ALC1248G

ADSL2/2+ Line Card

User's Guide

Version 3.50
9/2005

ZyXEL

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Disclaimer

Interference Statements and Warnings

FCC Statement

This switch complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1 This switch may not cause harmful interference.

2 This switch must accept any interference received, including interference that may cause undesired operations.

FCC Warning

This equipment 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 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 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,
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1 Go to www.zyxel.com.

2 Select your product from the drop-down list box on the ZyXEL home page to go to that product's page.

3 Select the certification you wish to view from this page.

Registration

Register your product online for free future product updates and information at www.zyxel.com for global products, or at www.us.zyxel.com for North American products.

ZyXEL Limited Warranty

ZyXEL warrants to the original end user (purchaser) that this product is free from any defects in materials or workmanship for a period of up to two years from the date of purchase. 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 value, and will be solely at the discretion of ZyXEL. This warranty shall not apply if the product is 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 of character to the purchaser.

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Customer Support

Please have the following information ready when you contact customer support.

- 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.

METHOD LOCATION	SUPPORT E-MAIL SALES E-MAIL	TELEPHONE* FAX	WEB SITE FTP SITE	REGULAR MAIL
CORPORATE HEADQUARTERS (WORLDWIDE)	support@zyxel.com.tw	+886-3-578-3942	www.zyxel.com www.europe.zyxel.com	ZyXEL Communications Corp. 6 Innovation Road II Science Park Hsinchu 300 Taiwan
	sales@zyxel.com.tw	+886-3-578-2439	ftp.zyxel.com ftp.europe.zyxel.com	
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	info@cz.zyxel.com	+420 241 091 359		
DENMARK	support@zyxel.dk	+45 39 55 07 00	www.zyxel.dk	ZyXEL Communications A/S Columbusvej 5 2860 Soeborg Denmark
	sales@zyxel.dk	+45 39 55 07 07		
FINLAND	support@zyxel.fi	+358-9-4780-8411	www.zyxel.fi	ZyXEL Communications Oy Malminkaari 10 00700 Helsinki Finland
	sales@zyxel.fi	+358-9-4780 8448		
FRANCE	info@zyxel.fr	+33 (0)4 72 52 97 97	www.zyxel.fr	ZyXEL France 1 rue des Vergers Bat. 1 / C 69760 Limonest France
		+33 (0)4 72 52 19 20		
GERMANY	support@zyxel.de	+49-2405-6909-0	www.zyxel.de	ZyXEL Deutschland GmbH. Adenauerstr. 20/A2 D-52146 Wuerselen Germany
	sales@zyxel.de	+49-2405-6909-99		
NORTH AMERICA	support@zyxel.com	+1-800-255-4101 +1-714-632-0882	www.us.zyxel.com	ZyXEL Communications Inc. 1130 N. Miller St. Anaheim CA 92806-2001 U.S.A.
	sales@zyxel.com	+1-714-632-0858	ftp.us.zyxel.com	
NORWAY	support@zyxel.no	+47 22 80 61 80	www.zyxel.no	ZyXEL Communications A/S Nils Hansens vei 13 0667 Oslo Norway
	sales@zyxel.no	+47 22 80 61 81		
SPAIN	support@zyxel.es	+34 902 195 420	www.zyxel.es	ZyXEL Communications Alejandro Villegas 33 1º, 28043 Madrid Spain
	sales@zyxel.es	+34 913 005 345		
SWEDEN	support@zyxel.se	+46 31 744 7700	www.zyxel.se	ZyXEL Communications A/S Sjöporten 4, 41764 Göteborg Sweden
	sales@zyxel.se	+46 31 744 7701		

METHOD	SUPPORT E-MAIL	TELEPHONE*	WEB SITE	REGULAR MAIL
LOCATION	SALES E-MAIL	FAX	FTP SITE	
UNITED KINGDOM	support@zyxel.co.uk	+44 (0) 1344 303044 08707 555779 (UK only)	www.zyxel.co.uk	ZyXEL Communications UK Ltd.,11, The Courtyard, Eastern Road, Bracknell, Berkshire, RG12 2XB, United Kingdom (UK)
	sales@zyxel.co.uk	+44 (0) 1344 303034	ftp.zyxel.co.uk	

* "+" is the (prefix) number you enter to make an international telephone call.

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Preface

Congratulations on your purchase of the ALC1248G ADSL2/2+ Line Card.

This preface discusses the conventions of this User's Guide. It also provides information on other related documentation.

Note: Register your product online to receive e-mail notices of firmware upgrades and information at www.zyxel.com for global products, or at www.us.zyxel.com for North American products.

About This User's Guide

This manual is designed to introduce you to the ALC1248G and give you detailed information about the line card features and hardware.

Related Documentation

- IES-5000 User's Guide

  Refer to the IES-5000 User's Guide for directions on installation, connections, maintenance, hardware trouble shooting and safety warnings.

- MSC1000G Management Switch Card User's Guide

  This user's guide covers the configuration of your IES-5000.

- ZyXEL Glossary and Web Site

  Please refer to www.zyxel.com for an online glossary of networking terms and additional support documentation.

Syntax Conventions

- "Enter" means for you to type one or more characters. "Select" or "Choose" means for you to use one of the predefined choices.
- Command and arrow keys are enclosed in square brackets. [ENTER] means the Enter, or carriage return key; [ESC] means the Escape key and [SPACE BAR] means the Space Bar.
- Mouse action sequences are denoted using a comma. For example, "In Windows, click **Start**, **Settings** and then **Control Panel**" means first click **Start**, then point your mouse pointer to **Settings** and then click **Control Panel**.
- "e.g.," is a shorthand for "for instance", and "i.e.," means "that is" or "in other words".
- "IES-5000" refers to the IES-5000 system including the main and splitter chassis and their cards.
- The "MSC" refers to the MSC1000G management switch card.
- The "ALC1248G", the "ALC" or the "line card" refers to the ALC1248G-51 for ADSL over POTS (Annex A). They also refer to the ALC1248G-53 for ADSL over ISDN (Annex B). Differentiation is made where needed.

Firmware Naming Conventions

A firmware version includes the model code and release number as shown in the following example.

Firmware Version: V3.50(ABD.0), V3.50(ABE.0)

"ABD" or "ABE" is the model code.

- "ABD" denotes the ALC1248G-51 for ADSL over POTS (Annex A).
- "ABE" denotes the ALC1248G-53 for ADSL over ISDN (Annex B).

"0" is this firmware's release number. This varies as new firmware is released. Your firmware's release number may not match what is displayed in this User's Guide.

User Guide Feedback

Help us help you. E-mail all User Guide-related comments, questions or suggestions for improvement to techwriters@zyxel.com.tw or send regular mail to The Technical Writing Team, ZyXEL Communications Corp., 6 Innovation Road II, Science-Based Industrial Park, Hsinchu, 300, Taiwan. Thank you.

CHAPTER 1
ALC1248G Overview

This chapter introduces the ADSL2/2+ line card's general features, factory default settings and hardware.

1.1 ALC1248G Overview

The ALC1248G ADSL2/2+ Line Card is perfect for ISPs or large building applications seeking to provide high bandwidth broadband services to subscribers while minimizing costs. One ALC provides ADSL service for 48 subscribers over existing telephone wiring, thus avoiding the cost and hassle of installing new wiring.

The line from the user carries both the ADSL and the voice signals. For each line, the splitter card separates the high frequency ADSL signal from the voice band signal and feeds the ADSL signal to the line card, while the voice band signal is diverted to the central office switch or PBX (Private Branch Exchange).

Use the Telco-50 connector pin assignments in Section 2.2 on page 22 along with the directions and safety warnings in the IES-5000's User's Guide to install the line card and make the necessary connections.

See the MSC1000G's User's Guide for detailed information on configuring the line card.

1.2 ADSL Standards Overview

These are the ADSL standards and rates that the ADSL line card supports at the time of writing. The actual transfer rates will vary depending on what the subscriber's device supports, the line conditions and the connection distance.

Table 1 ADSL Standards Maximum Transfer Rates

STANDARD	MAXIMUM DOWNSTREAM	MAXIMUM UPSTREAM
G.dmt	8160 Kbps	1024 Kbps
ANSI T1.413 issue 2	8160 Kbps	1024 Kbps
G.lite	1536 Kbps	512 Kbps
ADSL2	12000 Kbps	1200 Kbps
ADSL2 Annex M	12000 Kbps	2400 Kbps
ADSL2+	25000 Kbps	1200 Kbps
ADSL2+ Annex M	25000 Kbps	2400 Kbps

1.3 Features

ADSL Compliance

- Multi-Mode ADSL Standard

  -DMT T1.413, issue 2

  -G.DMT (ITU G.992.1) Annex A

  -G.DMT (ITU G.992.1) Annex B

  -G.LITE (ITU G.992.2)

- ADSL2

  -G.992.3 Annex A

  -G.992.3 Annex B

- ADSL2+

  -G.992.5 Annex A

  -G.992.5 Annex B

IEEE 802.1p Priority

The system uses IEEE 802.1p priority to assign priority levels to individual PVCs. The system can also handle multiple IEEE 802.1p priority queues on a single PVC.

System Monitoring

- System status (link status, rates, statistics counters)
- Temperatures, voltage reports and alarms.

System Error Logging

The ALC's system error log will record error logs locally. These logs may be viewed again after a warm restart.

Configurable Alarms

The system allows you to customize the priority levels of individual alarms and the alarm severity threshold for recording alarms on an individual port(s).

Alarm LED

An **ALM** (alarm) LED lights when the ALC is overheated or the voltage readings are outside the tolerance levels and turns off when the temperature or voltage has returned to a normal level. Fans in the main chassis cool the unit.

IEEE 802.1Q Tagged VLAN

Your ALC uses the IEEE 802.1Q Tagged VLAN (Virtual Local Area Network), which allows it to deliver tagged/untagged frames to and from its ports. The IES-5000 supports up to 4094 individual VLANs.

IEEE 802.1x Port-based Authentication

The ALC supports the IEEE 802.1x standard for centralized user authentication and accounting management through an optional network authentication (RADIUS) server.

MAC (Media Access Control) Filter

Use the MAC filter to filter incoming frames based on MAC (Media Access Control) address(es) that you specify. You may enable/disable the MAC filter on specific ports. You may specify up to ten MAC addresses per port.

MAC (Media Access Control) Count Limit

You can limit the number of MAC addresses that may be dynamically learned on a port. You may enable/disable the MAC count filter on individual ports.

IGMP Count Limit

You can limit the number of IGMP groups a subscriber on a port can join. You may enable/disable the IGMP count limit on individual ports.

Static Multicast

Use static multicast to allow incoming frames based on multicast MAC address(es) that you specify. This feature can be used in conjunction with IGMP snooping to allow multicast MAC address(es) that are not learned by IGMP snooping. You can use static multicast to pass routing protocols, such as RIP and OSPF.

IGMP Snooping

With IGMP snooping, group multicast traffic is only forwarded to ports that are members of that group. IGMP snooping generates no additional network traffic, allowing you to significantly reduce multicast traffic passing through your IES-5000.

IGMP Proxy

The IES-5000 can act as an IGMP proxy device to reduce multicast traffic. It issues IGMP host messages to a multicast router or server on behalf of the connected multicast hosts.

Profile Server

The profile server feature allows you to manage profiles on multiple IES-5000's.

Multiple PVC and ATM QoS

The IES-5000 allows you to use different channels (also called Permanent Virtual Circuits or PVCs) for different services or subscribers. Define channels on each DSL port for different services or levels of service and assign each channel a priority. ATM Quality of Service (QoS) allows you to regulate the average rate and fluctuations of data transmission. This helps eliminate congestion to allow the transmission of real time data (such as audio and video).

Priority-based PVCs

The system provides Priority-based PVCs (PPVCs) to give different priorities to PVCs that are members of the same VLAN. Use up to eight priority queues for the member PVCs. The system maps frames with certain IEEE 802.1p priorities to a PVC with a particular priority queue.

1.4 Front Panels

The figure below shows the front panel of the ALC.

Figure 1   Front Panel
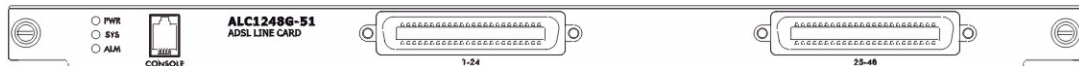
1.5 Ports and LEDs

These are the details of the ALC1248G ports and LEDs.

1.5.1 Ports

The following table describes the port labels on the front panel.

Table 2   Front Panel Ports

LABEL	DESCRIPTION
CONSOLE	For troubleshooting purposes, this mini RJ-11port connects to a computer when the line card is not manageable from the MSC.
1-24, 25-48	These Telco-50 connectors are for connecting the ALC to the splitter cards.

1.5.2 LEDs

The following table describes the LED indicators on the front panel of the ALC.

Table 3 LED Descriptions

LED	COLOR	STATUS	DESCRIPTION
PWR	Green.	On	The line card is turned on.
		Off	The line card is off.
SYS	Green	Blinking	The line card is rebooting and performing self-diagnostic tests.
		On	The line card is on and functioning properly.
		Off	The power is off or the line card is not ready/malfunctioning.
ALM	Red	On	There is a hardware failure.
		Off	The line card is functioning normally.

1.6 Default Settings

These are the line card's factory default settings.

Table 4 Default Settings

VLAN Default Settings		
One VLAN is created (this is also the management VLAN).		
VID:	1	
Registration	Fixed	
Tagging:	Untagged for all ports	
ADSL Port Profile Default Settings		
Name:	DEFVAL	
Profile Status:	Active	
Latency Mode:	Interleave	
	Upstream ADSL Settings:	Downstream ADSL Settings:
Max Rate	1000 Kbps	24000 Kbps
Min Rate	64 Kbps	64 Kbps
Interleave Delay	20 ms	20 ms
Max SNR	31 db	31 db
Min SNR	0 db	0 db
Target SNR	6 db	6 db
Virtual Channel Default Settings		
VPI:	0	
VCI:	33	
ATM Profile:	DEFVAL	

Table 4 Default Settings

ATM Profile Default Settings		
Name	DEFVAL	
Traffic Class	UBR	
Peak Cell Rate (PCR)	300000 cells/sec.	
Cell Delay Variation Tolerance (CDVT)	0	
Default IGMP Filter Profile Settings		
The **DEFVAL** IGMP filter profile is assigned to all of the DSL ports by default. It allows a port to join all multicast IP addresses (224.0.0.0~239.255.255.255).		

CHAPTER 2
Specifications

This chapter gives details about the line card hardware and features.

2.1 Product Specifications

Table 5   Device Specifications

Dimensions	390.6 mm (W) x 231.0 mm (D) x 24.0 mm (H)
Weight	0.5 kg
Interface	• Two Telco-50 connectors: 48 ADSL Ports • One mini RJ11 console port for local management
MAC Address Table	Up to 16K entries
Max. Number of IGMP Filter Profiles	128
Operation Temperature	0º C ~ 50º C
Storage Temperature	-40º C ~ 85º C
Operation Humidity	20% ~ 95% RH (non-condensing)
Storage Humidity	5% ~ 95% RH (non-condensing)
ADSL Compliance	Multi-Mode ADSL Standard • DMT T1.413, issue 2 • G.DMT (ITU G.992.1) Annex A • G.DMT (ITU G.992.1) Annex B • G.LITE (ITU G.992.2) ADSL2 • G.992.3 Annex A • G.992.3 Annex B ADSL2+ • G.992.5 Annex A • G.992.5 Annex B

Table 5   Device Specifications

Certifications	CE Conformity
	FCC
	ITU-T K.20
	
	Safety
	    IEC 60950-1
	    EN 60950-1
	    CSA 60950-1
	    UL 60950-1
	
	EMC
	    EN 300386
	    EN 55022
	    EN 61000-3-2
	    EN 61000-3-3
	    EN 55024

Other Features	• MAC Filtering • MAC Count Limiting • Hardware-based Multicasting • IEEE 802.1Q VLAN Tagging • GVRP • IEEE 802.1p CoS with Priority Queuing • IEEE 802.1w RSTP • IGMP v1 & v 2 Snooping • DHCP Relay Option82 • IEEE 802.1x Port-based Authentication

2.2 Telco-50 Connector Pin Assignments

The following diagrams show the pin assignments of the Telco-50 connector.

Figure 2 USER 1-24 Telco-50 Pin Assignments
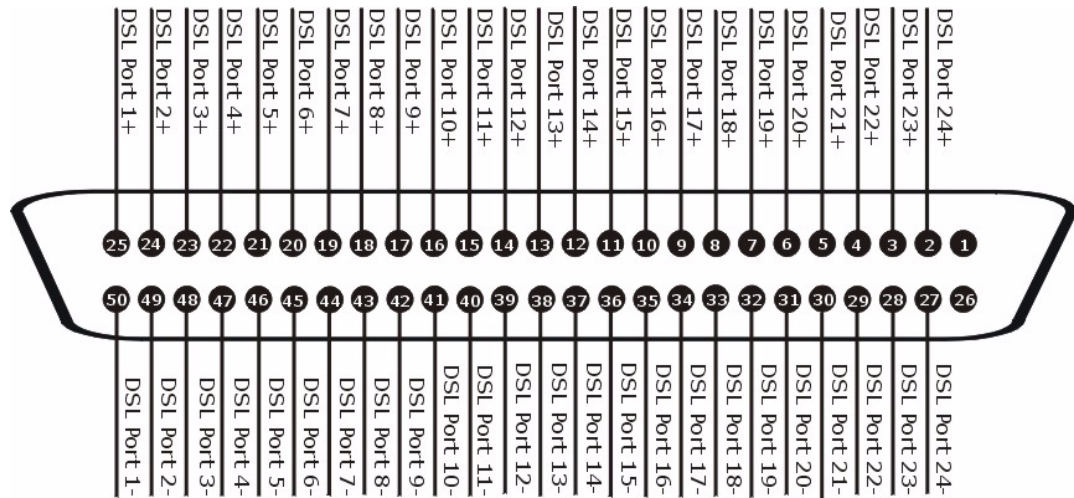
Figure 3 USER 25-48 Telco-50 Pin Assignments
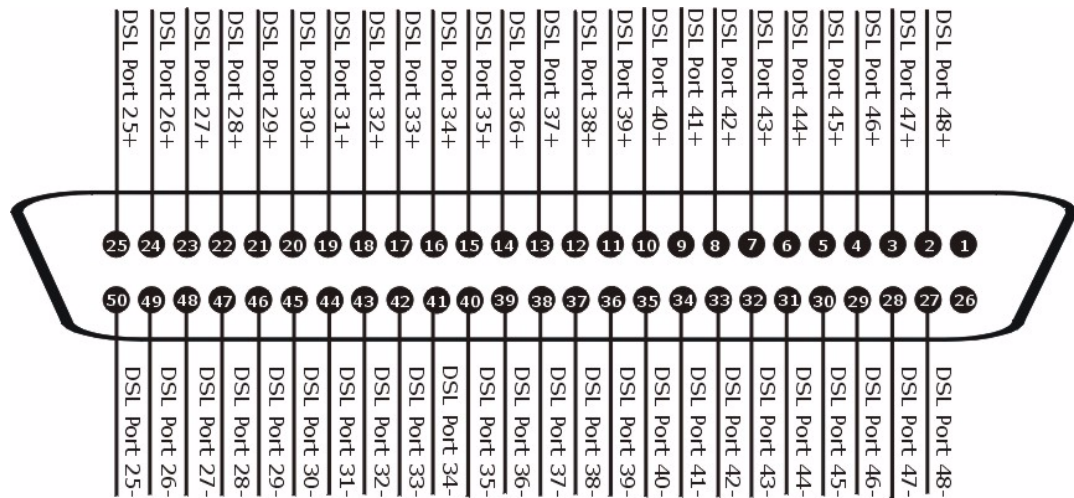
This table lists the ports and matching pin numbers for the hardware Telco-50 connector.

Table 6 Hardware 1-24 Telco-50 Connector Port and Pin Numbers

PORT NUMBER	PIN NUMBER
1	25, 50
2	24, 49
3	23, 48
4	22, 47
5	21, 46
6	20, 45
7	19, 44
8	18, 43

Table 6 Hardware 1-24 Telco-50 Connector Port and Pin Numbers (continued)

PORT NUMBER	PIN NUMBER
9	17, 42
10	16, 41
11	15, 40
12	14, 39
13	13, 38
14	12, 37
15	11, 36
16	10, 35
17	9, 34
18	8, 33
19	7, 32
20	6, 31
21	5, 30
22	4, 29
23	3, 28
24	2, 27

Table 7 Hardware 25-48 Telco-50 Connector Port and Pin Numbers

PORT NUMBER	PIN NUMBER
25	25, 50
26	24, 49
27	23, 48
28	22, 47
29	21, 46
30	20, 45
31	19, 44
32	18, 43
33	17, 42
34	16, 41
35	15, 40
36	14, 39
37	13, 38
38	12, 37
39	11, 36
40	10, 35
41	9, 34

Table 7 Hardware 25-48 Telco-50 Connector Port and Pin Numbers (continued)

PORT NUMBER	PIN NUMBER
42	8, 33
43	7, 32
44	6, 31
45	5, 30
46	4, 29
47	3, 28
48	2, 27

2.3 Wire Gauge Specifications

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.

Table 8 Wire Gauge Specifications

WIRE TYPE	REQUIRED AWG NO. (DIAMETER)
Telephone Wire	26 or larger

2.4 Console Cable Pin Assignments

The following diagram and chart show the pin assignments of the console cable.

Figure 4 Console Cable Mini RJ-11 Male Connector
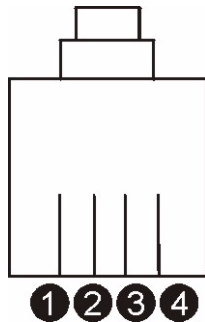
Table 9 Console Cable Connector Pin Assignments

MINI RJ-11 MALE
Pin 2: TXD

Table 9   Console Cable Connector Pin Assignments

MINI RJ-11 MALE
Pin 3: RXD
Pin 4: GND

CHAPTER 3
Troubleshooting

This chapter covers potential problems and possible remedies. After each problem description, some steps are provided to help you to diagnose and solve the problem.

3.1 The SYS or PWR LED Does Not Turn On

Table 10 SYS LED Troubleshooting

STEPS	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 the IES-5000 User's Guide).
2	Make sure the power wires are connected properly.
3	Make sure the line card is properly installed.
4	The LED itself or the unit may be faulty; contact your vendor.

3.2 The ALM LED Is On

The **ALM** (alarm) LED lights when the line card is overheated or the voltage readings are outside the tolerance levels.

Table 11 ALM LED Troubleshooting

STEPS	CORRECTIVE ACTION
1	Use the `sys monitor status` command to verify the cause of the alarm. See step 2 if the unit is overheated, and step 3 if the voltages are out of the allowed ranges.
2	Ensure that the IES-5000 is installed in a well-ventilated area and that normal operation of the fans is not inhibited. Keep the bottom, top and all sides clear of obstructions and away from the exhaust of other equipment.
3	If the voltage levels are outside the allowed range, take a screen shot of the `sys monitor status` command display and contact your vendor.

3.3 DSL Data Transmission

The DSL link is up, but data cannot be transmitted.

Table 12 DSL Data Transmission Troubleshooting

STEPS	CORRECTIVE ACTION
1	Check the line card's port isolation settings.
	Check to see that the VPI/VCI and multiplexing mode (LLC/VC) settings in the subscriber's DSL modem or router match those of the DSL port.
	If the subscriber is having problems with video or other high-bandwidth services, make sure the line card's DSL port's data rates are set high enough.
2	Check the VLAN configuration.
3	Ping the line card from the computer behind the DSL modem or router.
	If you cannot ping, connect a DSL modem to a DSL port (that is known to work).
	If the DSL modem or router works with a different DSL port, there may be a problem with the original port. Contact the distributor.
	If using a different port does not work, try a different DSL modem or router with the original port.

3.4 Local Server

The computer behind a DSL modem or router cannot access a local server connected to the line card.

Table 13 Local Server Troubleshooting

STEPS	CORRECTIVE ACTION
1	Refer to Section 3.3 on page 28 to make sure that the subscriber is able to transmit to the line card.
2	Make sure the computer behind the DSL device has the correct gateway IP address configured.
3	Check the VLAN configuration (refer to the MSC User's Guide).
4	Check the cable and connections between the line card and the local server.
5	Try to access another local server.
	If data can be transmitted to a different local server, the local server that could not be accessed may have a problem.

3.5 Data Rate

The SYNC-rate is not the same as the configured rate.

Table 14   SYNC-rate Troubleshooting

STEPS	CORRECTIVE ACTION
1	Connect the DSL modem or router directly to the DSL port using a different telephone wire.
2	If the rates match, the quality of the telephone wiring that connects the subscriber to the DSL port may be limiting the speed to a certain rate. If they do not match when a good wire is used, contact the distributor.

3.6 Password

If you forget your password, you will need to use the console port to reload the factory-default configuration file (see).

3.7 The Line Card is not Manageable

The line card always uses the default configuration. Any changes you did to the line card are stored on the MSC. By default, the MSC is allowed to manage every line card. Use the `lcman show` command on the MSC to see a line card's connection status. If you still cannot manage the line card from the MSC, the line card's configuration file may be damaged or the firmware may be old, you may need to restore the default configuration file or upload new firmware using the line card's console port.

Note: The MSC resets the line card after a period of inactivity on the line card. This may damage the line card if you are uploading the default configuration file or new firmware to the line card. Use the `lcman disable <slot>` command on the MSC to prevent the MSC from managing the line card.

After you upload the file successfully, use the `lcman enable <slot>` command on the MSC to allow the MSC to manage the line card again.

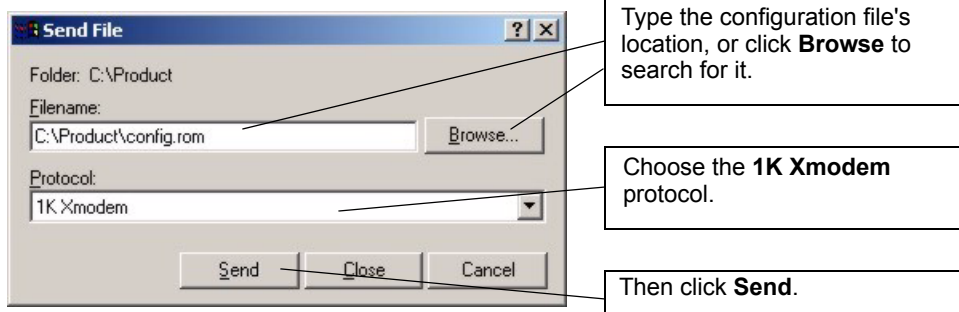Refer to the MSC User's Guide for details about commands.

3.7.1 Uploading the Default Configuration File via Boot Commands

Obtain the default configuration file, unzip it and save it in a folder. Use a console cable to connect a computer with terminal emulation software to the line card's console port. Pull out the line card and push it back in, you will see the initial screen. When you see the message `Press any key to enter Debug Mode within 3 seconds` press any key to enter debug mode.

To upload the configuration file, do the following:

1 Type `atlc` after the `Enter Debug Mode` message.

2 Wait for the `Starting XMODEM upload` message before activating XMODEM upload on your terminal.

3 This is an example Xmodem configuration upload using HyperTerminal. Click **Transfer**, then **Send File** to display the following screen.

Figure 5 Example Xmodem Upload

Type the configuration file's location, or click **Browse** to search for it.

Choose the **1K Xmodem** protocol.

Then click **Send**.

4 After a successful configuration file upload, type `atgo` to restart the line card.

```
Bootbase Version: V1.00 | 03/23/2005 16:10:06
FLASH: AMD 32M
Hardware Version:
Serial Number:
RAM: Size = 133120 Kbytes


ZyNOS Version: V3.50(ABE.0)b3 | 05/11/2005 11:56:26

Press any key to enter debug mode within 3 seconds.
...........
Enter Debug Mode
atlc
Starting XMODEM upload (CRC mode)....
CCCC
Total  393216 bytes received.

Erasing...
...................................................................................
.....OK

atgo
```
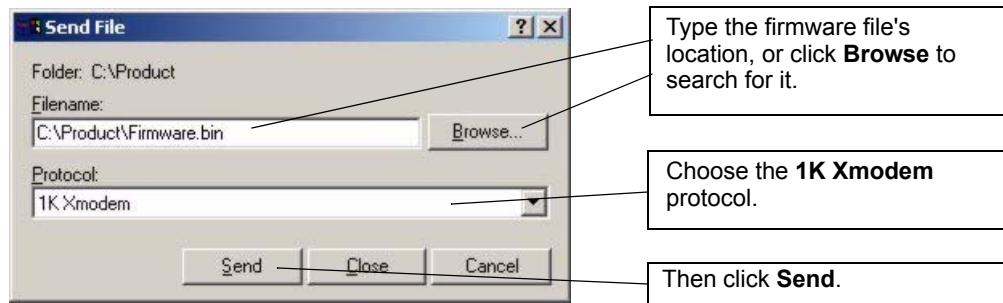
3.7.2 Uploading the Firmware via Boot Commands

Usually you should use FTP with the MSC to upload the line card's firmware. If you cannot manage the line card from the MSC, use the following procedure to upload firmware to the line card.

1 Obtain the firmware file, unzip it and save it in a folder on your computer.

2 Connect your computer to the console port and use terminal emulation software configured to the following parameters:

- VT100 terminal emulation
- 9600 bps
- No parity, 8 data bits, 1 stop bit
- No flow control

3 Pull out the line card and push it back in to restart it and begin a session.

4 When you see the `Press any key to enter Debug Mode within 3 seconds` message, press a key to enter debug mode.

5 Type `atba5` after the `Enter Debug Mode` message (this changes the console port speed to 115200 bps).

6 Change the configuration of your terminal emulation software to use 115200 bps and reconnect to the line card.

7 Type `atur` after the `Enter Debug Mode` message.

8 Wait for the `Starting XMODEM upload` message before activating XMODEM upload on your terminal.

9 This is an example Xmodem configuration upload using HyperTerminal. Click **Transfer**, then **Send File** to display the following screen.

Figure 6 Example Xmodem Upload

Type the firmware file's location, or click **Browse** to search for it.

Choose the **1K Xmodem** protocol.

Then click **Send**.

10After a successful firmware upload, the line card restarts. The console port speed automatically changes back to 9600 bps when the line card restarts.

```
Bootbase Version: V1.00 | 03/23/2005 16:10:06
FLASH: AMD 32M
Hardware Version:
Serial Number:
RAM: Size = 133120 Kbytes


ZyNOS Version: V3.50(ABE.0)b3 | 05/11/2005 11:56:26


Press any key to enter debug mode within 3 seconds.
...........
Enter Debug Mode
atba5
Now, console speed will be changed to 115200 bps


OK
atur
Starting XMODEM upload (CRC mode)....
CCCCCCCC
Total  2003968 bytes received.


Erasing..............................
..............................................................................
..............................................................................
..............................................................................
..............................................................................
..............................................................................
..............................................................................
.........
OK
System Reboot...
Console speed will be changed to 9600 bps
```

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