Preface

This manual describes how to install and use the provided eight-port Fast Ethernet Switch, which features that 10/100BASE-TX ports automatically sense the presence of 100Mbps or 10Mbps Ethernet networks. 100BASE-FX Multi-mode and Single-mode fiber ports are also available for this product series.

To get the most out of this manual, you should have an understanding of networking concepts such as bridging, IEEE 802.3 Ethernet and 100BASE-TX/FX Fast Ethernet, and local area networks (LANs).

For more information about these topics, please refer to the Appendix.

Table of Contents

Chapter Overview

Introduction

A general overview of switching benefits and the features of the
Switch this manual accompanied with.

Installation

Everything you need to know to install and configure the Switch
with your network.

Specifications

The Switch's specifications at a glance.

Connector Pinouts

See Appendix A for more information.

Introduction to LAN & Ethernet Technologies

See Appendix B for more information.

Introduction

Benefits of Switching

Ethernet switching technology has dramatically boosted the total bandwidth of a network. It puts configuration flexibility and bandwidth adaptability into the local workgroups where the majority of work is generated.

It further eliminates congestion problems inherent to the CSMA/CD protocol and improves predictable response time under heavy network loads. Expensive routing equipment was used in the past to reduce the congestion under heavy loads.

The new wave of object-oriented client and server applications demands higher bandwidth and tighter integration of client work stations with servers. The old shared-access Ethernet technology provides neither enough bandwidth nor predictable response time for this new wave of workgroup computing.

Fast Ethernet switching not only satisfies both technical and business requirements, but also preserves the user's existing investment in the huge 10BASE-T Ethernet installed base.

This compatibility ensures a path for users to add, change, and migrate to Fast Ethernet as demands emerge. It also provides a low cost and flexible bandwidth solution directly to local workgroups where the majority of work is generated, reducing the need for expensive network equipment.

Eight Ports Ethernet Switch

The eight-port Fast Ethernet switch offered here adds 100Mbps switching performance in a cost-effective desktop package. The Switch has RJ-45 ports, each a 10/100 port capable of autosensing both speed and half/full duplex mode.

With the demand for fiber, this eight-port switch provides multi-mode fiber ports.

This switch makes it possible to join a 100Mbps Fast Ethernet network to an existing 10Mbps Ethernet network. Its internal cache buffers the traffic from the higher bandwidth 100Mbps segment to the 10Mbps segment. If you later decide to make both segments 100Mbps Fast Ethernet, the ports of the switch will automatically sense the change and adjust to 100Mbps operation (for RJ-45 ports only).

In addition to the benefits of integrating 10Mbps and 100Mbps networks, this switch is also useful for segmenting networks that is bogged down with excess traffic. By splitting a network into several segments and bridging them, you can cut the traffic load on your network and reduce collisions on each segment, especially if you can minimize intersegment traffic by placing users and devices that normally talk to each other on the same segment.

This switch fully complies with IEEE802.3u, 100BASE-TX/FX, and IEEE802.3, 10BASE-T standards. It features "wire-speed" switching mechanisms as well as the ability to filter local traffic, collisions, and error packets to maximize network performance.

This eight-port switch also facilitates an affordable and efficient migration path to 100Mbps Fast Ethernet and can continue to enhance your network's performance even if you upgrade your

existing network with standard Ethernet applications, internetworking systems and client-side adapters to minimize migration costs.

Product Features

This eight-port switch provides the following features:

♦ Eight dual-speed 100BASE-TX/10BASE-T or 100BASE-FX switching ports or 6 100BASE-TX/10BASE-T + 2 100BASE-FX switching ports

♦ Full- and Half-Duplex capability on every TX ports.

♦ Auto MDIX on every TX ports.

♦ Dip Switch for Full- and Half-Duplex setting on Fiber ports.

♦ Designed in compliance with IEEE802.3, 10BASE-T, IEEE802.3u, 100BASE-TX and 100BASE-FX standards.

♦ Supports 802.3x Flow Control pause packet for Full-Duplex in case buffer is full.

♦ Supports Back Pressure function for Half-Duplex operation in case buffer is full.

♦ Supports Store & Forward architecture and performs forwarding and filtering at non-blocking full wire speed.

♦ Broadcast Storming Filter function.

♦ Comprehensive array of LED indicators that communicate the status of the switch and troubleshooting information.

Packing List

When you unpack the switch, you should find the items listed below. Please inspect the contents, and report any apparent damage or missing items immediately to your authorized reseller.

The Eight-port Switch

User's Manual

AC power cord

Front Panel

The front panel of the switch has eight ports and an array of LED indicators to provide you with instant feedback on the status of the switch.
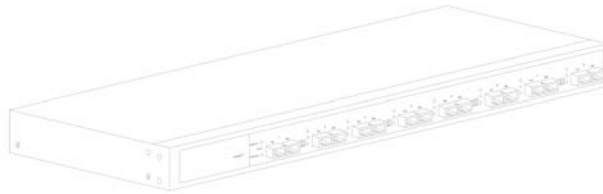

Figure 1: Front Panel

Ports

The TX ports of the switch automatically senses and adapts itself to the presence of both 10BASE-T and 100BASE-TX network standards. The switch can auto MDIX on any TX ports, provide easy uplink with any TX port. For 100BASE-FX ports, since the ports are fiber, they are capable of accepting 100BASE-FX connections only.

When connects to a 100BASE-TX network, the ports operate at 100Mbps in half-duplex mode and 200Mbps in full-duplex mode. When connects to a 10BASE-T network, the ports operate at 10Mbps in half-duplex mode and 20Mbps in full-duplex mode. With 100BASE-FX ports, when it connects to a 100BASE-FX network, the ports operate at 100Mbps in half-duplex mode and 200Mbps in full-duplex mode.

The maximum range of a 100BASE-TX network connected to the switch is 100 meters with Category 5 shielded twisted-pair and unshielded twisted-pair (STP/UTP) cable. A 10BASE-T network may range up to 100 meters with Category 3, 4, or 5 STP/UTP cable. As for the length of FX fiber link between a switch and Data Terminal Equipment, FX is capable to span at least 2 Kilometers using 62.5/125-micron fiber-optic cable in full-duplex mode and 412 meters in half-duplex mode.

The following table summarizes the port and cable specifications for this switch.

Speed	Connector	Port Speed Half/Full Duplex	Cable
100BASE-TX	RJ-45	00/200 Mbps	100M, Category 5 STP/UTP
10BASE-T	RJ-45	10/20 Mbps	100M, Category 3, 4, or 5 STP/UTP
100BASE-FX	Straight-tip (ST or SC)	00/200 Mbps	62.5/125 micron Multi-Mode fiber-optic cable

LEDs

The array of LED indicators on the front panel conveys status and configuration information to help you monitor and troubleshoot the switch.
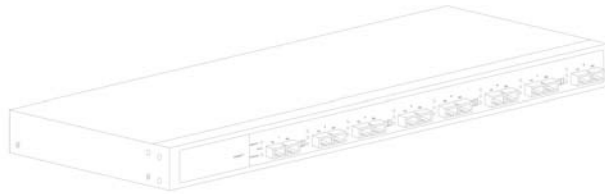

Figure 2: LED & Button Indicators

❶ Port Status

10/100BASE-TX Ports

Each port has an array of three LEDs to show status information. The LEDs are identified by a corresponding array of captions located below the LEDs on the front panel.

LNK/ACT: The link indicator is the top LED. It is illuminated whenever the port is connected to another working networked device.

The LED flashes when the port is transmitting or receiving data.

100: The middle LED comes on whenever the switch detects that the corresponding port is connected to a 100BASE-TX segment.

FDX/COL: The lower LED is illuminated when the port is operating in full-duplex mode. When this LED is off, the port is operating in half-duplex mode.

The LED flashes when the switch detects packet collisions on the port.

❷ Power

This LED comes on when the switch is connected to a power supply and turned on.

❸ Auto MDIX

If connecting to an uplink port of a hub or another switch, any of the switch's RJ-45 ports can be used.

❶ Port Status

100BASE-FX Ports

Each port has an array of three LEDs to show status information. The LEDs are identified by a corresponding array of captions located beside the LEDs on the front panel.

LNK/ACT: The link indicator is the top LED. It is illuminated whenever the port is connected to another working networked device.

The LED flashes when the port is transmitting or receiving data.

100: The middle LED shines whenever the switch detects that the corresponding port is connected to a 100BASE (100Mbps) segment.

FDX/COL: The lower LED is illuminated when the port is operating in full-duplex mode. When this LED is off, the port is operating in half-duplex mode.

The LED flashes when the switch detects packet collisions on the port.

❷ Power

This LED comes on when the switch is connected to a power supply and turned on.

❸ Activity Status

TX: Transmit Data

RX: Receive Data

❹ Dip Switch

Full-Duplex: Toggle up to enable Full-Duplex mode for
 100BASE-FX ports (Default setting).

Half-Duplex: Toggle down to enable Half-Duplex mode for
 100BASE-FX ports.

There is no auto MDIX for fiber 100BASE-FX ports; thus the auto MDIX

status does not apply to 100BASE-FX ports.

Installation

This chapter presents step-by-step installation instructions for this eight-port Ethernet Switch.

Selecting a Site for the Switch

As with any electronic device, you should place the Switch where it will not be subjected to extreme temperatures, humidity, or electromagnetic interference. Specifically, the site you select should meet the following requirements:

The room temperature should be between 32 and 104 degrees Fahrenheit (0 to 40 degrees Celsius).

- ♦ The relative humidity should be less than 90 percent, non-condensing.

Surrounding electrical devices should not exceed the electromagnetic field (RFC) standards for IEC 801-3, Level 2 (3V/M) field strength.

Make sure that the switch receives adequate ventilation. Do not block the ventilation holes on the sides of the switch or the fan exhaust port on the rear of the switch.

The power outlet should be within 1.8meter (6 feet) of the switch.

Connecting to Power

Connect the supplied AC power cord to the receptacle on the back of the switch, and then plug the cord into a standard AC outlet with a voltage range from 100 to 250 VAC.

Turn the Ethernet switch on by flipping the ON/OFF switch on the rear of the unit to the **I** (ON) position. The **O** position is OFF.

Figure 3: Rear view of the switch

Connecting to Your Network

10/100BASE-TX ports

Connect cables to computers or network segments into the RJ-45 ports on the front of this switch. It does not matter which port you select. All the non-fiber ports support 10BASE-T or 100BASE-TX with full- or half-duplex.

Use any port (auto MDIX) with the straight or cross-over twisted-pair cable for connecting to a regular or uplink port of a hub or another switch.

The cable must be a Category 5 shielded twisted-pair or unshielded twisted-pair (STP/UTP) cable for 100BASE-TX, or Category 3, 4, or 5 STP/UTP cable for 10BASE-T.

100BASE-FX ports

Prepare a pair of fiber optic cables with SC type connectors at both ends.

If you are making a connection to a server or workstation, be sure that it has a properly installed 100BASE-FX network interface card. Connect the **Rx/Tx** jacks on the target device to the **Tx/Rx** jacks on the switch.

Specifications

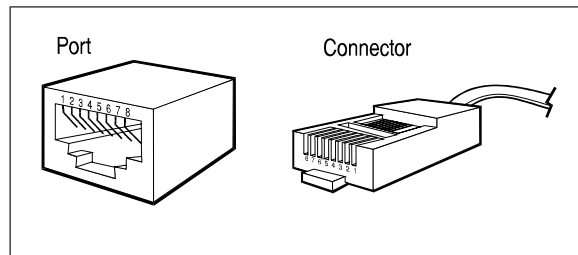|	
Applicable Standards	10BASE-T, IEEE 802.3 100BASE-TX/FX, IEEE 802.3u
Ports	10/100BASE-TX or 100BASE-FX
Speed	100BASE-TX: 200Mbps full-duplex 100Mbps half-duplex 10BASE-TX: 20Mbps full-duplex 10Mbps half-duplex 100BASE-FX: 200Mbps full-duplex 100Mbps half-duplex
Performance	14,880/148,800pps forwarding rate per port.
LED Indicators	POWER, LNK/ACT, 100, FDX/COL
Dimensions	440 X 205 X 45mm Rack-mount size
Weight	2.8kg (6.2lb)
Power Input	100 ~ 250 VAC, 47/63 Hz, 2A
Power Consumption	12 W
Operating Temperature	32 ~ 104 degrees F (0 ~ 40 degrees C)
Humidity	10 ~ 90%, non-condensing
Altitude	10,000 ft (3048 m)
Emissions	FCC part 15 Class A, CISPR Class A, VCCI-I CE Mark
Safety	UL

Appendix A - Connector Pinouts

Figure 4: RJ-45 Connector and Cable Pins

The following table lists the pinout of the switch's
10/100BASE-T/TX ports.

Pin	Regular Ports	Uplink port
1	Input Receive Data +	Output Transmit Data +
2	Input Receive Data -	Output Transmit Data -
3	Output Transmit Data +	Input Receive Data +
4	NC	NC
5	NC	NC
6	Output Transmit Data -	Input Receive Data -
7	NC	NC
8	NC	NC

Appendix B — Introduction to LAN & Ethernet Technologies

In the last ten years, as communication and business applications become increasingly complex, computer network has evolved as a very important part of the enterprise infrastructure. Communication systems like Local Area Network (LANs) have grown into a sophisticated, powerful, yet flexible technology today. Among different types of Local Area Networks, such as FDDI, ATM, Token Ring and Apple Talk, Ethernet strikes a good balance between speed, price, ease of installation, and supportability.

This primer helps to explain this most popular technology and its associated products such as Ethernet hubs and switches.

LAN

In order to reduce the expense on computer hardware and software and to easily share information, LAN technologies were developed for people to share distributed computing resources. LAN connects independent computers, file servers, printers, etc. together within a confined geographic area, usually a single building or a college campus. As LAN expands to link hundreds and thousands of computers, various network protocols and media have developed to meet the organization's different requirements. At times, multiple LANs that are geographically dispersed may need to connect together and become so called Wide Area Network (WAN).

Ethernet Technologies

More than 80 percent of all Local Area networks are installed with
Ethernet. The Institute of Electrical and Electronic Engineers
(IEEE) define the standard of Ethernet as IEEE 802.3. The
IEEE 802.3 provides rules for configuring Ethernet LANs,
specifies how elements should interact with one another, and
different types of media that can be used, as well as data rate
(10Mbps) of Ethernet. Ethernet supports just about all kinds of
popular network protocols. It is one of the most ideal
networking technologies today.

Fast Ethernet

For networks that need higher transmission speeds, IEEE has
also established the standard 802.3u, which raises the
Ethernet speed limit from 10 Mbps to 100 Mbps. This allows a
network device to transmit data through media such as
category 5 UTP (Unshielded Twisted Pair) cable or fiber optic
cable at the rate of 100 Mbps instead of 10 Mbps. A number
of other high-speed LAN technologies are also available for
high bandwidth and good client server response time.
However, Fast Ethernet offers the best solution that provides
smooth migration from 10Base-T technology to 100 Base-TX.
It requires only minimal changes with existing cabling
infrastructure. Fast Ethernet and its successors have been
said to be the most cost effective and high-performance
networking solutions of the future.

The Fast Ethernet contains three different cabling schemes. 100Base-TX for use with category 5 UPT/STP cable, 100Base-FX for use with Multi-mode fiber-optic cable, and 100Base-T4 for use with cable 3,4,or 5 UPT cable. Among three of them, 100Base-TX is most compatible to 10Base-TX. It allows users to retain the existing 10Base-T cabling infrastructure, thus becomes the most popular Fast Ethernet technology. Gigabit Ethernet is still in the process of development. Other than supports higher data transfer speed, this technology also promises for an easy migration path.

Ethernet Products

Hub

Hub is a central connection point for wiring the network. It connects two or more Ethernet segments of any media type. When transmitting signal begins to deteriorate, which is caused by the limitation of media length, hub simply takes the incoming signal and repeats or amplifies it out to all ports connected. Hub, also called repeater, only allows users to share Ethernet. Individuals of a shared network can only get a percentage of the available network bandwidth, therefore, a network of repeaters also named "Shared Ethernet".

Switches

The function of a switch is to connect separate networks together. A Switch maps the Ethernet addresses of the nodes residing on each network segment and then allows only the necessary traffic to pass through. When a packet is received by the switch, the switch determines the destination and source segments of a packet and forward it to the right direction or drop it if the destination and the source are originated from the same network. Switches also prevent bad or misaligned packets from spreading into the rest of network, thus increasing efficiency of the network transmission.

There are two basic architectures of LAN switches, cut-through and store-and-forward. Cut-through switches only examine the destination address before forwarding it on to its destination segment. A store-and-forward switch accepts and analyzes the entire packet before forwarding it to its destination. It allows the switch to catch certain packet errors and keep them from propagating through the network. Today there are a large number of hybrid switches available that mix both cut through and store-and-forward architectures.