

*Dimension*  
*GS-1116 and GS-1124*

*Gigabit Switches*

*User's Guide*

March 2004

Version 0.1



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<sup>1</sup> “+” is the (prefix) number you enter to make an international telephone call.

Dimension GS-1116/GS-1124 Gigabit Switch

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# Table of Contents

|  |     |
|--|-----|
| Chapter 1 Getting to Know the Switch.....            | 1-1 |
| 1.1 Introduction.....                                | 1-1 |
| 1.2 Features.....                                    | 1-2 |
| 1.3 Package Contents.....                            | 1-3 |
| 1.4 Gigabit Switch Network Applications.....         | 1-3 |
| Chapter 2 Hardware Description and Installation..... | 2-1 |
| 2.1 Desktop Installation.....                        | 2-1 |
| 2.2 Rack-mounted Installation.....                   | 2-2 |
| 2.3 Rear Panel.....                                  | 2-3 |
| 2.4 Front Panel.....                                 | 2-3 |
| Chapter 3 Troubleshooting.....                       | 3-1 |
| 3.1 Introduction.....                                | 3-1 |
| 3.2 Improper Network Cabling and Topology.....       | 3-2 |





## List of Figures

|  |     |
|--|-----|
| Figure 1-1 GS-1116 .....   | 1-1 |
| Figure 1-2 GS-1124 .....   | 1-1 |
| Figure 1-3 Gigabit Switch for Server Farm .....                  | 1-4 |
| Figure 1-4 Gigabit Switch for Super User Work Groups .....       | 1-5 |
| Figure 2-1 Attaching Rubber Feet .....                           | 2-1 |
| Figure 2-2 Attaching Mounting Brackets and Screws .....          | 2-2 |
| Figure 2-3 Switch Mounting to an EIA Standard 19-inch Rack ..... | 2-2 |
| Figure 2-4 GS-1116/GS-1124 Rear Panel .....                      | 2-3 |
| Figure 2-5 GS-1116 Front Panel .....                             | 2-3 |
| Figure 2-6 GS-1124 Front Panel .....                             | 2-3 |
| Figure 2-7 Transceiver Installation Example .....                | 2-5 |
| Figure 2-8 Installed Transceiver .....                           | 2-5 |
| Figure 2-9 Opening the Transceiver's Latch Example .....         | 2-6 |
| Figure 2-10 Transceiver Removal Example .....                    | 2-6 |
| Figure 2-11 GS-1116 Front Panel LEDs .....                       | 2-7 |
| Figure 2-12 GS-1116 Front Panel LEDs .....                       | 2-7 |

## List of Tables

|   |     |
|---|-----|
| Table 2-1 GS-1116/GS-1124: Front Panel Ports .....                    | 2-3 |
| Table 2-2 Mini GBIC Slots LED Descriptions .....                      | 2-4 |
| Table 2-3 Network Cable Types .....                                   | 2-7 |
| Table 2-4 Front Panel LED Descriptions .....                          | 2-8 |
| Table 3-1 Troubleshooting PWR LED .....                               | 3-1 |
| Table 3-2 Troubleshooting LNK/ACT LED .....                           | 3-1 |
| Table 3-3 Troubleshooting 1000 LEDs .....                             | 3-1 |
| Table 3-4 Troubleshooting FDX LED .....                               | 3-2 |
| Table 3-5 Troubleshooting Improper Network Cabling and Topology ..... | 3-2 |

# Preface

Congratulations on your purchase of the Dimension GS-1116 or GS-1124 Gigabit Switch.

This preface introduces you to the Dimension GS-1116 and GS-1124 Gigabit Switch and discusses the organization and conventions of this User's Guide. It also provides information on other related documentation.

## About Gigabit Ethernet

Gigabit Ethernet is a 1Gbps (1000Mbps) extension of the IEEE 802.3 Ethernet networking standard. Its primary applications are in corporate LANs, campus networks and service provider networks where it can be used to tie together existing 100Mbps Ethernet networks.

## About the Dimension GS-1116 and GS-1124 Gigabit Switch

The GS-1116 or GS-1124 is designed to improve your network performance with high-speed data transmission over copper wire. The GS-1116 or GS-1124 provides an ideal upgrade path for existing Ethernet-based networks that need more bandwidth. It can be installed as a backbone network while retaining existing investments in Ethernet hubs, switches and wiring infrastructure.

## General Syntax Conventions

For brevity's sake, we will use "e.g." as shorthand for "for instance", and "i.e." as shorthand for "that is" or "in other words" throughout this manual.

The Dimension GS-1116 or GS-1124 Gigabit Switch may be referred to as the switch in this manual except where we refer to a specific switch.

## Related Documentation

ZyXEL Web Site

The ZyXEL download library at [www.zyxel.com](http://www.zyxel.com) contains additional support documentation and an online glossary of networking terms.

# Chapter 1

## Getting to Know the Switch

*This chapter describes the key features, benefits and applications of the switch.*

### 1.1 Introduction

The switch is designed for the campus or building environment as a high bandwidth backbone. The GS-1116 has 16 100/1000 Mbps RJ-45 ports. The GS-1124 has twenty-four 100/1000 Mbps RJ-45 ports. You can connect the switch to existing Ethernet routers, switches or hubs without additional expensive wiring or equipment installation.



**Figure 1-1 GS-1116**



**Figure 1-2 GS-1124**

Gigabit Ethernet over copper technology is a cost effective way of upgrading network equipment from fast Ethernet to Gigabit speed by using standard 4-pair Category 5 copper cabling. The Mini GBIC slots allow for fiber optic high-speed backbone connections.

Both ports 15 and 16 in the GS-1116 (or 23 and 24 in the GS-1124) support 3.3V Mini GBIC. The GBIC port auto detects between Giga copper and Mini GBIC. The Mini GBIC module is optional. When the Mini GBIC module is not installed, these act as Giga copper connections.

The switch is an ideal solution for solving traffic block at the core of the network. It offers auto-negotiation 100/1000Base-T Gigabit Ethernet ports that can significantly improve your network backbone performance.

## 1.2 Features

- Conforms to IEEE 802.3 10Base-T, IEEE802.3u 100Base-TX, IEEE802.3z Gigabit fiber and IEEE802.3ab 1000Base-T standards.
- IEEE 802.1p supports two priority queues for outgoing traffic helping improving network efficiency and performance.
- Auto-negotiating 100/1000Mbps Ethernet RJ-45 ports.
- Automatic MDI/MDIX supported.
- Switching fabric of 32Gbps in the GS-1116 and 48Gbps in the GS-1124.
- N-way Auto-negotiation supported.
- Embedded 4K MAC address table providing 4000 MAC addresses entries.
- 2 Megabits memory buffer.
- 3.3V Mini GBIC port for Gigabit fiber transceiver. .
- Two Gigabit copper ports.
- Supports auto address learning.
- Supports store-and-forwarding switching architecture for abnormal packet filtering.
- Back-Pressure-Base flow control on Half-duplex mode Ethernet ports.
- Pause-Frame-Base flow control on Full-duplex mode Ethernet ports.
- No-Blocking full wire speed architecture.
- One fan for good ventilation and to increase system heat sink performance.
- Power, 1000, LNK/ACT, FDX/COL LEDs and Mini-GBIC LEDs.
- Standard 19-inch rack mount design

### 1.2.1 IEEE 802.1p Class of Service

The IEEE 802.1p Class of Service (CoS) provides two queues for high and low priority traffic. This improves network efficiency and performance by giving higher priority to outgoing traffic. The lower queue has a priority value in the range of zero to three and the higher queue has a priority value in the range of four to seven.



**When the Mini GBIC module is installed, the Mini GBIC (Giga fiber) port has higher priority than Giga copper port. When the Mini GBIC port is connected, the Giga copper port is disabled.**

---

## 1.3 Package Contents

Compare the contents of your GS-1116/GS-1124 Gigabit Switch package with the checklist below. If any item is missing or damaged, please contact your local dealer.

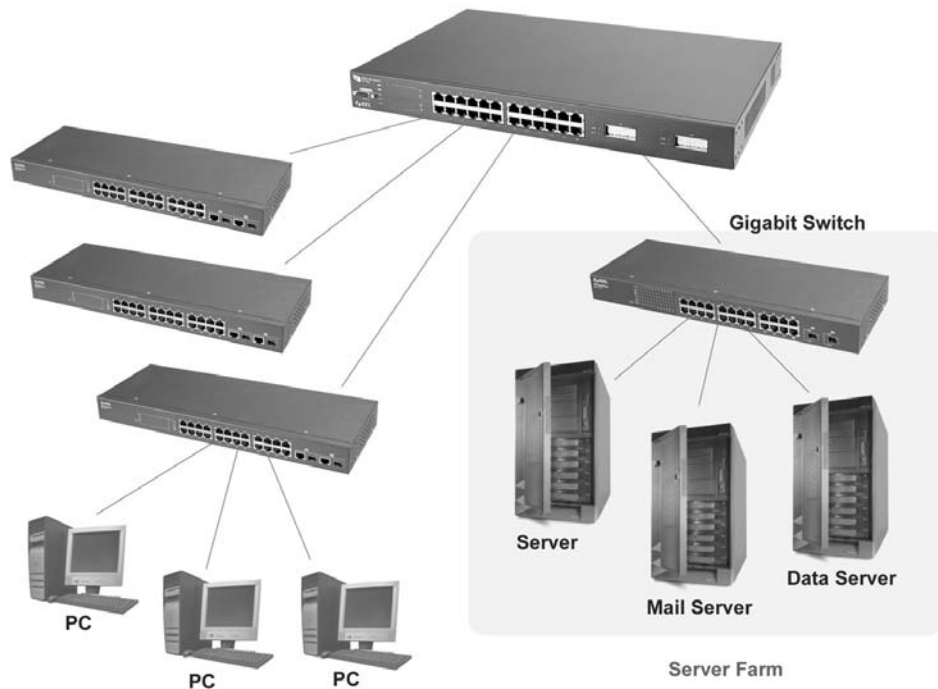
- GS-1116 or GS-1124 Gigabit switch
- Power cord
- Quickstart Guide
- This User's Guide in CD-ROM format.
- Four rubber feet
- Rack mount brackets

## 1.4 Gigabit Switch Network Applications

This section provides a sample of network topologies in which the Gigabit switch functions as a high-bandwidth backbone switch for a server farm or as a high-bandwidth backbone switch for a super user workgroup. The switch is an ideal upgrade for 100Mbps Ethernet networks. You can connect existing switches, hubs or computers with Gigabit 1000Base-T Ethernet adapters to the switch.

### 1.4.1 Gigabit Switch for Server Farm

The following figure depicts a 24-port 100/1000 TX plus 2 Mini GBIC Switch connected to a computer network and a server farm. For enterprise networks where large data broadcasts are constantly processed, this switch is suitable for connecting departmental switches to the core Gigabit switch through a number of servers. Connecting servers to the core Gigabit switch allows each end station to rapidly access the server's data and to smoothly communicate with all the devices in the network.



**Figure 1-3 Gigabit Switch for Server Farm**

### 1.4.2 Gigabit Switch for “Super User” Work Groups

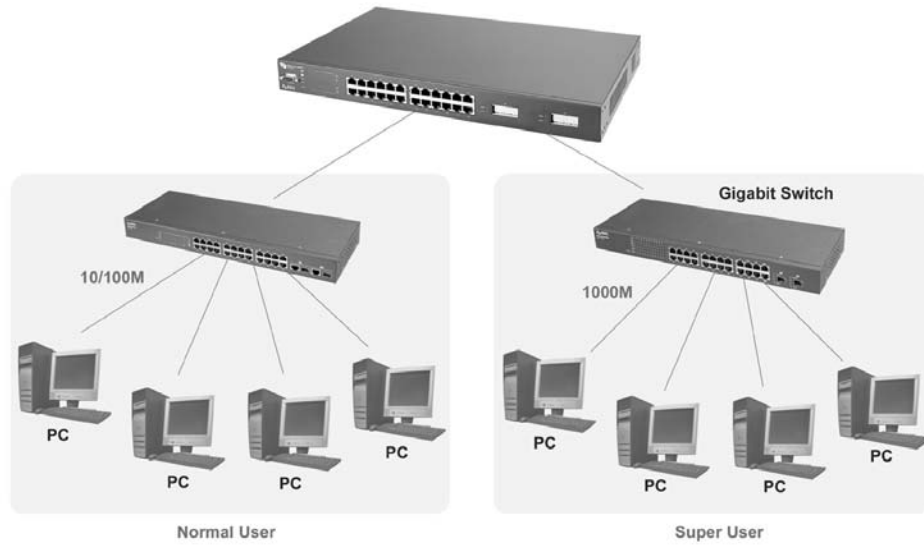
You can use the GS-1116 or the GS-1124 to connect servers, switches, workstations and computers (the Gigabit 1000Base-T NIC must be installed onto the computer) to each other.

The following figure depicts a typical backbone application of the switch in an enterprise environment. The “Normal User” workgroup and the “Super User” workgroup are connected to a switch via a 10/100Mbps switch and a Gigabit switch respectively. This enables the two networks to communicate with each other, prioritizing the “Super User” network with higher connection speeds through a Gigabit switch.

The “Normal User” workgroup runs applications that are not time sensitive and do not require large amounts of bandwidth, such as Internet browsing and e-mail.

The “Super User” workgroup runs bandwidth-hungry applications like large FTP file transfers and real time applications such as video conferencing.

The switch automatically learns node addresses, which are subsequently used to filter and forward all traffic based on the destination address. You can use the Mini GBIC slots to connect with a fiber optic network that extends your Ethernet network and to separate “Normal User” and “Super User” networks.



**Figure 1-4 Gigabit Switch for Super User Work Groups**





# Chapter 2

## Hardware Description and Installation

*This section discusses switch installations, hardware and functional overview.*

The switch is suited to an office environment where it can be rack mounted on standard EIA racks or placed as a standalone switch on a desktop.



**For proper ventilation, allow at least 4 inches (10 cm) of clearance at the front, 3.4 inches (8 cm) at the back of the switch. This is especially important for enclosed rack installations.**

---

### 2.1 Desktop Installation

1. Set the switch upside-down on a sturdy level space with a power outlet nearby.
2. Make sure there is enough clearance around the switch to allow air circulation and the attachment of cables and the power cord.
3. Remove the adhesive backing from the supplied rubber feet.
4. Attach the rubber feet to each corner on the bottom of the switch. These rubber feet help protect the switch from shock or vibration and ensure space between devices when stacking.
5. Turn the switch right side up after you attach the rubber feet.



**Figure 2-1 Attaching Rubber Feet**



**Do not block the ventilation holes. Leave space between switches when stacking.**

---

## 2.2 Rack-mounted Installation

The switch can be mounted on an EIA standard size, 19-inch rack or in a wiring closet with other equipment. Follow the steps below to mount your switch on a standard EIA rack using the included rack-mounting kit.

1. Align one bracket with the holes on one side of the switch and secure it with the bracket screws. Similarly, attach the other bracket.



**Figure 2-2 Attaching Mounting Brackets and Screws**

2. After attaching both mounting brackets, position the switch in the rack by lining up the holes in the brackets with the appropriate holes on the rack. Secure the switch to the rack with the rack's mounting screws.



**Figure 2-3 Switch Mounting to an EIA Standard 19-inch Rack**

## 2.3 Rear Panel

The ventilation fan and three-pronged power receptacle are located on the rear panel of the switch.



Figure 2-4 GS-1116/GS-1124 Rear Panel

### 2.3.1 Rear Panel Power Connection

Connect one end of the supplied power cord to the power receptacle on the back of the switch and the other end to the 100-240 VAC, 50-60 Hz power source. Push the power switch to the **ON** position.

## 2.4 Front Panel

The following graphics show the front panels of the GS-1116 and the GS-1124.



Figure 2-5 GS-1116 Front Panel



Figure 2-6 GS-1124 Front Panel

Table 2-1 GS-1116/GS-1124: Front Panel Ports

| CONNECTOR                           | DESCRIPTION  |
|-------------------------------------|--|
| 1-16 and 1-24 RJ-45 ports           | Connect these 100/1000 Mbps RJ-45 Ethernet ports to computers, hubs, Ethernet switches or routers.     |
| 17 - 18 and 25 - 26 mini GBIC ports | Use mini GBIC transceivers in these ports for fiber-optical connections to backbone Ethernet switches. |

### 2.4.1 100/1000Mbps RJ-45 Auto-negotiating Ports

The GS-1116 has 16 100/1000 Mbps RJ-45 ports. The GS-1124 has twenty-four 100/1000 Mbps RJ-45 ports. The auto-negotiation feature allows the switches to detect the speed of incoming transmission and adjust appropriately without manual intervention. It allows data transfers of either

- 100Mbps in half-duplex mode

- 100Mbps or 1000Mbps in full-duplex mode depending on your Ethernet network.

## 2.4.2 Auto-sensing (Auto MDI/MDIX) Ports

You can connect each RJ-45 auto-sensing port to a computer, hub or switch using either a straight through or a crossover Ethernet cable.

## 2.4.3 Mini GBIC Slots

These are slots for Mini GBIC (Gigabit Interface Converter) transceivers. A transceiver is a single unit that houses a transmitter and a receiver. The switch does not come with transceivers. You must use transceivers that comply with the Small Form-factor Pluggable (SFP) Transceiver MultiSource Agreement (MSA). See the SFF committee's INF-8074i specification Rev 1.0 for details.

You can change transceivers while the switch is operating. You can use different transceivers to connect to Ethernet switches with different types of fiber-optic connectors.



**To avoid possible eye injury, do not look into an operating fiber-optic module's connectors.**

---

- Type: SFP connection interface
- Connection speed: 1 gigabit per second (Gbps)

**Table 2-2 Mini GBIC Slots LED Descriptions**

| LED | COLOR  | STATUS   | DESCRIPTION  |
|-----|--------|----------|--|
| LNK | Green  | On       | The link to a 1000 Mbps (1 Gbps) Ethernet network is up.   |
|     |        | Off      | There is no link to a 1000 Mbps (1 Gbps) Ethernet network or the 1000 Mbps network link is down. |
| ACT | Yellow | Blinking | The system is transmitting/receiving Ethernet traffic.   |
|     |        | Off      | The system is not transmitting/receiving Ethernet traffic.                                       |

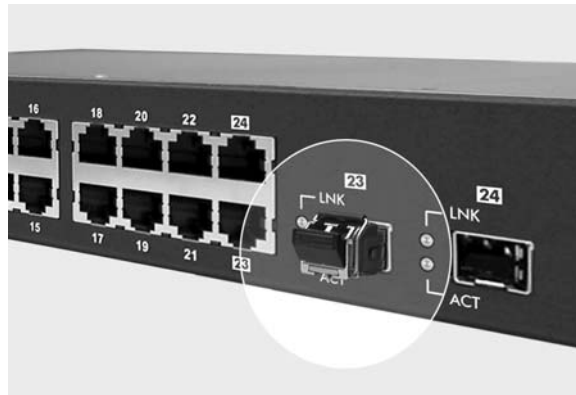
## Transceiver Installation

Use the following steps to install a mini GBIC transceiver (SFP module).

1. Insert the transceiver into the slot with the exposed section of PCB board facing down.
2. Press the transceiver firmly until it clicks into place.
3. The switch automatically detects the installed transceiver. Check the LEDs to verify that it is functioning properly.



**Figure 2-7 Transceiver Installation Example**

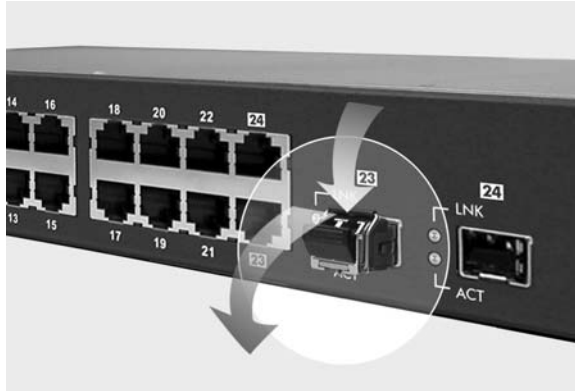


**Figure 2-8 Installed Transceiver**

### **Transceiver Removal**

Use the following steps to remove a mini GBIC transceiver (SFP module) from the GBIC port.

1. Remove the fiber-optic cables from the transceiver.
2. Unlock the transceiver's latch (latch styles vary).
3. Pull the transceiver out of the slot.
4. Put the transceiver's dust cover on the transceiver.



**Figure 2-9 Opening the Transceiver's Latch Example**



**Figure 2-10 Transceiver Removal Example**



**Keep the dust cover on a fiber optic module until you connect it.**

---

Use the appropriate Ethernet or fiber-optic cables to connect the module to an Ethernet switch. With a fiber-optic module, remove the dust covers from the connectors. You may need to clean the fiber-optic cable's connectors with a cotton swab dipped in alcohol.

#### **2.4.4 Front Panel Connections**

You can use unshielded twisted pair (UTP) or shielded twisted-pair (STP) Ethernet cables for RJ-45 ports. The following table describes the types of network cable used for the different connection speeds.

**Table 2-3 Network Cable Types**

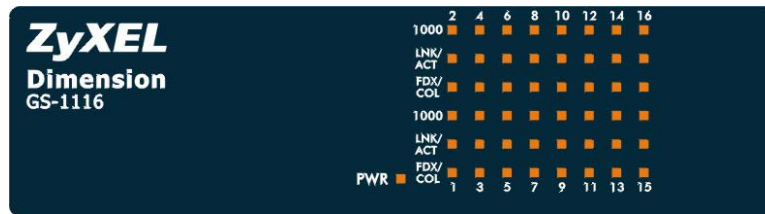
| SPEED    | NETWORK CABLE TYPE             |
|----------|--------------------------------|
| 100Mbps  | 100Ω 2-pair UTP/STP Category 5 |
| 1000Mbps | 100Ω 4-pair UTP/STP Category 5 |



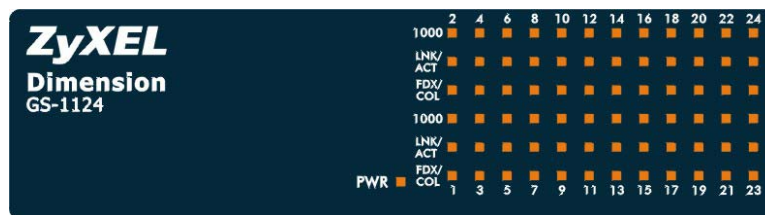
**Make sure the cable length between connections does not exceed 100 meters (328 feet).**

### 2.4.5 Front Panel LEDs

The LEDs give real-time status information.



**Figure 2-11 GS-1116 Front Panel LEDs**



**Figure 2-12 GS-1116 Front Panel LEDs**

The following table provides LED descriptions.

Table 2-4 Front Panel LED Descriptions

| <b>SYSTEM</b>                     |              |               |   |
|-----------------------------------|--------------|---------------|---|
| <b>LED</b>                        | <b>COLOR</b> | <b>STATUS</b> | <b>DESCRIPTION</b>  |
| PWR                               | Green        | On            | The switch is turned on and receiving power.  |
|                                   |              | Off           | The switch is off or not receiving power.   |
| <b>1000 BASE-T ETHERNET PORTS</b> |              |               |   |
| <b>LED</b>                        | <b>COLOR</b> | <b>STATUS</b> | <b>DESCRIPTION</b>  |
| 1000                              | Green        | On            | A link to a 1000Mbps Ethernet device is up.   |
|                                   |              | Off           | The port is not connected to a 1000Mbps Ethernet device.  |
| LNK/ACT                           | Green        | On            | The port is connecting with an Ethernet device.   |
|                                   |              | Blinking      | The port is receiving or transmitting data.   |
|                                   |              | Off           | No Ethernet device is attached.   |
| FDX/COL                           | Yellow       | On            | The port is operating in full-duplex mode.  |
|                                   |              | Blinking      | The port is operating in half-duplex mode and collisions are occurring. The more collisions there are, the faster the LED blinks. |
|                                   |              | Off           | No device is attached or the device is in half-duplex mode.   |
| <b>MINI-GBIC SLOTS</b>            |              |               |   |
| <b>LED</b>                        | <b>COLOR</b> | <b>STATUS</b> | <b>DESCRIPTION</b>  |
| LNK                               | Green        | On            | Port is connected at 1000Mbps.  |
|                                   |              | Off           | Port is not connected at 1000Mbps.  |
| ACT                               | Orange       | Blinking      | The port is receiving or transmitting data.   |



# Chapter 3

## Troubleshooting

*This section describes common problems you may encounter with the switch in your network and possible solutions.*

### 3.1 Introduction

Troubleshoot the switch using the LEDs to detect problems.

#### 3.1.1 PWR LED

The **PWR** LED on the front panel does not light up.

**Table 3-1 Troubleshooting PWR LED**

| STEPS | CORRECTIVE ACTION   |
|-------|---|
| 1     | Check the connections from your switch to the power source. Make sure you are using the supplied power cord and that you are using a 100 - 240V AC, 50/60Hz power source. |
| 2     | Make sure the power source is turned on and that the switch is receiving sufficient power.  |
| 3     | If these steps fail to correct the problem, contact your local distributor for assistance.  |

#### 3.1.2 LNK/ACT or LNK/ACT LED

The **LNK/ACT** (or **LNK/ACT**) LED does not light up when a device is connected.

**Table 3-2 Troubleshooting LNK/ACT LED**

| STEPS | CORRECTIVE ACTION  |
|-------|--|
| 1     | Verify that the attached device(s) is turned on and properly connected to your switch.   |
| 2     | Make sure the Ethernet adapters are working on the attached devices.   |
| 3     | Verify that proper network cable type is used and its length does not exceed 100 meters. For more information on network cable types, see <i>Table 2-3</i> . |

#### 3.1.3 100, 1000 LEDs

The LEDs do not show the speed of my Ethernet device.

**Table 3-3 Troubleshooting 1000 LEDs**

| STEPS | CORRECTIVE ACTION   |
|-------|---|
| 1     | Check the connection between the switch and your Ethernet device(s).  |
| 2     | Verify that you are using the proper cable type and that its length does not exceed 100 meters. For more information on network cable types, see <i>Table 2-3</i> . |

### 3.1.4 FDX/COL LED

What is the duplex mode of the Ethernet device?

**Table 3-4 Troubleshooting FDX LED**

| STEPS | CORRECTIVE ACTION   |
|-------|---|
| 1     | The Ethernet device is connected at full-duplex mode if the <b>FDX</b> LED is yellow but not blinking.                          |
| 2     | The Ethernet device is connected at half-duplex mode if the <b>FDX</b> LED is off but the <b>LNK/ACT</b> LED is on or blinking. |

## 3.2 Improper Network Cabling and Topology

Improper network cabling or topology setup is a common cause of poor network performance and network failure.

**Table 3-5 Troubleshooting Improper Network Cabling and Topology**

| DESCRIPTION  | PROBLEMS AND CORRECTIVE ACTION  |
|--|---|
| Faulty cables                                      | Using faulty network cables may affect data rates and have an impact on your network performance. Replace with new standard network cables.   |
| Non-standard network cables                        | Non-standard cables may increase the number of packet collisions and cause other network problems that affect your network performance. Refer to <i>Table 2-3</i> for more information on network cable types.                                |
| Cabling Length                                     | If you use longer cables than are needed, transmission quality may be affected. The network cables should not be longer than the limit of 100 meters.   |
| Too many hubs between the computers in the network | Too many hubs (or repeaters) between the connected computers in the network may increase the number of packet collisions or other network problems. Remove unnecessary hubs from the network.   |
| A loop in the data path                            | A data path loop forms when there is more than one path or route between two networked computers. This results in broadcast storms that will severely affect your network performance. Make sure there are no loops in your network topology. |

# Product Specifications

*This section provides the specifications of the switch.*

| GENERAL                           |  |
|-----------------------------------|--|
| Standards                         | IEEE802.3<br>IEEE802.3u 100BASE-TX<br>IEEE802.3z Gigabit fiber<br>IEEE802.3ab 1000Base-T<br>IEEE802.3x Flow Control  |
| Uplink Interface                  | GS-1116: 16x 1000Base-T Ethernet Ports<br>GS-1124: 24x 1000Base-T Ethernet Ports<br>Two 3.3V mini-GBIC slots, provide gigabit fiber connectivity<br>Connector type: RJ-45<br>Auto-MDIX<br>Pause frame for 100/1000 Mbps full duplex<br>Back pressure flow control for 100 Mbps half duplex |
| Media Interface Exchange          | All ports auto-sensing (auto MDI-/MDI-X)   |
| Data Transfer Rate                | Fast Ethernet: 100Mbps (half duplex)/200Mbps (full duplex)<br>Gigabit Ethernet: 2000Mbps(full duplex)  |
| Network Cables                    | 100BASE-TX: 2 pair STP Cat. 5 cable EIA/TIA 568 100Ohm(100M)<br>1000BASE-T: 4 pair STP Cat. 5 cable EIA/TIA 568 100Ohm(100M)   |
| Performance and Management        |  |
| Packet Forwarding Rate            | 148800PPS for 100BASE-TX<br>1488000PPS for 1000BASE-T  |
| Switching Method                  | Store-and-forward  |
| MAC Address Table (Auto-learning) | GS-1116: 4K entries<br>GS-1124: 4K entries   |
| Data Buffer                       | GS-1116: 2Mbits<br>GS-1124: 2Mbits   |
| Layer 2 features                  | Bridging: 4K MAC addresses<br>Switching fabric: GS-1116: 32Gbps<br>GS-1124: 48Gbps<br>IEEE802.1p egress, two priority queues<br>Support Frame size: 1522 bytes<br>Broadcast storm control  |
| Physical Environment              |  |
| Weight                            | Main switch: GS-1116: 3.5Kg, GS-1124: 3.5Kg  |

|                       |   |
|-----------------------|---|
| LED                   | <p>SYSTEM</p> <p>PWR (Green): On/Off</p> <p>16/24 x 1000BASE-T ETHERNET PORTS</p> <p>1000 (Green): On/Off</p> <p>LNK/ACT (Link/Activity), (Green): On/Blinking/Off</p> <p>FDX/COL (Full-duplex), (Yellow): On/Blinking/Off</p> <p>MINI-GBIC SLOTS</p> <p>LNK (Green): On/Off</p> <p>ACT (Green): Blinking</p> |
| Dimensions            | <p>440(W) x 161(D) x 44(H) mm</p> <p>19" rack mountable enclosure</p>   |
| Power Supply          | 100 - 240V AC, 50/60Hz internal universal power supply  |
| Power Consumption     | <p>GS-1116: 47W max</p> <p>GS-1124: 69W max</p>   |
| Operating Temperature | 0°C to 45°C (32°F to 113°F)   |
| Operational Humidity  | 10% to 90% (Non-condensing)   |
| EMI                   | FCC Class A, CE, C-Tick for NZ/AUS  |
| Safety                | UL, cUL   |

# Index

|  |     |  |     |
|--|-----|--|-----|
| 1000/ 100 Ethernet LED .....   | 2-4 | Installation                               |     |
| 802.3x .....   | 1-2 | Desktop .....                              | 2-1 |
| About the Dimension Gigabit Switch.....                                | xii | Network Application                        |     |
| Auto MDI/MDIX.....   | 2-4 | Backbone Switch.....                       | 1-3 |
| Auto-negotiation.....  | 2-4 | Network Cable Length Limit .....           | 2-7 |
| Cabling Length .....   | 3-2 | Network Cable Types.....                   | 2-7 |
| Campus Environment .....   | 1-1 | 1000Mbps .....                             | 2-7 |
| CE .....   | iv  | 100Mbps .....                              | 2-7 |
| Certification .....  | v   | Non-standard network cables.....           | 3-2 |
| class A.....   | iv  | Normal User workgroup .....                | 1-4 |
| Collisions .....   | 2-8 | Package Contents .....                     | 1-3 |
| Contacting Customer Support.....                                       | vii | Power Connection .....                     | 2-3 |
| Copyright.....   | ii  | Power Receptacle.....                      | 2-3 |
| CoS .....  | 1-3 | Product Specifications                     |     |
| Data path loop.....  | 3-2 | General.....                               | A   |
| Desktop Installation .....   | 2-1 | Performance and Management.....            | A   |
| Disclaimer.....  | ii  | Physical Environment .....                 | A   |
| Faulty cables .....  | 3-2 | Rack-mounted Installation .....            | 2-2 |
| FCC.....   | iv  | Rear Panel .....                           | 2-3 |
| FCC Rules.....   | iv  | Related Documentation.....                 | xii |
| Features.....  | 1-2 | Repair .....                               | iii |
| Federal Communications Commission (FCC)<br>Interference Statement..... | iv  | Return Material Authorization number ..... | iii |
| Front Panel.....   | 2-3 | RJ-45 ports .....                          | 2-4 |
| Front Panel Connections.....   | 2-6 | Server Farm.....                           | 1-3 |
| Front Panel LED .....  | 2-7 | Service.....                               | iii |
| Front Panel LED Descriptions.....                                      | 2-8 | Speed.....                                 | 3-1 |
| GBIC.....  | 2-4 | Store-and-Forward Switching .....          | 1-2 |
| Gigabit Ethernet.....  | xii | Super User workgroup .....                 | 1-4 |
| High Bandwidth Backbone.....   | 1-1 | Syntax Conventions .....                   | xii |
| IEEE 802.1p.....   | 1-3 | Trademarks .....                           | ii  |
| Installation   |     | Transceiver.....                           | 1-2 |
| Rack-Mounted .....   | 2-2 | Transceiver Installation.....              | 2-5 |
|  |     | Transceiver Removal .....                  | 2-5 |

|  |                              |     |
|--|------------------------------|-----|
| Troubleshooting                            | ventilation.....             | 2-1 |
| 100, 1000 LEDs .....                       | Ventilation Fan.....         | 2-3 |
| FD LED.....                                | Warranty.....                | iii |
| Troubleshooting                            | Work Groups.....             | 1-4 |
| Improper Network Cabling and Topology .3-2 | ZyXEL Limited Warranty ..... | iii |
| LK/ACT LED .....                           | Note .....                   | iii |
| PWR LED.....                               | ZyXEL Web Site.....          | xii |
| 3-1  |                              |     |