

1000Mbps  
GSW-Series

# 16/24-Port 10/100/1000Mbps Gigabit Ethernet Switch



**User's Manual**

**16/24-Port 10/100/1000Mbps**

**Gigabit Ethernet Switch**

**GSW-1601/GSW-2401/GSW-2416**

**User's Manual**

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## **Revision**

PLANET 16/24-Port 10/100/1000Mbps Gigabit Ethernet Switch User's Manual

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# 1. INTRODUCTION

## 1.1 Package Contents

Check the contents of your package for following parts:

- Gigabit Ethernet Switch x 1
- User's manual x 1
- Power cord x 1
- Rubber feet x 4
- Two rack-mounting brackets with attachment screws x1

If any of these are missing or damaged, please contact your dealer immediately, if possible, retain the carton including the original packing material, and use them against to repack the product in case there is a need to return it to us for repair.

## 1.2 How to Use This Manual

This Gigabit Ethernet Switch User Manual is structured as follows:

### **Chapter 2 Installation**

The chapter explains the feature, functionality and the physical installation of the Gigabit Ethernet Switch.

### **Chapter 3 Switch operation**

The chapter explains the Gigabit Ethernet Switch transmit operation.

### **Chapter 4 Troubleshooting**

The chapter explains the troubleshooting of the Gigabit Ethernet Switch.

### **Appendix A**

This chapter contains cable information of the Gigabit Ethernet Switch.

In the following section, the term "Gigabit Ethernet Switch" means the GSW-1601/GSW-2401 and GSW-2416.

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## 1.3 Product Features

- Comply with IEEE 802.3, 10Base-T, IEEE 802.3u 100Base-TX, IEEE 802.3ab 1000Base-T, IEEE 802.3z 1000Base-SX/LX Ethernet standard
- 16/24-Port 10/100/1000Mbps Gigabit Ethernet ports
- 16-Port SFP (Small Form-factor Pluggable) for 3.3V mini GBIC module, shared with port#9 to #24 (GSW-2416 only)
- Features Store-and-Forward mode with wire-speed filtering and forwarding rates
- Hardware based 10/100Mbps, half / full duplex and 1000Mbps full duplex mode, flow control and auto-negotiation
- IEEE 802.3x flow control for full duplex operation and Backpressure for half duplex operation
- Integrated address look-up engine, support 8K absolute MAC addresses
- 340/500/400K bytes on-chip frame buffer
- 9K Jumbo packet support
- Automatic address learning and address aging
- Supports Auto MDI/MDI-X function
- Support CSMA/CD protocol
- 100~240VAC, 50~60Hz universal Power input
- FCC, CE class A compliant



## 1.4 Product Specifications

<b>Product</b>	GSW-1601 / GSW-2401 / GSW-2416 16/24-Port 10/100/1000Mbps Gigabit Ethernet Switch
<b>Hardware Specification</b>	
<b>Ports</b>	16/24 10/100/1000Base-T RJ-45 Auto-MDI/MDI-X ports
<b>SFP Ports (GSW-2416 only)</b>	16 ports 3.3V mini-GBIC SFP, 1000Mbps full-duplex; shared with port #9 to port 24
<b>Switch Processing Scheme</b>	Store-and-Forward
<b>Throughput (packet per second)</b>	GSW-1601: 23.8Mpps. GSW-2401/GSW-2416: 35.7Mpps
<b>Switch fabric</b>	GSW-1601: 32Gbps. GSW-2401/GSW-2416: 48Gbps
<b>Address Table</b>	8K entries
<b>Share data Buffer</b>	GSW-1601: 340K bytes on-chip frame buffer GSW-2401: 500K bytes on-chip frame buffer GSW-2416: 400K bytes on-chip frame buffer
<b>Jumbo packet size</b>	9K
<b>Flow Control</b>	Back pressure for half duplex, IEEE 802.3x Pause Frame for full duplex
<b>Dimensions (W x D x H)</b>	GSW-1601/GSW-2401: 440 x 120 x 44 mm (1U height) GSW-2416: 440 x 200 x 44 mm (1U height)
<b>Weight</b>	GSW-1601: 1.54kg GSW-2401: 1.64kg GSW-2416: 2.6kg

<b>Power Requirement</b>	100~240 VAC, 50-60 Hz
<b>Power Consumption / Dissipation</b>	GSW-1601/GSW-2401: 30 watts / 102BTU GSW-2416: 130 watts / 443 BTU
<b>Temperature</b>	Operating: 0~50 degree C Storage -40~70 degree
<b>Humidity Operating:</b>	5% to 90%, Storage: 5% to 90% (Non-condensing)
<b>Standards Conformance</b>	
<b>Regulation Compliance</b>	FCC Part 15 Class A, CE
<b>Standards Compliance</b>	IEEE 802.3 (Ethernet) IEEE 802.3u (Fast Ethernet) IEEE 802.3ab(Gigabit Ethernet) IEEE 802.3z (Gigabit Ethernet) IEEE 802.3x (Full-duplex flow control)

## **2. INSTALLATION**

This section describes the functionalities of the Gigabit Ethernet Switch's components and guides how to install it on the desktop. Basic knowledge of networking is assumed. Please read this chapter completely before continuing.

### **2.1 Product Description**

The PLANET Gigabit Ethernet Switch is 10/100/1000Mbps Gigabit Ethernet Switch with 16/24 ports respectively, and non-blocking wire-speed performance. With 32/48Gbps internal switching fabric, the Gigabit Ethernet Switch can handle extremely large amounts of data in a secure topology linking to a backbone or high capacity servers.

The Gigabit Ethernet Switch has 8K MAC Address table and provides 340/400/500K bytes buffer memory. The Gigabit Ethernet Switch offers wire-speed packets transfer performance without risk of packet loss. The high data throughput of Gigabit Ethernet Switch makes it ideal for most Gigabit environments, especially while network upgrades to a Gigabit environment.

All RJ-45 copper interfaces support 10/100/1000Mbps Auto-Negotiation for optimal speed detection through RJ-45 Category 6, 5 or 5e cables. Support standard for Auto-MDI/MDI-X that can detect the type of connection to any Ethernet device without requiring special straight or crossover cables, the GSW-2416 provide 24 10/100/1000Base-T ports and together with 16-SFP(Small Form-factor Pluggable). Shared with port #9 to port #24, make the GSW-2416 be a 16-Port Gigabit fiber Switch with mini-GBIC fiber-optic module installed that shall provide long distance fiber connectivity.

#### **2.1.1 Product Overview**

The PLANET Gigabit Ethernet Switch with 16/24 RJ-45 10/100/1000Mbps ports for high-speed network connectivity. The Gigabit Ethernet Switch can also automatically identify and determine the correct transmission speed and half/full duplex mode of the attached devices with its 16/24 ports. The Gigabit port with jumbo frame feature supported, can handle

extremely large amounts of data transmission in a secure topology linking to a backbone or high-power servers.

The Gigabit Ethernet Switch also supports Store-and-Forward forwarding scheme to ensure low latency and high data integrity, eliminates unnecessary traffic and relieves congestion on critical network paths. With an intelligent address recognition algorithm, the Gigabit Ethernet Switch could recognize up to 8K different MAC address and enables filtering and forwarding at full wire speed.

The Flow Control function allows your Gigabit Switch supported routers and servers to directly connect to this Switch for fast, reliable data transfer.

### 2.1.2 Switch Front Panel

Figure 2-1 & 2-2 & 2-3 shows a front panel of Gigabit Ethernet Switch.

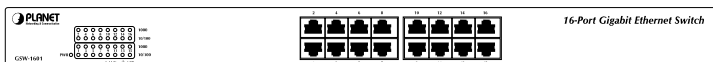


Figure 2-1 GSW-1601 front panel



Figure 2-2 GSW-2401 front panel

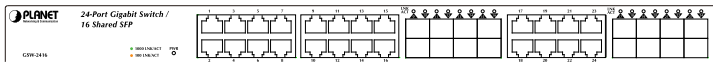


Figure 2-3 GSW-2416 front panel

### 2.1.3 LED Indicators

#### GSW-1601/GSW-2401 System

LED	Color	Function
PWR	Green	Lights to indicate that the Switch has power.

### Per 10/100/1000Mbps port

LED	Color	Function
1000	Green	Lights to indicate that the Switch is successfully connecting to the network at 1000Mbps. Blinks to indicate the Switch is receiving or sending data. Off to indicate the Switch is connecting to the network at 10Mbps or 100Mbps.
10/100	Green	Lights to indicate that the Switch is successfully connecting to the network at 100Mbps. Blinks to indicate the Switch is receiving or sending data. Off to indicate the Switch is connecting to the network at 10Mbps or 100Mbps.

### GSW-2416 System

LED	Color	Function
PWR	Green	Lights to indicate that the Switch has power.

### Per 10/100/1000Mbps port

LED	Color	Function
1000 LNK/ ACT	Green	Lights to indicate that the Switch is successfully connecting to the network at 1000Mbps. Blinks to indicate the Switch is receiving or sending data.
100 LNK/ ACT	Amber	Lights to indicate that the Switch is successfully connecting to the network at 100Mbps. Blinks to indicate the Switch is receiving or sending data.

## Per SFP Interface

LED	Color	Function
SFP LNK/ ACT	Green	Lights to indicate that the Switch is successfully connecting to the network at 1000Mbps through SFP interface. Blinks to indicate the Switch is receiving or sending data.

### 2.1.4 Switch Rear Panel

Figure 2-4 & 2-5 shows a rear panel of Gigabit Ethernet Switch.

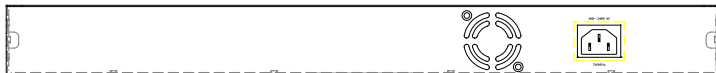


Figure 2-4 GSW-1601/GSW-2401 rear panel

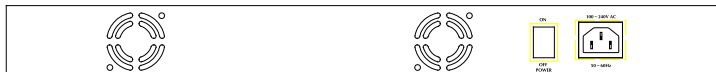


Figure 2-5 GSW-2416 rear panel

#### Power Notice:

1. The device is a power-required device, it means, it will not work till it is powered. If your networks should active all the time, please consider using UPS (Uninterrupted Power Supply) for your device. It will prevent you from network data loss or network downtime.
2. In some area, installing a surge suppression device may also help to protect your Gigabit Ethernet Switch from being damaged by unregulated surge or current to the Switch or the power adapter.

## 2.2 Installing the Switch

This part describes how to install your Gigabit Ethernet Switch and make connections to it. Please read the following topics and perform the procedures in the order being presented.



This Gigabit Ethernet Switch does not need software configuration.

### 2.2.1 Desktop Installation

To install the Gigabit Ethernet Switch on desktop, simply follow the next steps:

- Step 1:** Attach the rubber feet to the recessed areas on the bottom of the Gigabit Ethernet Switch.
- Step 2:** Place the Gigabit Ethernet Switch on desktop near an AC power source.
- Step 3:** Keep enough ventilation space between the Gigabit Ethernet Switch and the surrounding objects.



When choosing a location, please keep in mind the environmental restrictions discussed in Chapter 1, Section 1.4 Product Specifications.

- Step 4:** Connect your Gigabit Ethernet Switch to network devices.
  - A. Connect one end of a standard network cable to the 10/100/1000 RJ-45 ports on the front of the Gigabit Ethernet Switch.
  - B. Connect the other end of the cable to the network devices such as printer servers, workstations or routers...etc.



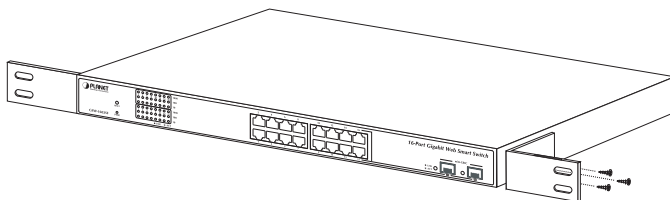
Connection to the Gigabit Ethernet Switch requires UTP Category 5 network cabling with RJ-45 tips. For more information, please see the Cabling Specification in Appendix A.

- Step 5:** Supply power to the Gigabit Ethernet Switch.
    - A. Connect one end of the power cable to the Gigabit Ethernet Switch.
    - B. Connect the power plug of the power cable to a standard wall outlet.
- When the Gigabit Ethernet Switch receives power, the Power LED should remain solid Green.

## 2.2.2 Rack Mounting

To install the Gigabit Ethernet Switch in a 19-inch standard rack, follow the instructions described below.

- Step 1:** Place your Gigabit Ethernet Switch on a hard flat surface, with the front panel positioned towards your front side.
- Step 2:** Attach a rack-mount bracket to each side of the Switch with supplied screws attached to the package. Figure 2-6 shows how to attach brackets to one side of the Gigabit Ethernet Switch.



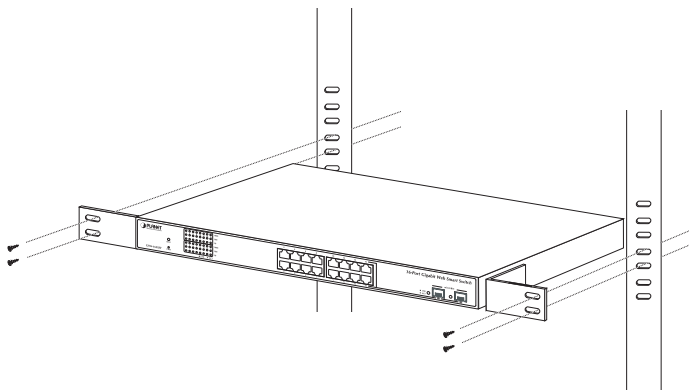
**Figure 2-6** Attaching the brackets to the Gigabit Ethernet Switch

### Caution:

You must use the screws supplied with the mounting brackets. Damage caused to the parts by using incorrect screws would invalidate your warranty.

- Step 3:** Secure the brackets tightly.
- Step 4:** Follow the same steps to attach the second bracket to the opposite side.
- Step 5:** After the brackets are attached to the Gigabit Ethernet Switch, use suitable screws to securely attach the brackets to the rack, as shown in Figure 2-7.





**Figure 2-7** Mounting the Gigabit Ethernet Switch in a Rack

**Step 6:** Proceeds with the steps 4 and steps 5 of session 2.2.1 Desktop Installation to connect the network cabling and supply power to your Gigabit Ethernet Switch.

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## **3. Switch Operation**

### **3.1 Address Table**

The Gigabit Ethernet Switch is implemented with an address table. This address table composed of many entries. Each entry is used to store the address information of some node in network, including MAC address, port no, etc. This information comes from the learning process of Gigabit Ethernet Switch.

### **3.2 Learning**

When one packet comes in from any port. The Gigabit Ethernet Switch will record the source address, port no. And the other related information in address table. This information will be used to decide either forwarding or filtering for future packets.

### **3.3 Forwarding & Filtering**

When one packet comes from some port of the Gigabit Ethernet Switch, it will also check the destination address besides the source address learning. The Gigabit Ethernet Switch will lookup the address-table for the destination address. If not found, this packet will be forwarded to all the other ports except the port which this packet comes in. And these ports will transmit this packet to the network it connected. If found, and the destination address is located at different port from this packet comes in, the Gigabit Ethernet Switch will forward this packet to the port where this destination address is located according to the information from address table. But, if the destination address is located at the same port with this packet comes in, then this packet will be filtered. Thereby increasing the network throughput and availability.

### **3.4 Store-and-Forward**

Store-and-Forward is one type of packet-forwarding techniques. A Store-and Forward Gigabit Ethernet Switch stores the incoming frame in

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an internal buffer, do the complete error checking before transmission. Therefore, no error packets occurrence, it is the best choice when a network needs efficiency and stability.

The Gigabit Ethernet Switch scans the destination address from the packet-header, searches the routing table provided for the incoming port and forwards the packet, only if required. The fast forwarding makes the switch attractive for connecting servers directly to the network, thereby increasing throughput and availability. However, the switch is most commonly used to segment existing hubs, which nearly always improves overall performance. An Ethernet Switching can be easily configured in any Ethernet network environment to significantly boost bandwidth using conventional cabling and adapters.

Due to the learning function of the Gigabit Ethernet Switch, the source address and corresponding port number of each incoming and outgoing packet are stored in a routing table. This information is subsequently used to filter packets whose destination address is on the same segment as the source address. This confines network traffic to its respective domain, reducing the overall load on the network.

The Gigabit Ethernet Switch performs "Store and Forward" therefore, no error packets occur. More reliably, it reduces the re-transmission rate. No packet loss will occur.

### **3.5 Auto-Negotiation**

The STP ports on the Gigabit Ethernet Switch have built-in "Auto-negotiation". This technology automatically sets the best possible bandwidth when a connection is established with another network device (usually at Power On or Reset). This is done by detect the modes and speeds at the second of both device is connected and capable of, both 10Base-T and 100Base-TX devices can connect with the port in either Half- or Full-Duplex mode. 1000Base-T can be only connected in Full-duplex mode.

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## **4. Troubleshooting**

This chapter contains information to help you solve issues. If the Gigabit Ethernet Switch is not functioning properly, make sure the Ethernet Switch was set up according to instructions in this manual.

### **The per port LED is not lit**

Solution:

Check the cable connection of the Gigabit Ethernet Switch.

### **Performance is bad**

Solution:

Check the speed duplex mode of the partner device. The Gigabit Ethernet Switch is run at Auto-negotiation mode and if the partner is set to half duplex, then the performance will be poor.

### **Per port LED is lit, but the traffic is irregular**

Solution:

Check that the attached device is not set to dedicate full duplex. Some devices use a physical or software switch to change duplex modes. Auto-negotiation may not recognize this type of full-duplex setting.

### **Why the Gigabit Ethernet Switch doesn't connect to the network**

Solution:

Check per port LED on the Gigabit Ethernet Switch. Try another port on the Gigabit Ethernet Switch. Make sure the cable is installed properly. Make sure the cable is the right type. Turn off the power. After a while, turn on power again.

## APPENDIX A NETWORKING CONNECTION

### A.1 Switch's RJ-45 Pin Assignments

#### 1000Mbps, 1000Base-T

Contact	MDI	MDI-X
1	BI_DA+	BI_DB+
2	BI_DA-	BI_DB-
3	BI_DB+	BI_DA+
4	BI_DC+	BI_DD+
5	BI_DC-	BI_DD-
6	BI_DB-	BI_DA-
7	BI_DD+	BI_DC+
8	BI_DD-	BI_DC-

#### 10/100Mbps, 10/100Base-TX

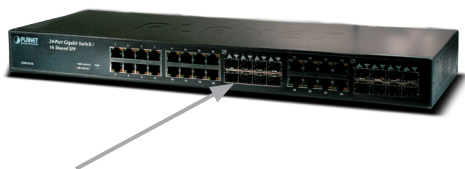
RJ-45 Connector pin assignment		
Contact	MDI Media Dependant Interface	MDI-X Media Dependant Interface - Cross
1	Tx + (transmit)	Rx + (receive)
2	Tx - (transmit)	Rx - (receive)
3	Rx + (receive)	Tx + (transmit)
4, 5	Not used	
6	Rx - (receive)	Tx - (transmit)
7, 8	Not used	



### A.3 Install the Mini-GBIC module

Please follow these steps to install the Mini-GBIC modules:

1. Power on the Gigabit Ethernet Switch and place it on a flat surface. Install the new Mini-GBIC modules by inserting it into the slots and sliding it in until it stops (See Figure A-2). Press it firmly until you feel the module snap into place. Never force, twist or bend the Mini-GBIC modules. The Mini-GBIC module slides in smoothly and the Gigabit Ethernet Switch will automatically detect the new module.



**Figure A-2** Insert the Mini-GBIC modules

2. After the fiber connection was built successfully. Check the LEDs to verify that if there is a link and a proper connection at the port.

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