MX25

Enterprise Media Exchange

Hardware Manual

Manual Part Number 90-18500

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Contents

Introduction

1.1   Scope

1.1.1   Audience

This manual is intended for properly trained service personnel and technicians who need to install an MX25 system. The manual assumes you are familiar with electronic circuitry and wiring practices.

1.1.2   Installation and Use

1.   Unpack the product and verify the items as described in chapter 2, starting on page 7.

2.   Prepare the site as described in chapter 4, starting on page 19.

Warning	The MX25 is designed to be installed by qualified personnel only. Installation by unqualified individuals may result in injury and damage to the MX25 and surrounding equipment.

Warning	This equipment is to be installed and maintained by service personnel only as defined by AS/NZS 3260 Clause 1.2.14.3 Service Personnel.

Warning	The MX25 must be installed in a secure location that has access restricted to qualified personnel only. Placing the MX25 in a location accessible by unqualified individuals may result in bodily injury and damage to the MX25 and surrounding equipment.

3.   Install the MX25 as described in chapter 5, starting on page 29.

Warning	Read and understand the installation instructions before you install the equipment or connect it to its power source.

4. Turn on the power.

5. Provision the system as described the MX25 Administrator's Manual.

1.1.3 What this Manual Includes

This manual provides detailed information and instructions on the hardware and proper installation of the MX25 Enterprise Media Exchange, how you should receive the product and what you should do so if there is an error.

1.1.4 What this Manual Does Not Include

This manual does not describe the features and functionality of the MX25, nor does it describe how you should provision or use this product. The manual does not discuss technology details, pricing, names of sales representatives, or names of distribution channels.

Access the Zultys web sites for all other information. Zultys is very open about its products and most of the manuals are available on line at http://www.Zultys.com.

1.2 Product Function

1.2.1 Interfaces

Figure 1-1 shows the available interfaces on the MX25.

No. of Ports	Interface
1	10/100 Ethernet circuit for WAN or LAN communication. No support for in-line power.
1	Single analog circuit connects to the PSTN in the event of a power failure to the unit.
1 (optional)	T1 (1.544 Mb/s) or E1 (2.048 Mb/s) circuit any one of which can support voice.
8, 16, or 24 (optional)	FXO analog circuits to connect to the PSTN (CO)
8, 16, or 24 (optional)	FXS analog circuits to connect to telephones, fax machines, overhead pagers, door openers, or other accessories.
8, 16, or 24 (optional)	ISDN BRA S/T interface to connect to the PSTN (CO) for telephone service

Figure 1-1   Available Interfaces on the MX25

1.2.2 Protocols

Figure 1-2 shows the supported protocols on the MX25.

Interface	Supported Protocols
T1 (1.544 Mb/s) voice	loop start, ground start, E&M wink start, E&M immediate start, ISDN PRA (Lucent custom, Nortel custom, National NI2, Japanese ISDN
E1 (2.048 Mb/s) voice	ETSI ISDN PRA
10/100 Ethernet circuit	UDP, TCP/IP
FXS analog circuits	loop start
FXO analog circuits	loop start and ground start
ISDN BRA S/T circuits	ETSI, ISDN, configured for user side only

Figure 1-2   Supported Protocols on MX25

1.3   Documentation Overview

1.3.1   Organization

This user's manual describes:

- how to unpack the equipment

- how to select a site for the MX25

- how to mount the equipment in a rack

- how to wire the system to your LAN and to the service provider

1.3.2   Nomenclature

1.3.2.1   Acronyms

This manual often uses acronyms specific to the industry of telecommunications and data communications. Because the sections (and, to a certain extent, the subsections) can be read in any sequence, acronyms are not defined in the text. For a complete list of acronyms used in this manual, see appendix A, starting on page 41.

1.3.2.2   Jargon

This manual often uses technical terms specific to the industry of telecommunications and data communications. Very specialized terms are sparsely used and their meanings are clearly explained where they are used. For a complete definition of all unique terms used in this manual, see the glossary in appendix B, starting on page 45.

1.3.3   Special Paragraph Styles

The following are the notices that are used to attract special attention to certain items. They set text off from the main body of the manual. These notices also appear in other languages where required by certain regulatory bodies:

Important   This notice contains special information that should not be ignored.

Caution   This notice calls attention to a condition or procedure which, if not observed, could result in damage to the MX25 or the loss of data.

Warning   This notice indicates that if a specific procedure or practice is not correctly followed, permanent damage to the MX25 and personal injury may result.

Danger   This notice warns you of imminent hazard to yourself and others if proper procedures are not followed.

1.4   Forms of Documentation

1.4.1   Printed

The printed version of this manual is updated as required.

1.4.2   PDF

This manual is available in PDF format. You can download the PDF file from the MX25 web site at:

http://www.Zultys.com

You can obtain old versions of the manual that may describe the hardware that you have, the manual that was used to produce the most recently printed manual, or the latest manual that describes all the latest features of the product. You can identify the version of the manual from the title page, opposite the table of contents (page 2 of the PDF file).

When you use the PDF file, you can click on any reference in the text. This powerful feature allows you to follow the references in the text very easily. Using Acrobat, you can then return to the page you were previously reading. This is a huge benefit to you if you want to study a small area of the product.

1.5   Colophon

This document was produced on personal computers using Adobe's FrameMaker for Windows. The printed book is printed by an offset process.

The headings are set in Swiss 721, Bitstream's version of the Helvetica™ typeface; the copy is set in Zapf Calligraphic, Bitstream's version of the Palatino™ typeface; notices are set in Swiss 721 or News Gothic, Bitstream's version of the Kingsley-ATF Type Corporation typeface. The drawings were produced using Adobe Photoshop, Adobe Illustrator, and Microsoft Visio.

1.6   Related Documents

Refer to the *MX25 Administration Manual* for information on the configuration and maintenance of the MX25.

1.7   Documentation Feedback

Zultys appreciates any constructive feedback on all our documentation. If you have comments or error reports on any Zultys documentation, please submit your feedback to:

Technical Publications Department
Zultys Technologies
771 Vaqueros Avenue
Sunnyvale, California 94085 USA
techpubs@Zultys.com

Receiving the Equipment

2.1 Initial Inspection

When the shipment of your MX25 system arrives, inspect the shipping boxes for external damage, and record any discrepancies. Save the boxes and packing material in case you need to ship the system to another facility. Always retain the packing materials if you suspect that part of the shipment is damaged—the carrier may need to inspect them.

Warning Do not attempt to use the equipment if it appears damaged. Immediately report the damage to your local Zultys sales representative.

2.2 Shipment Contents

2.2.1 Unpacking Boxes

If the boxes have not been damaged in transit, unpack them carefully. Ensure that you do not discard any accessories that may be packaged in the same box as the main unit. Take care when handling the MX25.

Caution Do not drop or jolt the MX25. If you allow the MX25 to receive a hard knock, you can cause irreversible damage.

2.2.2 Verify Content

There are several hardware options for the MX25 system. Upon delivery of your system, inspect the packing list, and confirm that all items listed on that note were received. You may not be able to verify delivery of firmware options until after you install your system. Compare the packing slip with your purchase order.

Ensure that the accessories listed in figure 2-1 are present in the shipment.

Ensure that there are no discrepancies in the shipment and then prepare the site as described in chapter 4, starting on page 19.

Qty	Description
10	Screw, imperial, 12-24 x ½", for mounting chassis to equipment rack.
10	Screw, metric, M6x10, for mounting chassis to equipment rack.
10	Screw, metric, M4x6, for fastening a mounting or extender bracket to the MX25.
2	Brackets for cable management
1	Compact disc containing software and documentation for the MX25
1	AC power cord for the MX25

Figure 2-1   Accessories for MX25 Base System

Important If you suspect that there are discrepancies or that the equipment is not fully functional, contact Zultys or your Zultys sales representative **immediately**. Retain all packing materials and the shipping note for Zultys or its representative to inspect. ZULTYS CANNOT BE HELD RESPONSIBLE IF YOU CLAIM THAT AN ITEM IS MISSING, AND YOU HAVE NOT INFORMED ZULTYS WITHIN THREE DAYS OF RECEIPT, OR IF YOU HAVE NOT RETAINED ALL PACKING MATERIALS FOR INSPECTION.

2.2.3   Serial Numbers

Verify the serial numbers of each item and compare them with the serial numbers on the packing lists. The serial number is a five digit alphanumeric code printed on a white barcode label. See figure 3-2 to locate the serial number on the back of the MX25.

2.3   In Case of Damage or Malfunction

Notify your Zultys sales or service representative under any of the following conditions:

- the shipping container or any of the contents appear damaged

- an item is missing

- there is a discrepancy between the packing slip and the equipment received

- the equipment does not function correctly

Your local Zultys sales representative will arrange for repair or replacement, at Zultys' discretion. In certain cases, Zultys may require a claim settlement.

2.4   Returning Items for Repair or Replacement

2.4.1   Warranty Coverage

Zultys provides a warranty only through distribution channels. If you are an end user, consult the reseller or distributor who has sold you the product for complete terms of the product the product that you have purchased. Zultys requires that its distributors provide a standard warranty that is one year in duration, and that complies with the local laws and expectations of the country in which you reside.

Before returning merchandise for repair or replacement, you must ensure that the items are under warranty. If you are unsure about the warranty of your merchandise, call your supplier or a local Zultys sales representative for clarification. Contact your supplier for a return merchandise authorization (RMA) number before returning any merchandise; this includes equipment covered under warranty.

For merchandise not under warranty, you will be charged for a repair if the item is returned to the factory. Call your supplier for pricing on an extended warranty for your merchandise.

2.4.2   Describing the Problem

If you are returning equipment for service, attach a tag or sheet of paper to the equipment giving the following details:

- your company or institution's name, address, and phone number
- the main person to contact, an alternative contact, and their phone numbers if different from the main phone number
- the return shipping address and any special shipping instructions
- the model number and serial number of the equipment being returned
- a description of the failure (If failure is intermittent, describe its frequency and special conditions that initiate the failure.)
- any additional comments

2.4.3   Accessories

Do not return any of the accessories with the equipment unless you suspect that one of them is faulty. If you return an accessory, place a tag on it that clearly identifies it as yours, and briefly explain the problem.

2.4.4   Packing

Wherever possible, use the original packing materials to ship the equipment. If these are not available, containers and cushioning material similar to those originally used are available from Zultys.

If it is inconvenient to obtain supplies from Zultys, use a strong, double-walled shipping carton. Place about 70 mm (3 in) of cushioning material around all sides of the equipment.

Zultys is not responsible for any damage that occurs during shipment back to the factory.

2.4.5   Shipping

Obtain from your nearest Zultys sales or service representative the correct address to which you should return the equipment. Clearly mark the container with Zultys' address and your own address. Ship the package prepaid and insured to Zultys.

The method of shipment which Zultys will return repaired merchandise back to your facility will be the same method by which you shipped the merchandise to Zultys. For example, if you shipped merchandise to Zultys by ground shipment, Zultys will return the merchandise to you by ground shipment. If the merchandise must be repaired and returned to you as soon as possible, you must arrange for the merchandise to be shipped to Zultys by overnight shipment.

2.4.6   Correspondence

In any correspondence subsequent to the return of equipment, always refer to the equipment by model number, serial number, and the RMA number assigned.

Hardware

3.1 Introduction

This chapter describes the hardware of the MX25. It also details the communications interfaces. This chapter describes how to interpret the LEDs on the units.

3.2 Front Side of MX25

The front side of the MX25 is the side that has no wiring connectors and is shown in figure 3-1.The
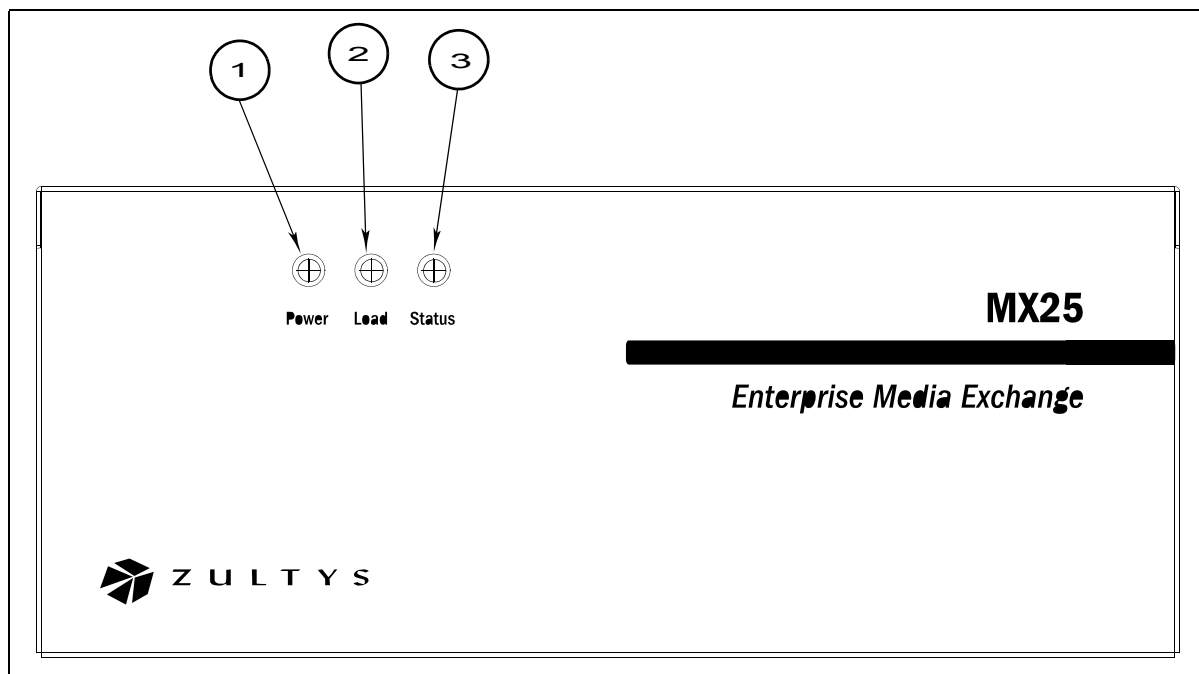

Figure 3-1   Front Side of MX25

only functional component of the front side are the LEDs. Refer to Chapter 7, starting on page 35 for a full description of the LED behavior.

The numbers in the figure correspond to the following descriptions:

1. *Power LED* – During normal operation, this LED indicates the status of ac power that is applied to the MX25. During system start up and shut down, this LED is used with the Load and Status LEDs to indicate completion of procedures.

2. *Load LED* – During normal operation, this LED indicates the amount of accesses to system services, and amount of storage for applications. During system start up and shut down, this LED is used with the Power and Status LEDs to indicate completion of procedures.

3. *Status LED* – During normal operation, this LED indicates the status of firmware update, temperature, console mode, and exceptions. During system start up and shut down, this LED is used with the Power and Load LEDs to indicate completion of procedures.

3.3   Rear Side of MX25

The rear side of the MX25 is the side that has the connectors for power, network communications, and PSTN connections as shown in figure 3-2. The numbers in the figure correspond to the following descriptions:
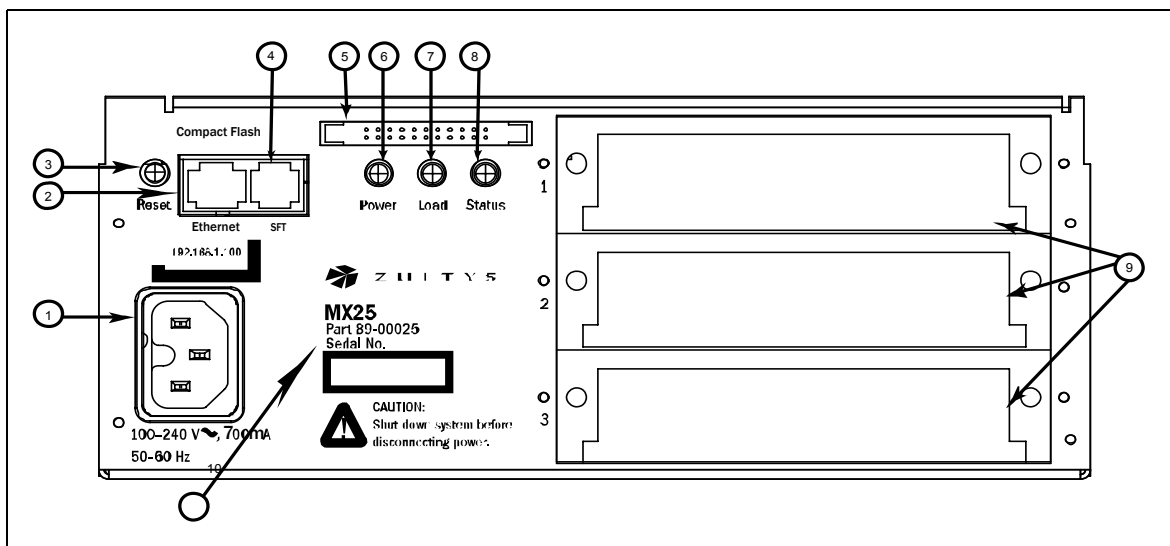

Figure 3-2   Rear Side of MX25

1. *ac Input* – Provides a universal fused input for ac power. You can insert 100 Vac to 240 Vac at 47 Hz to 63 Hz.

2. *Ethernet port* – A 10/100Base-T circuit for connection to any IP device, such as a LAN switch, router, or IP phone. This port has automatic MDI capability. No in-line power is provided on this circuit.

3. *Reset button* – When power to the MX25 is off, pressing this button turns the unit on. When power is already on, press this button for two seconds to initiate a system shut down. If this button is pressed and held for several seconds during power up, the MX25 starts in "Console Mode." Refer to section 6.5 on page 34 for instructions on using and activating console mode.

4. *SFT (System Failure Transfer)* – One RJ11 connector operates as a lifeline circuit in case of power failure to the unit. An FXO board in slot 1 is necessary in order for an emergency call to be established. See the MX25 Administrator Manual for setup and configuration.

5. *Compact Flash* –Provides extra storage such as voice mail and extended auto attendant scripts. Compact flash is not supported by the current software version.

6. *Power LED*– See section 3.2 and section 7.2 for a description of the LEDs.

7. *Load LED* – See section 3.2 and section 7.2 for a description of the LEDs.

8. *Status LED* – See section 3.2 and section 7.2 for a description of the LEDs.

9. *Interface slots* – Each slot can accommodate one interface card to connect to the PSTN. There are four types of interface cards:

   - **FXS**: analog subscriber-side interface. Provides eight circuits that support loop start. The MX25 can accommodate one, two, or three of these cards. See section 3.4 and section 3.5 for circuit usage and pin assignments.

   - **FXO**: analog exchange-side circuits. Provides eight circuits that support loop start or ground start. The MX25 can accommodate one, two, or three of these cards. See section 3.4 and section 3.5 for circuit usage and pin assignments.

   - **PCM**: 2 full-duplex DTE circuits. The T1 or E1 functionality and protocol is configured from the administration software. The MX25 can accommodate one card installed. See section 3.4 and section 3.5 for circuit usage and pin assignments.

   - **BRA**: 4 full-duplex ISDN BRA S/T circuits. The MX25 can accommodate 1, 2, or 3 of these cards installed. See section 3.4 and section 3.5 for circuit usage and pin assignments.

10. *Serial Number* – This is the serial number that identifies the main chassis. Refer to this number when identifying the system to a technical support representative or when returning the system for repair or replacement.

In version 2.4 hardware, there is an internal fan tray which contains two fans. See the MX25 Administrator's Manual for more information for the internal fans.

3.4   Circuit Usage

3.4.1   10/100Base-T

The MX25 has one 10/100Base-T Ethernet circuit and can be used in one of the following ways:

- To connect to your ISP to provide data connectivity for the enterprise

- As the main circuit to connect to your LAN

3.4.2   Analog

The MX25 can be purchased with one, two, or three analog FXO or FXS cards installed. The FXO circuits support Loop Start, Loop Start with Caller ID, Ground Start, and Ground Start with Caller ID. The FXS circuits support only Loop Start.

3.4.3 PCM (T1 and E1)

The MX25 can be purchased with one DTE card installed. The MX25 physically uses the same T1/E1 card as the MX250. However, on the MX25, you can use only one circuit. Each DTE board has two full-duplex circuits that can be configured for either T1 (1.544 Mb/s) or E1 (2.048 Mb/s), and can be configured to use one of several PSTN protocols. You configure the circuit type and protocol from the administration software.

3.4.4 ISDN BRA (S/T Interface)

The MX25 can be purchased with one, two, or three BRA cards installed. Each BRA card has four S/T circuits for connection to the telephony service provider. The BRA cards are interchangeable with no restrictions on the number of circuits used.

3.4.5 Analog FXO

The MX25 can be purchased with one, two, or three FXO cards installed. Each module provides eight two-wire exchange side circuits that connect to the central office lines.

3.4.6 Analog FXS

The MX25 can be purchased with one, two, or three FXS cards installed. Each module provides eight two-wire subscriber side circuits that connect to equipment such as analog phones, fax machines or modems.

3.5 Pin Assignment

3.5.1 10/100Base-T

The 10/100Base-T Ethernet port can be routed to a patch panel or to a punch down block for fanning out to the proper destination. All ports use the RJ-45 connectors, with each circuit capable of auto-detecting whether the CAT5 cable is straight or crossed over and adapting accordingly.

Ensure that the wiring for the Ethernet cables comply with EIA/TIA 568A for the CAT5 10/100Base-T Ethernet. Some cable suppliers reference EIA/TIA 568A and others reference 568B. The difference is that the green and orange pairs are terminated to different pins; however, the assignment of pin to signal are exactly the same on both references. Crossover cables comply with EIA/TIA 568A in all aspects except signals on pins 1 and 3 at one end appear on pins 2 and 6 on the other end.

Figure 3-3 shows the pin assignment on an RJ45 connector.

3.5.2 Analog RJ12

There is one RJ12 port on the back of the MX25 that connects one analog subscriber circuit to the MX25. Figure 3-4 shows the pin assignment on an RJ12 connector marked SFT. Figure 3-5 shows the accompanying description of each pin.
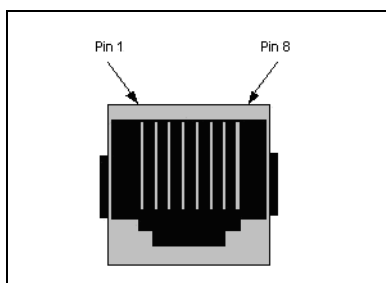
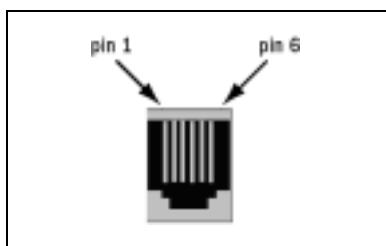**Figure 3-3   Pin Assignment of a 10/100 Ethernet Circuit**

Figure 3-4   Pin Assignment of the Analog Circuit on the rear side of MX25

Pin	Signal Name	Abbreviation
1	(not connected)	—
2	(not connected)	—
3	Ring 1	R1
4	Tip 1	T1
5	(not connected)	—
6	(not connected)	—

Figure 3-5   Pin Description of the Analog Circuit - continued

3.5.3   Analog 50-Pin Telco

The FXO and FXS interface boards have the 50-pin telco receptacle (female) for connecting the analog circuits to the MX25. Figure 3-6 shows the pin assignment on the telco connector of the FXS and FXO cards. Figure 3-7 shows the accompanying description of each pin.

3.5.4   PCM (T1 and E1)

Each of the two PCM circuits on the DTE card terminates on an RJ45 connector. Figure 3-8 shows the pin assignment of each pin of the PCM. Both circuits have the same pin assignment. Figure 3-9 shows the accompanying description of each pin.

Figure 3-10 shows how you connect the PCM circuits to the network or other equipment. To connect the MX25 to the network jack, you should use a straight cable. To connect the MX25 to an existing terminal system (such as an existing PBX), you should use a crossover cable.

The figure shows the pinouts for the MX25 and the pinouts that are normally used for terminal and network equipment. Consult the documentation for those devices to confirm the pin assignment.
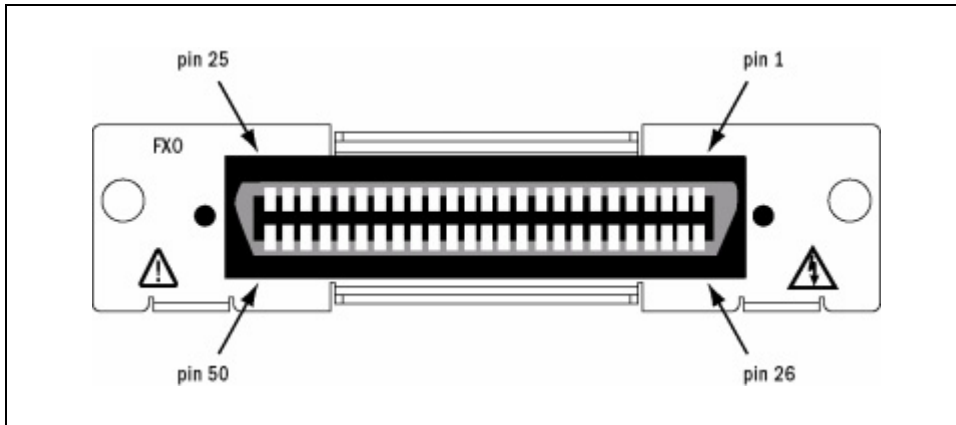
Figure 3-6   Pin Assignment of a 50-pin Telco Connector on FXO or FXS Card

Pin	Signal Name	Abbreviation
1 to 8	Tips for circuit 1 to 8	T1 to T8
26 to 33	Ring for circuit 1 to 8	R1 to R8
9 to 25	Unconnected	
34 to 50	Unconnected	

Figure 3-7   Pin Description of 50-pin Telco Connector
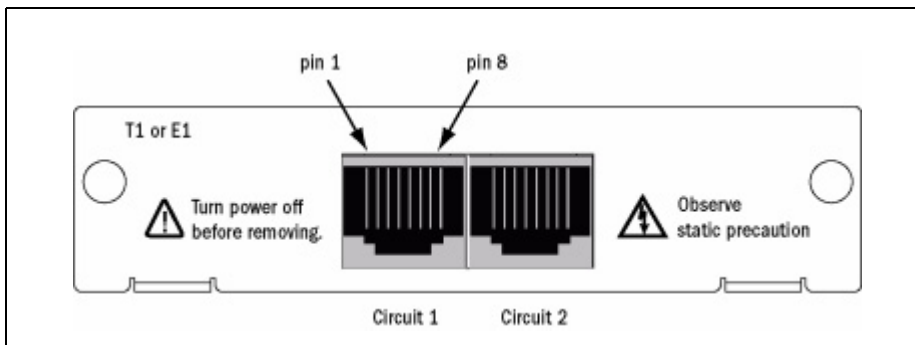
Figure 3-8   Pin Assignment of PCM Circuits on DTE Card

Pin	Signal Name	Circuit	Source
3	NC	–	–
6	NC	–	–
7	NC	–	–
8	NC	–	–
1	Received Data, ring	BAa	Facility
2	Received Data, tip	BAb	Facility
4	Transmitted Data, ring	BBa	MX25
5	Transmitted Data, tip	BBb	MX25

Figure 3-9   Pin Description of a PCM Circuit

Figure 3-10   Wiring the PCM Circuits to the Network or Other Equipment

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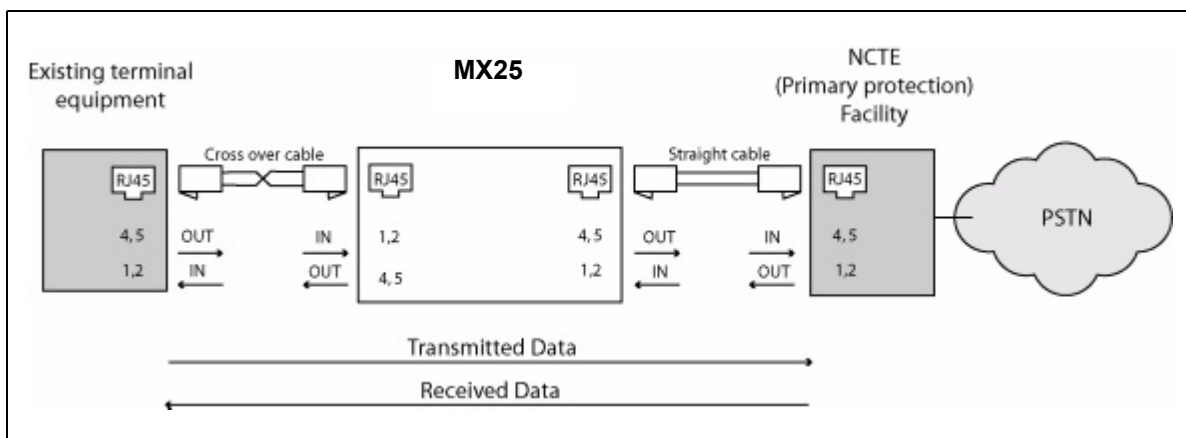**Important** The cables that are used for PCM are different from those used for Ethernet. While you can use a straight Ethernet cable to connect (straight through) PCM, you should avoid doing so because you will cause degradation of the signal. You cannot use a crossover Ethernet cable in place of a cross over PCM cable.

3.5.5   ISDN BRA (S/T Interface)

Each of the four ISDN BRA circuits terminates on an RJ45 connector. Figure 3-11 shows the pin assignment of each pin of the RJ45 connector of the BRA card. Each circuit on the BRA card has the same pin assignment. Figure 3-12 shows the pin description of each pin on the RJ45 connector.
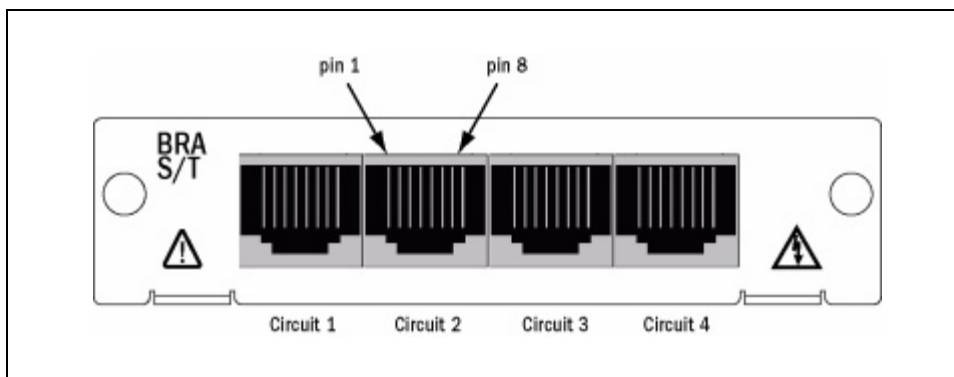
Figure 3-11   Pin Assignment of the ISDN BRA (S/T) Circuits on BRA Interface Card

Pin	Signal Name	Circuit
3	Transmit + (tip)	Tx+
6	Transmit – (ring)	Tx–
4	Receive + (tip)	Rx+
5	Receive – (ring)	Rx–

Figure 3-12   Pin Description of the ISDN BRA (S/T) Circuit

Pin	Signal Name	Circuit
1	not connected	NC
2	not connected	NC
7	not connected	NC
8	not connected	NC

Figure 3-12   Pin Description of the ISDN BRA (S/T) Circuit   (Continued)

Preparation

4.1   Introduction

This chapter explains:

- guidelines for selecting a site
- tools required for installation
- types of cables for voice and network connections
- mounting options for single and dual units
- instructions for installing mounting brackets for single and dual units

The MX25 is designed to be permanently installed within a network room in a 19" equipment rack. You must carefully install the MX25 system to ensure its proper operation.

Warning	The MX25 is designed to be installed by qualified personnel only. Installation by unqualified individuals may result in bodily injury and damage to the MX25 and surrounding equipment.

Warning	This equipment is to be installed and maintained by service personnel only as defined by AS/NZS 3260 Clause 1.2.14.3 Service Personnel.

Warning	The MX25 must be installed in a secure location that has access restricted to qualified personnel only. Placing the MX25 in a location accessible by unqualified individuals may result in bodily injury and damage to the MX25 and surrounding equipment.

4.2   Selecting a Site

4.2.1   Earth Ground

You need to ensure a protective earth ground for proper installation of the MX25 system. Verify that the resistance to ground is less than 0.1 Ω between the equipment frame and earth ground (per UL 60950, paragraph 2.6.3.3). A decent earth ground is normally implemented with a copper rod (about 15 mm or 0.6" diameter) driven at least 4 m (12 ft) into moist soil.

To improve conductivity, salt or magnesium sulphate can be added to the soil surrounding the rod to a depth of 200 mm (0.6 ft); this procedure may require periodic replenishing.

4.2.2   Temperature

You should install the MX25 in an environment where there is ample air flow to circulate the air around the product and the temperature does not go below 0°C and does not exceed 40°C.

Warning   If you install the MX25 in an environment where the temperature is outside the range 0°C ~ 40°C, this may result in bodily injury and damage to the MX25 or surrounding equipment. You will also void your warranty.

4.2.3   Ventilation

Ensure that the MX25 has space on either side for ventilation.

Important   Do not cover the slots and openings on the equipment. These are provided for ventilation and protection against overheating.

4.2.4   Rack Space

If possible, install the system in a 19" rack or cabinet nearby the corporate networking equipment. The height used is 2 RU. See section 4.5 on page 23 for information about the requirements of the equipment rack.

4.2.5   Power Requirements

The MX25 uses ac power as its primary power source. You can connect a UPS to the MX25 to provide continued operation in the event of loss of ac power.

4.2.5.1   AC input

The total ac power input on the MX25 is 100 W, for ringing analog telephones, fax machines and modems.

The MX25 has a universal ac input that you can connect to a standard electric outlet (90 Vac to 264 Vac, 47 Hz to 63 Hz).

4.2.5.2 Uninterruptable Power Supply (UPS)

You can connect the ac input to a UPS for operation of the MX25 in case of a power outage. Zultys does not recommend this solution because most UPS devices are not designed for the longevity demanded by telecommunications applications. Also, most UPS devices are scaled too small and can provide only a short standby duration.

You cannot monitor the voltage of the external UPS with the MX25. Review the manufacturer's documentation for site selection for the device that you select.

4.2.6 Cable Lengths

You need to install the MX25 so that you can run cables from it to associated equipment. Figure 4-1 shows the minimum and maximum length of any cables that you connect to the MX25.

Circuit	Connector	Minimum Distance	Maximum Distance
T1 or E1	RJ45	0	1.8 km (6000 ft)
Analog	RJ11	0	1 km (3000 ft)
BRA S/T	RJ45	5 m (15 ft)	25 m (75 ft)
10/100BaseT	RJ45	0	100 m (300 ft)

Figure 4-1   Minimum and Maximum Cable Lengths

The distance listed in the table for the T1 or E1 circuits is the maximum distance between the MX25 chassis and the nearest repeater of the T1 or E1 signal. The actual cable used to connect to the demarcation point may be significantly shorter.

4.2.7 Other Site Requirements

Ensure that you select a site so that liquids or objects will not fall onto the equipment and so that foreign objects will not be drawn into the ventilation holes.

4.3 Tools and Cables Required for Installation

4.3.1 Tools

Figure 4-2 shows the required tools for performing the hardware installation:

Tool	Purpose
manual screwdriver, Phillips or crosshead, sized to fit M2 screwhead	to fasten the modules into the MX25
manual screwdriver, Phillips or crosshead, sized to fit M4 screwhead	to fasten the mounting brackets and cable management brackets to the sides of MX25 chassis
manual screwdriver, Phillips or flat-head, sized to fit 12-24 screws	to loosely screw in place mounting screws of chassis to rack
power screwdriver, Phillips or flat-head, sized to fit 12-24 screws	to tighten mounting screws of chassis to rack

Figure 4-2   Required Tools for Installation

Tool	Purpose
manual screwdriver, Phillips or flat-head, sized to fit M6 screws	to loosely screw in place mounting screws of chassis to rack
power screwdriver, Phillips or flat-head, sized to fit M6 screws	to tighten mounting screws of chassis to rack
ESD-preventative wrist strap	to prevent harmful electrostatic discharge onto electronic equipment during installation

Figure 4-2   Required Tools for Installation

4.3.2   Cables

The number of cables and types of cables that you require to perform installation depend on the options enabled on the MX25 chassis and your network configuration. Figure 4-3 lists the cables that you may require for the MX25.

Cable	Max Qty	Used to connect
50-pin telco	3	Analog FXO or FXS circuits
RJ45, BRA S/T wiring, Cat 5	12	ISDN BRA ports to PSTN
RJ45, USOC wiring, Cat 5	2	T1 or E1 port to PSTN
RJ11 cables	1	Analog circuit to telephones, fax machines, or other analog accessories
RJ45, 258A wiring, Cat 5	2	Ethernet to an IP-enabled network

Figure 4-3   MX25 cables

For the T1 and E1 circuits, you must ensure that you wire Tx to Rx. You may need straight or cross over cables to accomplish this.

Warning   To reduce the risk of fire, use only 0.4 mm² (26 AWG) or larger wire for all telecommunications circuits.

4.4   Electrostatic Discharge (ESD) Precautions

Almost all electronic components can be damaged by ESD during handling. Component damage can occur at ESD voltages as low as 50 V. A person walking across a nylon carpet can easily generate voltages in excess of 5000 V.

Observe the following guidelines to help prevent ESD damage when installing or servicing the MX25 system or any other electronic device.

- Assemble or disassemble equipment only in a static-free work area.

- Use a conductive work surfaces (such as an antistatic mat) to dissipate static charge.

- Wear a conductive wrist strap and lab coat to dissipate static charge accumulation.

- Minimize handling of assemblies and components.

- Keep replacement parts in their original static-free packaging.

- Remove all plastic, foam, vinyl, paper, and other static-generating materials from the immediate work area.

- Use tools that do not create ESD.

In addition to these precautions, do not handle connector pins to avoid contamination.

Caution	You can easily damage the MX25 by failing to follow these instructions. You may delay installation or cause the equipment to prematurely fail. Such failure may lead to a disruption of the service provided by the equipment. You may also void your warranty.

4.5 Equipment Rack

4.5.1 Installation

Zultys recommends that you install the MX25 in the same secured wiring closet as that of the networking equipment to which it connects. Devices that connect to the MX25 are likely to be the LAN switch and the provisioning computer.

All connections to the MX25 system are made at the rear side of the system. Leave space at the rear of the system for cables and for personnel installing the system.

Warning	The MX25 system must be properly grounded (earthed). When the equipment is mounted in an equipment rack, the rack must be connected to ground (earth). See section 4.2.1 on page 20 for details on the proper grounding technique.

Warning	Ensure that the rack is properly mounted to the floor or has properly fitted stabilizers so that it cannot move and will not tip over. If the rack tips over, it may cause you bodily injury and may damage the equipment.

When you mount equipment in the equipment rack, place the MX25 at the bottom of the rack if it is the only device in the rack. If you mount the MX25 in a rack that is partially filled, load the rack from the bottom to the top with the heaviest equipment at the bottom of the rack.

4.5.2 Mounting Options

There are several ways to deploy the MX25 in a 19-inch rack. You have the flexibility to mount the MX25 as a single unit or as two separate units installed side-by-side. The mounting options are:

- Front mount

- Middle front mount

- Rear mount

- Middle rear mount

4.6   Installing Brackets on Chassis

The MX25 main chassis is supplied with two mounting brackets that you must fasten onto the chassis prior to installing it into a 19" equipment rack. You can also install two MX25s together side by side with additional dual connector brackets and mount them in the four positions described in the following sections.

4.6.1   Single Unit installation

Using four M4x6 screws (flat-head and phillips), you can fasten the mounting brackets (80-01210-00) in one of four positions. Decide which of the four mounting positions below is required, and then follow the appropriate instructions for installing the mounting brackets. For all single unit installations, a mounting bracket and an extender bracket are needed.

Warning	Use only the M4x6 screws (58-20002-00) to secure the mounting bracket and the extender bracket to the chassis. Using a longer length screw may protrude too far into the chassis and cause internal damage to the boards. Using a shorter length screw will not securely fasten the mounting bracket to the chassis and cause the chassis to fall after mounting to the equipment rack.

4.6.1.1   Front mount

1.   Remove the M4 screw (one from each side) from position A as shown in figure 4-4.
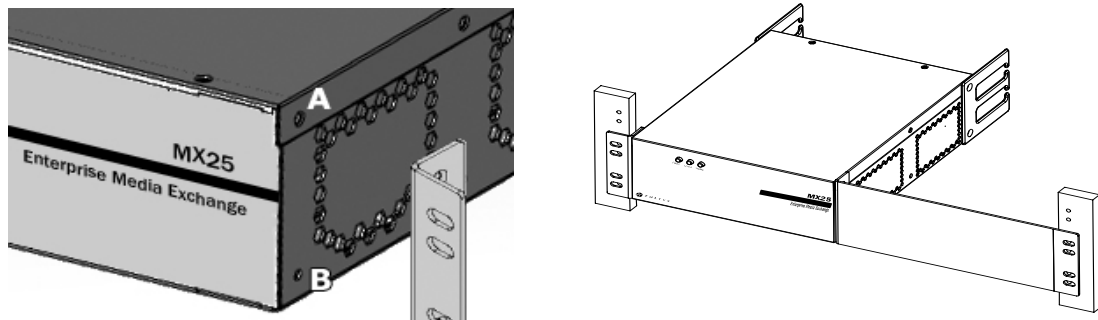

Figure 4-4   Front bracket mount

2.   Hold a mounting bracket (80-01210-00) against the chassis so that the holes on the mounting bracket are aligned with positions A and B on the chassis.

3.   Fasten the mounting bracket using two M4x6 screws (58-20002-00) at positions A and B.

4.   Hold the extender bracket against the other side of the chassis so that the holes are aligned.

5.   Fasten the extender bracket using two M4x6 screws (58-20002-00).

6.   Hold the chassis so that the holes on both sides are aligned.

7.   Using a screwdriver, connect the mounting bracket and extender bracket to the rack.

8.   If required, fasten the plastic cable management brackets (80-01240-01) at the rear mount positions as shown, using two M4X6 screws (58-20002-00).

4.6.1.2 Middle front mount

1. Remove the M4 screw (one from each side) from position C as shown in figure 4-5.
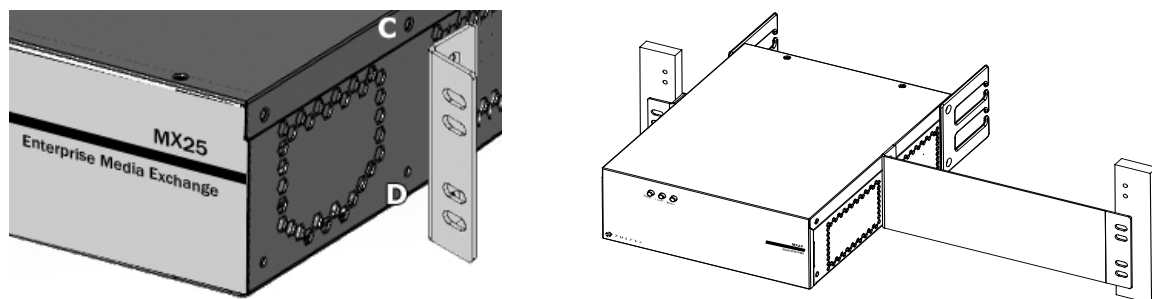

Figure 4-5   **Front bracket mid-mount**

2. Hold a mounting bracket (80-01210-00) against the chassis so that the holes on the mounting bracket are aligned with positions C and D on the chassis.

3. Fasten a mounting bracket using two M4x6 screws (58-20002-00) at positions C and D.

4. Hold the extender bracket against the other side of the chassis so that the holes are aligned.

5. Fasten the extender bracket using two M4x6 screws (58-20002-00).

6. Hold the chassis so that the holes on both sides are aligned.

7. Using a screwdriver, connect the mounting bracket and extender bracket to the rack.

8. If required, fasten the plastic cable management brackets (80-01240-01) at the rear mount positions as shown, using two M4X6 screws (58-20002-00).

4.6.1.3 Rear Mount

1. Remove the M4 screw (one from each side) from position A as shown in figure 4-6.
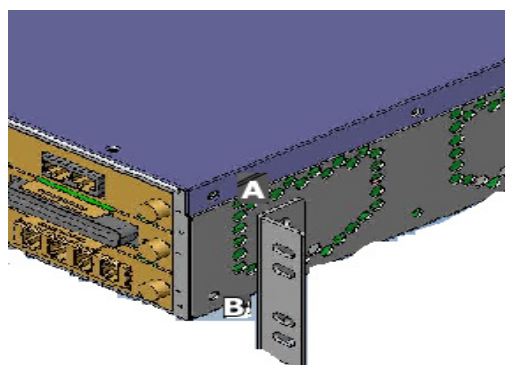

Figure 4-6   **Rear bracket mount**

2. Hold a mounting bracket (80-01210-00)against the chassis so that the holes on the mounting bracket are aligned with positions A and B on the chassis.

3. Fasten a mounting bracket using two M4x6 screws (58-20002-00) at positions A and B.

4.   Hold the extender bracket against the other side of the chassis so that the holes are aligned.

5.   Fasten the extender bracket using two M4x6 screws (58-20002-00).

6.   Hold the chassis so that the holes on both sides are aligned.

7.   Using a screwdriver, connect the mounting bracket and extender bracket to the rack.

4.6.1.4   Middle Rear Mount

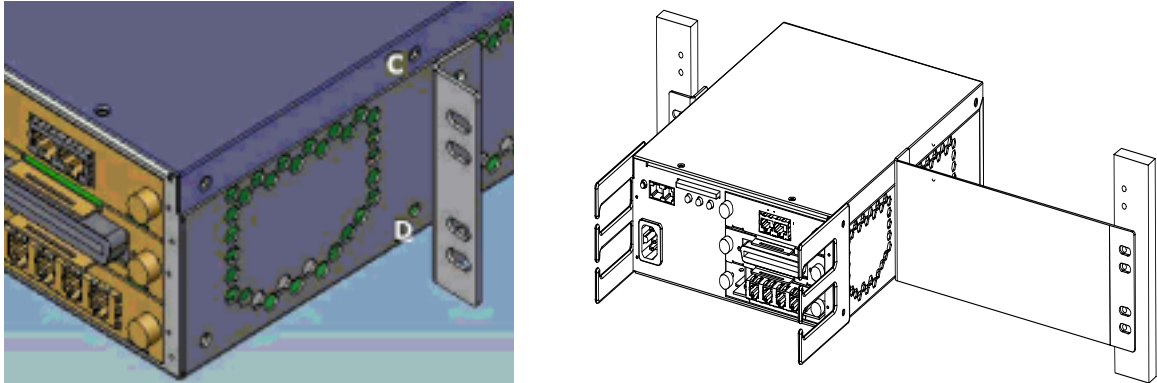1.   Remove the M4 screw (one from each side) from position C as shown in figure 4-7.

Figure 4-7   Rear bracket mid-mount

2.   Hold a mounting bracket (80-01210-00) against the chassis so that the holes on the mounting bracket are aligned with positions C and D on the chassis.

3.   Fasten a mounting bracket using two M4x6 screws (58-20002-00) at positions C and D.

4.   Hold the extender bracket against the other side of the chassis so that the holes are aligned.

5.   Fasten the extender bracket using two M4x6 screws (58-20002-00).

6.   Hold the chassis so that the holes on both sides are aligned.

7.   Using a screwdriver, connect the mounting bracket and extender bracket to the rack.

8.   If required, fasten the plastic cable management brackets (80-01240-01) at the rear mount positions as shown, using two M4X6 screws (58-20002-00).

4.6.2   Dual Unit installation

Using eight dual connector brackets to connect two MX25s side by side, you can fasten the mounting brackets in one of four positions. Decide which of the four mounting positions to use, then follow the appropriate instructions for installing the mounting brackets.

Note Cable management brackets (80-01240) cannot be placed between the rack mount bracket (80-01210) and the MX25 chassis with the dual connector bracket arrangement shown in figures 4-8 and 4-9. Cable management brackets can only be fastened to the MX25 chassis in the rear mount positions by themselves.

1. Remove the M4 screw (one from each side) from position A as shown in figure 4-4.

2. For the second MX25, repeat step 1 but make sure you remove the M4 screw from the opposite end.

3. Hold a mounting bracket (80-01210-00) against the chassis so that the holes on the mounting bracket are aligned with positions A and B (for dual front mount), C and D (for middle front) on the chassis.

4. Repeat step 3 for the second MX25.

5. Mount two dual connector brackets (80-00030) on the front for both MX25s as shown in figure 4-8.
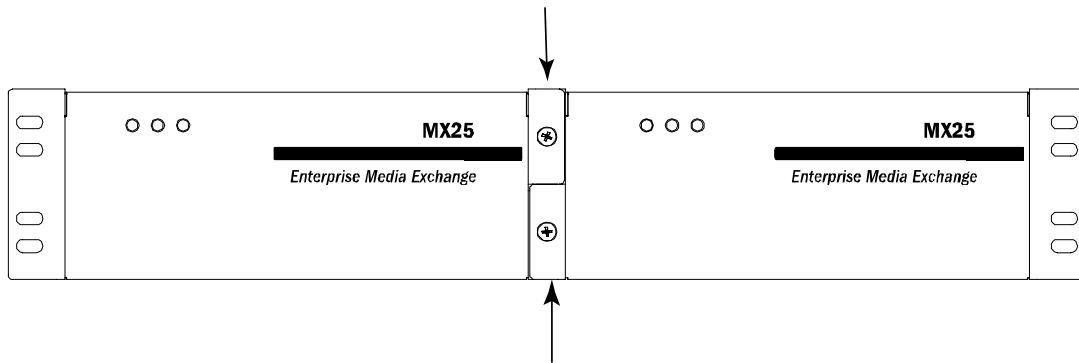

Figure 4-8   Dual connector brackets: front view

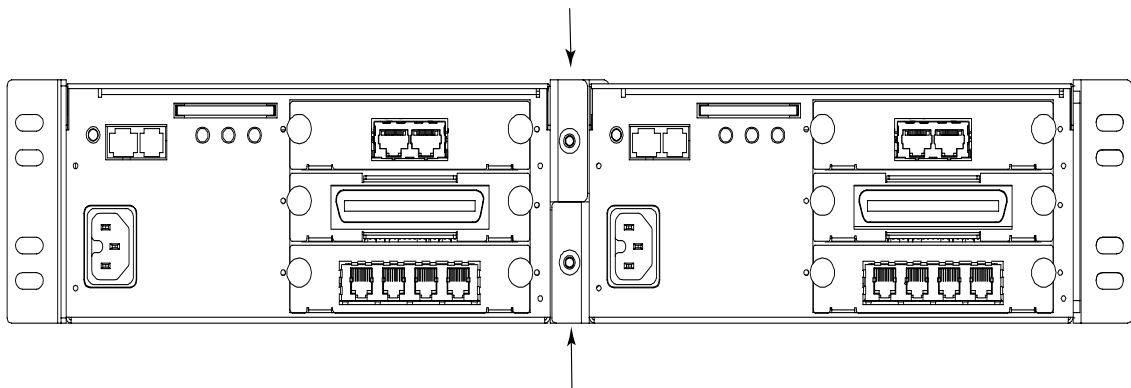6. Mount two dual connector brackets (80-00030) on the rear for both MX25s as shown in figure 4-9.

Figure 4-9   Dual connector brackets: rear view

7. Hold the chassis so that the holes on both sides are aligned as shown in figure 4-10. Fasten
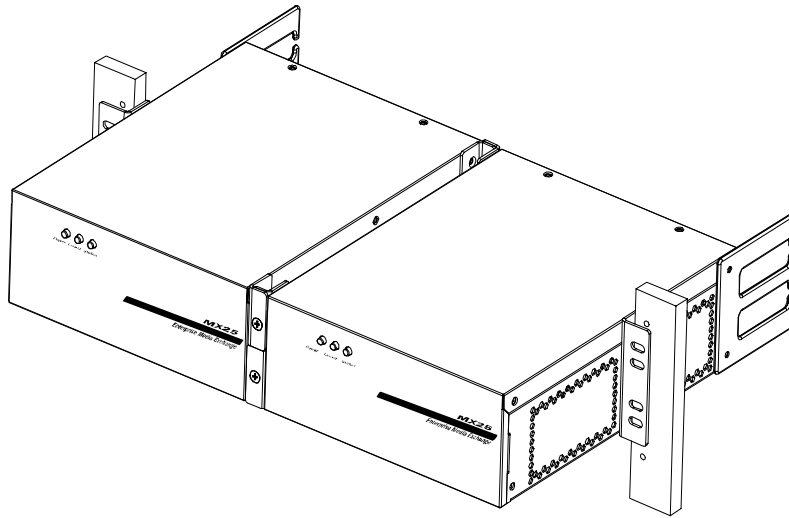

Figure 4-10   Dual unit front mount with cable brackets

the chassis to the equipment rack using the screws provided.

8. If required, fasten the plastic cable management brackets (80-01240-01) at the rear mount positions as shown, using M4X6 screws (58-20002-00).

Wiring

5.1 Introduction

This chapter explains how to wire the MX25.

Important	You must read the section on site selection and preparation before starting to install the MX25. Refer to chapter 4, starting on page 19.

Danger	Do not work on the MX25 during periods of high electrical activity in the atmosphere, such as during lightning and storms.

5.2 Wiring the MX25

1. Connect the MX25 and PC for console mode. Connect the Ethernet port to the PC or laptop that will provision the MX25. See Figure 3-2 on page 12 to identify the Ethernet port and Reset button.

2. Connect all subscriber stations:

   - If you have IP phones or devices enabled with softphones, connect a LAN switch to the Ethernet port on the MX25, and connect the IP phones or devices with softphones into the switch. See figure 3-2 on page 12 to identify the Ethernet port.

   - If you have analog telephones, fax machines, or modems, connect the FXS board to one of the interface slots (item 9 of Figure 3-2 on page 12). Then connect the analog devices to the analog ports on the **FXS** interface card.

3. Connect voice lines to the PSTN:

   - If you have a T1 or E1, use the RJ45 ports on the **DTE** card. The first time that you start the MX25, these circuits are undefined. You can configure the protocol for each circuit. See the MX25 Administration software for PCM configuration.

   - If you have analog PSTN lines, use the telco (50-way connector) connector on the **FXO** interface card. Figure 5-1 shows the several options in which you can connect to the PSTN using this connector.
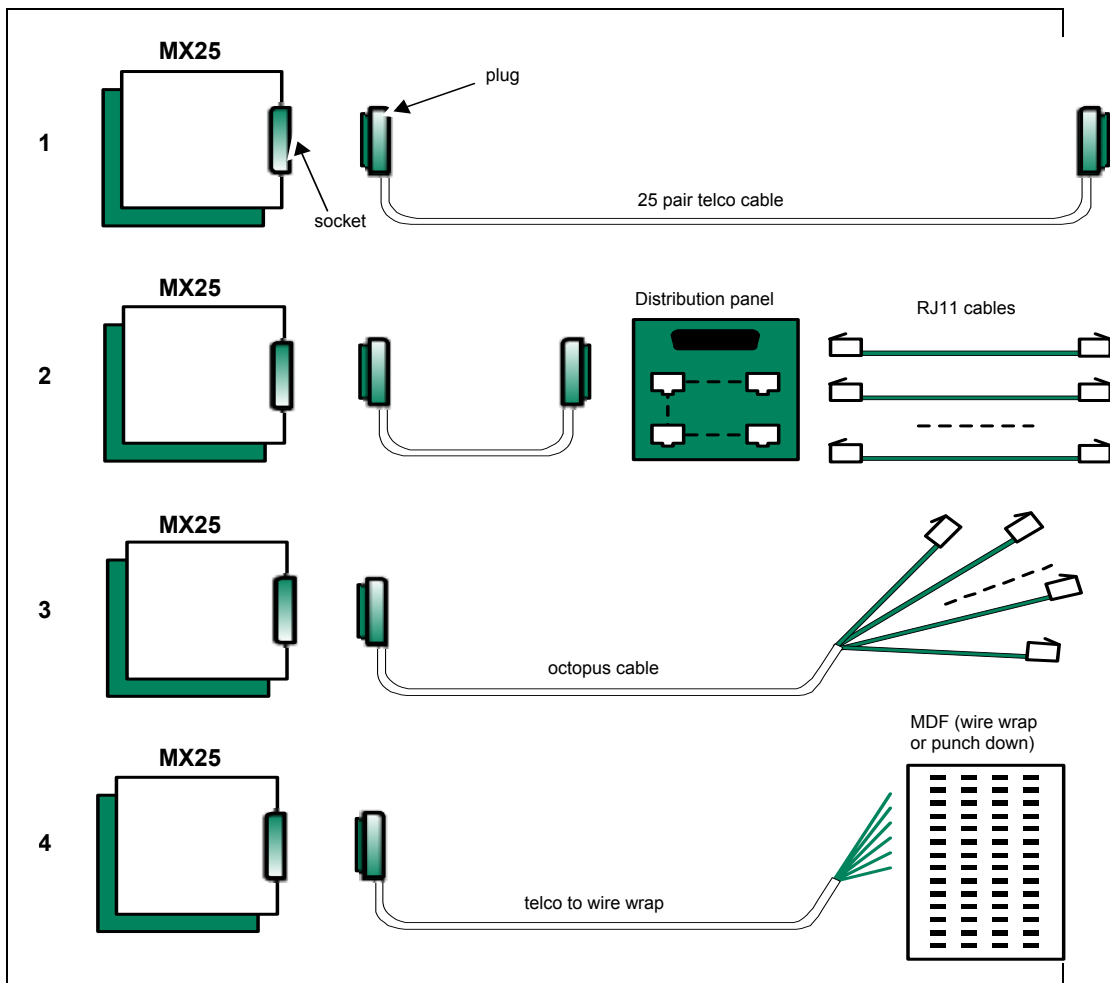
4. Connect to the IP WAN.

Figure 5-1   FXO Wiring options

If you connect to the WAN using external equipment, you can connect the external equipment to the MX25 using the 10/100 Base-T port.

5. Ensure that the power switch is in the off position. See figure 3-2 on page 12 to identify the ac input and power switch.

6. Plug the ac cord into the ac input.

Danger   You must use this system only with the power cord provided. If this is not suitable, contact your Zultys sales or service representative. The power cord that is provided has a separate ground (earth) connector, and you must insert it into a power socket that is provided with a protective ground (earth) contact. You must not negate this protective action by using an extension cord (power cable) that does not carry the protective grounding conductor.

Warning The power supply cord is used as the main disconnect device. Ensure that the power socket is located or installed near the equipment and is easily accessible.

Danger The power cord provides the safety ground for the MX25. You must keep this cord properly connected at all times, even if the equipment is not powered by the ac mains.

Caution Do not place objects on the power cord. Run the power cord so that people cannot step on or trip on the power cord.

7.   Plug the ac power cord into the wall outlet.

Warning Do not overload wall outlets as this might result in electric shock.

IP Addresses and Console Mode

6.1   Introduction

This chapter describes how to activate and use console mode on the MX25.

6.2   IP Addresses from Factory

The external IP address of the MX25 when it is shipped from the factory is **192.168.1.100**. See the MX25 administrator manual for downloading the Administrator User Interface software and changing the external IP address of the MX25 to connect to your network.

Important	For most applications, you should change these IP addresses before connecting the MX25 to your network.

6.3   Definition of Console Mode

The console mode is a defined way to access the MX25. It is possible that the IP address of the MX25 is unknown. Putting the MX25 in console mode as described in section 6.5 fixes the IP address of the MX25 so you can access and configure the system.

Before putting the MX25 into console mode, you should disconnect the Ethernet port from your system. This will ensure that there are no conflicts with other devices on your network.

Important	Ensure that you disconnect the Ethernet cable from the MX25 before putting the MX25 into console mode. Failure to do so may disturb other devices on the LAN.

When the MX25 is in console mode, you can connect a computer, hub or switch to the ethernet port. The IP address that you should use to access the MX25 is **192.168.1.100**.

6.4   Features

When you have placed the MX25 into console mode, you have access to the following features which are not available when the MX25 is not in console mode:

- ability to change the external IP addresses of the MX25

- reset master password to default password

- emergency recovery mode

- secure access to the system

There are two methods to activate console mode.

6.5 Console Mode Activated During Power Up

To put the MX25 into console mode from power up:

1. Connect your PC or laptop to the Ethernet port from your system.

2. Ensure power to the MX25 is turned off.

3. Connect ac power to the ac input of the MX25.

4. Immediately after connecting the ac power, press and hold the Reset button for several seconds.

The MX25 indicates it has entered console mode with the Status LED as shown in figure 7-5.

Log into the MX25 administration software on your computer to configure the MX25. For details on how to configure the MX25, see the **MX25 Administration User's Manual**.

To exit the console mode you must shut down and power cycle the MX25. To turn the power off, either use the shutdown command from the MX administration software or press and hold the **Reset** button as described in section 3-2 on page 12.

6.6 Console Mode Activation During Normal Operation

Pressing the Reset button during normal operation puts the MX25 into console without changing its IP address.

To put the MX25 into console mode during normal operation:

1. Disconnect the Ethernet port from the system

2. Press and hold the Reset button for about 3 seconds

The MX25 indicates it has entered console mode with the Status LED as shown in figure 7-5 on page 36.

Once the MX25 is in console mode you can access it at the IP address that you assigned it.

To exit console mode, press and hold the Reset button for two seconds. The MX25 exits console mode and restores the status of the LEDs.

LEDs

7.1   Introduction

This chapter describes the various indications for each LED on the MX25. The three LEDs on the front have the same indication as the three LEDs on the rear of the MX25.

7.2   During Startup

During startup, the LEDs indicate the progression of the startup process, as indicated in figure 7-1. None of the LEDs shows any red during any portion of this startup phase.

State	Power	Load	Status
Power Off	Off	Off	Off
Boot code running	Orange	Off	Off
Linux running on SC	Flash Green	Off	Off
SC application running	Green	Orange	Off
All boards operational	Off	Green	Orange
Applications loaded	Green	Green	Orange
Configurations loaded	Green	Green	Flash Green
System Ready	Green	Green	Green

Figure 7-1   Conditions For LEDs on MX25 During Normal Startup

If there is an error during startup, the LEDs indicate the nature of the problem, as indicated in figure 7-2.

State	Power	Load	Status
Boot code failure	undefined	undefined	undefined
Linux failure on SC	Flash red	Off	Off
Configuration failure	Red	Flash red	Off
Telecom board failure	Red	Off	Flash red
Internal software fault	Flash red	Flash red	Flash red

Figure 7-2   Conditions For LEDs on MX25 During Abnormal Startup

7.3 Operational System

There are three LEDs on the front of the chassis and three LEDs on the rear of the chassis. The meanings of the LEDs is described in figure 7-3, figure 7-4, and figure 7-5.

When the MX25 is running normally, all LEDs are green. Also, when the MX25 is operational, none of the LEDs is off.

Status	Colors
AC power off	clear
AC power on	orange, green
AC power off	flash green

Figure 7-3   Meaning of LED Colors for Power After Startup is Complete

Status	Colors
System load is light with all of these conditions:	green
— access to system services < 80%	
— application and report storage < 80%	
Load is medium because of at least one of these conditions:	orange
— access to system services > 80% and < 90%	
— application and report storage > 80% and < 90%	
Load is heavy because of at least one of these conditions:	red
— access to system services > 90%	
— application and report storage > 90%	

Figure 7-4   Meaning of LED Colors for Load After Startup is Complete

Status	Colors
Firmware update in progress	green flash orange
Firmware update failure	orange
Temperature too high	flash red off
Console Mode is active	flash orange, green, then red
Error in entering Console Mode	fast flash red
Syslog event threshold exceeded	red
Normal	green

Figure 7-5   Meaning of LED Colors for Status After Startup is Complete

7.4 System Shut Down

You can initiate a shutdown of the MX25 from the Administrative UI as described in the **MX25 Administration Manual**. On the MX25 you can also shut down the system with the reset button. The stages of this shut down are shown by the LEDs as described in figure 7-6.

The power to the MX25 will not be removed until the power cord is physically unplugged from the chassis.

State	Power	Load	Status
Normal	Green	Green	Green
Shut down initiated	Green	Green	Flash Orange
Applications shut down	Green	Off	Off
Linux shut down	Flash Green	Off	Off
Power off	Off	Off	Off

Figure 7-6   **Conditions For LEDs on MX25 During Shut Down**

Chapter 8

Maintenance and Use

8.1 Introduction

This chapter describes how you should ensure that the MX25 continues to operate.

Warning	Only trained and qualified personnel should be allowed to maintain the MX25.

8.2 Usage

Warning	Do not use the MX25 to report a gas leak when in the vicinity of the gas leak.

8.3 Servicing

For proper servicing of these products, return them to the distributor from whom you purchased them or to Zultys.

Caution	There are no parts inside the MX25 that you can repair or replace yourself. If you repair the MX25 yourself, you will void your warranty. Refer servicing to only qualified service personnel.

8.4 Disposal

When the system is no longer of any use, you may return it to Zultys, or the Zultys distributor from whom you purchased the equipment, for proper disposal.

Appendix A

Acronyms

A	Ampere
ac	alternating current
ANSI	American National Standards Institute
b/s	bits per second
BRA	Basic Rate Access to ISDN
CAS	channel associated signaling
CCITT	International Telegraph and Telephone Consultative Committee
CCS	common channel signalling
CO	central office
CPE	customer premises equipment
CSU	channel services unit
dc	direct current
DCE	data circuit terminating equipment
DMM	digital multimeter
DS1	digital signal level 1 (1.544 Mb/s)
DSU	digital services unit
DTE	data terminal equipment
E1	digital signal, level 1, specified by ITU-T (2.048 Mb/s)
ESD	electrostatic discharge
ESF	extended superframe format for t1, comprising 24 frames in a superframe
ETSI	European Telecommunication Standards Institute
FCC	Federal Communications Commission
FDL	facility data link
ft	feet
FXO	foreign exchange office (analog subscriber side interface)
FXS	foreign exchange subscriber (analog exchange side interface)

GND	ground
h	hour(s)
Hz	Hertz
IEC	International electrotechnical commission
IEEE	Institute of electrical and electronic engineers
in	inch
IP	Internet protocol
ISDN	integrated services digital network
ISO	International Organization for Standardization
ISP	Internet service provider
ITTS	ITU Telecommunications Standardization Sector (formerly the CCITT)
ITU	International Telecommunication Union
K	1024
k	kilo (1000)
KB	kilo-byte (1024 bytes)
kb/s	kilo-bits per second
kHz	kilo-Hertz
km	kilometer
kW	kilo-Watt
LAN	local area network
LED	light emitting diode
LRE	long reach Ethernet
LS	loop start
LSB	least significant bit
m	meter
mA	milli-Ampere
MB	mega-byte (1,048,576 bytes)
Mb/s	million bits per second
MF	multi frequency
MHz	mega-Hertz
mm	millimeter
ms	milli-second
MSB	most significant bit
mW	milli-Watt
MX	media exchange (MX25)

n/a	not applicable
NCTE	network circuit-terminating equipment
NEBS	network equipment building system
ns	nanosecond
NT	network termination
NTE	network terminal equipment
OSI	open systems interconnection
PABX	private automatic branch exchange
PBX	private branch exchange
PC	personal computer
PCB	printed circuit board
PCM	pulse code modulation
PDF	portable document format
POTS	plain old telephone service
PRA	primary rate access
PRI	primary rate interface
PSTN	public switched telephone network
PSU	power supply unit
RAM	random access memory
RMA	return material authorization
ROM	read only memory
RTC	real time clock
RU	rack unit (1.75 in, 44.45 mm)
Rx	receive
RxD	receive data (or received data)
s	second
SC	system controller
SRAM	static random access memory
T1	T-carrier for digital signal level 1 (1.544 Mb/s)
TDM	time division multiplexing
TIA	Telecommunications Industries Association
Tx	transmit
TxD	transmit data (or transmitted data)
U	*see* RU
UI	user interface

UL	Underwriter's Laboratory
UPS	uninterruptible power supply
V	Volt
Vac	Volts with alternating current
Vdc	Volts with direct current
VF	voice frequency
Vpp	Volts peak to peak
W	Watt
WAN	wide area network

Glossary

10/100Base-T. A physical media that can operate as 10Base-T or 100Base-T.

10Base-T. A physical media specified by the IEEE 802.3 standard for supporting Ethernet with a maximum transmission rate of 10 Mb/s. 10BaseT consists of copper twisted-pair cable normally used for wiring ordinary telephones. Ethernet is a common technology used for connecting computers into a local area network (LAN).

100Base-T. A local area network transmission standard that supports a data rate of 100 Mbps. Also known as *Fast Ethernet*; similar in function to 10BaseT.

Ethernet. The most widely-installed local area network (LAN) technology. Originally developed at the Xerox Corporation Palo Alto Research Center, Ethernet is specified in the IEEE 802.3 standard. Ethernet is a best-effort delivery system that uses CSMA/CD technology. Ethernet can be run over a variety of physical media, including coaxial, twisted pair, and fiber optics.

Foreign Exchange Office (FXO). An analog interface that connects to the Public Switched Telephone Network (PSTN) central office and is the interface offered on a standard telephone.

Foreign Exchange Station (FXS). An analog interface that connects directly to a standard telephone and supplies ring, voltage, and dial tone.

Gateway. A network point that serves as an entrance to another network. Computers that control traffic within an enterprise's network or at the local Internet Service Provider (ISP) are gateways. IP datagrams are transferred from network to network through gateways until it reaches its final destination. See Router.

Hub. A hub network topology consists of a backbone (main circuit) to which a number of outgoing lines can be attached, each providing at least one connection port for attaching devices. As a network product, a hub may include a group of modem cards for dial-in users, a gateway card for connections to a local area network, and a line connection.

Hypertext Transfer Protocol (HTTP). An application layer protocol that defines a set of rules for exchanging files (text, images, sound, video, and other multimedia files) on the Internet. Described by RFC 2068.

Incoming call. A call originated by a source that is external to the enterprise.

Internet. A worldwide computer network system in which users at any one computer can, with permission, exchange information from any other computer and sometimes talk directly to users at other computers; also known as the "Net." Originally designed by the Advanced Research Projects Agency (ARPA) of the U.S. Defense Department in 1969 so that a communication signal could withstand a nuclear war and serve military institutions worldwide. First known as the ARPAnet, the internet has evolved into public, cooperative, and self-sustaining facility accessible to billions of people worldwide.

Internet Engineering Task Force (IETF). The organization that defines standard Internet operating protocols such as TCP/IP. The IETF is supervised by the Internet Society Internet Architecture Board (IAB). IETF members are drawn from the Internet Society's individual and organization membership. Standards are expressed in the form of Requests for Comments (RFCs).

Internet Protocol (IP). A network layer protocol that sends datagram packets between Internet nodes. IP is a connectionless protocol, implying that there is no continuing connection between communicating endpoints. IP provides addressing, type-of-service (ToS) specification, security, fragmentation and reassembly features. The most widely used IP version is Internet Protocol Version 4 (IPv4). The ZIP 4x4 phone supports IP as defined in RFC 791.

Intranet. A restricted-access network that works like the Web, but isn't on it. Usually owned and managed by a corporation, an intranet enables a company to share its resources with its employees without making available confidential information to everyone with Internet access.

IP Address (version 4). A 32-bit number that identifies each sender or receiver of information sent across the internet. An IP address has two parts: the network identifier and the identifier of a specific device on the network. On the Internet itself – between the router that moves packets between points along the route – only the network part of the address is examined.

Local Area Network (LAN). A group of computers and associated devices that share a common communications line and the resources of a single processor or server within a limited geographic area, such as an office building. 10BaseT Ethernet is the most commonly used form of LAN. A hardware device called a hub serves as the common wiring point, enabling data to be sent from one machine to another over the network. LANs are typically limited to distances of less than 500 meters and provide low-cost, high-bandwidth networking capabilities within a small geographical area.

Media Access Control (MAC) Address. A hardware number that uniquely identifies a computer or other device. Within an Ethernet configuration, the MAC address is a 6-octet address assigned to the network interface card. When your computer is connected to the Internet, a correspondence table relates your IP address to your computer's physical (MAC) address on the LAN. The MAC address is used by the Media Access Control sublayer of the Datalink Control (DLC) protocol layer. Each physical device type has a different MAC sublayer.

Network Interface Card (NIC). A circuit board or card that is installed in a computer for the purpose of connecting the computer to a network. Personal computers on a LAN usually contain a NIC designed for a specific LAN transmission technology, such as Ethernet.

Public Switched Telephone Network (PSTN). The world-wide collection of voice-oriented public telephone networks. Also referred to as Plain Old Telephone Service (POTS).

Repeater. A device that receives a digital signal on a transmission medium and regenerates the signal for the next leg of the medium. Repeaters overcome attenuation losses caused by free-space electromagnetic-field divergence or cable loss over electromagnetic media. A series of repeaters facilitates the extension of a signal over long distances.

Request for Comments (RFC). A formal document issued by the Internet Engineering Task Force. Some RFCs are informational in natural while others become Internet standards. RFCs are the result of committee drafting and subsequent review by interested parties. No further comments or changes to an RFC are permitted once it becomes an Internet standard; changes to internet standards are enacted through subsequent RFCs that supersede or elaborate on all or parts of existing RFCs.

RJ-45. A single-line digital transmission interface. Resembling a standard phone connector, an RJ-45 connector is twice as wide (with eight wires) and is used for connecting computers to local area networks (LANs) or phones with multiple lines.

Router. A device that determines the next network point to which a data packet should be sent on to its final destination. Routers also act as traffic cops, allowing only authorized machines to transmit data into the local network so that private information can remain secure. In addition to supporting these dial-in and leased connections, routers also handle errors, maintain network usage statistics, and handle security issues.

Server. A computer program or device that provides services to other computers.

Server Farm. A network where clients install their own computers to run Web servers, email, or any other TCP/IP based services they require, making use of leased permanent Internet connections with 24-hour worldwide access. Instead of using expensive dedicated-line connections to various offices, servers can be placed on server farm networks to provide high-speed Internet access for a fraction of the cost of a leased line.

Session Initiated Protocol (SIP). An Internet standard protocol that defines a method of initiating an interactive user session involving multimedia elements, such as voice, chat, gaming, video, and virtual reality. SIP is a request-response protocol that deals with requests from clients and responses from servers through any transport protocol, such as UDP or TCP. Described by RFC 3261, SIP can establish, modify, or terminate multimedia sessions or Internet telephony calls.

SIP Endpoint. An internet host that understands the SIP protocol.

SIP Registrar. A SIP Registrar is a UAS that responds to REGISTER requests and maintains a list of bindings that are accessible to proxy servers and redirect servers within its administrative domain.

SIP Server. A network device that performs special functions at the request of SIP endpoints. Servers typically act in response to SIP endpoint requests, but can also initiate functions on their own. RFC 3261 defines three types of SIP servers: SIP Proxy servers, Redirect servers, and Registrar servers.

Subnet Mask. A number that, when applied to an IP address, can identify the subnetwork where the address resides. For example, within a class B network, a subnet mask of 255.255.255.0 specifies that the first two portions of the decimal dot format are the network number, while the third portion is a subnet number. The fourth portion is the host number. A subnet mask of 255.255.0.0 species a class B network that does not have a subnet.

Switch. A network device that selects a path or circuit for sending a unit of data to its next destination. A switch may also include the function of the router. A switch is generally a simpler and faster mechanism than a router, which requires knowledge about the network and how to determine the route. A switch is usually associated with layer 2 of the OSI communications model.

System Controller (SC). One of the boards inside the MX25. It stores all of the application software for the MX25 and upon power on, forwards the software to the other boards in the system.

Universal Resource Locator (URL). A standard method of specifying the location of an internet resource. Also referred to as a location or address, URLs specify the location of files on servers. A general URL has the syntax protocol://address. For example, http://www.zultys.org/index.html specifies that the protocol is http and the address is www.zyltys.org/ index.html.

Unshielded Twisted Pair (UTP). Also known as 10BaseT. This is the standard cabling used for telephone lines. It is also used for Ethernet connections.

User Agent Server. A SIP logical entity that generates a response to a SIP request. The response accepts, rejects, or redirects the request. This role lasts only for the duration of that transaction; if a piece of software responds to a request, it acts as a UAS for the duration of that transaction. If it generates a request later, it assumes the role of a user agent client to process that transaction.

Wide Area Network (WAN). A geographically dispersed telecom network. Although a WAN may be privately owned, the term usually implies the inclusion of public networks.

Appendix C

Regulatory and Safety Compliance

C.1   Usage

The MX25 complies with the following agency approvals and standards. The MX25 is therefore approved for business use and connection to the PSTN in the following countries:

- Argentina
- Australia
- Canada
- China
- Europe
- Hong Kong
- Japan
- Korea
- Mexico
- New Zealand
- South Africa
- USA

C.2   Safety

- CSA-C22.2 60950 Safety of Information Technology Equipment
- AS/NZ 60950:2000 Safety of Information Technology Equipment
- EN60950: Safety of Information Technology Equipment
- IEC60950: Safety of Information Technology Equipment

C.3   Electromagnetic Compatibility (EMC) Emissions

- FCC part 15 Class A
- ICES-003 Radiated and Conducted Emission from digital apparatus Class A

- AS/NZS 3548/CISPR 22/EN 55022 Emission Class A
- EN61000-3-2 Harmonics current to public supply system
- EN61000-3-3 Voltage fluctuations to public low-voltage system
- EN55022 Class A

C.4 Electromagnetic Compatibility (EMC) Immunity

- IEC61000-4-2 ESD
- IEC61000-4-3 Radiated RF electromagnetic field immunity
- IEC61000-4-4 Electrical Fast Transient/Burst
- IEC61000-4-5 Surge
- IEC61000-4-6 Conducted disturbances, induced by radio-frequency fields
- IEC61000-4-11 Voltage Dips, Variations and Short Interruptions
- EN55024

C.5 Telecom

- FCC part 68 T1 & PSTN
- AS/ACIF S002/S031/S038
- PTC 220/220
- CTR-12/13 E1
- CTR 3/4 ISDN BRI
- CTR 21 Analog

C.6 FCC Information

C.6.1 Class A Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio-frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to correct the interference at their own expense.

C.6.2 Registration Numbers

- (FCC) US:ZULISNANMX250
- (Canada) IC:4478AMX250

C.6.3   Use with the Phone Network

This equipment cannot be used on telephone company-provided coin service. Connection to party line service is subject to state tariffs.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make the necessary modifications in order to maintain uninterrupted service.

If trouble is experienced with this equipment, please contact Zultys for repair and warranty information. If the trouble is causing harm to the telephone network, the telephone company may request you remove the equipment from the network until the problem is resolved.

When programing the emergency numbers you should make test calls to verify correct operation.

1.   Remain on the line and explain to the operator the reason for the call before hanging up.

2.   Perform such activities infrequently and during off peak hours such as early in the morning.

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