

IES-5106M / IES-5112M / IES-6000M

Integrated Ethernet Switch

User's Guide

Default Login Details

IP Address	http://192.168.1.1
User Name	admin
Password	1234

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www.zyxel.com

ZyXEL

About This User's Guide

Intended Audience

This manual is intended for people who want to install and maintain the IES series Integrated Ethernet Switch. This User's Guide gives hardware installation, connection and maintenance instructions. It also gives specifications.

Related Documentation

- Line Card User's Guides

These User's Guides provide hardware connection details and explain how to configure and manage the individual line cards.

- Management Switch Card User's Guide

This User's Guide provides hardware connection details, and configuration and management instructions for the management switch card.

- Supporting Disk

Refer to the included CD for support documents.

Documentation Feedback

Send your comments, questions or suggestions to: techwriters@zyxel.com.tw

Thank you!

Need More Help?

More help is available at www.zyxel.com.



- Download Library

Search for the latest product updates and documentation from this link. Read the Tech Doc Overview to find out how to efficiently use the documentation in order to better understand how to use your product.

- Knowledge Base

If you have a specific question about your product, the answer may be here. This is a collection of answers to previously asked questions about ZyXEL products.

- Forum

This contains discussions on ZyXEL products. Learn from others who use ZyXEL products and share your experiences as well.

Customer Support

Should problems arise that cannot be solved by the methods listed above, you should contact your vendor. If you cannot contact your vendor, then contact a ZyXEL office for the region in which you bought the device.

See http://www.zyxel.com/web/contact_us.php for contact information. Please have the following information ready when you contact an office.

- Product model and serial number.
- Warranty Information.
- Date that you received your device.
- Brief description of the problem and the steps you took to solve it.

Document Conventions

Warnings and Notes

These are how warnings and notes are shown in this User's Guide.

Warnings tell you about things that could harm you or your device.

Note: Notes tell you other important information (for example, other things you may need to configure or helpful tips) or recommendations.








Naming Conventions

- The IES-5106M main chassis may be referred to as the "IES-5106M" or the "main chassis".
- The IES-5112M main chassis may be referred to as the "IES-5112M" or the "main chassis".
- The IES-6000M main chassis may be referred to as the "IES-6000M" or the "main chassis".
- The IES-3000ST splitter chassis is compatible with the IES. It may be referred to as the "IES-3000ST" or the "splitter chassis".
- The IES-3016ST splitter chassis is compatible with the IES. It may be referred to as the "IES-3016ST" or the "splitter chassis".
- The IES-5000ST splitter chassis is compatible with the IES. It may be referred to as the "IES-5000ST" or the "splitter chassis".
- The IES-5002ST splitter chassis is compatible with the IES. It may be referred to as the "IES-5002ST" or the "splitter chassis".
- The IES-5005ST splitter chassis is compatible with the IES. It may be referred to as the "IES-5005ST" or the "splitter chassis".
- The MSC1024G, MSC1224G, MSC1024GB, or MSC1224GB (Management Switch Card) may be referred to as the "management card" or the "MSC".
- The ALC1248G-51, ALC1248G-53, ALC1272G (ADSL Line Cards), SLC1248G-22 (SHDSL Line Card), VLC1224G-41 (VDSL Line Card) and VOP1248G-61 (VoIP Line Card) may be collectively referred to as the "line cards".
- The ALC1248G-51 for ADSL over POTS (Annex A) Line Card may be referred to as the "ALC1248G", the "ALC" or the "line card" in this User's Guide.
- The ALC1248G-53 for ADSL over ISDN (Annex B) Line Card may be referred to as the "ALC1248G", the "ALC" or the "line card" in this User's Guide.
- The ALC1272G ADSL2/2+ Line Card may be referred to as the "ALC1272G", the "ALC" or the "line card" in this User's Guide.
- The SLC1248G SHDSL Line Card may be referred to as the "SLC1248G", the "SLC" or the "line card" in this User's Guide.

- The VLC1224G VDSL Line Card may be referred to as the “VLC1224G”, the “VLC” or the “line card” in this User’s Guide.
- The VOP1248G-61 VoIP Line Card may be referred to as the “VOP1248G”, the “VOP”, or the “line card” in this User’s Guide.
- IES refers to the main chassis and its cards, along with the splitter chassis and its cards. The IES-6000 may be referred to as the “IES”, the “system”, or the “device”.

Icons Used in Figures

Figures in this User’s Guide may use the following generic icons. The IES icon is not an exact representation of your device.

IES 	Computer 	Notebook computer 
Server 	Telephone 	
Switch 	Router 	

Safety Warnings

For your safety, be sure to read and follow all warning notices and instructions.

For your safety, be sure to read and follow all warning notices and instructions.

- Do NOT use this product near water, for example, in a wet basement or near a swimming pool.
- Do NOT expose your device to dampness, dust or corrosive liquids.
- Do NOT store things on the device.
- Do NOT install, use, or service this device during a thunderstorm. There is a remote risk of electric shock from lightning.
- Warning! Connect the frame ground before you connect any other cables or wiring. Refer to [Chapter 5 on page 75](#) for the ground wire gauge.
- Connect ONLY suitable accessories to the device.
- ONLY qualified service personnel should service or disassemble this device.
- Make sure to connect the cables to the correct ports.
- Place connecting cables carefully so that no one will step on them or stumble over them.
- Always disconnect all cables from this device before servicing or disassembling.
- Use ONLY a power wire of the appropriate wire gauge (see [Chapter 5 on page 75](#) for details) for your device. Connect it to a power supply of the correct voltage (see [Chapter 5 on page 75](#) for details).
- Do NOT allow anything to rest on the power adaptor or cord and do NOT place the product where anyone can walk on the power adaptor or cord.
- Do NOT use the device if the power adaptor or cord is damaged as it might cause electrocution.
- If the power adaptor or cord is damaged, remove it from the device and the power source.
- Do NOT attempt to repair the power adaptor or cord. Contact your local vendor to order a new one.
- Do not use the device outside, and make sure all the connections are indoors. There is a remote risk of electric shock from lightning.
- CAUTION: RISK OF EXPLOSION IF BATTERY (on the motherboard) IS REPLACED BY AN INCORRECT TYPE. DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS. Dispose them at the applicable collection point for the recycling of electrical and electronic equipment. For detailed information about recycling of this product, please contact your local city office, your household waste disposal service or the store where you purchased the product.

- Do NOT obstruct the device ventilation slots, as insufficient airflow may harm your device.
- Keep the air filters clean, in order to ensure sufficient airflow.
- Always cover empty slots with slot covers, to ensure sufficient airflow and reduce the danger of electric shock.
- Warning! To avoid risk of electric shock, remove only one card at a time and do not place fingers or objects inside the chassis.
- Use only No. 26 AWG (American Wire Gauge) or larger telecommunication line cord.
- Fuse Warning! Replace a fuse only with a fuse of the same type and rating.
- The length of exposed (bare) power wire should not exceed 10 mm.
- Warning: This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.
- Fan Module Warning! Use the fan module handle when pulling out or pushing in the fan module. Be careful not to put fingers or objects inside the fan module.
- Energy Hazard Warning! Remove all metal jewelry, watches, and so on from your hands and wrists before serving this device.

This product is recyclable. Dispose of it properly.



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System Introduction

This chapter describes the system features, specifications and applications of the IES.

1.1 System Description

The IES is an IP-based DSLAM (Digital Subscriber Line Access Multiplexer) that connects subscribers to the Internet. As a high-performance yet compact platform, it conveniently gives telephone companies and Internet Service Providers (ISPs) the ability to deliver broadband Internet access and voice services to subscribers. The IES platform allows for convenient management and support of various technologies.

The IES-5106M can hold a maximum of five line cards, so up to 240 subscribers (360 when using the ALC1272 72-port line card) can simultaneously utilize a wide range of powerful broadband services.

The IES-5112M can hold a maximum of ten line cards, so up to 480 subscribers (720 when using the ALC1272 72-port line card) can simultaneously utilize a wide range of powerful broadband services.

The IES-6000M can hold a maximum of sixteen line cards, so up to 768 subscribers (1152 when using the ALC1272 72-port line card) can simultaneously utilize a wide range of powerful broadband services.

Additionally, the line cards are hot-swappable; thus, you do not need to interrupt the service of other cards to change or service an individual card. A single management switch card can provide the convenience of centralized network traffic supervision.

The IES also has dual, hot-swappable power modules that reduce the chance of system shutdown.

1.2 Applications

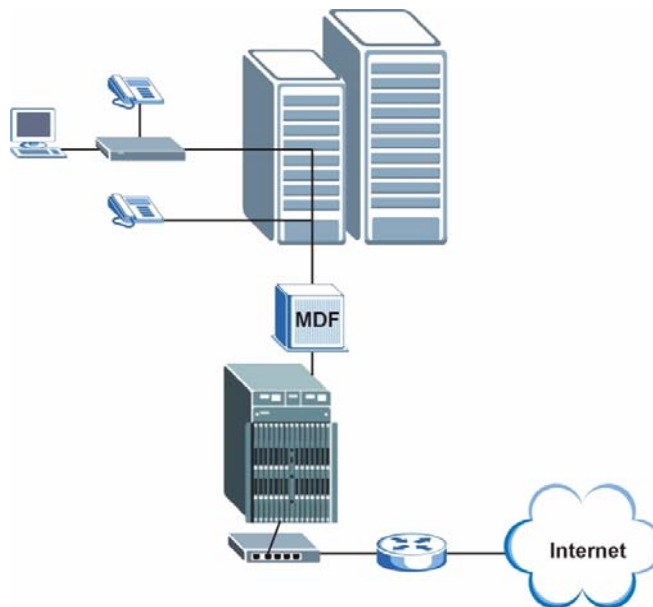
These are the main applications for the IES:

- Internet access, Voice over IP and multimedia services for Multiple Tenant Units (MTU).
- Other applications include video services, telemedicine, surveillance systems, remote servers systems, cellular base stations and high-quality videoconferencing.

1.2.1 MTU Application

The following diagram depicts a typical application of the IES in a large residential building or multiple tenant unit (MTU). This application leverages existing phone line wiring to provide voice service and Internet access (with DSL modems) to all tenants. The MDF is the point of termination for the outside telephone company lines coming into a building and the telephone wiring in the building. Note that ADSL service can co-exist with voice service on the same line.

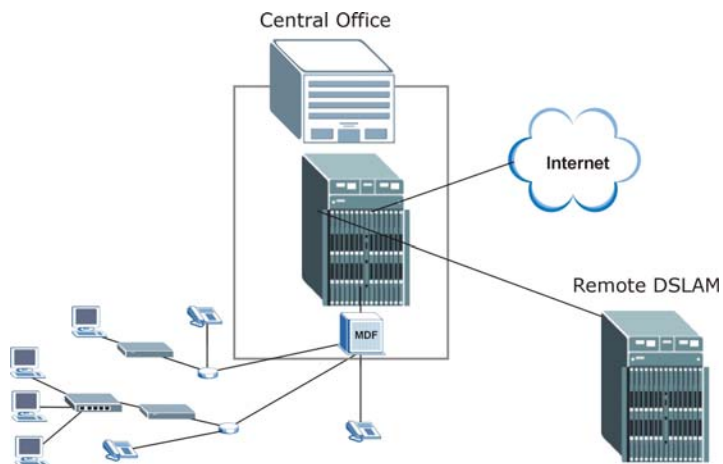
Figure 1 Application: Multi-tenant Unit (MTU)



1.2.2 Central Office Application

The IES provides DSL and voice service over telephone wires to subscribers. The following figure shows the IES setup in a telephone company's central office.

Figure 2 Application: Central Office



1.3 Front Panel

The following figures show the main chassis front panels with cards installed.

Figure 3 IES-5106M Front Panel

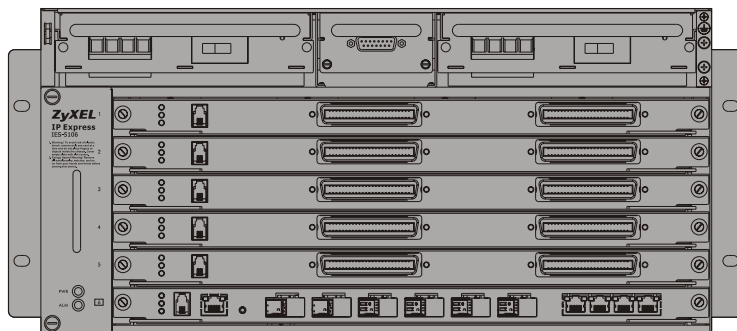


Figure 4 IES-5112M Front Panel

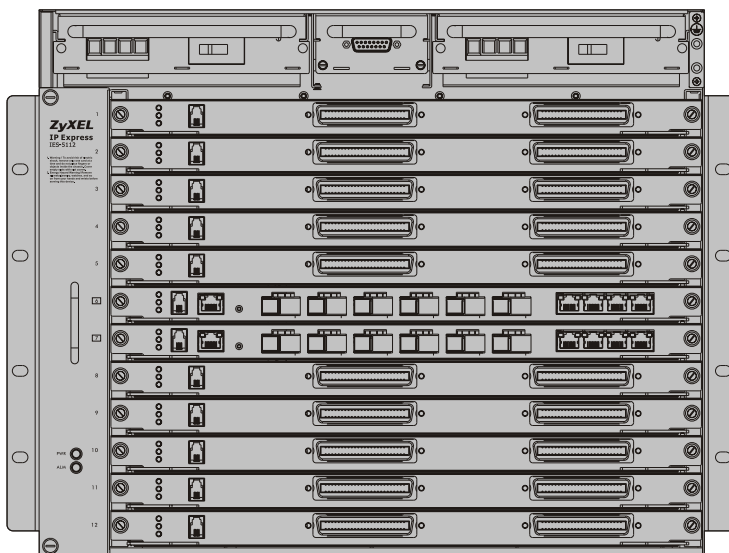
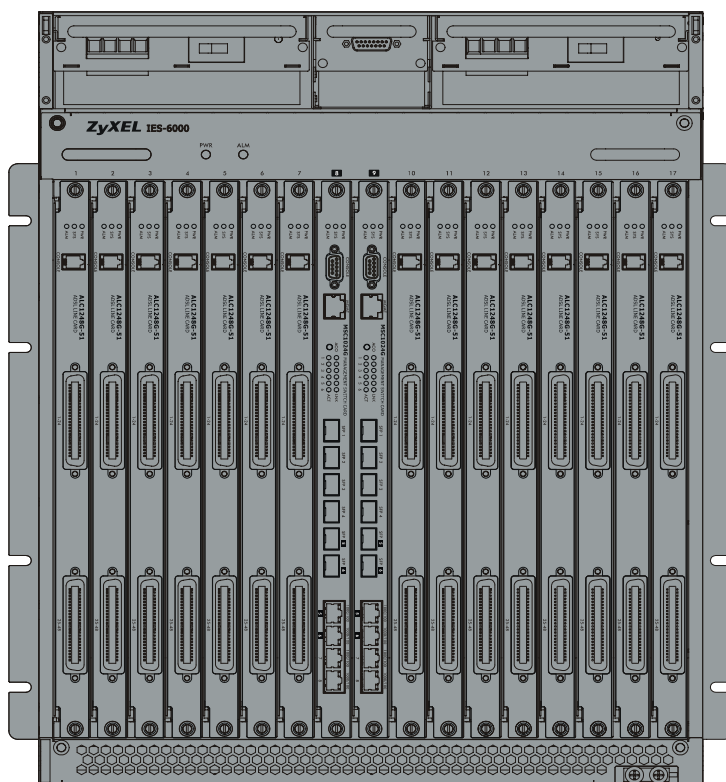


Figure 5 IES-6000M Front Panel

Hardware Installation and Connections

This chapter describes how to install and connect the IES-6000M and line cards.

2.1 General Installation Instructions

Perform the installation as follows:

- Make sure the IES's power switches are in the **OFF** position.
- Install the main chassis as detailed in this chapter. Make sure you connect the frame grounds before you make any other connections.
- If line cards are not already installed, follow the procedure in the next section to install them.
- Refer to [Section 2.6 on page 47](#) for instructions on making connections with Telco-50 connectors.
- Refer to [Section 2.7 on page 57](#) for instructions on making alarm connections.
- Refer to [Section 2.8 on page 59](#) for instructions on making power connections and turning on the IES.

2.2 Main Chassis Installation

This section explains how to install the main chassis on a rack. If you are installing the main chassis without a splitter chassis, you can install the main chassis on a desktop instead.

2.2.1 Rack-mounted Installation Requirements

Make sure the rack will safely support the combined weight of all the equipment it contains.

- Use a #2 Phillips screwdriver to install the screws.

- Refer to [Chapter 5 on page 75](#) for the gauge of wire to use for the frame ground connections.
- Refer to [Chapter 5 on page 75](#) for the IES-6000M's dimensions, weights and power consumption.

Failure to use the proper screws may damage the unit.

2.2.2 Mounting the Main Chassis on a Rack

Make sure that nothing obstructs the airflow of the main chassis.

- If you are facing the IES-5106M or IES-5112M front panel, the fan exhaust vents are located on the right side panel of the unit and the fans along with the intake vents are located on the left side panel.

Figure 6 IES-5106M Airflow

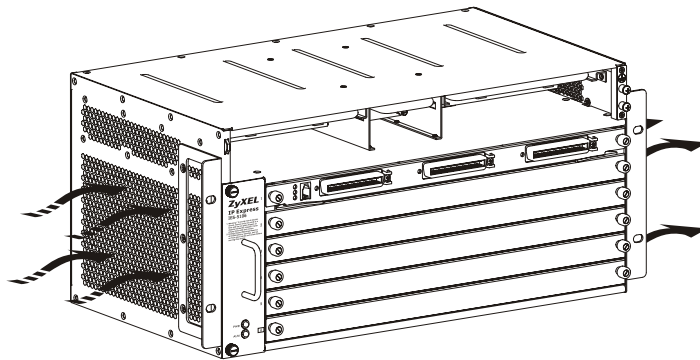
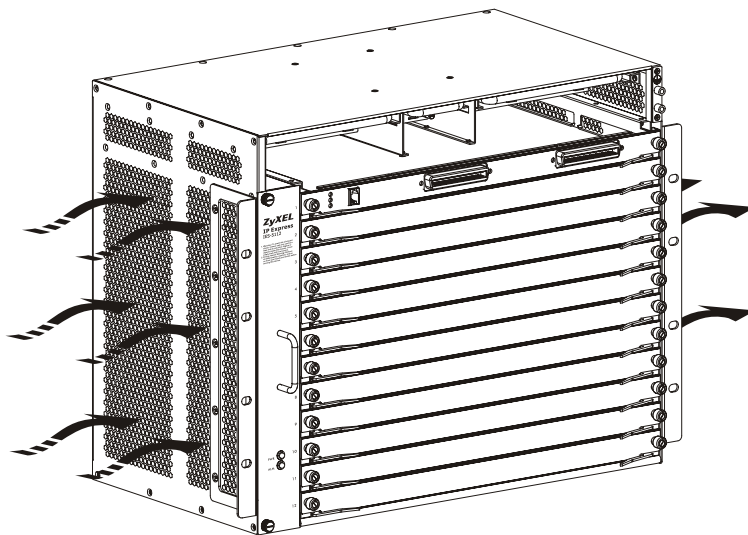
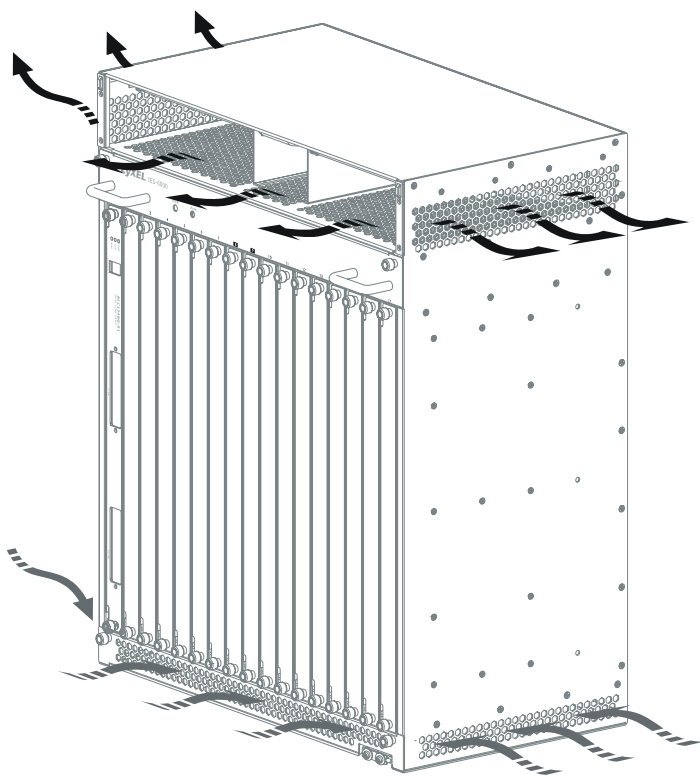


Figure 7 IES-5112M Airflow



- If you are facing the IES-6000M front panel, the fan intake vents are located on the bottom of the front and side panels of the unit. The fan exhaust vents are located on the top of the front and side panels, right above the fan module.

Figure 8 IES-6000M Airflow

Use the following procedure to install the main chassis in the rack.

Note: Install the main chassis and splitter chassis in a rack with the splitter chassis directly below the main chassis.

Note: For the IES-5106M, If you are using 72-port line cards, use two IES-5005ST splitter chassis. If you are using 48-port line cards, use one IES-5005ST splitter chassis and one IES-5002ST splitter chassis.

Note: For the IES-5112M, If you are using 72-port line cards, use two IES-5000ST splitter chassis. If you are using 48-port line cards, use one IES-5000ST splitter chassis and one IES-5002ST splitter chassis.

Note: For the IES-6000M, if you are using a single management card in the main chassis, install the IES-3016ST splitter chassis (which provides 16 splitter or extension card slots). If you are using two management cards in the main chassis, install the IES-3000ST splitter chassis (which provides 15 splitter or extension card slots).

- 1** Position a mounting bracket on one side of the chassis, making sure the screw holes on the bracket are on the same side as the front panel of the main chassis.
- 2** Use the screwdriver to install the screws through the mounting bracket holes into the main chassis.

- 3 Repeat steps 1-2 to attach the second mounting bracket on the other side of the main chassis.

Figure 9 Attaching Mounting Brackets to the IES-5106M

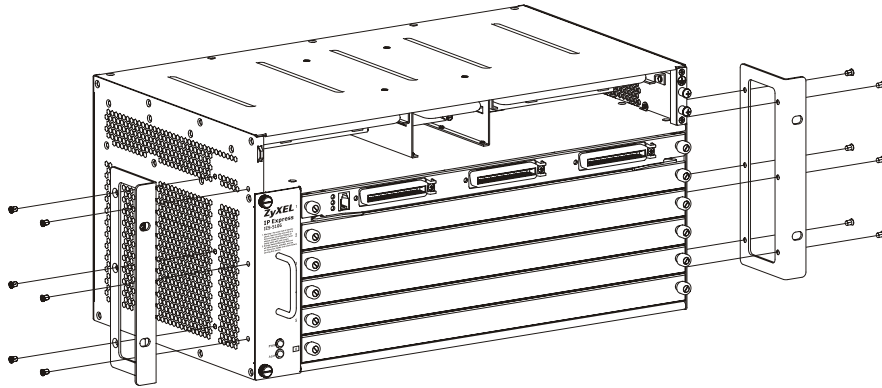


Figure 10 Attaching Mounting Brackets to the IES-5112M

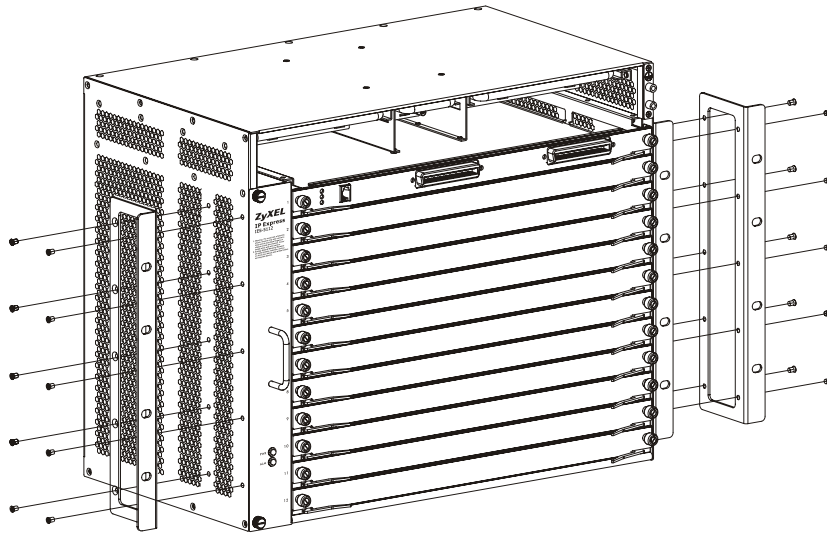
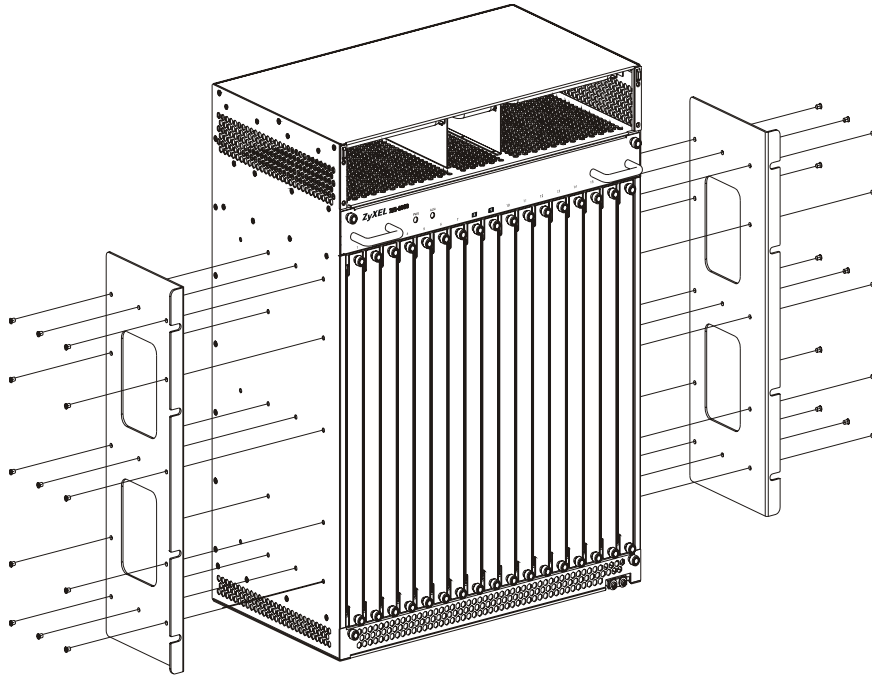


Figure 11 Attaching Mounting Brackets to the IES-6000M

- 4 Position a mounting bracket (that is already attached to the main chassis) on one side of the rack, lining up the screw holes on the bracket with the screw holes on the side of the rack.
- 5 Use the screwdriver to install the screws through the mounting bracket holes into the rack.
- 6 Repeat steps 4-5 to attach the second mounting bracket on the other side of the rack.

2.2.3 Connecting the IES-5106M/IES-5112M Frame Ground

Refer to [Chapter 5 on page 75](#) for the ground wire gauge.

- The IES-5106M/IES-5112M frame ground is on the upper right corner of the front panel.
- The IES-5005ST, IES-5000ST or IES-5002ST frame ground is near the lower left of the rear panel.
- Connect the frame grounds to a building's protective earthing terminals using a green-and-yellow frame ground wire.

Warning! Connect the frame ground before you connect any other cables or wiring.

Figure 12 IES-5106M/IES-5112M Frame Ground

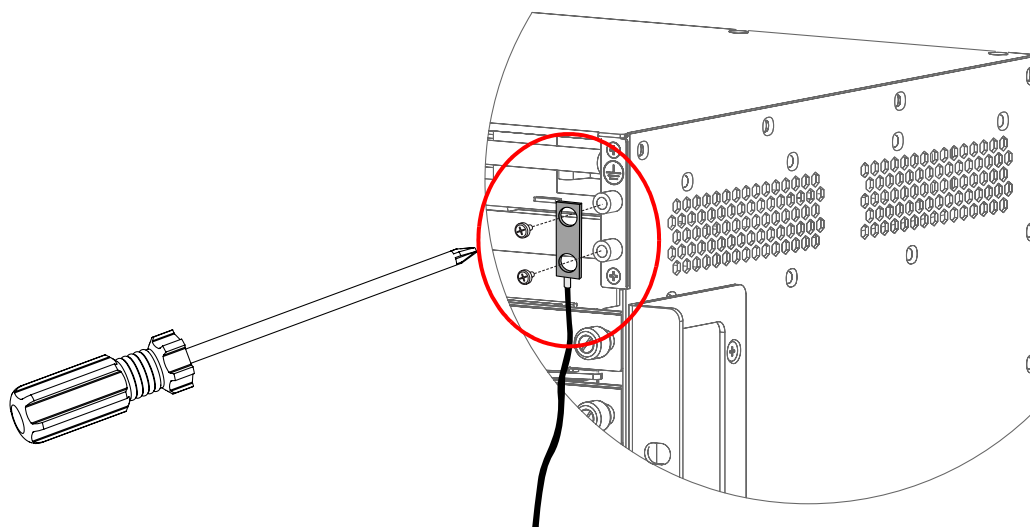


Figure 13 IES-5005ST Splitter Chassis Frame Ground

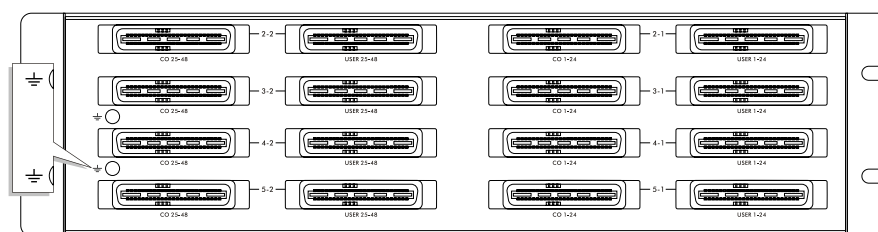


Figure 14 IES-5000ST Splitter Chassis Frame Ground

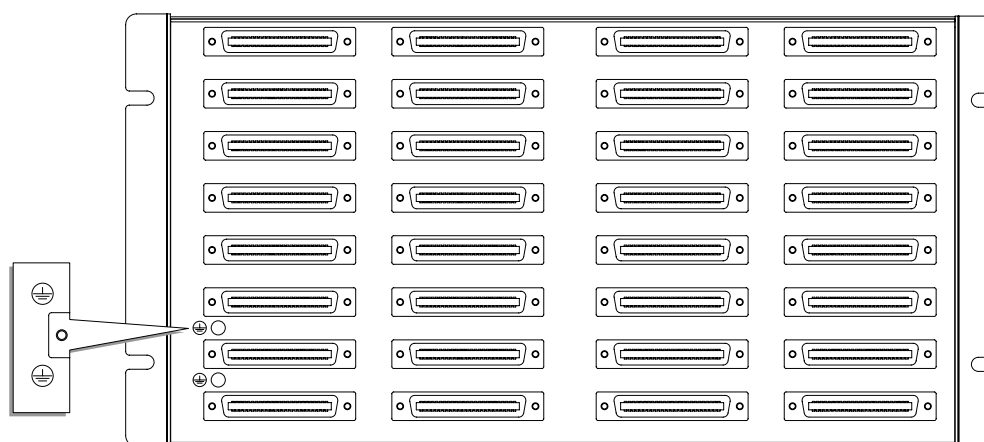
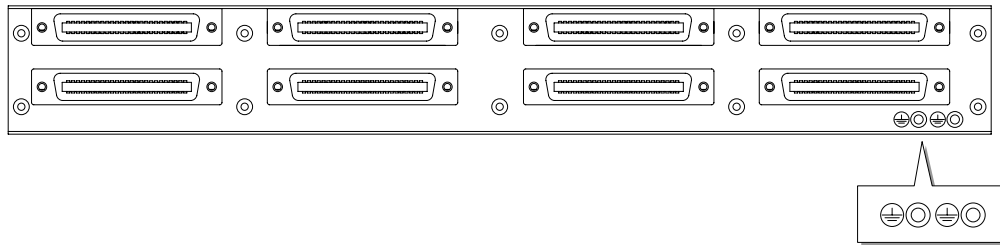


Figure 15 IES-5002ST Splitter Chassis Frame Ground

2.2.4 Connecting the IES-6000M Frame Ground

Refer to [Chapter 5 on page 75](#) for the ground wire gauge.

- The IES-6000M frame ground is on the lower right corner of the front panel.
- The IES-3000ST or IES-3016ST frame ground is near the lower left corner of the rear panel.
- Connect the frame grounds to a building's protective earthing terminals using a green-and-yellow frame ground wire.

Warning! Connect the frame ground before you connect any other cables or wiring.

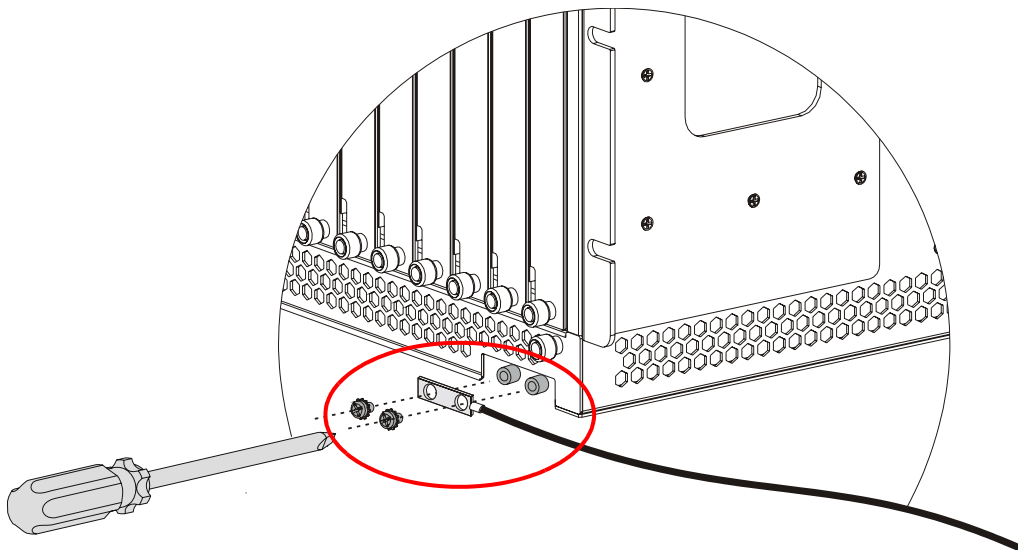
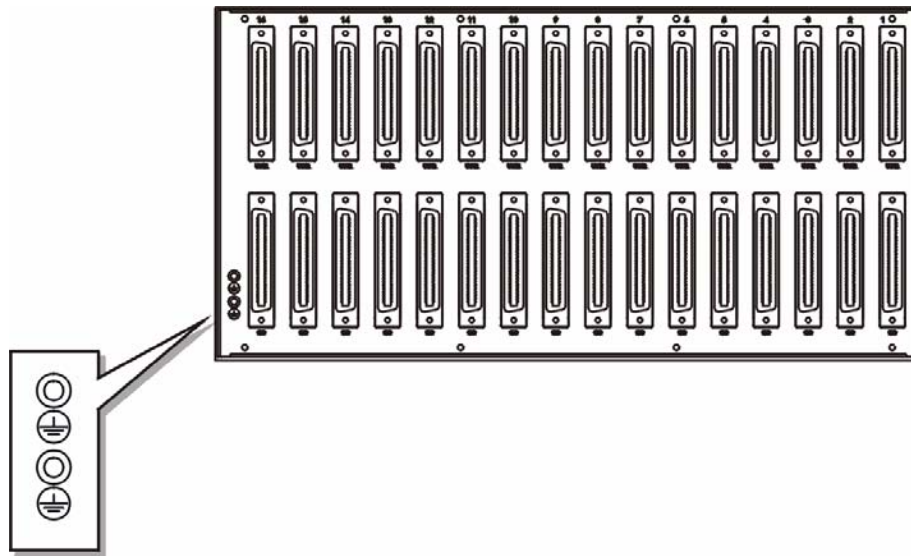
Figure 16 IES-6000M Frame Ground

Figure 17 IES-3016ST Splitter Chassis Frame Ground

2.3 Card Installation

This section shows you how to install and remove line cards.

- Install management switch cards in slot 8 and/or 9 on the IES. You can use either slot if there is only one management switch card.
- Install the line cards in the IES in the other slots.
- Leave the slot covers on unused slots.

2.3.1 Installing MSC and Line Cards

Use the following procedure to install management switch cards and line cards in the main chassis.

- 1 Grasp the center of the front panel of the card with one hand and place the other hand under the card to support it.
- 2 Insert the card halfway into the slot and spread the two ejector levers outward. Make sure the ejector levers are perpendicular to the front panel.
- 3 Slide the card into the slot until it makes contact with the backplane. The ejector levers should be at a small angle to the front panel now.
- 4 Push the two ejector levers firmly until they are flush with the front panel.

Note: The MSC has more connector pins than the other cards so you need to exert more force to get the MSC all the way in and properly seated in the backplane. Make sure the front panel of the MSC is touching the front panel of the chassis. The MSC must be installed properly in order for you to be able to tighten the thumbscrews.

- 5 Tighten the two thumbscrews.

Figure 18 Installing a Card

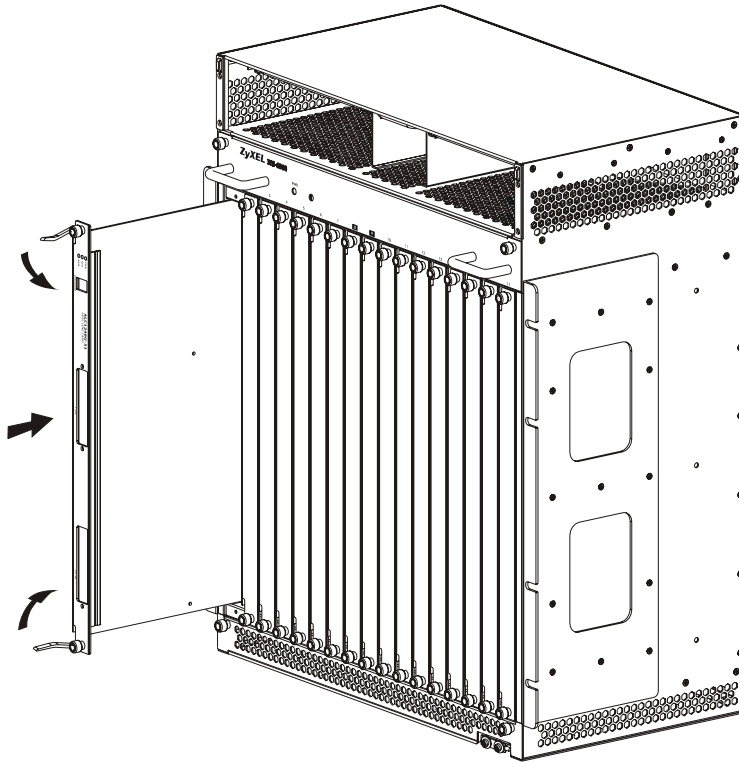


Figure 19 Closing the Ejector Levers

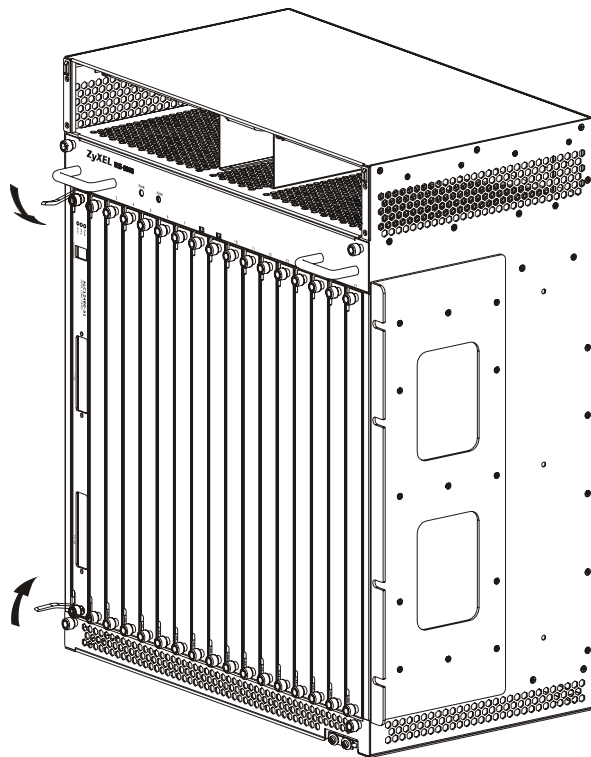
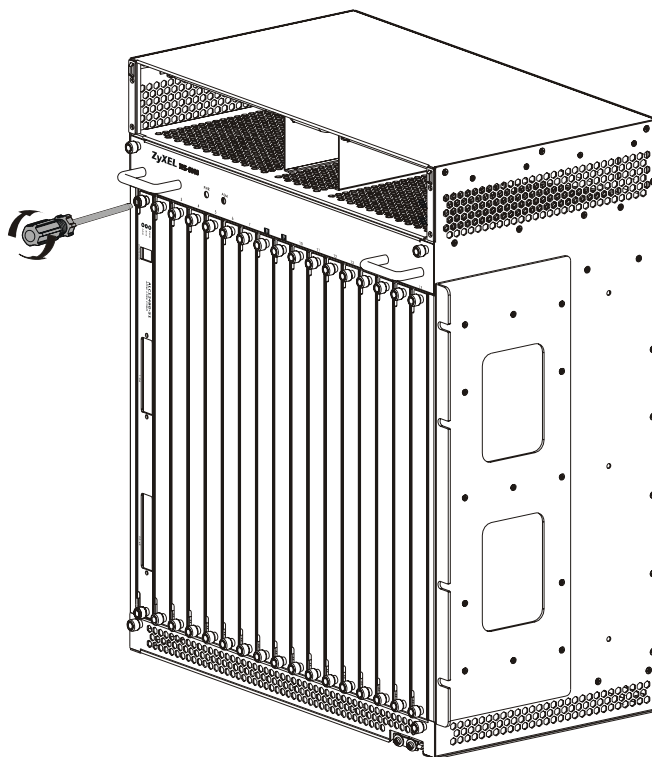


Figure 20 Tightening Card Thumbscrews



2.3.2 Removing MSC and Line Cards

Use the following procedure to remove management switch cards and line cards from the main chassis.

- 1 Disconnect all cables from the card.
- 2 Loosen the two thumbscrews.
- 3 Pull the two ejector levers firmly until the front of the card is clear of the main chassis. Pull the ejector levers until they are perpendicular to the front panel.

Note: The MSC has more connector pins than the other cards so when removing it you need to exert more force to get the front of the MSC clear of the main chassis.

- 4 Grasp the center of the front panel of the card with one hand and place the other hand under the card to support it.
- 5 Slide the card out of the slot.

Figure 21 Loosening Card Thumbscrews

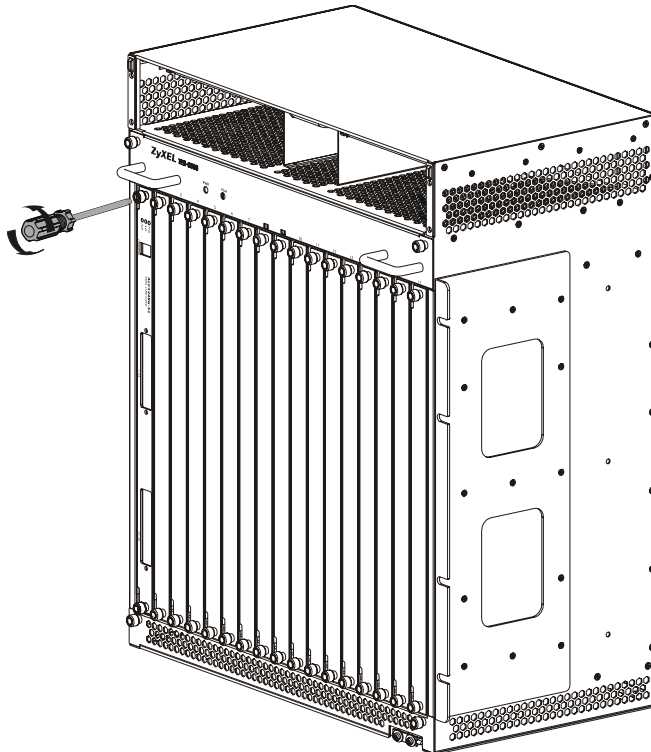


Figure 22 Opening the Ejector Levers

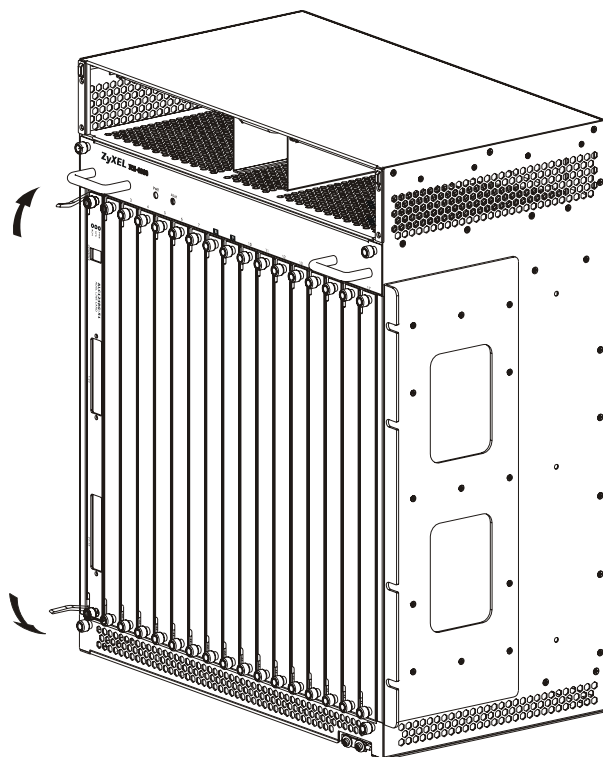
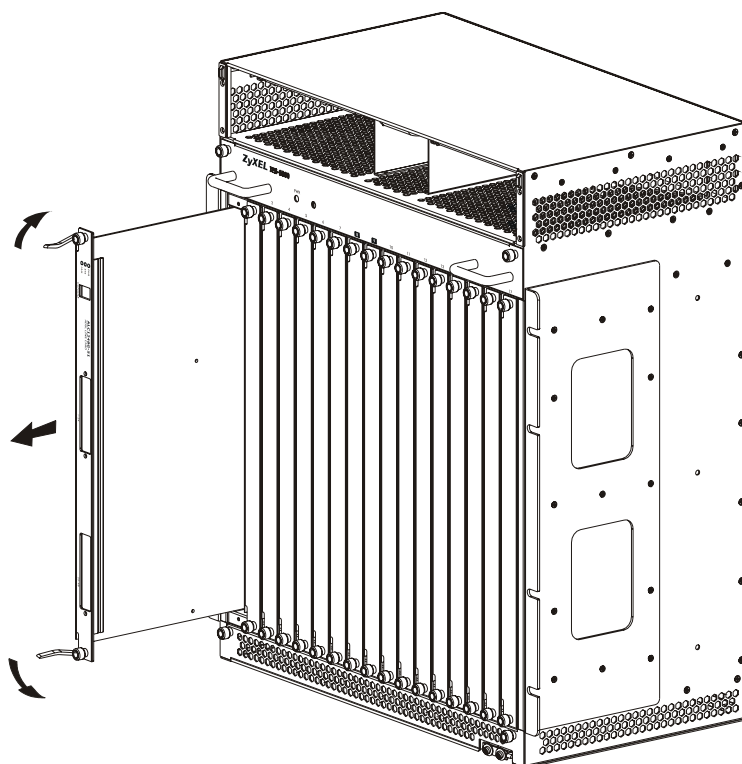


Figure 23 Removing a Main Chassis Card



2.3.3 Installing a Splitter Chassis Card

The splitter card's type and slot must match those of the line card to which it is to connect. For example, install ASC1024 cards in the slots below an ALC line card in the main chassis (see [Figure 34 on page 42](#)). Use the SEC1024 extension card with the VOP1248G VoIP line card. Leave the slot covers on unused splitter slots.

Use the following procedure to install a splitter or extension card in the splitter chassis.

- 1 If there is one splitter chassis below the main IES main chassis, install a line card's splitter or extension cards below the line card and in adjacent slots (a management switch card does not need a splitter chassis card).

If there are two splitter chassis below the main IES main chassis, install the splitter or extension cards in the splitter chassis slots that correspond to the slot number of the line card in the main chassis.

- 2 Grasp the center of the front panel of the card with one hand and place the other hand under the card to support it.
- 3 Insert the card into the slot and push it in until the front panel of the card is flush with the front panel of the splitter chassis.
- 4 Tighten the two thumbscrews.

Figure 24 Installing a Splitter Chassis Card

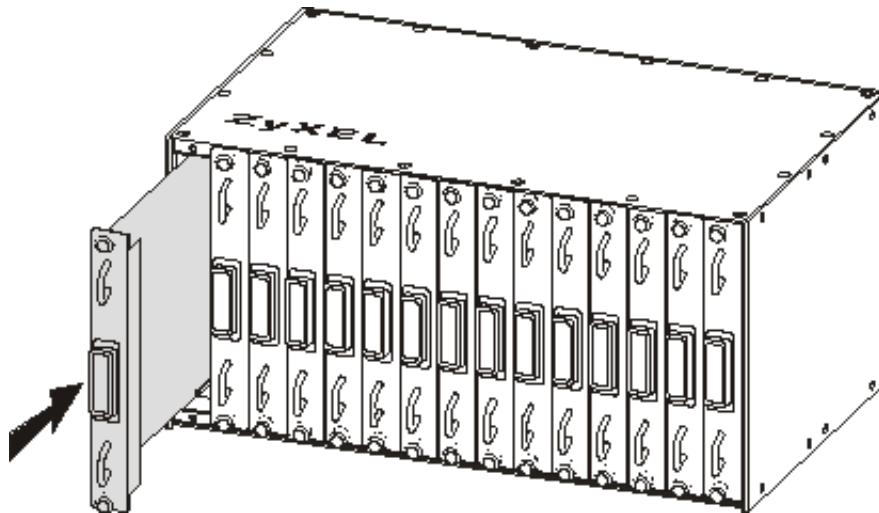
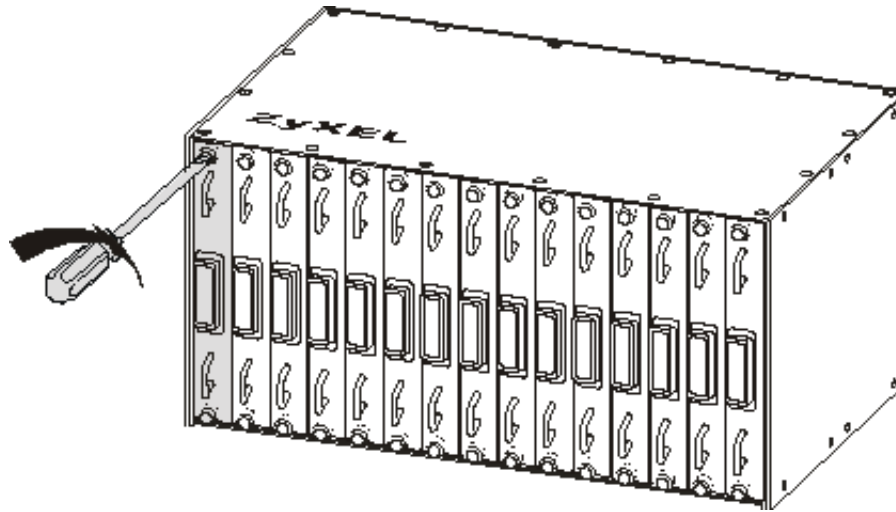


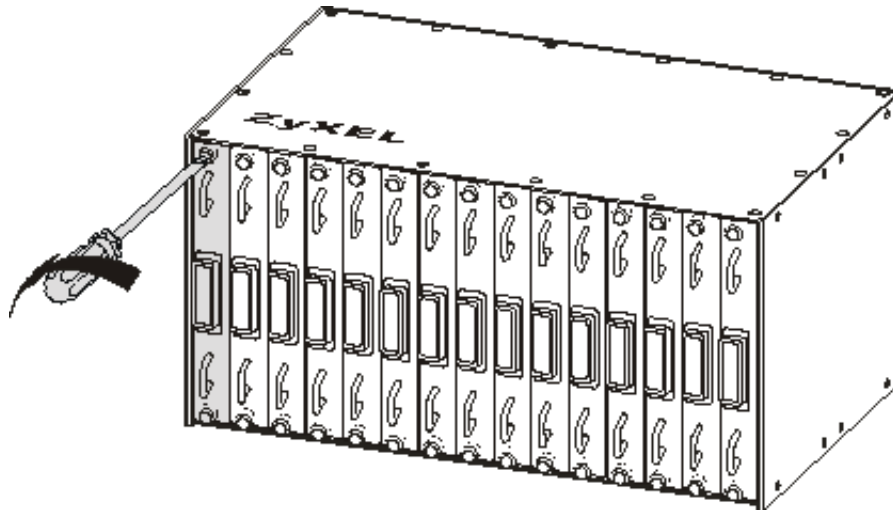
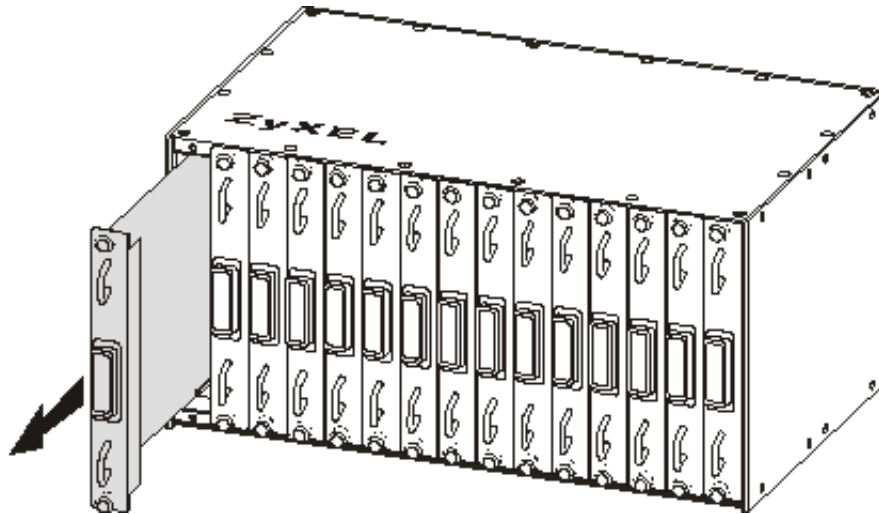
Figure 25 Tightening Splitter Chassis Card Thumbscrews



2.3.4 Removing a Splitter Chassis Card

Use the following procedure to remove a splitter or extension card from the splitter chassis.

- 1 Disconnect the cable from the card.
- 2 Loosen the two thumbscrews.
- 3 Grasp the handles on the front panel of the card and start to pull the card out.
- 4 After you have the card partially out of the splitter chassis, place one hand under the card to support it.
- 5 Slide the card out of the slot.

Figure 26 Loosening Splitter Chassis Card Thumbscrews**Figure 27** Removing a Splitter Chassis Card

2.4 IES-5106M/IES-5112M Card Connections

The following describes how to connect the line cards to the splitter chassis cards. For the management switch card, refer to the card's User's Guide for instructions on making the connections.

2.4.1 IES-5106M/IES-5112M 48-port Line Card Connections

Use a Telco-50 cable to connect the line card's front panel Telco-50 connector to the corresponding splitter card's front panel Telco-50 connector. Make sure that you use the appropriate length Telco-50 cables with the line cards; using cables of

the wrong length blocks access to other cards. See the specifications appendix for the lengths of ZyXEL's optional Telco-50 cables.

Use a long Telco-50 cable to connect a line card's **1-24** Telco-50 connector to the Telco-50 connector on the corresponding splitter card in the left column (labeled x-1) of the splitter chassis.

Use a short Telco-50 cable to connect a line card's **25-48** Telco-50 connector to the Telco-50 connector on the corresponding splitter card in the right column (labeled x-2) of the splitter chassis.

When using 48-port line cards (such as the ALC1248G), use an IES-5005ST (for IES-5106M) or IES-5000ST (for IES-5112M) splitter card chassis in conjunction with an IES-5002ST splitter card chassis, as shown in the following figures.

Figure 28 IES-5106M Front Panel Telco-50 Connections (with 5 Line Cards)

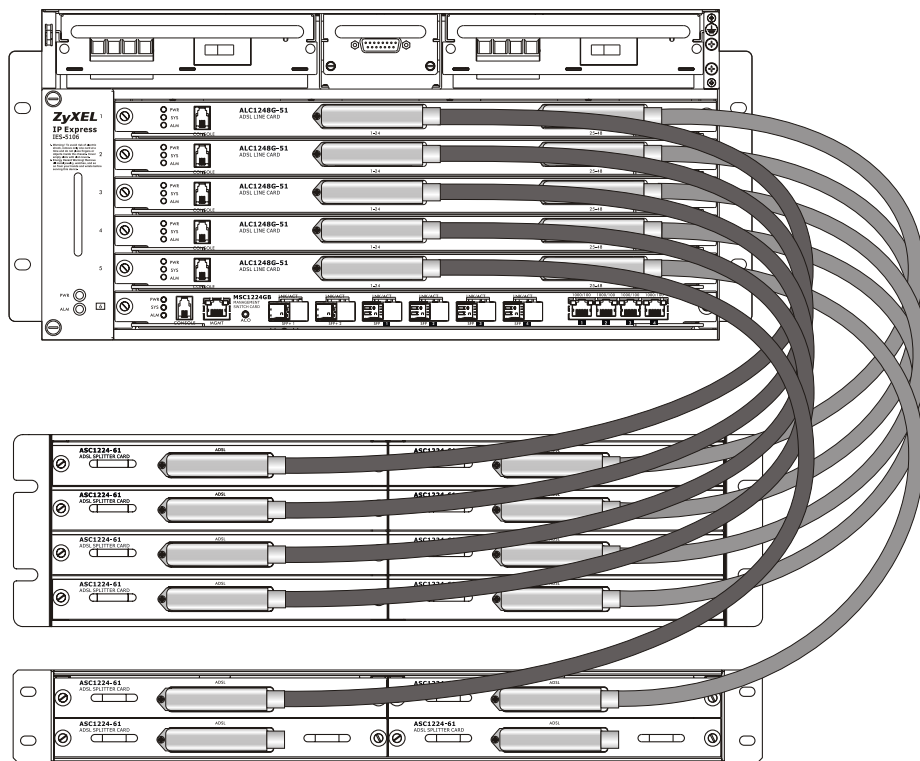
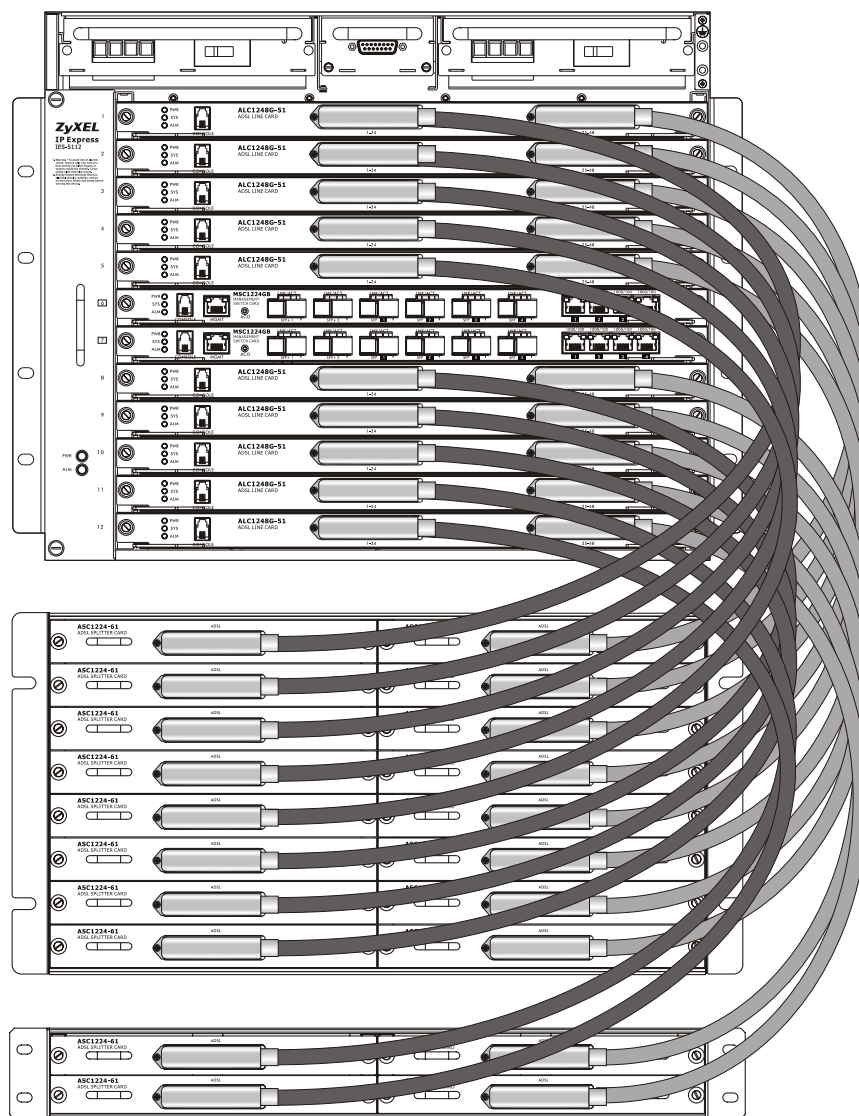


Figure 29 IES-5112M Front Panel Telco-50 Connections (with 10 Line Cards)

2.4.2 IES-5106M/IES-5112M 72-port Line Card Connections

When using 72-port line cards (such as the ALC1272G) use two IES-5005ST (for IES-5106M) or two IES-5000ST (for IES-5112M) splitter card chassis as shown in the following figures.

Figure 30 IES-5106M Front Panel Telco-50 Connections (with 72-port Line Cards)

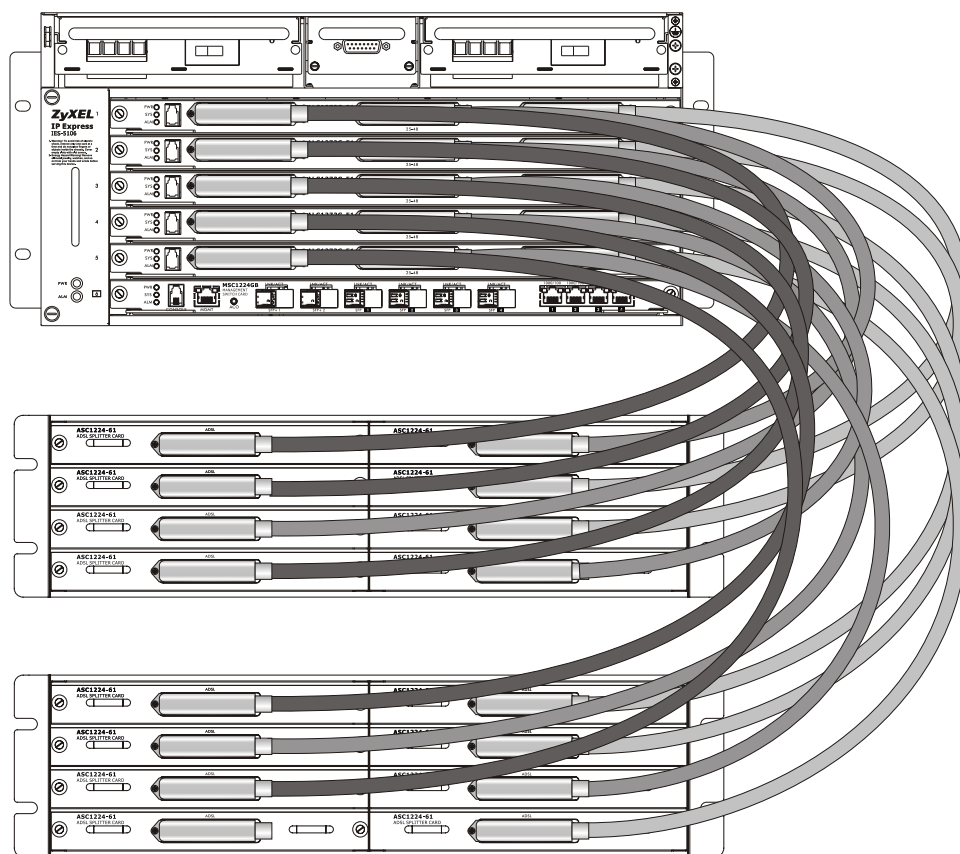
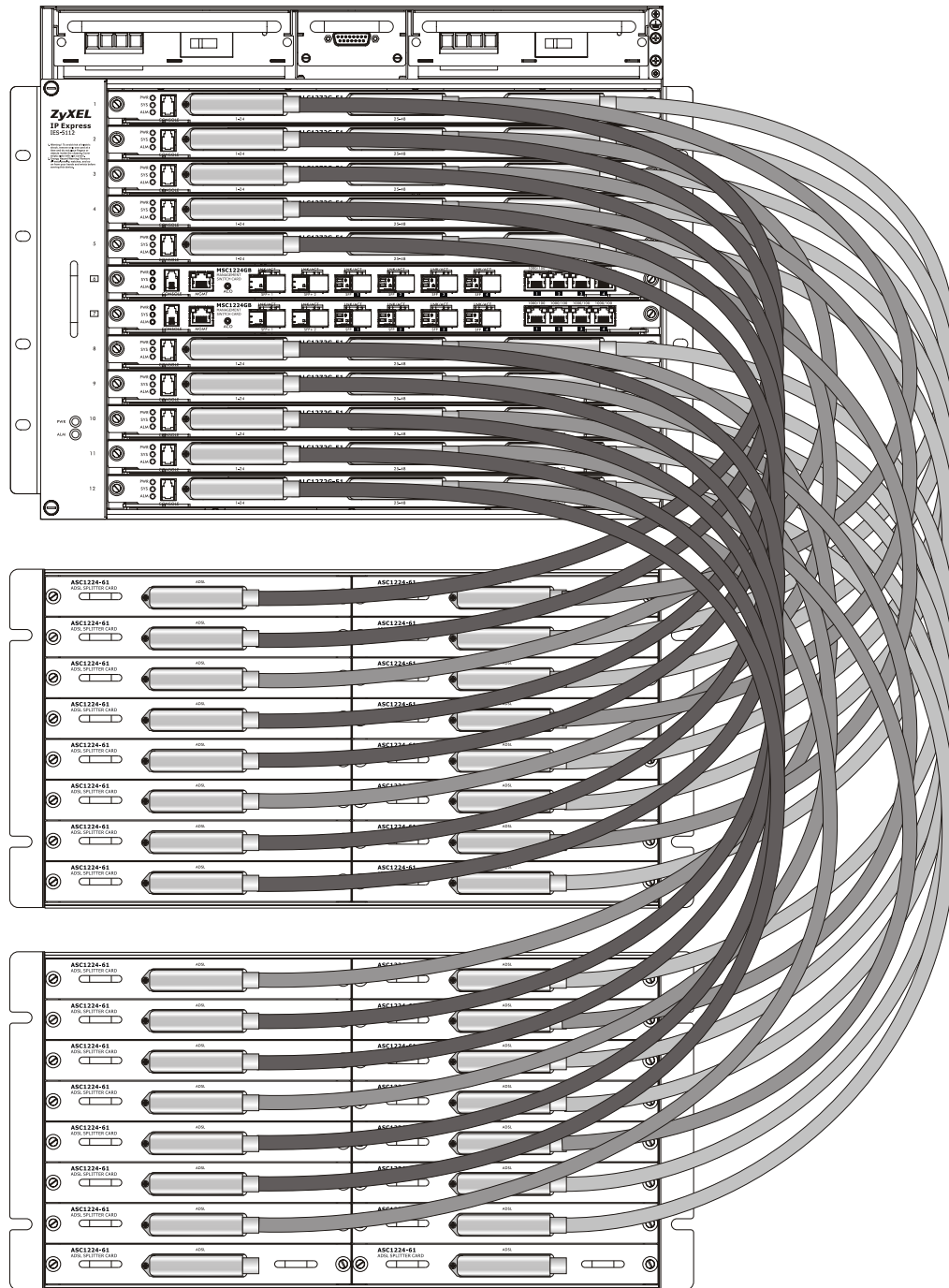


Figure 31 IES-5112M Front Panel Telco-50 Connections (with 72-port Line Cards)

The 72-port line cards use long, medium and short Telco-50 cables (see [Chapter 5 on page 75](#) for the exact lengths of each cable).

Note: These cables are different in length from the “long” and “short” cables used with the other line cards. See the appendix on product specifications for details.

Use a long Telco-50 cable to connect a 72-port line card's **1~24** Telco-50 connector to the Telco-50 connector on the corresponding splitter card.

Use a medium Telco-50 cable to connect a 72-port line card's **25~48** Telco-50 connector to the Telco-50 connector on the corresponding splitter card.

Use a short Telco-50 cable to connect a 72-port line card's **49~72** Telco-50 connector to the Telco-50 connector on the corresponding splitter card.

2.4.2.1 IES-5106M 72-port Line Card to Splitter Card Connections

Connect the line card ports to the splitter or extension card ports as described in the following table, which represents the IES's front panel. In the numbers in this table, the first number refers to the line card's slot in the IES-5005 (**1 to 8**) and the numbers in parentheses refer to the Telco-50 port connector on the line card (ports **1~24**, **25~48** and **49~72**).

Table 1 72-port Line Card Connections

CHASSIS	SLOT #	LINE CARD TELCO-50 CONNECTORS		
IES-5106M	1	1 (1~24)	1 (25~48)	1 (49~72)
	2	2 (1~24)	2 (25~48)	2 (49~72)
	3	3 (1~24)	3 (25~48)	3 (49~72)
	4	4 (1~24)	4 (25~48)	4 (49~72)
	5	5 (1~24)	5 (25~48)	5 (49~72)
		SPLITTER CARD TELCO-50 CONNECTORS		
IES-5005ST	1	1 (1~24)	1 (25~48)	
	2	2 (1~24)	1 (49~72)	
	3	2 (25~48)	2 (49~72)	
	4	3 (1~24)	3 (25~48)	
IES-5005ST	1	4 (1~24)	3 (49~72)	
	2	4 (25~48)	4 (49~72)	
	3	5 (1~24)	5 (25~48)	
	4		5 (49~72)	

2.4.2.2 IES-5112M 72-port Line Card to Splitter Card Connections

Connect the line card ports to the splitter or extension card ports as described in the following table, which represents the IES's front panel. In the numbers in this table, the first number refers to the line card's slot in the IES-5000 (**1 to 8**) and the numbers in parentheses refer to the Telco-50 port connector on the line card (ports **1~24**, **25~48** and **49~72**).

Table 2 72-port Line Card Connections

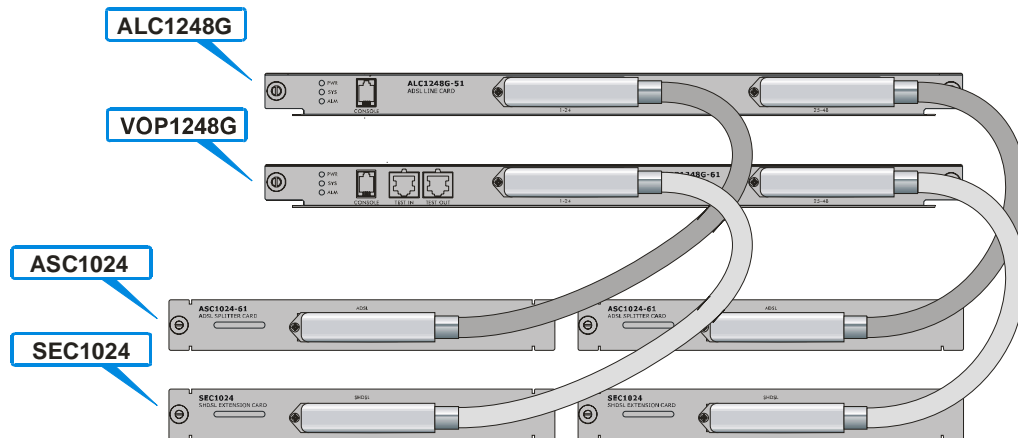
CHASSIS	SLOT #	LINE CARD TELCO-50 CONNECTORS
---------	--------	-------------------------------

Table 2 72-port Line Card Connections

IES-5112M	1	1 (1~24)	1 (25~48)	1 (49~72)
	2	2 (1~24)	2 (25~48)	2 (49~72)
	3	3 (1~24)	3 (25~48)	3 (49~72)
	4	4 (1~24)	4 (25~48)	4 (49~72)
	5	5 (1~24)	5 (25~48)	5 (49~72)
	6	6 (1~24)	6 (25~48)	6 (49~72)
	7	7 (1~24)	7 (25~48)	7 (49~72)
	8	8 (1~24)	8 (25~48)	8 (49~72)
	9	9 (1~24)	9 (25~48)	9 (49~72)
	10	10 (1~24)	10 (25~48)	10 (49~72)
SPLITTER CARD TELCO-50 CONNECTORS				
IES-5000ST	1	1 (1~24)	1 (25~48)	
	2	2 (1~24)	1 (49~72)	
	3	2 (25~48)	2 (49~72)	
	4	3 (1~24)	3 (25~48)	
	5	4 (1~24)	3 (49~72)	
	6	4 (25~48)	4 (49~72)	
	7	5 (1~24)	5 (25~48)	
	8	6 (1~24)	5 (49~72)	
IES-5000ST	1	6 (25~48)	6 (49~72)	
	2	7 (1~24)	7 (25~48)	
	3	8 (1~24)	7 (49~72)	
	4	8 (25~48)	8 (49~72)	
	5	9 (1~24)	9 (25~48)	
	6	10 (1~24)	9 (49~72)	
	7	10 (25~48)	10 (49~72)	
	8			

2.4.3 IES-5106M/IES-5112M VoIP Line Card Telco-50 Connections

When you use a VoIP line card in conjunction with an ADSL or VDSL card, place the VoIP card and its extension cards in the chassis directly adjacent to the DSL card and its splitter cards, as shown in the following figure (this example uses the ALC line card and ASC1024 splitter).

Figure 32 DSL and VoIP Front Panel Telco-50 Connections (2 Splitter Chassis)

Use a Telco-50 cable to connect the SEC1024's **USER** Telco-50 connector on the rear of the splitter chassis to the **CO** Telco-50 connector on the rear of an ADSL or VDSL splitter card.

Alternatively, use a Telco-50 cable to connect the SEC1024s **USER** Telco-50 connector directly to the Main Distribution Frame when no ADSL/VDSL service is required (see [Section 2.5.3 on page 45](#)).

2.4.4 IES-5106M/IES-5112M Splitter Chassis Rear Panel Connections (DSL)

A DSL splitter card separates the voice signal from the DSL signal. It feeds the DSL signals to the DSL line card and diverts the voice signal to the **CO** Telco-50 connector (or wire wrapping pins) on the splitter chassis' rear.

Connect the **CO** Telco-50 connectors to the PBX or PSTN/ISDN switch when using the ADSL splitter card.

Connect the **USER** Telco-50 connectors to the subscribers' telephone wiring. In most multi-tenant unit applications, the **USER** pins connect to the subscribers' telephone wiring via Main Distribution Frame (MDF).

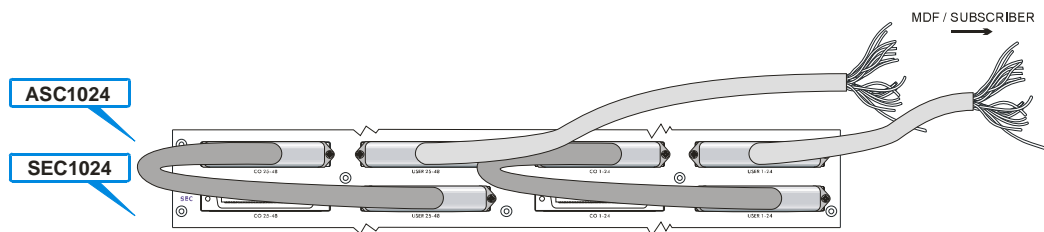
See [Section 2.6.4 on page 48](#) for example splitter chassis rear panel connections.

2.4.5 IES-5106M / IES-5112M Splitter Chassis Rear Panel Connections (VoIP)

When using the VoIP line card in conjunction with an ADSL or VDSL card and its associated splitter card(s), connect the VoIP line card's extension card(s) and the DSL splitter card(s) as follows.

Note: Use 180-degree Telco-50 cables for VoIP rear panel connections (see [Chapter 5 on page 75](#) for information on 180-degree Telco-50 cable length).

Figure 33 DSL and VoIP Rear Panel Telco-50 Connections (2 Splitter Chassis)



- Connect the **USER** Telco-50 connector from the extension card attached to the VoIP line card's **1 ~ 24** ports to the **CO** Telco-50 connector of the splitter card attached to the DSL line card's **1 ~ 24** ports.
- Connect the **USER** Telco-50 connector from the extension card attached to the VoIP line card's **25 ~ 48** ports to the **CO** Telco-50 connector of the splitter card attached to the DSL line card's **25 ~ 48** ports.

When you do not use the VoIP line card in conjunction with a DSL splitter card, connect the USER Telco-50 connectors to the subscribers' telephone wiring. In most multi-tenant unit applications, the **USER** pins connect to the subscribers' telephone wiring via a Main Distribution Frame (MDF).

2.5 IES-6000M Card Connections

The following describes how to connect the line cards to the splitter chassis cards. For the management switch card, refer to the card's User's Guide for instructions on making the connections.

Use a Telco-50 cable to connect the line card's front panel Telco-50 connector to the corresponding splitter or extension card's front panel Telco-50 connector. Make sure that you use the appropriate length Telco-50 cables with the line cards, as using cables of the wrong length blocks access to other cards. See [Chapter 5 on page 75](#) for the lengths of ZyXEL's optional Telco-50 cables.

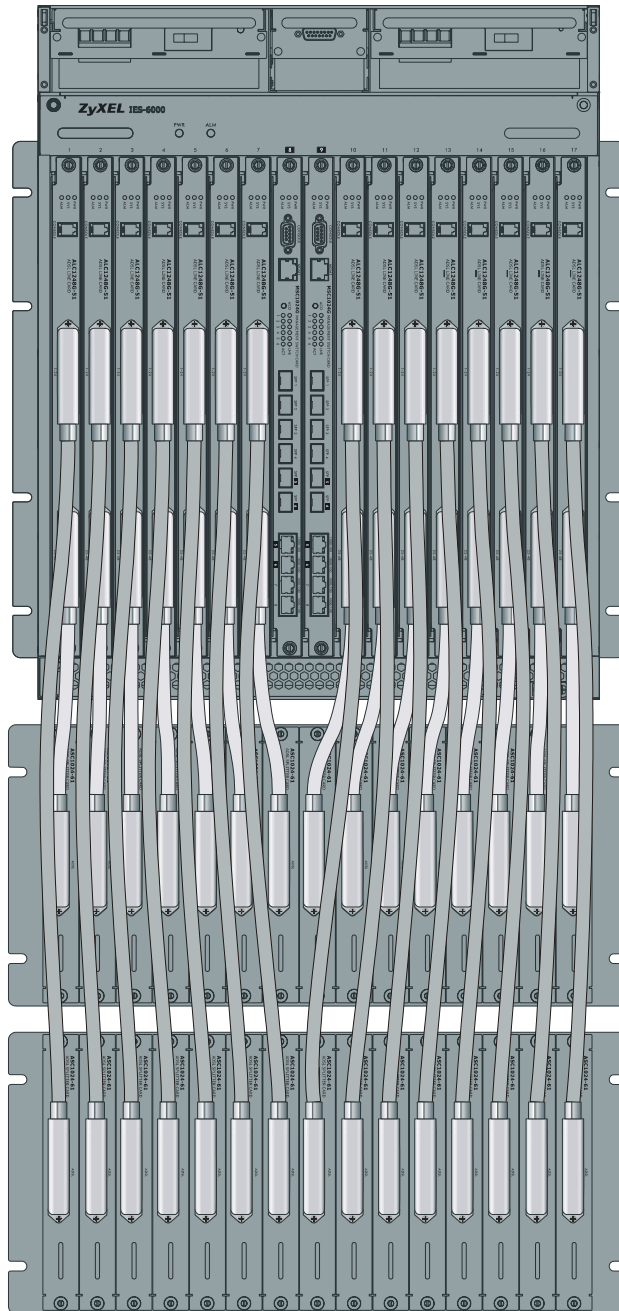
Follow these directions if there is one splitter chassis below the IES-6000M main chassis.

- Use a short Telco-50 cable to connect a line card's **25-48** Telco-50 connector to the Telco-50 connector on the corresponding splitter or extension card.
- Use a long Telco-50 cable to connect a line card's **1-24** Telco-50 connector to the Telco-50 connector on the corresponding splitter or extension card.

Follow these directions if there are two splitter chassis below the IES-6000M main chassis.

- Use a short Telco-50 cable to connect a line card's **25-48** Telco-50 connector to the Telco-50 connector on the corresponding splitter card of the upper splitter chassis.
- Use a long Telco-50 cable to connect a line card's **1-24** Telco-50 connector to the Telco-50 connector on the corresponding splitter card of the lower splitter chassis.

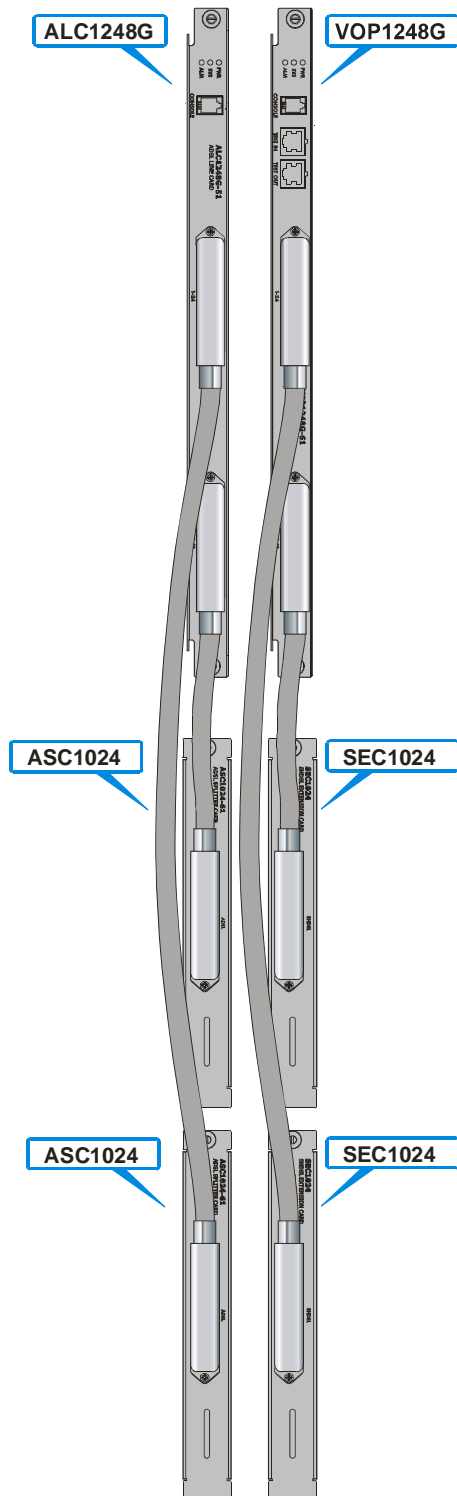
Figure 34 IES-6000 Front Panel Telco-50 Connections (2 Splitter Chassis)



2.5.1 IES-6000M VoIP Line Card Telco-50 Connections

When you use a VoIP line card in conjunction with an ADSL or VDSL card, place the VoIP card and its extension cards in the chassis directly adjacent to the DSL card and its splitter cards, as shown in the following figure (this example uses the ALC line card and ASC1024 splitter).

Figure 35 IES-6000 DSL and VoIP Front Panel Telco-50 Connections (2 Splitter Chassis)



Use a Telco-50 cable to connect the SEC1024's **USER** Telco-50 connector on the rear of the splitter chassis to the **CO** Telco-50 connector on the rear of an ADSL or VDSL splitter card.

Alternatively, use a Telco-50 cable to connect the SEC1024s **USER** Telco-50 connector directly to the Main Distribution Frame when no ADSL/VDSL service is required (see [Section 2.5.3 on page 45](#)).

2.5.2 IES-6000M Splitter Chassis Rear Panel Connections (DSL)

A DSL splitter card separates the voice signal from the DSL signal. It feeds the DSL signals to the DSL line card and diverts the voice signal to the **CO** Telco-50 connector (or wire wrapping pins) on the splitter chassis' rear.

Connect the **CO** Telco-50 connectors to the PBX or PSTN/ISDN switch when using the ADSL splitter card.

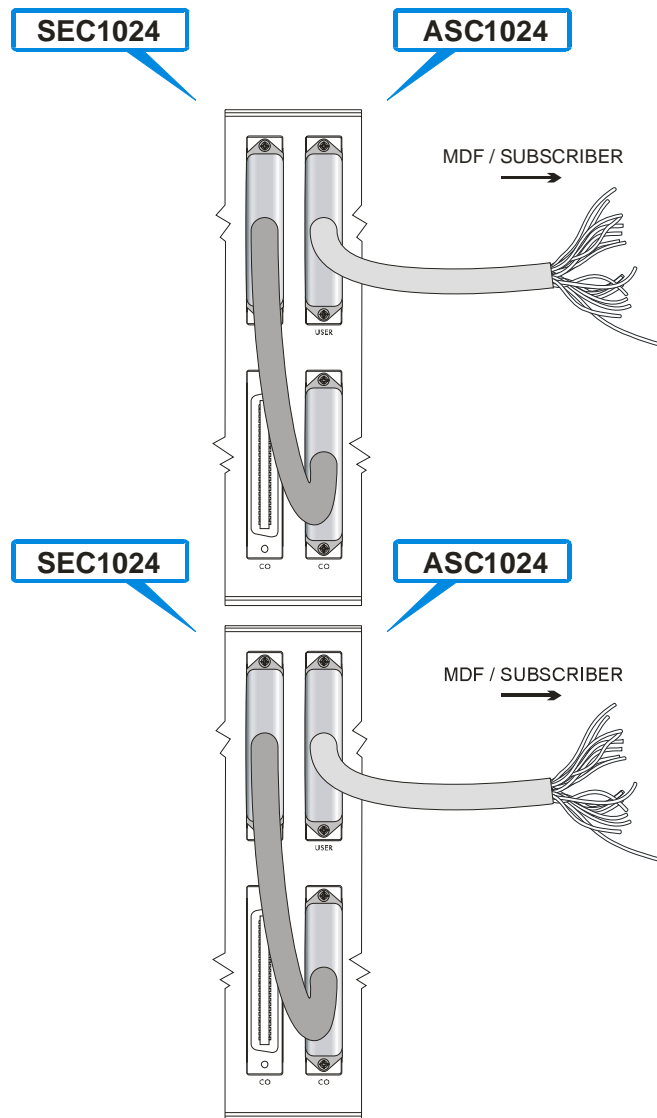
Connect the **USER** Telco-50 connectors to the subscribers' telephone wiring. In most multi-tenant unit applications, the **USER** pins connect to the subscribers' telephone wiring via Main Distribution Frame (MDF).

See [Section 2.6.4 on page 48](#) for example splitter chassis rear panel connections.

2.5.3 IES-6000M Splitter Chassis Rear Panel Connections (VoIP)

When using the VoIP line card in conjunction with an ADSL or VDSL card and its associated splitter card(s), connect the VoIP line card's extension card(s) and the DSL splitter card(s) as follows.

Note: Use 180-degree Telco-50 cables for VoIP rear panel connections (see [Chapter 5 on page 75](#) for information on 180-degree Telco-50 cable length).

Figure 36 IES-6000 DSL and VoIP Rear Panel Telco-50 Connections (2 Splitter

Chassis)

- Connect the **USER** Telco-50 connector from the extension card attached to the VoIP line card's **1 ~ 24** ports to the **CO** Telco-50 connector of the splitter card attached to the DSL line card's **1 ~ 24** ports.
- Connect the **USER** Telco-50 connector from the extension card attached to the VoIP line card's **25 ~ 48** ports to the **CO** Telco-50 connector of the splitter card attached to the DSL line card's **25 ~ 48** ports.

When you do not use the VoIP line card in conjunction with a DSL splitter card, connect the USER Telco-50 connectors to the subscribers' telephone wiring. In most multi-tenant unit applications, the **USER** pins connect to the subscribers' telephone wiring via a Main Distribution Frame (MDF).

2.6 MDF Connections

This section shows you how to connect the splitter chassis to a Main Distribution Frame (MDF).

2.6.1 MDF Connections Overview

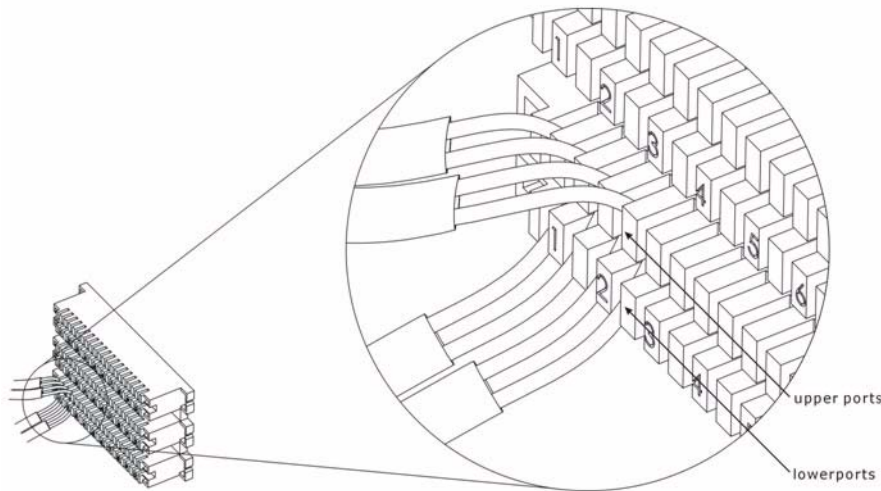
Observe the following before you start:

- Refer to [Chapter 5 on page 75](#) for the gauge of telephone wire to use.
- Follow the pin assignments shown in the line card User's Guide to wire Telco-50 cables to Telco-50 connectors.

2.6.2 MDF (Main Distribution Frame)

An MDF is usually installed between subscribers' equipment and the telephone company (CO) in a basement or telephone room. The MDF is the point of termination for the outside telephone company lines coming into a building and the telephone wiring in the building.

Figure 37 MDF (Main Distribution Frame) Wiring



- Connect wiring to end-user equipment to the lower ports of an MDF and connect wiring from the telephone company to the upper ports of an MDF (see the previous figure).
- Some MDFs have surge protection circuitry built in between the two banks; thus, do not connect telephone wires from the telephone company directly to your IES.
- Use a punch-down tool to seat telephone lines into MDF blocks.

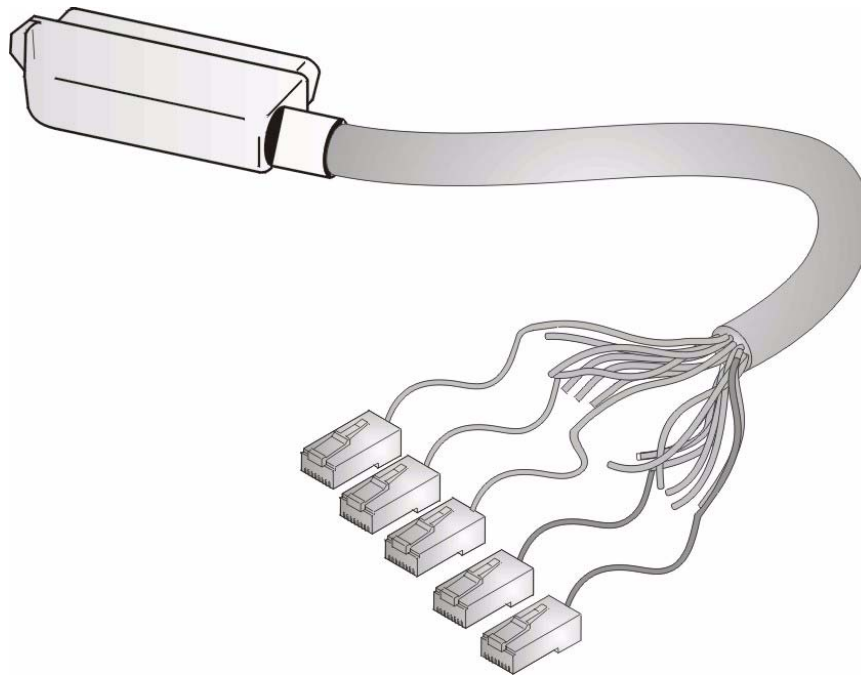
2.6.3 Telco-50 Cables

Telco-50 cables are used for data and voice applications with MDFs (Main Distribution Frame), patch panels and distribution boxes. They can also be used as extension cables. Telco-50 cables are made up of 25 twisted-pair copper wires.

Connect a Telco-50 connector to one end of the cable (see the User's Guide for the individual line card for pin assignments) and connect the other end directly to an MDF. Alternatively, attach RJ-11 connectors and connect directly to DSL modems or telephones.

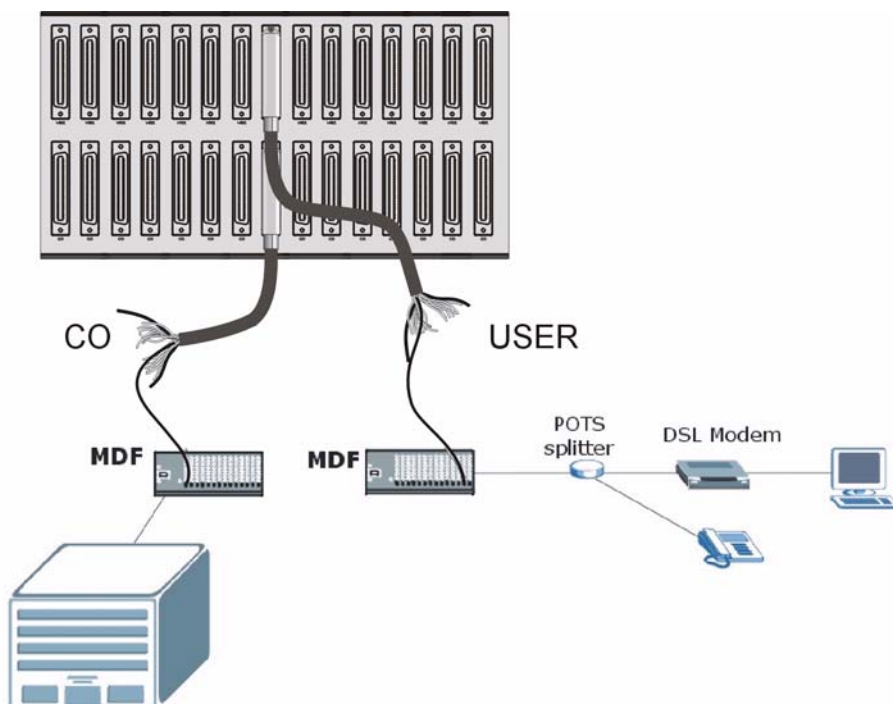
Note: The cable shown below uses a 90-degree Telco-50 connector, where the cable extends from the side of the connector (at ninety degrees to the port). For rear-panel splitter chassis connections using the VOP-1248G VoIP line card, use a 180-degree Telco-50 connector (where the cable extends from the base of the connector directly opposite the port).

Figure 38 Telco-50 Cable with RJ-11 Connectors



2.6.4 MDF Connection Scenarios

The following figure gives an overview of possible scenarios for the IES using the line cards and splitter cards. Data and voice signals can coexist on the same telephone wiring.

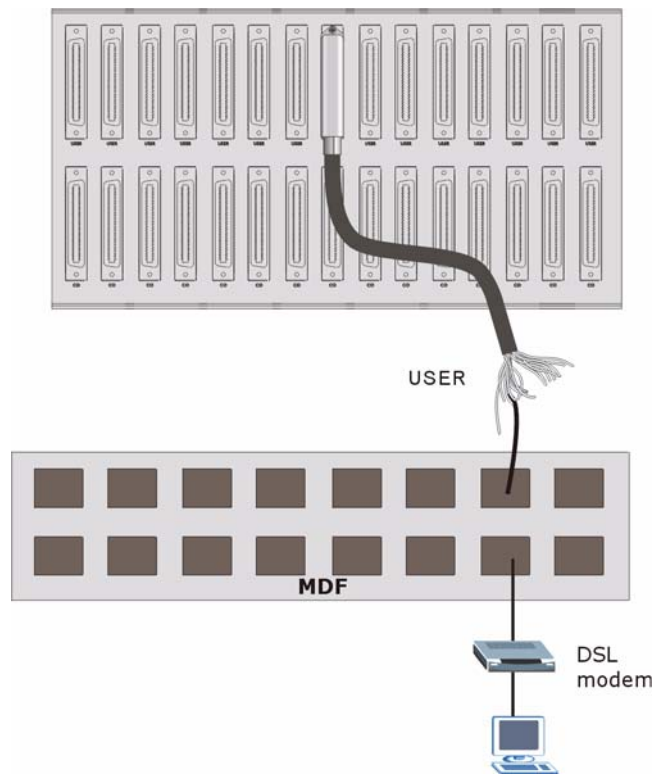
Figure 39 Installation Overview Example

You can also attach RJ-11 connectors to the Telco-50 cable and connect directly to a DSL modem(s) or patch panel. The following sections describe typical installation scenarios.

2.6.4.1 MDF Installation Scenario A

You want to install the IES in an environment where there are no previously installed MDFs. There is no phone service and you want to install the IES for data-access only. No connection from the Telco-50 CO connector is necessary. G.SHDSL connections carry data only, thus they are best suited to this installation scenario.

You may connect using an MDF or attach RJ-11 connectors to the non-IES end of the Telco-50 cable and then connect to DSL modems directly.

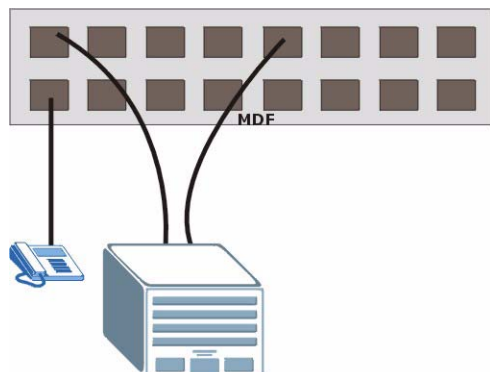
Figure 40 Installation Scenario A

Use the following procedure for this MDF installation scenario.

- 1 Connect the Telco-50 connector end of the cable to the Telco-50 connector labeled **USER**.
- 2 Connect the wiring on the other end of the Telco-50 cable to the upper ports of the MDF using a punch-down tool.
- 3 Connect the telephone wiring from each end-user's DSL modem to the lower ports of the MDF.

2.6.4.2 Installation Scenario B

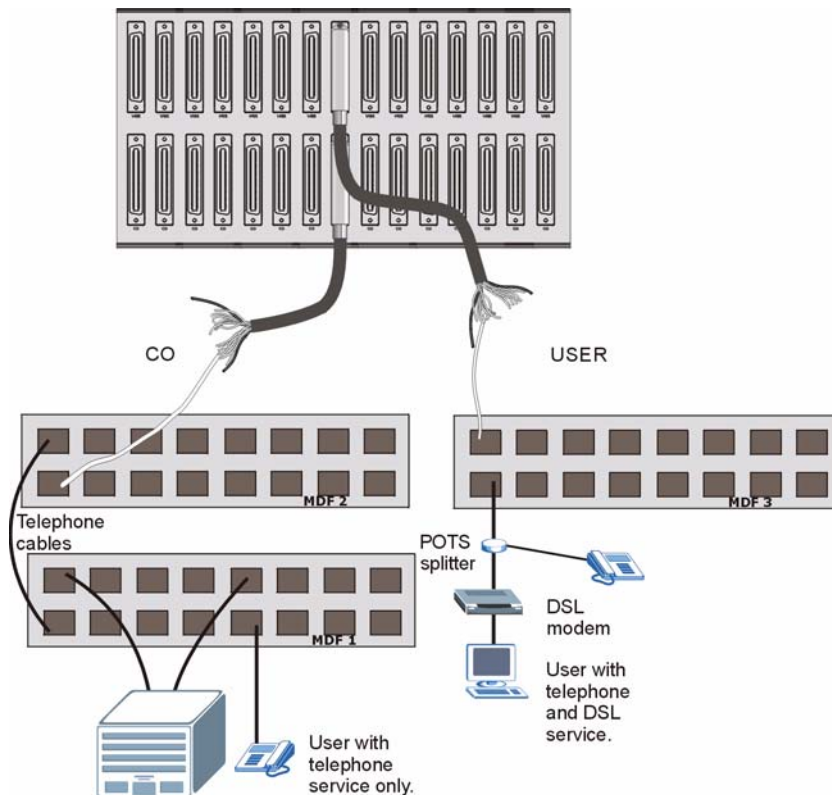
Phone service is available. There is one MDF from which end-users CO connections are made (see next figure). This installation scenario does not apply to G.SHDSL connections.

Figure 41 One MDF for End-user and CO Connections

This installation scenario requires three MDFs. Please refer to the following figure for the connection schema.

- MDF 1 is the original MDF used for telephone connections only.
- MDF 2 is used for telephone connections only.
- MDF 3 is for DSL service connections.

Note: Change the wiring from MDF 1 to MDF 3 for telephone subscribers who want DSL service.

Figure 42 Installation Scenario B

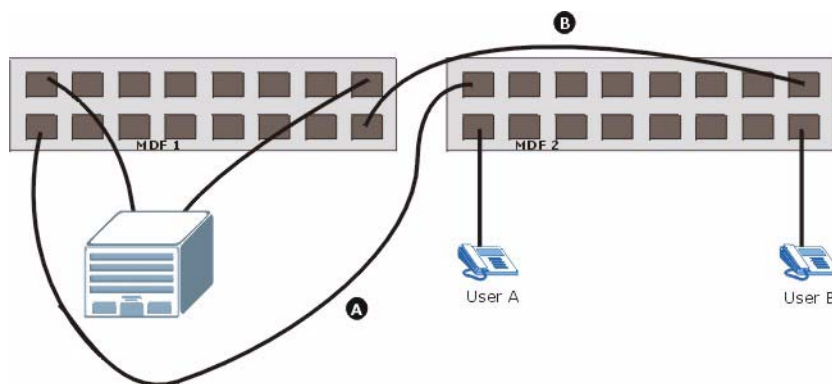
Use the following procedure for this MDF installation scenario.

- 1** Connect the Telco-50 connector end of the cable you want for DSL service to the Telco-50 connector labeled **USER** on the splitter chassis rear panel.
- 2** Connect the wiring on the other side of the Telco-50 cable to the upper ports of MDF 3 using a punch-down tool.
- 3** Connect the telephone wiring from the end-user's DSL modem(s) to the lower ports of MDF 3.
- 4** Connect the Telco-50 connector end of the cable you want for phone service to the Telco-50 connector labeled **CO** on the splitter chassis rear panel.
- 5** Connect the wiring on the other side of the Telco-50 cable to the lower ports of MDF 2 using a punch-down tool.
- 6** Connect the upper ports of MDF 2 to the lower ports of MDF 1 using telephone wires.
- 7** Connect the upper ports of MDF 1 to the telephone company.
- 8** Telephone subscribers only (non-DSL subscribers) retain connections to the lower ports of MDF 1.
- 9** Change the wiring from MDF 1 to MDF 3 for telephone subscribers who want DSL service.

2.6.4.3 Installation Scenario C

Phone service is also available but there are two MDFs; one for end-user telephone line connections and the other one for CO telephone wiring connections (see the following figure). This installation scenario does not apply to G.SHDSL connections.

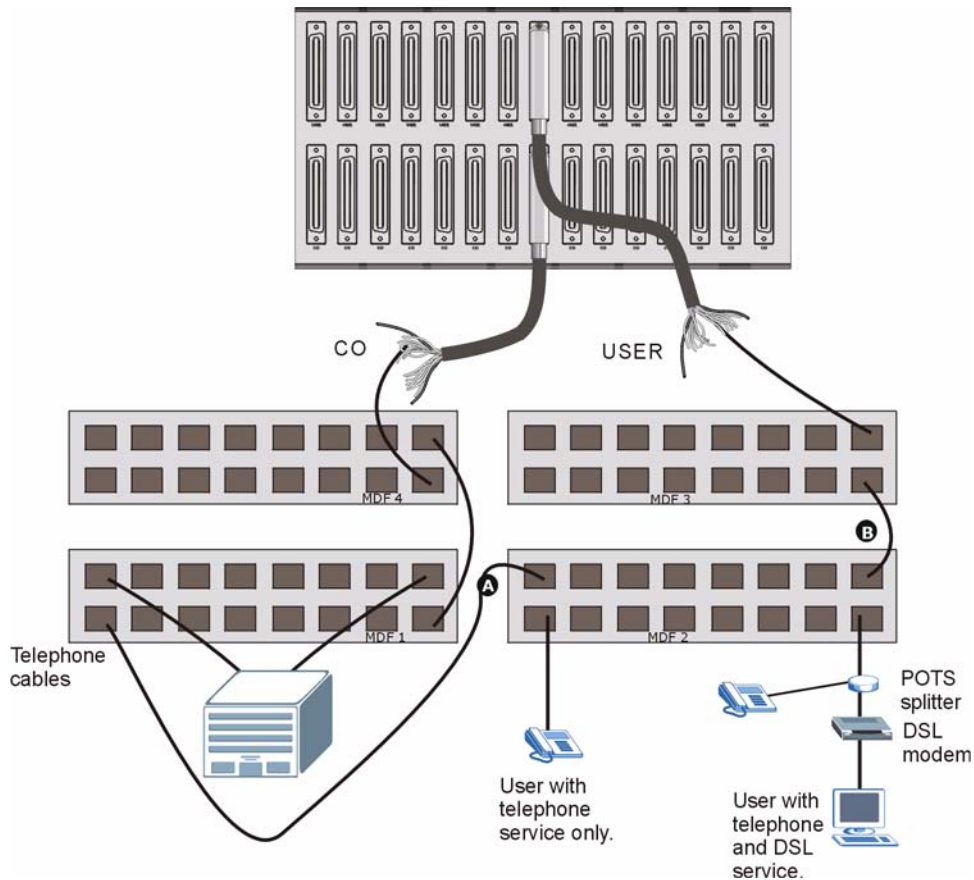
Note: Users A and B have telephone (only) service.

Figure 43 Two Separate MDFs for End-user and CO Connections

This installation scenario requires four MDFs. Please refer to the following figure for the DSL connection schema.

- MDFs 1 and 2 are the two original MDFs.
- MDFs 3 and 4 are two additional MDFs you need.

Note: User A still has telephone service only. User B now has telephone and DSL service (see the following figure)

Figure 44 Installation Scenario C

Use the following procedure for this MDF installation scenario.

- 1 Connect the Telco-50 connector end of the cable you want for DSL service to the Telco-50 connector labeled **USER** on the splitter chassis rear panel.
- 2 Connect the wiring on the other side of the Telco-50 cable to the upper ports of MDF 3 using a punch-down tool.
- 3 Connect the lower ports of MDF 3 to the upper ports of MDF 2 for those users that want DSL service. (Users who want telephone service only, retain the original connection from the top port of MDF 2 to the bottom port of MDF 1.)
- 4 Connect the telephone wiring from the end-user's DSL equipment to the lower ports of MDF 2.
- 5 Connect the Telco-50 connector end of the cable you want for phone service to the Telco-50 connector labeled **CO** on the splitter chassis rear panel.
- 6 Connect the wiring on the other side of the Telco-50 cable to the lower ports of MDF 4 using a punch-down tool.

- 7 Connect the top ports of MDF 4 to the bottom ports of MDF 1 using telephone wires.
- 8 Connect the top ports of MDF 1 to the telephone company.

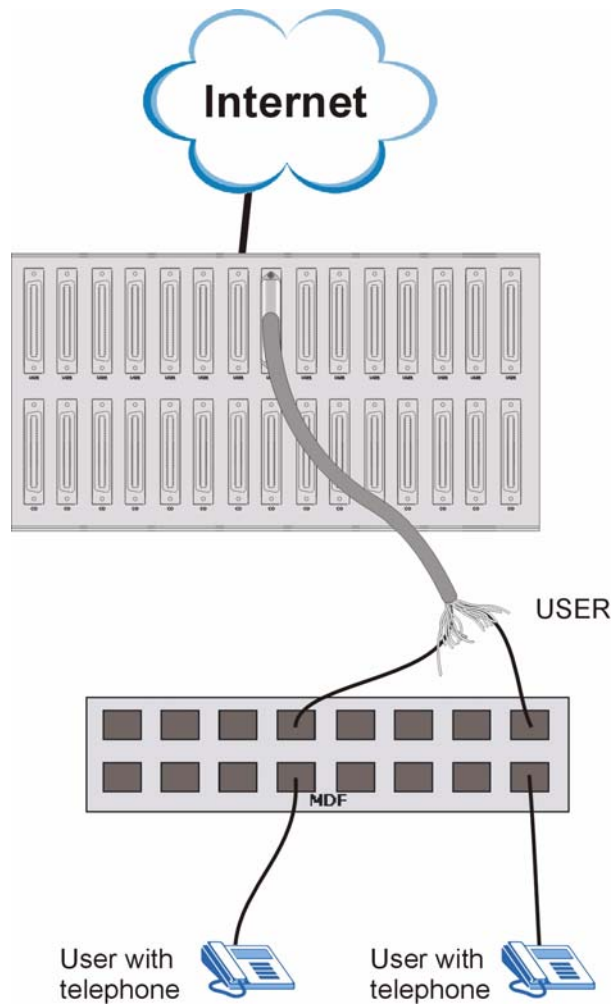
2.6.5 VoIP Connection Scenarios

These scenarios describe how to use the VOP1248G VoIP line card to provide voice service to your subscribers.

2.6.5.1 VoIP Installation Scenario A

In this installation scenario, you use a VoIP line card, an SEC1024 extension card and an MDF to provide voice service over the Internet to your subscribers.

Figure 45 VoIP Connection Scenario A



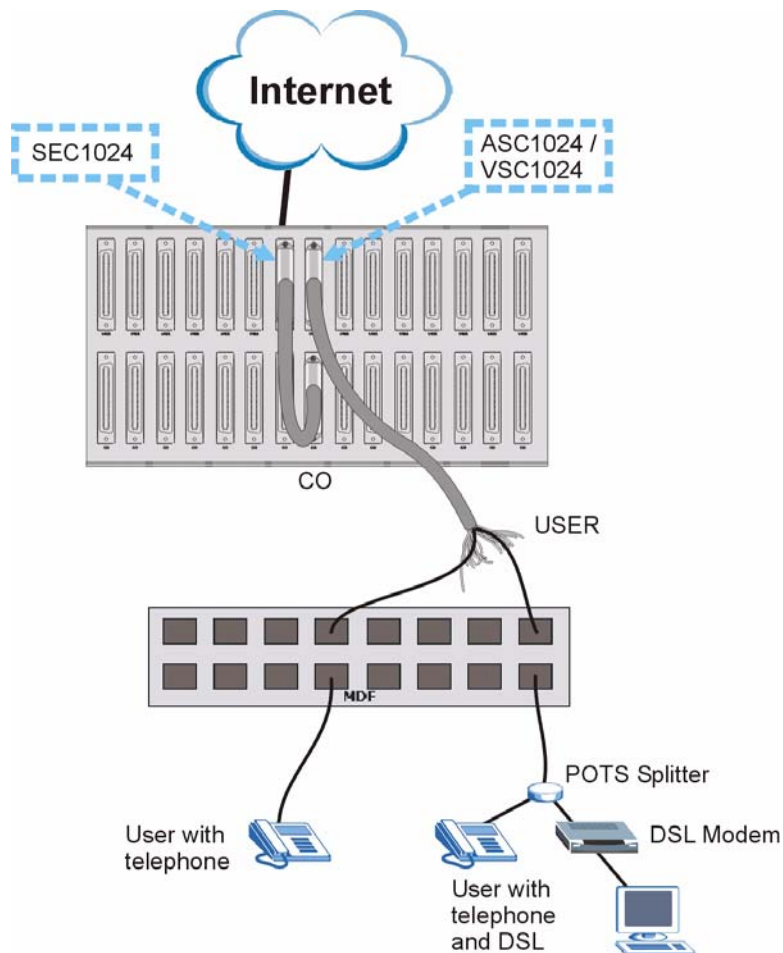
Use the following procedure for this installation scenario.

- 1 Connect the Telco-50 connector end of the cable you want to use for voice service to the Telco-50 connector labeled **USER** on the splitter chassis rear panel.
- 2 Connect the wiring on the other side of the Telco-50 cable to the upper ports of the MDF using a punch-down tool.
- 3 Connect the telephone wiring from the end-user's POTS telephone equipment to the lower ports of the MDF.

2.6.5.2 VoIP Installation Scenario B

In this installation scenario, you use a VoIP line card and an SEC1024 extension card in conjunction with a DSL line card, its associated splitter card and an MDF to provide voice service over the Internet and DSL Internet access to certain subscribers (a DSL line card port is reserved for each user even if the user does not subscribe to DSL). See [Section 2.6.3 on page 48](#) and [Section 2.5.3 on page 45](#) for more information on using the VOP1248G in conjunction with DSL line cards. This installation scenario does not apply to G.SHDSL connections.

Figure 46 VoIP Connection Scenario B



Use the following procedure for this installation scenario.

- 1** Connect the Telco-50 connector end of the cable you want to use for voice and data service to the Telco-50 connector labeled **USER** on the DSL splitter card's rear panel.
- 2** Connect the wiring on the other end of the Telco-50 cable to the upper ports of the MDF using a punch-down tool.
- 3** Connect the telephone wiring from the end-user's DSL and POTS equipment to the lower ports of the MDF.
- 4** Using another Telco-50 cable, connect the **CO** port on the DSL splitter card to the **USER** port on the SEC1024 extension card.
- 5** Connect the Telco-50 port on the front of the DSL splitter card to the **1 ~ 24** port on the front of the DSL line card.
- 6** Connect the Telco-50 port on the front of the SEC extension card to the **1 ~ 24** port on the front of the VoIP line card.

2.7 Alarm Module

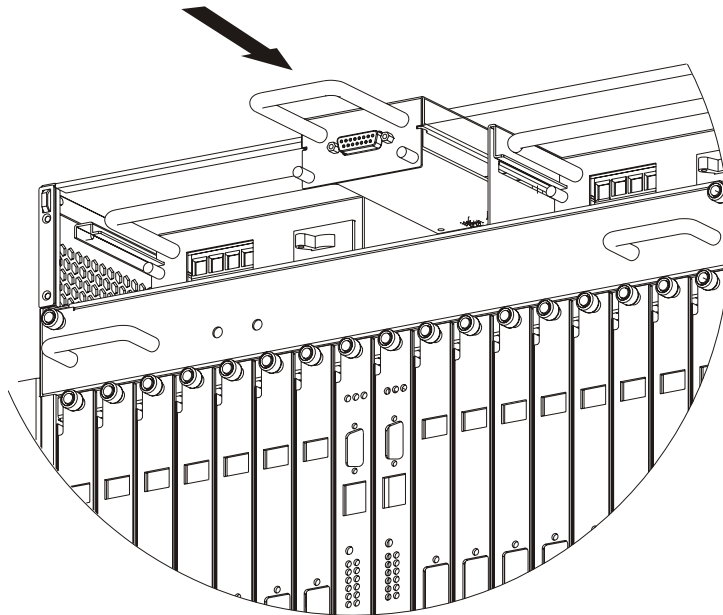
The DB-15 **ALARM** port is located between the power modules at the top of the front panel. It is used for connecting to alarm input and alarm output terminals on other pieces of equipment.

2.7.1 Installing the Alarm Module

Use the following procedure to install the alarm module in the main chassis.

- 1** Insert the alarm module into the slot, putting it at the top of the slot, and push it in until the alarm module comes into contact with the backplane. The front of the alarm module should be well inside the front panel.
- 2** Use a screwdriver to tighten the alarm module screws.

Figure 47 Installing the Alarm Module

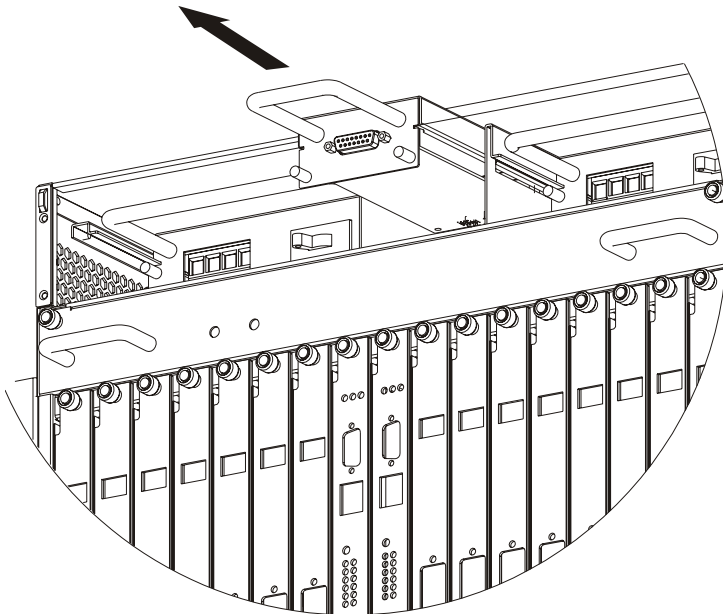


2.7.2 Removing the Alarm Module

Use the following procedure to remove the alarm module from the main chassis.

- 1 Use a screwdriver to loosen the alarm module screws.
- 2 Grasp the handle on the front of the alarm module, and pull the alarm module out.

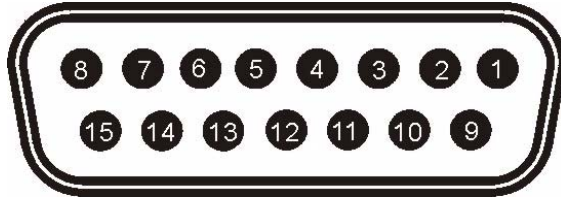
Figure 48 Removing the Alarm Module



2.7.3 Alarm Connections

This section explains the connections to the **ALARM** port.

Figure 49 ALARM Connector Pin Layout



A closed circuit on the **ALARM** input pins indicates an alarm.

- Pins 1 and 9 are alarm input one.
- Pins 2 and 10 are alarm input two.
- Pins 3 and 11 are alarm input three.

The IES signals an alarm when it detects an alarm on the **ALARM** input pins, the IES is overheated, the voltage readings are outside the tolerance levels, a fan fails, or another alarm occurs.

To signal a minor alarm, the MSC opens the circuit for pins 4 and 12 and closes the circuit for pins 5 and 12.

To signal a major alarm, the MSC opens the circuit for pins 13 and 6 and closes the circuit for pins 14 and 6.

To signal a critical alarm, the MSC opens the circuit for pins 7 and 15 and closes the circuit for pins 8 and 15.

2.8 Power Connections

Use the following procedures to connect the IES to a power source after you have installed the main chassis in a rack.

Refer to Chapter 5 on page 75 for power requirements and make sure you are using an appropriate power source.

Observe the following before you start:

- Refer to [Chapter 5 on page 75](#) for the gauge of wire to use for the IES power connections.

- Keep the IES power switches in the **OFF** position until you come to procedure for turning on the power.
- Keep the power supply switch in the **OFF** position until you come to procedure for turning on the power.

Use only power wires of the required diameter for connecting the IES to a power supply (refer to Chapter 5 on page 75 for the required wire gauge).

2.8.1 Power Modules

The main chassis uses two power supply modules. These modules are hot-swappable and supply power to the line cards.

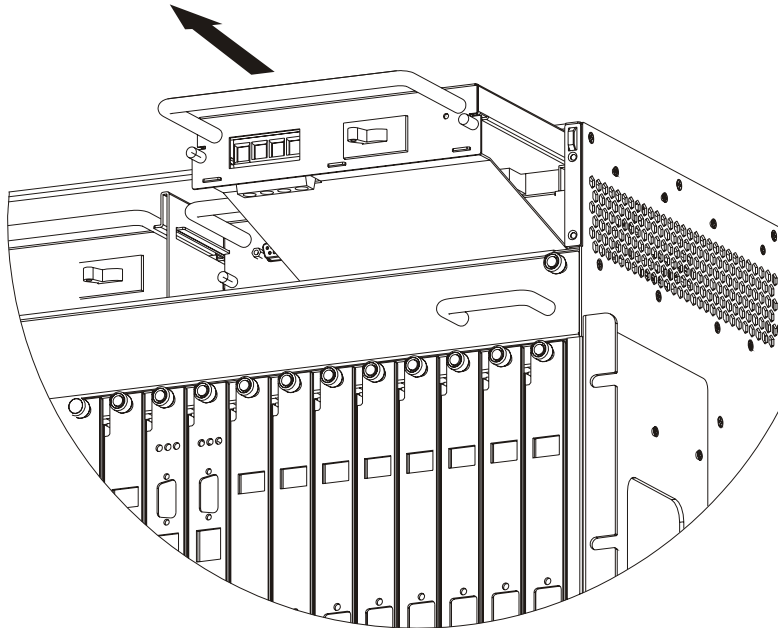
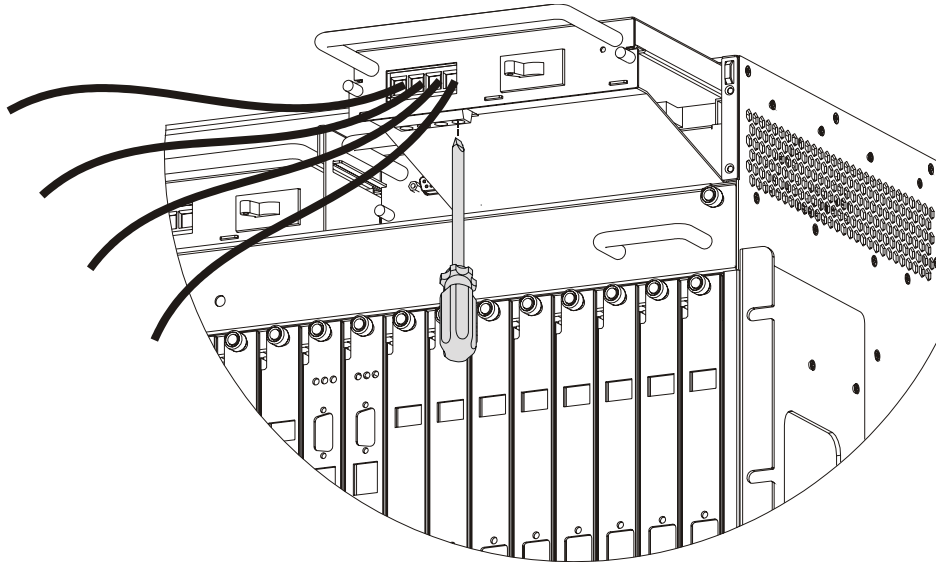
The power connections are on the front of each power module. The power modules are in the upper left and upper right corners of the front panel of the main chassis.

2.8.1.1 Procedure to Connect the Power

When installing the IES power wires, push the wires firmly into the terminals as deep as possible and make sure that no exposed (bare) wires can be seen or touched.

Use four wires to connect to each power module, two wires for the positive terminals and two wires for the negative terminals.

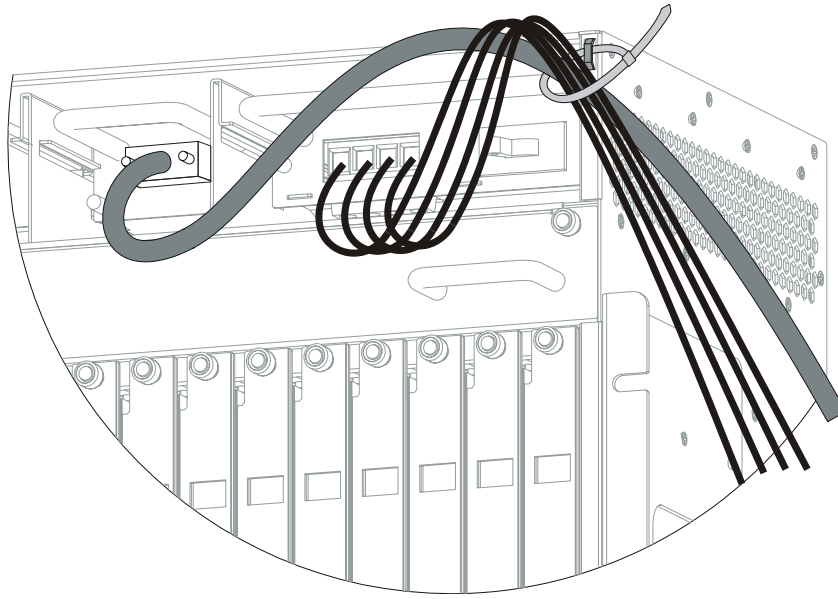
- 1 Use a screwdriver to loosen the power module screws.
- 2 Slide the power module out partially to expose the power terminal screws.
- 3 Connect power wires to the negative power terminals on the front of the power module, and tighten the terminal screw.
- 4 Connect the other ends of the power wires to the –36 V terminal on the power supply.
- 5 Connect power wires to the positive power terminals on the front of the IES power module, and tighten the terminal screw.
- 6 Connect the other ends of the power wires to the ground terminal on the power supply.
- 7 Push the power module back in and tighten the screws.
- 8 Repeat the previous steps for the second power supply module.

Figure 50 Sliding Out the IES Power Module**Figure 51** Connecting the Power Wires to the IES Power Module

2.9 Dressing the Power Wires and Alarm Cable

Use a cable tie to dress the power wires and the alarm cable after you connect them.

Figure 52 Dressing the IES-6000M Power Wires and Alarm Cable



2.9.1 Procedure to Turn on the IES Power

- 1 Turn on the power supply.
- 2 Move the power switches on both power modules to the **ON** position.

Hardware Troubleshooting

This chapter explains how to troubleshoot the system hardware.

3.1 The PWR LED Does Not Turn On or Is Blinking

The **PWR** light blinks if the input power for the fans is not stable and is off if there is no input power. The **PWR** light stays on if the input for the fans is normal.

Table 3 PWR LED Troubleshooting

STEP	CORRECTIVE ACTION
1	Make sure the power wires are properly connected to the power supply and the power supply is operating normally. Make sure you are using the correct power source (refer to Chapter 5 on page 75). Make sure the power supply modules are turned ON. Refer to Section 4.2 on page 72 .
3	The LED itself, the fan module, or the unit may be faulty; contact your vendor.

3.2 The ALM LED Is On

The **ALM** LED is on when at least one fan has failed in the fan module. Working fans emit a low buzz and blow air. If the fans are not working properly, refer to [Section 4.1 on page 67](#) for instructions on changing a fuse or changing the fan module.

3.3 No Voice on an ADSL Connection

The ADSL line cards allow the telephone wiring used for DSL connections to also simultaneously carry normal voice conversations.

Table 4 Voice Troubleshooting

STEP	CORRECTIVE ACTION
1	Make sure the subscriber has a POTS splitter properly installed.
2	Check the telephone wire connections between the subscriber and the MDF(s).
3	Check the telephone wire and connections between the MDF(s) and USER port(s). Refer to the pin assignments in the line card User's Guide.
4	Check the telephone wire and connections between the MDF(s) and the CO port(s). Check the telephone wire mapping on the MDF(s).
5	Check the connection from the MDF(s) to the PBX or the telephone company PSTN or ISDN switch.
6	Make sure the in-house wiring works and is connected properly.
7	Repeat the steps above using a different DSL port.

3.4 No Voice on a VoIP Connection

Check the POTS and line card connections between the subscriber, the MDF(s) and the VOP line card. See your VOP User's Guide for more information on troubleshooting VoIP problems.

3.5 Testing Wiring

Use the following tests if there is no voice.

Systematically test wiring using a functioning telephone to determine if there is a wiring problem. If the connection is good, the telephone will return a dial tone. Letters in the figure shown next indicate the systematic tests to be done. Suppose you're using installation scenario "B" as shown in the chapter on MDF connections. The logic for other scenarios should be similar.

Use steps A-D if there is no voice but you can transmit data. Use all of the steps if there is no voice and you cannot transmit data.

Figure 53 Testing In-house Wiring

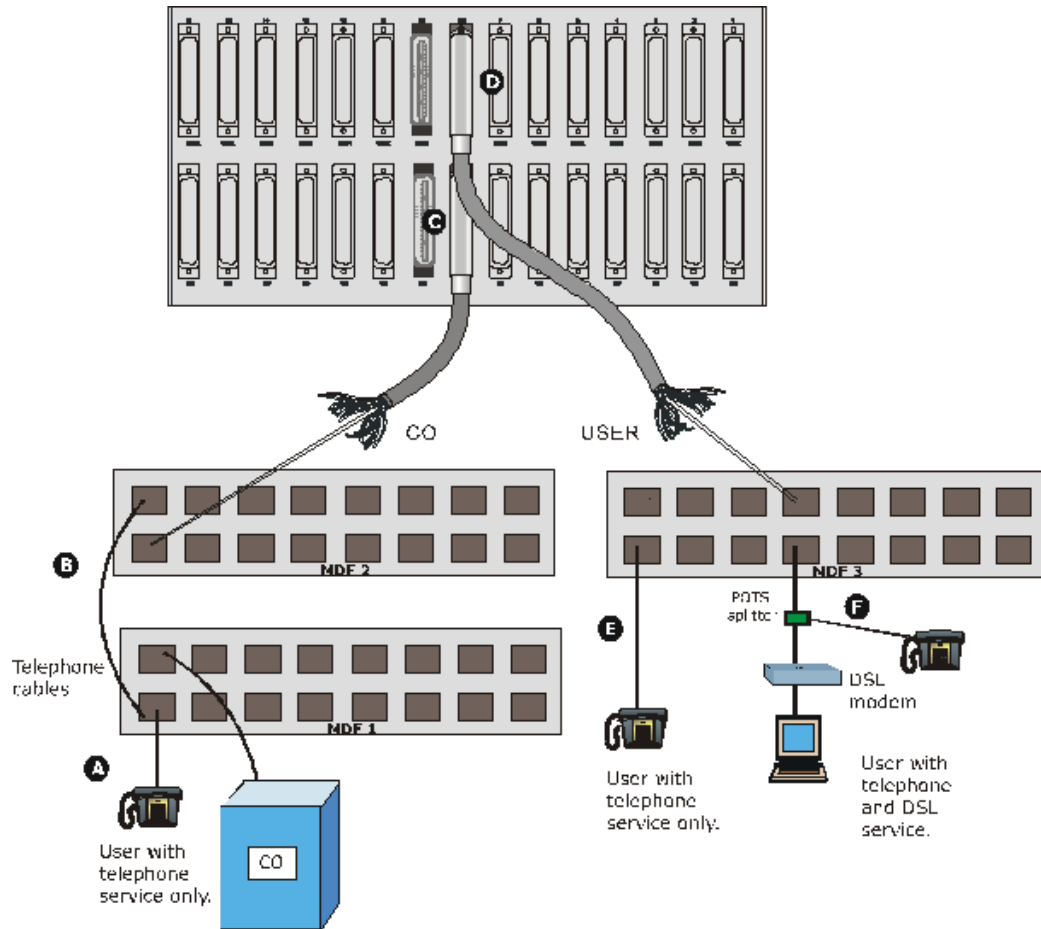


Table 5 Testing In-house Wiring

STEP	TEST
A	Wiring problem between the CO and MDF 1. Connect a standard telephone to MDF 1. If there is no dial tone, then a problem with the wire or wire connections between MDF 1 and the CO exists. Contact your telephone company for troubleshooting.
B	Wiring problem between MDF 1 and MDF 2. Connect a telephone to the upper port of MDF 2. If there is no dial tone, then the problem is between MDF 1 and MDF 2. Check the telephone wire and connections between MDFs 1 and 2.

Table 5 Testing In-house Wiring (continued)

STEP	TEST
C	<p>Wiring problem between MDF 2 and the USER Telco-50 connector on the splitter chassis.</p> <p>Disconnect the Telco-50 cable from the splitter chassis' Telco-50 CO connector. Connect a telephone to the appropriate pins of the Telco-50 cable's Telco-50 connector.</p> <p>If there is no dial tone, then the problem is between the splitter chassis Telco-50 CO connector and MDF 2.</p> <p>Check the Telco-50 cable's pin assignments (refer to the line card User's Guide for the proper pin assignments). Replace the Telco-50 cable if the pin assignments are okay and there is still no dial tone.</p>
D	<p>Problem with a splitter card or the splitter chassis.</p> <p>Reconnect the Telco-50 cable to the splitter chassis' Telco-50 CO connector.</p> <p>Disconnect the Telco-50 cable from the splitter chassis' Telco-50 USER connector. Connect a telephone to the appropriate pins of the splitter chassis' Telco-50 USER connector (refer to the line card User's Guide for the proper pin assignments).</p> <p>If there is no dial tone, make sure that the splitter card is properly installed. Try a different splitter card. If using a different splitter card solves the problem, replace the first splitter card.</p> <p>If using a different splitter card does not solve the problem, the splitter chassis may be faulty, contact your vendor.</p>
E	<p>Wiring problem between the USER Telco-50 connector on the splitter chassis and MDF 3.</p> <p>Reconnect the Telco-50 cable to the splitter chassis' Telco-50 USER connector.</p> <p>Connect a telephone to a lower port of MDF 3. If there is no dial tone, then the problem is between the splitter chassis Telco-50 USER connector and MDF 3. Replace the Telco-50 cable connecting the USER port to MDF 3.</p> <p>If the problem remains, check the pin assignments of the USER Telco-50 connector. If the problem remains, then the IES or MDF 3 is faulty. Repeat the test in step A using MDF 3 to determine if MDF 3 has problems. Contact the telephone company if that is the case.</p> <p>If not, contact your IES vendor outlining the problem and the steps you took to solve it.</p>
F	<p>Building-wiring problem between the subscriber's wall jack and MDF 3.</p> <p>Disconnect the DSL modem from the wall jack and connect the telephone to the wall jack. If there is no dial tone, then there is a problem with the building wiring between the DSL subscriber's home and the MDF. Contact your telephone company for troubleshooting.</p>

Maintenance

This chapter describes how to perform maintenance on the system hardware.

4.1 Fan Maintenance

This section describes how to change a fan fuse or a fan module on the IES.

4.1.1 Procedure to Remove and Install the IES-5106M/IES-5112M Fan Module

The IES main chassis has a hot-swappable fan module. The fan module is at the left on the front panel. Replace the entire fan module if the fuse is not the problem. Return any malfunctioning fan modules to the manufacturer.

Perform the following procedure to remove the fan module in order to clean the fan filter or change a fan fuse or the fan module.

- 1 Loosen the thumbscrews on the front of the fan module.
- 2 Slide out the fan module.
- 3 Replace the fuse if it is burnt out (see [Chapter 5 on page 75](#) for fuse information). If the fuse is not the problem, use a different fan module from the manufacturer.
- 4 Slide out the fan filter. Clean or replace the filter.
- 5 Slide the fan filter back into the fan module.
- 6 Slide the fan module back into the fan module slot.
- 7 Tighten the thumbscrews.

Figure 54 Loosening the IES-5106M/IES-5112M Fan Module Thumbscrews

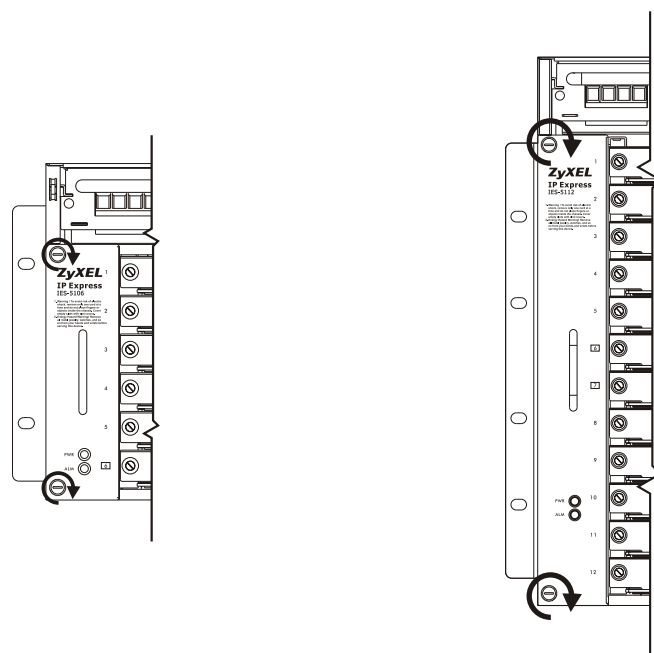


Figure 55 Removing the IES-5106M/IES-5112M Fan Module

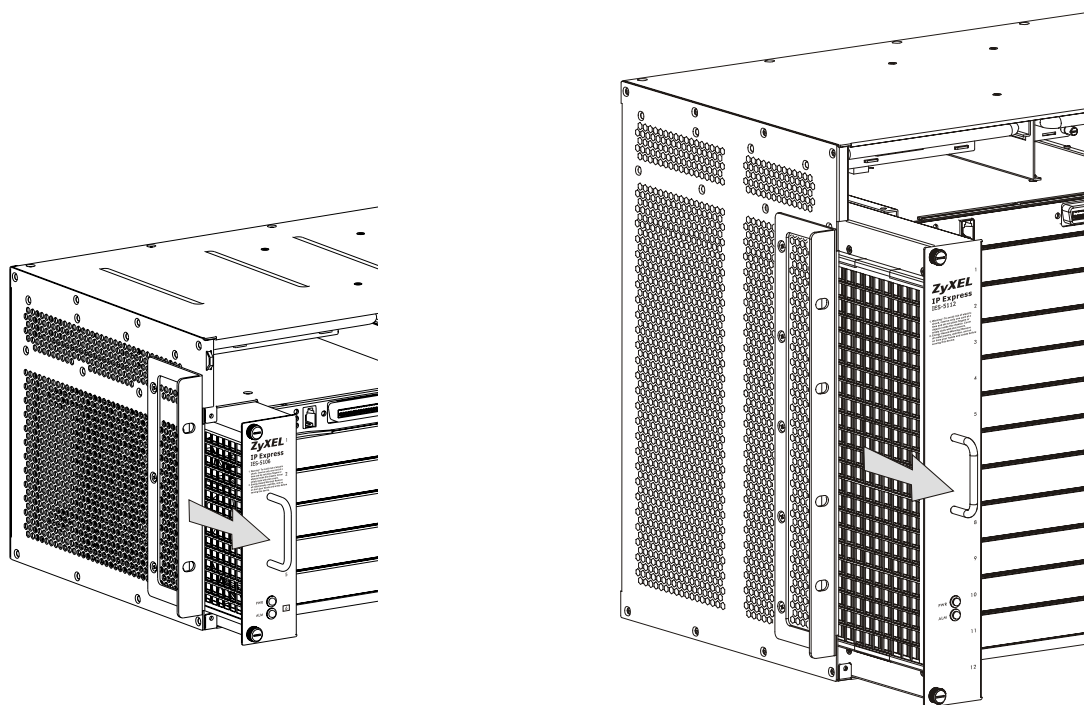
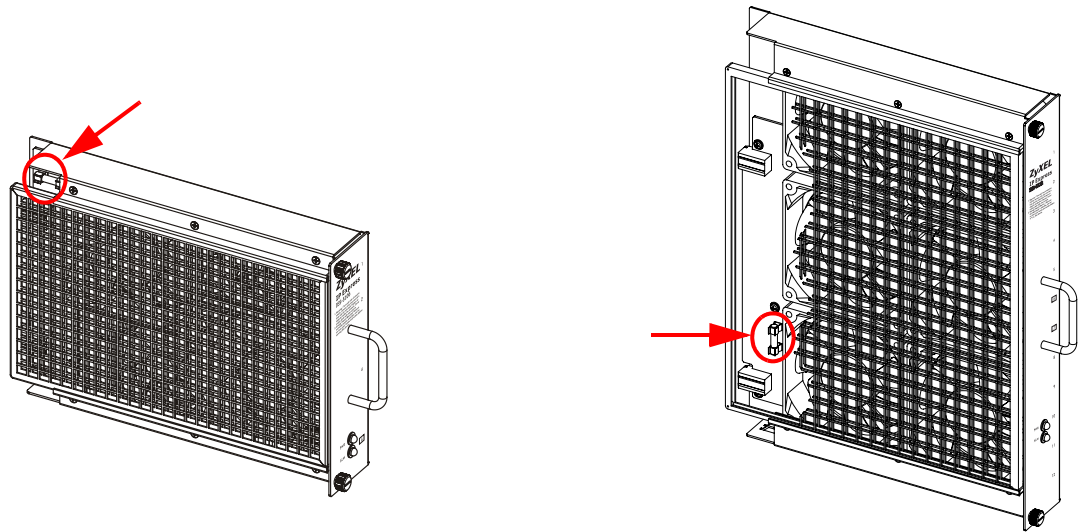


Figure 56 IES-5106M/IES-5112M Fan Module (Location of Fuse Indicated)

4.1.2 Procedure to Remove and Install the IES-6000M Fan Module

The IES main chassis has a hot-swappable fan module. The IES-6000M fan module is located above the slots and below the power modules on the front panel. Replace the entire fan module if the fuse is not the problem. Return any malfunctioning fan modules to the manufacturer.

Perform the following procedure to remove the fan module in order to change a fan fuse or the fan module.

- 1 Loosen the thumbscrews on the front of the fan module.
- 2 Slide out the fan module.
- 3 Replace the fuse if it is burnt out (see [Chapter 5 on page 75](#) for fuse information). If the fuse is not the problem, use a different fan module from the manufacturer.
- 4 Slide the fan module back into the fan module slot.
- 5 Tighten the thumbscrews.

Figure 57 Loosening the IES-6000M Fan Module Thumbscrews

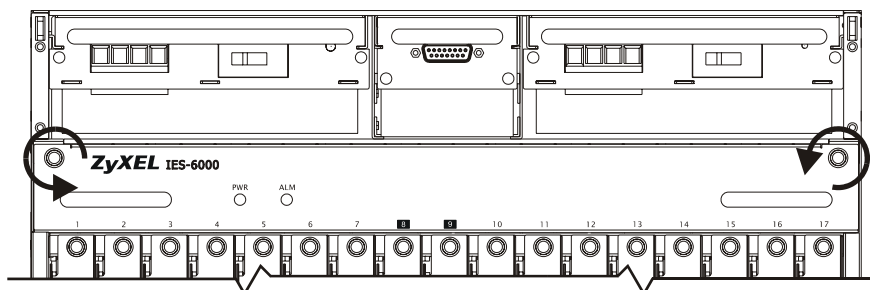


Figure 58 Removing the IES-6000M Fan Module

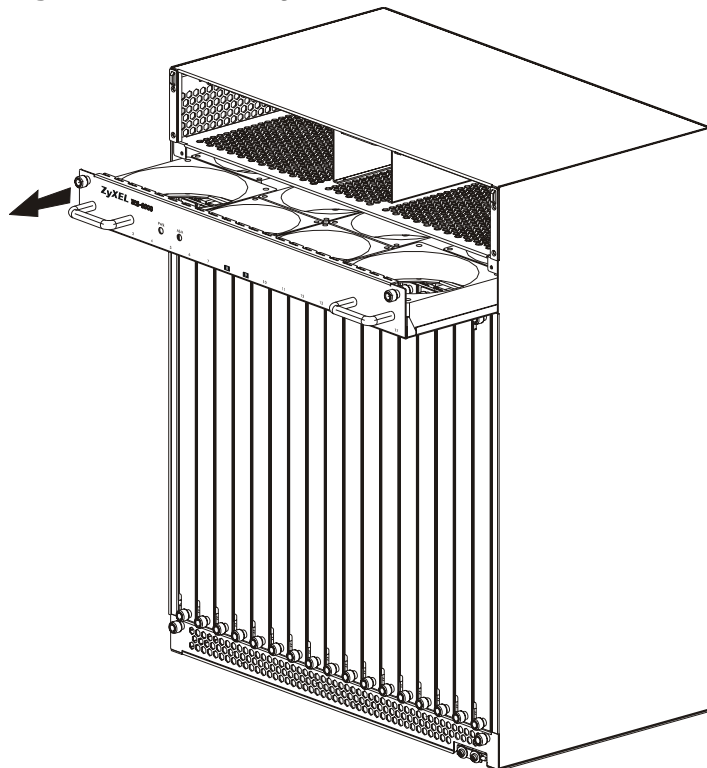
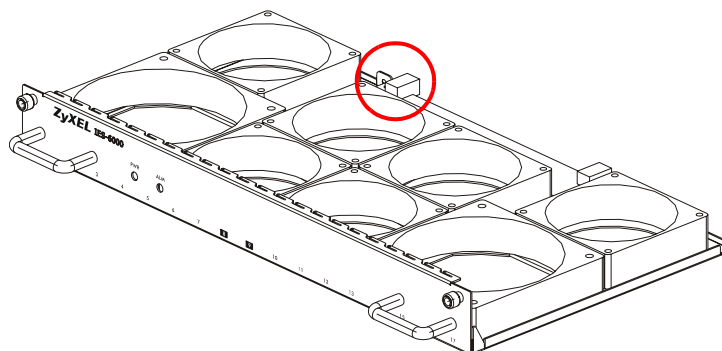


Figure 59 IES-6000M Fan Module (Location of Fuse Indicated)



4.1.3 Procedure to Remove and Install the IES-6000M Filters

The IES-6000M has three filters, one located at the bottom of the front panel and two located at the bottom of the two side panels. The filter on the front panel is different than the filters on the side panels, so make sure you order the correct filter(s).

To clean or replace the filter on the front panel, loosen the thumbscrews on the front of the filter, and remove the filter. Clean or replace it as necessary.

To clean or replace a filter on the side panel, you have to remove the one at the bottom of the front panel first. Then, slide out the filter along the side panel, and clean or replace it as necessary.

Figure 60 Loosening the IES-6000M Air Filter Thumbscrews

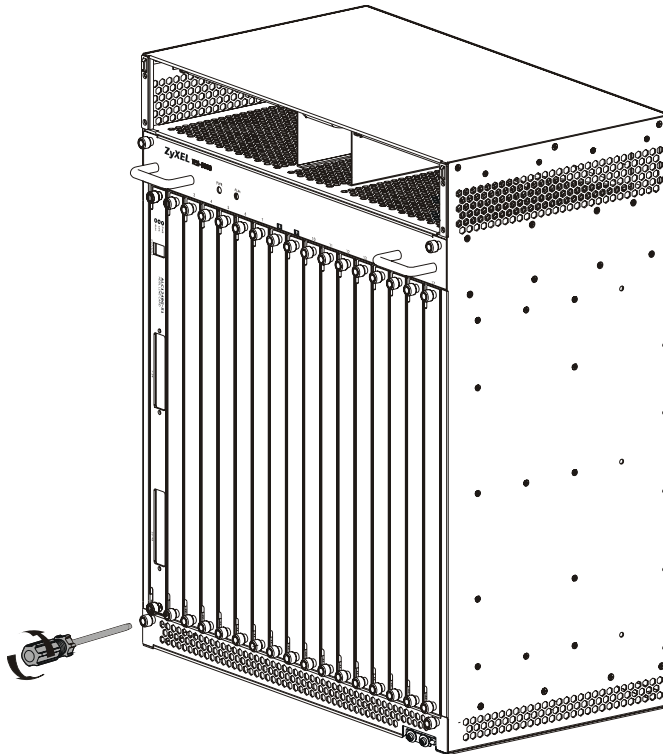
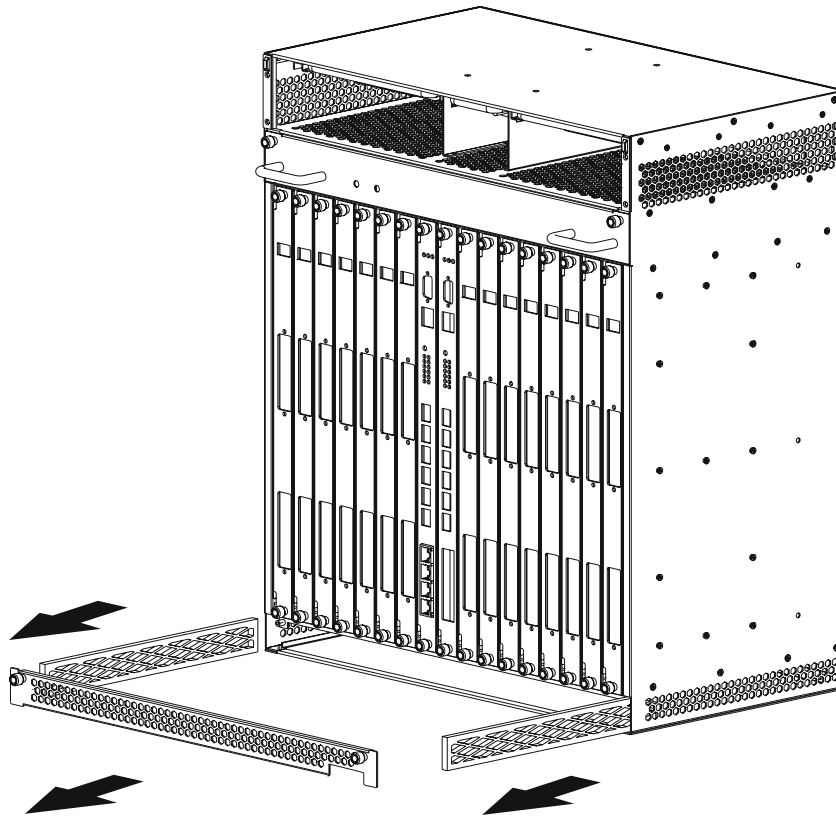


Figure 61 Removing the IES-6000M Air Filters



4.2 Power Maintenance

This section describes how to change the power modules. The power modules have a built-in circuit breaker. Before you replace a power module, make sure the circuit breaker is not causing the problem.

4.2.1 Procedure to Disconnect the Power

The power modules are hot-swappable and can be disconnected from the power supply individually.

- 1 Make sure that the power module you want to disconnect has the power switch in the **OFF** position.
- 2 Turn off the power supply.
- 3 Disconnect the power wires from the power supply's power terminals.

4.2.2 Procedure to Change a Power Module

The power modules are near the top of the front panel of the main chassis. Use the following procedure to change a power module.

- 1 Refer to [Section 4.2.1 on page 72](#) to disconnect the power before you begin.
- 2 Use a screw driver to loosen the thumbscrews on the front panel of the IES power supply module.
- 3 Grab the handle, and slide out the power supply module.
- 4 Disconnect the power wires from the IES power module terminals.
- 5 Replace the IES power module with a new one from the manufacturer.
- 6 Connect the power wires to the new IES power module's power terminals.
- 7 Slide the IES power module back into the power module slot.
- 8 Tighten the thumbscrews.
- 9 Refer to [Section 4.2.3 on page 74](#) to reconnect the power after you finish.

Figure 62 Sliding Out the IES Power Module

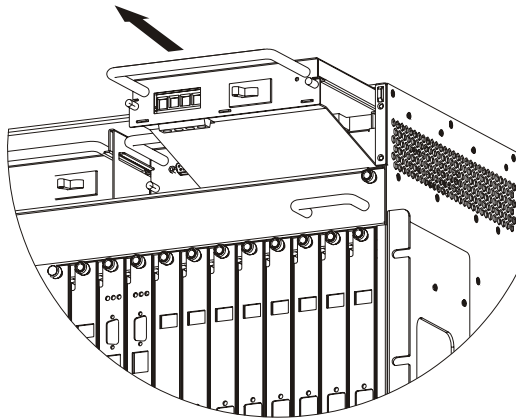
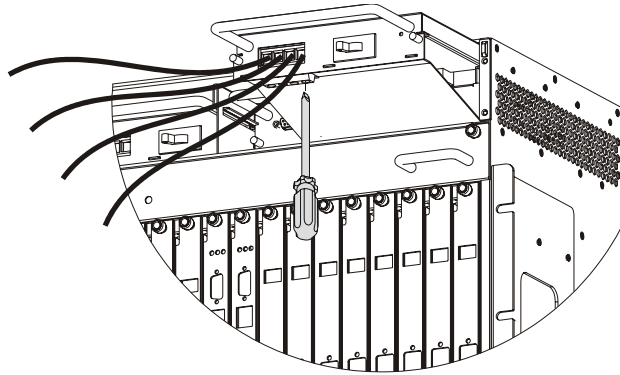


Figure 63 Connecting the Power Wires to the IES Power Module



4.2.3 Procedure to Reconnect the Power

- 1 Reconnect the power wires to the power supply terminals.
- 2 Turn the power supply back on.
- 3 Turn the IES power module switch back to the ON position.

Product Specifications

This appendix lists system features and provides detailed system specifications. See the User's Guides for individual line cards for information on card features, settings and hardware.

5.1 Features

The following table lists key IES features.

Table 6 Features

Slots	The IES main chassis has slots for hot-swappable line cards and management switch cards.
Backplane	Connect the hot-swappable line cards and MSC cards to the backplane. The backplane is the inside rear panel of the IES.
Splitter Chassis	The splitter chassis have slots for splitter and extension cards and Telco-50 connectors for connecting to the subscribers and the PBX (Private Branch Exchange) or PSTN/ISDN (Public Switched Telephone Network/Integrated Services Digital Network) switch.
Hot-swappable Line Cards	The IES uses hot-swappable line cards.
Hot-swappable Splitter Cards	The splitter chassis use hot-swappable splitter cards.
Management Switch Card	The IES accommodates a management switch card that switches traffic and forwards it between the line cards and other Ethernet switches.
Hot-swappable Fan Module	The IES is equipped with a hot-swappable fan module with a filter to provide easy maintenance, greater reliability and increased system operating lifetimes.
Power Modules	The IES has dual, hot-swappable power modules. One power module is redundant. The IES can be fully powered by just one power module so the system can keep running while you replace a power module.
Alarm Port	The IES has three alarm input and three alarm output terminals to connect to other pieces of equipment.
Scalable Platform for Future Expansion	The flexible design of the IES allows service providers to start with minimum cost. As the number of users and applications increases, additional line cards can be added to support more subscribers.

5.2 System Specifications

This section provides the specifications for the IES.

Table 7 System Specifications

Main chassis dimensions (excluding fan module handle)	IES-5106M: 440 mm (W) x 249.75 mm (D) x 214.52 mm (H); 5U IES-5112M: 440 mm (W) x 249.4 mm (D) x 362.22 mm (H); 8.2U IES-6000M: 440 mm (W) x 280 mm (D) x 484 mm (H); 12U
Splitter chassis dimensions	IES-5000ST: 440 mm (W) x 280 mm (D) x 240 mm (H), 5.4U IES-5005ST: 440 mm (W) x 280 mm (D) x 123.90 mm (H), 2.787U IES-5002ST: 440 mm (W) x 280 mm (D) x 60 mm (H), 1.5U IES-3000ST: 442.7 mm (W) x 280 mm (D) x 222.5 mm (H); 5U IES-3016ST: 434.1 mm (W) x 280 mm (D) x 219.4 mm (H); 5U
Chassis weight (including fan and power module weight; excluding card weights)	IES-5106M: 10.2 kg IES-5112M: 13.34 kg IES-6000M: 18 kg
Splitter chassis weight (excluding card weights)	IES-5000ST: 10.0 kg IES-5005ST: 6.1 kg IES-5002ST: 7.0 kg IES-3000ST: 10.8 kg IES-3016ST: 11.8 kg
Number of slots	IES-5106M: Total 6 (5 line card slots plus 1 management card slots). IES-5112M: Total 12 (10 line card slots plus 2 management card slots). IES-6000M: Total 17 (15 ~ 16 line card slots plus 1 ~ 2 management card slots). IES-5000ST: 16 splitter or extension cards IES-5005ST: 8 splitter or extension cards IES-5002ST: 4 splitter or extension cards IES-3000ST: 15 splitter or extension cards IES-3016ST: 16 splitter or extension cards
Rack mounting	The IES is 19-inch (482.6 mm) or 23-inch (584.2 mm) rack-mountable.

Table 7 System Specifications

Wire gauge specifications	<p>AWG (American Wire Gauge) is a measurement system for wire that specifies its thickness. As the thickness of the wire increases, the AWG number decreases.</p> <p>Make sure you use wires of the specified wire gauge.</p> <p>Ground wire: 6 AWG or larger</p> <p>Telephone wire: 26 AWG or larger</p> <p>Power wire: 6 AWG or larger (two pairs of wires are required to support full power)</p>
Power consumption (Max)	<p>IES-5106M: 936 Watts; 26 Amps; -36 to -72 Volts DC, no tolerance</p> <p>IES-5112M: 1260 Watts; 35 Amps; -36 to -72 Volts DC, no tolerance</p> <p>IES-6000M: 2160 Watts; 60 Amps; -36 to -72 Volts DC, no tolerance</p>
Backplane	<p>IES-5106M: The backplane has 10 1-Gigabit Ethernet ports.</p> <p>IES-5112M: The backplane has 20 1-Gigabit Ethernet ports.</p> <p>IES-6000M: The backplane has 16 1-Gigabit Ethernet ports.</p>
Telco-50 cable length specifications (optional)	<p>IES-5106M: long 93 cm; medium: 71 cm; short 53 cm</p> <p>IES-5112M: long 110 cm; medium: 93 cm; short 71 cm</p> <p>IES-6000M: long 53 cm; short 13 cm; 180-degree cable (for VOP-1248G splitter rear panel) 60 cm</p>
Operating Environment	<p>IES-5106M: Temperature -40°C ~ 65°C; Humidity 10% - 90% RH (non-condensing)</p> <p>IES-5112M: Temperature -40°C ~ 65°C; Humidity 10% - 90% RH (non-condensing)</p> <p>IES-6000M: Temperature 0°C ~ 50°C; Humidity 10% - 90% RH (non-condensing)</p>
Storage Environment	<p>Temperature: -40°C ~ 70°C</p> <p>Humidity: 10% - 95% RH (non-condensing)</p>

Table 7 System Specifications

Fan modules	<p>Fan mechanical operation</p> <p>Safe design: All fans have rotor-locking protection to prevent damage to wiring and electrical components. The fan rotors will lock when fan movement is physically obstructed.</p> <p>Locked rotor protection: No damage will occur when the fan rotors are locked for 72 continuous hours. After this amount of time, damage to the fans may occur. The fans will automatically restart as soon as the physical obstruction is removed.</p> <p>Polarity protection: A reverse-polarity voltage connection will not cause damage. After the polarity is corrected, the fan will restart automatically.</p> <p>Insulation resistance: There should be more than 10M ohms of resistance between the housing and the terminal at 500 VDC.</p> <p>The IES-5106M's fan module consists of two different sizes of fans: two 6 cm and two 9 cm. Fan Dimensions: 60 mm (W) x 20 mm (D) x 60 mm (H) and 92 mm (W) x 25 mm (D) x 92 mm (H)</p> <p>The IES-5112M's fan module has six 9 cm fans. Fan Dimensions: 92 mm (W) x 25 mm (D) x 92 mm (H)</p> <p>The IES-6000M's fan module consists of two different sizes of fans: two 12 cm and six 9 cm. Fan Dimensions: 120 mm (W) x 120 mm (D) x 25.4 mm (H) and 90 mm (W) x 90 mm (D) x 25.4 mm (H)</p>
Fan fuse ratings	<p>IES-5106M: Number of fuses: 1; Type: T; Amps: 1; Volts AC: 250; Dimensions: 5 mm (D) x 20 mm (L)</p> <p>IES-5112M: Number of fuses: 1; Type: T; Amps: 2; Volts AC: 250; Dimensions: 5 mm (D) x 20 mm (L)</p> <p>IES-6000M: Number of fuses: 1; Type: T; Amps: 3; Volts AC: 250; Dimensions: 5 mm (D) x 20 mm (L)</p>
Power modules	<p>Two 300V / 65A 10.16 mm terminal blocks with dual inputs</p> <p>Built-in surge protection</p> <p>Rated Voltage -48.0 VDC</p> <p>Operating Voltage: -36 ~ -72 VDC, no tolerance</p> <p>Maximum power consumption: IES-5106M: 936 W; IES-5112M: 1260 W; IES-6000M: 2160 W</p> <p>Power module circuit breaker ratings:</p> <p>Number of circuit breakers: 1</p> <p>Type: C</p> <p>Amps: 60</p> <p>Volts DC: 125</p> <p>Dimensions: 63.5 mm (W) x 47 mm (D) x 19.18 mm (H)</p>

Table 7 System Specifications

Alarm module	The alarm module has a DB15M connector for connections from and to other devices. See Section 2.7 on page 57 for more information about the ALARM module.
Certifications	RoHS Compliance CE Conformity FCC ITU-T K.20 Safety: EN 60950-1 CSA 60950-1 UL 60950-1 IEC 60950-1 EMC: FCC Part 15 Class A EN55022 Class A EN55024 Class A ETSI 300-386 Complies with ETSI 300-019

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Certifications

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- This device may not cause harmful interference.

- This device must accept any interference received, including interference that may cause undesired operations.

FCC Warning

This device has been tested and found to comply with the limits for a Class A digital switch, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial environment. This device 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 device in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE Mark Warning:

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Taiwanese BSMI (Bureau of Standards, Metrology and Inspection) A Warning:

警告使用者
這是甲類的資訊產品，在居住的環境使用時，
可能造成射頻干擾，在這種情況下，
使用者會被要求採取某些適當的對策。

Notices

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

CLASS 1 LASER PRODUCT

APPAREIL À LASER DE CLASS 1

PRODUCT COMPLIES WITH 21 CFR 1040.10 AND 1040.11.

PRODUIT CONFORME SELON 21 CFR 1040.10 ET 1040.11.

Viewing Certifications

- 1 Go to <http://www.zyxel.com>.
- 2 Select your product on the ZyXEL home page to go to that product's page.
- 3 Select the certification you wish to view from this page.

ZyXEL Limited Warranty

ZyXEL warrants to the original end user (purchaser) that this product is free from any defects in material or workmanship for a specific period (the Warranty Period) from the date of purchase. The Warranty Period varies by region. Check with your vendor and/or the authorized ZyXEL local distributor for details about the Warranty Period of this product. During the warranty period, and upon proof of purchase, should the product have indications of failure due to faulty workmanship and/or materials, ZyXEL will, at its discretion, repair or replace the defective products or components without charge for either parts or labor, and to whatever extent it shall deem necessary to restore the product or components to proper operating condition. Any replacement will consist of a new or re-manufactured functionally equivalent product of equal or higher value, and will be solely at the discretion of ZyXEL. This warranty shall not apply if the product has been modified, misused, tampered with, damaged by an act of God, or subjected to abnormal working conditions.

Note

Repair or replacement, as provided under this warranty, is the exclusive remedy of the purchaser. This warranty is in lieu of all other warranties, express or implied, including any implied warranty of merchantability or fitness for a particular use or purpose. ZyXEL shall in no event be held liable for indirect or consequential damages of any kind to the purchaser.

To obtain the services of this warranty, contact your vendor. You may also refer to the warranty policy for the region in which you bought the device at http://www.zyxel.com/web/support_warranty_info.php.

Registration

Register your product online to receive e-mail notices of firmware upgrades and information at www.zyxel.com.

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