

FES-1800

Fast Ethernet Switch
User's Manual

Networking the future

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Quick installation

This quick installation guide is provided to help the user to set up the switch in a short time. However, it is recommended that users read through this manual before trying installing the hardware.

After unpacking the switch, a suitable location must be found for it. Because this switch occupies a central location in the network, it is important to find a stable horizontal surface which is clear of electromagnetic interference and equipped with a power outlet.

Neither the switch nor any device should be powered on while installing network components.

Now the user needs to connect all devices that will directly interface with the new switch and with Category 5 UTP, Category 1 STP or equivalent cables. It is better to start from the highest-numbered jack. Fast Ethernet Adapters is highly recommended for all devices connecting to a Fast Ethernet Switch. The maximum cable length between any end node in the network and the switch is 100 meters (328 feet) for Fast Ethernet switch.

To uplink two switches together, connect both devices with a Category 5 UTP or Category 1 STP cable at maximum length of 100 meters. When uplinking, the connection can be made in port 8 via the switch on the rear panel to setup the position to X.

All the connections have to be checked and the correct location of cables should be verified. The switch and the connected devices can now be powered on. The switch will indicate all port connections by blinking the correspondent port indicators.

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Introduction

Congratulations to your purchase on Xsense Fast Ethernet Switch!

The Xsense Fast Ethernet switch provide you the possibility in setting up a small, medium or large size network without encountering bandwidth bottlenecks.

The switch is compliant with the IEEE802.3u Fast Ethernet standard, which will power your network with a 100Mbps-transmission speed.

Xsense Fast Ethernet network is ideal for transferring large files in a network and accessing to advanced applications such as videoconferencing.

This manual provides the main features on your switch, as well as a brief explanation on networking terminology and topography. Tips for the switch installation and everyday network management (including troubleshooting) are also included to help you get started.

General Features of a Switch

General features of FES-1800 Switch

Compliant with the IEEE802.3 10Mbps specification (10BASE-T)

Compliant with the IEEE802.3u 100Mbps specification (100BASE-TX)

Supports Category 5 unshielded twisted-pair cabling (UTP-5)

An uplink switch on the rear panel to switch port 8 for connectivity to another Switch/Repeater hub

Individual port status LEDs for LINK/ACTIVITY and Collision/Duplex status LEDs

General Features of a Switch

Front panel

FES-1800

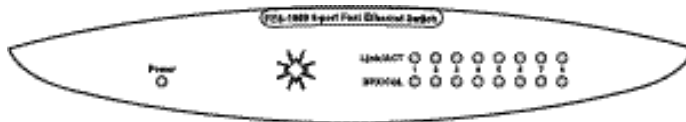


Figure 1-1

The switch's front panel displays features LED (light emitting diode) indicators. (See Figure 1-1.)

Rear panel

FES-1800

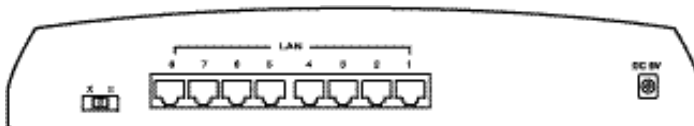


Figure 1-2

The rear panel of the switch contains the power socket and Ethernet cable connectors. Its cable connectors are of RJ-45 type. RJ-45 stands for Recommended Jack No. 45, an Electronic Industries Association (EIA) designation. Each jack serves to connect a cable to the switch.

LED indicators allow users to check the port status and network traffic at a glance. Exhaustive LEDs displayed on the switch allow easy network management. The power socket accepts DC power of 5V. (See Figure 1-2)

Quick Overview of Networking Terminology

Network Terminology

A network is consisted of multiple interconnected nodes. A node can be a computer, a server (that is, a computer dedicated to storing networked data or applications), a shared peripheral (such as a printer or modem) or other networking devices (such as repeating or switching switches, routers, transceivers, etc.).

A Fast Ethernet network operates at a 100Mbps (Megabits per second) transfer speed, as opposed to Ethernet networks, which operate at speeds of 10Mbps.

To be connected to a Fast Ethernet network, a node must be equipped with a Fast Ethernet adapter or a network interface card (NIC). A twisted-pair cable connects the node to a switch, and each node is connected to one port on the switch. The port adopts the abilities of a repeater, a transceiver and an adapter in a Fast Ethernet network. Ports and cables are connected through a fixed jack.

All segments are linked together by repeaters (but not by routers, bridges or switches) form a collision domain.

Collisions occur when two or more nodes accidentally attempt to transmit data across the network because of the traffic jams. Naturally, the more packets traveling across the network, the more likely the collision occurs. Although collisions do not cause any serious harm, but they affect the velocity of all nodes traveling on the network. Moreover, collisions prevent twisted pair cabling from being fully utilized, since one of the cable's two twisted pairs must resolve collision conflicts instead of transmitting data.

What is a Switch?

The networking device you have purchased is known as a switch. It is used to connect and transmit data between network nodes.

A port is consisted of an input/output circuit and any associated circuit. A jack, on the other hand, is an external connector linked to a port. The design of the switch allows one or more jacks to be connected to a single port.

The switch displays different jacks on its external panel. One or more jacks are connected to one internal port. The uplink jack features two jacks. One of them acts as a regular port for data transfer while the other (uplink port) serves to uplink the switch to another switch or repeater hubs. Uplinking different switches or repeater hubs can increase the number of nodes in a network. Expanding a network is necessary when planning to connect more computers or offer new services, such as printing capabilities or Internet access.

Each port of a switch acts as an adapter (conform to the network environment), a transceiver (carry data) and a repeater (link different segments).

A Fast Ethernet switch performs three standard functions:

- Repeat signals received from a connected node

Quick Overview of Networking Terminology

- Check the validity of each signal it receives and discard invalid signal.
- Show whether each network node is currently connected, idle, transmitting data, or in half/full duplex. Indicating a collision it gives users an idea on the network's current traffic status, Collisions occur frequently in a Fast Ethernet network.

Different applications are used to for different network devices. Those applications performed by a switch have functions as follows:

- Establish peer-to-peer relations between workstations.
- Interconnect users' workstations to a server for a stand-alone client-server network.
- Interconnect different users' workstations, servers or other devices and uplink with another Fast Ethernet switch to form a larger network.
- Interconnect different users' workstations, and servers. Uplink the switch with another Fast Ethernet switch to provid a connection with another network expansion device, such as a router, switch or bridge.

A switch thus acts as a central piece in a network topology and configuration. It is necessary to carefully study its physical emplacement and the configuration of the network.

What Is Fast Ethernet?

Historical Background

Fast Ethernet was developed in the early 90s to solve the bottleneck problems encountered by older Ethernet networks. Ethernet, however, is a networking technology developed in the early 70s.

Ethernet network carries data signal through thick passive cables at a speed of 10Mbps. However, signals are delivered to all nodes in the network at the same time, which resulted in frequent collisions and a lag in general network performance.

Fast Ethernet, instead, transmits data at a rate of 100Mbps. It is needed for people who use CAD/CAM, videoconferencing, and exchange large amount of files.

Besides the increasing available bandwidth, Fast Ethernet system also brings the advantage of using the same network operating system. Moreover, it is as well backward compatible with Ethernet equipment.

Ethernet and Fast Ethernet Standards

The Institute of Electrical and Electronic Engineers (IEEE) is an international standard for Ethernet and Fast Ethernet systems. The standard for Ethernet twisted-pair networks is known as the IEEE802.3 standard, or 10BASE-T.

The IEEE802.3u standard or 100BASE-TX governs its successor, Fast Ethernet. Your switch is compliant with the 100BASE-TX standard.

Moreover, to set up a network with a Fast Ethernet switch, all nodes have to be connected to the switch through 100BASE-TX compliant adapters (built-in or plug-in versions) or network interface cards (NIC). As for the network operating system, any Ethernet-compatible system as well as the NIC's drivers can be used

Cables Required

Fast Ethernet network does not use as same kind of cable as does Ethernet network. 100BASE-TX requires Category 5 unshielded twisted-pair (Category 5 UTP) or Category 1 shielded twisted-pair (Category 1 STP), or any equivalent cable to transmit data.

UTP, STP or equivalent cable must be applied with a Fast Ethernet switch. Those cables are easy to find as they are widely sold in retail stores and pre-installed in many buildings.

How to Configure a Fast Ethernet Network?

How to Configure a Fast Ethernet Network?

Cable Length

In a Fast Ethernet network, twisted-pair cables have a length limit. No UTP or STP cable can be of more than 100 meters (328 feet). A signal can not be sent between two end nodes through more than 200 meters of twisted pair cable.

In a non-uplinked network, all end nodes are thus connected to a switch through cables which do not exceed 100 meters in length. For this reason, a non-uplinked network is said to have a maximum diameter of 200 meters (656 feet), as a signal first has to be sent from one end node to the switch and then be repeated from the switch to another end node.

When configuring, network users must be certain that no cable exceeds the length limit and that this length is well managed between end nodes and the switch.

Uplinking

Uplinking a switch with another network expansion device, such as a router, switch, bridge, or repeater hubs allows users to increase the number of ports on a network. A 100BASE-TX switch can be uplinked with another 10BASE-T/100BASE-TX Switch/Repeater Hub through a twisted-pair cable. This is easy and inexpensive to increase the number of interconnected nodes in a network. Uplinking switches, however, adds additional network constraints.

The maximum diameter of an uplinked network must not exceed 200 meters (656.2 feet), and the total length between two end nodes must be no longer than 200 meters. Despite of the length limit, users have to be aware of the following rules when uplinking two switches:

1. When uplinking two network devices, one jack on each switch must be used.
2. The uplink cable applied between both switches must be Category 5 UTP, Category 1 STP or equivalent twisted-pair cable.
3. When uplinking port 8 to another switch, **the read panel on the switch must be set to X position.**

Besides expanding a network, uplinking switches may allow users to adopt different types of network topologies to manage their needs.

How to Configure a Fast Ethernet Network?

Different Network Topologies

Varies with users' needs, the switch can be operated as a standalone device or in a multiple-switches environment.

Standalone Device

When one switch is in use in a network, it is a standalone switch. The switch can only be connected to users' workstations. Its main function is to exchange data in a peer-to-peer relationship.

In addition to data exchange between end nodes, having access to a common pool of data requires the user to connect a server to the network. A server is a central workstation that stores data, applications, or both. It connects to a switch as it does any other network workstation.

Other devices can also be connected to a switch to increase the number of services available to users. A central printer eliminates the need to connect each workstation to a dedicated printer. An IP sharing device allows all network users to access to the Internet through one modem, ISP account and IP address.

Multiple Switches Environment

Increasing the size of a network through uplinking allows a greater number of users to access to a greater number of services. Two switches may be uplinked together, each switch's regular jack must be kept free while the uplink jack is being used.

Other Ways to Expand Your Network

Even when the uplink function of the switch increases the size of a 10BASE-T/100BASE-TX Fast Ethernet network, users may want to expand further to improve their network capabilities or integrate it into other networks. Here are some possibilities to optimize a network.

Dual-speed hubs

Dual-speed devices allow users to integrate 10BASE-T devices to a Fast Ethernet network. If an Ethernet network is already being possessed, such devices protect user's previous input in Ethernet technology, while upgrading their network to faster 100BASE-TX speeds. Dual-speed hubs automatically recognize adapters or NICs using Ethernet or Fast Ethernet systems, adjust and integrate themselves into the existing network.

Router

Router decides the path a data packet takes based on the data's transmission protocol. It regulates and organizes the traffic in a networking environment.

Bridges

Bridges connect two networks that adopt same physical characteristics, such as two Ethernet or two Fast Ethernet networks.

How to Configure a Fast Ethernet Network?

Gateway

A gateway is a device that connects a network to another, supporting a different protocol than the one currently used (Fast Ethernet in this case).

Installing a Switch

Before the Installation

Before installing a switch, users must ascertain that a proper operating environment is provided for the network. A right operating environment for a network features these factors:

- Power : The switch must be provided with a power voltage ranging from 90 to 264 VAC (with an error margin of 10%) at 50 to 60Hz (+/- 3Hz). The switch's power supply will automatically adjust itself to the power available.
- Humidity : The switch and the entire network should be located in the driest area possible. Humid places should be avoided, as humidity can damage the equipment. The non-condensed degree of humidity in which the switch operates ranges from 10 to 90 percent.
- Temperature : While the switch is stored in places with temperatures ranging from -25°C to 70°C (-13°F to 158°F), it should be operated only in areas with temperatures ranging from 0°C to 40°C (32°F to 158°F). Be sure that the switch is not located near a heat source.

Physical installation

The physical location of the switch must be carefully planned. Users should be aware of the following factors:

- Ventilation : When installing the switch, make sure there are open spaces of at least 10 centimeters in length, both in front and behind the switch to provide proper ventilation.
- Light : Like any other electronic devices, keep the switch away from direct sunlight or strong light sources.
- Interference : A Fast Ethernet switch should be kept away from any heat source or electromagnetic interference to avoid malfunctions.
- Power source : The switch should be installed near a power outlet, preferably one located in a position that centersl to all network end nodes.
- Hardware : The availability of all connectors and cables required to install the switch and network should be checked.
- Distance from wall adapter : Direct connection between the wall adapters and the switch are preferable.
- Airflow : Nothing should be pressed against the switch's left or right sides. Also, the square ventilation holes located on the switch's sides must not be blocked in any way. Constant cool air is needed to ensure top performance.

Network diameter of an uplinked Fast Ethernet network must not exceed 200 meters. For this reason, the path of cables and the switch's location have to be considered carefully.

Installing a Switch

Connecting Hubs or Other Switches

To make a switch-to-hub or switch-to-switch connection, please do the following:

1. Make sure you have the proper cables:
 - Use Category 3 UTP (Unshielded Twisted Pair) cables or better for 10BASE-T connections
 - Use Category 5 UTP cables for 100BASE-TX connections.
2. Connect UTP Cable to regular port of FES-1800 Fast Ethernet Switch, which is connected to port-8 on FES-1800 Fast Ethernet Switch. The switch must be setup to **X** position before you connect cable in

Figure 5-1 illustrated an example of an expanded Network segment.

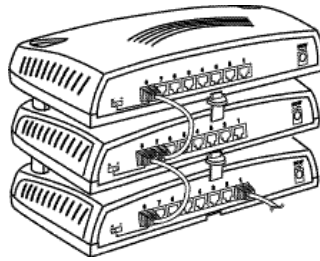


Figure 5-1

Cable Connections

Once the switch is correctly mounted as of the before, cables linked to end nodes can be connected to the ports.

Caution: While connecting cables to the switch, make sure to turn off both the switch and the connected equipment.

Connecting end nodes with a cable

To connect a cable to an end node, users must first turn off the end node. If the end node is switched on while connecting it to the switch, it might result in a loose connection and damages on the adapter and the end node.

Connecting a cable to the switch

To connect a cable to the switch, the user should select an RJ-45 jack on the switch's rear panel; once plugging the cable into the end node's adapter, it should be plugged into the switch's selected jack.

Installing a Switch

The users must consider the following cable requirements prior to connections:

- Cables must be of a Category 5 UTP or Category 1 STP or equivalent cable type for a Fast Ethernet network. Such cables feature RJ-45 plugs at both ends and through wiring.
- In a Fast Ethernet network, cable lengths must not exceed 100 meters (328 feet) between network end nodes and the switch.
- All end nodes connected to a Fast Ethernet switch must be equipped with Fast Ethernet adapters complying the IEEE802.3u standard.
- Cables should be kept as far as possible from any electrical source, motor or fluorescent light.

When uplinking two switches together, be certain to free both FES-1800 switches' port 8. Plug one end of the uplink cable into the first switch's port 8, then plug in other end of the cable to the other FES-1800 switch port 8, which must be switch to the X position before you connect the cable.

To uplink the switch, users should be aware of the following requirements:

- The cable used to uplink both switches must be a Category 5 UTP, Category 1 STP or equivalent.
- The maximum length of the uplink cable must not exceed one hundred meters.

The switch can now be connected to the power cord.

Checking Port Status

Once the switch is connected to the power cord, the power indicator will blink steadily. The switch will then automatically test each port connection. Users need to turn on the end node to test port connections. If it is off, the port will indicate a connection failure. All ports connected to a powered on end node should indicate a light link/activity and full duplex/collision.

If the end node is on but the test fails, the users should check and verify the cable connection. If both are correctly set up, it is recommended to contact the dealer.

If a port, indicator or any other part of the switch fails to work, users must contact the dealer immediately.

LED Indicators

The switch's front panel contains indicators called light emitting diodes or LEDs. LEDs make quick diagnoses on the network's status. They allow users to know, at a glance, the kind of problem the network encounters.

Different functions of LED's are displayed on the front panel. There are five types of LEDs:

Power indicator:

Color : Green

Label : Power

This indicator turns to green when the switch is connected to the wall adapter. If the green light fails to flash steadily, contact your dealer.

Link/ ACT indicator:

Color : Green

Label : Link/ACT

This indicator flashes in a steady green when the port is linking.

Color : Green blinks steadily

Label : Link/ACT

This indicator blinks steadily when transmitting data over ethernet network.

DPX / COL indicator :

Color : Green

Label : DPX / COL

When a port is functioning in full duplex mode, the indicator corresponding to this port flashes in a steady green.

Full Duplex dedicates bandwidth from original node to designated port, switch can reduce the chance of collision between transmission. Rather than checking for collision during transmission, switch uses that portion of UTP/STP cables to transmit data. Therefore, at any given time, it doubles the amount of information travels through network.

Color : Green blinks steadily

Label : Collision

This indicator blinks steadily when data encounter collision during transmission.

A collision occurs as two end nodes are sending data simultaneously on the network. Collisions are frequent in a Fast Ethernet network. When a collision occurs, the two end nodes stop data transmission but backs up again later on.

However, excessive collision may indicate a sign of:

- Network overload
- Device malfunctions
- Cabling problem

Troubleshooting

The different LED's displayed on the switch's front panel help users manage their networks. Here is a list of common problems to help users diagnose whether their network difficulties are related to the switch or to the external factors.

The link users need to troubleshoot the following should the front panel link of LED does not flash:

- Check to see if the connected device is on. Check the quality of the adapter.
- Length limits for a connection between an end node and a switch can not exceed 100 meters.
- Cable for the connection. Straight-through cables operate as to interconnect a switch to another switch (via an uplink port), a station or a server. Cross-wired cables, on the other hand, are to connect end nodes to another end node. The use of crossover cable could result in connection problems.
- Quality of the cable. Check the defectiveness of the cable.
- Check the plugs at both ends of the cable. A loose plug can result in a false connection.

If all of the above are checked and verified, the malfunction might be related to the switch itself. In this case, the switch should be sent back to the retailer for a complete hardware troubleshooting. If the connection cable or the power outlet is defective, replace the product. Change the switch location if the power outlet can not be replaced.

Problems can also be prevented by:

- Leaving a free space (10cm at least) in the switch's lateral fans.
- Keeping the switch away from any electromagnetic interference, lights sources, and direct sunlight.
- Making sure that all cables do not exceed the recommended maximum length of 100 meters.
- Checking the quality of the cables and outlets connected the switch to end nodes and to the wall adapter.

Network Management

- Selecting a location that fits the network's configuration and ensures the switch's safety.
- Being aware of cables' physical path and avoiding any interruptions.

Specifications

Technical Specifications:

FES-1800:	Eight 10/100BASE-T/TX auto-negotiating ports with RJ-45 connectors.
Chip Set:	Kendin, KS 8998
LED Reports:	Per Unit - Power Status Per Port - Link/Active, Full Duplex/Collision (2LEDs)
Ethernet Standards:	IEEE 802.3 10BASE-T, IEEE 802.3u 100BASE-TX
Cable:	10BASE-T, 2 pair UTP Cat.3,4,5. Up to 100m (328ft) 100BASE-TX 2 pair UTP Cat. 5. Up to 100m (328ft)
Switching Methods:	Store-and-forward.
Forwarding Rate:	14,880 pps for 10Mbps, 148,800 pps for 100Mbps

Physical Specifications:

AC Input:	90-132VAC or 180-264VAC, 50-60Hz external universal power supply.
Input Fuse:	2A
Output Voltage:	5VDC
Power Consumption:	10W max
Operating Temperature:	0°C - 40°C (32°F - 104°F)
Storage Temperature:	-25°C - 70°C (-13°F - 158°F)
Humidity:	10% to 90% non-condensing
Emission Compliance:	FCC part 15 class A, CE mark
Net Weight :	516 g 1.14s lbs

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