LevelOne

FSW-1611TX

16Port 10/100Mbps 13” Fast Ethernet Switch

USER'S GUIDE

FCC WARNING

This equipment has been tested and found to comply with the limits for a Class A computing device pursuant to Part 15 of FCC Rules, which are designed to provide reasonable protection against electromagnetic interference in a commercial environment.

Changes or modifications to the equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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.

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A. UNPACKING INFORMATION

Thank you for purchasing LevelOne FSW-1611TX 16Port 10/100Mbps 13" Fast Ethernet Switch. Before continuing, please check the contents of the product package. This product package should contain the following items:

- One LevelOne FSW-1611TX 16Port 10/100Mbps 13" Fast Ethernet Switch
- One Power Cord
- Four Rubber Feet (for desktop placement)
- One Rackmount Kit
- Four Stackable stand
- User's Guide

If anything is missing, please contact your place of purchase.

B. PRODUCT INTRODUCTION

This chapter describes the features of the Switch and some background information about Ethernet/Fast Ethernet switching technology.

Fast Ethernet Technology

The growing importance of LANs and the increasing complexity of desktop computing applications are fueling the need for high performance networks. A number of high-speed LAN technologies have been proposed to provide greater bandwidth and improve client/server response times. Among them, 100BASE-T (Fast Ethernet) provides a non-disruptive, smooth evolution from the current 10BASE-T technology. The non-disruptive and smooth evolution nature, and the dominating potential market base, virtually guarantee cost effective and high performance Fast Ethernet solutions in the years to come.

100Mbps Fast Ethernet is a new standard specified by the IEEE 802.3 LAN committee. It is an extension of the 10Mbps Ethernet standard with the ability to transmit and receive data at 100Mbps, while maintaining the CSMA/CD Ethernet protocol. Since the 100Mbps Fast Ethernet is compatible with all other 10Mbps Ethernet environments, it provides a straightforward upgrade and takes advantage of the existing investment in hardware, software, and personnel training.

Switching Technology

Another approach to pushing beyond the limits of Ethernet technology is the development of switching technology. A switch bridge Ethernet packets at the MAC address level of the Ethernet protocol transmitting among connected Ethernet or Fast Ethernet LAN segments.

Switching is a cost-effective way of increasing the total network capacity available to users on a local area network. A switch increases capacity and decreases network loading by dividing a local area network into different *segments*, which don't compete with each other for network transmission capacity.

The switch acts as a high-speed selective bridge between the individual

segments. The switch, without interfering with any other segments, automatically forwards traffic that needs to go from one segment to another. By doing this the total network capacity is multiplied, while still maintaining the same network cabling and adapter cards.

For Fast Ethernet networks, a switch is an effective way of eliminating problems of chaining hubs beyond the "two-repeater limit." A switch can be used to split parts of the network into different collision domains, making it possible to expand your Fast Ethernet network beyond the 205-meter network diameter limit for 100BASE-TX networks. Switches supporting both traditional 10Mbps Ethernet and 100Mbps Fast Ethernet are also ideal for bridging between the existing 10Mbps networks and the new 100Mbps networks.

Switching LAN technology is a marked improvement over the previous generation of network bridges, which were characterized by higher latencies. Routers have also been used to segment local area networks, but the cost of a router, the setup and maintenance required make routers relatively impractical. Today switches are an ideal solution to most kinds of local area network congestion problems.

Features

The Switches were designed for easy installation and high performance in an environment where traffic on the network and the number of user increase continuously.

These Switches provide immediate access to a rapidly growing network through a wide range of user-reliable functions.

The Switches are ideal for deployment with multiple high-speed servers for shared bandwidth 10Mbps or 100Mbps workgroups. With the highest bandwidth 200Mbps (100Mbps full-duplex mode), any port can provide workstations with a congestion-free data pipe for simultaneous access to the server.

The Switches are expandable by cascading two or more switches together. As all ports support 200Mbps, the Switches can be cascaded from any port and to any number of switches.

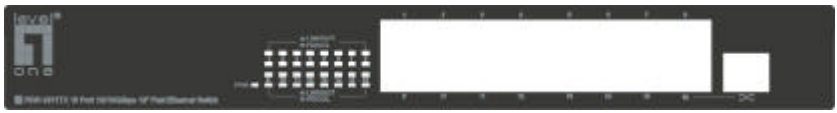
The Switches are a perfect choice for site planning to upgrade to Fast Ethernet in the future. Ethernet workgroups can connect to the Switches now, and change adapters and hubs anytime later without needing to change the Switches or reconfigure the network.

The Switches combine dynamic memory allocation with store-and-forward switching to ensure that the buffer is effectively allocated for each port, while controlling the data flow between the transmit and receive nodes to guarantee against all possible packet loss.

The LevelOne FSW-1611TX 16Port 10/100Mbps 13" Fast Ethernet Switch are an unmanaged 10/100 Fast Ethernet Switch that offers solutions in accelerating small Ethernet workgroup bandwidth. Other key features are:

- Independent bandwidth for each port
- 100/10Mbps TP ports with Auto-Negotiation support
- Bridging capability for 100Mbps and 10Mbps segments
- Store and Forward technology
- Built-in Crossover port
- IEEE 802.3x flow control support for Full-Duplex operation
- Back-pressure support for Half-Duplex operation
- Three QoS levels checked via IP Header and 802.1Q VLAN Tag and selectable on per port basis.
- 512K Byte Buffer Memory
- 16K MAC Address Table
- Desktop size with rack mounting capability

The Front Panel



LevelOne 16Port 10/100Mbps 13" Fast Ethernet Switch

Port Speeds

100/10Mbps TP Ports

Each 100/10Mbps TP port provides an Auto-Negotiation function that senses for the attached device's maximum operating speed and automatically sets the Switch to operate at that speed. Each TP port uses RJ-45 connector that allows network TP cables to be easily attached or removed. Users only need to connect a network device into any TP port and the Switch will do the rest.

Crossover Connector

The last TP port in this model supports a Crossover function. The Crossover function is used for Uplinking to a standard port on another Switch using normal TP cable.

☞ **Warning:** *You cannot use the last TP port's regular port when you are using the Crossover port.*

Cabling

10Mbps – Category 3, 4, or 5 TP cabling can be used for transmitting data at 10Mbps or 20Mbps bandwidth on 10BASE-T networks.

100Mbps – Only Category 5 TP cabling can be used for transmitting data at 100Mbps or 200Mbps bandwidth on 100BASE-TX networks.

Port Type	Cable Type	Connector
10BASE-T	Category 3, 4 or 5 TP	RJ-45
100BASE-TX	Category 5 TP	RJ-45

Note: Category 5 TP cable should be used *whenever* installing new TP

cabling.

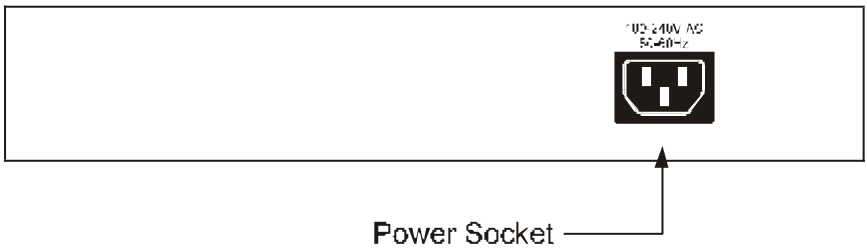
Status LEDs

This LevelOne 16Port 10/100Mbps 13" Fast Ethernet Switch comes with a complete range of LEDs. The table below lists each LED's name, color and a brief description of its function.

- One for power On/Off
- One per port for Link/Activity
- One per port for Full-Duplex/Collision

NAME	COLOR	FUNCTION
PWR	Green	• Lit: Power "On"
LINK/ACT	Green	• Lit: When the port has a valid physical connection (Link) with another device. • Blinks: When the port is sending or receiving data (Activity).
FD/COL	Amber	• Lit: When the port is set to Full-Duplex mode. • Blinks: When a collision is detected,in Half-Duplex mode.

The Rear Panel



Power Socket

The Power Socket is designed to be used with the power cord included in the product package.

a) Attach the female end of the cord to the power connector on the back panel.

b) Attatch the male end of the cord to a grounded power outlet.

Note: To reset the switch, Remove the power cord and re-attach it .

a) The switch must be reset when the MAC Address table needs to be rebuilt.

b) The switch must be reset when the fiber port Full/Half – Duplex modes are changed.

C. INSTALLATION

This LevelOne 16Port 10/100Mbps 13” Fast Ethernet Switch is "Plug & Play." They do NOT require software configuration. Users can immediately use any of the features of this product simply by attaching the cables and turning on the power.

TO LOCATE THE Switch ON A DESKTOP

a) Attach the four rubber feet included in the product package to the bottom of the Switch, one in each corner.
b) Place the Switch on a clean, flat desk or table top close to a power outlet.
C) Plug in all network connections and the power cord

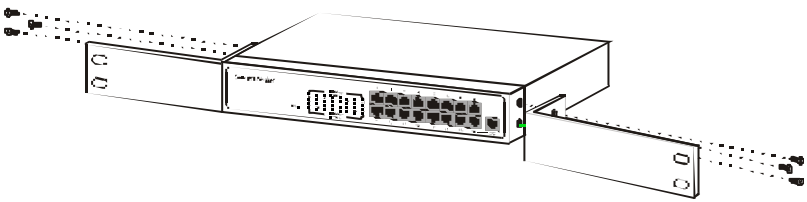
To stack your Switch

a) Attach the four stackable stand included in the product package to the bottom of the Switch, one in each corner.
b) Now , you can can use the switch to stack with other switch with stackable stand.
C) Plug in all network connections and the power cord

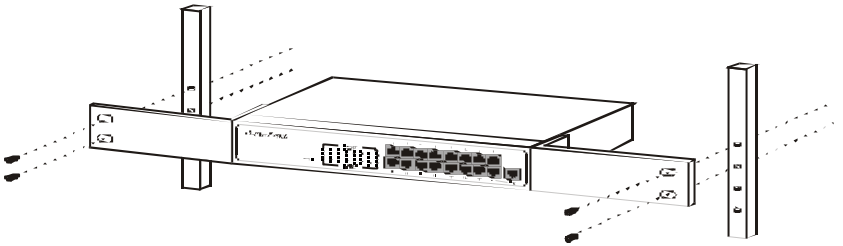
RACKMOUNT PLACEMENT

This LevelOne 16Port 10/100Mbps 13” Fast Ethernet Switch can be mounted in an EIA standard-sized 19-inch rack.

1. Attach one (1) rackmounting bracket on each side of the Switch’s front panel with the provided screws.



2. Use the other provided screws to secure the Switch to the rack.



D. HELPFUL SUGGESTIONS

Prior to Installation

Before installing this LevelOne FSW-1611TX 16Port 10/100Mbps 13" Fast Ethernet Switch and connecting it to network devices, it is important to plan the network's layout. Things you should consider include:

? **Dedicated Bandwidth:** File servers and other high-traffic hardware improve their performance if they have their own dedicated 10Mbps or 100Mbps bandwidth.

? **Full-Duplex:** Determine which devices support Full-Duplex connections.

? **Fast Ethernet:** Make sure rules for cable lengths and categories are followed.

? **Auto-Negotiation:** Devices with different speeds may be easily swapped when the other end of the cable is fixed to a port with Auto-Negotiation.

? **Crossover Uplink:** This LevelOne 16Port 10/100Mbps 13" Fast Ethernet Switch can be Uplinked to another Switch using the Crossover function located on the last TP port.

☞ Remember - If you are using the last TP port's Crossover port, you cannot use the last TP port's regular port. ` If you use both of the last port's ports at the same time your Switch will not operate properly.

Half- and Full-Duplex

This Switch supports both Half- and Full-Duplex modes for 10BASE-T and 100BASE-TX.

- In Half-Duplex mode data cannot be transmitted and received at the same time. Attached devices must finish transmitting data before

they can receive data.

- In Full-Duplex mode data can be transmitted and received at the same time.

However:

a) Full-Duplex transmission is only possible between two devices with a dedicated link (e.g., Switch-Switch, Switch-PC)

b) Both devices must have Full-Duplex capability

c) Both devices must be set to Full-Duplex (e.g. Auto-Negotiation – Auto-Negotiation, Non-Auto-Negotiation to Non-Auto-Negotiation)

- The 100BASE-TX/10BASE-T ports on the Switch detect and set the line's operating mode by using their Auto-Negotiation function.

Auto-Negotiation

Every 100/10Mbps dual speed port on this LevelOne FSW-1611TX 10/100Mbps Fast Ethernet Switch has a built-in "Auto-Negotiation" function. This technology automatically sets the best possible bandwidth as soon as a connection is established with another network device (usually at Power “On” or Reset). This capability is achieved via the Switch’s Auto-Negotiation function that automatically detects the modes and speeds the second (attached) device is capable of.

Evaluating Auto-Negotiation Capability:

If the attached device is:	**This Switch Will Automatically Set Its TP Ports to Operate At:**
100Mbps, no Auto-Negotiation	100Mbps Bandwidth (100BASE-TX, Half-Duplex)
100Mbps, with Auto-Negotiation	200Mbps Bandwidth (100BASE-TX, Full-Duplex)
10Mbps, no Auto-Negotiation	10Mbps Bandwidth (10BASE-T, Half-Duplex)

10Mbps, with Auto-Negotiation	20Mbps Bandwidth (10BASE-T, Full-Duplex)

☞ **Helpful Warning:** If the attached device is set to a fixed mode (ex: Forced Full-Duplex) it will not operate as an Auto-Negotiation device.

MAC Address Table

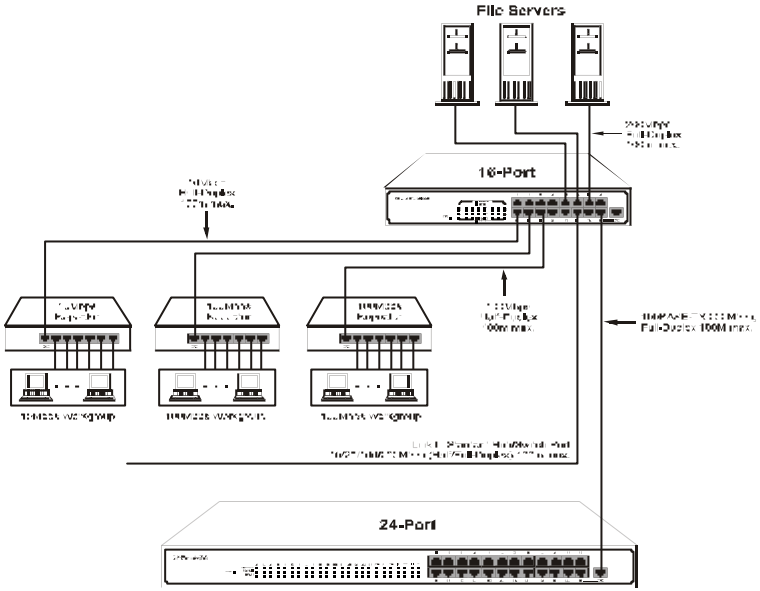
Every Ethernet data packet includes both source and destination addresses. This 6-byte ID is called the MAC (Media Access Control) Address.

The Switch can automatically learn and store MAC addresses. However, the MAC address table is volatile: it disappears when the Switch is powered "Off" or reset.

Note: When the network needs reconfiguration, we recommend to restart switch first. After all nodes have been moved, Remove *the power cord and re-attach it on the back panel* to rebuild the internal MAC address table.

Sample Application

The optimal application for this Switch is to interconnect file servers with other bandwidth-hungry workgroups, departments, and offices all with dedicated bandwidths.



E. Troubleshooting

I. Link LED does not lit after cable is connected to the port.

- Verify that the other end of the cable is connected to a device that is powered on and on-line.
- For TP cable connection to another Switch or Hub, verify that only one end of the cable is connected to a "Crossover" port.

II. 100BASE-TX port Link LED is lit, Collision LED is blinking, but traffic is irregular.

- Check that the attached device is not set to dedicated 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).

ALWAYS CHECK THAT:

- CABLE AND LINK DISTANCES ARE WITHIN THE NETWORK'S SPECIFICATIONS
- OVERALL NETWORK DIAMETERS ARE WITHIN THE NETWORK'S SPECIFICATIONS

F. PRODUCT SPECIFICATIONS

Models	FSW-1611TX
Standards	• 100BASE-TX IEEE 802.3u • 10BASE-T IEEE 802.3
Ports	• Sixteen (16) 100BASE-TX/10BASE-T
Media Support	• 100BASE-TX Category 5 TP • 10BASE-T Category 3, 4 or 5 TP
Bandwidth	• 100BASE-TX - 200/100Mbps via Auto-Negotiation • 10BASE-T - 20/10Mbps via Auto-Negotiation
Forwarding/Filtering Rate	• 148,800 packets/second per port @ 100Mbps, max. • 14,880 packets/second per port @ 10Mbps, max.
Latency	• 10 µsec @100Mbps, minimum • 72 µsec @ 10Mbps, minimum
MAC Addresses	• 16K six-byte entries maximum, self-learning
Buffer Memory	• 512 Kbyte
Duplex Modes	• Auto-Negotiation
Crossover	• Port 16 has an extra port for Crossover function
LED Indicators	• One for Power • One per port for Link/ACT • One per port for Full-Duplex or Collision (100Base-TX / 10Base-T)
Power Supply	• Internal full range switching power supply • Input voltage: 100 ~ 240 VAC +/-10%, 50/60 Hz
Power Consumption	• 16.5 watt max.
Environment	• Operating Temp: 0° ~ 45°C (32° ~ 113°F) • Storage Temp : -20° ~ 70°C (-4° ~ 158°F) • Humidity : 10% ~ 90% non-condensing
Certification	• FCC Class A, CE Mark
Dimensions	• 250 x 150 x 43 mm (9.8 x 5.9 x 1.7 inches)