VLC1324G

VDSL2 Line Card

User's Guide

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ZyXEL

www.zyxel.com

About This User's Guide

Intended Audience

This manual is intended for users of the VLC1324G VDSL2 Line Card and the VSC1224-41 Splitter Card. It describes detailed information about the cards' features and hardware.

Related Documentation

- IES-5000 and IES-6000 User's Guides
  Refer to the IES-5000 or the IES-6000 User's Guide for directions on installation, connections, maintenance, hardware trouble shooting and safety warnings.
- MSC1000G and MSC1024G Management Switch Card User's Guides
  These user's guides cover the configuration of your IES-5000 or IES-6000. Refer to these user's guides for information on your VLC's default settings.
- ZyXEL Web Site
  Please refer to www.zyxel.com for additional support documentation and product certifications.

User Guide Feedback

Help us help you. Send all User Guide-related comments, questions or suggestions for improvement to the following address, or use e-mail instead. Thank you!

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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.

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

Syntax Conventions

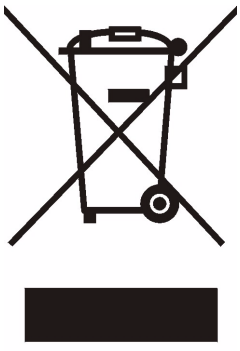
- The VLC1324G may be referred to as the "line card", the "VLC", the "device" or the "system" in this User's Guide.
- The "VLC1324G", the "VLC", the "device" and the "line card" refer to the VLC1324G-51 for VDSL over POTS (Annex A). They also refer to the VLC1324G-53 for VDSL over ISDN (Annex B). Differentiation is made where needed.
- "IES" refers to the IES-5000 or IES-6000 system, including the main chassis and all associated cards.
- "MSC" refers to the MSC1000GA management switch card.
- Product labels, screen names, field labels and field choices are all in **bold** font.
- A key stroke is denoted by square brackets and uppercase text, for example, [ENTER] means the "enter" or "return" key on your keyboard.
- "Enter" means for you to type one or more characters and then press the [ENTER] key. "Select" or "choose" means for you to use one of the predefined choices.
- A right angle bracket (>) within a screen name denotes a mouse click. For example, **Maintenance > Log > Log Setting** means you first click **Maintenance** in the navigation panel, then the **Log** sub menu and finally the **Log Setting** tab to get to that screen.
- Units of measurement may denote the "metric" value or the "scientific" value. For example, "k" for kilo may denote "1000" or "1024", "M" for mega may denote "1000000" or "1048576" and so on.

Safety Warnings

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.
- Connect ONLY suitable accessories to the device.
- Do NOT open the device or unit. Opening or removing covers can expose you to dangerous high voltage points or other risks. ONLY qualified service personnel should service or disassemble this device. Please contact your vendor for further information.
- 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.
- Do not use the device outside, and make sure all the connections are indoors. There is a remote risk of electric shock from lightning.
- Do NOT obstruct the device ventilation slots, as insufficient airflow may harm your device.
- Warning! To avoid risk of electric shock, remove only one card at a time and do not place fingers or objects inside the chassis. Cover empty slots with slot covers.

This product is recyclable. Dispose of it properly.



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PART I
Introduction, Specifications and Troubleshooting

1

VLC Overview

This chapter introduces the VDSL2 line card's general features, default settings and hardware.

1.1 VLC Overview

The VLC VDSL2 Line Card is perfect for ISPs or large building applications seeking to provide high bandwidth broadband services to subscribers while minimizing costs. One VLC provides VDSL2 service for 24 subscribers over existing telephone wiring, thus avoiding the cost and hassle of installing new wiring.

The line from the user carries both the VDSL2 and the voice signals. For each line, the splitter card separates the high frequency VDSL2 signal from the voice band signal and feeds the VDSL2 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 2.3 on page 25 along with the directions and safety warnings in the IES User's Guide to install the line card and make the necessary connections.

1.2 VDSL2 Profiles Overview

Here are the VDSL2 maximum transmission rates that the VLC 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.[1]

Table 1 VDSL2 Profile Maximum Transfer Rates

VDSL2 PROFILE	MAXIMUM DOWNSTREAM	MAXIMUM UPSTREAM
8a/b/c/d	85 Mbps	18 Mbps
12a/b	85 Mbps	50 Mbps
17a	100 Mbps	50 Mbps

1.3 Key Features

Here is a partial list of the VLC's features.

1. These are the highest link rates attained in testing. Actual data transfer rates will vary. These rates are for a single port. The ports cannot all simultaneously link up at these rates.

VDSL2 Compliance

- ITU-T
  -G.993.2
  -G.994.1

Discrete Multi-Tone (DMT) Modulation

The VLC is a DMT-based VDSL2 solution which dynamically adapts the bit transfer rate to conditions on the local loop. This allows the line card to sustain high performance even over noisy lines.

Transmit PSD Notches

The VLC supports the transmission of PSD (Power Spectral Density) notches at RFI (Radio Frequency Interference) bands. This reduces the effects of strong radio sources nearby.

Upstream Power Backoff

Upstream Power Backoff (UPBO) methods can be applied to VDSL2 networks, in order to solve FEXT (Far End Cross (X) Talk) noise effects in distributed environments.

Downstream Power Back-Off

The VLC1324G-51 supports the downstream power back-off (DPBO) in ITU-T G.997.1 to reduce far-end crosstalk.

Band Plan Support

The VLC supports the band plans defined in ITU-T G.993.2.

Alarm Profiles

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). The VLC also includes a DSL error (ES, SES, UAS) monitoring and alarm reporting mechanism.

VDSL2 Profiles

Profiles allow you to configure VDSL2 ports efficiently. You can configure all of the VDSL2 ports with the same profile, thus removing the need to configure the VDSL2 ports one-by-one. You can also change an individual VDSL2 port by assigning it a different profile. The VLC supports the following VDSL2 profiles:

- 8a
- 8b
- 8c
- 8d
- 12a
- 12b
- 17a

- The DS1 frequency band of the 17a profile starts at 138 kHz and the edge frequency of the upper band of the 17a profile is 17.664 MHz.
- The VDSL2 profiles are programmable and automatically adapt according to the line condition of each VDSL2 line.

VDSL2 to ADSL2+ Fallback

The VLC can automatically use ADSL2+ for connections where VDSL2 training fails. This allows a longer connection distance.

Spectral Mask

PSD (Power Spectral Density) defines the distribution of a VDSL line's power in the frequency domain. A PSD mask is a template that specifies the maximum allowable PSD for a line. The VLC transmitter signal complies with the Power Spectrum Density (PSD) mask specified in ITU-T G.993.2 and supports masks EU32_D32, EU36_D48, and EU40_D48.

Latency Mode

The VLC supports the latency path function specified in ITU-T G.993.2 and you can manually configure the payload transfer delay for interleaved transmissions.

Rate Adaption

Rate adaption lets the VLC adjust from the configured transmission rate to the attainable transmission rate automatically depending on the line quality. The VDSL transmission rate then stays at the new rate or adjusts if line quality improves or deteriorates.

The rate adaptation conforms to ITU-T G.993.2 and G.997.1 and is manually configurable and can adjust automatically based on the line quality as determined by the Signal-to-Noise Ratio (SNR).

Trellis Coding

The VLCuses Trellis coding (as specified in ITU-T G.993.2) to help reduce the noise in VDSL transmissions.

Impulse Noise Protection (INP)

Short impulses from external sources may cause bursts of errors which could impact multimedia (ex. voice, video, or picture) quality. The VLC's VDSL2 supports Impulse Noise Protection (INP) as defined ITU-T G.993.2. The VLC's impulse noise protection provides the ability to correct errors regardless of the number of errors in an errored DMT (Discrete Multi-Tone) symbol. You can configure the minimum impulse noise protection to provide up to 16 DMT symbols protection.

Loop Diagnostic

The VLC supports the loop diagnostic function specified in ITU-T G.993.2. The test parameters include quiet line noise, signal-to-noise ratio, loop attenuation, signal attenuation, signal-to-noise ratio margin, attainable net data rate, and far-end actual aggregate transmit power. After completing the loop diagnostic function, the VLC displays the test results and automatically returns to the normal state to be ready for initialization.

System Monitoring

- System status (link status, rates, statistics counters)
- Configurable temperature and voltage monitoring thresholds and alarm reports.

Alarm LED

An **ALM** (alarm) LED lights when the VLC 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.

CFM

The IEEE 802.1ag Connectivity Fault Management (CFM) specification allows network administrators to identify and manage connection faults. Through discovery and verification of the path, CFM can detect, analyze and isolate connectivity faults in bridged LANs. This is especially helpful when the route between a CO VDSL switch and one of its CPE goes through switches owned by independent organizations.

IEEE 802.1Q Tagged VLAN

Your VLC uses the IEEE 802.1Q Tagged VLAN (Virtual Local Area Network), which allows it to deliver tagged/untagged frames to and from its ports.

Port Isolation

The VLC's port isolation feature allows each port to communicate with the uplink port but not communicate with each other.

Isolation (per-VLAN)

Use isolation to block the VDSL2 subscribers in a specific VLAN from sending traffic directly to each other.

IEEE 802.1x Port-based Authentication

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

Packet Filter

The VLC supports packet filtering based on protocol. You can configure the VLC to accept all packets, accept PPPoE packets only or block any combination of the following protocols: IP, ARP, DHCP, EAPOL, PPPoE, NetBios or IGMP.

MAC (Media Access Control) Filter

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

MAC 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 Snooping

The VLC supports IGMP snooping enabling group multicast traffic to be only forwarded to ports that are members of that group; thus allowing you to significantly reduce multicast traffic passing through your VLC.

IGMP Filter

The IGMP filter defines multicast groups a port can join. You can create IGMP filter profiles which allow access to a multicast group, then assign the IGMP filter to a specific VDSL2 port.

Multicast Group Limit

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

Discarding of IGMP Query Messages

The VLC discards IGMP query messages received from subscriber ports. This prevents subscribers from hosting IGMP multicast servers.

IGMP Statistics

The VLC records the number of active users in an IGMP multicast channel (multicast group). The VLC also records IGMP message statistics on a per port basis to ease management and troubleshooting.

IGMP Message Rate Limiting

The VLC can limit how many IGMP message packets a subscriber can send per second. This prevents subscribers from flooding the multicast server.

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.

Multicast VLAN

Multicast VLAN is designed for applications (such as Media-on-Demand (MoD)) using multicast traffic across an Ethernet ring-based service provider network. Multicast VLAN allows one single multicast VLAN to be shared among different subscriber VLANs on the network. This improves bandwidth utilization by reducing multicast traffic in the subscriber VLANs and simplifies multicast group management.

Multicast Bandwidth Control

The VLC supports static bandwidth control for multicast traffic. Bandwidth limits can be assigned to multicast channels. During IGMP snooping, the system checks the total bandwidth usage to see if it exceeds the specified limit. If the specified limits are reached, the system restricts the joining of multicast groups on a per port basis.

DHCP Relay

DHCP (Dynamic Host Configuration Protocol RFC 2131 and RFC 2132) allows individual computers to obtain TCP/IP configuration at start-up from a server. You can configure the system as a DHCP relay agent to have another DHCP server provide TCP/IP configuration for the clients. In addition, you can set the system to forward client DHCP requests to specific DHCP servers based on the VLAN ID. You can also specify up to two DHCP servers for each VLAN to provide failover protection.

Rate Limiting

Rate limiting on the subscriber ports allows service providers to offer tiered service in increments of 64 Kbps. This service differentiation is not only to fulfill the needs of different customers, but also to provide a network infrastructure that combines guaranteed performance and flexibility in service provisioning.

DHCP Relay Option 82

The system supports DHCP relay agent82 (RFC 3046) that adds additional information to client DHCP requests that the MSC relays to a DHCP server. It also supports adding the sub-option 2 (Remote ID) with additional information.

DHCP Snooping

DHCP snooping allows the system to identify packets with DHCP server assigned IP address(es) and block access of devices using unknown IP addresses on a subscriber port. You can also manually add static IP addresses to the DHCP snooping table.

Anti-IP Address Spoofing

With DHCP snooping, a line card records which IP addresses are assigned on each port. The line card drops packets from a device using a different IP address.

Anti-MAC Address Spoofing

The VLC checks to make sure the MAC addresses of the devices connected to the DSL ports are not the same as MAC addresses of devices connected to the Ethernet network. This protects the network from disruptions of service caused by subscriber devices spoofing the MAC address of ISP servers.

Transparent LAN Service (TLS)

Use TLS (also known as VLAN stacking) to add an outer VLAN tag to the inner IEEE 802.1Q tagged frames that enter the network. This allows a service provider to provide different services based on specific VLANs, for many different customers.

1.4 Front Panel of VLC

The figure below shows the front panel of the VLC.

Figure 1 Front Panel

1.5 Ports and LEDs of VLC

These are the details of the VLC 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	These Telco-50 connectors are for connecting the VLC to the splitter cards.

1.5.2 LEDs

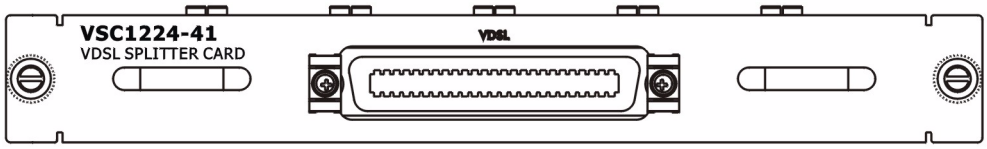
The following table describes the LED indicators on the front panel of the VLC.

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 malfunctioning.
ALM	Red	On	There is a hardware failure or alarm.
		Off	The line card is functioning normally.

1.6 VSC1224-41 POTS Splitter

Figure 2 Front Panel of VSC1224-41



A 24 port POTS splitter is used to differentiate analog signal from the VDSL2 band. The VLC1324G-51 uses the VSC1224-41 and the VLC1324G-53 uses the VSC1224-43U. The splitter is installed in the splitter chassis. See the IES User's Guide for installation instructions.

2

VLC Specifications

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

2.1 VLC Product Specifications

Table 4 VLC Specifications

Dimensions	390.6 mm (W) x 240.0 mm (D) x 13.8 mm (H)
Weight	1 kg
Interface	• One Telco-50 connector: 24 VDSL2 Ports • One mini RJ11 console port for local management
Operation Temperature	-40º C ~ 65º C
Storage Temperature	-40º C ~ 70º C
Operation Humidity	10% ~ 90% RH (non-condensing)
Storage Humidity	10% ~ 95% RH (non-condensing)
Power Consumption	Less than 70 Watts
Power Input	-36~-72 VDC (typical -48 VDC)
Fuse Rating	Number of fuses: 1 Type: T Amps: 4 Volts AC: 250 Dimensions: 5mm (D) x 20mm (L)
VDSL2 Compliance	ITU-T VDSL2 Standard • G.993.2 • G.994.1
MAC Address Table	4 K entries
Max. Number of IGMP Filter Profiles	128
Supported VDSL2 Profiles	8a, 8b, 8c, 8d, 12a, 12b, 17a
Number of VLANs per card	Up to 1 K individual VLANs
External Splitter Details	The VLC1324G-51 uses the VSC1224-41 splitter. The VLC1324G-53 uses the VSC1224-43U splitter. The splitter has a front panel Telco-50 connector for connecting to the VLC.
Supported Band Plans	ITU-T G.993.2 Annex A ITU-T G.993.2 Annex B (bandplans 997 and 998)

Table 4 VLC Specifications

Certifications	RoHS & WEEE compliant NEBS compliant ETSI 300-019 K.20 Safety EN60950-1 EN41003-1 ETSI300-386 CSA60950-1 UL60950-1 IEC60950-1 EMC FCC Part 15 Class A EN55022 Class A EN55024 Class A ETSI 300 386
Network Management	• Local debug function through a RS-232 port • Web-based configurator through MSC • SNMP v1, v2c and v3 based support through MSC • Remote debug through MSC (Telnet) • Status display and event report • Multi-level login through MSC
MIB	• RFC1213 SNMP MIB II • RFC1493 Bridge MIB· • RFC1643 Ethernet MIB· • RFC2674 Q MIB· • VDSL2 Line MIB (RFC3728)· • RFC1757 RMON MIB, group 1, 2, 3, 9 • ZyXEL proprietary MIB. - MIB for VDSL2 uplink/downlink SNR - MIB for VDSL2 interface Tx/Rx power - MIB for IGMP statistics per subscriber interface and per multicast VLAN basis, which at least include counters of IGMP join, IGMP leave and active multicast group(s) - MIB for counters of active users on a per-multicast group basis - MIB for VDSL2 line includes far-end and near-end Error Second (ES), Severely Error Second (SES) and Unavailable Second (UAS) at VTU-O, and near-end ES, SES and UAS at VTU-R - MIB for VDSL2 port includes the far-end and near-end Code Violation (incorrect Cyclic Redundancy Check, CRC) at VTU-O, and near-end Code Violation at VTU-R
Other Features	• Anti-IP Address Spoofing • Anti-MAC Address Spoofing • MAC Filtering • MAC Count Limiting • Hardware-based Multicasting • Multicast Group Limit • IGMP Message Rate Limiting • IEEE 802.1Q VLAN Tagging • IEEE 802.1p CoS with Priority Queuing • IGMP v1 & v 2 Snooping • DHCP Snooping • IEEE 802.1x Port-based Authentication • ACL profile • IEEE 802.1p Priority Mapping Sets • Transmit PSD

2.2 VLC Firmware Naming Conventions

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

Firmware Version: V3.90(AYL.0) , V3.90(BBW.0) ,

“AYL” or “BBW” is the model code.

- "AYL" denotes the VLC1324G-51 for VDSL over POTS (Annex A).
- "BBW" denotes the VLC1324G-53 for VDSL over ISDN (Annex B).

“0” is the 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.

2.3 Telco-50 Connector Pin Assignments

The following figures and table describe the pin assignments for the VLC’s Telco-50 connector. The splitter card’s Telco-50 connector and the USER and CO hardware Telco-50 connectors on the rear panel of the splitter chassis also use the same pin assignments.

Figure 3 VLC Ports 1-24 Telco-50 Connector Pin Assignments

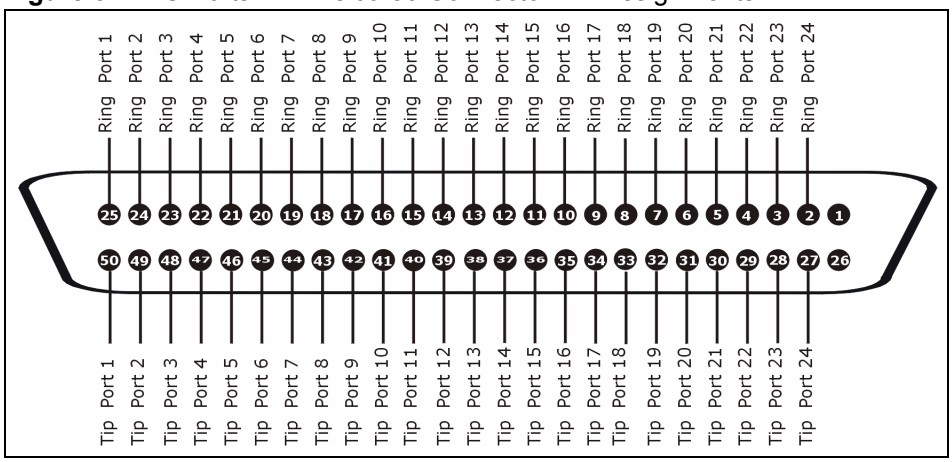


Table 5 VLC Telco-50 Connector Pin Assignments

PORTS 1-24			
Pin 1	NULL	Pin 26	NULL
Pin 2	Ring Port 24	Pin 27	Tip Port 24
Pin 3	Ring Port 23	Pin 28	Tip Port 23
Pin 4	Ring Port 22	Pin 29	Tip Port 22
Pin 5	Ring Port 21	Pin 30	Tip Port 21
Pin 6	Ring Port 20	Pin 31	Tip Port 20
Pin 7	Ring Port 19	Pin 32	Tip Port 19

Table 5 VLC Telco-50 Connector Pin Assignments (continued)

PORTS 1-24			
Pin 8	Ring Port 18	Pin 33	Tip Port 18
Pin 9	Ring Port 17	Pin 34	Tip Port 17
Pin 10	Ring Port 16	Pin 35	Tip Port 16
Pin 11	Ring Port 15	Pin 36	Tip Port 15
Pin 12	Ring Port 14	Pin 37	Tip Port 14
Pin 13	Ring Port 13	Pin 38	Tip Port 13
Pin 14	Ring Port 12	Pin 39	Tip Port 12
Pin 15	Ring Port 11	Pin 40	Tip Port 11
Pin 16	Ring Port 10	Pin 41	Tip Port 10
Pin 17	Ring Port 9	Pin 42	Tip Port 9
Pin 18	Ring Port 8	Pin 43	Tip Port 8
Pin 19	Ring Port 7	Pin 44	Tip Port 7
Pin 20	Ring Port 6	Pin 45	Tip Port 6
Pin 21	Ring Port 5	Pin 46	Tip Port 5
Pin 22	Ring Port 4	Pin 47	Tip Port 4
Pin 23	Ring Port 3	Pin 48	Tip Port 3
Pin 24	Ring Port 2	Pin 49	Tip Port 2
Pin 25	Ring Port 1	Pin 50	Tip Port 1

The following graphics show pin assignments for the Telco-50 connectors on the cables that connect the VLC to a splitter card in the splitter chassis.

Figure 4 IES-5000/5005 Cable Telco-50 Pin Assignments (VLC End)

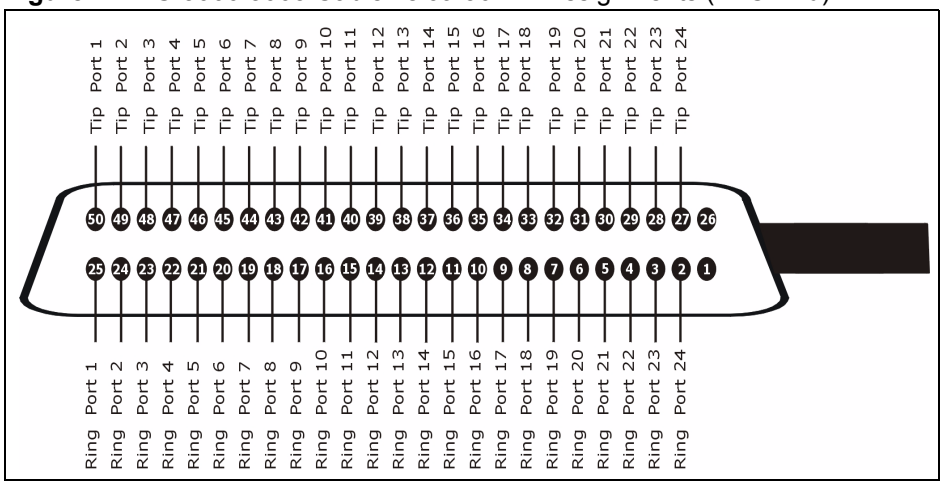


Figure 5 IES-5000/5005 Cable Telco-50 Pin Assignments (Splitter Card End)

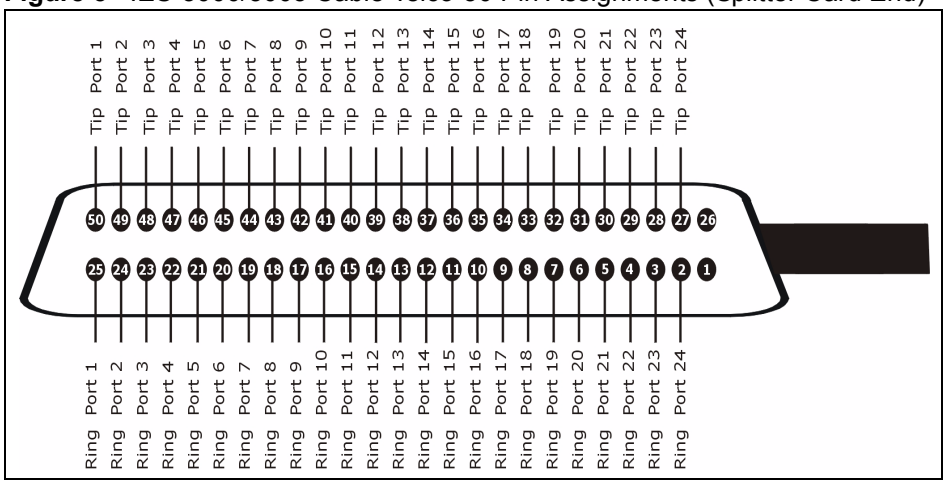


Figure 6 IES-6000 Cable Telco-50 Pin Assignments (VLC End)

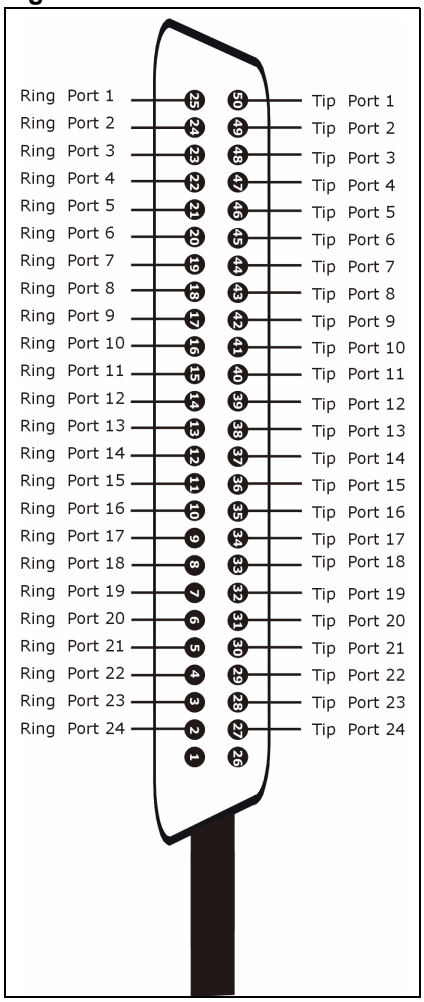
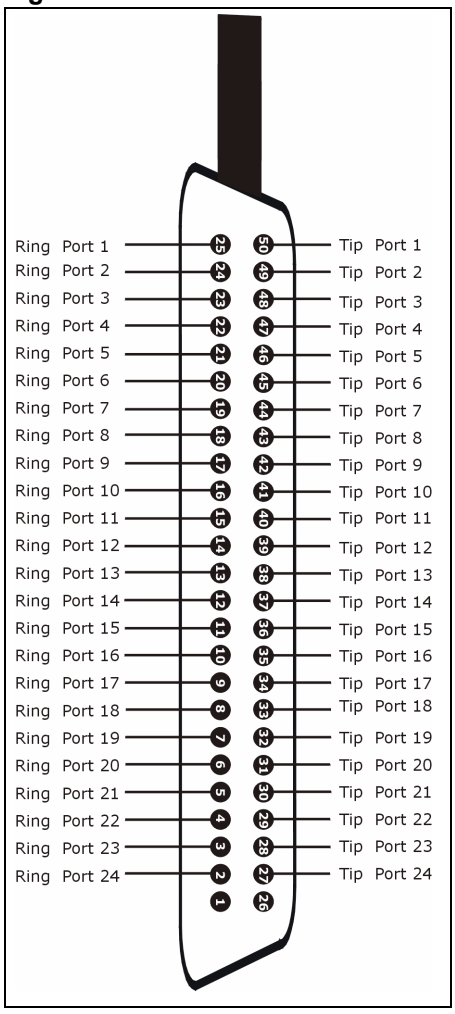


Figure 7 IES-6000 Cable Telco-50 Pin Assignments (Splitter End)



2.4 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 6 Wire Gauge Specifications

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

2.5 Console Cable Pin Assignments

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

Figure 8 Console Cable Mini RJ-11 Male Connector

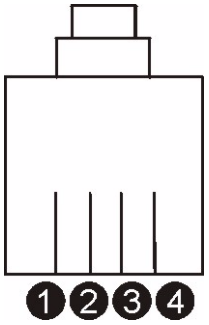


Table 7 Console Cable Connector Pin Assignments

MINI RJ-11 MALE
Pin 2: TXD
Pin 3: RXD
Pin 4: GND

2.6 VSC1224-41

The following table lists the splitter card specifications.

Table 8 VSC1224-41 CO Impedance Splitter Card Specifications

COUNTRY	POTS
Taiwan	900 Ω
Others	600 Ω

2.7 VSC1224-43U

The VSC1224-43U provides an impedance of 135 ohms and 150 ohms for ISDN.

3

VLC 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 9 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 User's Guide for details).
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 10 ALM LED Troubleshooting

STEPS	CORRECTIVE ACTION
1	Use the `sys monitor show` 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 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 show` command display and contact your vendor.

3.3 VDSL2 Data Transmission

The VDSL2 link is up, but data cannot be transmitted.

Table 11 VDSL2 Data Transmission Troubleshooting

STEPS	CORRECTIVE ACTION
1	Check the line card's port isolation settings. If the subscriber is having problems with video or other high-bandwidth services, make sure the line card's VDSL2 port's data rates are set high enough.
2	Check the VLAN configuration.
3	Ping the MSC from the computer behind the VDSL2 modem or router. If you cannot ping, connect a VDSL2 modem to a VDSL2 port (that is known to work). If the VDSL2 modem or router works with a different VDSL2 port, there may be a problem with the original port. Contact the distributor. If using a different port does not work, try a different VDSL2 modem or router with the original port.

3.4 Local Server

The computer behind a VDSL2 modem or router cannot access a local server connected to the line card.

Table 12 Local Server Troubleshooting

STEPS	CORRECTIVE ACTION
1	Refer to Section 3.3 on page 32 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.
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 13 SYNC-rate Troubleshooting

STEPS	CORRECTIVE ACTION
1	Connect the VDSL2 modem or router directly to the VDSL2 port using a different telephone wire.
2	If the rates match, the quality of the telephone wiring that connects the subscriber to the VDSL2 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 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.

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.

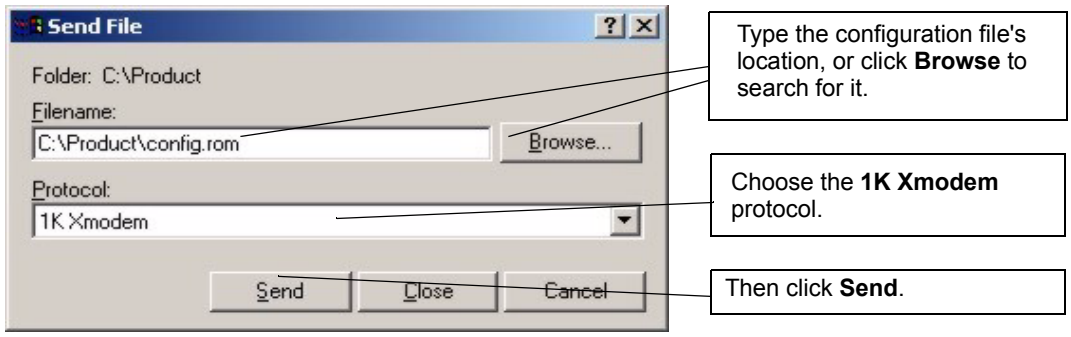
3.6.1 Uploading the Default Configuration File via Boot Commands

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 9 Example Xmodem Upload



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: V3.90(AYL.0)b5 | 1/01/2008 20:50:26

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
```

3.6.2 Uploading the Firmware via Boot Commands

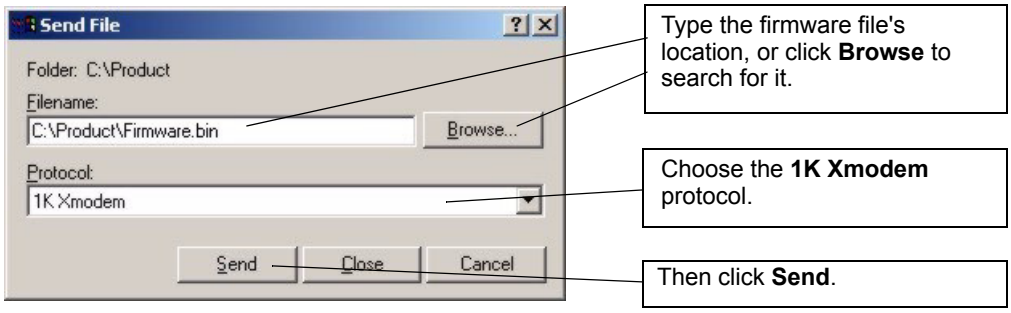
Usually you should use FTP or HTTP with the MSC to upload the line card's firmware. If you cannot manage the line card from the MSC, use the following procedure to upload firmware to the line card.

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
- No parity, 8 data bits, 1 stop bit
- 9600 bps
- 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 10 Example Xmodem Upload



10 After 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: V3.90(AYL.0)b5 | 1/01/2008 20:50:26

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
```

PART II Appendices and Index

A

Legal Information

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

- 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，
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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.

Viewing Certifications

1. Go to http://www.zyxel.com.
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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.

B

Customer Support

In the event of problems that cannot be solved by using this manual, 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. Regional offices are listed below (see also http://www.zyxel.com/web/contact_us.php). Please have the following information ready when you contact an office.

Required Information

- 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.

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

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