 2-14.

---

#### Required Equipment and Tools

To begin this task, you must have the following equipment and tools (refer to Section 6—*Appendices*, Appendix H—“D50 Component Part Numbers”)

- (1–24) LPF8 cards.

**Note:** Each LPF8 card must be placed in the same LPFS8 slot number as its corresponding ADSL line card in the LCS.

---

**LPFS8 Card Layout**

Cards are placed into the LPFS8 in the following order, from left to right, to match corresponding ADSL line cards in the LCS:

	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D
Position #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	

Figure 2-8: Low Pass Filter Shelf Card Layout

Position #:

- 1** LPF8 card.
- through
- 24** LPF8 card.

Each LPFS8 can support up to 192 ADSL lines with LPF8 cards.

**Important! Complete all procedures in the volume titled Installation before proceeding with the LPFS8 Card Placement procedure.**

**LPFS8 Card Placement**

Follow these steps to install each LPF8 card into the LPFS8:

Table 2-3: LPF8 Card Placement

STEP	PROCEDURE
<b>1</b>	Refer to Section 1— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures” in this volume to do the following: <ul style="list-style-type: none"> <li>■ Open and close the front panel on the LPFS8.</li> <li>■ Attach a properly grounded ESD strap (important!).</li> </ul> Unlock, insert, and lock LPF8 cards.
<b>2</b>	<b>Important! LPF8 card packaging contains IMPORTANT WARNINGS and INSTRUCTIONS on how to correctly handle cards. Follow these warnings and procedures carefully to prevent any electrostatic damage during installation.</b>
<b>3</b>	Carefully remove the first card from its packaging.

Table 2-3: LPF8 Card Placement (continued)

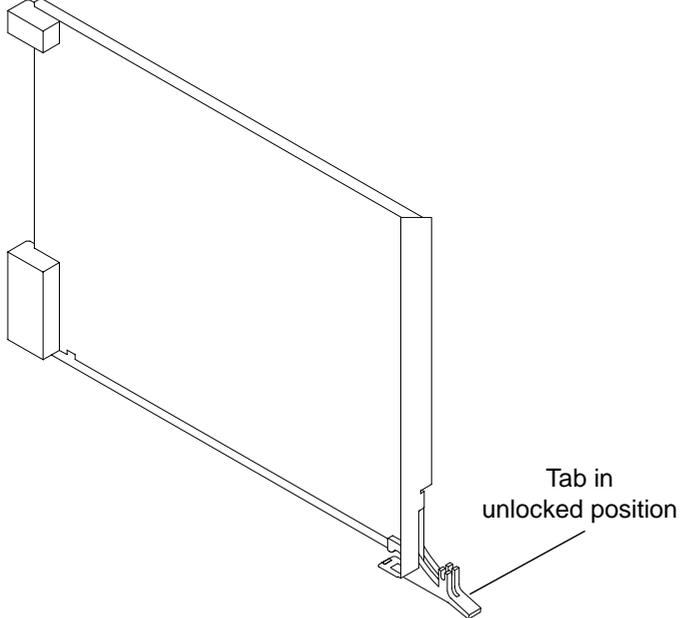
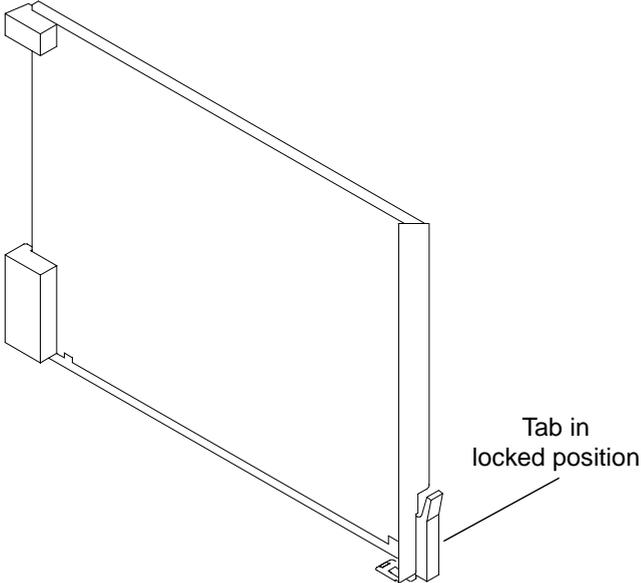
STEP	PROCEDURE
<p><b>4</b></p>	<p>Flip and hold the locking tab (located on the outside edge of the card) in its up or unlocked position.</p>  <p style="text-align: center;">Figure 2-9: Card with Locking Tab in Unlocked Position</p>
<p><b>5</b></p>	<p>Slide the card in its guide in Slot 1 until it plugs into the backplane connector.</p> <p><b>Important! DO NOT force the card into position. If the card does not plug in easily, slide the card back out and verify you are placing it in the correct position and that the guides are aligned. Check for any obstructions or bent pins on the connectors that might prevent the card from sliding easily into place.</b></p>

Table 2-3: LPF8 Card Placement (continued)

STEP	PROCEDURE
<p><b>6</b></p>	<p>Flip the locking tab down until you hear an audible “click.” The “click” indicates the card is locked into position.</p>  <p style="text-align: center;">Figure 2-10: Card with Locking Tab in Locked Position</p>
<p><b>7</b></p>	<p>Repeat Steps 3 through 6 for all cards in the LPFS8.</p>
<p><b>8</b></p>	<p>The <b>LPFS8 Card Placement</b> procedure is complete.</p>

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## SECTION 3 CARD CABLING

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# Chapter 1

## OC3 Trunk Card Cabling

---

### Introduction

The interface between the ATM Network and the D50 is made at the Master Control Shelf (MCS) trunk interface card. The D50 supports the following ATM trunk interface cards:

- DS3T, DS3T2, and DS3TQ (45 Mbps).
- OC3T, OC3T2, OC3T2L, OC3T2M, and OC3TQS, OC3TQM, and OC3TQL (155 Mbps).

This chapter provides detailed instructions on how to connect the ATM network fiber optic cabling to a D50 with OC3T, OC3T2, OC3T2L, OC3T2M, OC3TQS, OC3TQM, or OC3TQL trunk cards.

To switch service between the active and standby trunk cards, refer to the volume titled Maintenance and Testing, Section 4—*Appendices*, Appendix A—“Trunk Card Service Switching.”

---

### Required Equipment and Tools

The volume titled Installation, Section 4—*ATM Network Cabling*, Chapter 2—“OC3 MCS to ATM Network Cabling” provides instructions on how to connect single-mode fiber optic cable from the Central Office optical cross-connect panel to the MCS. Verify that this fiber optic cabling is complete and that the OC3T<sup>1</sup> card is placed in the MCS (see Section 2—*Card Placement*, Chapter 1—“MCS Card Installation” in this volume) before beginning this procedure.

---

### Fiber Optic Trunk Cable Connection

“Transmit” and “receive” fiber optic trunk cabling is connected to and run from the Central Office Optical Distribution Frame (ODF) across the horizontal cable racks to the D50 by the network service provider or a D50 Technician. Refer to the volume titled Installation, Section 4—*ATM Network Cabling*, Chapter 2—“OC3 MCS to ATM Network Cabling.” This trunk cabling is connected to the D50 at the faceplate of the OC3T trunk card.

---

<sup>1</sup> “OC3T” refers to the OC3T, OC3T2, OC3T2L, OC3T2M, OC3TQS, OC3TQM, and OC3TQL trunk cards throughout the remainder of this chapter.

Follow these steps to connect fiber optic cabling from the Central Office Optical Distribution Frame (ODF) to the OC3T trunk card<sup>2</sup> in the Master Control Shelf:

Table 3-1: Fiber Optic Trunk Connection

STEP	PROCEDURE
1	<p>Refer to Section 1—<i>Basic Procedures</i>, Chapter 1—“Basic Procedures” in this volume to do the following:</p> <ul style="list-style-type: none"> <li>■ Attach a properly grounded ESD strap (important!).</li> <li>■ Open and close the MCS front panel.</li> </ul>
2	<p>Fiber optic cabling runs from the Central Office Optical Distribution Frame (ODF) to the D50 through the clip(s) above slot 7 and slot 8 in the Master Control Shelf (MCS).            Has this cabling been done?</p> <ul style="list-style-type: none"> <li>■ If YES, proceed to Step 3.</li> <li>■ If NO, refer to the volume titled <i>Installation</i>, Section 4—<i>ATM Network Cabling</i>, Chapter 2—“OC3 MCS to ATM Network Cabling” for fiber optic cabling from the ODF to the MCS.</li> </ul>
3	<p>Pull the cabling out and down to the OC3T trunk card.</p> <p><b>Important! Be careful when handling and routing fiber optic cabling. Do not make any bends or coil the cabling in less than a 2” diameter loop. The cabling is fragile and kinks or sharp bends can cause signal distortion.</b></p> <div style="text-align: center;">  </div> <p><b>Warning! Follow all standard safety procedures when using fiber optic cabling and equipment to prevent eye damage.</b></p>
4	<p>Clean the connectors on the end of the fiber optic cabling following local procedures.<sup>1</sup></p>
5	<p>Clean the transmit and receive connectors located on the card front of the trunk card following local procedures. See the drawing in the next step.</p>

<sup>2</sup> Cabling for a second redundant OC3T trunk card can also be installed using this procedure.

Table 3-1: Fiber Optic Trunk Connection (continued)

STEP	PROCEDURE
6	<p>Connect the duplex fiber optic cabling to the “transmit” and “receive” connectors on the trunk card. Position the SC duplex connector so the small tabs are on the left. Push in on the connector until it locks into position.</p> <p>If a second trunk card has been installed, connect the second cable to the “transmit” and “receive” connectors on the second card.</p> <p><b>Note:</b> The ODF “transmit” fiber connection must be connected to the card’s “receive” (back) connector, and the ODF “receive” fiber connection must be connected to the card’s “transmit” (front) connector. The duplex fiber optic cabling with SC duplex connections ensures that these connections are made correctly.</p> <div style="text-align: center;"> </div> <p style="text-align: center;">Figure 3-1: OC3T Trunk Card Transmit/Receive Connectors</p>
7	The <b>Fiber Optic Trunk Cable Connection</b> procedure is complete.

<sup>1</sup> Suggested fiber connection cleaning materials include oil-free compressed air, lint-free wipes, isopropyl alcohol, cotton swaps, and lint-free pipe cleaners.



## Chapter 2 MLA2 to LSM2 Card Cabling

---

**Introduction** In a Central Office installation, Line Card Shelves are connected to the Master Control Shelf via Line Card Shelf Multiplexer (LSM2) and Master Line Adapter (MLA2<sup>1</sup>) cards. The LSM2 and MLA2 cards exchange signals at OC-3 rate over multi-mode fiber optic cable. The LSM2 card receives the signal from its MLA2 card and then multiplexes and demultiplexes ATM cell streams for up to 24 line cards.

This chapter provides detailed instructions on how to make the multi-mode fiber optic cable connection to the LSM2 card in a Line Card Shelf and its MLA2 card in the Master Control Shelf.

---

**Required Equipment and Tools** The volume titled *Installation*, Section 5—*MLA Cabling*, Chapter 1—“MLA2 to LSM2 Fiber Optic Cabling” provides instructions on how to connect multi-mode fiber optic cable from the Central Office optical cross-connect panel to the MCS. Verify that this fiber optic cabling is complete and that the MLA2 card is placed in the MCS (see Section 2—*Card Placement*, Chapter 1—“MCS Card Installation” in this volume) before beginning this procedure.

---

**Fiber Optic Cable Connection – LCS to MCS** Follow these steps to connect fiber optic cable from the LSM2 card in the Line Card Shelf to its MLA2 card in the Master Control Shelf:

Table 3-2: Fiber Optic Cable Connection—LCS to MCS

STEP	PROCEDURE
1	Refer to Section 1— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures” in this volume to do the following: <ul style="list-style-type: none"><li>■ Remove and replace the LCS front panel.</li><li>■ Attach a properly grounded ESD strap (important!).</li><li>■ Remove and replace the MCS front panel.</li></ul>

---

<sup>1</sup> The MLA2 card supports Quality of Service Version 4.0 (QoSV4.0).

Table 3-2: Fiber Optic Cable Connection—LCS to MCS (continued)

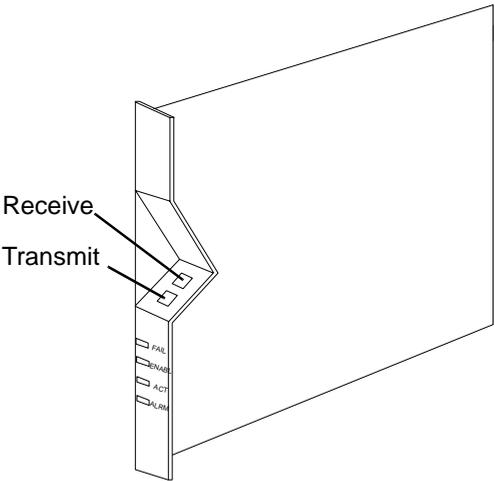
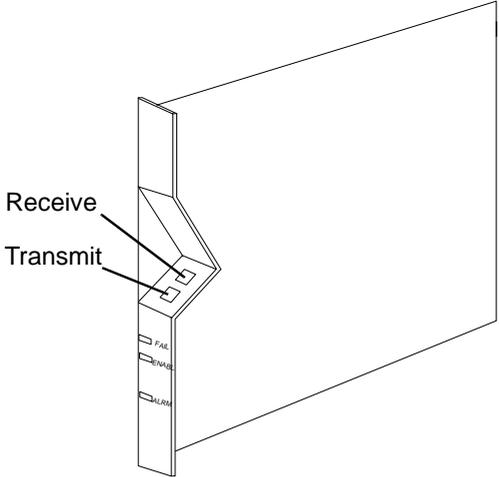
STEP	PROCEDURE
2	<p>Clean the connectors at both ends of the cable following local practices<sup>1</sup>.</p> <p><b>Important! Be careful when handling and routing fiber optic cabling. Do not make any bends or coil the cabling in less than a 2” diameter loop. The cabling is fragile and kinks or sharp bends can cause signal distortion.</b></p> <p></p> <p><b>Warning! Follow all standard safety procedures when using fiber optic cabling and equipment to prevent eye damage.</b></p>
3	<p>Clean the transmit and receive connectors located on the card fronts of the LSM2 and MLA2 cards following local procedures. See drawing in the following step.</p>
4	<p>In the first LCS (LCS1), connect the duplex fiber optic cable to the transmit and receive connectors on the LSM2 card. Position the SC duplex connector so the small tabs are on the left. Push in on the connector until it locks into position.</p> <p><b>Note:</b> The LSM2 “transmit” (front) fiber connection must be connected to the MLA2 “receive” (back) connector, and the LSM2 “receive” fiber connection must be connected to the MLA2 “transmit” connector. The duplex fiber optic cables with SC duplex connections ensure that these connections are made correctly.</p>  <p>Figure 3-2: LSM2 “Transmit” and “Receive” Connector Locations</p>

Table 3-2: Fiber Optic Cable Connection—LCS to MCS (continued)

STEP	PROCEDURE
5	<p>In the MCS, connect the duplex fiber optic cable to the transmit and receive connectors on the first MLA2 card. Position the SC duplex connector so the small tabs are on the left. Push in on the connector until it locks into position.</p> <p><b>Note:</b> The MLA2 “transmit” (front) connector must be connected to the LSM2 “receive” (back) connector and the MLA2 “receive” connector must be connected to the LSM2 “transmit” connector. The duplex fiber optic cables with SC duplex connectors ensure that these connections are made correctly.</p>  <p style="text-align: center;">Figure 3-3: MLA2 “Transmit” and “Receive Connectors</p>
6	Repeat Steps 2 through 6 for each LCS installed in the D50. Connect each LSM2 card to its corresponding MLA2 card.
7	The <b>Fiber Optic Cable Connection – LCS to MCS</b> procedure is complete.

<sup>1</sup> Suggested fiber connection cleaning materials include oil-free compressed air, lint-free wipes, isopropyl alcohol, cotton swabs, and lint-free pipe cleaners.



## Chapter 3

### MLA2L/MLA2S/OC3L Card Cabling

---

**Introduction** The Master Control Shelf (MCS) can communicate with remote Line Card Shelves (LCS) or standard ATM network equipment over an OC-3 interface. The Line Card Multiplexer (LSM2L or LSM2S) card, at the remote LCS site, communicates via a OC-3 signal over single-mode fiber optic cable to an MLA2L or MLA2S card in the MCS (the LSM2L connects to the MLA2L; the LSM2S connects to the MLA2S). Standard ATM network equipment communicates over a broadband UNI<sup>1</sup> tributary interface over single-mode fiber optic cable to an OC3L broadband card in the MCS. The OC3L broadband card can also send and receive ATM traffic to and from other OC3L cards directly.

This chapter provides detailed instructions on how to connect “transmit” and “receive” single-mode fiber optic cables to the MLA2L, MLA2S, or OC3L card.

---

**Required Equipment and Tools** The volume titled *Installation*, Section 5—*MLA Cabling*, Chapter 2—“MLA2L/MLA2S and OC3L Fiber Optic Cabling” provides instructions on how to connect single-mode fiber optic cable from a Central Office optical cross-connect panel, or standard ATM network equipment, to the MCS. Verify that this fiber optic cabling is complete and that the MLA2L/MLA2S/OC3L card is placed in the MCS (see Section 2—*Card Placement*, Chapter 1—“MCS Card Installation” in this volume) before beginning this procedure.

---

**MLA2L/MLA2S/OC3L Fiber Optic Cabling** Follow these steps to connect single-mode fiber optic cable to the MLA2L, MLA2S, or OC3L card in the Master Control Shelf:

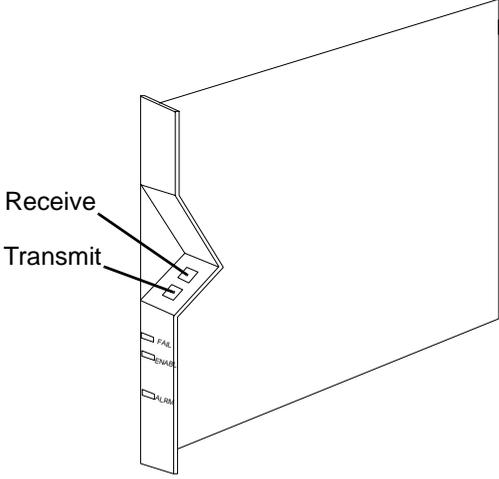
Table 3-3: MLA2L/MLA2S/OC3L Fiber Optic Cabling

STEP	PROCEDURE
1	Refer to Section 1— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures” in this volume to do the following: <ul style="list-style-type: none"><li>Remove and replace the MCS front panel.</li><li>Attach a properly grounded ESD strap (important!).</li></ul>
2	Locate the single-mode fiber optic cable for the MLA2L/MLA2S/OC3L card. Make sure it is brought down through the clip and through the slot at the top of the MCS card cage to the card.

---

<sup>1</sup> UNI = User Network Interface.

Table 3-3: MLA2L/MLA2S/OC3L Fiber Optic Cabling (continued)

STEP	PROCEDURE
3	Clean the transmit and receive connectors located on the front of the card following local procedures <sup>1</sup> .
4	<p>Connect the single-mode fiber optic cable to the “transmit” and “receive” connectors on the card. Position the SC duplex connector so the small tabs are on the left. Push in on the connector until it locks into position.</p>  <p>The diagram shows a side view of a card with two fiber optic connectors. The top one is labeled 'Receive' and the bottom one is labeled 'Transmit'. Below these are three other ports labeled 'FAN', 'SERIAL', and 'MLA2L'. The card is shown with a perspective view of its front panel.</p> <p>Figure 3-4: MLA2L/MLA2S/OC3L “Transmit” and “Receive” Connectors</p>
5	Loosely coil any slack in the fiber optic cable and lay it on top of the MCS card cage alongside the CSIP. You may loop and tie fiber optic cable outside the MCS back panel if the area above the MCS card cage becomes too congested. Again, <u>do not</u> coil the cable in less than a 2” diameter loop.
6	Repeat Steps 2 through 5 for each additional MLA2L, MLA2S, or OC3L card.
7	The <b>MLA2L/MLA2S/OC3L Fiber Optic Cabling</b> procedure is complete.

<sup>1</sup> Suggested fiber connection cleaning materials include oil-free compressed air, lint-free wipes, isopropyl alcohol, cotton swabs, and lint-free pipe cleaners.

## Chapter 4 MLAT1 Card Cabling

---

**Introduction** The Master Control Shelf (MCS) can communicate with remote Line Card Shelves (LCS) over a DS-1 interface. The Line Card Multiplexer (LSMT1) card, at the remote LCS site, communicates via a DS-1 signal over copper cable to an Master Line Adapter (MLAT1) card in the MCS.

---

**Required Equipment and Tools** The volume titled Installation, Section 5—*MLA Cabling*, Chapter 3—“MLAT1 Copper Cabling” provides instructions on how to connect copper cable from the DSX cross connect panel or punch down block in the Central Office to the MCS. Verify that this cabling is complete and that the MLAT1 card is placed in the MCS (see Section 2—*Card Placement*, Chapter 1—“MCS Card Installation” in this volume) before beginning this procedure.

---

**MLAT1 Card Cabling** Follow these steps to connect 4xDS1 cables to the MLAT1 card in the Master Control Shelf:

Table 3-4: MLAT1 Card Cabling

STEP	PROCEDURE
1	Refer to Section 1— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures” in this volume to do the following: <ul style="list-style-type: none"><li>■ Remove and replace the MCS front panel.</li><li>■ Attach a properly grounded ESD strap (important!).</li></ul>
2	Locate the 4xDS-1 “transmit” and “receive” cables terminated with RJ-45 plugs for the MLAT1 card. Make sure the cables are brought down through the slot at the top of the MCS card cage to MLAT1 card.

Table 3-4: MLAT1 Card Cabling (continued)

STEP	PROCEDURE
<p><b>3</b></p>	<p>Connect the 4xDS-1 cables to the front of the MLAT1 card; connect the “transmit” cable to the back RJ-45 plug and the “receive” cable to the front RJ-45 plug. Push in on the cables until they lock into position.</p> <div> </div> <p>Figure 3-5: MLAT1 Card “Transmit” and “Receive” Connectors</p>
<p><b>4</b></p>	<p>Repeat Steps 2 and 3 for additional MLAT1 cards.</p>
<p><b>5</b></p>	<p>The <b>MLAT1 Card Cabling</b> procedure is complete.</p>

## Chapter 5 MLAT3/DS3L Card Cabling

---

**Introduction** The Master Control Shelf (MCS) can communicate with remote Line Card Shelves (LCS) or standard ATM network equipment over a DS-3 interface. The Line Card Multiplexer (LSMT3) card, at the remote LCS site, communicates via a DS-3 signal over coax cable to a Master Line Adapter (MLAT3) card in the MCS. Standard ATM network equipment communicates over a broadband UNI<sup>1</sup> tributary interface over coax cable to a DS3L broadband card in the MCS. The DS3L broadband card can also send and receive ATM traffic to and from other DS3L cards directly.

This chapter provides detailed instructions on how to connect “transmit” and “receive” coax cables to the MLAT3 or DS3L card.

---

**Required Equipment and Tools** The volume titled *Installation*, Section 5—*MLA Cabling*, Chapter 4—“MLAT3 and DS3L Coax Cabling” provides instructions on how to route coax cables from a Central Office DSX-3 cross connect panel, or standard ATM network equipment, to the MCS. Verify that this cabling is complete and that the MLAT3 or DS3L card is placed in the MCS (see Section 2—*Card Placement*, Chapter 1—“MCS Card Installation” in this volume) before beginning this procedure.

---

**MLAT3/DS3L Coax Cabling** Follow these steps to connect the T3 coax cable stub to the MLAT3 or DS3L card in the Master Control Shelf:

Table 3-5: MLAT3/DSL Coax Cabling

STEP	PROCEDURE
1	Refer to Section 1— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures” in this volume to do the following: <ul style="list-style-type: none"><li>■ Remove and replace the MCS front panel.</li><li>■ Attach a properly grounded ESD strap (important!).</li></ul>

---

<sup>1</sup> UNI = User Network Interface.

Table 3-5: MLAT3/DSL Coax Cabling (continued)

STEP	PROCEDURE
2	<p>Locate the T3 coax cable stub with “transmit” and “receive” SMB connectors for the MLAT3 or DS3L card. Make sure the cables are brought down through the grounding clip and grounding board, then through the slot at the top of the MCS card cage, to the MLAT3 or DS3L card. Make sure the ferrite remains inside the top of the MCS, above the card cage.</p> <p><b>Important! Be sure the connectors do NOT touch the CSIP components in an active system; contact could result in a short circuit.</b></p>
3	<p>Connect the SMB connectors on the ends of the cables to the front of the MLAT3 or DS3L card; connect the “transmit” cable connector to the back connector on the card and the “receive” cable connector to the front connector. Push in on the connectors until they lock into position.</p> <div> </div> <p>Figure 3-6: MLAT3/DS3L Card “Transmit” and “Receive” Connectors</p>
4	Repeat Steps 2 and 3 for additional MLAT3 and DS3L cards.
5	The <b>MLAT3/DS3L Coax Cabling</b> procedure is complete.

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## SECTION 4 REMOTE SITE CABLING

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## Chapter 1

### LSM2L/LSM2S Card Cabling

---

**Introduction**      The Master Control Shelf (MCS) can communicate with remote Line Card Shelves (LCS) over an OC-3 interface. The Line Card Multiplexer (LSM2L or LSM2S) card, at the remote LCS site, communicates via an OC-3 signal over single-mode fiber optic cable to a Master Line Card Adapter (MLA2L or MLA2S) card in the MCS (the LSM2L connects to the MLA2L; the LSM2S connects to the MLA2S).

---

**Required Equipment and Tools**      To begin this task you must have the following equipment and tools (refer to Section 6—*Appendices*, Appendix H—“D50 Component Part Numbers”):

- Single-mode duplex fiber optic cabling (9/125  $\mu\text{m}$  diameter) with SC duplex connectors (or SC duplex adapters), and 3/4 inch or longer connector housing shells.
- Fiber optic duplex SC connector termination kit.

---

**LSM2L/LSM2S  
 Card Cabling**

Single-mode “transmit” and “receive” fiber optic cables are connected to an optical patch panel and run to the remote Line Card Shelf per local procedures. Follow these steps to connect single-mode fiber optic cables to the faceplate of the LSM2L/LSM2S card:

**Note:** The LSM2L card is connected to a corresponding MLA2L card in an MCS; the LSM2S card is connected to a corresponding MLA2S card in an MCS.

Table 4-1: LSM2L/LSM2S Card Cabling

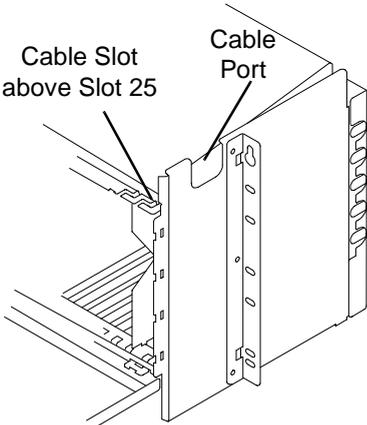
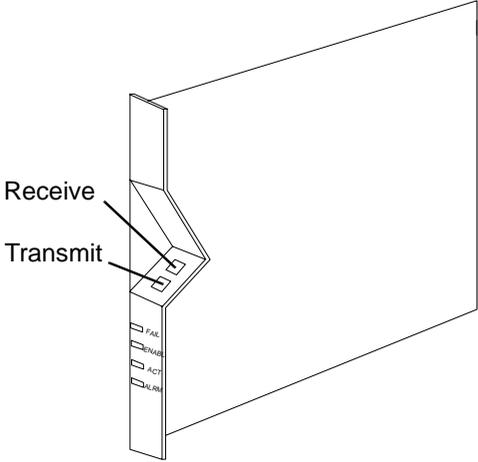
STEP	PROCEDURE
1	Refer to Section 1— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures” in this volume to do the following: <ul style="list-style-type: none"> <li>■ Attach a properly grounded ESD strap (important!).</li> <li>■ Locate the LCS cable ports.</li> <li>■ Open and close (or remove and replace) the LCS front panel.</li> </ul>
2	Terminate OC-3 “transmit” and “receive” single-mode fiber optic cables at the optical patch panel per local procedures. <p><b>Important! Be careful when handling and routing fiber optic cable. Do not make any bends or coil the cable in less than a 2 inch diameter loop. The cable is fragile, and kinks or sharp bends can cause signal distortion.</b></p> <p> <b>Warning! Follow all standard safety procedures when using fiber optic cable and equipment to prevent eye damage.</b></p>
3	Route the cables from the optical patch panel to the remote LCS.
4	Bring the fiber optic cables through the cable port on the top right of the remote LCS assembly. <div style="text-align: center;">  </div> <p>Figure 4-1: LSM Cable Path in the LCS</p>

Table 4-1: LSM2L/LSM2S Card Cabling (continued)

STEP	PROCEDURE
5	Pull the fiber optic cables from the side of the remote LCS to the front.
6	Route the fiber optic cables through the cable slot and clip above slot 25, and down to the card.
7	Cut the fiber optic cables to the correct length. Terminate SC duplex connectors on the cables.
8	Clean the transmit and receive connectors <sup>1</sup> located on the front of the LSM2L/LSM2S card following local procedures. See drawing in next step.
9	<p>Connect the fiber optic cable to the transmit and receive connectors on the LSM2L/LSM2S card. Position the SC duplex connector so the small tabs are on the left. Push in on the connector until it locks into position.</p>  <p style="text-align: center;">Figure 4-2: LSM2L/LSM2S Transmit/Receive Connectors</p>
10	Dress, tie and label cables.
11	The <b>LSM2L/LSM2S Card Cabling</b> procedure is complete

<sup>1</sup> Suggested fiber connection cleaning materials include oil-free compressed air, lint-free wipes, isopropyl alcohol, cotton swabs, and lint-free pipe cleaners.



## Chapter 2

### LSMT1 Card Cabling

---

**Introduction**      The Master Control Shelf (MCS) can communicate with remote Line Card Shelves (LCS) over a DS-1 interface. The Line Card Multiplexer (LSMT1) card, at the remote LCS site, communicates via a DS-1 signal over copper cable to an Master Line Adapter (MLAT1) card in the MCS.

This chapter provides detailed instructions on how to connect 4xDS-1 cables to the LSMT1 card in the remote LCS. To connect 4xDS-1 cables to the LSMT1 card in a D50 RAM, refer to the volume titled Installation, Section 8—*D50 RAM*.

---

**Required  
Equipment and  
Tools**

To begin this task you must have the following equipment and tools (refer to Section 6—*Appendices*, Appendix H—“D50 Component Part Numbers”)

- (2) 4-pair 4xDS-1 (transmit and receive) cables.
- (2) RJ-45 plugs.
- RJ-45 crimp tool and cutter.
- (4) T1 EMI filter ferrites.
- Grounding wire.

Two 4xDS-1 cables with RJ-45 connectors are required for each LSMT1 card connection: one for “transmit” and one for “receive.”

---

**LSMT1 Card Cabling**

4-pair 4xDS-1 “transmit” and “receive” copper cables are connected to a DSX cross connect panel or punch down panel and run to the remote Line Card Shelf per local procedures. Follow these steps to connect the 4-pair 4xDS-1 cables to the faceplate of the LSMT1 card.

**Note:** The LSMT1 card is connected to a corresponding MLAT1 card in a D50 Master Control Shelf (MCS).

Table 4-2: LSMT1 Card Cabling

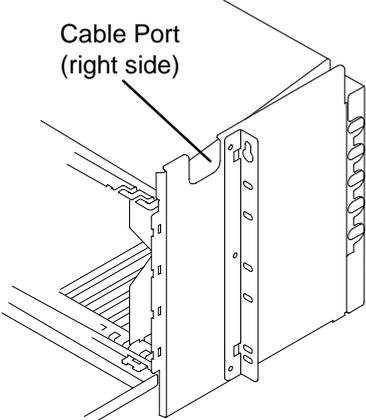
STEP	PROCEDURE
1	Refer to Section 1— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures” in this volume to do the following: <ul style="list-style-type: none"> <li>■ Attach a properly grounded ESD strap (important!).</li> <li>■ Locate the LCS cable ports.</li> <li>■ Remove and replace the LCS front panel.</li> </ul>
2	Terminate the “transmit” and “receive” 4xDS-1 cables at the DSX cross connect panel or punch down panel, following local procedures.
3	Route the 4xDS-1 cables from the cross connect panel or punch down panel to the remote LCS.
4	Push the 4xDS-1 cables through one of the large cable ports on the top right or left side of the remote LCS, following local procedures. <div style="text-align: center;">  <p>Figure 4-3: LSM Cable Port in the LCS</p> </div>
5	Pull the 4xDS-1 transmit and receive cables from the side of the remote LCS to the front.
6	Cut the 4xDS-1 transmit and receive cables to the correct length.

Table 4-2: LSMT1 Card Cabling (continued)

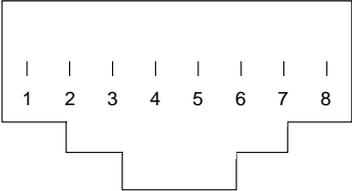
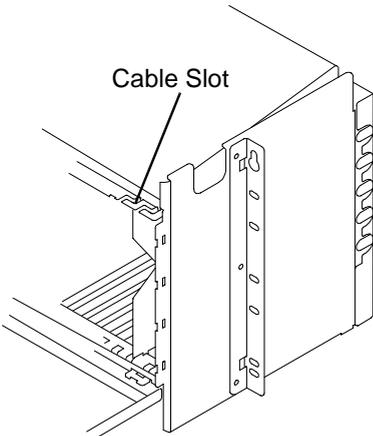
STEP	PROCEDURE																																																												
7	<p>Strip the “transmit” and “receive” 4xDS-1 cables and terminate RJ-45 plugs onto both cables using a crimp tool. RJ-45 pin outs are provided in the following figures.</p> <div style="text-align: center;">  </div> <p>Figure 4-4: RJ-45 Plug (viewed from the open end of the plug)</p> <div style="display: flex; justify-content: space-around;"> <table border="1"> <thead> <tr> <th colspan="3">LSMT1 TRANSMIT</th> </tr> <tr> <th>RJ-45 Pin #</th> <th>Cable Wire</th> <th>Wire Color</th> </tr> </thead> <tbody> <tr><td>1</td><td>Ring: Line 1</td><td>Blue/White</td></tr> <tr><td>2</td><td>Tip: Line 1</td><td>White/Blue</td></tr> <tr><td>3</td><td>Ring: Line 2</td><td>Orange/White</td></tr> <tr><td>4</td><td>Tip: Line 2</td><td>White/Orange</td></tr> <tr><td>5</td><td>Ring: Line 3</td><td>Green/White</td></tr> <tr><td>6</td><td>Tip: Line 3</td><td>White/Green</td></tr> <tr><td>7</td><td>Ring: Line 4</td><td>Brown/White</td></tr> <tr><td>8</td><td>Tip: Line 4</td><td>White/Brown</td></tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="3">LSMT1 RECEIVE</th> </tr> <tr> <th>RJ-45 Pin #</th> <th>Cable Wire</th> <th>Wire Color</th> </tr> </thead> <tbody> <tr><td>1</td><td>Ring: Line 1</td><td>Blue/White</td></tr> <tr><td>2</td><td>Tip: Line 1</td><td>White/Blue</td></tr> <tr><td>3</td><td>Ring: Line 2</td><td>Orange/White</td></tr> <tr><td>4</td><td>Tip: Line 2</td><td>White/Orange</td></tr> <tr><td>5</td><td>Ring: Line 3</td><td>Green/White</td></tr> <tr><td>6</td><td>Tip: Line 3</td><td>White/Green</td></tr> <tr><td>7</td><td>Ring: Line 4</td><td>Brown/White</td></tr> <tr><td>8</td><td>Tip: Line 4</td><td>White/Brown</td></tr> </tbody> </table> </div> <p>Figure 4-5: RJ-45 T1 “Transmit” and “Receive” Pin Outs</p>	LSMT1 TRANSMIT			RJ-45 Pin #	Cable Wire	Wire Color	1	Ring: Line 1	Blue/White	2	Tip: Line 1	White/Blue	3	Ring: Line 2	Orange/White	4	Tip: Line 2	White/Orange	5	Ring: Line 3	Green/White	6	Tip: Line 3	White/Green	7	Ring: Line 4	Brown/White	8	Tip: Line 4	White/Brown	LSMT1 RECEIVE			RJ-45 Pin #	Cable Wire	Wire Color	1	Ring: Line 1	Blue/White	2	Tip: Line 1	White/Blue	3	Ring: Line 2	Orange/White	4	Tip: Line 2	White/Orange	5	Ring: Line 3	Green/White	6	Tip: Line 3	White/Green	7	Ring: Line 4	Brown/White	8	Tip: Line 4	White/Brown
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6	Tip: Line 3	White/Green																																																											
7	Ring: Line 4	Brown/White																																																											
8	Tip: Line 4	White/Brown																																																											
8	<p>Route the 4xDS-1 transmit and receive cables through the clip above slot 25 at the top of the remote LCS cage, and down to the slot.</p> <div style="text-align: center;">  </div> <p>Figure 4-6: LSM Cable Slot in the LCS</p>																																																												

Table 4-2: LSMT1 Card Cabling (continued)

STEP	PROCEDURE
<p><b>9</b></p>	<p>Connect the 4xDS-1 cables to the front of the LSMT1 card; connect the “transmit” cable to the back RJ-45 plug and the “receive” cable to the front RJ-45 plug. Push in on the connectors until they lock into position.</p> <div> </div> <p>Figure 4-7: LSMT1 Card “Transmit” and “Receive” Connectors</p>
<p><b>10</b></p>	<p>Properly ground the 4xDS-1 cables to the remote LCS, per local procedures.</p>
<p><b>11</b></p>	<p>Place an EMI filter ferrite as required for 4xDS-1 cables, per local procedures.</p>
<p><b>12</b></p>	<p>Dress, tie and label cables.</p>
<p><b>13</b></p>	<p>The <b>LSMT1 Card Cabling</b> procedure is complete.</p>

## Chapter 3 LSMT3 Card Cabling

---

**Introduction** The Master Control Shelf (MCS) can communicate with remote Line Card Shelves (LCS) over a DS-3 interface. The Line Card Multiplexer (LSMT3) card at the remote LCS site communicates via a DS-3 signal over coax cable to a Master Line Adapter (MLAT3) card in the MCS.

This chapter provides detailed instructions on how to connect DS-3 coaxial cables to the LSMT3 card in the remote LCS.

---

### Required Equipment and Tools

To begin this task you must have the following equipment and tools (refer to Section 6—*Appendices*, Appendix H—“D50 Component Part Numbers”):

- (1) T3 coax cable stub with ferrite and grounding board, and with SMB connectors on one end and 75 ohm female BNC connectors on the other end.
- (1) coax cable stub grounding clip.
- WECO 728A equivalent coax cables (transmit and receive).
- (2) 75 ohm male BNC connectors.
- Coax cable cutters.
- Coax center crimp tool.
- Coax cable stripping tool.
- Coax crimp tool.

---

### LSMT3 Card Cabling

DS-3 “transmit” and “receive” coax cables connect to a DSX-3 cross connect panel and run to the LSMT3 card in the remote Line Card Shelf. Follow these steps to connect DS-3 coax cables to the faceplate of the LSMT3 card.

**Note:** The LSMT3 card connects to a corresponding MLAT3 card in a D50 Master Control Shelf (MCS).

Table 4-3: LSMT3 Card Cabling

STEP	PROCEDURE
1	Refer to Section 1— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures” in this volume to do the following: <ul style="list-style-type: none"> <li>■ Attach a properly grounded ESD strap (important!).</li> <li>■ Locate the LCS cable ports.</li> <li>■ Remove and replace the LCS front panel.</li> </ul>
2	Terminate the “transmit” and “receive” coax cables at the DSX-3 cross connect panel, following local procedures.

Table 4-3: LSMT3 Card Cabling (continued)

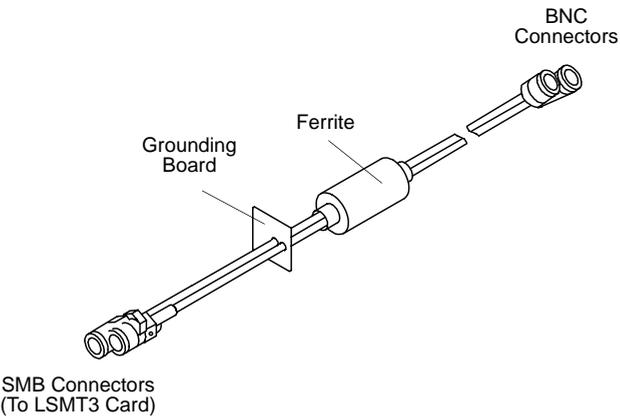
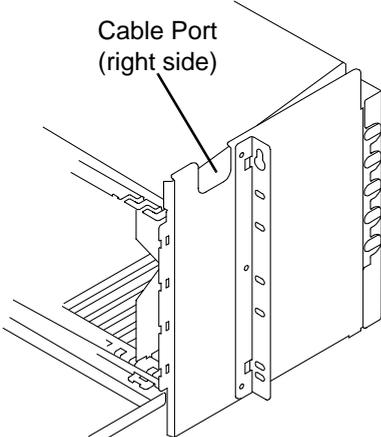
STEP	PROCEDURE
3	Route the cables from the cross connect panel to the remote LCS.
4	Cut the cables to the correct length.
5	Strip and terminate the male BNC connectors onto the cables using the coax stripping tool and crimp tool.
6	<p>Connect the cables to the “transmit” and “receive” female BNC connectors on the T3 coax cable stub.</p>  <p style="text-align: center;">Figure 4-8: T3 Coax Cable Stub</p>
7	<p>Push the coax cable stub through one of the large cable ports on the top right or left side of the remote LCS, following local procedures.</p>  <p style="text-align: center;">Figure 4-9: LSMT3 Cable Port in the LCS</p>
8	Pull the coax cable stub from the side of the remote LCS to the front.

Table 4-3: LSMT3 Card Cabling (continued)

STEP	PROCEDURE
<p><b>9</b></p>	<p>Route the coax cable stub through the clip above slot 25 at the top of the remote LCS cage, and down to the slot.</p> <div> <p>The diagram shows a perspective view of an LCS cage. A coax cable stub is shown entering from the top left, passing through a small clip-like structure above a slot labeled 'Cable Slot'. The cable then runs down the length of the cage. The cage has several other slots visible along its side.</p> </div> <p style="text-align: center;">Figure 4-10: LSMT3 Cable Slot in the LCS</p>
<p><b>10</b></p>	<p>Connect the coax cable stub to the front of the LSMT3 card: connect the “transmit” cable to the back SMB connector, and the “receive” cable to the front SMB connector. Push in on the connectors until they lock into position.</p> <div> <p>The diagram shows a perspective view of the front of an LSMT3 card. Two SMB connectors are visible on the front edge. The one on the left is labeled 'Transmit' and the one on the right is labeled 'Receive'. Below these connectors, there are four indicator lights labeled 'FAIL', 'ENABLE', 'ACT', and 'ALARM' from top to bottom.</p> </div> <p style="text-align: center;">Figure 4-11: LSMT3 Card “Transmit” and “Receive” Connectors</p>

Table 4-3: LSMT3 Card Cabling (continued)

STEP	PROCEDURE
11	<p>A grounding clip is required to properly ground the coax cable stub.</p> <div> <p>The diagram shows a 3D perspective of a U-shaped grounding clip. One end of the clip has a small, curved protrusion labeled 'Front Hook (slides over MCS upper guide plate)'. The rest of the clip is a flat, rectangular band.</p> </div> <p style="text-align: center;">Figure 4-12: Grounding Clip</p> <p>Slide the grounding clip onto the LCS upper guide plate over the cable grounding board, as shown.</p> <p><b>Note:</b> The grounding board must go between the LCS upper guide plate and the grounding clip.</p> <div> <p>This diagram illustrates the assembly of the grounding clip. A rectangular 'Grounding Board' is positioned between the 'LCS Upper Guide Plate' and the 'Grounding Clip'. Two coaxial cables are shown: one passing through a hole in the board and clip, labeled 'to coax cables', and another passing through a hole in the clip, labeled 'to LSMT3 card'. The clip is shown being pushed onto the LCS upper guide plate.</p> </div> <p style="text-align: center;">Figure 4-13: Grounding Clip on LCS Upper Guide Plate</p>
12	Dress, tie and label cables following local procedures.
13	The <b>LSMT3 Card Cabling</b> procedure is complete.

## Chapter 4

### Remote Craft Access Unit Installation and Cabling

---

#### Introduction

The Remote Craft Access Unit (RCAU), which installs in slot 26 in a remote LCS, has two primary functions: remote craft access and alarm reporting.

Remote Craft Access lets a technician:

- Connect a Craft Terminal PC laptop directly to the LCS through the RCAU serial port connection.
- Open a communication channel between the remote LCS and the D50's NMP (Network Management Processor) card to provide remote access to management functions.
- Commission line cards and line card shelf multiplexer (LSM) cards at a remote LCS.
- Provision and monitor DSL lines remotely.
- Troubleshoot problems at a remote LCS.

Alarm reporting allows:

- Users to set up four external alarms at the remote site, through cable connections between the RCAU and the remote site.
- Direct reporting of alarm information back to the central office via the MCS, where up to four alarms are viewable in Craft Terminal.

This chapter will describe how to:

- Install the RCAU.
- Set up the Remote Craft Access PC interface with the RCAU.
- Make the RCAU alarm cable connections.

For instructions on setting up Remote Craft Access at the D50 RAM (Remote Access Module), refer to the volume titled Installation, Section 8—*D50 RAM*, Chapter 8—“D50 RAM Remote Craft Access.”

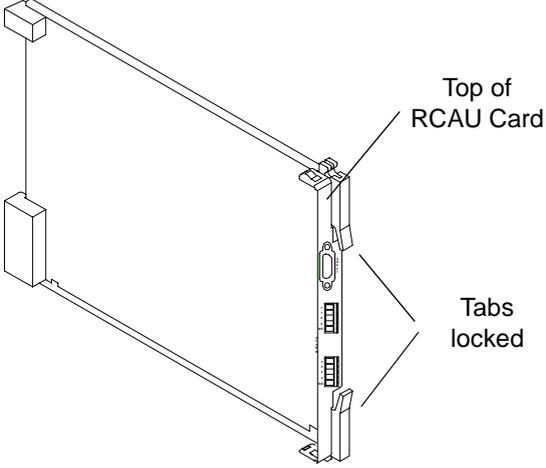
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Table 4-4: Installing the RCAU (continued)

STEP	PROCEDURE
<p><b>3</b></p>	<p>Flip and hold the locking tabs (located on the outside edge of the card) into their up and unlocked position.</p> <div> <p>The diagram shows a perspective view of a Remote Craft Access Unit (RCAU) card. Two locking tabs are visible on the left side of the card, both of which are flipped upwards. A label 'Tabs unlocked' with a pointer indicates the position of these tabs. The card is shown partially inserted into a vertical backplane slot.</p> </div> <p>Figure 4-15: RCAU with Locking Tabs in the Unlocked Position</p>
<p><b>4</b></p>	<p>Slide the unit in its guide (slot #26) until it plugs into the backplane connector. The RCAU is “keyed” so it will only plug into its correct position on the backplane.</p> <p><b>Important! DO NOT force the RCAU into position. If the unit does not plug in easily, slide it back out and verify you are placing it in the correct position and that the guides are aligned. Check for any obstructions or bent pins on the connectors that might prevent the unit from sliding easily into place.</b></p>

Table 4-4: Installing the RCAU (continued)

STEP	PROCEDURE
5	<p>Flip the locking tabs down until you hear an audible “click.” The “click” indicates the unit is locked into position.</p> <div><p>The diagram shows a vertical RCAU card with two locking tabs on its right side. The top tab is labeled 'Top of RCAU Card' and the bottom tab is labeled 'Tabs locked'. The tabs are shown in a downward position, indicating they are locked. The RCAU card is connected to a horizontal cable that runs across the top of the frame.</p></div> <p>Figure 4-16: RCAU with Locking Tabs in the Locked Position</p>
6	<p>The <b>Installing the RCAU</b> procedure is complete.</p>

**Setting Up the PC Interface to the RCAU**

**Craft Terminal Reference Documents.** This procedure assumes you have reviewed the volume titled Craft Terminal. Refer to this manual as necessary while completing this procedure.

**Craft Terminal On-Line Help.** Craft Terminal has Windows NT or Windows 2000 and Craft Terminal application help available via the Help menu.

This procedure provides detailed instructions on how to set up a Craft Terminal PC laptop interface to the RCAU in a remote LCS.

Table 4-5: Setting Up the PC Interface to the RCAU

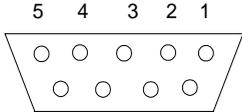
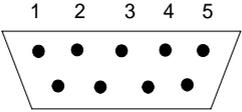
STEP	PROCEDURE
1	Install Windows NT or Windows 2000 <sup>1</sup> according to the manufacturer's instructions.  <b>Note:</b> If Windows NT or Windows 2000, Windows support services, and Craft Terminal have already been installed, proceed to Step 4.
2	Install and configure Windows support services: Serial Port, Modem, Remote Access Services (RAS), Simple Network Management Protocol (SNMP), and Dial-up Networking following the instructions in the volume titled <u>Craft Terminal</u> , Section 1— <i>Overview and Installation</i> , Chapter 1—“Craft Terminal Overview.”
3	Install Craft Terminal software following the instructions in the volume titled <u>Craft Terminal</u> , Section 1— <i>Overview and Installation</i> , Chapter 6—“Installing/Removing Craft Terminal Software.”  <b>Important! Windows NT service packs that were previously installed will need to be reinstalled at this point.</b>
4	Connect the serial port cable to your PC's 9-pin or 25-pin serial port connector.  <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Female (to PC or laptop)</p> </div> <div style="text-align: center;">  <p>Male (to RCAU Card)</p> </div> </div> <p style="text-align: center;">Figure 4-17: DB-9 Connector Pin-outs</p>

Table 4-5: Setting Up the PC Interface to the RCAU (continued)

STEP	PROCEDURE
<p><b>5</b></p>	<p>Connect the other end of the serial port cable to the craft interface serial port connector on the RCAU.</p> <div> </div> <p style="text-align: center;">Figure 4-18: RCAU Craft Interface Serial Port</p>
<p><b>6</b></p>	<p>The Remote Craft Access feature must be enabled in the Master Control Shelf (MCS) using Craft Terminal. Refer to Section 5—<i>Commissioning</i>, Chapter 2—“Using Craft Terminal for Commissioning,” <b>Establish Communication with the D50</b>, page 5-23.</p>
<p><b>7</b></p>	<p>The <b>Setting Up the PC Interface to the RCAU</b> procedure is complete.</p>

<sup>1</sup> As of Release 8.0, Windows 2000 can be used for the Craft Terminal application.

**Required Equipment and Tools**

To begin this task you must have the following equipment and tools:

- (1–2) Unshielded Twisted Pair (UTP) cables (26–28 gauge).
- **Note:** Each cable should have at least four wires (two twisted pairs). Each two alarms require one dedicated UTP cable.
- (1–2) Five-position 3.5 mm pitch pluggable terminal blocks (included with RCAU).
- (4) Plastic tie wraps.

**RCAU Cable Connections – Alarms 1 and 2**

Follow these steps to:

- Connect one UTP cable to a five-position 3.5 mm pitch pluggable terminal block.
- Plug the terminal block into a five-pin port on the front of the RCAU.

**Note:** The RCAU supports up to four external alarms. Each two alarms require a separate UTP cable. One pluggable terminal block supports one UTP cable. If three or four alarms are installed, a second pluggable terminal block and a second UTP cable are required. The RCAU has two five-pin ports to support up to two pluggable terminal blocks.

Table 4-6: RCAU Cable Connections—Alarms “1” and “2”

STEP	PROCEDURE
1	Refer to Section 1— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures” in this volume to do the following: <ul style="list-style-type: none"> <li>■ Attach a properly grounded ESD strap (important!).</li> <li>■ Remove and replace the LCS front panel.</li> </ul>
2	Split one end of a UTP cable into two separate twisted pairs, and terminate the two pairs at two site alarms, according to local procedures.
3	Using wire cutters, strip back insulation on the four wires at the other end of the same UTP cable by 1/4 inch (6 mm). Two of the wires will be used for Alarm “1,” two for Alarm “2.” <p><b>Note:</b> If you require just one site alarm, you will use just two of the four wires.</p>

Table 4-6: RCAU Cable Connections—Alarms “1” and “2” (continued)

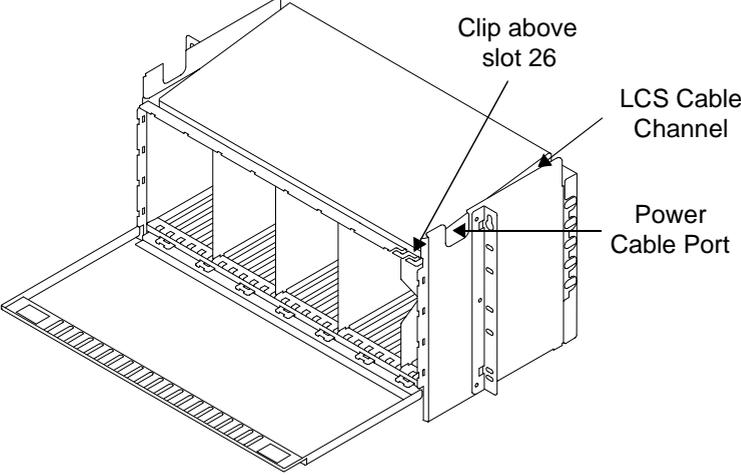
STEP	PROCEDURE
<p><b>4</b></p>	<p>Route the cable through the Power Cable Port on the right side of the LCS. Then route the cable through the metal clip above LCS slot 26 and down to the RCAU card.</p>  <p style="text-align: center;">Figure 4-19: LCS with Clip Above Slot 26</p>
<p><b>5</b></p>	<p>Place one plastic tie wrap around the cable directly above the metal clip, and a second plastic tie wrap around the cable directly below the metal clip. Tighten the tie wraps. The tie wraps provide strain relief and keep the cable from moving up or down.</p> <p><b>Note:</b> If you using more than two site alarms, <u>do not</u> tighten the tie wraps. You will need to secure a second cable above and below the metal clip when you do the routing for Alarms “3” and “4.”</p>

Table 4-6: RCAU Cable Connections—Alarms “1” and “2” (continued)

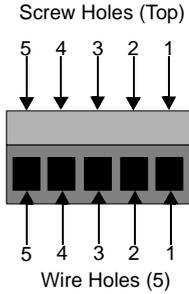
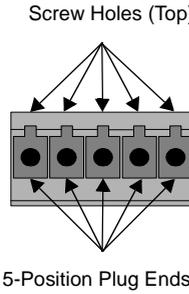
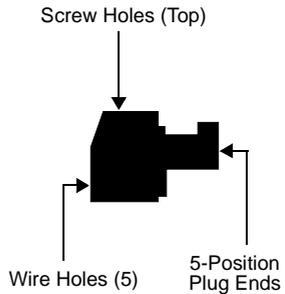
STEP	PROCEDURE
<p><b>6</b></p>	<p>Insert two of the wires from the UTP cable into Positions 1 and 2 in a five-position 3.5 mm pitch pluggable terminal block, then insert the other two wires into Positions 3 and 4 of the same pluggable terminal block, as shown in the <u>back view</u> below.</p> <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  <p>Screw Holes (Top)</p> <p>5 4 3 2 1</p> <p>5 4 3 2 1</p> <p>Wire Holes (5)</p> <p><b>BACK VIEW</b></p> </div> <div style="text-align: center;">  <p>Screw Holes (Top)</p> <p>5-Position Plug Ends</p> <p><b>FRONT VIEW</b></p> </div> <div style="text-align: center;">  <p>Screw Holes (Top)</p> <p>Wire Holes (5)</p> <p>5-Position Plug Ends</p> <p><b>SIDE VIEW</b></p> </div> </div> <p>Figure 4-20: 5-Position 3.5 mm Pitch Pluggable Terminal Block</p>
<p><b>7</b></p>	<p>Tighten the four screws on the terminal block until a good connection is made with the wires. <u>Do not</u> exceed 4.5 inch pound (0.5 N.m) torque.</p>
<p><b>8</b></p>	<p>Place a third plastic tie wrap around the <u>insulated</u> section of the UTP cable at the pluggable terminal block, and secure the end of the tie wrap in Position 5 of the block. The third tie wrap also provides strain relief and secures the cable to the terminal block.</p>

Table 4-6: RCAU Cable Connections—Alarms “1” and “2” (continued)

STEP	PROCEDURE
<p><b>9</b></p>	<p>Plug the terminal block into the five-pin Alarm “1” and “2” port on the RCAU card.</p> <div> </div> <p style="text-align: center;">Figure 4-21: RCAU Alarm Ports 1–4</p>
<p><b>10</b></p>	<p>The <b>RCAU Cable Connections – Alarms 1 and 2</b> procedure is complete. Continue to the next procedure, <b>RCAU Cable Connections – Alarms 3 and 4</b> if you are installing more than two alarms.</p>

**RCAU Cable Connections – Alarms 3 and 4**

Follow these steps to make RCAU cable connections for Alarms “3” and “4.”

Table 4-7: RCAU Alarm “3” and “4” Cable Connections

STEP	PROCEDURE
1	<p>Refer to Section 1—<i>Basic Procedures</i>, Chapter 1—“Basic Procedures” in this volume to do the following:</p> <ul style="list-style-type: none"> <li>■ Attach a properly grounded ESD strap (important!).</li> <li>■ Remove the LCS front panel.</li> </ul>
2	<p>Split one end of a second UTP cable into two separate twisted pairs, and terminate the two pairs at two site alarms, according to local procedures.</p>
3	<p>Using wire cutters, strip back insulation on the four wires at the other end of the same UTP cable by 1/4 inch (6 mm). Two of the wires will be used for Alarm “3,” two for Alarm “4.”</p> <p><b>Note:</b> If you require just three external alarms, you will use just two of the four wires.</p>
4	<p>Route the cable through the Power Cable Port on the right side of the LCS.</p> <div style="text-align: right;"> </div> <p style="text-align: center;">Figure 4-22: LCS with Clip Above Slot 26</p>
5	<p>Route the cable through the metal clip above LCS slot 26 and down to the RCAU card.</p> <p><b>Note:</b> When routing the cable through the metal clip, be sure to also route it through the same two plastic tie wraps (directly above and below the metal clip) that the cable for Alarms “1” and “2” is routed through. Then tighten both tie wraps. The tie wraps provide strain relief, and prevent the cables from moving up or down.</p>

Table 4-7: RCAU Alarm “3” and “4” Cable Connections (continued)

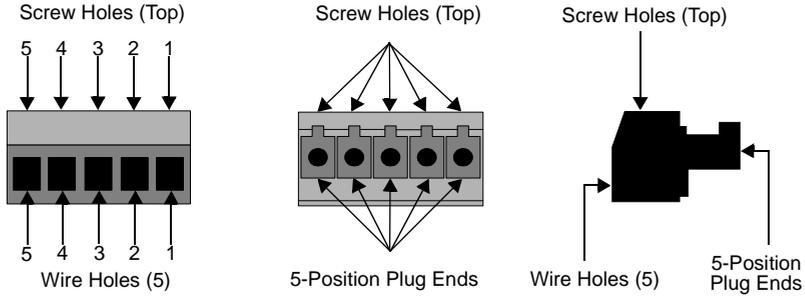
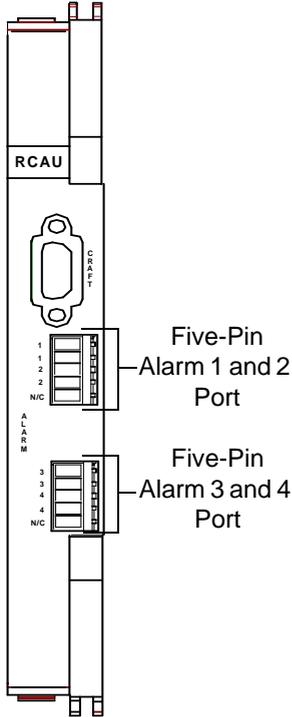
STEP	PROCEDURE
<p><b>6</b></p>	<p>Insert two of the wires from the second UTP cable into Positions 1 and 2 in a second five-position 3.5 mm pitch pluggable terminal block, then insert the other two wires into Positions 3 and 4 of the same pluggable terminal block, as shown in the <u>back view</u> below.</p>  <p style="text-align: center;"><b>BACK VIEW                      FRONT VIEW                      SIDE VIEW</b></p> <p style="text-align: center;">Figure 4-23: 5-Position 3.5 mm Pitch Terminal Block</p>
<p><b>7</b></p>	<p>Tighten the four screws on the terminal block until a good connection is made with the wires. <u>Do not</u> exceed 4.5 inch pound (0.5 N.m) torque.</p>
<p><b>8</b></p>	<p>Place a third plastic tie wrap around the <u>insulated</u> section of the second UTP cable at the pluggable terminal block, and secure the end of the tie wrap in Position 5 of the block. The tie wrap provides strain relief and secures the cable to the terminal block.</p>

Table 4-7: RCAU Alarm “3” and “4” Cable Connections (continued)

STEP	PROCEDURE
<p><b>9</b></p>	<p>Plug the terminal block into the five-pin Alarm “3” and “4” port on the RCAU card.</p>  <p>The diagram shows a vertical RCAU card. At the top, there are two small red and white connectors. Below them is a rectangular section labeled 'RCAU'. Underneath is a circular component with a central opening. Below that are two five-pin terminal blocks. The upper terminal block is labeled 'Five-Pin Alarm 1 and 2 Port' and has pins numbered 1, 2, 3, 4, and 5. The lower terminal block is labeled 'Five-Pin Alarm 3 and 4 Port' and has pins numbered 3, 4, and 5, with 'NIC' written below the 5 pin. To the left of the terminal blocks, the text 'E2321A' is printed vertically.</p>
<p><b>10</b></p>	<p>The <b>RCAU Cable Connections – Alarms 3 and 4</b> procedure is complete.</p>



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## SECTION 5 COMMISSIONING

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# Chapter 1

## Power Up and Visual Status Check

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**Introduction** The D50 installation, cabling and card placement procedures are now complete. This chapter provides detailed instructions on how to commission the D50 and determine its operational condition.

---

**Required Equipment and Tools** To begin this task you must have the following equipment and tools (refer to Section 6—*Appendices*, Appendix H—“D50 Component Part Numbers”)

- (4) to (10) 15 amp GMT fuses, two for the MCS and two for each LCS (up to four total).

---

**Power Up the D50** Follow these steps to “power up” the D50:

Table 5-1: Power Up the D50

STEP	PROCEDURE
1	Refer to Section 1— <i>Basic Procedures</i> , Chapter 1—“Basic Procedures” in this volume to do the following: <ul style="list-style-type: none"><li>■ Attach a properly grounded ESD strap (important!).</li><li>■ Remove and replace the MCS front panel.</li></ul> <b>Important!</b> Remove and replace the LCS front panel.

Table 5-1: Power Up the D50 (continued)

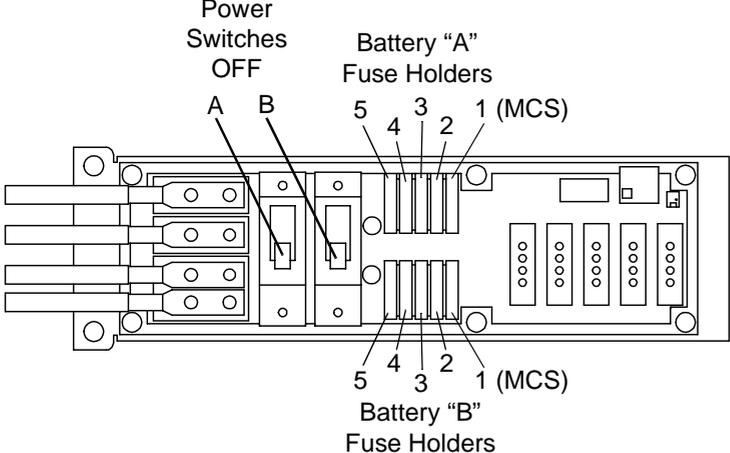
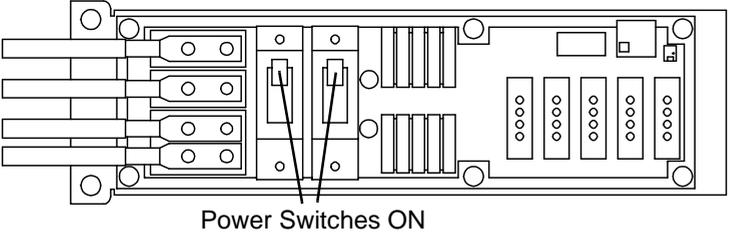
STEP	PROCEDURE
<p><b>2</b></p>	<p><b>Important! At the Master Control Shelf CSIP Power and Distribution Board<sup>1</sup>, check to make sure the “A” and “B” power switches are set in the “OFF” or “Down” position.</b></p>  <p style="text-align: center;">Figure 5-1: CSIP Power Switches and Fuse Holders</p>
<p><b>3</b></p>	<p>The CSIP has battery “A” and battery “B” fuse holders for the first five shelves in the D50 (one MCS and up to four LCSs). Fuse holders are set up as follows:</p> <ul style="list-style-type: none"> <li>■ Fuse 1: Master Control Shelf.</li> <li>■ Fuses 2–5: Line Card Shelves 1 through 4.</li> </ul> <p>Install the 15 amp GMT fuses that are shipped with the Master Control Shelf and Line Card Shelves. Install fuses with the metal “tang” down. Be sure to install the required fuses for both power feeds.</p> <p><b>Important! Only place fuses for the MCS and installed LCSs. <u>DO NOT</u> place fuses in all fuse holder positions unless you are installing an MCS and four LCSs.</b></p>
<p><b>4</b></p>	<p>Set the “A” and “B” power switches to the “ON” or “Up” position.</p>  <p style="text-align: center;">Figure 5-2: CSIP Power Switches in the “ON” Position</p>

Table 5-1: Power Up the D50 (continued)

STEP	PROCEDURE
5	The time required for the D50 to boot up will vary based on the size of the system: the MCS (including the MTU <sup>2</sup> , NMP, MCP, trunk, MLA, and broadband cards) takes several minutes to boot up. Each LCS (including the LSM and line cards) requires several more minutes to boot up.
6	The <b>Power Up the D50</b> procedure is complete. Continue to the next procedure, <b>Indicator Lights</b> .

<sup>1</sup> The CSIP Power and Distribution Board will be referred to as the CSIP throughout this procedure.

<sup>2</sup> The optional MTU (Master Timing Unit) cards are installed in MCS slots 1 and 2. Two MTU cards are required for 1:1 unit protection. MTU cards provide a physical interface with external timing input.

**Indicator Lights**

While the D50 is going through the boot-up process, a number of different indicator lights will come on and off. The following procedure explains what these lights indicate and any recommended action.

Table 5-2: Indicator Lights

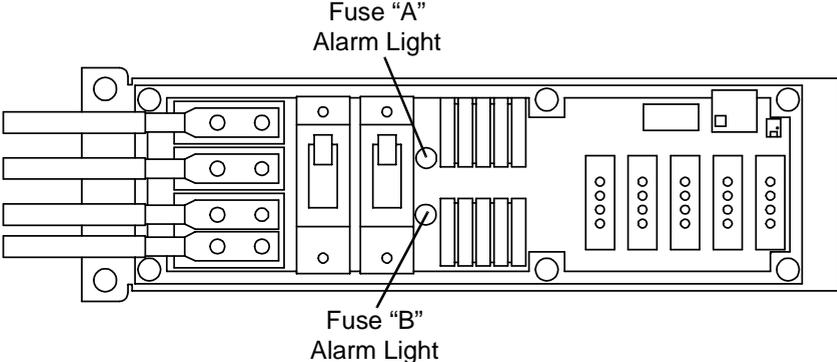
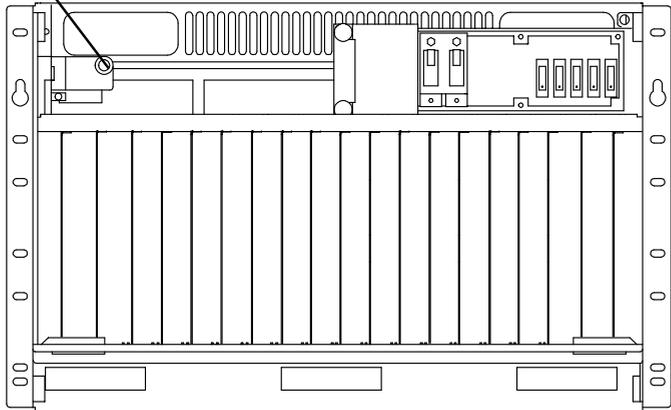
STEP	PROCEDURE
1	<p>Check the CSIP “A” and “B” fuse alarm indicator lights. The alarm lights are located to the left of the fuse holders.</p>  <p>Figure 5-3: CSIP Fuse “A” and “B” Alarm Indicator Lights</p>
2	<p>Is a Fuse Alarm indicator light on?</p> <ul style="list-style-type: none"> <li>■ If YES, replace the blown fuse. A blown fuse is indicated by an exposed colored tip on the metal “tang.”</li> <li>■ If NO, all fuses are good. Continue to Step 3.</li> </ul>

Table 5-2: Indicator Lights (continued)

STEP	PROCEDURE
<p><b>3</b></p>	<p>The Bay Alarm indicator light is located in the upper left of the Master Control Shelf. It will stay on until the D50 Master Control Processor (MCP) card completes its initialization process; this takes several minutes.</p> <p style="text-align: center;">Bay Alarm Indicator Light</p>  <p style="text-align: center;">Figure 5-4: Bay Alarm Indicator Light</p>
<p><b>4</b></p>	<p>The front panel of each card in the MCS and LCSs has LED indicator lights. These lights come on solid during power-up and then go through a sequence of flashing on and off during initialization. All “FAIL” and “ALM” indicator lights go out, and the “ENABL” indicator lights flash on and off in 2 second intervals, until connections are made on the card ports and the cards and ports are unlocked.</p> <p>The Bay Alarm indicator light will go off once the green “ENABL” lights come on.</p> <p>The following procedure, <b>D50—Visual Status Check</b> provides more detail on LED indicator lights.</p>

**D50—Visual Status Check**

The front panel of each card in the MCS and the LCSs has LED indicator lights. The purpose of these LEDs is to provide limited information and conditions about the D50.

Visual Status Check procedures for each MCS and LCS card begin on the next page. Some of the Visual Status Check procedures require the use of Craft Terminal<sup>1</sup> to check the conditions for a particular card. Refer to Chapter 2—“Using Craft Terminal for Commissioning” in this volume, and refer to the volume titled Craft Terminal.

Front Panel LED indicators for each MCS and LCS card are defined in Appendix C—“Card Front Panel LED Indicators” in this volume.

**Important! The D50 takes several minutes to boot up. Make sure you wait until this initialization process is complete before proceeding with the visual status check.**

**“FAIL” Indicator.** Follow these steps to visually check the status of all the following cards:

- Master Control Shelf cards:
  - NMP.
  - MCP.
  - Trunk cards: DS3T/DS3T2/DS3TQ and OC3T/OC3T2/OC3T2L/OC3T2M/OC3TQS/OC3TQM/OC3TQL.
  - MLA cards: MLA2, MLA2S, MLA2L, MLAT1, and MLAT3.
  - Broadband tributary cards: OC3L and DS3L.
- Line Card Shelf cards:
  - LSM cards: LSM2, LSM2S, LSM2L, LSMT1, and LSMT3.
  - Line cards: DS1, DMT8a-3, DMT8a-4, SDSL8, SDSL8+, SHDSL8, and IDSL8.

Table 5-3: “FAIL” Indicator

STEP	PROCEDURE
1	Is the <u>red</u> “FAIL” indicator light OFF? <ul style="list-style-type: none"> <li>■ If YES, the card is functional. Continue to the next procedure: <b>“ENABL” Indicator.</b></li> <li>■ If NO, continue to Step 2.</li> </ul>
2	Is the <u>red</u> “FAIL” indicator light steady ON? <ul style="list-style-type: none"> <li>■ If YES, use Craft Terminal to check the condition of the card. See Chapter 2—“Using Craft Terminal for Commissioning.” Follow the recommended action listed in Appendix F—“Conditions and Recommended Actions” in this volume.</li> <li>■ If NO, continue to Step 3.</li> </ul>

<sup>1</sup> A lower version of Craft Terminal (Release 10.0 and lower) can be loaded on the same platform with Craft Terminal Release 11.0 to manage a previous release of D50 system software. The lower version of Craft Terminal must be loaded into a different directory from the Craft Terminal Release 11.0 software.

Table 5-3: “FAIL” Indicator (continued)

STEP	PROCEDURE
3	<p>Is the red “FAIL” indicator light FLASHING?</p> <ul style="list-style-type: none"> <li>■ If YES, and it is flashing on and off at ½ second intervals, then either the card’s software is newer than that of the active MCP, or the slot is provisioned for a different card (e.g., a DMT8a-3 card is in a slot provisioned for an SDSL8+ card). Use Craft Terminal to check the condition of the card. See Chapter 2—“Using Craft Terminal for Commissioning.” Follow the recommended action listed in Appendix F—“Conditions and Recommended Actions” in this volume.</li> </ul> <p><b>Note:</b> The “FAIL” indicator light will flash on and off at 2 second intervals during download of a new code.</p> <p>Continue to the next procedure: <b>“ENABL” Indicator.</b></p>

**“ENABL” Indicator.** Follow these steps to visually check the status of the following cards:

- Master Control Shelf cards:
  - NMP.
  - MCP.
  - Trunk cards: DS3T/DS3T2/DS3TQ and OC3T/OC3T2/OC3T2L/OC3T2M/OC3TQS/OC3TQM/OC3TQL.
  - MLA cards: MLA2, MLA2S, MLA2L, MLAT1, and MLAT3.
  - Broadband tributary cards: OC3L and DS3L.

- Line Card Shelf cards:
  - LSM cards: LSM2, LSM2S, LSM2L, LSMT1, and LSMT3.
  - Line cards: DS1, DMT8a-3, DMT8a-4, SDSL8, SDSL8+, SHDSL8, and IDSL8.

Table 5-4: “ENABL” Indicator

STEP	PROCEDURE
<b>1</b>	<p>Is the <u>green</u> “ENABL” indicator light steady ON?</p> <ul style="list-style-type: none"> <li>■ If YES, this card has initialized all its hardware and software, the card is “unlocked,” and it is providing or can provide service. Do not unplug this card. Continue to one of the following procedures:               <ul style="list-style-type: none"> <li>– For the NMP card: STOP; there are no additional LEDs to check.</li> <li>– For the MCP card, all trunk cards or all LSM cards: <b>“ACT” Indicator</b>, page 5-9.</li> <li>– For all MLA, LSM, and broadband tributary cards: <b>“ALM” Indicator—Trunk, MLA, Broadband, and LSM Cards</b>, page 5-10.</li> <li>– For line cards: <b>“ALM” Indicator—Line Cards</b>, page 5-11.</li> </ul> </li> <li>■ If NO, continue to Step 2.</li> </ul>
<b>2</b>	<p>Is the <u>green</u> “ENABL” indicator light FLASHING?</p> <ul style="list-style-type: none"> <li>■ If YES, the card is initializing.               <ul style="list-style-type: none"> <li>– The “ENABL” indicator light will flash on and off at 1 second intervals while the boot code is loading.</li> <li>– The “ENABL” indicator light will flash on and off at ½ second intervals while the operational system is loading. Wait approximately 1 to 2 minutes for this process to be completed and for the light to begin flashing on and off in 2 second intervals.</li> <li>– The “ENABL” indicator light will continue to flash on and off at 2 second intervals until the cards are “unlocked.” Follow the procedure in Chapter 2—“Using Craft Terminal for Commissioning” to “unlock” cards.</li> </ul> </li> <li>■ If NO, continue to Step 3.</li> </ul>
<b>3</b>	<p>Is the card an MCP or trunk card?</p> <ul style="list-style-type: none"> <li>■ If YES, the card is in “hot” standby status and being updated with configuration information from the active card. The flashing will stop once the synchronization process is complete. Continue to Step 4.</li> <li>■ If NO, continue to Step 4.</li> </ul>

Table 5-4: “ENABL” Indicator (continued)

STEP	PROCEDURE
4	<p>Is the <u>green</u> “ENABL” indicator light OFF?</p> <ul style="list-style-type: none"><li>■ If YES, the card is not providing service, this may indicate a failure. See Chapter 2—“Using Craft Terminal for Commissioning.” Follow the recommended action listed in Appendix F—“Conditions and Recommended Actions” in this volume. Continue to Step 5.</li><li>■ If NO, continue to Step 5.</li></ul>
5	<p>Continue to one of the following procedures:</p> <ul style="list-style-type: none"><li>■ For MCP, trunk cards, and all LSM cards: <b>“ACT” Indicator</b>, page 5-9.</li><li>■ For MLA cards: <b>“ALM” Indicator—Trunk, MLA, Broadband, and LSM Cards</b>, page 5-10.</li><li>■ For broadband cards: <b>“ALM” Indicator—Trunk, MLA, Broadband, and LSM Cards</b>, page 5-10.</li><li>■ For line cards: <b>“ALM” Indicator—Line Cards</b>, page 5-11.</li></ul>

**“ACT” Indicator.** Follow these steps to visually check the status of the following cards:

- Master Control Shelf cards:
  - MCP.
  - Trunk cards: DS3T/DS3T2/DS3TQ and OC3T/OC3T2/OC3T2L/OC3T2M/OC3TQS/OC3TQM/OC3TQL.
- Line Card Shelf cards:
  - LSM cards: LSM2, LSM2S, LSM2L, LSMT1, and LSMT3.

Table 5-5: “ACT” Indicator

STEP	PROCEDURE
1	<p>Is the <u>yellow</u> “ACT” indicator light steady ON?</p> <ul style="list-style-type: none"> <li>■ If YES, the card is the “active” card of a protection pair and is providing or can provide service. DO NOT unplug this card. Continue to the next procedure: <b>“ALM” Indicator—Trunk, MLA, Broadband, and LSM Cards.</b></li> <li>■ If NO, continue to Step 2.</li> </ul>
2	<p>Is the <u>yellow</u> “ACT” indicator light OFF?</p> <ul style="list-style-type: none"> <li>■ If YES, the protection card is synchronized with the active card and in “standby” status, normal status for the protection card. Continue to the next procedure: <b>“ALM” Indicator—Trunk, MLA, Broadband, and LSM Cards.</b></li> <li>■ If NO, continue to Step 3.</li> </ul>
3	<p>Is the <u>yellow</u> “ACT” indicator light FLASHING?</p> <ul style="list-style-type: none"> <li>■ If YES, the protection card is synchronizing itself with the active card and is not ready to take over operations. The card is in “hot” standby status. Wait approximately 3 minutes for the indicator light to stop flashing.           <ul style="list-style-type: none"> <li>– If the “ACT” light continues to flash, use Craft Terminal to check the condition of the card. See Chapter 2—“Using Craft Terminal for Commissioning.” Follow the recommended action listed in Appendix F—“Conditions and Recommended Actions” in this volume.</li> </ul> </li> </ul> <p>Continue to the next procedure: <b>“ALM” Indicator—Trunk, MLA, Broadband, and LSM Cards.</b></p>

**“ALM” Indicator—Trunk, MLA, Broadband, and LSM Cards.** Follow these steps to visually check the status of the following cards:

- Master Control Shelf cards:
  - Trunk cards: DS3T/DS3T2/DS3TQ and OC3T/OC3T2/OC3T2L/OC3T2M/OC3TQS/OC3TQM/OC3TQL.
  - MLA cards: MLA2, MLA2S, MLA2L, MLAT1, and MLAT3.
  - Broadband tributary cards: OC3L and DS3L.
- Line Card Shelf cards:
  - LSM cards: LSM2, LSM2S, LSM2L, LSMT1, and LSMT3.

Table 5-6: “ALM” Indicator—Trunk, MLA, Broadband, & LSM Cards

STEP	PROCEDURE
1	Is the <u>red</u> ALM indicator light ON? <ul style="list-style-type: none"> <li>■ If YES, continue to Step 2.</li> <li>■ If NO, continue to the next procedure: <b>“ALM” Indicator—Line Cards.</b></li> </ul>
2	Is the card a trunk card? <ul style="list-style-type: none"> <li>■ If YES, continue to Step 3.</li> <li>■ If NO, skip to Step 4.</li> </ul>
3	Is the trunk card connected to an ATM Network Element (router or ATM switch)? <ul style="list-style-type: none"> <li>■ If YES, verify the near end network equipment connection. Use Craft Terminal to verify that the network equipment is sending a signal. This may indicate a Loss of Signal (LOS) or Loss of Frame (LOF) problem. See Chapter 2—“Using Craft Terminal for Commissioning.” Follow the recommended action listed in Appendix F—“Conditions and Recommended Actions” in this volume.</li> <li>■ If NO, the ALM indicator light will remain ON until a network equipment connection is made.</li> </ul> <p><b>Important! The trunk card must be connected to a router or ATM switch to complete test and commissioning procedures.</b></p>
4	Is the card an MLA, broadband tributary or LSM card? <ul style="list-style-type: none"> <li>■ If YES, the fiber optic connections may be dirty, reversed or defective. Use Craft Terminal to check the condition of the card; this may indicate a loss of signal problem. See Chapter 2—“Using Craft Terminal for Commissioning.” Follow the recommended action listed in Appendix F—“Conditions and Recommended Actions” in this volume.</li> </ul> Continue to the next procedure: <b>“ALM” Indicator—Line Cards.</b>

**“ALM” Indicator—Line Cards.** Follow these steps to visually check the status of the following cards:

- Line Card Shelf cards:
  - Line cards: DS1, DMT8a-3, DMT8a-4, SDSL8, SDSL8+, SHDSL8, and IDSL8.

Table 5-7: “ALM” Indicator—Line Cards

STEP	PROCEDURE
1	<p>Is the <u>red</u> “ALM” indicator light ON?</p> <ul style="list-style-type: none"> <li>■ If YES, one or more of the ports configured for “managed service<sup>1</sup>” is unable to perform its function. It may mean a loss of synchronization or loss of signal. This is not an equipment failure, continue to Step 2.</li> <li>■ If NO, no alarm condition exists. Line card ports are either “locked” and not configured for service, or “unlocked” and providing service to end user equipment. Line cards themselves can also be locked or unlocked. Continue to the next procedure, <b>“SYNC” Indicator—Line Cards.</b></li> </ul>
2	<p>Use Craft Terminal to determine if the line card ports are connected to end user equipment and configured for service. See Chapter 2—“Using Craft Terminal for Commissioning.” Follow the recommended action listed in Appendix F—“Conditions and Recommended Actions” in this volume.</p> <p>Are the line card ports connected to end user equipment at the end of the local loop?</p> <ul style="list-style-type: none"> <li>■ If YES, continue to Step 3.</li> <li>■ If NO, use Craft Terminal to determine if line card ports are locked or unlocked. See Chapter 2—“Using Craft Terminal for Commissioning.” Follow the recommended action listed in Appendix F—“Conditions and Recommended Actions” in this volume. The ALM indicator light will remain ON if line card ports are unlocked and not connected to end user equipment. Continue to the next procedure: <b>“SYNC” Indicator—Line Cards.</b></li> </ul>

Table 5-7: “ALM” Indicator—Line Cards

STEP	PROCEDURE
3	<p>Use Craft Terminal to determine if the ports are “unlocked.” Are the ports unlocked?</p> <ul style="list-style-type: none"> <li>■ If YES, verify the far end network connection. Use Craft Terminal to verify that the end user’s equipment is sending a signal; this is a possible Loss of Signal (LOS), Loss of Power (LPR), or Loss of Frame (LOF) problem. See Chapter 2—“Using Craft Terminal for Commissioning.” Follow the recommended action listed in Appendix F—“Conditions and Recommended Actions” in this volume.</li> <li>■ End user equipment may be turned off—the ALM indicator light will remain ON until end user equipment is turned back on.</li> </ul> <p>Continue to the next procedure: <b>“SYNC” Indicator—Line Cards.</b></p>

<sup>1</sup> Will not generate an alarm event unless the service is provisioned for “managed service.” If the service is provisioned for “managed service” an alarm is generated.

**“SYNC” Indicator—Line Cards.** Follow these steps to visually check the status of the following cards:

- Line Card Shelf cards:
  - Line cards: DS1, DMT8a-3, DMT8a-4, SDSL8, SDSL8+, SHDSL8, and IDSL8.

Table 5-8: “SYNC” Indicator—Line Cards

STEP	PROCEDURE
1	<p>Is the <u>yellow</u> “SYNC” indicator light steady ON?</p> <ul style="list-style-type: none"> <li>■ If YES, the card is synchronized and one or more ports on this line card is connected to equipment on the other end of the local loop. This card may be providing service, <u>DO NOT</u> unplug this card. Continue to Step 4.</li> <li>■ If NO, continue to Step 2.</li> </ul>
2	<p>Is the <u>yellow</u> “SYNC” indicator light FLASHING?</p> <ul style="list-style-type: none"> <li>■ If YES, the card is either in “testing” mode, or is establishing a connection with end user equipment at the end of the local loop, this may take about 15 seconds. When the connection is established the “SYNC” indicator light will go to steady ON condition. Continue to Step 4.</li> </ul> <p><b>Note:</b> On the SDSL8, SDSL8+, and IDSL8 cards, the “SYNC” light may not begin flashing for up to 30 seconds.</p> <ul style="list-style-type: none"> <li>■ If NO, continue to Step 3.</li> </ul>

Table 5-8: “SYNC” Indicator—Line Cards (continued)

STEP	PROCEDURE
3	Is the yellow “SYNC” indicator light OFF? <ul style="list-style-type: none"><li>■ If YES, the line card is not synchronized and none of the ports are connected to end user equipment on the other end of the local loop. This light will stay off until one or more of the ports are connected to end user equipment on the other end of the local loop.</li><li>■ If NO, continue to Step 4.</li></ul>
4	The <b>Power Up and Visual Status Check</b> procedure is complete.

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**MTU Card LED Indicators**

Follow these steps to visually check the status of the:

- One MTU (Master Timing Unit) card configuration (if there is one Central Office BITS clock).
- Two MTU card configuration (if there are two Central Office BITS clocks).

The optional MTU cards are designed to be installed in slots 1 and 2 in the MCS (Master Control Shelf). Two MTU cards are required for 1:1 unit protection. The MTU cards provide a physical interface with external timing input. If you decide not to install MTU cards, these two slots would not be used.

Table 5-9: One MTU Card—LED Indicators

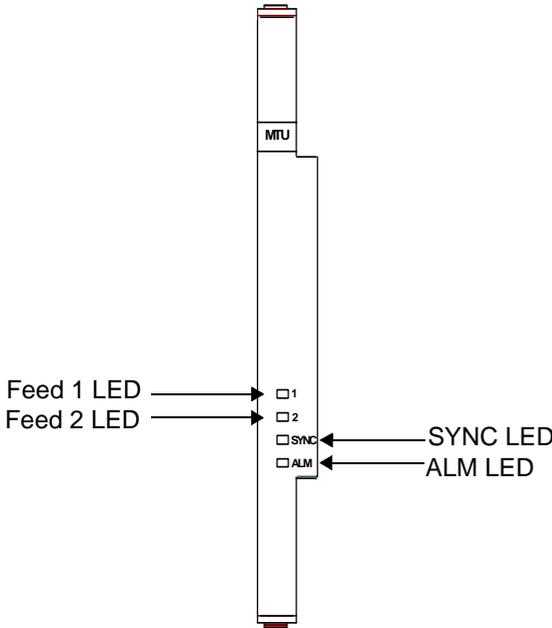
STEP	PROCEDURE
1	<p>The figure below indicates the LEDs on the face of the MTU card.</p> <div style="text-align: center;">  <p>The diagram shows a vertical MTU card with four LEDs on its right side. From top to bottom, the LEDs are labeled: '1', '2', 'SYNC', and 'ALM'. Arrows point from the text labels to the corresponding LEDs: 'Feed 1 LED' points to '1', 'Feed 2 LED' points to '2', 'SYNC LED' points to 'SYNC', and 'ALM LED' points to 'ALM'. The card itself is labeled 'MTU' near the top.</p> </div> <p style="text-align: center;">Figure 5-5: MTU Card LEDs</p>

Table 5-9: One MTU Card—LED Indicators (continued)

STEP	PROCEDURE
2	<p>Is the <u>yellow</u> “SYNC” indicator light on?</p> <ul style="list-style-type: none"> <li>■ If YES, the timing synchronization to the card is functioning normally. Nothing further needs to be checked.</li> <li>■ If No, continue to Step 3.</li> </ul>
3	<p>Is the “SYNC” indicator light <u>off</u> (LED not lit)?</p> <ul style="list-style-type: none"> <li>■ If YES, the MTU card is not functioning properly. There could be several reasons for the problem: <ul style="list-style-type: none"> <li>– The J2 jumper on the side of the card may be set to a different format than the feed format (e.g., the feed format might be Extended Super Frame, and the jumper setting Super Frame).</li> <li>– The MTU card may not be synchronized with the BITS clock timing signal.</li> <li>– There may not be a timing signal coming from the BITS clock.</li> <li>– The MTU card may not be properly seated and locked in place.</li> <li>– The twisted pair cable connection at the BITS clock may not be secure.</li> <li>– The twisted pair cable connection at the three-hole terminal block on the MCS Backplane Circuit Board may not be secure.</li> <li>– The twisted pair cable may be damaged.</li> <li>– There may not be power going to the MTU card.</li> <li>– If necessary, replace the MTU card if the LED not lit condition continues.</li> </ul> </li> </ul> <p><b>Note:</b> Whenever the “SYNC” indicator light is <u>off</u> (LED not lit), the “ALM” indicator light will be <u>red</u>. When synchronization is restored, the “ALM” indicator light will be <u>off</u> (LED not lit), and the “SYNC” indicator light will be <u>yellow</u>.</p>
4	<p>Is the Feed “1” indicator light <u>green</u>?</p> <ul style="list-style-type: none"> <li>■ If YES, the card is correctly installed in card slot 1, and matches the J4 jumper setting on the side of the MTU card (preset to card slot 1). <p><b>Note:</b> The Feed “2” LED will be <u>off</u> (not lit).</p> </li> <li>■ If NO, power has been lost to the card, and the LED will be <u>off</u> (not lit), until power is restored.</li> </ul>

Table 5-10: Two MTU Cards—LED Indicators

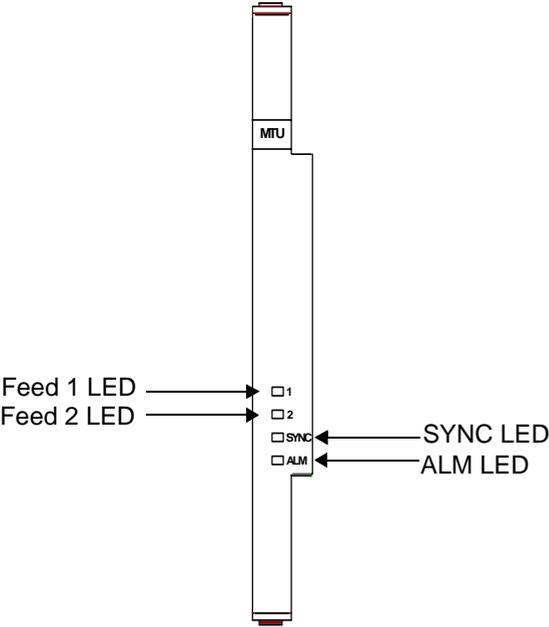
STEP	PROCEDURE
1	<p>The figure below indicates the LEDs on the face of the MTU card.</p> <div><p>The diagram shows a vertical MTU card with four LEDs on its face. From top to bottom, the LEDs are labeled: □1, □2, □SYNC, and □ALM. Arrows point from the text labels to the corresponding LEDs: 'Feed 1 LED' points to □1, 'Feed 2 LED' points to □2, 'SYNC LED' points to □SYNC, and 'ALM LED' points to □ALM. The card has a small 'MTU' label near the top and a red indicator at the bottom.</p></div> <p>Figure 5-6: MTU Card LEDs</p>

Table 5-10: Two MTU Cards—LED Indicators (continued)

STEP	PROCEDURE
2	<p>Are the <u>yellow</u> “SYNC” indicator lights on both MTU cards on?</p> <ul style="list-style-type: none"> <li>■ If YES, the timing synchronization to both cards is functioning normally. Nothing further needs to be checked.</li> </ul> <p><b>Note:</b> One MTU card is the active card, and the second MTU card is the redundant card.</p> <ul style="list-style-type: none"> <li>■ If No, continue to Step 3.</li> </ul>
3	<p>Is the “SYNC” indicator light <u>yellow</u> on one MTU card and <u>off</u> (LED not lit) on the second MTU card?</p> <ul style="list-style-type: none"> <li>■ If YES, the card with the <u>yellow</u> “SYNC” indicator light is providing timing synchronization and is the active MTU card, and the second MTU card automatically becomes the redundant card and is not available for service. There could be several reasons why the second MTU card’s “SYNC” LED is <u>off</u> (not lit): <ul style="list-style-type: none"> <li>– The J2 jumper on the side of the card may be set to a different format than the feed format (e.g., the feed format might be Extended Super Frame [ESF], and the jumper setting Super Frame [SF]).</li> <li>– The MTU card may not be synchronized with the BITS clock timing signal.</li> <li>– There may not be a timing signal coming from the BITS clock.</li> <li>– The MTU card may not be properly seated and locked in place.</li> <li>– The twisted pair cable connection at the BITS clock may not be secure.</li> <li>– The twisted pair cable connection at the three-hole terminal block on the MCS Backplane Circuit Board may not be secure.</li> <li>– The twisted pair cable may be damaged.</li> <li>– If necessary, replace the MTU card if the LED not lit condition continues.</li> </ul> </li> </ul> <p><b>Note:</b> Whenever a “SYNC” indicator light is <u>off</u> (not lit), the “ALM” indicator light for that card will be <u>red</u>. When synchronization is restored, the “ALM” indicator light will be <u>off</u> (LED not lit), and the “SYNC” indicator light will be <u>yellow</u>.</p>

Table 5-10: Two MTU Cards—LED Indicators (continued)

STEP	PROCEDURE
4	<p>Are the “SYNC” indicator lights <u>off</u> (LEDs not lit) on both MTU cards?</p> <ul style="list-style-type: none"> <li>■ If YES, the MTU cards are not functioning properly. There could be several reasons for the problem: <ul style="list-style-type: none"> <li>– The J4 jumpers on the sides of both cards may be set to the same card slot (this error would synchronize both cards to the same BITS feed).</li> <li>– The J2 jumpers on the sides of both cards may be set to a different format than the feed format (e.g., the feed format might be ESF, and both jumpers set to SF).</li> <li>– The MTU cards may not be synchronized with either BITS clock timing signal.</li> <li>– There may not be a timing signal coming from either BITS clock.</li> <li>– The MTU cards may not be properly seated and locked in place.</li> <li>– The twisted pair cable connections at both BITS clocks may not be secure.</li> <li>– Both twisted pair cable connections at the three-hole terminal blocks on the MCS Backplane Circuit Board may not be secure.</li> <li>– Both twisted pair cables may be damaged.</li> <li>– If necessary, replace both MTU cards if the LEDs not lit conditions continue.</li> </ul> </li> </ul>
5	<p>Is Feed indicator light “1” <u>green</u> on one MTU card, and Feed indicator light “2” <u>green</u> on the other MTU card?</p> <ul style="list-style-type: none"> <li>■ If YES, the cards are correctly installed in card slots 1 and 2, and match the J4 jumper settings on the sides of the MTU cards (one jumper set to card slot 1, one jumper set to card slot 2).</li> </ul> <p><b>Note:</b> The Feed indicator lights tell the operator which feed is going to which card.</p> <ul style="list-style-type: none"> <li>■ If NO, continue to Step 6.</li> </ul>
6	<p>Are the Feed indicator lights on both MTU cards <u>red</u>?</p> <ul style="list-style-type: none"> <li>■ If YES, the J4 jumper settings on both MTU cards have been configured to the same card slot (either slot 1 or 2), and are synchronized to the same BITS feed. Service will not be restored to either card until the jumper settings are modified.</li> <li>■ If NO, continue to Step 7.</li> </ul>
7	<p>Are the Feed indicator lights on both MTU cards <u>off</u> (not lit)?</p> <ul style="list-style-type: none"> <li>■ If YES, power has been lost to both cards.</li> </ul>

## Chapter 2

### Using Craft Terminal for Commissioning

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#### Introduction

Craft Terminal is a stand-alone craft interface application. It is used for initial installation of a D50 multiplexer, to complete initial test and commissioning procedures, to set up communications with a management system, and for on-site diagnosis of a hardware or local network problem. Craft Terminal communicates directly with the D50 multiplexer through a serial port or Ethernet connection using Point-to-Point Protocol (PPP). It operates on a PC laptop or desktop, using either the Windows NT or the Windows 2000 operating system.

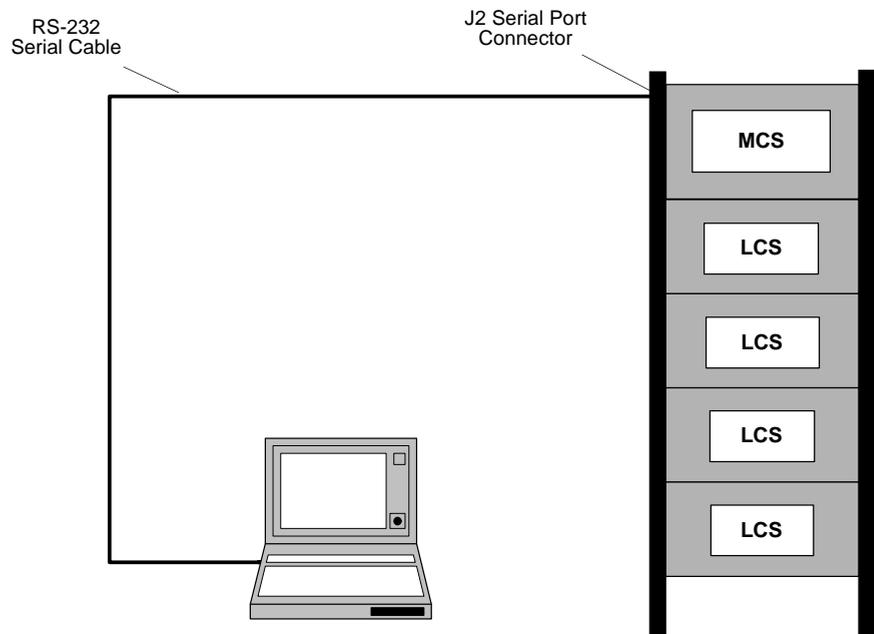


Figure 5-7: Craft Terminal Serial Port Connection to the D50

For the Craft Terminal direct Ethernet connection to the MCS, refer to Chapter 3—“Craft Terminal Direct Ethernet Connection.”

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#### Provisioning Parameters

Initial provisioning parameters for each card type are described in this chapter beginning in the section titled **NMP and MCP Cards—Unlock/Check Conditions**, page 5-33. For a complete description of provisioning parameters, refer to the volume titled Provisioning.

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**Craft Terminal Reference Documents**      This procedure assumes you have reviewed the volume titled Craft Terminal. Refer to this manual as necessary while completing this procedure.

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**Craft Terminal Online Help**      Craft Terminal has Windows NT or Windows 2000 and Craft Terminal application help available via the Help menu.

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**Required Equipment and IP Information**      To begin this task you must have the following equipment and tools:

- A laptop PC to support Windows NT or Windows 2000, Simple Network Management Protocol (SNMP), Remote Access Service (RAS), and Craft Terminal software.
- A standard straight through serial port cable with a 9-pin RS-232-C (DB-9) male connector on one end—to connect directly to the D50 multiplexer<sup>1</sup>—and a 9-pin or 25-pin RS-232-C (DB-9) female connector on the other end—to match the serial port connector on your PC. Refer to Figure 5-8: DB-9 Connector Pin-outs, page 5-21.
- Contact the local Network Administrator to get D50 IP Address information for the Craft Terminal In-Band and 10Base-T Ethernet connections:
  - IP Address, for example: 192.168.1.4.
  - IP Mask, for example: 255.255.255.0.
  - Gateway, for example: 192.168.1.251. (Gateway information may not be required.)
  - VPI/VCI (In-Band only), for example: 40, 70.

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**Set up PC Interface with the D50**      Follow these steps to set up Craft Terminal on your PC and connect to the D50:

**Note:** The serial port connection, described below, must be used to establish initial communication with the D50.

Table 5-11: Set Up PC Interface with the D50

STEP	PROCEDURE
1	Install Windows NT or Windows 2000 <sup>1</sup> according to the manufacturer's instructions.
2	Install and configure Windows support services: Serial Port, Modem, Remote Access Services (RAS), Simple Network Management Protocol (SNMP), and Dial-up Networking following the instructions in the volume titled <u>Craft Terminal</u> , Section 1— <i>Overview and Installation</i> , Chapter 1—"Craft Terminal Overview."

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<sup>1</sup> If your D50 has a male J2 serial port connector, you will need to connect a gender changer device between the serial cable and the D50, or use a serial cable with two female ends.

Table 5-11: Set Up PC Interface with the D50 (continued)

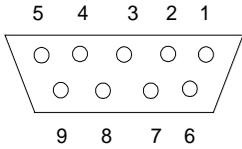
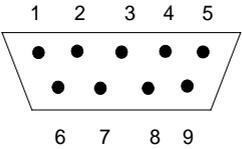
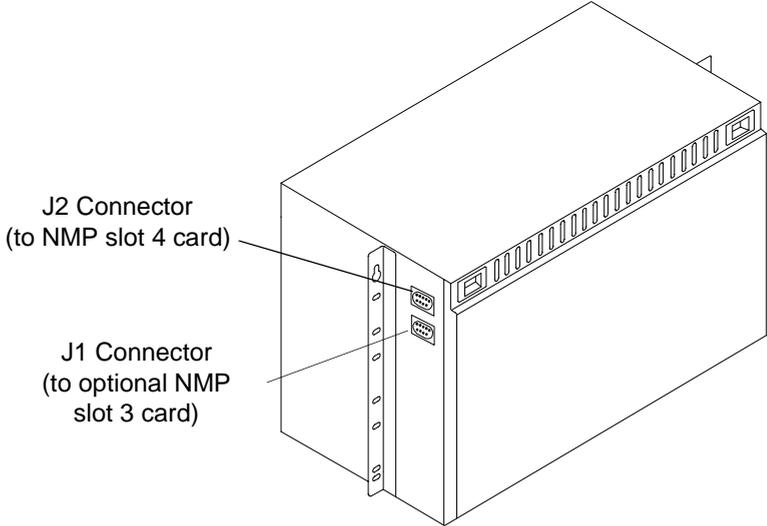
STEP	PROCEDURE
3	<p>Install Craft Terminal software following the instructions in the volume titled <i>Craft Terminal</i>, Section 1—<i>Overview and Installation</i>, Chapter 6—“Installing/Removing Craft Terminal Software.”</p> <p><b>Important! Windows NT service packs that were previously installed will need to be reinstalled at this point.</b></p>
4	<p>Connect the serial port cable to your PC’s 9-pin or 25-pin serial port connector.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Female (to PC or laptop)</p> </div> <div style="text-align: center;">  <p>Male (to D50)</p> </div> </div> <p style="text-align: center;">Figure 5-8: DB-9 Connector Pin-outs</p>

Table 5-11: Set Up PC Interface with the D50 (continued)

STEP	PROCEDURE
<p><b>5</b></p>	<p>Connect the other end of the serial port cable to the J2 serial port connector on the left side of the D50's MCS.</p> <p>The D50 has two 9-pin serial ports located on the back of the Master Control Shelf Alarm Board—the J2 port connects to the Network Management Processor slot 4 card, the J1 port connects to the <i>optional</i> NMP slot 3 card<sup>2</sup>. These serial ports are accessed through serial port connectors on the left side of the MCS assembly.</p>  <p>The diagram shows a perspective view of the Master Control Shelf Alarm Board (MCS) assembly. On the left side, there are two 9-pin serial port connectors. The upper connector is labeled 'J2 Connector (to NMP slot 4 card)' and the lower connector is labeled 'J1 Connector (to optional NMP slot 3 card)'. The board has a series of slots along the top edge and a vertical row of connectors on the left side.</p> <p style="text-align: center;">Figure 5-9: MCS Serial Ports</p>
<p><b>6</b></p>	<p>Continue to the next procedure: <b>Establish Communication with the D50.</b></p>

<sup>1</sup> As of Release 8.0, Windows 2000 can be used for the Craft Terminal application.

<sup>2</sup> Planned for future release.

**Establish Communication with the D50**

Follow these steps to establish communication with the D50:

Table 5-12: Establish Communication with the D50

STEP	PROCEDURE
1	<p>To start the Craft Terminal application:</p> <ul style="list-style-type: none"> <li>■ From the Task bar, click the <b>Start</b> button.</li> <li>■ Select <b>Programs</b> ⇒ <b>Nokia</b> ⇒ <b>D50CraftTerminal</b>.</li> </ul> <p>or if you have installed the Craft Terminal icon on your desktop:</p> <ul style="list-style-type: none"> <li>■ Double-click the <b>Craft Terminal</b> icon.</li> </ul>
2	<p>Craft Terminal displays the Connection Dialog box:</p> <ul style="list-style-type: none"> <li>■ Choose <b>Serial Cable</b>.</li> <li>■ Click <b>OK</b>.</li> </ul> <p>After a few moments, Craft Terminal displays the Main screen and the System window.</p>
3	<p>In the Main menu bar:</p> <ul style="list-style-type: none"> <li>■ Select <b>Tools</b> ⇒ <b>Initialize System...</b></li> </ul> <p>Craft Terminal displays the System Initialization dialog box.</p> <div> </div>
4	<p>The Remote Craft field enables Remote Craft Access for connecting Craft Terminal directly to the D50 RAM. The default setting is disabled; to enable Remote Craft Access, click the Enable check box.</p>

Figure 5-10: System Initialization Dialog Box

Table 5-12: Establish Communication with the D50 (continued)

STEP	PROCEDURE
5	<p>The InBand MTU Size field (for Maximum Transmission Unit) enables configuration of the channel size. The default setting is 1500 bytes (the range is 68 to 1500 bytes). <b>Do not change this setting unless instructed to do so by your network administrator.</b></p> <p><b>Note:</b> Craft Terminal may momentarily display a “0” in the InBand MTU Size field, before the default value of 1500 is displayed.</p>
6	<p>The System Initialization dialog box is also used for setting up the Ethernet or In-Band Management connection between the D50 and Craft Terminal or a management system.</p> <p>Are you setting up an Ethernet connection, or the In-Band Management connection?</p> <ul style="list-style-type: none"> <li>■ If you are setting up an Ethernet connection, continue to Step 7.</li> <li>■ If you are setting up the In-Band Management connection, skip to Step 8.</li> </ul> <p><b>Note:</b> Both the Ethernet connection and the In-Band Management connection can be set up on the same D50.</p>
7	<p>To set up the Ethernet connection information on the NMP card:</p> <ul style="list-style-type: none"> <li>■ In the Ethernet dialog box (near the bottom of the window), enter the IP Address and IP Mask information.</li> <li>■ In the Gateway dialog box, enter the Gateway IP Address information (if required).</li> <li>■ Click <b>OK</b>.</li> </ul> <p><b>Important! The IP Address must be established via Craft Terminal so a management system can communicate with the D50 over a TCP/IP data network.</b></p> <p>To set up cabling for Craft Terminal 10Base-T connections, refer to the volume titled <u>Installation</u>, Section 7—<i>Ethernet and Alarm Board Cabling</i>, Chapter 1—“Craft Terminal Ethernet Cabling.”</p> <p>Skip to Step 11.</p>

Table 5-12: Establish Communication with the D50 (continued)

STEP	PROCEDURE
8	<p><b>Important! Before you can set up the In-Band Management connection, you must verify with the Network Administrator that the ATM network router or switch has been set up and provisioned as follows<sup>1</sup></b> (refer to the volume titled <i>Installation</i>, Section 7—<i>Ethernet and Alarm Board Cabling</i>, <b>Chapter 1—“Craft Terminal Ethernet Cabling,” Figure 7-2: In-Band Management Connection to the D50</b>):</p> <ul style="list-style-type: none"> <li>■ The VPI/VCI information matches the In-Band settings to be entered through Craft Terminal.</li> <li>■ The VPI/VCI bandwidth configuration does not exceed a maximum of <u>128</u> Kbps with DS3T, DS3T2, OC3T, and OC3T2 trunk cards.</li> <li>■ The VPI/VCI bandwidth configuration does not exceed a maximum of <u>512</u> Kbps with DS3TQ, OC3TQS, OC3TQM, and OC3TQL trunk cards.</li> </ul> <p>Proceed to one of the following steps according to the In-Band Management connection you are setting up:</p> <p><b>Note:</b> Only one In-Band Management connection can be supported on a D50 system; to set up a different In-Band Management connection, the existing connection must first be deleted.</p> <ul style="list-style-type: none"> <li>■ For a connection on a <u>broadband tributary card</u>, continue to Step 9.</li> <li>■ For a connection on a <u>trunk card</u>, skip to Step 10.</li> </ul>

Table 5-12: Establish Communication with the D50 (continued)

STEP	PROCEDURE
9	<p>(For a <u>broadband tributary card</u>)</p> <p>In the NMP Slot 4 In Band Management box:</p> <ul style="list-style-type: none"> <li>■ Enter the IP Address, IP Mask, VPI, and VCI information.</li> <li>■ Select the BB-MLA option.</li> <li>■ In the drop-down menu, select the slot supporting the broadband card.</li> <li>■ The Traffic Descriptor (TD) field default setting is 7; this traffic descriptor has been preset for In-Band Management. To select a different existing option, or to create new options, refer to the next procedure, <b>Traffic Descriptor Selection and Creation</b>, page 5-28. To view the TrDescr values, refer to <b>View the TrDescr Values</b>, page 5-32.</li> <li>■ In the Gateway dialog box, enter the Gateway IP Address information (if required).</li> <li>■ In the In Band Management dialog box, click the <b>Create Connection</b> button. The system assigns a connection ID number and displays it in the Connection ID (Conn ID) field.</li> </ul> <p><b>Note:</b> The <b>Create Connection</b> button becomes the <b>Edit Connection</b> button. You can click it to display the Connection window for the new connection, to check the status of the connection and to lock and unlock the connection's Administration State.</p> <p>Clicking the <b>Edit Connection</b> button closes the System Initialization dialog box. To re-open it, select <b>Tools</b> ⇒ <b>Initialize System...</b></p> <ul style="list-style-type: none"> <li>■ Click <b>OK</b>.</li> </ul> <p>Skip to Step 11.</p>

Table 5-12: Establish Communication with the D50 (continued)

STEP	PROCEDURE
10	<p>(For a <b>trunk card</b>.)</p> <p>In the NMP Slot 4 In Band Management box:</p> <ul style="list-style-type: none"> <li>■ Enter the IP Address, IP Mask, VPI, and VCI information.</li> <li>■ The Traffic Descriptor (TD) field default setting is 7; this traffic descriptor has been preset for In-Band Management. To select a different existing option, or to create new options, refer to the next procedure, <b>Traffic Descriptor Selection and Creation</b>, page 5-28. To view the TrDescr values, refer to <b>View the TrDescr Values</b>, page 5-32.</li> <li>■ In the Gateway dialog box, enter the Gateway IP Address information (if required).</li> <li>■ In the In Band Management dialog box, click the <b>Create Connection</b> button. The system assigns a connection ID number and displays it in the Connection ID (Conn ID) field.</li> </ul> <p><b>Note:</b> The <b>Create Connection</b> button becomes the <b>Edit Connection</b> button. You can click it to display the Connection window for the new connection, to check the status of the connection and to lock and unlock the connection's Administration State.</p> <p>Clicking the <b>Edit Connection</b> button closes the System Initialization dialog box. To re-open it, select <b>Tools</b> ⇒ <b>Initialize System...</b></p> <ul style="list-style-type: none"> <li>■ Click <b>OK</b>.</li> </ul> <p>Continue to Step 11.</p>
11	<p>Craft Terminal displays the System window.</p> <ul style="list-style-type: none"> <li>■ Click the <b>System</b> tab page, if it is not displayed.</li> <li>■ In the MCP Synchronization box, click the <b>Yes</b> option button, if it is not selected.</li> <li>■ Click the <b>SAVE</b><sup>2</sup> button to permanently save IP Address and In Band Management information in the D50 Master Control Shelf (MCS) backplane PROM.</li> <li>■ Click <b>Yes</b> in the Craft Application dialog box that appears, stating that the procedure may take several minutes.</li> </ul> <p>The System dialog box may be left open.</p>
12	<p>The <b>Establish Communication with the D50</b> procedure is complete.</p> <p>Continue to the procedure titled <b>NMP and MCP Cards—Unlock/Check Conditions</b>, page 5-33, to begin unlocking the cards in the MCS and LCS.</p>

<sup>1</sup> The In-Band Management connection dialog box is not active until the ATM network router or switch set-up and provisioning are complete.

<sup>2</sup> The SAVE command saves all transactions in the MIB, in case the NMP or MCP cards fail or in case of a system power failure. Use the SAVE command periodically during your Craft Terminal session.

**Traffic  
Descriptor  
Selection and  
Creation**

**Important! Consult your network administrator before selecting or creating traffic descriptors.**

The default traffic descriptor for the In-Band Management connection is 7.

- To select a different existing traffic descriptor, refer to Table 5-13: Select a Different Traffic Descriptor, below.
- To create a new traffic descriptor, refer to Table 5-14: Create a New Traffic Descriptor, page 5-30.

Follow these steps to select a different existing traffic descriptor for the In-Band Management connection<sup>2</sup>:

Table 5-13: Select a Different Traffic Descriptor

STEP	PROCEDURE
1	<p>Before selecting a different existing traffic descriptor, the System Initialization dialog box must be closed.</p> <p>If the System Initialization dialog box is open, do one of the following:</p> <ul style="list-style-type: none"> <li>■ Click <b>Cancel</b> to close the dialog box without saving any unsaved In Band Management information.</li> <li>■ Click <b>OK</b> to save any unsaved In Band Management information and to close the dialog box.</li> </ul> <p><b>Note:</b> When you re-open the System Initialization dialog box after clicking <b>OK</b>, you must re-enter the VPI and VCI information.</p>
2	In the Main menu bar, select <b>Tools</b> ⇒ <b>Traffic Descriptors...</b> .
3	<p>The Traffic Descriptors window is displayed, listing all existing traffic descriptors.</p> <ul style="list-style-type: none"> <li>■ Traffic descriptor ID numbers are displayed in the Index column.</li> <li>■ Descriptors 1 through 10 are the preset options; descriptor 7 is the default option for In-Band Management.</li> <li>■ Additional user-created descriptors are automatically numbered in the order they are created, beginning with 33.</li> </ul>
4	Determine the ID number of the traffic descriptor you need from the Index column, then click <b>Close</b> .
5	In the Main menu bar, select <b>Tools</b> ⇒ <b>Initialize System...</b> to display the System Initialization dialog box.
6	In the In Band Management dialog area, enter the descriptor ID number in the Traffic Descriptor (TrDescr) box.
7	Re-enter the VPI and VCI information, and the IP Address and IP Mask information if necessary.

<sup>2</sup> For additional information on setting up the In-Band Management connection, refer to the previous procedure, **Establish Communication with the D50**, page 5-23.

Table 5-13: Select a Different Traffic Descriptor (continued)

STEP	PROCEDURE
8	<p>Click the <b>Create Connection</b> button. The system assigns a connection ID number and displays it in the Connection ID (Conn ID) field.</p> <p><b>Note:</b> After the connection is created, the TrDescr field is no longer displayed. To view the TrDescr values, refer to <b>View the TrDescr Values</b>, page 5-32.</p> <p><b>Note:</b> The <b>Create Connection</b> button becomes the <b>Edit Connection</b> button. You can click it to display the Connection window for the new connection, to check the status of the connection and to lock and unlock the connection's Administration State.</p> <p>Clicking the <b>Edit Connection</b> button closes the System Initialization dialog box. To re-open it, select <b>Tools</b> ⇒ <b>Initialize System...</b> .</p>
9	<p>Click <b>OK</b>.</p>
10	<p>The <b>Traffic Descriptor Selection and Creation</b> procedure is complete. Refer to the previous procedure, <b>Establish Communication with the D50</b>, page 5-23, to continue setting up the In-Band Management connection.</p>

Follow these steps to create a new traffic descriptor for the In-Band Management connection<sup>3</sup>:

Table 5-14: Create a New Traffic Descriptor

STEP	PROCEDURE
1	<p>Before creating a new traffic descriptor, the System Initialization dialog box must be closed.</p> <p>If the System Initialization dialog box is open, do one of the following:</p> <ul style="list-style-type: none"> <li>■ Click <b>Cancel</b> to close the dialog box without saving any unsaved In Band Management information.</li> <li>■ Click <b>OK</b> to save any unsaved In Band Management information and to close the dialog box.</li> </ul> <p><b>Note:</b> When you re-open the System Initialization dialog box after clicking <b>OK</b>, you must re-enter the VPI and VCI information.</p>
2	<p>In the Main menu bar, select <b>Tools</b> ⇒ <b>Traffic Descriptors...</b> .</p>
3	<p>In the Traffic Descriptors window, click <b>New</b> to display the New Traffic Descriptor dialog box.</p>
4	<p>Set the following settings as required (for details, refer to the volume titled <i>Provisioning</i>, Section 1—<i>Provisioning Concepts</i>, Chapter 12—“ATM QoS Provisioning”):</p> <ul style="list-style-type: none"> <li>■ Descriptor Type (default is NoClpNoScr).</li> <li>■ Service Category (default is CBR).</li> <li>■ Frame Discard (default is True).</li> <li>■ Param1: (default is 0).</li> <li>■ Param2: (default is 0).</li> <li>■ Param3: (default is 0).</li> <li>■ Param4: (default is 0).</li> <li>■ Param5: (default is 0).</li> </ul> <p><b>Note:</b> The combined size of all traffic descriptors cannot exceed the bandwidth limit of:</p> <ul style="list-style-type: none"> <li>– 128 Kbps in a system with DS3T, DS3T2, OC3T, or OC3T2 trunk cards, or</li> <li>– 512 Kbps in a system with DS3TQ, OC3TQS, OC3TQM, and OC3TQL trunk cards.</li> </ul>
5	<p>Click <b>Create</b>. A window appears showing the ID number for the new traffic descriptor.</p>

<sup>3</sup> For additional information on setting up the In-Band Management connection, refer to the procedure titled **Establish Communication with the D50**, page 5-23.

Table 5-14: Create a New Traffic Descriptor (continued)

STEP	PROCEDURE
6	Click <b>OK</b> . The new traffic descriptor appears in the Traffic Descriptors window. The ID number is shown in the Index column.
7	Click <b>Close</b> .
8	In the Main menu bar, select <b>Tools</b> ⇒ <b>Initialize System...</b> to display the System Initialization dialog box.
9	In the In Band Management dialog area, enter the ID number of the new traffic descriptor in the Traffic Descriptor (TrDescr) box.
10	Re-enter the VPI and VCI information, and the IP Address and IP Mask information if necessary.
11	<p>Click the <b>Create Connection</b> button. The system assigns a connection ID number and displays it in the Connection ID (Conn ID) field.</p> <p><b>Note:</b> After the connection is created, the TrDescr field is no longer displayed. To view the TrDescr values, refer to <b>View the TrDescr Values</b>, page 5-32.</p> <p><b>Note:</b> The <b>Create Connection</b> button becomes the <b>Edit Connection</b> button. You can click it to display the Connection window for the new connection, to check the status of the connection and to lock and unlock the connection's Administration State.</p> <p>Clicking the <b>Edit Connection</b> button closes the System Initialization dialog box. To re-open it, select <b>Tools</b> ⇒ <b>Initialize System...</b> .</p>
12	Click <b>OK</b> .
13	The <b>Traffic Descriptor Selection and Creation</b> procedure is complete. Refer to the previous procedure, <b>Establish Communication with the D50</b> , page 5-23, to continue setting up the In-Band Management connection.

**View the TrDescr Values** After a connection is created in the D50 via Craft Terminal, the System Initialization window in Craft Terminal no longer displays the TrDescr field. Follow these steps to view the TrDescr values:

Table 5-15: View the TrDescr Values

STEP	PROCEDURE
1	In the Main menu bar, select <b>Tools</b> ⇒ <b>Initialize System...</b> to display the System Initialization dialog box.
2	Click the <b>Edit Connection</b> button to display the Connection window.
3	Select the Connection tab, and click <b>Show Z</b> to display the Connection Link window.
4	Select the Link Config tab. The read-only Traffic Descriptors fields (Receive and Transmit) are displayed in the lower left of the window.

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**NMP and MCP  
Cards—Unlock/  
Check  
Conditions**

Follow these steps to “unlock” the Administration State and check the operational conditions of Master Control Shelf NMP and standby MCP<sup>4</sup> cards:

Table 5-16: NMP and MCP Cards—Unlock/Check Conditions

STEP	PROCEDURE
1	Display the Equipment Locator group graphic by clicking <b>View</b> in the Main toolbar and selecting <b>Rack</b> .
2	Display the Master Control Shelf (MCS) locator by clicking <b>View</b> in the Main toolbar and selecting MCS.  <b>Note:</b> The MCS locator does not display Master Control Shelf slots 1 and 2. The first slot in the MCS locator is Master Control Shelf slot 3. It reads “NMP.” References to slot numbers will be according to their actual location in the Master Control Shelf.
3	In the MCS equipment locator, click the NMP card in slot 4 <sup>1</sup> to display the NMP slot 4 object view window.  <b>Note:</b> To see all the items in the object view window, you may need to drag it into view, or move or close other opened windows.
4	Click the <b>Status</b> tab in the NMP window to view the NMP’s Administration State.
5	Click the <b>Unlocked</b> option button in the Administration State box to “unlock” the NMP card.
6	Click the <b>Save</b> button in the System window to save all changes to the MIB.
7	Click the <b>Refresh</b>  icon in the toolbar to “refresh” the data in the Conditions list dialog box.  <b>Note:</b> Craft Terminal automatically refreshes the data in the Conditions list dialog box. The Refresh icon forces a “refresh” command; this is an optional step.
8	The Conditions dialog box shows the Operational State and Availability Status for the NMP card.  Refer to Section 6— <i>Appendices</i> , Appendix F—“Conditions and Recommended Actions,” Table 6-19: NMP & MCP Conditions & Recommended Actions. Follow the Recommended Action listed for the condition.  You may now close the NMP object view window or leave it open.

<sup>4</sup> The active MCP card comes up “unlocked.”

Table 5-16: NMP and MCP Cards—Unlock/Check Conditions (continued)

STEP	PROCEDURE
9	Repeat Steps 3 through 8 to “unlock” the Administration State and check conditions for the standby MCP card. (The active MCP card comes up “unlocked.”)
10	The <b>NMP and MCP Cards—Unlock/Check Conditions</b> procedure is complete.  Continue to the next procedure: <b>Trunk and Broadband Cards/Ports—Unlock/Check Conditions</b> .

<sup>1</sup> NMP slot 4 is the main NMP card; NMP slot 3 is an optional card planned for a future release.

**Trunk and Broadband Cards/Ports—Unlock/Check Conditions**

Follow these steps to “unlock” the Administration State and to check the operational conditions and default configuration for Master Control Shelf DS3 trunk (DS3T, DS3T2, and DS3TQ) cards and ports, OC3 trunk (OC3T, OC3T2, OC3T2L, OC3T2M, OC3TQS, OC3TQM, and OC3TQL) cards and ports, and DS3L and OC3L broadband tributary cards and ports:

Table 5-17: Trunk/Broadband Cards/Ports—Unlock/Check Conditions

STEP	PROCEDURE
1	Click the first trunk card (slot 7 <sup>1</sup> ) or the first broadband tributary card in the Equipment Locator to open the card object view window.  <b>Note:</b> The MCS locator does not display Master Control Shelf slots 1 and 2. The first slot in the MCS locator is Master Control Shelf slot 3. It reads “NMP.” References to slot numbers will be according to their actual location in the Master Control Shelf.  <b>Note:</b> To see all the items in the object view window, you may need to drag it into view, or move or close other opened windows.
2	Click the <b>Status</b> tab to view the card Administration State.
3	Click the <b>Unlocked</b> option button in the Administration State box to “unlock” the card.
4	Click the <b>Save</b> button in the System window to save all changes to the MIB.
5	Click the <b>Refresh</b>  icon in the toolbar to “refresh” the data in the Conditions list dialog box.

Table 5-17: Trunk/Broadband Cards/Ports—Unlock/Check Conditions

STEP	PROCEDURE
6	<p>The Conditions list box shows the Operational State and Availability Status for the card.</p> <p>Refer to Section 6—<i>Appendices</i>, Appendix F—“Conditions and Recommended Actions”; see the sections for trunk and broadband tributary cards. Follow the Recommended Action listed for the condition.</p>
7	<p>Ports are depicted in the Equipment Locator as small circle ports on the cards. Click the port on the first trunk or broadband tributary card.</p>
8	<p>Continue to the next steps according to the card type you are unlocking:</p> <ul style="list-style-type: none"><li>■ For a DS3 trunk or DS3L broadband tributary card, click the DS3T tab and continue to Step 9.</li><li>■ For an OC3 trunk or OC3L broadband tributary card, click the OC3T tab and skip to Step 10.</li></ul>

Table 5-17: Trunk/Broadband Cards/Ports—Unlock/Check Conditions

STEP	PROCEDURE
9	<p>For a DS3 trunk or DS3L broadband tributary card, verify or change the configuration settings according to your network configuration:</p> <p><b>Note:</b> Default settings are in bold.</p> <ul style="list-style-type: none"> <li>■ Addressing Mode: <b>NNI</b> is preset for the DS3 trunk card; <b>UNI</b> is preset for the DS3L card.</li> <li>■ Cell Scrambling: click the Disable or <b>Enable</b> option button.</li> <li>■ HEC Coset: click the Disable or <b>Enable</b> option button.</li> <li>■ Starvation Cycles: set these for Ingress and Egress for the DS3L card, and Ingress for the DS3 trunk card (except for the DS3T card).</li> <li>■ Line Build Out: click the <b>Low</b> or High option button.</li> </ul> <p><b>Note:</b> The DS3 trunk and DS3L broadband tributary Line Interface Units (LIU) support two levels of line build out (this is the length of the coax cable from the MCS backplane to the Central Office DSx3 panel):</p> <ul style="list-style-type: none"> <li>- Low = Coax cables shorter than 50 feet (default).</li> <li>- High = Coax cables between 50 and 450 feet.</li> </ul> <p>Line build out is not applicable to the OC3 trunk or OC3L broadband tributary cards.</p> <ul style="list-style-type: none"> <li>■ Line Type: click the setting you need: Direct Mapping CBit, Direct Mapping M23, <b>PLCP CBit</b>, or PLCP M23.</li> <li>■ Timing: click the <b>Loop</b> (DS3 trunk default), Loop PLCP, <b>Internal</b> (DS3L default), Internal PLCP, or External option button.</li> </ul> <p><b>Note:</b> If your system has an MTU card and two DS3TQ trunk cards installed, the Timing option must be set to External for both trunk cards.</p> <p>Click <b>Apply Changes</b>.</p> <p><b>Important! The Cell Scrambling, HEC Coset, and Line Type settings must match those at the other end of the DS3 connection (ATM network equipment).</b></p> <p>Refer to the volume titled <u>Craft Terminal</u> for more information on the DS3T tab page.</p> <p>Skip to Step 11.</p>

Table 5-17: Trunk/Broadband Cards/Ports—Unlock/Check Conditions

STEP	PROCEDURE
<p><b>10</b></p>	<p>For an OC3 trunk or OC3L broadband tributary card, verify or change the configuration settings according to your network configuration:</p> <p><b>Note:</b> Default settings are in bold.</p> <ul style="list-style-type: none"> <li>■ Addressing Mode: <b>UNI</b> is preset for the OC3L cards; <b>NNI</b> is preset for the OC3 trunk card.</li> <li>■ Facility Type: <b>SONET</b> is the OC3 trunk default; <b>SDH</b> is the OC3L default.</li> <li>■ Timing Option: click the <b>Loop</b> (OC3 trunk default), <b>Internal</b> (OC3L default), or <b>External</b> option button.</li> </ul> <p><b>Note:</b> If your system has an MTU card and two OC3TQ trunk cards installed, the Timing option must be set to External for both trunk cards.</p> <ul style="list-style-type: none"> <li>■ S1 Sync Status: enter a value (1 through <b>15</b>) in the Transmit dialog box (OC3 trunk cards only).</li> <li>■ Starvation Cycles: set these for Ingress and Egress for the OC3L card, and Ingress for the OC3 trunk card (except for the OC3T card).</li> <li>■ Path RDI (OC3 trunk cards) or HP RDI (OC3L card): <ul style="list-style-type: none"> <li>– Mode: click the <b>Default</b> option button (OC3 trunk cards only).</li> <li>– Loss of Cell Delineation: click the Enable or <b>Disable</b> option button.</li> <li>– Payload Label Mismatch: click the Enable or <b>Disable</b> option button.</li> <li>– Trace Identifier Mismatch: click the Enable or <b>Disable</b> option button (OC3 trunk cards only).</li> </ul> </li> </ul> <p>Click <b>Apply Changes</b>.</p> <p><b>Important! The ATM switch or router must be configured with the same facility type as the D50 (SONET or SDH).</b></p> <p>Refer to the volume titled <u>Craft Terminal</u> for more information on the OC3T tab page.</p>
<p><b>11</b></p>	<p>Click the <b>Status</b> tab to view the port’s Administration State.</p>
<p><b>12</b></p>	<p>Click the <b>Unlocked</b> option button in the Administration State box to “unlock” the port.</p>
<p><b>13</b></p>	<p>Click the <b>Save</b> button in the System window to save all changes to the MIB.</p>
<p><b>14</b></p>	<p>Click the <b>Refresh</b> icon in the toolbar to “refresh” the data in the Conditions list box.</p>

Table 5-17: Trunk/Broadband Cards/Ports—Unlock/Check Conditions

STEP	PROCEDURE
15	<p>The Conditions list box shows the Operational State and Availability Status for the port.</p> <p>Refer to Section 6—<i>Appendices</i>, Appendix F—“Conditions and Recommended Actions”; see the sections for trunk and broadband tributary cards. Follow the Recommended Action listed for the condition.</p> <p>You may now close the object view windows or leave them open.</p>
16	<p>Repeat Steps 1 through 15 to “unlock” the Administration State and check the configuration settings and conditions for the slot 8 (standby) trunk card and port, and for additional broadband tributary cards and ports.</p>
17	<p>The <b>Trunk and Broadband Cards/Ports— Unlock/Check Conditions</b> procedure is complete.</p> <p>Continue to the next procedure: <b>MLA Cards and Ports— Unlock/Check Conditions</b>.</p>

<sup>1</sup> The first unlocked trunk card becomes the active trunk card; in this case, the trunk card in slot 7.

<sup>2</sup> Craft Terminal automatically refreshes the data in the Conditions list dialog box. The Refresh icon forces a “refresh” command; this is an optional step.

**MLA Cards and Ports—  
 Unlock/Check  
 Conditions**

Follow these steps to “unlock” the Administration State and to check the operational conditions for all Master Control Shelf MLA cards and ports:

Table 5-18: MLA Cards and Ports—Unlock/Check Conditions

STEP	PROCEDURE
1	<p>To unlock the MLA card:</p> <ul style="list-style-type: none"> <li>■ Click the MLA card to bring up the card object view window.</li> </ul> <p><b>Note:</b> To see all the items in an object view window, you may need to drag it into view, or move or close other opened windows.</p> <ul style="list-style-type: none"> <li>■ Click the <b>Status</b> tab to view the card’s Administration State.</li> <li>■ Click <b>Unlocked</b> in the Administration State box.</li> </ul> <p><b>Note:</b> The card changes from black to dark blue after it is unlocked.</p>
2	<p>Click the <b>Save</b> button in the System window to save all changes to the MIB.</p>
3	<p>Click the <b>Refresh!</b>  icon in the toolbar to “refresh” the data in the Conditions list box.</p>

Table 5-18: MLA Cards and Ports—Unlock/Check Conditions (continued)

STEP	PROCEDURE
4	<p>The Conditions list box shows the Operational State and Availability Status for the MLA card.</p> <p>Refer to Section 6—<i>Appendices</i>, Appendix F—“Conditions and Recommended Actions,” Table 6-22: MLA Conditions &amp; Recommended Actions. Follow the Recommended Action listed for the condition.</p>
5	<p>Ports are depicted in the Equipment Locator as small circle ports on the cards. Click the port on the first MLA card to bring up the port object view window.</p> <p><b>Note:</b> For the MLAT1 card, clicking the port displays 5 additional ports: the IMUX port and four T1 ports; configuration settings must be set individually for each port. Click a port to bring up its object view window.</p>

Table 5-18: MLA Cards and Ports—Unlock/Check Conditions (continued)

STEP	PROCEDURE
6	<p>Verify the configuration settings as follows:</p> <p><b>Note:</b> Default settings are in bold.</p> <p>For <u>MLA2</u>, <u>MLA2L</u>, or <u>MLA2S</u> card ports:</p> <ul style="list-style-type: none"> <li>■ Click the <u>OC3T</u> tab, and verify: <ul style="list-style-type: none"> <li>– Facility Type: click the <b>SONET</b> option button (not SDH).</li> <li>– Timing Option: leave the <b>Internal</b> option button selected.</li> <li>– Starvation Cycles: set these for Ingress and Egress.</li> </ul> </li> </ul> <p>For <u>MLAT1</u> card ports:</p> <ul style="list-style-type: none"> <li>■ Click the <u>DS1</u> tab, and verify: <ul style="list-style-type: none"> <li>– Line Type (IMUX port only): select <b>ESF</b> or SF.</li> <li>– Transmit Clock Source (IMUX port only): leave the <b>Internal</b> option button selected.</li> <li>– Starvation Cycles (IMUX port only): set these for Ingress and Egress.</li> <li>– Line Build Out (non-IMUX ports only): leave the setting at <b>100</b> or enter a different setting as required.</li> </ul> </li> </ul> <p>For <u>MLAT3</u> card ports:</p> <ul style="list-style-type: none"> <li>■ Click the <u>DS3T</u> tab, and verify: <ul style="list-style-type: none"> <li>– Addressing Mode: the default <b>NNI</b> is preset.</li> <li>– Cell Scrambling: select Disable or <b>Enable</b>.</li> <li>– HEC Coset: select Disable or <b>Enable</b>.</li> <li>– Starvation Cycles: set these for Ingress and Egress.</li> <li>– Line Build Out: select <b>Low</b> or High.</li> <li>– Line Type: select Direct Mapping CBit, Direct Mapping M23, <b>PLCP CBit</b>, or PLCP M23.</li> <li>– Timing: select Loop or <b>Internal</b>.</li> </ul> </li> </ul> <p>Click <b>Apply Changes</b>.</p> <p><b>Important! The settings for the MLA card must match those for the corresponding LSM card. See the following section, LSM Card and Port— Unlock/Check Conditions.</b></p> <p>Refer to the volume titled <u>Craft Terminal</u> for more information on the MLA port tab pages, including Quality of Service (QoS) provisioning.</p>
7	Click the <b>Status</b> tab to view the port’s Administration State.
8	Click the <b>Unlocked</b> option button in the Administration State box to “unlock” the port.
9	Click the <b>Save</b> button in the System window to save all changes to the MIB.

Table 5-18: MLA Cards and Ports—Unlock/Check Conditions (continued)

STEP	PROCEDURE
10	Click the <b>Refresh</b> icon in the Tools menu to “refresh” the data in the Conditions list box.
11	The Conditions list box shows the Operational State and Availability Status for the MLA port.  Refer to Section 6— <i>Appendices</i> , Appendix F—“Conditions and Recommended Actions,” Table 6-22: MLA Conditions & Recommended Actions. Follow the Recommended Action listed for the condition.
12	For <u>MLAT1</u> cards only: repeat Steps 5 through 11 for each port on the card.
13	You may now close both MLA object view windows or leave them open.
14	Repeat Steps 1 through 13 for each installed MLA card.
15	The <b>MLA Cards and Ports— Unlock/Check Conditions</b> procedure is complete.  Continue to the next procedure: <b>LSM Card and Port— Unlock/Check Conditions</b> .

<sup>1</sup> Craft Terminal automatically refreshes the data in the Conditions list box. The Refresh icon forces a “refresh” command; this is an optional step.

**LSM Card and Port—  
Unlock/Check  
Conditions**

Follow these steps to “unlock” the Administration State and to check the operational conditions for the Line Card Shelf LSM card and port:

Table 5-19: LSM Card and Port—Unlock/Check Conditions

STEP	PROCEDURE
1	Display the LCS1 Equipment Locator group graphic by clicking <b>View</b> in the Main toolbar and selecting LCS1, or by right-clicking the LCS in the rack locator graphic.  <b>Note:</b> To see all the items in an object view window, you may need to drag it into view, or move or close other opened windows.
2	To unlock the LSM card: <ul style="list-style-type: none"> <li>■ Click the LSM card to bring up the card object view window.</li> <li>■ Click the <b>Status</b> tab to view the card’s Administration State.</li> <li>■ Click <b>Unlocked</b> in the Administration State box.</li> </ul> <b>Note:</b> The card changes from black to dark blue after it is unlocked.

Table 5-19: LSM Card and Port—Unlock/Check Conditions (continued)

STEP	PROCEDURE
3	Click the <b>Save</b> button in the System window to save all changes to the MIB.
4	Click the <b>Refresh</b> <sup>1</sup>  icon in the toolbar to “refresh” the data in the Conditions list box.
5	<p>The Conditions list box shows the Operational State and Availability Status for the LSM card.</p> <p>Refer to Section 6—<i>Appendices</i>, Appendix F—“Conditions and Recommended Actions,” <b>Table 6-23: LSM Conditions &amp; Recommended Actions</b>. Follow the Recommended Action listed for the condition.</p>
6	<p>Ports are depicted in the Equipment Locator as small circle ports on the cards. Click the port on the LSM card to bring up the port object view window.</p> <p><b>Note:</b> For the LSMT1 card, clicking the port displays 5 additional ports: the IMUX port and four T1 ports; configuration settings must be set individually for each port. Click a port to bring up its object view window.</p>

Table 5-19: LSM Card and Port—Unlock/Check Conditions (continued)

STEP	PROCEDURE
7	<p>Verify the configuration settings as follows:</p> <p><b>Note:</b> Default settings are in bold.</p> <p>For <u>LSM2</u>, <u>LSM2S</u>, or <u>LSM2L</u> card ports:</p> <ul style="list-style-type: none"> <li>■ Click the <u>OC3T</u> tab, and verify: <ul style="list-style-type: none"> <li>– Facility Type: click the <b>SONET</b> option button (not SDH).</li> <li>– Timing Option: click the Internal option button (not <b>Loop</b>).</li> <li>– Loss of Cell Delineation: select <b>Disable</b> or Enable.</li> <li>– Payload Label Mismatch: select <b>Disable</b> or Enable.</li> </ul> </li> </ul> <p>For <u>LSMT1</u> card ports:</p> <ul style="list-style-type: none"> <li>■ Click the <u>DS1</u> tab, and verify: <ul style="list-style-type: none"> <li>– Line Type (IMUX port only): select <b>ESF</b> or SF.</li> <li>– Transmit Clock Source (IMUX port only): click the Internal option button (not <b>Loop</b>).</li> <li>– Starvation Cycles (IMUX port only): set for Ingress.</li> <li>– Line Build Out (non-IMUX ports only): leave the setting at <b>100</b> or enter a different setting as required.</li> </ul> </li> </ul> <p>For <u>LSMT3</u> card ports:</p> <ul style="list-style-type: none"> <li>■ Click the <u>DS3T</u> tab, and verify: <ul style="list-style-type: none"> <li>– Addressing Mode: the default <b>NNI</b> is preset.</li> <li>– Cell Scrambling: select Disable or <b>Enable</b>.</li> <li>– HEC Coset: select Disable or <b>Enable</b>.</li> <li>– Starvation Cycles: set these for Ingress and Egress.</li> <li>– Line Build Out: select <b>Low</b> or High.</li> <li>– Line Type: select Direct Mapping CBit, Direct Mapping M23, <b>PLCP CBit</b>, or PLCP M23.</li> <li>– Timing: select <b>Loop</b>, Internal, or Internal PLCP.</li> </ul> </li> </ul> <p>Click <b>Apply Changes</b>.</p> <p><b>Important! The settings for the LSM card must match those for the corresponding MLA card. See the previous section, MLA Cards and Ports— Unlock/Check Conditions, page 5-38.</b></p> <p>Refer to the volume titled <u>Craft Terminal</u> for more information on the LSM port tab pages, including Quality of Service (QoS) provisioning.</p>
8	Click the <b>Status</b> tab to view the port’s Administration State.
9	Click the <b>Unlocked</b> option button in the Administration State box to “unlock” the port.
10	Click the <b>Save</b> button in the System window to save all changes to the MIB.

Table 5-19: LSM Card and Port—Unlock/Check Conditions (continued)

STEP	PROCEDURE
11	Click the <b>Refresh</b> icon in the toolbar to “refresh” the data in the Conditions list box.
12	The Conditions list box shows the Operational State and Availability Status for the LSM port.  Refer to Section 6— <i>Appendices</i> , Appendix F—“Conditions and Recommended Actions,” <b>Table 6-23: LSM Conditions &amp; Recommended Actions</b> . Follow the Recommended Action listed for the condition.
13	For <u>LSMT1</u> cards only: repeat Steps 6 through 12 for each port on the card.
14	You may now close both LSM object view windows or leave them open.
15	Repeat Steps 1 through 14 for each LCS in the rack locator.
16	The <b>LSM Card and Port—Unlock/Check Conditions</b> procedure is complete.  Continue to the next procedure: <b>Line Cards—Unlock/Check Conditions</b> .

<sup>1</sup> Craft Terminal automatically refreshes the data in the Conditions list box. The Refresh icon forces a “refresh” command; this is an optional step.

**Line Cards—Unlock/Check Conditions**

Follow these steps to “unlock” the Administration State and to check the operational conditions for line cards:

Table 5-20: Line Cards—Unlock/Check Conditions

STEP	PROCEDURE
1	Display the LCS1 Equipment Locator group graphic by clicking <b>View</b> in the Main toolbar and selecting LCS1, or by right-clicking the LCS in the rack locator graphic.  <b>Note:</b> To see all the items in the object view window, you may need to drag it into view, or move or close other opened windows.
2	Click the line card in the LCS1 equipment locator to open the line card dialog window.  <b>Note:</b> Line cards appear “black” at initial start-up.
3	Click the <b>Status</b> tab to view the line card Administration State.

Table 5-20: Line Cards—Unlock/Check Conditions (continued)

STEP	PROCEDURE
4	<p>Click the <b>Unlocked</b> option button in the Administration State box to “unlock” the card.</p> <p><b>Note:</b> Line cards change color from black to dark blue after they are “unlocked.”</p>
5	<p>Click the <b>Save</b> button in the System window to save all changes to the MIB.</p>
6	<p>Click the <b>Refresh</b>  icon in the toolbar to “refresh” the data in the Conditions list box.</p>
7	<p>The Conditions list box shows the Operational State and Availability Status for the line card.</p> <p>Refer to Section 6—<i>Appendices</i>, Appendix F—“Conditions and Recommended Actions,” <b>Table 6-24: Line Card Conditions &amp; Recommended Actions</b>. Follow the Recommended Action listed for the condition.</p> <p>You may now close the line card object view window or leave it open.</p>
8	<p>Repeat Steps 2 through 6 to “unlock” the Administration State and check the condition of each line card in the LCS.</p>
9	<p>Ports are depicted in the Equipment Locator as small circle ports on the cards. Clicking the port on a line card displays Ports 1–4 for quad cards and Ports 1–8 for octal cards.</p> <p><b>Note:</b> A black line card port indicates a “locked” Administration State. The line card port turns green once the port is unlocked and “synched up” with end user equipment (CPE).</p> <p><b>Important! Do not unlock a line card port until it is provisioned and connected to CPE, or an “alarm” condition will be generated.</b></p>

Table 5-20: Line Cards—Unlock/Check Conditions (continued)

<b>STEP</b>	<b>PROCEDURE</b>
<b>10</b>	Are there additional Line Card Shelves? <ul style="list-style-type: none"><li>■ If YES, repeat all the steps from the previous section (<b>LSM Card and Port—Unlock/Check Conditions</b>, page 5-41) and this section for each LCS.</li><li>■ If NO, the Line Cards—Unlock/Check Conditions procedure is complete.</li></ul>
<b>11</b>	The <b>Line Cards—Unlock/Check Conditions</b> procedure is complete.  <b>Important!</b> Be sure to replace the MCS top screen and replace and close MCS and LCS front and back panels after completion of all procedures in the volumes titled <u>Installation</u> and <u>Commissioning</u> , to ensure proper air flow through the D50.

<sup>1</sup> Craft Terminal automatically refreshes the data in the Conditions list box. The Refresh icon forces a “refresh” command; this is an optional step.

## Chapter 3

### Craft Terminal Direct Ethernet Connection

---

#### Introduction

Craft Terminal<sup>1</sup> can also connect directly to the D50 through an Ethernet cross-over cable connected to the Master Control Shelf (MCS) backplane.

Before the Ethernet connection can be used, IP address information must be set up for the D50 using a serial port connection from Craft Terminal. Refer to Chapter 2—“Using Craft Terminal for Commissioning.”

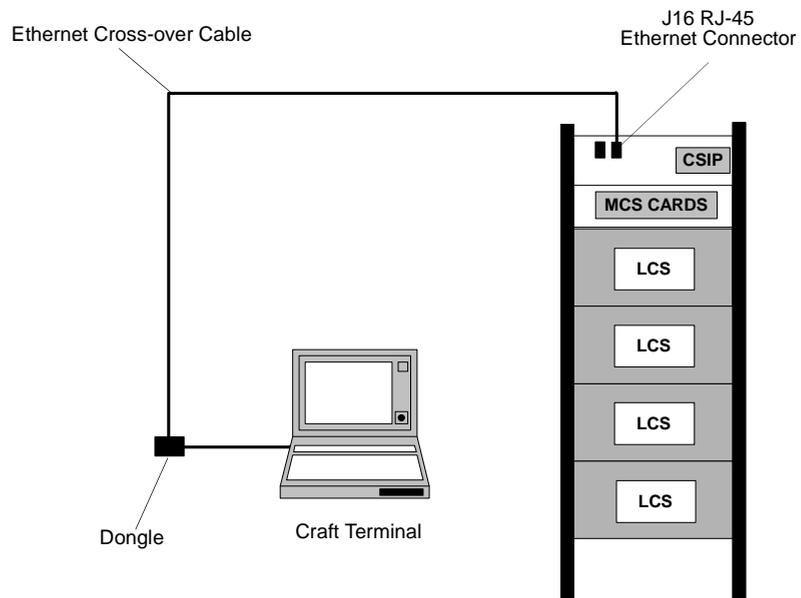


Figure 5-11: Craft Terminal Direct Ethernet Connection to the D50

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#### Required Equipment and IP Information

The Craft Terminal Direct Ethernet connection to the D50 requires the following equipment and information:

- Ethernet LAN PC card.
- PC card modem dongle with an RJ-45 female plug.
- Ethernet 10Base-T cross-over cable with RJ-45 male plugs on both ends.
- IP Address, Mask and Gateway information initialized on the NMP card. Refer to Chapter 2—“Using Craft Terminal for Commissioning.”

---

<sup>1</sup> A lower version of Craft Terminal (Release 10.0 and lower) can be loaded on the same platform with Craft Terminal Release 11.0 to manage a previous release of D50 system software. The lower version of Craft Terminal must be loaded into a different directory from the Craft Terminal Release 11.0 software.

**Direct Ethernet Connection Set-up**

Follow these steps to set up the Craft Terminal direct Ethernet connection and to access the D50:

Table 5-21: Direct Ethernet Connection Set-up

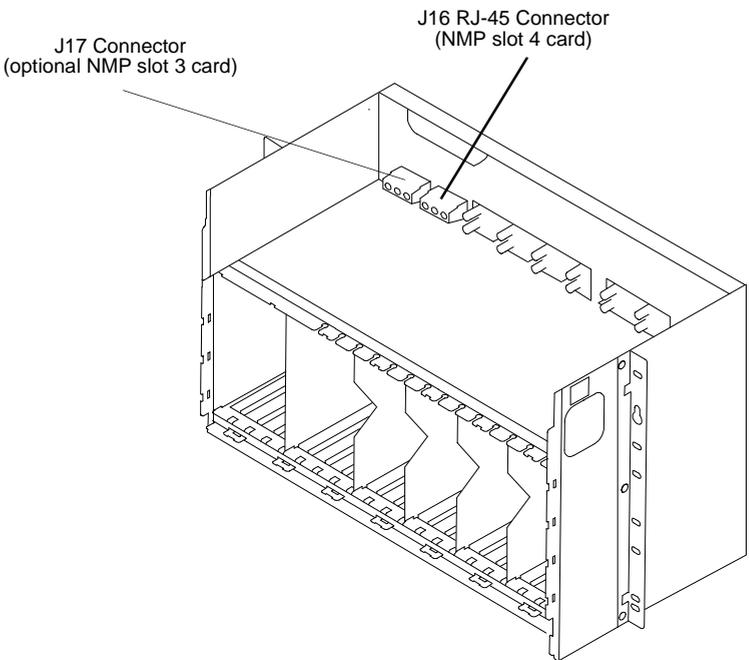
STEP	PROCEDURE
1	Insert the Ethernet LAN PC card into the card port on the PC.
2	Connect the dongle to the PC card.
3	Connect the Ethernet cross-over cable to the dongle.
4	Refer to the “Basic Procedures” chapter in this volume to remove and replace the MCS top screen.
5	Push the cross-over cable through one of the large cable ports at the back of the MCS.
6	<p>Connect the cable to the J16 RJ-45 connector.</p>  <p>The diagram shows a perspective view of the MCS backplane. Two RJ-45 connectors are highlighted with callouts: 'J17 Connector (optional NMP slot 3 card)' on the left and 'J16 RJ-45 Connector (NMP slot 4 card)' on the right. The backplane is shown with its top cover removed, revealing the internal slots and components.</p>
<p>Figure 5-12: Ethernet Connector Locations on the MCS Backplane</p>	
7	Power up the PC.
8	<p>To start the Craft Terminal application:</p> <ul style="list-style-type: none"> <li>■ Click the <b>Start</b> button (usually located at the lower left corner of the PC screen).</li> <li>■ Select <b>Programs ⇒ Nokia ⇒ Craft Terminal</b>.</li> </ul> <p>or if you have installed the Craft Terminal icon on your desktop:</p> <ul style="list-style-type: none"> <li>■ Double-click the <b>Craft Terminal</b> icon.</li> </ul>

Table 5-21: Direct Ethernet Connection Set-up (continued)

STEP	PROCEDURE
9	In the <b>Connection Dialog</b> box, click on <b>Ethernet</b> .
10	Enter the IP Address for the D50.
11	Click <b>OK</b> . After a few moments, the screen displays the D50 components and the toolbar.
12	<p>When you have finished with the D50, select <b>File</b> ⇒ <b>Exit</b>.</p> <p>Craft Terminal is now closed.</p> <p>The <b>Direct Ethernet Connection Set-up</b> procedure is complete.</p> <p><b>Important!</b> Be sure to replace the MCS top screen and replace and close MCS and LCS front and back panels after completion of all procedures in the volumes titled <u>Installation</u> and <u>Commissioning</u>, to ensure proper air flow through the D50.</p>

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## Chapter 4

### Connectivity Tests

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**Introduction** After all the procedures in the volume titled Installation and the previous procedures in this volume are completed, the D50 should be operational. The following connectivity tests and system checks should be completed.

---

**Connectivity Tests** End-to-end connectivity testing should be performed for both data only and data plus voice applications, to confirm that data is passing successfully between the CPE and the ATM network element. Connectivity testing is performed by “pinging” between elements, as shown in the following diagrams.

In a bridged environment:

- 1 Ping from the client PC(s) to the Ethernet interface at the ATM network element.
- 2 Ping from the server to the Ethernet interface at the ATM network element.
- 3 Ping from the server to the client PC.

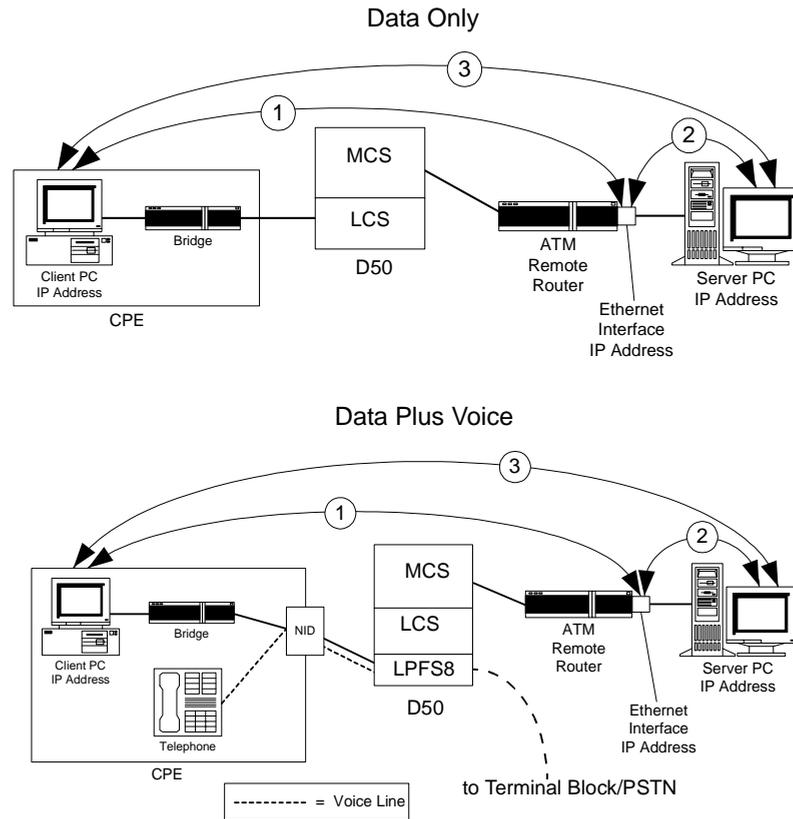


Figure 5-13: Bridged Environment “Ping” Tests

In a routed environment:

- 1 Ping from the client PC(s) to the ATM trunk interface at the ATM network element (if an IP address is assigned to the ATM trunk interface).
- 2 Ping from the client PC(s) to the Ethernet interface at the ATM network element.
- 3 Ping from the server to the Ethernet interface at the ATM network element.
- 4 Ping from the server to the client PC(s).

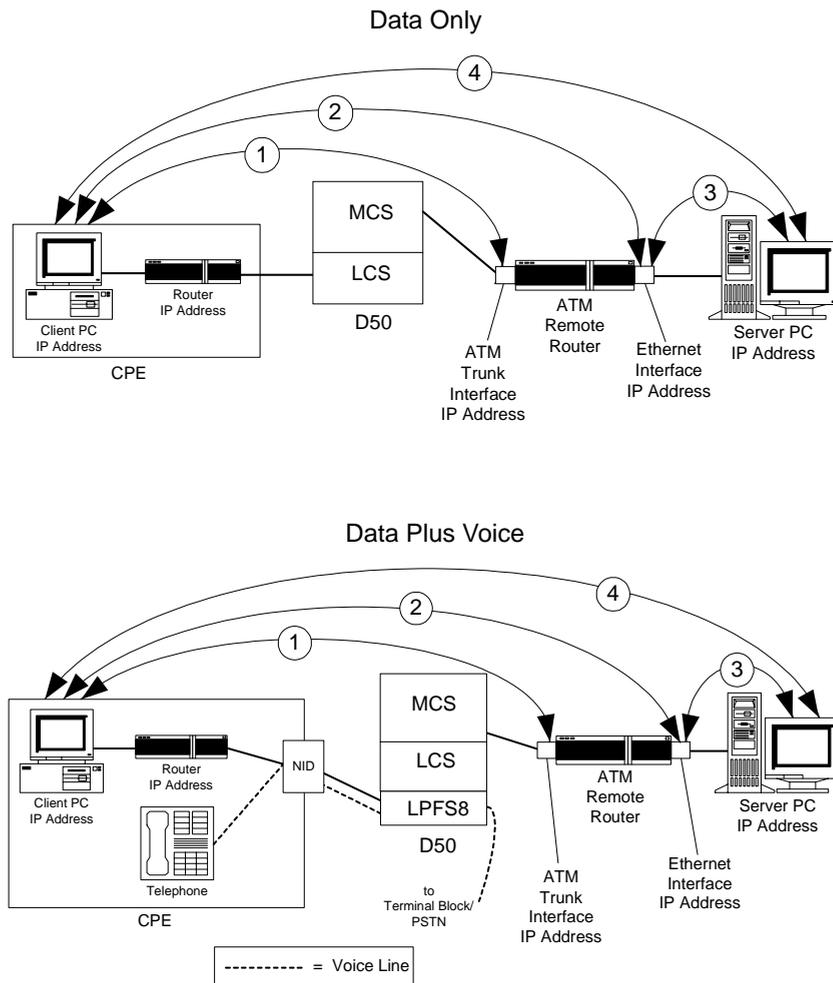


Figure 5-14: Routed Environment “Ping” Tests

**CSIP Alarms**      The CSIP has two red Fuse Alarm indicator lights (to indicate a blown fuse) and one red Bay Alarm indicator light (to indicate system initialization). These lights should be off. For details and diagrams, refer to Chapter 1—“Power Up and Visual Status Check” in this section.

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**Card Front Panel Indicators**      Each D50 card has front panel indicator lights which provide visual status information. The lights should appear as follows:

- “FAIL” (red) – off.
- “ENABL” (green) – steady on.
- “ACT” (yellow) – steady on.
- “SYNC” (yellow) – steady on.
- “ALM” (red) – off.

**Note:** Not all lights appear on all cards.

For details on indicator lights for each card, refer to Chapter 1—“Power Up and Visual Status Check” in this section and Section 6—*Appendices*, Appendix C—“Card Front Panel LED Indicators” in this volume.

For details on indicator lights on the MTU (Master Timing Unit) timing card, refer to both of the references mentioned above.

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**Craft Terminal and Displays**      Craft Terminal displays colored graphics for the MCS, LCSs, cards, and ports. The colors indicate different conditions for the represented item. The colors listed indicate unlocked, enabled, and operational equipment:

- MCS and LCSs – dark blue.
- Cards – dark blue.
- Port objects – green.

**Note:** For line cards only, click the port object to display the individual ports; unlocked and provisioned ports are green, locked and non-provisioned ports are black.

For details, refer to:

- Chapter 2—“Using Craft Terminal for Commissioning” in this section, the individual sections for each card type titled “Cards/Ports—Unlock/Check Conditions” in this volume.
  - The volume titled Craft Terminal.
-

**Card Conditions and Status**

The following table lists the Operational State, Availability Status, Primary/Standby status, and Conditions for each card in Craft Terminal, as they appear when the card is capable of providing service:

Table 5-22: Card Conditions and Status

<b>Card Type</b>	<b>Operational State</b>	<b>Availability Status</b>	<b>Primary/Standby Status</b>	<b>Conditions</b>
NMP	Enabled	Operable	-----	-----
MCP (slot 6)	Enabled	Operable	Primary	-----
MCP (slot 5)	Enabled	Operable	Standby	-----
Trunk (slot 8)	Enabled	Operable	Primary	-----
Trunk (slot 7)	Enabled	Operable	Standby	-----
MLA	Enabled	Operable	-----	-----
Broad-band	Enabled	Operable	-----	-----
LSM	Enabled	Operable	-----	-----
Line	Enabled	Operable	-----	-----

**Note:** The optional MTU cards do not appear in Craft Terminal, nor does the optional Remote Craft Access Unit (RCAU) card.

For details on Conditions, refer to Section 6—*Appendices*, Appendix F—“Conditions and Recommended Actions” in this volume. For details on display windows and contents, refer to the volume titled Craft Terminal.



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## SECTION 6 APPENDICES

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## Appendix A

### D50 Commissioning Checklist

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#### Card Placement and Card Cabling

Complete the following steps to place MCS, LCS, and LPFS8 cards and complete cabling and connections for ATM Network, MLA, LSM, and broadband tributary cards:

Table 6-1: Card Placement and Card Cabling Checklist

STEP	PROCEDURE	✓
1	<p><b>Important! Always wear a properly grounded ESD strap when handling cards.</b></p> <p>Place cards into the MCS as indicated on the work order:</p> <ul style="list-style-type: none"> <li>■ MTU, slots 1 and 2.<sup>1</sup></li> <li>■ NMP, slot 4.</li> <li>■ MCP, slots 5 (optional) and 6.</li> <li>■ DS3 or OC3 trunk cards, slots 7 (standby, optional) and 8 (primary, required).</li> <li>■ MLA cards (slots 9 through 20). One MLA card required for each LCS, Remote LCS, or D50 RAM.</li> <li>■ Broadband tributary cards OC3L and DS3L (slots 9 through 20). One broadband tributary card is required for each piece of standard ATM network equipment.</li> </ul> <p><b>Reference:</b> The volume titled <u>Commissioning</u>:</p> <ul style="list-style-type: none"> <li>■ Section 1—<i>Basic Procedures</i>, Chapter 1—“Basic Procedures.”</li> <li>■ Section 2—<i>Card Placement</i>, Chapter 1—“MCS Card Installation.”</li> </ul>	
2	<p>Place line cards (slots 1 through 24) as indicated on the work order. The LCS is divided into four groups of six line card slots (“six packs”) for cabling on the backplane. Place the same type of line card within a “six pack”; do not mix line card types within a “six pack.”</p> <p><b>Reference:</b> The volume titled <u>Commissioning</u>, Section 2—<i>Card Placement</i>, Chapter 2—“LCS Card Installation.”</p>	

Table 6-1: Card Placement and Card Cabling Checklist (continued)

STEP	PROCEDURE	✓
3	<p>Place the LSM card (slot 25) in the collocated LCS(s) as indicated on the work order. The LSM card must match its corresponding MLA card as follows:</p> <ul style="list-style-type: none"> <li>■ LSM2 to MLA2.</li> <li>■ LSM2S to MLA2S.</li> <li>■ LSM2L to MLA2L.</li> <li>■ LSMT1 to MLAT1.</li> <li>■ LSMT3 to MLAT3.</li> </ul> <p><b>Reference:</b> The volume titled <u>Commissioning</u>, Section 2—<i>Card Placement</i>, Chapter 2—“LCS Card Installation.”</p>	
4	<p>Place LPF8-2<sup>2</sup> cards in the LPFS8 as indicated on the work order (required for data plus voice).</p> <p><b>Reference:</b> The volume titled <u>Commissioning</u>, Section 2—<i>Card Placement</i>, Chapter 3—“LPFS8 Card Installation.”</p>	
5	<p>Connect trunk card fiber optic cabling at OC3T, OC3T2, OC3T2L, OC3T2M, OC3TQS, OC3TQM, or OC3TQL trunk cards.</p> <p><b>Reference:</b> The volume titled <u>Commissioning</u>, Section 3—<i>Card Cabling</i>, Chapter 1—“OC3 Trunk Card Cabling.”</p>	
6	<p>Connect MLA2 to LSM2 card multi-mode fiber optic cabling for co-located MCS and LCS installations.</p> <p><b>Reference:</b> The volume titled <u>Commissioning</u>, Section 3—<i>Card Cabling</i>, Chapter 2—“MLA2 to LSM2 Card Cabling.”</p>	
7	<p>Connect MLA2L/MLA2S or OC3L card single-mode fiber optic cabling for Remote LCS or other standard ATM network equipment applications.</p> <p><b>Reference:</b> The volume titled <u>Commissioning</u>, Section 3—<i>Card Cabling</i>, Chapter 3—“MLA2L/MLA2S/OC3L Card Cabling.”</p>	
8	<p>Connect MLAT1 card copper cabling for Remote LCS or D50 RAM applications.</p> <p><b>Reference:</b> The volume titled <u>Commissioning</u>, Section 3—<i>Card Cabling</i>, Chapter 4—“MLAT1 Card Cabling.”</p>	
9	<p>Connect MLAT3 or DS3L card coax cabling for Remote LCS/D50 RAM applications or other standard ATM network equipment applications.</p> <p><b>Reference:</b> The volume titled <u>Commissioning</u>, Section 3—<i>Card Cabling</i>, Chapter 5—“MLAT3/DS3L Card Cabling.”</p>	

Table 6-1: Card Placement and Card Cabling Checklist (continued)

STEP	PROCEDURE	✓
10	<p>Place line cards and the LSM card (and LPF8M or MRTC cards for the D50 RAM) at the Remote LCS or D50 RAM location as indicated on the work order. The LSM card must match its corresponding MLA card as shown:</p> <ul style="list-style-type: none"> <li>■ LSM2 to MLA2.</li> <li>■ LSM2S to MLA2S.</li> <li>■ LSM2L to MLA2L.</li> <li>■ LSMT1 to MLAT1.</li> <li>■ LSMT3 to MLAT3.</li> </ul> <p><b>Reference:</b></p> <ul style="list-style-type: none"> <li>■ The volume titled <u>Commissioning</u>, Section 2—<i>Card Placement</i>, Chapter 2—“LCS Card Installation.”</li> <li>■ The volume titled <u>Installation</u>, Section 8—<i>D50 RAM</i>, Chapter 5—“D50 RAM Card Installation.”</li> </ul>	
11	<p>Connect the LSM card cabling at the Remote LCS or D50 RAM location as indicated on the work order.</p> <p><b>Reference:</b></p> <ul style="list-style-type: none"> <li>■ The volume titled <u>Commissioning</u>: <ul style="list-style-type: none"> <li>– Section 4—<i>Remote Site Cabling</i>: <ul style="list-style-type: none"> <li>- Chapter 1—“LSM2L/LSM2S Card Cabling.”</li> <li>- Chapter 2—“LSMT1 Card Cabling.”</li> <li>- Chapter 3—“LSMT3 Card Cabling.”</li> </ul> </li> <li>– The volume titled <u>Installation</u>, Section 8—<i>D50 RAM</i>, <ul style="list-style-type: none"> <li>■ Chapter 6—“D50 RAM LSMT1 Cabling.”</li> </ul> </li> </ul> </li> </ul>	

<sup>1</sup> MTU cards are optional.

<sup>2</sup> LPF8-2 cards are T1.413i2 compliant with DMT8a-3 line cards.

**Test and Commissioning**

Complete the following steps to power up the D50, unlock cards/ports, check operational status, configure the trunk cards and establish communication via an Ethernet or In-Band Management network:

Table 6-2: Test and Commissioning Checklist

STEP	PROCEDURE	✓
1	<p>Install 15 amp GMT fuses in the MCS CSIP and/or Auxiliary CSIP based on the number of LCS(s).</p> <p><b>Reference:</b> The volume titled <u>Commissioning</u>, Section 5—<i>Commissioning</i>, Chapter 1—“Power Up and Visual Status Check.”</p>	
2	<p>Power up the D50, wait for it to go through the boot-up and initialization process. Check indicator lights on cards for visual status check. All FAIL and ALM indicator lights go out, ENABL lights on cards will flash on and off at 2 second intervals until the cards/ports are unlocked.</p> <p><b>Reference:</b> The volume titled <u>Commissioning</u>, Section 5—<i>Commissioning</i>, Chapter 1—“Power Up and Visual Status Check.”</p>	
3	<p>Connect Craft Terminal laptop to the D50 using a serial port cable (straight through cable with 9-pin RS-232-C (DB-9) connectors; see documentation referenced below for pin-out charts) to the J2 serial port connector on the MCS.</p> <p>Open the Craft Terminal application and select “Serial Cable” in the Connection Dialog window.</p> <p><b>Reference:</b> The volume titled <u>Commissioning</u>:</p> <ul style="list-style-type: none"> <li>■ Section 5—<i>Commissioning</i>, Chapter 2—“Using Craft Terminal for Commissioning.”</li> <li>■ Section 6—<i>Appendices</i>, Appendix E—“Craft Terminal Troubleshooting Tips.”</li> </ul>	

Table 6-2: Test and Commissioning Checklist (continued)

STEP	PROCEDURE	✓
4	<p>Configure NMP Slot 4 IP Addresses for Ethernet or In-Band Management network connection (select “Tools” ⇒ “Initialize System” from the pull down menu):</p> <ul style="list-style-type: none"> <li>■ IP Address.</li> <li>■ IP Mask.</li> <li>■ VPI/VCI (required for In-Band Management only).</li> <li>■ Gateway IP (if required).</li> </ul> <p><b>Important! For In-Band Management, the VPI/VCI bandwidth configuration on the ATM switch/router can not exceed a maximum of 128 Kbps and the VPI/VCI information must match the In-Band settings entered via Craft Terminal.</b></p> <p><b>Reference:</b> The volume titled <u>Commissioning</u>, Section 5—<i>Commissioning</i>, Chapter 2—“Using Craft Terminal for Commissioning.”</p>	
5	<p>Use Craft Terminal to:</p> <ul style="list-style-type: none"> <li>■ Unlock all the D50 MCS and LCS cards/ports.</li> <li>■ Check the Operational State and Administrative Status of each card/port.</li> </ul> <p>Click the “Save” button in the System window to save all changes to the MIB.</p> <p><b>Note:</b> Line card ports should not be unlocked until the port is provisioned and connected to end user equipment. You will cause an alarm condition if you unlock a line card port before provisioning is complete.</p> <p><b>Reference:</b> The volume titled <u>Commissioning</u>:</p> <ul style="list-style-type: none"> <li>■ Section 5—<i>Commissioning</i>, Chapter 2—“Using Craft Terminal for Commissioning.”</li> <li>■ Section 6—<i>Appendices</i>, Appendix F—“Conditions and Recommended Actions.”</li> </ul>	
6	<p>Configure the trunk and broadband card(s) and port(s) to work with the ATM switch or router connected to the other side of the ATM trunk connection, according to the cards in your system:</p> <ul style="list-style-type: none"> <li>■ For a DS3 trunk or DS3L broadband card, continue to Step 7.</li> <li>■ For an OC3 trunk or OC3L broadband card, skip to Step 8.</li> </ul>	

Table 6-2: Test and Commissioning Checklist (continued)

STEP	PROCEDURE	✓
7	<p>For a DS3 trunk or DS3L broadband card, verify or change the configuration settings according to your network configuration:</p> <p><b>Note:</b> Trunk configuration settings must match those on the ATM switch or router.</p> <ul style="list-style-type: none"> <li>■ Addressing Mode. Default: NNI (DS3 trunk card) or UNI (DS3L card).</li> <li>■ Cell Scrambling. Default: Enable.</li> <li>■ HEC Coset. Default: Enable.</li> <li>■ Starvation Cycles. Defaults: 0.</li> <li>■ Line Build Out. Default: Low.</li> <li>■ Line Type. Default: PLCP CBit.</li> <li>■ Timing. Default: Loop (DS3 trunk) or Internal (DS3L).</li> </ul> <p><b>Note:</b> If your system has an MTU card and two DS3TQ trunk cards installed, the Timing option must be set to External for both trunk cards.</p> <p>Click the <b>Apply Changes</b> button. Click the <b>Save</b> button in the System window to save trunk card configuration settings to the MIB.</p> <p><b>Reference:</b> The volume titled <u>Commissioning</u>:</p> <ul style="list-style-type: none"> <li>■ Section 5—<i>Commissioning</i>, Chapter 2—“Using Craft Terminal for Commissioning.”</li> <li>■ Section 6—<i>Appendices</i>, Appendix F—“Conditions and Recommended Actions.” See the sections for trunk and broadband cards.</li> </ul> <p>Skip to Step 9.</p>	

Table 6-2: Test and Commissioning Checklist (continued)

STEP	PROCEDURE	✓
8	<p>For an OC3 trunk or OC3L broadband card, verify or change the configuration settings according to your network configuration:</p> <ul style="list-style-type: none"> <li>■ Addressing Mode. Default: NNI (OC3 trunk card) or UNI (OC3L card).</li> <li>■ Facility Type. Default: SONET (OC3 trunk) or SDH (OC3L).</li> <li>■ Timing Option. Default: Loop (OC3 trunk) or Internal (OC3L).</li> </ul> <p><b>Note:</b> If your system has an MTU card and two OC3TQ trunk cards installed, the Timing option must be set to External for both trunk cards.</p> <ul style="list-style-type: none"> <li>■ S1 Sync Status. Default: 15.</li> <li>■ Starvation Cycles. Defaults: 0.</li> <li>■ Path RDI (OC3 trunk) or HP RDI (OC3L): <ul style="list-style-type: none"> <li>– Mode. Default: Default.</li> <li>– Loss of Cell Delineation. Default: Disable.</li> <li>– Payload Label Mismatch. Default: Disable.</li> <li>– Trace Identifier Mismatch. Default: Disable.</li> </ul> </li> </ul> <p><b>Note:</b> Trunk configuration settings must match those on the ATM switch or router.</p> <p>Click the <b>Apply Changes</b> button. Click the <b>Save</b> button in the System window to save trunk card configuration settings to the MIB.</p> <p><b>Reference:</b> The volume titled <u>Commissioning</u>:</p> <ul style="list-style-type: none"> <li>■ Section 5—<i>Commissioning</i>, Chapter 2—“Using Craft Terminal for Commissioning.”</li> </ul> <p>Section 6—<i>Appendices</i>, Appendix F—“Conditions and Recommended Actions.” See the sections for trunk and cards.</p>	
9	<p>Conduct connectivity tests between the various network elements to verify that data and/or voice is passing successfully between the CPE and the ATM network.</p> <p><b>Reference:</b> The volume titled <u>Commissioning</u>, Section 5—<i>Commissioning</i>, Chapter 4—“Connectivity Tests.”</p>	

Table 6-2: Test and Commissioning Checklist (continued)

STEP	PROCEDURE	✓
10	<p>On the MCS CSIP and each Auxiliary CSIP, verify that both red Fuse Alarm indicator lights and the red Bay Alarm indicator light are off.</p> <p><b>Reference:</b> The volume titled <u>Commissioning</u>, Section 5—<i>Commissioning</i>, Chapter 1—“Power Up and Visual Status Check.”</p> <p><b>Reference:</b> The volume titled <u>Commissioning</u>, Section 5—<i>Commissioning</i>, Chapter 4—“Connectivity Tests.”</p>	
11	<p>Be sure front panel indicator lights on the front of all D50 cards appear as follows:</p> <ul style="list-style-type: none"> <li>■ “FAIL” (red) – off.</li> <li>■ “ENABL” (green) – steady on.</li> <li>■ “ACT” (yellow) – steady on.</li> <li>■ “SYNC” (yellow) – steady on.</li> <li>■ “ALM” (red) – off.</li> </ul> <p><b>Reference:</b> The volume titled <u>Commissioning</u>, Section 5—<i>Commissioning</i>, Chapter 4—“Connectivity Tests.”</p>	
12	<p>Be sure all D50 elements created in Craft Terminal are displayed as follows:</p> <ul style="list-style-type: none"> <li>■ MCS and LCSs – dark blue.</li> <li>■ Cards – dark blue.</li> <li>■ Port objects – green.</li> </ul> <p><b>Note:</b> For line cards only, click the port object to display the individual ports; unlocked and provisioned ports are green, locked and non-provisioned ports are black.</p> <p><b>Reference:</b> The volume titled <u>Commissioning</u>, Section 5—<i>Commissioning</i>, Chapter 4—“Connectivity Tests.”</p>	

Table 6-2: Test and Commissioning Checklist (continued)

STEP	PROCEDURE	✓
<p><b>13</b></p>	<p>The D50 is operational when the following Conditions, Operational State and Availability Status readings are displayed:</p> <ul style="list-style-type: none"> <li>■ NMP: No Conditions, Enabled, Operational.</li> <li>■ MCP (slot 6): Primary service provider, Enabled, Operational.</li> <li>■ MCP (slot 5) Standby from a protection group, Enabled, Operational.</li> <li>■ Trunk (slot 8): Primary service provider, Enable, Operational.</li> <li>■ Trunk (slot 7): Standby from a protection group, Enabled, Operational.</li> <li>■ MLA/broadband tributary cards: No Conditions, Enabled, Operational.</li> <li>■ LSM: No Conditions, Enabled, Operational.</li> <li>■ Line Card: No Conditions, Enabled, Operational.</li> </ul> <p><b>Reference:</b> The volume titled <u>Commissioning</u>, Section 5—<i>Commissioning</i>, Chapter 4—“Connectivity Tests.”</p>	
<p><b>14</b></p>	<p>Be sure to replace the MCS top screen and replace and close MCS and LCS front and back panels after completion of all procedures in the volumes titled <u>Installation</u> and <u>Commissioning</u>, to ensure proper air flow through the D50.</p> <p><b>Reference:</b> The volume titled <u>Commissioning</u>, Section 1—<i>Basic Procedures</i>, Chapter 1—“Basic Procedures.”</p>	



## Appendix B

### QoS Hardware and Software Compatibilities

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**Compatibilities Table** The following table shows QoS capabilities supported by the D50 trunk and MLA cards:

Table 6-3: QoS Hardware and Software Compatibilities

<b>QoS V4 Priority Queuing</b>		<b>ATM QoS<sup>1</sup></b>		
	<b>Hardware</b>	<b>Software</b>	<b>Hardware</b>	<b>Software</b>
D50 Trunk Cards	DS3T2, OC3T2, OC3T2M, OC3T2L	Release 5.1	DS3TQ, OC3TQL, OC3TQM, OC3TQS	Release 6.0, 8.0, 9.0, 10.0, and 11.0
MLA Cards	MLA2, MLA2S, MLA2L, MLAT3, MLAT1	Release 5.1	MLA2, MLA2S, MLA2L, MLAT3, MLAT1	Release 6.0, 8.0, 9.0, 10.0, and 11.0

<sup>1</sup> ATM QoS supports CBR, VBR-nrt, VBR-rt, UBR, and UBR+.



## Appendix C

### Card Front Panel LED Indicators

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#### Card Front Panel LED Indicators

The front panel of each card in the Master Control Shelf (MCS) and Line Card Shelf (LCS) has LED indicator lights. The purpose of these LEDs is to provide limited information and conditions about the D50. These LED indicators are defined in the tables below for each MCS and LCS card.

**Note:** For information about front panel LED indicators for the MTU (Master Timing Unit) card, see the **MTU Card LED Indicators** section at the end of this appendix.

Table 6-4: Red LED “FAIL” Indicator—All Cards

Steady ON	Flashing	OFF
<p><b>Card Failure.</b></p> <p>Card failure detected during power-up self test or during operation.</p>	<p><b>Card Type Mismatch.</b></p> <p>Card software is more recent than the MCP’s, or the slot’s provisioning is not for this card.</p> <p>The flashing frequency is <u>fast</u> (1 Hz), 0.5 seconds on, 0.5 seconds off.</p> <p><b>Card Upgrading.</b></p> <p>Card software is upgrading.</p> <p>The flashing frequency is <u>slow</u> (0.33 Hz), 1.5 seconds on, 1.5 seconds off.</p>	<p><b>Card is Operational.</b></p> <p>The card passed all internal diagnostics and is operational.</p>

Table 6-5: Green LED “ENABL” Indicator—All Cards

Steady ON	Flashing	Flashing Slowly
<p><b>Card is Unlocked.</b></p> <p>The card is unlocked and may be providing service; <b>DO NOT</b> remove this card.</p> <p>Indicates that the card has initialized all its hardware and software and can provide at least partial service, and has been administratively unlocked in the MIB.</p>	<p><b>Card is Initializing.</b></p> <p>The card is powered up and going through initialization; wait for it to stop flashing.</p> <p>MCP and Trunk Cards: For protection group cards the flashing green light indicates “hot” standby status. The card is being updated with configuration information from the active card.</p> <p>The flashing will stop once the synchronization process is complete. The card is in “standby” status ready to take over when the green LED is steady “ON.”</p>	<p><b>Card is Locked.</b></p> <p>The flashing frequency is <u>slow</u> (0.33 Hz), 1.5 seconds on, 1.5 seconds off.</p> <p>The card is administratively locked in the MIB. All operation is inhibited. No service will be provided.</p>

Table 6-6: Yellow LED “ACT” Indicator—MCP, Trunk, LSM Cards

Steady ON	Flashing	OFF
<p><b>Card is Active.</b></p> <p>This card is the active card of a protection pair and is providing service; <u>DO NOT</u> remove.</p>	<p><b>Card is Synchronizing.</b></p> <p>The protection card is synchronizing with the active card and is not ready to take over operations; it is in “hot” standby status.</p>	<p><b>Card is in Standby Mode.</b></p> <p>Indicates “standby” status for a protection card. This card is synchronized with the active card and is ready to take over operations.</p> <p>Standby status for a protection card is also indicated by steady “ON” green light.</p>

Table 6-7: Yellow LED “SYNC” Indicator—Line Cards

Steady ON	Flashing	OFF
<p><b>Card is Synchronized.</b></p> <p>One or more ports on this line card are connected to equipment on the other end of the outside loop; e.g., CPE, a NIC card, or a modem.</p> <p>This line card may be providing service; <u>DO NOT</u> remove.</p>	<p>Flashing at 0.5 Hz: card is in Test mode.</p> <p>Flashing at other than 0.5 Hz: card is in Training mode, it is establishing a connection to equipment on the other end of the outside loop; e.g., CPE, a NIC card or a modem.</p>	<p><b>Card is not Synchronized.</b></p> <p>None of the ports on this line card are connected to equipment on the other end of the outside loop.</p>

Table 6-8: Red LED “ALM” Indicator—Trunk, MLA, LSM Cards

Steady ON	OFF
<p><b>Card is in Alarm.</b>            A near-end or far-end alarm condition exists on one or more ports.</p> <ul style="list-style-type: none"> <li> <p>■ <b>Trunk Cards</b>                The trunk port connects to the ATM network with Tx/Rx coaxial cabling (DS3 trunk cards) or Tx/Rx fiber optic cabling (OC3 trunk cards). The ALM indicator will stay on if the “transmit” and “receive” cable connections are <u>reversed</u> between the trunk card and the ATM network.</p> <p>Disconnect and flip the coaxial cable connection at the MCS backplane or the fiber optic cable connectors at the trunk card faceplate to correct this condition.</p> </li> <li> <p>■ <b>MLA and LSM Cards</b>                The MLA and LSM ports connect to each other with fiber optic, coaxial, or copper cabling. The MLA “transmit” connector connects to the LSM “receive” connector, and the MLA “receive” connector connects to the LSM “transmit” connector. The ALM indicator will stay on if the “transmit” and “receive” connections are <u>reversed</u> between the MLA and the LSM.</p> <p>Disconnect and flip the MLA/LSM cable connections at the card faceplates to correct this condition.</p> </li> </ul>	<p>No alarm exists.</p>

Table 6-9: Red LED “ALM” Indicator—Broadband Cards

<b>Steady ON</b>	<b>OFF</b>
<p><b>Card is in Alarm.</b>  <u>Broadband tributary cards</u>                      The broadband port connects to ATM equipment with fiber optic (OC3L card) or coaxial (DS3L card) cabling. The ALM indicator will stay on if there is a diagnostic test failure or a loss of signal (LOS) condition.</p>	<p>No alarm exists.</p>

Table 6-10: Red LED “ALM” Indicator—Line Cards

<b>Steady ON</b>	<b>OFF</b>
<p><b>Card is in Alarm.</b>                      An alarm condition exists on one or more ports. Indicates that one or more of the ports configured for “managed service” is unable to perform its function.                      An alarm condition may mean loss of synchronization, not an equipment failure.                      Line card ports connect to equipment on the other end of the outside loop, e.g., a NIC card, a modem, or other CPE.</p>	<p>No alarm exists, or the card is not provisioned for managed service.</p>

**MTU Card LED Indicators**

The optional MTU cards are designed to be installed in slots 1 and 2 of the Master Control Shelf of the D50. The purpose of these LEDs is to provide “limited” information and conditions about the MTU cards. These LED indicators are defined in the tables below as they relate to:

- One MTU (Master Timing Unit) card configurations (if there is one Central Office BITS clock).
- Two MTU card configurations (if there are two Central Office BITS clocks).

Table 6-11: One MTU Card—“SYNC” LED Indicator

<b>SYNC LED YELLOW</b>	<b>SYNC LED OFF (LED Not Lit)</b>
<p>The timing synchronization to the card is functioning normally.</p>	<p>If the “SYNC” light is <u>off</u> (LED not lit), the MTU card is not providing network timing synchronization. The card could have any of the following problems:</p> <ul style="list-style-type: none"> <li>■ The J2 jumper on the side of the card may be set to a different format than the feed format (e.g., the feed format might be Extended Super Frame, and the jumper setting Super Frame).</li> <li>■ The card may not be synchronized with the BITS clock timing signal.</li> <li>■ There may not be a timing signal coming from the BITS clock.</li> <li>■ The card may not be properly seated and locked in place.</li> <li>■ The twisted pair cable connection at the BITS clock may not be secure.</li> <li>■ The twisted pair cable connection at the three-hole terminal block on the MCS Backplane Circuit Board may not be secure.</li> <li>■ The twisted pair cable for the Feed may be damaged.</li> <li>■ There may be no power going to the MTU card.</li> <li>■ If necessary, replace the MTU card if the LED failure condition continues.</li> </ul> <p><b>Note:</b> Whenever the “SYNC” indicator light is <u>off</u> (not lit), the “ALM” indicator light will be <u>red</u>. When synchronization is restored, the “ALM” indicator light will be <u>off</u> (LED not lit), and the “SYNC” indicator light will be <u>yellow</u>.</p>

Table 6-12: One MTU Card—"ALM" LED Indicator

<b>ALM LED OFF (LED Not Lit)</b>	<b>ALM LED RED</b>
<p>The MTU card is synchronized with the BITS clock and functioning normally.</p>	<p>The MTU card is not synchronized with the BITS clock and network timing is unavailable.</p> <p>See Column 2 in Table 6-11: One MTU Card—"SYNC" LED Indicator for ways to troubleshoot this problem.</p>

Table 6-13: One MTU Card—Feed "1" LED Indicator

<b>FEED 1 LED GREEN</b>	<b>FEED 1 LED OFF (LED Not Lit)</b>
<p>The card is correctly installed in card slot 1, and matches the J4 jumper setting on the side of the MTU card (preset to card slot 1).</p> <p><b>Note:</b> The Feed "2" LED will be <u>off</u> (not lit).</p>	<p>If power to the MTU card is lost, both Feed indicator lights ("1" and "2") will be <u>off</u> (LEDs not lit).</p>

Table 6-14: Two MTU Cards—"SYNC" LED Indicators

<b>Both SYNC LEDs YELLOW</b>	<b>One SYNC LED YELLOW, One OFF (LED Not Lit)</b>	<b>Both SYNC LEDs OFF (LEDs Not Lit)</b>
<p>The cards are functioning normally. Nothing further needs to be checked.</p> <p><b>Note:</b> One MTU card is the active card, and the second MTU card is the redundant card.</p>	<p>The card with the <u>yellow</u> "SYNC" indicator light is providing timing synchronization and is the active MTU card, and the second MTU card automatically becomes the redundant card and is not available for service. There could be several reasons why the second MTU card's "SYNC" LED is <u>off</u> (not lit):</p> <ul style="list-style-type: none"> <li>■ The J2 jumper on the side of the card may be set to a different format than the feed format (e.g., the feed format might be Extended Super Frame [ESF], and the jumper setting Super Frame [SF]).</li> <li>■ The MTU card may not be synchronized with the BITS clock timing signal.</li> <li>■ There may not be a timing signal coming from the BITS clock.</li> <li>■ The MTU card may not be properly seated and locked in place.</li> <li>■ The twisted pair cable connection at the BITS clock may not be secure.</li> <li>■ The twisted pair cable connection at the three-hole terminal block on the MCS Backplane Circuit Board may not be secure.</li> <li>■ The twisted pair cable may be damaged.</li> <li>■ If necessary, replace the MTU card if the LED not lit condition continues.</li> </ul>	<p>If the "SYNC" lights on both MTU cards are <u>off</u> (LEDs not lit), the MTU cards are not providing network timing synchronization. There could be several reasons for the problem:</p> <ul style="list-style-type: none"> <li>■ The J4 jumpers on the sides of both cards may be set to the same card slot (this error would synchronize both cards to the same BITS feed).</li> <li>■ The J2 jumpers on the sides of both cards may be set to a different format than the feed format (e.g., the feed format might be ESF, and both jumpers set to SF).</li> <li>■ The MTU cards may not be synchronized with either BITS clock timing signal.</li> <li>■ There may not be a timing signal coming from either BITS clock.</li> <li>■ The MTU cards may not be properly seated and locked in place.</li> <li>■ The twisted pair cable connections at both BITS clocks may not be secure.</li> <li>■ Both twisted pair cable connections at the three-hole terminal blocks on the MCS Backplane Circuit Board may not be secure.</li> <li>■ Both twisted pair cables may be damaged.</li> <li>■ If necessary, replace both MTU cards if the LEDs not lit conditions continue.</li> </ul>

Table 6-15: Two MTU Cards—"ALM" LED Indicators

<b>Both ALM LEDs OFF (LEDs Not Lit)</b>	<b>One ALM LED OFF, One RED</b>	<b>Both ALM LEDs RED</b>
<p>The MTU cards are synchronized with the BITS clock and functioning normally.</p>	<p>One MTU card is synchronized with the BITS clock and functioning normally, and the second redundant MTU card is not available for service. See Column 2 in Table 6-14: Two MTU Cards—"SYNC" LED Indicators for ways to troubleshoot this problem.</p>	<p>Neither MTU cards is synchronized with the BITS clock, and network timing is not available. See Column 3 in Table 6-14: Two MTU Cards—"SYNC" LED Indicators for ways to troubleshoot this problem.</p>

Table 6-16: Two MTU Cards—Feed "1" and "2" LED Indicators

<b>FEED 1 and 2 LEDs GREEN</b>	<b>FEED 1 or 2 LEDs RED</b>	<b>FEED 1 and 2 LEDs OFF (LEDs Not Lit)</b>
<p>Feed indicator light "1" is <u>green</u> on one MTU card, and Feed indicator light "2" is <u>green</u> on the other MTU card. This means that the cards are correctly installed in card slots 1 and 2, and match the J4 jumper settings on the sides of the MTU cards (one jumper set to card slot 1, one jumper set to card slot 2).</p> <p><b>Note:</b> Only one Feed indicator light will be green on each card.</p> <p><b>Note:</b> The Feed indicator lights tell the operator which feed is going to which card.</p>	<p>The J4 jumper settings on both MTU cards have been configured to the same card slot (either slot 1 or 2), and are synchronized to the same BITS feed. Service will not be restored to either card until the jumper settings are modified.</p>	<p>The power has been lost to both cards.</p>



## Appendix D

### System Recovery Procedures

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**Introduction** This chapter provides system recovery procedures to be used when Craft Terminal cannot communicate with the D50 through the serial port (COM 1).

**Craft Terminal Cannot Communicate with the D50** This procedure describes how to troubleshoot the situation where Craft Terminal cannot communicate with a D50:

Table 6-17: Craft Terminal Cannot Communicate with the D50

STEP	PROCEDURE
1	If Craft Terminal is unable to communicate with the D50, it will give a “timeout” error message when you attempt to <i>open</i> a connection or <i>apply</i> changes.
2	<p>Open the Dial-Up Networking command by running (from the Windows Taskbar):</p> <ul style="list-style-type: none"> <li>■ From Windows NT: <b>Start-&gt;Programs-&gt;Accessories-&gt;Dial-Up Networking.</b></li> <li>■ From Windows 2000<sup>1</sup>: <b>Start-&gt;Settings-&gt;Network and Dialup Connections-&gt;Diamond Craft.</b></li> </ul> <p>If a <b>Hangup</b> button appears, continue to Step 3.</p> <p>For Windows NT, if a <b>Dial</b> button appears, continue to Step 4.</p> <p>For Windows 2000, if a <b>Connect</b> button appears, continue to Step 4.</p> <p>If none of these buttons appear, contact Nokia Technical Support for further instructions.</p> <p>Refer to the volume titled <u>Craft Terminal</u>.</p>
3	<p>Craft Terminal may not have hung up correctly the last time you connected to the D50. Click the <b>Hangup</b> button.</p> <p>If the <b>Hangup</b> button goes away, close the <b>Dial-Up Networking</b> dialog box and attempt to open a connection from Craft Terminal to the D50 again.</p> <p>If the <b>Hangup</b> button does not go away, contact Nokia Technical Support for further instructions.</p>

Table 6-17: Craft Terminal Cannot Communicate with the D50 (continued)

<b>STEP</b>	<b>PROCEDURE</b>
<b>4</b>	The D50 may be experiencing problems, or there may be a problem with the serial port or cable. Click the <b>Dial</b> button. You may see an error message that tells you what to check next.  If <b>Dial</b> does not work and gives you no useful error messages, continue to Step 5.
<b>5</b>	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 Nokia Technical Support for further instructions.
<b>6</b>	The <b>Craft Terminal Cannot Communicate with the D50</b> procedure is complete.

<sup>1</sup> As of Release 8.0, Windows 2000 can be used for the Craft Terminal application.

## Appendix E

### Craft Terminal Troubleshooting Tips

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#### Craft Terminal Troubleshooting Tips

Follow the Recommended Actions listed below to correct error conditions or problems for installing and running Craft Terminal:

Table 6-18: Craft Terminal Troubleshooting Tips

#	IF THE CONDITION IS THIS...	THEN DO THIS...
1	“MgmtApi.dll not found” error message appears immediately on starting the Craft Terminal application.	In Windows NT or Windows 2000, turn on SNMP services in Network Services.
2	“The ordinal <6467> could not be located in dynamic library MFC42.DLL” error message appears on starting the Craft Terminal application.	Reinstall latest Windows NT service pack.
3	“Remote Access Services are not turned on...”	In Windows NT or Windows 2000, turn on RAS services in Network Services.
4	“Error connecting to D50” is displayed in the error bar of Craft Terminal GUI.	<ul style="list-style-type: none"> <li>■ Check all port settings (baud rate, stop bits, etc.) against installation details. See the volume titled <u>Craft Terminal</u>.</li> <li>■ Check modem settings against installation details. See the volume titled <u>Craft Terminal</u>.</li> <li>■ Check that cable is properly attached to serial port connector, and/or try another cable.</li> <li>■ Reboot NMP by pulling/resetting NMP card.</li> <li>■ Test serial port with oscilloscope. Contact the manufacturer if problem continues.</li> <li>■ Reinstall latest Windows NT service pack.</li> </ul>

Table 6-18: Craft Terminal Troubleshooting Tips (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
5	“ <b>Connected</b> ” then “ <b>Timeout</b> ” messages appear in the error bar of Craft Terminal (and no data is shown).	<ul style="list-style-type: none"><li>■ Reinstall latest Windows NT service pack.</li><li>■ Reboot NMP by pulling/resetting the NMP card.</li></ul>
6	“An earlier version of this application is required to communicate with this system.”	<ul style="list-style-type: none"><li>■ Craft Terminal does not manage D50s running previous system software that is older than Release 5.1. An earlier version of Craft Terminal can be loaded onto the same platform as the current version, but must be installed into a different directory.</li><li>■ Craft Terminal cannot find the D50. Check the IP address, network connections, etc.</li></ul>

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## Appendix F

### Conditions and Recommended Actions

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#### NMP and MCP Conditions and Recommended Actions

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

**Note:** Craft Terminal alarm descriptions are listed in full text (e.g., “Diagnostic test failure”). The Condition column indicates whether an event is generated in Craft Terminal.

Table 6-19: NMP & MCP Conditions & Recommended Actions

#	IF THE CONDITION IS THIS...	THEN DO THIS...
1	<p>Diagnostic test failure: Exists when a card fails the diagnostic test.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>Hardware diagnostic:</p> <ul style="list-style-type: none"> <li>■ Verify that the card is properly seated and locked in place.</li> <li>■ Replace bad NMP or MCP card if Diagnostic test failure condition continues.</li> </ul>
2	<p>Software download failure: Occurs when a transaction from the MCP to the database has failed.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>Software diagnostic; replace bad MCP card.</p>
3	<p>Unequipped: Indicates the card is not in the slot.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Departed: equipment has been removed.</p>	<ul style="list-style-type: none"> <li>■ Place an NMP card correctly in slot #4</li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>■ Place an MCP card correctly in slots #5 and #6.</li> </ul>
4	<p>Equipment failed: Indicates a failure with the card.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>Replace bad NMP or MCP card.</p>

Table 6-19: NMP & MCP Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
5	<p>Standby from a protection group: Indicates that the card in the protection group meets the operation/availability criteria for fulfilling the standby role.</p> <p>Operational State: Enabled.</p> <p>Availability Status: Operational: fully capable of providing service.</p>	<p>No action required. Normal reading for the “standby” MCP card.</p> <p>Not applicable for NMP card.</p>
6	<p>Primary service provider: Indicates that the card in the protection group is fulfilling the role of the primary service provider.</p> <p>Operational State: Enabled.</p> <p>Availability Status: Operational: fully capable of providing service.</p>	<p>No action required. Normal reading for NMP card. Normal reading for “primary” MCP card.</p>
7	<p>Attribute fail condition: Indicates that the system attributes recorded by the equipment reveal a fatally flawed parameter value.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>Replace bad NMP or MCP card.</p>
8	<p>Attribute incomplete: Indicates that the equipment has not completed updating the system attributes.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Unknown.</p>	<p>Replace bad NMP or MCP card if condition does not clear within 2 to 3 minutes. May be a hardware problem or indication that NMP or MCP software is not the latest version.</p>
9	<p>Attribute down revisioned: Indicates that the NMP card or standby MCP card has an older software version than the active MCP card.</p> <p>Operational State: Enabled.</p> <p>Availability Status: Temporarily Inoperable.</p>	<p>No action required. 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).</p>

Table 6-19: NMP & MCP Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
10	<p>Attribute mismatch: Exists when the analysis of system attributes results in software or hardware incompatibility (i.e., incorrect card type, or card with newer software than active MCP card).</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable.</p>	<ul style="list-style-type: none"> <li>■ Replace the incorrect card type with the correct card type, or correct the provisioning to match the inserted card.</li> <li>■ Compare the software version of the card with that of the active MCP card; a card with newer software than the MCP must be replaced with a card with the same or older software.</li> </ul>
11	<p>Uninitialized: Indicates that the operational state, availability state and other status are not yet initialized.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Unknown.</p>	<p>Check NMP or MCP card configuration using Craft Terminal. Are all attributes listed?</p> <ul style="list-style-type: none"> <li>■ If YES, wait for initialization to complete. Replace the NMP or MCP card if it cannot complete initialization.</li> <li>■ If NO, replace the bad NMP or MCP card.</li> </ul>
12	<p>Standby MCP synch pending: Indicates that the standby MCP is synchronizing its database and MIB with the active MCP.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Temporarily Inoperable.</p>	<p>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 Craft Terminal, and then unlock again and re-attempt synchronization.</p>

**DS3 Trunk/DS3L Broadband Conditions & Recommended Actions**

Follow the Recommended Actions listed below to correct error conditions received for a DS3T, DS3T2, or DS3TQ trunk card, or a DS3L broadband tributary card:

**Note:** For information and instructions regarding threshold crossing events, refer to the volume titled Provisioning, or the volume titled Maintenance and Testing, Section 1—*System Monitoring*, Chapter 3—“Performance Monitoring.”

**Note:** Craft Terminal alarm descriptions are listed in full text (e.g., “Diagnostic test failure”). The Condition column indicates whether an event is generated in Craft Terminal.

Table 6-20: DS3T & DS3L Conditions & Recommended Actions

#	IF THE CONDITION IS THIS...	THEN DO THIS...
1	<p>Diagnostic test failure: Exists when a card fails the diagnostic test.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>Hardware diagnostic:</p> <ul style="list-style-type: none"> <li>■ Verify that the card is properly seated and locked in place.</li> <li>■ Replace bad DS3 trunk card or DS3L broadband card if Diagnostic test failure condition continues.</li> </ul>
2	<p>Software download failure: Exists when a card experiences an invalid software download.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>Software diagnostic; replace bad DS3 trunk card or DS3L broadband card.</p>

Table 6-20: DS3T & DS3L Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
3	<p>Loss of signal: Exists when a port detects a Loss of signal.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>LOS indicates a physical connection failure:</p> <ul style="list-style-type: none"> <li>■ Check DS3 trunk or DS3L broadband interface Tx/Rx reversal at the MCS backplane by reversing the coax cable connections.</li> <li>■ If the condition clears, then the connections were reversed.</li> <li>■ If the condition does not clear, then connect a coax cable jumper between the Tx and Rx connections on the backplane. Set the DS3 Line Timing parameter from “Loop” to “Internal.”</li> <li>■ If the LOS condition clears, then the DS3 trunk or DS3L Tx and Rx are working; the problem is in the ATM Network or router, or other standard ATM equipment. Report as appropriate and coordinate with an ATM Network Technician to isolate and fix the problem.</li> <li>■ If the LOS condition does not clear, there is a problem with the DS3 trunk card or DS3L broadband card. Replace the card and test the connections again.</li> </ul>
4	<p>Loss of frame: Exists when a port detects Loss of frame.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<ul style="list-style-type: none"> <li>■ Check DS3 trunk or DS3L interface connections at the MCS backplane and DS3 cross connect panel.</li> <li>■ If DS3 trunk or DS3L connections are good, the problem is in the ATM Network or router, or other standard ATM equipment. Report as appropriate and coordinate with an ATM Network Technician to isolate and fix the problem.</li> </ul>

Table 6-20: DS3T & DS3L Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
5	<p>Alarm indication signal: Indicates a problem on the far end of the DS3 trunk card or DS3L broadband card.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>Report as appropriate and coordinate with an ATM Network Technician to isolate and fix the problem.</p> <p><b>Note:</b> Not applicable to the DS3TQ trunk card.</p>
6	<p>Remote defect indicator: Indicates a far-end problem on the “transmit” side of the DS3 trunk card or DS3L broadband card, or a D50 “transmit” problem.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>Report as appropriate and coordinate with an ATM Network Technician to isolate and fix the problem.</p> <p><b>Note:</b> Not applicable to the DS3TQ trunk card.</p>
7	<p>Loss of cell delineation: Indicates a DS3 trunk card or DS3L line type mismatch. The line type at the D50 and at the other end of the DS3 trunk card or DS3L signal must be set the same (ATM Cell Mapping or PLCP CBit Parity).</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<ul style="list-style-type: none"> <li>■ Use Craft Terminal to re-check the DS3 trunk card or DS3L port line type.</li> <li>■ Follow instructions in the volume titled <u>Commissioning</u>, Section 5—<i>Commissioning</i>, Chapter 2—“Using Craft Terminal for Commissioning” for DS3 trunk card or DS3L configuration settings.</li> </ul>
8	<p>Loopback activated: Indicates that loopback is activated on the interface.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>Not an error condition.</p> <p>Use Craft Terminal to remove the loopback mode from the DS3 trunk port or the DS3L broadband card and put the card back in service.</p>

Table 6-20: DS3T & DS3L Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
9	<p>Unequipped: Indicates the card is not in the slot.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Departed: equipment has been removed.</p>	<p>Place a DS3 trunk card correctly in slot #8 (working) and slot #7 (protection), or a DS3L card correctly in the required slot (slots 9 through 20).</p> <p>For the DS3L card, make “transmit” and “receive” cable connections to the corresponding non-D50 equipment.</p>
10	<p>Equipment failed: Indicates a failure with the card.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>Hardware Diagnostic:</p> <ul style="list-style-type: none"> <li>■ Verify that the card is properly seated and locked in place.</li> <li>■ Replace bad DS3 trunk card or DS3L card if failed condition continues.</li> </ul>
11	<p>Standby from a protection group: Indicates that the card in the protection group meets the operation/availability criteria for fulfilling the standby (protection) role.</p> <p>Operational State: Enabled.</p> <p>Availability Status: Operational: fully capable of providing service.</p>	<p>No action required. Normal reading for the “standby” (or “protection”) DS3 trunk card.</p> <p>Not applicable for the DS3L card.</p>
12	<p>Primary service provider: Indicates that the card in the protection group is fulfilling the role of the primary service provider.</p> <p>Operational State: Enabled.</p> <p>Availability Status: Operational: fully capable of providing service.</p>	<p>No action required. Normal reading for the “active” DS3 trunk card.</p> <p>Not applicable for the DS3L card.</p>
13	<p>Attribute fail condition: Indicates that the system attributes recorded by the equipment reveal a fatally flawed parameter value.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>Replace bad DS3 trunk card or DS3L broadband card.</p>

Table 6-20: DS3T &amp; DS3L Conditions &amp; Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
14	<p>Attribute incomplete: Indicates that the equipment has not completed updating the system attributes.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Unknown.</p>	<p>Replace bad DS3 trunk card or DS3L broadband card if condition does not clear within 2 to 3 minutes. May be a hardware problem or indicates that card software is not the latest version.</p>
15	<p>Attribute down revisioned: Indicates that the card has an older software version than the active MCP card.</p> <p>Operational State: Enabled.</p> <p>Availability Status: Temporarily Inoperable.</p>	<p>No action required. 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.</p>
16	<p>Attribute mismatch: Exists when the analysis of system attributes results in software or hardware incompatibility (e.g., incorrect card type, or card with newer software than active MCP card).</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable.</p>	<ul style="list-style-type: none"> <li>■ Replace the incorrect card type with the correct card type, or correct the provisioning to match the inserted card.</li> <li>■ Compare the software version of the card with that of the active MCP card; a card with newer software than the MCP must be replaced with a card with the same or older software.</li> </ul>
17	<p>Uninitialized: Indicates that the operational state and other status are not initialized yet.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Unknown.</p>	<p>Check DS3 trunk card or DS3L broadband card configuration using Craft Terminal. Are all attributes listed?</p> <ul style="list-style-type: none"> <li>■ If YES, wait for initialization to complete. Replace the DS3 trunk card or DS3L broadband card if it cannot complete initialization.</li> <li>■ If NO, replace the DS3 trunk card or DS3L broadband card.</li> </ul>

**OC3 Trunk/OC3L  
 Broadband  
 Conditions &  
 Recommended  
 Actions**

Follow the Recommended Actions listed below to correct error conditions received for OC3T, OC3T2, OC3T2L, OC3T2M, OC3TQS, OC3TQM, or OC3TQL<sup>1</sup> trunk cards and OC3L broadband tributary cards:

**Note:** For information and instructions regarding threshold crossing events, refer to the volume titled Provisioning, or the volume titled Maintenance and Testing, Section 1—*System Monitoring*, Chapter 3—“Performance Monitoring.”

**Note:** Refer to **Test OC3 Trunk Card Transmit and Receive Levels**, page 6-74, for “transmit” and “receive” power levels for the OC3 trunk cards.

**Note:** Craft Terminal alarm descriptions are listed in full text (e.g., “Diagnostic test failure”). The Condition column indicates whether an event is generated in Craft Terminal.

Table 6-21: OC3T & OC3L Conditions & Recommended Actions

#	IF THE CONDITION IS THIS...	THEN DO THIS...
1	Diagnostic test failure: Exists when a card fails the diagnostic test.  Operational State: Disabled.  Availability Status: Failed: failed (not removed or unreachable).	Hardware diagnostic: <ul style="list-style-type: none"> <li>■ Verify that the card is properly seated and locked in place.</li> <li>■ Replace bad OC3 trunk or OC3L broadband card if Diagnostic test failure condition continues.</li> </ul>
2	Software download failure: 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 or OC3L broadband card.

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<sup>1</sup> Throughout this section, “OC3” refers to all OC3 trunk card types.

Table 6-21: OC3T & OC3L Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
3	<p>Loss of signal: Exists when a port detects a Loss of signal.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>LOS indicates a physical connection failure:</p> <ul style="list-style-type: none"> <li>■ Check for reversed fiber optic cable. Always use fiber optic cables with SC duplex connections to ensure connections are not reversed.</li> <li>■ If the condition clears, then the connections were reversed.</li> <li>■ If the condition does not clear, then connect a fiber optic jumper between the Tx and Rx connections on the OC3 trunk or OC3L broadband card. Set the OC3 Line Timing parameter from “Loop” to “Internal.”</li> <li>■ If the LOS condition clears, then the OC3 trunk or OC3L Tx and Rx are OK, the problem is in the ATM Network or router, or other standard ATM equipment. Report as appropriate and coordinate with an ATM Network Technician to isolate and fix the problem.</li> <li>■ If the LOS condition does not clear, there is a problem with the OC3 trunk or OC3L broadband card. Replace the OC3 trunk or OC3L broadband card and test the connections again.</li> </ul>
4	<p>Loss of frame: Exists when a port detects Loss of frame.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<ul style="list-style-type: none"> <li>■ Check the fiber optic interface connection at the face plate of the OC3 trunk card and at the Optical Distribution Frame (ODF), or the OC3L broadband card and the non-D50 equipment.</li> <li>■ If OC3 trunk or OC3L connections are good, the problem is in the ATM Network or router, or other standard ATM equipment. Report as appropriate and coordinate with ATM Network Technician to isolate and fix the problem.</li> </ul>

Table 6-21: OC3T & OC3L Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
5	<p>Bit error rate: Indicates the BER condition on the port.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<ul style="list-style-type: none"> <li>■ Check the “PM Data for Near End” box on the Physical PM tab in Craft Terminal. The problem may be a signal degrade or signal fail condition. The signal degrade and signal fail condition thresholds are set in the BERT box on the OC3 Thresholds tab in Craft Terminal.</li> <li>■ Use Craft Terminal to re-check OC3 port Timing Option; it should be set to “Loop.” Follow instructions in the volume titled <u>Commissioning</u>, Section 5—<i>Commissioning</i>, Chapter 2—“Using Craft Terminal for Commissioning” for OC3 trunk or OC3L configuration settings.</li> <li>■ Check the fiber optic interface connection at the face plate of the OC3L trunk card and at the Optical Distribution Frame (ODF), or the OC3L broadband card and the non-D50 equipment. Be sure the fiber optic cable is single-mode.</li> <li>■ If OC3 trunk or OC3L connections are good, the problem is in the ATM Network or router, or other standard ATM equipment. Report as appropriate and coordinate with ATM Network Technician to isolate and fix the problem.</li> </ul>
6	<p>Trace identifier mismatch—Path.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>Check receive path trace data and expected path trace data in Craft Terminal. Verify that the path trace is accurate.</p>
7	<p>Trace identifier mismatch—Section.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>Check receive section trace data and expected section trace data in Craft Terminal. Verify that the section trace is accurate.</p>

Table 6-21: OC3T & OC3L Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
8	Loss of pointer—Path. Operational State: Enabled. Availability Status: Operational: fully capable of providing service.	Check both the D50 and the ATM switch router OC3 facility provisioning. Both should have the same facility type: either SONET or SDH.
9	Alarm indication signal—Line: Indicates a problem on the far end of the OC3 trunk or OC3L broadband card.  <b>Note:</b> An event is generated in Craft Terminal. Operational State: Disabled. Availability Status: Inoperable: incapable of providing service.	Report as appropriate and coordinate with ATM Network Technician to isolate and fix the problem.
10	Alarm indication signal—Path: Indicates a problem on the far end of the OC3 trunk or OC3L broadband card.  <b>Note:</b> An event is generated in Craft Terminal. Operational State: Disabled. Availability Status: Inoperable: incapable of providing service.	Report as appropriate and coordinate with ATM Network Technician to isolate and fix the problem.
11	Remote defect indicator—Line: Indicates a far-end problem on the “transmit” side of the OC3 trunk or OC3L broadband card, or a D50 “transmit” problem.  <b>Note:</b> An event is generated in Craft Terminal. Operational State: Disabled. Availability Status: Inoperable: incapable of providing service.	Report as appropriate and coordinate with ATM Network Technician to isolate and fix the problem.

Table 6-21: OC3T & OC3L Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
<b>12</b>	<p>Remote defect indicator—Path: Indicates a far-end problem on the “transmit” side of the OC3 trunk or OC3L broadband card, or a D50 “transmit” problem.</p> <p style="padding-left: 40px;"><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>Report as appropriate and coordinate with ATM Network Technician to isolate and fix the problem.</p>
<b>13</b>	<p>Alarm indication signal: Indicates a problem on the far end of the OC3 trunk or OC3L broadband card.</p> <p style="padding-left: 40px;"><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>Report as appropriate and coordinate with ATM Network Technician to isolate and fix the problem.</p>
<b>14</b>	<p>Remote defect indicator: Indicates a far-end problem on the “transmit” side of the OC3 trunk or OC3L broadband card, or a D50 “transmit” problem.</p> <p style="padding-left: 40px;"><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>Report as appropriate and coordinate with ATM Network Technician to isolate and fix the problem.</p>

Table 6-21: OC3T & OC3L Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
15	<p>Loss of cell delineation: Indicates an OC3 trunk or OC3L facility type mismatch. The facility type at the D50 and at the other end of the OC3 trunk or OC3L signal must be set the same (SONET or SDH).</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<ul style="list-style-type: none"> <li>■ Use Craft Terminal to re-check the OC3 trunk or OC3L port Facility Type.</li> <li>■ Follow instructions in the volume titled <u>Commissioning</u>, Section 5—<i>Commissioning</i>, Chapter 2—“Using Craft Terminal for Commissioning” for OC3 configuration settings.</li> </ul>
16	<p>Loopback activated: Indicates that loopback is activated on the interface.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>Not an error condition.</p> <p>Use Craft Terminal to remove the loopback mode from the OC3 trunk or OC3L broadband port and put the card back in service.</p>
17	<p>Unequipped: Indicates the card is not in the slot.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Departed: equipment has been removed.</p>	<p>Place an OC3 trunk correctly in Slot #8 (working) and Slot #7 (protection), or an OC3L broadband card correctly in the required slot (slots 9 through 20).</p> <p>For the OC3L broadband card, make “transmit” and “receive” cable connections to the corresponding non-D50 equipment.</p>
18	<p>Equipment failed: Indicates a failure with the card.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>Hardware Diagnostic:</p> <ul style="list-style-type: none"> <li>■ Verify that the card is properly seated and locked in place.</li> <li>■ Replace bad OC3 trunk or OC3L broadband card if failed condition continues.</li> </ul>

Table 6-21: OC3T & OC3L Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
19	<p>Standby from a protection group: Indicates that the card in the protection group meets the operation/availability criteria for fulfilling the standby (or protection) role.</p> <p>Operational State: Enabled.</p> <p>Availability Status: Operational: fully capable of providing service.</p>	<p>No action required. Normal reading for the “standby” (or “protection”) OC3 trunk card.</p> <p>Not applicable for the OC3L broadband card.</p>
20	<p>Primary service provider: Indicates that the card in the protection group is fulfilling the role of the primary service provider.</p> <p>Operational State: Enabled.</p> <p>Availability Status: Operational: fully capable of providing service.</p>	<p>No action required. Normal reading for the “active” OC3 trunk card.</p> <p>Not applicable for the OC3L broadband card.</p>
21	<p>Attribute fail condition: Indicates that the system attributes recorded by the equipment reveal a fatally flawed parameter value.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>Replace bad OC3 trunk or OC3L broadband card.</p>
22	<p>Attribute incomplete: Indicates that the equipment has not completed updating the system attributes.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Unknown.</p>	<p>Replace bad OC3 trunk or OC3L broadband card if condition does not clear within 2 to 3 minutes. May be a hardware problem or indicates that card software is not the latest version.</p>
23	<p>Attribute down revisioned: Indicates that the card has an older software version than the active MCP card.</p> <p>Operational State: Enabled.</p> <p>Availability Status: Temporarily Inoperable.</p>	<p>No action required. 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.</p>

Table 6-21: OC3T &amp; OC3L Conditions &amp; Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
24	<p>Attribute mismatch: Exists when the analysis of system attributes results in software or hardware incompatibility (e.g., incorrect card type, or card with newer software than active MCP card).</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable.</p>	<ul style="list-style-type: none"> <li>■ Replace the incorrect card type with the correct card type, or correct the provisioning to match the inserted card.</li> <li>■ Compare the software version of the card with that of the active MCP card; a card with newer software than the MCP must be replaced with a card with the same or older software.</li> </ul>
25	<p>Uninitialized: Indicates that the operational state and other status are not initialized yet.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Unknown.</p>	<p>Check OC3 trunk or OC3L broadband card configuration using Craft Terminal. Are all attributes listed?</p> <ul style="list-style-type: none"> <li>■ If YES, wait for initialization to complete. Replace the OC3 trunk or OC3L broadband card if it cannot complete initialization.</li> <li>■ If NO, replace the OC3 trunk or OC3L broadband card.</li> </ul>

**MLA Conditions and Recommended Actions**

Follow the Recommended Actions listed below to correct error conditions received for all Master Line Card Adapter (MLA) cards (MLA2, MLA2L, MLA2S, MLAT1, and MLAT3):

**Note:** For information and instructions regarding threshold crossing events, refer to the volume titled Provisioning, or the volume titled Maintenance and Testing, Section 1—*System Monitoring*, Chapter 3—“Performance Monitoring.”

**Note:** Craft Terminal alarm descriptions are listed in full text (e.g., “Diagnostic test failure”). The Condition column indicates whether an event is generated in Craft Terminal.

**Note:** When referring to all MLA card types collectively, “MLA” is used; when referring to all LSM card types collectively, “LSM” is used.

Table 6-22: MLA Conditions & Recommended Actions

#	IF THE CONDITION IS THIS...	THEN DO THIS...
1	<p>Diagnostic test failure: Exists when a card fails the diagnostic test.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>Hardware diagnostic:</p> <ul style="list-style-type: none"> <li>■ Verify that the card is properly seated and locked in place.</li> <li>■ Replace bad MLA card if Diagnostic test failure condition continues.</li> </ul>
2	<p>Software download failure: Exists when a card experiences an invalid software download.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>Software diagnostic; replace bad MLA card.</p>

Table 6-22: MLA Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
3	<p>Loss of signal: Exists when a port detects a Loss of signal.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>The MLA card is not receiving a signal from the LSM card.</p> <p>For the fiber optic MLA2/MLA2L/MLA2S and LSM2/LSM2L/LSM2S interface:</p> <ul style="list-style-type: none"> <li>■ Check the fiber optic cable connections. Clean cable connections following local procedures<sup>1</sup>.</li> <li>■ Check for reversed cable.</li> <li>■ Check for defective cable. Refer to <b>Test MLA Transmit and LSM Receive</b>, page 6-71.</li> </ul> <p>For the MLAT1 and LSMT1 interface:</p> <ul style="list-style-type: none"> <li>■ Check all DS1 connections for both cards.</li> <li>■ Check for reversed cable.</li> <li>■ Be sure the MLAT1-LSMT1 cable has cross-over connectors.</li> <li>■ Conduct a loopback test to check the connection path (refer to the volume titled <u>Maintenance and Testing</u>, Section 3—<i>Troubleshooting</i>, Chapter 1—“Line and Terminal Loopback Tests”).</li> </ul> <p>For the MLAT3 and LSMT3 interface:</p> <ul style="list-style-type: none"> <li>■ Check connections for both cards.</li> <li>■ Check for reversed cable.</li> </ul>

Table 6-22: MLA Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
4	<p>Loss of frame: Exists when a port detects Loss of frame.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>There is a problem with the MLA “receive” connector, or the LSM “transmit” connector, or the cable between them.</p> <p>For the fiber optic MLA2/MLA2L/MLA2S and LSM2/LSM2L/LSM2S interface:</p> <ul style="list-style-type: none"> <li>■ Check for defective cable. Refer to <b>Test MLA Transmit and LSM Receive</b>, page 6-71.</li> </ul> <p>For the MLAT1 and LSMT1 interface:</p> <ul style="list-style-type: none"> <li>■ Check all DS1 connections for both cards.</li> <li>■ Check for reversed cable.</li> <li>■ Be sure the MLAT1-LSMT1 cable has cross-over connectors.</li> <li>■ Conduct a loopback test to check the connection path (refer to the volume titled <u>Maintenance and Testing</u>, Section 3—<i>Troubleshooting</i>, Chapter 1—“Line and Terminal Loopback Tests”).</li> </ul> <p>For the MLAT3 and LSMT3 interface:</p> <ul style="list-style-type: none"> <li>■ Check connections for both cards.</li> <li>■ Check for reversed cable.</li> </ul>
5	<p>Overflow: Indicates that the system is running out of resource (memory).</p> <p>Operational State: Enabled.</p> <p>Availability Status: Degraded.</p>	<p>This condition should not appear during test and commissioning procedures.</p> <p>Indicates that the “ingress” threshold is exceeded, indicating severe buffering congestion.</p>

Table 6-22: MLA Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
6	<p>Alarm indication signal</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>The LSM card is not receiving a signal from the MLA card.</p> <p>For the fiber optic MLA2/MLA2L/MLA2S and LSM2/LSM2L/LSM2S interface:</p> <ul style="list-style-type: none"> <li>■ Check the fiber optic cable connections. Clean cable connections following local procedures<sup>1</sup>.</li> <li>■ Check for reversed cable.</li> <li>■ Check for defective cable. Refer to <b>Test MLA Transmit and LSM Receive</b>, page 6-71.</li> </ul> <p>For the MLAT1 and LSMT1 interface:</p> <ul style="list-style-type: none"> <li>■ Check all DS1 connections for both cards.</li> <li>■ Check for reversed cable.</li> <li>■ Conduct a loopback test to check the connection path (refer to the volume titled <u>Maintenance and Testing</u>, Section 3—<i>Troubleshooting</i>, Chapter 1—“Line and Terminal Loopback Tests”).</li> </ul> <p>For the MLAT3 and LSMT3 interface:</p> <ul style="list-style-type: none"> <li>■ Check connections for both cards.</li> <li>■ Check for reversed cable.</li> </ul>

Table 6-22: MLA Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
7	<p>Remote defect indicator: Indicates a far end problem.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>For the MLA2/MLA2L/MLA2S and LSM2/LSM2L/LSM2S interface:</p> <ul style="list-style-type: none"> <li>■ Be sure the OC3T tab configuration settings are the same for the MLA2 and LSM2 cards.*</li> <li>■ Check the fiber optic cable connections. Clean cable connections following local procedures<sup>1</sup>.</li> <li>■ Check for reversed cable.</li> <li>■ Check for defective cable. Refer to <b>Test MLA Transmit and LSM Receive</b>, page 6-71.</li> </ul> <p>For the MLAT1/LSMT1 interface:</p> <ul style="list-style-type: none"> <li>■ Be sure the DS1 tab configuration settings are the same for the MLAT1 and LSMT1 cards.*</li> <li>■ Check connections for both cards.</li> <li>■ Check for reversed cable.</li> <li>■ Conduct a loopback test to check the connection path (refer to the volume titled <u>Maintenance and Testing</u>, Section 3—<i>Troubleshooting</i>, Chapter 1—“Line and Terminal Loopback Tests”).</li> </ul> <p>For the MLAT3/LSMT3 interface:</p> <ul style="list-style-type: none"> <li>■ Be sure the DS3T tab configuration settings are the same for the MLAT3 and LSMT3 cards.*</li> <li>■ Check connections for both cards.</li> <li>■ Check for reversed cable.</li> </ul> <p>* Refer to the volume titled <u>Commissioning</u>, Section 5—<i>Commissioning</i>, Chapter 2—“Using Craft Terminal for Commissioning.”</p>

Table 6-22: MLA Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
8	<p>Loss of cell delineation.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable; incapable of providing service.</p>	<ul style="list-style-type: none"> <li>■ Use Craft Terminal to check the settings on the appropriate configuration tab (OC3T, DS1, or DS3T) are the same for the MLA and LSM cards. Refer to the volume titled <u>Commissioning</u>, Section 5—<i>Commissioning</i>, Chapter 2—“Using Craft Terminal for Commissioning.”</li> <li>■ Indicates a problem in either the MLA card or the LSM card. Replace one of these cards (e.g., the MLA card) to see if the condition is corrected. If not, replace the other card (e.g., the LSM card).</li> </ul> <p>For the MLAT1:</p> <ul style="list-style-type: none"> <li>■ Indicates a problem with the DS1 facility, due to <u>Sequence Error</u> (corrupted data) or <u>Excessive Delay</u> (the relative delay in the affected port greatly exceeds that in other ports). <ul style="list-style-type: none"> <li>– For <u>Sequence Error</u>: replace one of the cards (e.g., the MLAT1 card) to see if the condition is corrected. If not, replace the other card (e.g., the LSMT1 card).</li> <li>– For <u>Excessive Delay</u>: re-route the connection on the affected port to shorten the line distance, or switch the connection to another card.</li> </ul> </li> </ul>

Table 6-22: MLA Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
9	<p>Rate degraded: Indicates that the number of active ports is less than the number of provisioned ports (i.e., unlocked ports on the MLAT1 and LSMT1 do not correspond), or one or more of the provisioned ports has a rate drop.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Enabled.</p> <p>Availability Status: Operable, but providing service at a lower rate.</p>	<p>Use Craft Terminal to determine if an MLAT1 port is locked that should be unlocked, or to check individual MLAT1 ports for LOS or LOF conditions.</p> <p>Applicable to MLAT1 only.</p>
10	<p>Loopback activated: Indicates that loopback is activated on the interface.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>Not an error condition. Use Craft Terminal to remove the loopback mode from the MLA port and put the card back in service.</p>
11	<p>Unequipped: Indicates the card is not in the slot.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Departed: equipment has been removed.</p>	<ul style="list-style-type: none"> <li>■ Place an MLA card correctly in slot #9 through #20 as required based on the number of Line Card Shelves (LSM cards).</li> <li>■ Make “transmit” and “receive” cable connections to corresponding LSM card(s).</li> </ul>
12	<p>Equipment failed: Indicates a failure with the card.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>Replace bad MLA card.</p>
13	<p>Attribute fail condition: Indicates that the system attributes recorded by the equipment reveal a fatally flawed parameter value.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>Replace bad MLA card.</p>

Table 6-22: MLA Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
14	<p>Attribute incomplete: Indicates that the equipment has not completed updating the system attributes.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Unknown.</p>	<p>Replace bad MLA card if condition does not clear within 2 to 3 minutes. May be a hardware problem or indication that MLA card software is not the latest version.</p>
15	<p>Attribute down revisioned: Indicates that the MLA card has an older software version than the active MCP card.</p> <p>Operational State: Enabled.</p> <p>Availability Status: Temporarily Inoperable.</p>	<p>No action required. 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.</p>
16	<p>Attribute mismatch: Exists when the analysis of system attributes results in software or hardware incompatibility (e.g., incorrect card type, or card with newer software than active MCP card).</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable.</p>	<ul style="list-style-type: none"> <li>■ Replace the incorrect card type with the correct card type, or correct the provisioning to match the inserted card.</li> <li>■ Compare the software version of the card with that of the active MCP card; a card with newer software than the MCP must be replaced with a card with the same or older software.</li> </ul>
17	<p>Uninitialized: Indicates that the operational state and other status are not initialized yet.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Unknown.</p>	<p>Indicates a communication path problem:</p> <ul style="list-style-type: none"> <li>■ Verify that the card is properly seated and locked in place.</li> <li>■ Call Technical Support; may need to replace the card if initialization can't complete.</li> </ul>
18	<p>Provisioning data out of range: One or more of the ports has been provisioned improperly.</p>	<p>Check and correct provisioning information.</p> <p>Applicable to the MLAT1 only.</p>

<sup>1</sup> Suggested cable connection cleaning materials include oil-free compressed air, lint-free wipes, isopropyl alcohol, cotton swabs, and lint-free pipe cleaners.

**LSM Conditions and Recommended Actions**

Follow the Recommended Actions listed below to correct error conditions received for all Line Card Shelf Multiplexer (LSM) cards (LSM2, LSM2L, LSM2S, LSMT1, and LSMT3):

**Note:** For information and instructions regarding threshold crossing events, refer to the volume titled Provisioning, or the volume titled Maintenance and Testing, Section 1—*System Monitoring*, Chapter 3—“Performance Monitoring.”

**Note:** Craft Terminal alarm descriptions are listed in full text (e.g., “Diagnostic test failure”). The Condition column indicates whether an event is generated in Craft Terminal.

**Note:** When referring to all LSM card types collectively, “LSM” is used; when referring to all MLA card types collectively, “MLA” is used.

Table 6-23: LSM Conditions & Recommended Actions

#	IF THE CONDITION IS THIS...	THEN DO THIS...
1	<p>Diagnostic test failure: Exists when a card fails the diagnostic test.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>Hardware diagnostic:</p> <ul style="list-style-type: none"> <li>■ Verify that the card is properly seated and locked in place.</li> <li>■ Replace bad LSM card if Diagnostic test failure condition continues.</li> </ul>
2	<p>Software download failure: Exists when a card experiences an invalid software download.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>Software diagnostic; replace bad LSM card.</p>

Table 6-23: LSM Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
3	<p>Loss of signal: Exists when a port detects a Loss of signal.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>The LSM card is not receiving a signal from the MLA card.</p> <p>For the fiber optic LSM2/LSM2L/LSM2S and MLA2/MLA2L/MLA2S interface:</p> <ul style="list-style-type: none"> <li>■ Check the fiber optic cable connections. Clean cable connections following local procedures<sup>1</sup>.</li> <li>■ Check for reversed cable.</li> <li>■ Check for defective cable or bad connections. Refer to <b>Test LSM Transmit and MLA Receive</b>, page 6-69.</li> </ul> <p>For the LSMT1 and MLAT1 interface:</p> <ul style="list-style-type: none"> <li>■ Check all DS1 connections for both cards.</li> <li>■ Check for reversed cable.</li> <li>■ Conduct a loopback test to check the connection path (refer to the volume titled <u>Maintenance and Testing</u>, Section 3—<i>Troubleshooting</i>, Chapter 1—“Line and Terminal Loopback Tests”).</li> </ul> <p>For the LSMT3 and MLAT3 interface:</p> <ul style="list-style-type: none"> <li>■ Check connections for both cards.</li> <li>■ Check for reversed cable.</li> </ul>

Table 6-23: LSM Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
4	<p>Loss of frame: Exists when a port detects Loss of frame.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>There is a problem with the LSM “receive” connector, or the MLA “transmit” connector, or the cable between them.</p> <p>For the fiber optic LSM2/LSM2L/LSM2S and MLA2/MLA2L/MLA2S interface:</p> <ul style="list-style-type: none"> <li>■ Check for defective cable or bad connections. Refer to <b>Test LSM Transmit and MLA Receive</b>, page 6-69.</li> </ul> <p>For the LSMT1 and MLAT1 interface:</p> <ul style="list-style-type: none"> <li>■ Check all DS1 connections for both cards.</li> <li>■ Check for reversed cable.</li> <li>■ Conduct a loopback test to check the connection path (refer to the volume titled <u>Maintenance and Testing</u>, Section 3—<i>Troubleshooting</i>, Chapter 1—“Line and Terminal Loopback Tests”).</li> </ul> <p>For the LSMT3 and MLAT3 interface:</p> <ul style="list-style-type: none"> <li>■ Check connections for both cards.</li> <li>■ Check for reversed cable.</li> </ul>
5	<p>Overflow: Indicates that the system is running out of resource (memory).</p> <p>Operational State: Enabled.</p> <p>Availability Status: Degraded.</p>	<p>This condition should not appear during test and commissioning procedures. Indicates that the “ingress” threshold is exceeded, indicating severe buffering congestion.</p>

Table 6-23: LSM Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
6	<p>Alarm indication signal.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>The MLA card is not receiving a signal from the LSM card.</p> <p>For the fiber optic LSM2/LSM2L/LSM2S and MLA2/MLA2L/MLA2S interface:</p> <ul style="list-style-type: none"> <li>■ Check the fiber optic cable connections. Clean cable connections following local procedures<sup>1</sup>.</li> <li>■ Check for reversed cable.</li> <li>■ Check for defective cable. Refer to <b>Test LSM Transmit and MLA Receive</b>, page 6-69.</li> </ul> <p>For the LSMT1 and MLAT1 interface:</p> <ul style="list-style-type: none"> <li>■ Check all DS1 connections for both cards.</li> <li>■ Check for reversed cable.</li> <li>■ Conduct a loopback test to check the connection path (refer to the volume titled <u>Maintenance and Testing</u>, Section 3—<i>Troubleshooting</i>, Chapter 1—“Line and Terminal Loopback Tests”).</li> </ul> <p>For the LSMT3 and MLAT3 interface:</p> <ul style="list-style-type: none"> <li>■ Check connections for both cards.</li> <li>■ Check for reversed cable.</li> </ul>

Table 6-23: LSM Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
7	<p>Remote defect indicator: Indicates a far end problem.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>For the LSM2/LSM2L/LSM2S and MLA2/MLA2L/MLA2S interface:</p> <ul style="list-style-type: none"> <li>■ Be sure the OC3T tab configuration settings are the same for the LSM and MLA cards.*</li> <li>■ Check the fiber optic cable connections. Clean cable connections following local procedures<sup>1</sup>.</li> <li>■ Check for reversed cable.</li> <li>■ Check for defective cable or bad connections. Refer to <b>Test LSM Transmit and MLA Receive</b>, page 6-69.</li> </ul> <p>For the LSMT1/MLAT1 interface:</p> <ul style="list-style-type: none"> <li>■ Be sure the DS1 tab configuration settings are the same for the LSMT1 and MLAT1 cards.*</li> <li>■ Check connections for both cards.</li> <li>■ Check for reversed cable.</li> <li>■ Conduct a loopback test to check the connection path (refer to the volume titled <u>Maintenance and Testing</u>, Section 3—<i>Troubleshooting</i>, Chapter 1—“Line and Terminal Loopback Tests”).</li> </ul> <p>For the LSMT3/MLAT3 interface:</p> <ul style="list-style-type: none"> <li>■ Be sure the DS3T tab configuration settings are the same for the LSMT3 and MLAT3 cards.*</li> <li>■ Check connections for both cards.</li> <li>■ Check for reversed cable.</li> </ul> <p>* Refer to the volume titled <u>Commissioning</u>, Section 5—<i>Commissioning</i>, Chapter 2—“Using Craft Terminal for Commissioning.”</p>

Table 6-23: LSM Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
8	<p>Loss of cell delineation.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<ul style="list-style-type: none"> <li>■ Be sure the settings on the appropriate configuration tab (OC3T, DS1, or DS3T) are the same for the LSM and MLA cards. Refer to the volume titled <u>Commissioning</u>, Section 5—<i>Commissioning</i>, Chapter 2—“Using Craft Terminal for Commissioning.”</li> <li>■ Indicates a problem in either the LSM card or the MLA card. Replace one of these cards (e.g., the LSM card) to see if the condition is corrected. If not, replace the other card (e.g., the MLA card).</li> </ul> <p>For the LSMT1:</p> <ul style="list-style-type: none"> <li>■ Indicates a problem with the DS1 facility, due to <u>Sequence Error</u> (corrupted data) or <u>Excessive Delay</u> (the relative delay in the affected port greatly exceeds that in other ports). <ul style="list-style-type: none"> <li>– For <u>Sequence Error</u>: replace one of the cards (e.g., the LSMT1 card) to see if the condition is corrected. If not, replace the other card (e.g., the MLAT1 card).</li> <li>– For <u>Excessive Delay</u>: re-route the connection on the affected port to shorten the line distance, or switch the connection to another card.</li> </ul> </li> </ul>

Table 6-23: LSM Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
9	<p>Rate degraded: Indicates that the number of active ports is less than the number of provisioned ports (i.e., unlocked ports on the LSMT1 and MLAT1 do not correspond), or one or more of the provisioned ports has a rate drop.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Enabled.</p> <p>Availability Status: Operable, but providing service at a lower rate.</p>	<p>Use Craft Terminal to determine if an LSMT1 port is locked that should be unlocked, or to check individual LSMT1 ports for LOS or LOF conditions.</p> <p>Applicable to LSMT1 only.</p>
10	<p>Loopback activated: Indicates that loopback is activated on the interface.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>Not an error condition. Use Craft Terminal to remove the loopback mode from the LSM port and put the card back in service.</p>
11	<p>Unequipped: Indicates the card is not in the slot.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Departed: equipment has been removed.</p>	<ul style="list-style-type: none"> <li>■ Place an LSM card correctly in LCS slot #25.</li> <li>■ Make “transmit” and “receive” cable connection to corresponding MLA card.</li> </ul>
12	<p>Equipment failed: Indicates a failure with the card.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>Replace bad LSM card.</p>

Table 6-23: LSM Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
13	<p>Dependent resource disabled: Exists when a resource has a dependency on another resource that is disabled.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Unreachable: resource cannot be accessed due to failure or removal of a resource on which it is dependent.</p>	<p>Use Craft Terminal to check condition status at the LSM “port” level.</p> <p>A dependent resource condition at the LSM port level indicates that the LSM cannot communicate with the MLA port. Refer to <b>Test LSM Transmit and MLA Receive</b>, page 6-69 and <b>Test MLA Transmit and LSM Receive</b>, page 6-71 to check for bad cable connections or to determine if the MLA card is bad.</p>
14	<p>Attribute fail condition: Indicates that the system attributes recorded by the equipment reveal a fatally flawed parameter value.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>Replace bad LSM card.</p>
15	<p>Attribute incomplete: Indicates that the equipment has not completed updating the system attributes.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Unknown.</p>	<p>Replace bad LSM card if condition does not clear within 2 to 3 minutes. May be a hardware problem or indication that LSM card software is not the latest version.</p>
16	<p>Attribute down revisioned: Indicates that the LSM card has an older software version than the active MCP card.</p> <p>Operational State: Enabled.</p> <p>Availability Status: Temporarily Inoperable.</p>	<p>No action required. 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.</p>

Table 6-23: LSM Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
17	<p>Attribute mismatch: Exists when the analysis of system attributes results in software or hardware incompatibility (e.g., incorrect card type, or card with newer software than active MCP card).</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable.</p>	<ul style="list-style-type: none"> <li>■ Replace the incorrect card type with the correct card type, or correct the provisioning to match the inserted card.</li> <li>■ Compare the software version of the card with that of the active MCP card; a card with newer software than the MCP must be replaced with a card with the same or older software.</li> </ul>
18	<p>Uninitialized: Indicates that the operational state and other status are not initialized yet.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Unknown.</p>	<p>Indicates communication path problem:</p> <ul style="list-style-type: none"> <li>■ Verify that the card is properly seated and locked in place.</li> <li>■ Call Technical Support, may need to replace the card if initialization can't complete.</li> </ul>
19	<p>Provisioning data out of range: One or more of the ports has been provisioned improperly.</p>	<p>Check and correct provisioning information.</p> <p>Applicable to the LSMT1 only.</p>

<sup>1</sup> Suggested cable 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 Actions**

Follow the Recommended Actions listed below to correct error conditions received for a line card (DS1, DMT8a-3, DMT8a-4, SDSL8, SDSL8+, SHDSL8, and IDSL8):

**Note:** For information and instructions regarding threshold crossing events, refer to the volume titled Provisioning, or the volume titled Maintenance and Testing, Section 1—*System Monitoring*, Chapter 3—“Performance Monitoring.”

**Note:** Craft Terminal alarm descriptions are listed in full text (e.g., “Diagnostic test failure”). The Condition column indicates whether an event is generated in Craft Terminal.

Table 6-24: Line Card Conditions & Recommended Actions

#	IF THE CONDITION IS THIS...	THEN DO THIS...
1	<p>Diagnostic test failure: Exists when a card fails the diagnostic test.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>Hardware diagnostic:</p> <ul style="list-style-type: none"> <li>■ Verify that the card is properly seated and locked in place.</li> <li>■ Replace bad line card if Diagnostic test failure condition continues.</li> </ul>
2	<p>Software download failure: Exists when a card experiences an invalid software download.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>Software diagnostic; replace bad line card.</p>
3	<p>Loss of signal: Exists when a port detects a Loss of Signal not preceded by a valid “dying gasp.”</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>Bad connection at end user equipment (NIC or modem). Possible causes:</p> <ul style="list-style-type: none"> <li>■ Subscriber<sup>1</sup> may have powered off CPE; CO or CPE does not support “dying gasp.”</li> <li>■ Bad end user equipment.</li> <li>■ Problem in the local loop; e.g., cable cut.</li> </ul>

Table 6-24: Line Card Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
4	<p>Loss of power: 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.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>No action required. Service will resume when customer turns on CPE.</p> <p><b>Note:</b> Not applicable to SDSL8, SDSL8+, IDSL8, or DS1 cards.</p>
5	<p>Loss of frame: Exists when a port detects Loss of frame.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>Bad connection at end user equipment (NIC or modem). Possible causes:</p> <ul style="list-style-type: none"> <li>■ Bad end user equipment.</li> <li>■ Problem in the local loop; e.g., cable cut.</li> </ul>
6	<p>High error rate: Indicates a high error rate on the port.</p>	<p>The provisioned Error Rate alarm threshold is exceeded. Do one or more of the following:</p> <ul style="list-style-type: none"> <li>■ Increase the Error Rate alarm threshold.</li> <li>■ Increase the provisioned Noise Margin.</li> <li>■ Reduce the data rate.</li> </ul> <p><b>Note:</b> Reducing data rate not applicable to the DS1 card.</p> <ul style="list-style-type: none"> <li>■ Check the quality of the loop, and adjust provisioning if necessary.</li> </ul> <p><b>Note:</b> Not applicable to SDSL8, SDSL8+, or IDSL8 cards.</p>
7	<p>Overflow: Indicates that the system is running out of resource (memory).</p> <p>Operational State: Enabled.</p> <p>Availability Status: Degraded.</p>	<p>This condition should not appear during test and commissioning procedures. Indicates that the “egress” threshold is exceeded, indicating severe buffering congestion.</p>

Table 6-24: Line Card Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
8	<p>Loss of cell delineation.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>Bad connection at end user equipment (NIC or modem). Possible causes:</p> <ul style="list-style-type: none"> <li>■ Bad end user equipment.</li> <li>■ Problem in the local loop; i.e. cable cut.</li> </ul> <p><b>Note:</b> Not applicable to SDSL8, SDSL8+, IDSL8, or DS1 cards.</p>
9	<p>Rate degraded: Indicates that the line card port has a rate drop.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Enabled.</p> <p>Availability Status: Operational.</p>	<p>The actual upstream or downstream data rate is below the minimum rate provisioned for the subscriber. Check and adjust provisioning parameters as necessary.</p> <p><b>Note:</b> Not applicable to the DS1 card.</p>
10	<p>Loopback activated: Indicates that loopback or test is activated on the interface.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable: incapable of providing service.</p>	<p>Not an error condition. Use Craft Terminal to remove the loopback mode from the line card port and put the card back in service.</p>
11	<p>Unequipped: Indicates the card is not in the slot.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Departed: equipment has been removed.</p>	<p>Place a line card correctly in LCS slot 1 through 24 as required.</p>
12	<p>Equipment failed: Indicates a failure with the card.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>On the Status tab, restart the card by clicking <b>Reset Card</b> in Craft Terminal. If the condition continues, replace the bad line card.</p>

Table 6-24: Line Card Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
13	<p>Dependent resource disabled: Exists when a resource has a dependency on another resource that is disabled.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Unreachable: resource cannot be accessed due to failure or removal of a resource on which it is dependent.</p>	<p>Use Craft Terminal to check condition status at the LSM “port” level.</p> <p>A dependent resource condition at the line card port level indicates that the line card cannot communicate with the LSM port.</p>
14	<p>Attribute fail condition: Indicates that the system attributes recorded by the equipment reveal a fatally flawed parameter value.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Failed: failed (not removed or unreachable).</p>	<p>Replace the bad line card.</p>
15	<p>Attribute incomplete: Indicates that the equipment has not completed updating the system attributes.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Unknown.</p>	<p>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.</p>
16	<p>Attribute down revisioned: Indicates that the line card has an older software version than the active MCP card.</p> <p>Operational State: Enabled.</p> <p>Availability Status: Temporarily Inoperable.</p>	<p>No action required. 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.</p> <p><b>Note:</b> While upgrading, the red FAIL indicator light will flash on and off.</p>
17	<p>Attribute mismatch: Exists when the analysis of system attributes results in software or hardware incompatibility (e.g., incorrect card type, or card with newer software than active MCP card).</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable.</p>	<ul style="list-style-type: none"> <li>■ Replace the incorrect card type with the correct card type, or correct the provisioning to match the inserted card.</li> <li>■ Compare the software version of the card with that of the active MCP card; a card with newer software than the MCP must be replaced with a card with the same or older software.</li> </ul>

Table 6-24: Line Card Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
18	<p>Uninitialized: Indicates that the operational state and other status are not initialized yet.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Unknown.</p>	<p>If this condition persists for more than 30 seconds, it indicates a communication path problem:</p> <ul style="list-style-type: none"> <li>■ Verify that the card is properly seated and locked in place.</li> <li>■ Call Technical Support; may need to replace the card if initialization can't complete.</li> </ul>
19	<p>Provisioning data out of range: Indicates that invalid setup information has been passed to the line card.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable.</p> <p>For the IDSL8 card only, indicates one of the following:</p> <ul style="list-style-type: none"> <li>■ More than one PPP connection.</li> <li>■ Mix of PPP and Frame Relay connections.</li> <li>■ More than 24 connections.</li> </ul>	<ul style="list-style-type: none"> <li>■ Set valid provisioning information for the line card. See the volume titled <u>Provisioning</u>, Section 1—<i>Provisioning Concepts</i>:</li> <li>■ For DMT8a-3 cards, Chapter 1—“DMT8a-3 ADSL Provisioning.”</li> <li>■ For DMT8a-4 cards, Chapter 2—“DMT8a4 ADSL Provisioning.”</li> <li>■ For SDSL8 cards, Chapter 3—“SDSL8 Provisioning.”</li> <li>■ For SDSL8+ cards, Chapter 4—“SDSL8+ Provisioning.”</li> <li>■ For SHDSL8 cards, Chapter 5—“SHDSL8 Provisioning.”</li> <li>■ For DS1 cards, Chapter 6—“DS1 Provisioning.”</li> <li>■ For IDSL8 cards, Chapter 7—“IDSL Provisioning.”</li> </ul>
20	<p>Error rate alarm: Indicates that the Near End or Far End errored frames per second threshold for Data mode has been exceeded.</p> <p>Operational State: Enabled.</p> <p>Availability Status: Operational.</p>	<p>Check Near End or Far End errored frames threshold.</p>

Table 6-24: Line Card Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
21	<p>IDSL NT activation active: Indicates the D50 is moving through the ISDN activation process, but has not exchanged the NT activation bit with the CPE.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable; incapable of provisioning service.</p>	<p>No action required, service will resume when the D50 and the CPE have exchanged the Act Bit and the line stays up.</p> <p>If the condition does not clear, there may be a bad connection at the CPE. Possible causes:</p> <ul style="list-style-type: none"> <li>■ Bad end user equipment.</li> <li>■ Problem in the local loop; e.g., cable cut.</li> </ul> <p><b>Note:</b> Applicable to the IDSL8 card only.</p>
22	<p>IDSL NT activation clear: Indicates the D50 (NT) and the CPE have moved through the ISDN activation process, and the line is up.</p>	<p>Not an error condition, no action required.</p> <p><b>Note:</b> Applicable to the IDSL8 card only.</p>

Table 6-24: Line Card Conditions & Recommended Actions (continued)

#	IF THE CONDITION IS THIS...	THEN DO THIS...
23	<p>IDSL LMI active: Indicates that the D50 is no longer receiving link integrity signals or status requests from the CPE.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable; incapable of providing service.</p>	<p>There may be a bad connection at the CPE. Possible causes:</p> <ul style="list-style-type: none"> <li>■ Bad end user equipment.</li> <li>■ Problem in the local loop; e.g., cable cut.</li> <li>■ The CPE may not support LMI (does not indicate an error condition).</li> </ul> <p><b>Note:</b> Applicable to IDSL8 card ports with Frame Relay connections only.</p>
24	<p>DS1 LMI down: Indicates that the D50 is no longer receiving link integrity signals or status requests from the CPE.</p> <p><b>Note:</b> An event is generated in Craft Terminal.</p> <p>Operational State: Disabled.</p> <p>Availability Status: Inoperable; incapable of providing service.</p>	<p>There may be a bad connection at the CPE. Possible causes:</p> <ul style="list-style-type: none"> <li>■ Bad end user equipment.</li> <li>■ Problem in the local loop; e.g., cable cut.</li> <li>■ The CPE may not support LMI (does not indicate an error condition).</li> </ul> <p><b>Note:</b> Applicable to the DS1 card only.</p>

<sup>1</sup> 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.

**MTU Card Alarm** Follow the Recommended Actions listed below to correct an alarm condition received for the Master Timing Unit (MTU) card:

**Note:** The Craft Terminal alarm description is listed in full text (e.g., “CLKLET SET”).

Table 6-25: MTU Alarm & Recommended Actions

#	IF THE CONDITION IS THIS...	THEN DO THIS...
1	CLKLET SET: Indicates that the external timing input signal is not detected by the MTU card(s).	<ul style="list-style-type: none"> <li>■ Be sure that the cards are inserted into the proper slots, according to the slot number on the side of each card (i.e., the card for Slot 1 into Slot 1, the card for Slot 2 into Slot 2).</li> <li>■ There may be a problem with the card(s). Replace one or both cards.</li> <li>■ There may be a problem with the peripheral equipment that generates or transmits the timing signal to the card(s). Check the peripheral equipment for possible problems.</li> </ul>

**Queue Conditions and Recommended Actions**

Follow the Recommended Actions listed below to correct error conditions received for a queue (Low, Medium, and High priority):

Craft Terminal alarm descriptions are listed in full text (e.g., “Overflow”). The Condition column indicates whether an event is generated in Craft Terminal.

Table 6-26: Queue Conditions & Recommended Actions

#	IF THE CONDITION IS THIS...	THEN DO THIS...
1	Overflow: Indicates that the “ingress” or “egress” threshold is exceeded, indicating severe buffering congestion.	Check queue configurations and make provisioning adjustments as necessary.
2	Bad Provisioning: Indicates that the specified queue size is out of range.	Check queue configurations and make provisioning adjustments as necessary.



## Appendix G

### Test Transmit/Receive LSM/MLA/Trunk Cards (Fiber Optic)

#### Test LSM Transmit and MLA Receive

Follow these steps to determine the cause of a “Loss of Signal” (LOS) condition at an MLA card (MLA2, MLA2L, and MLA2S only):

Table 6-27: Test LSM Transmit and MLA Receive

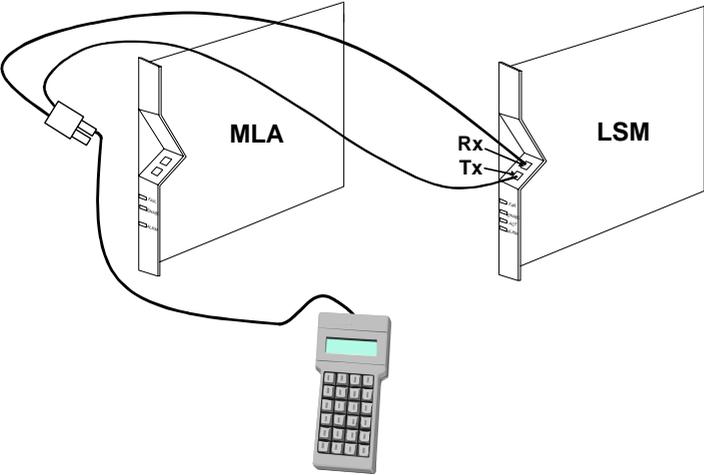
STEP	PROCEDURE
1	Disconnect the fiber optic cable from the MLA connectors.
2	Connect an optical meter to the end of the LSM “transmit” cable. <div style="text-align: center;">  <p>The diagram illustrates the test setup. It shows two circuit boards: an MLA card on the left and an LSM card on the right. A fiber optic cable is connected between the two cards. The cable is plugged into the Tx port of the LSM card and the Rx port of the MLA card. An optical meter is connected to the free end of the cable at the Tx port of the LSM card. The meter has a small screen and a keypad. Labels 'MLA' and 'LSM' are placed on their respective boards. On the LSM board, the ports are labeled 'Rx' and 'Tx'.</p> </div> <p style="text-align: center;">Figure 6-1: Test LSM Transmit at LSM Tx Cable</p>
3	Set the optical meter to dBm, and set the wavelength setting to 1300 nm.
4	Check the output signal power on the optical meter according to the card’s cable type; refer to <b>Interface Types and Optical Power</b> , page 6-76. <p>Is the output signal power within the listed range?</p> <ul style="list-style-type: none"> <li>■ If YES, the LSM transmit signal is good to the end of the fiber optic cable. Replace the bad MLA card. The test procedure is complete.</li> <li>■ If NO, continue to Step 5 to determine if the fiber optic cable or the LSM card is bad.</li> </ul>
5	Disconnect the fiber optic cable from the LSM connectors.

Table 6-27: Test LSM Transmit and MLA Receive (continued)

STEP	PROCEDURE
6	Connect a fiber optic jumper in the LSM “transmit” connector (the lower, front connector on the card).
7	Connect an optical meter to the other end of the fiber optic jumper. <div style="text-align: center;"> <p>The diagram shows a rectangular LSM card with two fiber optic connectors on its front face. The upper connector is labeled 'Rx' and the lower one is labeled 'Tx'. A fiber optic jumper is plugged into the 'Tx' connector. The other end of the jumper is connected to an optical power meter, which is a handheld device with a screen and a keypad.</p> </div> <p style="text-align: center;">Figure 6-2: Test LSM Transmit at LSM Tx Connector</p>
8	Set the optical meter to dBm, and set the wavelength setting to 1300 nm.
9	Check the output signal power on the optical meter according to the card’s cable type; refer to <b>Interface Types and Optical Power</b> , page 6-76. Is the output signal power within the listed range? <ul style="list-style-type: none"> <li>■ If YES, replace the bad fiber optic cable. The test procedure is complete.</li> <li>■ If NO, replace the bad LSM card. The test procedure is complete.</li> </ul>

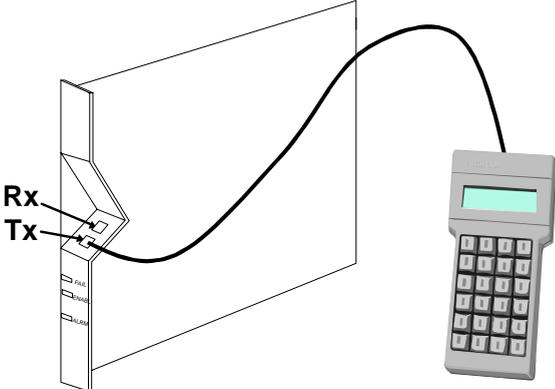
**Test MLA Transmit and LSM Receive**

Follow these steps to determine the cause of a “Loss of Signal” (LOS) or “Dependent Resource Disabled” (DRD) condition at an LSM card (LSM2, LSM2L, and LSM2S only):

Table 6-28: Test MLA Transmit and LSM Receive

STEP	PROCEDURE
1	Disconnect the fiber optic cable from the LSM connectors.
2	Connect an optical meter to the end of the MLA “transmit” cable. <div> <p>The diagram illustrates the test setup. On the left is an MLA card with two fiber optic ports labeled 'Rx' and 'Tx'. On the right is an LSM card with a fiber optic port. A fiber optic cable connects the 'Tx' port of the MLA card to the fiber optic port of the LSM card. A handheld optical meter is connected to the other end of the fiber optic cable. The meter has a small screen and a keypad.</p> </div> <p>Figure 6-3: Test MLA Transmit at MLA Tx Cable</p>
3	Set the optical meter to dBm, and the wavelength setting to 1300 nm.
4	Check the output signal power on the optical meter according to the card’s cable type; refer to <b>Interface Types and Optical Power</b> , page 6-76. <p>Is the output signal power within the listed range?</p> <ul style="list-style-type: none"> <li>■ If YES, the MLA signal is good to the end of the fiber optic cable. Replace the bad LSM card. The test procedure is complete.</li> <li>■ If NO, continue to Step 5 to determine if the fiber optic cable or the MLA card is bad.</li> </ul>
5	Disconnect the fiber optic cable from the MLA connectors.
6	Connect a fiber optic jumper in the MLA “transmit” connector (the lower, front connector on the card).

Table 6-28: Test MLA Transmit and LSM Receive (continued)

STEP	PROCEDURE
7	<p>Connect an optical meter to the other end of the fiber optic jumper.</p>  <p style="text-align: center;">Figure 6-4: Test MLA Transmit at MLA Tx Connector</p>
8	<p>Set the optical meter to dBm, and the wavelength setting to 1300 nm.</p>
9	<p>Check the output signal power on the optical meter according to the card's cable type; refer to <b>Interface Types and Optical Power</b>, page 6-76.</p> <p>Is the output signal power within the listed range?</p> <ul style="list-style-type: none"> <li>■ If YES, replace the bad fiber optic cable. The test procedure is complete.</li> <li>■ If NO, replace the bad MLA card. The test procedure is complete.</li> </ul>

**Test LSM and  
MLA Tx/Rx  
without an  
Optical Meter**

Follow these steps to determine the cause of a “Loss of Signal” (LOS) condition at the LSM (LSM2, LSM2L, and LSM2S only) or MLA (MLA2, MLA2L, and MLA2S only) card “transmit” and “receive” connectors without using an optical meter:

Table 6-29: Test LSM and MLA Tx/Rx without Optical Meter

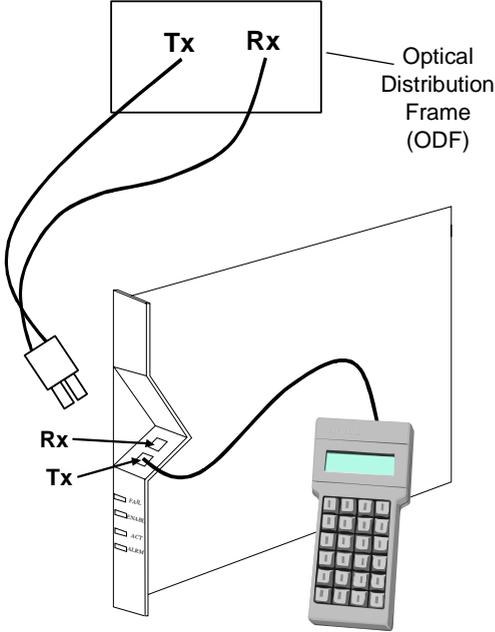
STEP	PROCEDURE
1	Disconnect the fiber optic cable from the MLA card “transmit” and “receive” connectors.
2	Connect a single-mode or multi-mode fiber optic jumper to the “transmit” and “receive” connectors on the card, according to the card type (refer to <b>Interface Types and Optical Power</b> , page 6-76).
3	On the MLA port’s OC3T tab in Craft Terminal, change the Timing Option parameter setting from “Loop” to “Internal.”
4	Is the LOS condition cleared at the MLA card? <ul style="list-style-type: none"> <li>■ If YES, the MLA transceivers are functioning. Continue to Step 5.</li> <li>■ If NO, the MLA transceivers are bad. Replace the MLA card. Skip to Step 9.</li> </ul>
5	Disconnect the fiber optic cable from the LSM card “transmit” and “receive” connectors.
6	Connect a single-mode or multi-mode fiber optic jumper to the “transmit” and “receive” connectors on the card, according to the card type (refer to <b>Interface Types and Optical Power</b> , page 6-76).
7	On the LSM port’s OC3T tab in Craft Terminal, change the Timing Option parameter setting from “Loop” to “Internal.”
8	Is the LOS condition cleared at the LSM card? <ul style="list-style-type: none"> <li>■ If YES, the LSM transceivers are functioning. The fiber optic cable is bad; replace the cable.</li> <li>■ If NO, the LSM transceivers are bad. Replace the LSM card.</li> </ul>
9	The <b>Test LSM and MLA Tx/Rx without an Optical Meter</b> procedure is complete.

**Test OC3 Trunk Card Transmit and Receive Levels**

Follow these procedures to test the “transmit” and “receive” power levels at the OC3 trunk card (OC3T, OC3T2, OC3T2L, OC3T2M, OC3TQS, OC3TQM, and OC3TQL).

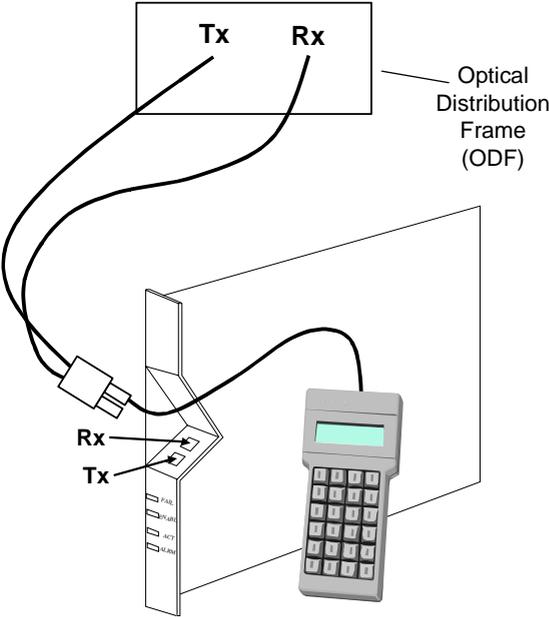
To verify the output power signal at the trunk card transmitter:

Table 6-30: Test OC3 Trunk Card Transmit Level

STEP	PROCEDURE
1	Disconnect the fiber optic cable from the OC3 trunk card “transmit” and “receive” connectors.
2	Connect a single-mode fiber optic jumper to the “transmit” connector (the lower, front connector on the card).
3	<p>Connect an optical meter to the other end of the fiber optic jumper.</p>  <p style="text-align: center;">Figure 6-5: Test OC3 Transmit Level</p>
4	Set the optical meter to dBm, and the wavelength setting to 1300 nm.
5	<p>Check the output signal power on the optical meter. The level should be within the range of -8 and -15 dBm. Refer to <b>Interface Types and Optical Power</b>, page 6-76.</p> <p>If the output signal power is NOT within this range, replace the bad OC3 trunk card.</p> <p>The test procedure is complete.</p>

To verify the output power signal received from the ATM switch at the trunk card:

Table 6-31: Test OC3 Trunk Card Receive Level

STEP	PROCEDURE
1	Disconnect the fiber optic cable from the OC3 trunk card “transmit” and “receive” connectors.
2	<p>Connect an optical meter to the “transmit” cable connector from the ATM switch; this is the cable that connects to the trunk card’s “receive” connector (the upper, back connector on the card).</p>  <p style="text-align: center;">Figure 6-6: Test OC3 Receive Level</p>
3	Set the optical meter to dBm, and the wavelength setting to 1300 nm.
4	<p>Check the input signal power on the optical meter. The level should be within the range of -8 and -28 dBm. Refer to <b>Interface Types and Optical Power</b>, page 6-76.</p> <p>If the input signal power is NOT within this range, test the output signal power at the ATM switch.</p> <p>The test procedure is complete.</p>

**Interface Types and Optical Power**

The following tables show the cable types for all MLA and LSM connections (Table 6-32: MLA to LSM Interface Types) and power ranges for all OC3 trunk card cable types (Table 6-33: OC3 Interface – Optical Power):

Table 6-32: MLA to LSM Interface Types

<b>Interface Type</b>	<b>Rate</b>	<b>MLA</b>	<b>Description</b>	<b>LSM</b>
Fiber Optic	OC3	MLA2	62.5/125 $\mu$ m multi-mode fiber	LSM2
		MLA2L	9/125 $\mu$ m single-mode fiber, long haul	LSM2L
		MLA2S	9/125 $\mu$ m single-mode fiber, short haul	LSM2S
Copper	4xDS1	MLAT1	copper cable/pair	LSMT1
Coaxial	DS3	MLAT3	coaxial cable	LSMT3

Table 6-33: OC3 Interface – Optical Power

<b>Optical Power</b>	<b>Multi-Mode</b>	<b>Short Haul Single-Mode</b>	<b>Long Haul Single-Mode</b>
Output – Maximum Average	-14 dBm	-8 dBm	0 dBm
Output – Minimum Average	-20.5 dBm	-15 dBm	-5 dBm
Input – Maximum Average	-14 dBm	-8 dBm	-10 dBm
Input – Minimum Average	-29 dBm	-28 dBm	-34 dBm

## Appendix H

### D50 Component Part Numbers

Part Numbers  
Table

Table 6-34: D50 Component Part Numbers

<b>PART NAME</b>	<b>NOKIA SALES CODE</b>	<b>HSAP PART NUMBER</b>
<b>D50 MULTIPLEXER ASSEMBLIES</b>		
Master Control Shelf (MCS) Kit (no cables; includes Fan Tray)	E32603.01--	50-0010
Line Card Shelf (LCS) Kit (no cables; includes Fan Tray)	E32604.01--	50-0020
Line Card Shelf (LCS) (no cables; includes Fan Tray)	E32405.01--	—
Remote Line Card Shelf (RLCS) Kit (no cables; includes Fan Tray)	T32498.02--	—
Remote Line Card Shelf (RLCS) (no cables; includes Fan Tray)	T32498.01--	—
Low Pass Filter Shelf (LPFS8) Kit (no cables; no fan tray required)	E32637.01--	50-0136
Low Pass Filter Shelf (LPFS8) with cables (no fan tray required)	E32413.01--	30-1400
Low Pass Filter Shelf (LPFS8) without cables (no fan tray required)	E32651.01--	50-0164
Remote Low Pass Filter Shelf (RLPFS8) Kit (no cables; no fan tray required)	T32499.02--	—
Remote Low Pass Filter Shelf (RLPFS8) (no cables; no fan tray required)	T32499.01--	—
Auxiliary CSIP Assembly Kit	E32606.01--	50-0040
LCS Fan Tray Kit, High RPM	E32424.01--	50-0050
LCS Fan Tray, High RPM (included in MCS and LCS Kits)	E32423.01--	30-0005
RLCS Fan Tray Kit, High RPM	T34750.02--	—
RLCS Fan Tray, High RPM (included in RLCS Kits)	T34750.01--	—
<b>CABLE ASSEMBLIES</b>		
LCS Power Cable (79-inch cable)	E32679.01--	40-0002-004

Table 6-34: D50 Component Part Numbers (continued)

<b>PART NAME</b>	<b>NOKIA SALES CODE</b>	<b>HSAP PART NUMBER</b>
LCS Power Cable (20-foot cable)	E32437.01	40-0048
2 Meter Duplex Fiber Optic Cable - multimode	E32402.01--	—
3 Meter Duplex Fiber Optic Cable - multimode	E32403.01--	70-0003-030
5 Meter Duplex Fiber Optic Cable - multimode	E32404.01--	—
T3 Coax Cable Stub (LSMT3 and MLAT3)	E32445.01--	—
Sequential Pair Cable Assembly for LCS	—	40-0025
Sequential Pair Cable Assembly for LPFS8	—	40-0037
LSMT3 Cable Assembly, 75 Ohm, Male	E32447.01--	—
MLAT3 Cable Assembly, 75 Ohm, Male	E32446.01--	—
48 Volt Power Long Reach Cable Assembly	E32437.01--	—
48 Volt Power Cable Assembly, LCS	E32679.01--	—
LSMT3, MLAT3, 75 ohm Cable Assembly, Male SMB, Female BNC	E32445.01--	—
<b>CABLE KITS</b>		
LCS to LPFS8 Cable Kit	E32448.01--	—
LPFS8 or LCS to MDF, Female, Cable Kit	E32449.01--	—
LPFS8 or LCS to MDF, Male, Cable Kit	E32450.01--	—
LPFS8A or LCS to MDF, 4.5 M, Bare, Cable Kit	E32453.01--	—
LCS, Male, 3-Pack Cable Kit	E32451.01--	—
LCS, Female, 3-Pack Cable Kit	E32452.01--	—
RLCS to MDF Cable Kit	T34746.01--	—
RLPFS8 to RLCS and MDF Cable Kit	T34745.01--	—
<b>INSTALLATION KITS</b>		
MCS/ACSIP Installation Kit	—	50-0060
LCS/LPFS8, RLCS/RLPFS8 Installation Kit	—	50-0070
D50 RAM Installation Kit	—	50-0129
<b>MASTER CONTROL SHELF (MCS) CARDS</b>		
Master Timing Unit (MTU) card	T32459.0030	60-0020-800
Network Management Processor (NMP) card	E32617.01--	60-0009-800
Master Control Processor (MCP) card	E32616.01--	60-0008-800
DS3T Trunk Interface card	E32613.01--	60-0007-800

Table 6-34: D50 Component Part Numbers (continued)

<b>PART NAME</b>	<b>NOKIA SALES CODE</b>	<b>HSAP PART NUMBER</b>
DS3T2 Trunk Interface card	E32615.01--	60-0007-802
DS3TQ Trunk Interface card	E32667.01--	60-0144-801
OC3T Trunk Interface card	E32622.01--	60-0027-801
OC3T2 Trunk Interface card	E32623.01--	60-0027-802
OC3T2L Trunk Interface card – long haul	E32421.01--	60-0027-803
OC3T2M Trunk Interface card – multimode	E32433.01--	60-0027-804
OC3TQL Trunk Interface card – long haul	E32426.01--	60-0144-813
OC3TQM Trunk Interface card – multimode	E32427.01--	60-0144-811
OC3TQS Trunk Interface card – short haul	E32653.01--	60-0144-812
Master Line Card Adapter card 2 – multimode (MLA2)	E32619.01--	60-0021-801
Master Line Card Adapter card 2 – long haul (MLA2L)	E32420.01--	60-0021-803
Master Line Card Adapter card 2 – single mode (MLA2S)	E32620.01--	60-0021-802
Master Line Card Adapter card – DS3 (MLAT3)	E32647.01--	50-0163
Master Line Card Adapter card – DS1 (MLAT1)	E32644.01--	60-0088-801
DS3 broadband interface card (DS3L)	E32631.01--	60-0085-802
OC3 broadband interface card (OC3L)	—	60-0021-812
<b>LINE CARD SHELF (LCS) CARDS</b>		
Line Card Shelf Multiplexer card (LSM2)	E32624.01--	60-0037-801
Line Card Shelf Multiplexer card – long haul (LSM2L)	E32422.01--	—
Line Card Shelf Multiplexer card – single mode (LSM2S)	E32625.01--	60-0037-802
Line Card Shelf Multiplexer card – DS3 (LSMT3)	E32648.01--	50-0162
Line Card Shelf Multiplexer card – DS1 (LSMT1)	E32643.01--	60-0087-801
CAM8 card (Complimentary Analysis Module)	T32486.01--	—
PAM8 card (Pair Analysis Module)	T324.0030--	60-0196-300
DMT8a-3 line card	T32478.01--	—
DMT8a-4 line card	T34765.01	—
DS1 line card (Quad DS1)	E32663.01--	60-0112-300
Remote Craft Access Unit (RCAU)	T32455.02--	—
SDSL8 line card (Octal SDSL)	E32626.01--	60-0044-801
SDSL8+ line card (Octal SDSL)	E32669.01--	60-0172-801

Table 6-34: D50 Component Part Numbers (continued)

<b>PART NAME</b>	<b>NOKIA SALES CODE</b>	<b>HSAP PART NUMBER</b>
SHDSL8 line card (Octal SHDSL)	T36311.01--	—
IDSL8 line card (Octal IDSL)	E32627.01--	60-0054-801
<b>LOW PASS FILTER SHELF (LPF8) CARD</b>		
LPF8-2 card (for DMT8a-3/DMT8a-4 line cards)	E32431.01--	60-0195-600
<b>D50 RAM</b>		
D50 RAM Assembly	E32610.01--	50-0128
Low Pass Filter card (LPF8M)	E32632.01--	60-0135-801
Through Connect LPF plug replacement card (MRTC)	E32633.01--	60-0135-802
<b>MISCELLANEOUS ITEMS</b>		
EMI Filter Ferrite (for DS-1 cables)	—	74-0035
EMI Filter Ferrite (for Power and Craft Terminal Ethernet cables)	—	28-0000
D50/D50e System Software, Release 11.0	S36385.01--	—
D50/D50e Administrative Utilities Upgrade Software, Release 11.0	S36385.01--	—
D50/D50e Craft Terminal Software, Release 11.0 (single user license)	S36386.01--	—
D50/D50e Craft Terminal Software, Release 11.0 (five user licenses)	S36387.01--	—
D50/D50e Craft Terminal Software, Release 11.0 (50 user licenses)	S36388.01--	—
D50 Documentation CD, Volumes 1–6, Release 11.0	C34766.90--	—
D50/D50e Administration Utilities User's Guide (Booklet), Release 11.0	—	26-0264

## Appendix I

### Glossary and Acronyms

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- 10BaseT.** A 10 Mbps Ethernet network that uses unshielded twisted pair cable in a star topology with a central hub.
- 2B1Q (Two Binary, One Quaternary).** A line encoding technique used in ISDN BRI, IDSL and SDSL. It is a four-level PAM (Pulse Amplitude Modulation) technique, which maps two bits of data into one quaternary symbol, with each symbol comprising one of four variations in amplitude and polarity over a circuit.
- AAL (ATM Adaptation Layer).** ATM Adaptation Layer is located above ATM and converts non-ATM bit streams into ATM cells. The AAL protocol supports higher-layer service requirements.
- ADSL (Asymmetric Digital Subscriber Line).** 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. The downstream rates are much faster than the upstream rates.
- AIS (Alarm Indication Signal).** 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.
- 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.
- ANSI (American National Standards Institute).** Founded in 1918, ANSI is a U.S. voluntary standards setting board.
- API (Application Programming Interface).** Software that an application program uses to request and carry out lower-level services performed by an operating system.
- ASCII (American Standard Code for Information Interchange).** A computer coding method for converting alphanumeric and punctuation characters and control codes into digital (binary) form.
- ATM (Asynchronous Transfer Mode).** 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.
- Attenuation.** Attenuation is the loss of signal strength over distance. Attenuation is measured in decibels.

- ATUC (ADSL Transmission Unit – Central Office).** Special electronics located in the Central Office to support a high rate of data transmission over UTP copper wires. This is the “downstream” direction. Works in conjunction with ATUR (see below).
- ATUR (ADSL Transmission Unit – Remote).** Special electronics located at the customer’s premises to support a high rate of data transmission over UTP copper wires. This is the “upstream” direction. Works in conjunction with ATUC (see above).
- AutoBaud.** A set of drivers available on SDSL devices to promote inter-operability.
- Auxiliary Common Systems Interface Panel (CSIP).** Each Auxiliary CSIP connects and distributes Central Office power to up to four Line Card Shelves (LCSs). Auxiliary CSIPs are required for D50’s with over five LCSs.
- AWG (American Wire Gauge).** A standard classification for measuring non-ferrous conductors such as copper wire.
- Backbone.** The part of a network that carries the heaviest traffic. It is one basis for the design of an overall network service. For example, the D50 operates on an ATM backbone.
- Bandwidth.** The capacity of a communications channel. For digital communications, bandwidth is usually measured in bits per second.
- BER (Bit Error Rate).** 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.
- BNC (Bayonett Neill Concelman).** A bayonet-locking cabling interconnection standard, used in thin coaxial cable Ethernet applications.
- BPS (Bits Per Second).** A measurement of transmission speed – number of bits transmitted each second.
- Bridge.** A communications device used to interconnect networks or network nodes with a common set of higher level protocols.
- Broadband.** A communications method in which multiple channels are formed by dividing the transmission medium on a shared communications path. Generally describes communications above 1.5 Mbps.
- Burst.** A short flow of packets, often followed by idle periods where there is no transmission activity.
- CAC (Connection Admission Control).** Procedures carried out by an ATM network at connection set-up to determine whether a requested virtual connection can be supported or should be rejected.
- CAM (Complimentary Analysis Module).** A Nokia Broadband Systems product. A card that is used to provide the pathway to perform continuity testing from the LCS to the MDF when using a Low Pass Filter Shelf (LPFS8). Plugs into the LPFS8 backplane in the same manner as a Low Pass Filter card. Works with the PAM (Pair Analysis Module) card.

- CAP (Competitive Access Provider).** An alternative competitive local exchange carrier.
- CBR (Constant or Continuous Bit Rate).** An ATM service category that supports a constant or guaranteed rate to transport services such as video or voice as well as circuit emulation requiring rigorous timing control and performance parameters.
- CCA (Congestion Control and Avoidance).** A resource and traffic management mechanism to correct, avoid and/or prevent excessive situations such as buffer overflow or insufficient bandwidth that can cause the network to collapse.
- CDV (Cell Delay Variance).** A component of Cell Transfer Delay, induced by buffering and scheduling.
- CDVT (Cell Delay Variance Tolerance).** Specifies the acceptable tolerance to cell-by-cell variations of the CDV (jitter).
- CE.** Products sold into the European Economic Community since January 1996 are required to carry the CE Mark. The CE Mark represents that the product meets all Electromagnetic Compatibility Directives.
- Cell.** The smallest data component in an ATM stream. The ATM Cell has a 5-byte header and contains 48 bytes of payload.
- CEV (Controlled Environment Vault).** An environmentally conditioned room for housing optical and electronic equipment.
- Channel.** A point-to-point link in a communications system.
- Circuit.** A transmission path for sending and receiving data and/or voice between two points in a telecommunications system.
- Circuit Emulation.** A virtual circuit service offered to end users where the characteristics of an actual, digital bit-stream line (for example, video traffic) are emulated.
- CLEC (Competitive Local Exchange Carrier).** These carriers compete with the local exchange service to provide telephone service to customers who may choose voice and/or data services. Additionally, a CLEC may lease existing lines or provide their own local loop.
- CLEI (Common Language Equipment Identifier) Codes.** Assigned to all telecommunications equipment that may be installed in a RBOC facility (or other facilities if required). The codes are assigned by Bellcore (now SAIC).
- Client/Server Model.** In the client-server model, the *server* program offers a service reachable over the network (or within a stand-alone system). A server receives a request, performs the service, and returns the result to the requester. The *client* program sends a request to the server and waits for a response.
- CLP (Cell Loss Priority).** A 1-bit field in the ATM cell header that corresponds to the loss priority of a cell. Lower priority (CLP=1) cells can be discarded under a congestion situation.
- CLR (Cell Loss Ratio).** A QoS parameter that gives the ratio of the lost cells to the total number of transmitted cells on a given VCC in cells per second.

**CMIP (Common Management Information Protocol).** 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.

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

**Coding Violation (CV).** A violation detected in the coding of a signal.

**Common Systems Interface Panel (CSIP) Alarm Board.** All D50 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 D50 alarm status.

**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 MCS and up to four Line Card Shelves (LCSs).

**CORBA (Common Object Resource Broker Architecture).** An Object Request Broker (ORB) standard developed by the Object Management Group (OMG). It is an object-oriented technology which provides a scalable, open platform for both service provider and large enterprise network environments.

**COT (Central Office Terminal or Termination).** The termination of a local loop facility. Located at the Central Office facility. See Digital Loop Carrier for further information about how this is used.

**CPE (Customer Premises Equipment).** Refers to telephone and related equipment located on the customer's premises (office or home).

**Craft Terminal (DiamondCraft®).** Craft Terminal, previously known as DiamondCraft, is the D50's stand-alone craft interface application. It communicates directly with a D50 through a serial port connection using Point-to-Point Protocol (PPP) or an Ethernet connection.

**CRC (Cyclical Redundancy Checking).** A data error-detecting mathematical process designed to ensure that errors don't occur undetected in a block of data. Systems using CRC will request that data be retransmitted if errors are detected.

**Cross-connect.** A connection between two or more elements of a telecommunications system.

**CTD (Cell Transfer Delay).** A QoS parameter that measures the maximum or worst-case time for a cell to be transferred from its source to its destination over a virtual connection. It is the sum of buffering, propagation, processing and queuing delays.

**D50 RAM (Remote Access Module).** The D50 RAM is a small, versatile DSL remote line card shelf supporting up to three 8-port D50 line cards, one Line Control Shelf

Multiplexer card, and three low pass filter cards, for up to 24 lines. It is equivalent to a small LCS.

**D50 Multiplexer.** The D50 Multiplexer is classified as a Digital Subscriber Line Access Multiplexer (DSLAM). The D50 Multiplexer uses Digital Subscriber Line (DSL) and Asynchronous Transfer Mode (ATM) technologies to deliver high speed data rates over the existing copper network.

**Data Rate.** The rate at which a channel carries data – measured in bits per second.

**dB (Decibel).** The decibel is a unit used to measure the power of sound or voltage. It is expressed as the ratio of two values. In telephony, the decibel (a logarithmic measurement) is used as a measure of relative power between circuits or transmission level points. As a reference: a change in level of 1 dB is barely perceptible under ideal conditions; however, increases or reductions of 3 dB result in doubling or halving, respectively, the power in a circuit. The corresponding figure for doubling or halving voltage is 6 dB.

**DLC (Digital Loop Carrier).** 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.

**DMT (Discrete Multi-Tone).** Modulation technique which uses Frequency Division Duplex multiplexing to transmit data in the 35 kHz to 1.1 MHz frequency spectrum. It divides the frequency range into 256 discrete bands, each with 4 kHz bandwidth. Each band is independently modulated.

**Downstream.** The communications path going from the CO or DSLAM to the client/end user.

**DS1 (Digital Signal Level One).** 1.544 Mbps digital signal.

**DS3 (Digital Signal Level Three).** 44.736 Mbps digital signal – equivalent of 28 T-1 channels (also referred to as T-3).

**DS3L.** A DS3 rate broadband tributary card that provides a standard ATM UNI/NNI interface that supports provisionable VPI/VCI mappings to the D50 trunk card, allowing ATM cells to be aggregated from standard ATM network equipment.

**DSL (Digital Subscriber Line).** The generic name for a family of digital services provided by the local telephone companies to their local subscribers. The high speeds of transmission (up to 8 Mbps) are accomplished over the existing twisted pair copper wires.

**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).

**Duplex.** Simultaneous, two-way independent transmission of data. Both ends of the communication can send and receive data at the same time. Also referred to as full-duplex.

**EFCI (Explicit Forward Congestion Indication).** A field in the ATM cell header indicating congestion or impending congestion. When EFCI is set, it indicates that a network element is either in a congested state or there is a potential congested state problem. The ATM end-system receiving cells with EFCI set can use this indication to adaptively decrease the cell rate of the connection to avoid congestion.

**Egress.** Outgoing direction to a network or network device. The term refers to data being sent out of a device or system, as opposed to information being sent into a network or network device (ingress).

**EMI (Electromagnetic Interference).** Unwanted electrical noise from an external source that can interfere with transmissions over copper cables.

**EML (Element Management Layer).** A layer representing the management and monitoring of components, at their lowest level, in a telecommunications network. In short, an abstraction of the functions provided by systems that manage each network element on an individual basis.

**EMS (Element Management Systems).** Software used to manage and monitor components of a telecommunication system at the lower levels of the Telecommunications Management Network.

**EOC (Embedded Operations Channel).** A control and signaling channel used for operations, administration and maintenance of the transmission line.

**EPD (Early Packet Discard).** A congestion control technique that selectively drops all but the last ATM cell in a Classical IP over ATM packet.

**Error Rate.** The ratio of incorrect elements sent to the total number of elements transmitted.

**ES (Errored Seconds).** The number of seconds in which at least one coding violation was detected.

**ESD (Electrostatic Discharge).** Transfer of an electrostatic charge on a surface through a conductive path to ground.

**ETSI (European Telecommunications Standards Institute).** ETSI is the European counterpart to ANSI, the American National Standards Institute. ETSI was founded in 1988.

**Fault.** Performance degradation that impacts the ability of the network element from properly performing.

**FEBE (Far End Block Error).** FEBE is used to monitor bit error performance of a communication link. An indication returned to the source that the far-end receiver has detected one or more errors in its received signal from the source.

**FEC (Forward Error Correction).** A transmission method in which extra bits or characters transmitted with the payload so that transmission errors can be corrected on the receiving end without forcing a retransmission.

**FM (Fault Management).** A data collection and reporting mechanism for component fault analysis.

**Frame.** In Time Division Multiplexing (TDM), a frame is one complete cycle of events. The frame consists of a fixed-size block of bits, which contains one (or more) time slots for each channel, plus synchronization and other overhead bits.

**Frame Relay.** Frame Relay is a packet mode switching interface defined by the ITU-T. Frame relay is provided on fractional T-1 or full T-carrier system carriers.

**FRF.** Frame Relay Forum.

**FRF.5.** Frame Relay/ATM PVC Network Interworking Implementation Agreement. FRF.5 provides the standard for ATM to become a high speed backbone for Frame Relay PVCs.

**FRF.8.** Frame Relay/ATM PVC Network Interworking Implementation Agreement. FRF.8 provides the standard for Frame Relay PVCs and ATM PVCs to communicate.

**GFC (Generic Flow Control).** A four bit field in the ATM header which can be used to provide local functions (e.g. flow control). The GFC is used to ensure that all nodes obtain access to the transmission medium. It can also be used to prioritize transmissions by data type.

**GUI (Graphical User Interface).** Generic name for the computer interface that presents graphics (icons) and characters. The GUI permits users to directly manipulate graphical objects displayed on the monitor.

**HDLC (High Level Data Link Control).** An ITU-TSS link layer protocol standard for point-to-point and multi-point communications. HDLC includes functions for link establishment, sequencing, flow control and error recovery.

**HDSL (High bit rate Digital Subscriber Line).** HDSL provides a T1 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.

**HTML (Hyper Text Markup Language).** HTML is the software programming language used to create World Wide Web pages.

**IAD (Integrated Access Device).** An integrated-access device that can multiplex voice and data on one line.

**IDF (Intermediate Distribution Frame).** A metal rack designed to connect cables and located in an equipment room or closet. Consists of bits and pieces that provide the connection between inter-building cabling and the intra-building cabling (i.e. between the Main Distribution Frame (MDF) and individual phone wiring).

**ISDL (ISDN Digital Subscriber Line).** Delivers speeds up to 128/144 Kbps on copper loops as long as 18,000 feet. Dedicated service for data communications applications only. 2B1Q interface. In most cases, users can use their existing ISDN CPE equipment.

- 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.
- ILEC (Incumbent Local Exchange Carrier).** The local carrier that is (typically) the primary carrier for local calls in a given area. ILECs are telephone companies that were part of the Bell System.
- In-Band.** Using the same circuit to transport both the information (e.g., data or voice) along with the signaling information.
- Ingress.** Incoming direction to a network or network device. The term refers to data being sent into a network element or system, as opposed to information being sent out (egress).
- Interleave.** A process or technique that reduces the number of undetected error bursts and improves burst error performance. Interleave mode provides the most robust service and more reliable service under long reach conditions for DSL service that supports the Interleave process.
- Inverse Multiplexer (IMUX).** A device that combines multiple links (usually T1s or E1s) a single shared digital channel. Circuits can be added and dropped without losing ATM cells.
- IP (Internet Protocol).** A component of the TCP/IP protocol suite. IP operates at Layer 3 of the OSI Reference model.
- ISDN (Integrated Services Digital Network).** ISDN is a digital telecommunications standard for transmitting digital voice, data and video on the same transmission facility. ISDN has two basic access interfaces; BRI (Basic Rate Interface) and PRI (Primary Rate Interface). Both interfaces provide circuit-switched access to public networks. BRI provides a throughput of 144 Kbps and PRI has a throughput of up to 2 Mbps.
- ISO (International Standards Organization).** The International Standards Organization is an international organization founded in 1946 to facilitate the development of international data communication standards.
- ISP (Internet Service Provider).** A vendor who provides access to the Internet and the World Wide Web.
- ISU (Integrated Services Unit).** A digital device that consists of a CSU (Channel Service Unit) and DSU (Digital Service Unit).
- ITU (International Telecommunications Union).** An organization established by the United Nations. The ITU sets telecommunications standards and allocates frequencies to various uses worldwide.
- IWF (Interworking Function).** A function used on an interface between networks which use dissimilar technologies.

- IXC (Interexchange Carrier).** Long distance carrier such as AT&T, MCI WorldCom, Sprint, and some smaller carriers.
- Java.** A programming language developed by Sun Microsystems® for platform independent, object-oriented application development.
- JDBC (Java DataBase Connectivity).** A Java based driver which provides a database independent interface between a Java application or applet and the database. It provides a Java API on one side and an SQL interface on the other.
- JDK (Java Developer's Kit).** A (platform specific) development environment for creating Java based applications and applets.
- Kbps (Kilo Bits Per Second).** A measurement of transmission speed – one thousand bits transmitted each second.
- kHz (Kilohertz).** A unit of frequency equal to one thousand (1,000) cycles per second (Hz).
- 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.
- Latency.** The amount of time between the moment a device generates a request for data and the instant at which the requested channel is available for transmission.
- Leaky Bucket Algorithm.** Officially called the Generic Cell Rate Algorithm. A method of explaining by means of a hole in a bucket, how an ATM switch measures the PCR and SCR conformance of each CBR and VBR connection.
- Line Card.** A line card serves as the interface between a line and a communications device.
- Line Card Shelf (LCS).** The D50 is made up of one Master Control Shelf and up to twelve Line Card Shelves. Each LCS has 24 mounting slots for line cards, one slot for a Line Card Shelf Multiplexer (LSM) card, and one slot for an optional LSM card for Remote Line Card Shelf protection group application.
- Line Card Shelf Multiplexer (LSM) card.** The LSM card communicates with the Master Line Card Adapter (MLA) card. The LSM multiplexes and demultiplexes ATM cell streams for up to 24 line cards in a Line Card Shelf.
- Link A.** The virtual connection path between the D50 and the CPE (or line card) side of the network.
- Link Z.** The virtual connection path between the D50 and the ATM side of the network.
- LISP (Local Internet Service Provider).** See ISP (Internet Service Provider).
- Local Loop.** The twisted pair cable connecting the subscriber to the Central Office.
- 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).

**Loopback.** Type of diagnostic test in which the transmitted signal is returned to the sending device after passing through a data communications link or network. The returned signal is then evaluated (either by a technician or diagnostic equipment) to get some sense of the condition of the line. Typically used in troubleshooting a data circuit or network.

**LOS (Loss of Signal).** An alarm sent by the receiving end to indicate that the transmission signal has been lost.

**Low Pass Filter Shelf (LPFS8).** Data plus voice frequency signals are received from the customer at the Low Pass Filter Shelf. The LPF8 card “splits” the low frequency voice signal from the high frequency ADSL signal. The voice signal is sent to the voice switch unimpeded; the data signal is received by the line card.

**Master Control Processor (MCP) card.** The MCP card is the central control and communications path for the D50; it stores program and provisioning database information. The D50 has two MCP cards in a 1:1 protection group.

**Master Control Shelf (MCS).** The MCS contains the central control and communication functions for the D50 and serves as the ATM network interface.

**Master Line Card Adapter (MLA) card.** Each MLA card provides the broadband interface to one Line Card Shelf. 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.

**Mbps (Mega Bits Per Second).** A measurement of transmission speed – one million bits transmitted each second.

**MBS (Maximum Burst Size).** An ATM traffic parameter that specifies the maximum number of cells in a burst that can be transmitted at the peak rate assuming that, at the beginning of the burst, the receiving buffers are empty.

**MDF (Main Distribution Frame).** A wiring arrangement which connects the telephone/data lines coming from outside on one side and the internal lines on the other.

**MDU (Multiple Dwelling Unit).** Refers to high-rise apartment buildings or sometimes office buildings. Newer MDUs are often being built with fiber optic cables and other equipment (such as DSLAMs) installed so the occupants have easy access to high-speed data services.

**MHz (Megahertz).** A unit of frequency equal to one million (1,000,000) cycles per second (Hz).

**MIB (Management Information Base).** The MIB contains all the provisioning information for the D50 Multiplexer. (The MIB contains data available to a network management program. The network manager queries the MIB.)

**MTBF (Mean Time Between Failure).** Reliability metric for electronic equipment that represents the average amount of time (expected or predicted) between breakdowns.

**Multi-mode Fiber.** Fiber whose core diameter is larger than single mode fiber, which allows many modes of light to propagate down the multiple fiber optic paths. Each of these paths has a slightly different length, depending upon how often the light

bounces off the reflective boundary of the core region. Multi-mode fiber is used for short-distance data links.

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

**MUX.** Abbreviation for Multiplexer.

**NE (Network Element).** Processor controlled entities of the telecommunications network that primarily provide switching and transport network functions and contain network operations functions.

**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 D50 shipping today is already NEBS-compliant.

**Network Management Processor (NMP) card.** The NMP card controls the D50's network management interfaces and provides the protocol support for communication for D50 Craft Terminal.

**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 Nokia Broadband Systems' 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.

**NISP (National Internet Service Provider).** See ISP (Internet Service Provider).

**NNI (Network Node Interface).** An Asynchronous Transfer Mode (ATM) interface between two public network pieces of equipment (contrast that to UNI, which stands for User Network Interface).

**Node.** Connection point in a network.

**Noise.** Unwanted electronic signals or disturbance that degrades line performance.

**OAM (Operations And Maintenance).** A group of network management functions that provide network fault indication, performance information, and data diagnosis functions.

**OC-1 (Optical Carrier Level-1).** A SONET line rate of 51.840 Mbps. Direct electrical-to-optical mapping of the STS signal with frame synchronous scrambling.

**OC-12.** SONET channel of 622.08 Mbps.

**OC-3 (Optical Carrier Level-3).** A SONET line rate of 155.520 Mbps. 3 x OC-1. Direct electrical-to-optical mapping of the STS signal with frame synchronous scrambling.

- OC3L.** A OC3 rate broadband tributary card that provides a standard ATM UNI/NNI interface that supports provisionable VPI/VCI mappings to the D50 trunk card, allowing ATM cells to be aggregated from standard ATM network equipment.
- ODF (Optical Distribution Frame).** Connection and distribution point for fiber optic cables. It is similar, in function, to an MDF for copper wires.
- Optical Cross-Connect Panel.** A cross-connect unit used for circuit administration and built from modular cabinets. It provides for the connection of individual optical fibers with optical fiber patch cords.
- Oracle8®.** An Object Relational Database Management System developed by Oracle.
- ORB (Object Request Broker).** An object-oriented system consisting of middleware which manages message traffic between application software and computer/software platforms.
- 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.
- OSS (Operations Support System).** A management operations center system which supports the daily operation of a telecommunications network.
- Packet.** A block or group of data organized in such a way as to be treated as a single unit within a communication network. It consists of the data (payload) and its control information.
- Pair Bonding.** This SHDSL feature enables the user to bond 2 ports to effectively double the maximum single-port bandwidth of 2.3 Mbps to provide up to 4.6 Mbps of symmetrical service.
- PAM (Pair Analysis Module) card.** A Nokia Broadband Systems' product. The PAM card plugs into the LCS backplane just like a line card and is used to test continuity of cable pair wiring from the LCS to the MDF. The PAM card is powered by AA batteries or -48V Central Office battery. The D50 does not have to be powered up to use the PAM card.
- Payload.** The data being transmitted, less its control and error-correction information.
- PCI (Peripheral Component Interconnect).** Bus of an Intel PC. PCI transfers data between the PC's main microprocessor and peripherals at up to 132 Mbps.
- PCR (Peak Cell Rate).** Specifies an upper bound on the rate at which traffic can be submitted to an ATM connection. Enforcement of this bound allows the network to allocate sufficient resources to ensure that the network performance objectives can be achieved.
- PDF (Portable Document Format).** File format of documents that can be viewed with Adobe Acrobat® Reader. PDF files are widely used to view files on the Internet.
- PDU (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 (Distributed Queue Dual Bus) functions as defined in IEEE 802.6-1990.
- PM (Performance Monitoring).** A data collection and reporting mechanism for Quality of Service analysis.
- PNNI (Private Network-to-Network Interface).** PNNI is a standard of the ATM Forum that provides a multilevel hierarchical routing model for scalability in large and complex networks using ATM switches from multiple vendors.
- POP (Point-of-Presence).** The physical place within a LATA (Local Access and Transport Area; the long distance carrier's local office) where the IEC (Inter-Exchange Carrier) provides services to the LEC (Local Exchange Carrier), 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.
- Profile.** A set of pre-defined configuration variables which can be applied to one or more objects (of the same type) during the provisioning process. The use of profiles decreases configuration time and increases accuracy.
- PSD (Power Spectral Density).** PSD is the total power in the specified bandwidth divided by the specified bandwidth. PSD is measured in watts per hertz.
- PSTN (Public Switched Telephone Network).** Refers to the worldwide telephone system accessible to anyone with a telephone.
- PTT (Post Telephone & Telegraph administration).** The PTTs, usually controlled by their governments, provide telephone and telecommunications services in most countries outside of the USA.
- PVC (Permanent Virtual Circuit).** A permanent association between two DTEs (Data Terminal Equipment) 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 ratio. The parameters apply to virtual channel connections and virtual path connections.
- RADSL (Rate Adaptive Digital Subscriber Line).** Transmission technology that supports both asymmetric and symmetric applications on a single twisted pair telephone line. Transmission rates are dynamically adjusted as the performance of the loop varies during a session.
- RBOC (Regional Bell Operating Company).** These are the major local service providers in the USA today. In 1984 ATT was broken up into 7 RBOCs. Today,

because of mergers, there are 4 RBOCs: BellSouth, Bell Atlantic, SBC Communications, and US WEST (recently merged with Qwest Communications).

**Redundancy.** This refers to various designs that provide a backup system (or part of a system) in case of a failure. As an example, the D50 has redundant power input terminals so that if one power source fails the backup source can continue to provide power to the system.

**Reed-Solomon.** A coding technique used to handle Forward Error Correction (FEC).

**Remote Line Card Shelf (RLCS).** An RLCS allows customers served over long loops — beyond 5.5 kilometers from the Central Office — access to DSL 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, coax or copper cable 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 in a standard Network Interface Device housing and a stand-alone 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.

**SCR (Sustainable Cell Rate).** An ATM traffic parameter in cells per second that characterizes a bursty source and specifies a maximum average rate at which cells can be sent over a given ATM virtual connection.

**SDH (Synchronous Digital Hierarchy).** SDH 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). SDH is an ETSI standard and is used in most of the world outside North America, where SONET is used. Transmission rates range from 155.520 Mbps to 9.953 Gbps.

**SDSL (Symmetric Digital Subscriber Line).** Also referred to as Single-Line Digital Subscriber Line, SDSL supports symmetrical T1 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.

**SHDSL (Single line high bit rate DSL).** Nokia octal line card supporting 8 ports of symmetric bit-rate transmission using multi-level Trellis Coded Pulse Amplitude Modulation (TC PAM).

**Simplex.** Simplex communication means that data can only be sent in one direction at a time. Also referred to as half-duplex.

**Single Mode Fiber.** Single mode fiber only provides one path for light pulses to travel through the fiber optic cable. There is very little loss of light pulses transmitted on single mode fiber. Therefore single mode fiber can be used for much longer distances than multi-mode fiber.

**Smart Jack.** According to the Newton's Telecom Dictionary, a "Smart Jack" is an industry term for a device that tests the integrity of T-1 circuits remotely from the central office. Installed on the customer premises in the form of a semi-intelligent demarcation point, a Smart Jack is completely passive until activated by code.

**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 an 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 an agent's MIB.

**SNR (Signal-to-Noise Ratio).** In 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 be before the signal loss is unacceptably high. The SNR also helps determine whether a particular type of cable is appropriate for the intended use.

**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 51.84 Mbps to 13.22 Gbps.

**Splitter.** A device used in DSL to split the incoming bit stream into voice and data.

**Subnet.** A physically independent network segment. A subnet usually identifies all of the nodes in one geographical area or building. Nodes on a subnet can share a single network address.

**SVC (Switched Virtual Circuit).** A virtual connection set up on demand via a signal protocol connection, established for a specific communications session and then 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 Mbps, which comes from two dozen 64 Kbps channels, together with one 8 Kbps framing channel.

**Tagging.** The marking of a non-conforming cell that can be later discarded along its route through the ATM network if severe congestion conditions are experienced or the cell is still in violation of the traffic contract.

**TCM (Trellis Coding Modulation).** A method of forward error correction in which each signal element is assigned a value based on phase and amplitude to help the receiving modem determine if the element is received in error. Allows the user to meet performance margin requirements for long loops, or increase the transmission throughput under a specified performance margin; provides increased gain against background and crosstalk noise.

**TCP/IP (Transmission Control Protocol / Internet Protocol).** TCP/IP is a common 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.

**Threshold.** Level or value of a particular signal where an event or alarm will be generated.

**TMN (Telecommunications Management Network).** Reference model for telecommunications network management.

**Transmission rates.** The speed at which data is transmitted, measured in bits per second (bps).

Table 6-35: Transmission Rates

DS level	E level	OC level	STM equivalents	Line bit rate
DS-0				64 Kbps
DS-1 (T-1)				1.544 Mbps
	E-1			2.048 Mbps
DS-2				6.312 Mbps
	E-2			8.448 Mbps
	E-3			34.368 Mbps
DS-3 (T-3)				44.736 Mbps
		OC-1		51.840 Mbps
		OC-3	STM-1	155.52 Mbps
		OC-9		466.56 Mbps
		OC-12	STM-4	622.08 Mbps
		OC-18		933.12 Mbps
		OC-24	STM-8	1.244 Gbps
		OC-36	STM-12	1.866 Gbps
		OC-48	STM-16	2.488 Gbps

Table 6-35: Transmission Rates (continued)

DS level	E level	OC level	STM equivalents	Line bit rate
		OC-96		4.976 Gbps
		OC-192		9.953 Gbps

- **DS.** Digital Signal hierarchy: standard signals used in the U.S. telecommunications industry.
- **E.** Standard signals used in the European telecommunications industry.
- **OC.** Optical Carrier; a SONET optical signal.
- **STM.** Synchronous Transport Module; depends on information occurring in regular and fixed patterns with respect to a reference such as a frame pattern.

**Trap.** A method used to isolate an abnormal condition or operation.

**Trunk.** A communication circuit or link that interconnects two entities, usually switching systems.

**Trunk Card.** An interface card used to connect a D50 multiplexer to the ATM backbone facility.

**Tunneling.** Refers to the encapsulation of a protocol within another protocol format that provides a datalink or path. Tunneling can be used as part of a private secure network via the Internet.

**Twisted Pair.** The term used to describe common copper telephone wire. The two wires are called Tip and Ring. Also called Unshielded Twisted Pair (UTP).

**UBR (Unspecified Bit Rate).** In ATM networks, a UBR connection transmits at variable rates. With UBR, specific bandwidth allocation is not guaranteed.

**UBR+.** Unspecified Bit Rate with minimum cell rate guarantee that allows a connection to burst up to peak cell rate.

**UNI (User 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.

**UNIX.** A multi-task, multi-user operating system developed by Ken Thompson of AT&T Bell Labs. UNIX is a registered trademark of Santa Cruz Operations.

**UPC.** The traffic control entity that monitors and enforces a virtual circuit's conformance with the source's traffic contract and parameters.

**Upstream.** Description of the communications path coming from the client/end user to the CO or DSLAM.

**USB (Universal Serial Bus).** The Universal Serial Bus is used in newer PCs. The bus is 12 Mbps and designed to be "plug and play." It supports multiple PC peripherals, including Nokia D50 compatible CPE with USB.

**VBR (Variable Bit Rate).** In ATM networks, a VBR connection transmits in bursts, at variable speeds.

**VC Topology.** Used in the Nokia D50's Craft Terminal software to set the direction and mode of communication for duplex, simplex egress, and simplex ingress PVC connections.

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

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

**VF. Voice Frequency** – In telephony, the usable voice-frequency band ranges from approximately 300 Hz to 3400 Hz. Also, the bandwidth allocated for a single voice-frequency transmission channel is usually 4 kHz.

**VoDSL (Voice over Digital Subscriber Line).** An end-to-end voice transport technique integrating voice and data over DSL using special gateways that are designed to connect packetized voice traffic to Class 5 circuit switches.

**VoIP (Voice over Internet Protocol).** A technique for transmitting voice information in digital form in packets rather than the circuit-switch protocol of the public switched telephone network.

**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.

**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, SHDSL, IDSL, or VDSL.

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