Trademarks

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FCC Warning

This equipment has been tested and found to comply with the requirements for a Class A digital device, pursuant to Part 15 of the FCC Rules. These requirements are designed for reasonable protection against harmful interference when the equipment operating in a commercial environment. This equipment can generate and radiate electromagnetic energy and, if not installed and used in accordance with this guide, may cause significant interference with radio communication. Operation of this equipment in a residential area is likely to cause interference to household appliances, in which case the user will be required to amend at his or her own expense.

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 preventive measures.

About This Guide

Purpose

This manual aims at helping users to know the key features of **Ether-FSH24RS Smart Fast Ethernet Switch**, install it in a 10BASE-T/100BASE-TX Fast Ethernet Local Area Network (LAN) and configure its VLAN and Trunking function.

Table of Contents

1 Product Overview

Introduction

A 24-port 10/100Mbps *Smart* Fast Ethernet Switch with VLAN and Trunking Capability

Ether-FSH24RS is an **auto-sensing and auto-negotiating "smart" Fast Ethernet switch** with ***VLAN*** and ***trunking*** capability. With its unique switching fabric, **Ether-FSH24RS** provides non-blocking full wire speed designated for all ports that can ensure maximum data transfer. In addition, one shared Uplink port is also provided for conventional uplinking with 100Mbps/200Mbps speed.

All its 24 RJ-45 station ports support 100Mbps/200Mbps Dual Speed. With its auto-sensing, **Ether-FSH24RS** automatically detects the speed of the devices you plug into, and routes the incoming data to its destination. The auto-negotiating function allows existing devices running at different speeds to communicate easily within the same network.

4-port Trunking with 800Mbps Bandwidth

Ether-FSH24RS also provides built-in function for *4-port trunking with 800Mbps maximum bandwidth* (4 x 200Mbps, in full duplex) and *4-group VLAN* capability. With trunking function enabled, data transmission can be boosted up to 800Mbps trunking bandwidth, which will effectively alleviate your network bottleneck with up to 4 times of original Fast Ethernet link speed. In fact, trunking might be the best option for relieving your nasty network bottleneck without incurring any extra costs using **Ether-FSH24RS**.

4-group VLAN for Instant Connectivity and Workgroup Privacy

Ether-FSH24RS also provides 4-group VLAN capability to ensure instant connectivity and workgroup privacy. Since each station port can be configured to whichever VLAN group, it offers utmost flexibility for workgroup assignment as to ensure workgroup privacy on the packet level. For those ports that join a VLAN, it offers instant connectivity without further configuration efforts from the network administrator. Members of a same VLAN group will be included within a same broadcast domain, and will feel exactly as they are on the same network segment although they might not belong to the same physical network segment.

Port Configuration via Console Port

VLAN and *Trunking* function of **Ether-FSH24RS** is configurable via Console port. Before you can utilize console port for *VLAN* or *Trunking* configuration, you must connect the console port of **Ether-FSH24RS** to the COM port (RS-232 interface) of your host PC, using a RS-232 cable. For the details of VLAN and Trunking port configuration, please refer to next section, *VLAN & Trunking Configuration through Console* as well as *Chapter 6, Configuring your Network for VLAN and Trunking.*

Store-and-Forward Architecture against Packet Loss

When network is under heavy traffic, the shared memory buffer in the switching devices might yield incorrect detections due to an overfed memory buffer. This drawback in transmission can happen either when data being transmitted in IEEE802.3x (Full Duplex) or in Backpressure Flow Control (Half Duplex) mode. To amend this problem, **Ether-FSH24RS** utilizes a fixed memory buffer allocation with **Store-and-forward** transmission to ensure an effective buffer allocation for each port. **Store-and-forward** transmission controls data flow from transmitting nodes to receiving nodes with the receiving buffer threshold adjusted to its optimal value, thus guaranteeing against all possible packet losses.

Active Flow Control

Ether-FSH24RS implements in full duplex mode a flow control which is compliant to IEEE 802.3x standard. While in half duplex mode, it employs an optional **Back Pressure Flow Control** to stall the incoming data when port buffers being saturated. With this flow control mechanism, it can be ensured that frames dropped during transmission are reduced to a minimum.

Non-blocking Wire Speed

Ether-FSH24RS's *non-blocking cross-bar matrix architecture* provides high-end performance for departmental and workgroup environments at a fraction of the cost of similar devices. Typically, this type of architecture is found only in high-end switches designed to handle huge corporate networks. With bandwidth needs and network efficiency concerns, **Ether-FSH24RS**'s switching fabric design is the perfect answer for solution.

Port Status Information at a Glance

The **LED indicators** on the front panel show relevant information of your network status. **Power LED** indicates the Power On/Off status. **VLAN LED** indicates the VLAN status. And the **Trunk LED** indicates the trunking status. Each **Link/Act LED** indicates the linking and receiving status of each port, while **FDX/Col LED** shows the half-duplex/ full-duplex transmission status and collisions within network. **100 M LED** indicates a connection running at 100 Mbps mode. **VLAN/Trunk LED** shows the VLAN/Trunking status of its corresponding station port. And **VLAN Group LED** shows the display status of VLAN groups. *For detailed LED information, please refer to Chapter 5, LED Indicators.*

VLAN & *Trunking* Configuration through Console

Ether-FSH24RS is pre-installed with specific firmware in its non-volatile flash memory to enable *VLAN* and *Trunking* configuration function. Through RS-232 cable connection via its console port to the COM port of host PC, **Ether-FSH24RS** allows network administrator to perform "smart" configuration from the host PC with convenience.

Since VLAN and Trunking configuration is performed through console port instead of within the Ethernet network, it is thus called ***out-of-band*** network management. The ***out-of-band*** network management also allows extra security since its configuration information is not mingled into the Ethernet network itself.

Before you can actually configure the station ports for *VLAN* and/or *Trunking* function, you must connect **Ether-FSH24RS'** console port via a RS-232 cable to a **COM** port on host PC. Once the connection is properly made, use either Windows Hyperterminal (in Windows 95/98/ NT environment) or serial communication programs such as Telix, Procomm, etc. (in DOS environment) to set up RS-232 communication.

For further details concerning VLAN and Trunking port configuration, please refer to Chapter 6, Configuring your Network for VLAN and Trunking.

What is VLAN?

Defining VLAN

What is VLAN? Since VLAN solutions and implementations are still very vendor-specific, to define precisely what VLANs will certainly arouse controversy. Nevertheless, most would agree that a VLAN can roughly be equated as a broadcast domain. More specifically, VLANs can be seen as a group of end-stations, perhaps on multiple physical LAN segments, which are not constrained by their physical location and can communicate as if they were on a common LAN.

There are roughly four ways to define VLAN membership: port grouping, MAC-layer grouping, network-layer grouping, and IP multicast grouping. **Ether-FSH24RS** *utilizes the port-grouping or port-based VLAN as it is designed for the initial implementation of VLAN in your network.*

Port-based VLAN

Ether-FSH24RS *Smart Fast Ethernet Switch fulfills the initial VLAN implementations as defining VLAN membership by groups of switch ports. Port grouping is the most common method of defining VLAN membership, and its configuration is straightforward. But, when a user moves from one port to another, it takes a network manager to manually reconfigure VLAN membership.*

With manual VLAN configuration, both the initial setup and all subsequent moves and changes are controlled by the network administrator, enabling a

high degree of control. Also moving users manually with VLANs may actually be easier than moving users across router subnets.

Table Maintenance via Signaling

When an end-station broadcasts its first frame, the switch resolves the end-station's attached port with its VLAN membership in cached address tables. As VLAN membership changes, these address tables can be manually updated by a system administrator at a management console.

802.1q VLAN Standard

In March, 1996, the IEEE 802.1 Internet-working Subcommittee completed the initial phase of investigation for developing a VLAN standard. The standard, known as 802.1Q, represents a major milestone in enabling VLANs to be implemented. Since the rapid deployment of LAN switching from around 1995, the shift toward LAN switching as a replacement for local/departmental routers, or even shared media devices (hubs) is just accelerating for now.

What is Trunking?

Trunking is a very useful feature to multiply network bandwidth within your LAN. By establishing a connection that allows network devices to communicate using multiple links in parallel, data can be transferred at multiple bandwidth. Specifically, **Ether-FSH24RS** *can form a super-bandwidth trunk by linking, in parallel fashion, its 4 trunking ports to other 4 ports on another* **Ether-FSH24RS** *for genuine high-speed data transfer.*

Ether-FSH24RS *provides such a useful feature as 4-port trunking to help you quadruple your network bandwidth without costing you extra money. You can consider implementing trunking function to boost the performance of your bandwidth-intensive network with benefits of 4 times bandwidth up to 800Mbps (4 × 200Mbps in full duplex). Especially when multimedia applications and other bandwidth intensive applications on intranets increase more than ever,* **Ether-FSH24RS** *is you right choice to solve bandwidth bottleneck with a trunking bandwidth as impressive as a full 800Mbps.*

Product Features

The main features of **Ether-FSH24RS Smart Fast Ethernet Switch** are as follows:

Basic features

- Flexible port configuration:
  - 24 × 10/100 Mbps auto-sensing and auto-negotiating ports (with 4 Trunking ports : Port 6, 7, 18, 19)
  - 1 × Uplink Port
  - 1 × Console Port
- Full compatibility with Ethernet/Fast Ethernet and VLAN standards:
  - IEEE 802.3u (100 BASE-TX Fast Ethernet)
  - IEEE 802.3 (10 BASE-T Ethernet)
  - ANSI/IEEE Std 802.3 Nway auto-negotiation
  - IEEE 802.1q VLAN standard
- Half/Full Duplex function for all station ports and Uplink port
- Auto-sensing and auto-negotiating function for all station ports and Uplink port
- Store and Forward transmission to prevent packet loss
- Active Flow control to minimize frame drops
  - Half Duplex: Back Pressure control
  - Full Duplex: IEEE 802.3x compliant flow control
- Full non-blocking architecture, system fabric with up to 4.8 Gbps speed
- Cost-effective to connect and expand your existing 10 Mbps Ethernet network to 100 Mbps Fast Ethernet networking environment
- 19-inch standard rack-mountable size
- Cabling distance between switches extensible to 100 meters through the Uplink port (shared with port 24)

Advanced Features

- ☛ VLAN grouping for instant connection and easy moves and changes within network.
- ☛ Virtual Workgroup with secure VLAN to ensure maximum worksite security and minimal administration efforts
- ☛ "Smart" VLAN & Trunking port configuration through Console *(out-of-band management*)
  - Windows Hyperterminal support (on Windows 95/98/2000)
  - Telix, Procomm support (on DOS)
- ☛ Secure VLAN grouping (up to 4 VLAN groups) for any station port
- ☛ 4-port trunking provides up to 800Mbps bandwidth in full duplex (or 2 × 2-port trunking , each with a 400Mbps trunking bandwidth)
- ☛ ***LED indicators*** for port status monitoring:

  System LEDs
  - **Power LED** (green) to indicate power on/off status
  - **VLAN LED** (green) to indicate the VLAN status
  - **Trunk LED** (yellow) to indicate the trunking status

  Station port LEDs
  - **Link/Act** (green) to indicate Linking status and activity
  - **FDX/Col** (yellow) to indicate Full/half duplex transmission mode and collisions
  - **100 M LED** (red) to indicate 10/100 Mbps speed
  - **VLAN/Trunk LED** (green) to indicate the VLAN/Trunking status

  VLAN Group LEDs
  - **VLAN1/2/3/4 LED** (green) to indicate the current status of **VLAN1/2/3/4** is being displayed by the row of **VLAN/ Trunk LEDs**

  VLAN display selection button
  - ***VLAN disp. sel.*** to control the VLAN group being displayed (will be disabled while trunking function in use)

2 Preparation before Installation

Unpack the Package

Before you begin the installation of **Ether-FSH24RS Smart Fast Ethernet Switch**, make sure that you have all the necessary components that come with your package. Follow the steps below to unpack your package contents:

1. Clear out the surrounding area for an adequate space to unpack the package carton.
2. Open the shipping carton and take out the package contents carefully.
3. Put back all the shipping materials such as plastic bag, paddings and linings into the shipping carton and save them for possible future transport need.

After unpacking and taking out all the components, you should check your package contents to see if you've got all the following components:

- ☒ **Ether-FSH24RS Smart Fast Ethernet Switch**
- ☒ AC power Adapter
- ☒ Screws and mounting brackets for rack mounting
- ☒ This ***Installation Guide***

If any of these components is missing or damaged, please contact your local dealer for replacement.

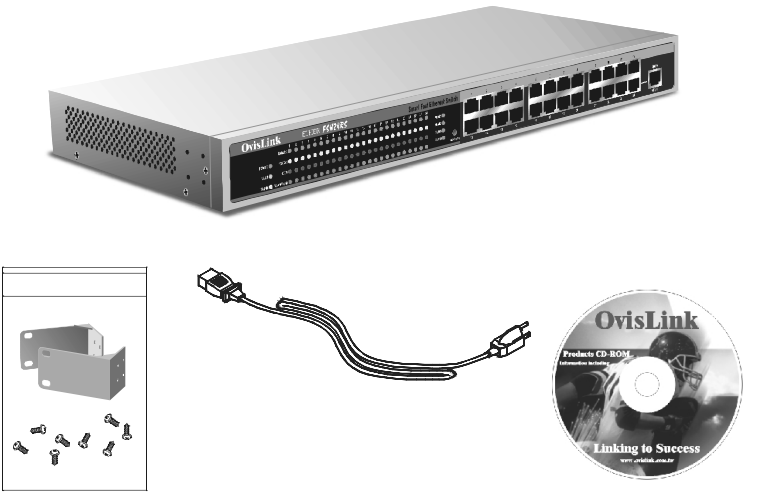


Fig. 2-1 Package Contents

Note:

RS-232 cable for console connection will only be optionally provided.

Fig. 2-2 Optional RS-232 Cable

The following sections introduce the front and rear panels of **Ether-FSH24RS Smart Fast Ethernet Switch**.

The Front Panel

The front panel is where you can find the 24 10/100Mbps station ports (MDI-X), one Uplink port (MDI-II) and the LED indicators. For the technical specifications of the ports, please refer to Product Specifications in Appendix A for detailed information. For information concerning LED indicators, please refer to *Chapter 5, LED Indicators*.

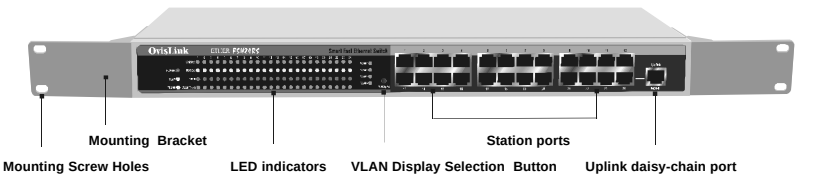


Fig. 2-3 Front Panel

The Rear Panel

The rear panel is where you can locate the power switch, AC power connector, console port and ventilators.

Power Switch

You can turn the power switch on /off to activate/deactivate the Switch. To turn on the Switch, press the power switch to the **ON** position. To turn off, press the power switch to the **OFF** position.

AC Power Connector

This is a three-pronged power connector where the power cord should be attached. Just plug the female end of the power cord into the connector, and the male end of the power cord into an AC power outlet. The power connector can accommodate an input voltage ranging from 100 ~ 240 V AC @ 50~60 Hz.

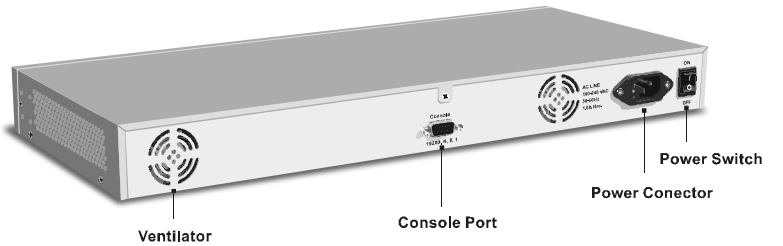


Fig. 2-4 Rear Panel

Console Port

The console port is where you will connect, with a RS-232 cable, to the host PC for smart configuration of VLAN and trunking function. Using the Hyperterminal utility (on Windows 95/98/2000 platform), you can easily configure VLAN on a per-port basis as well as manage 4-port trunking with up to 800Mbps bandwidth (or 2 × 2-port trunking with up to 400Mbps bandwidth for each trunk).

As the following illustration has shown, there are markings right below the console port that gives the proper setting parameters (19200, N, 8, 1) for establishing a proper console port connection. For the details of establishing console port connection, please refer to *Chapter 6, Configuring your Network for VLAN and Trunking* .

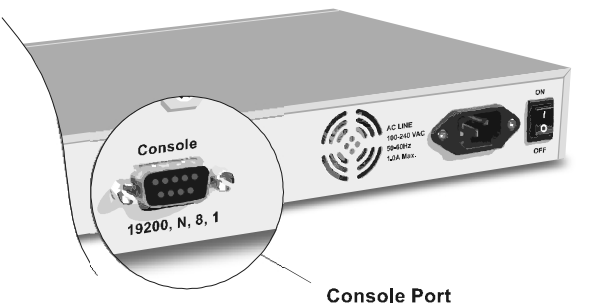


Fig. 2-5 Console Port

Ventilators

These two ventilator fans help circulate the cool air through the heated components inside the switch. The air holes on both sides of the switch also serve as heat vents to dissipate the heat. For proper ventilation, please be careful in your installation that in any case these openings should not be blocked. An adequate margin space for the rear and both sides of the switch should be provided. Be reminded that without proper air circulation to dissipate the heat, the internal components of the switch might get overheated and lead to system failure.

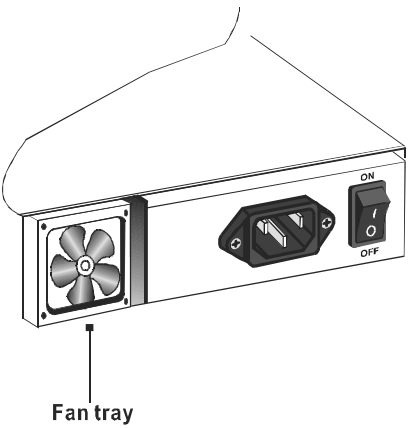


Fig. 2-6 Cooling Fan housed within fan tray

Each cooling fan is housed in a fan tray, which ensures its proper functioning without getting entangled with external wirings. The cooling fans are endurable and work reliably to prevent your switch from overheating. Since the switch is equipped with two cooling fans, heat dissipation can still function if one fan stop running. But if you find either fan not functioning properly, please contact your local dealer for replacement.

3 Installation of the Switch

Quick Installation

Ether-FSH24RS Smart Fast Ethernet Switch is compliant to both 10Base-T Ethernet and 100BASE-TX Fast Ethernet standards. It also provides an Uplink port to extend your switch-to-switch cabling distance up to 100 meters. **Ether-FSH24RS Smart Fast Ethernet Switch** is primarily targeted as an ideal VLAN/Trunking solution to both enhance your virtual workgroup performance as well as offer a trunking bandwidth of 800Mbps in an Ethernet/Fast Ethernet network environment. With its built-in VLAN/Trunking function, it also minimizes your network administration efforts with benefits of instant connection with exceptional bandwidth plus packet-level security within your VLANs.

3 Steps to Quick Installation

Step 1. Check visually the integrity of the power cord to see if it is in good condition. If the power cord is ready for use, then plug the female end of the power cord into the connector on the rear of the switch, and the male end into a power outlet. Power on the Switch.

Step 2. Use a RS-232 cable to connect the console port and the COM port of your host PC. Configure VLAN and/or Trunking ports from the host PC, using Windows *Hyperterminal* utility (on Windows 95/98/2000). For further details, please refer to *Chapter 6, Configuring your Network for VLAN and Trunking*.

Step 3. Connect each network device (e.g., workstation, server, hub, switch or router) to the appropriate RJ-45 port of your **Ether-FSH24RS**, using 100 ohm unshielded twisted pair (UTP) (category 3,4 or 5) or shielded twisted-pair (STP) cable. Note that you should do so according your plan for VLAN grouping and/or trunking.

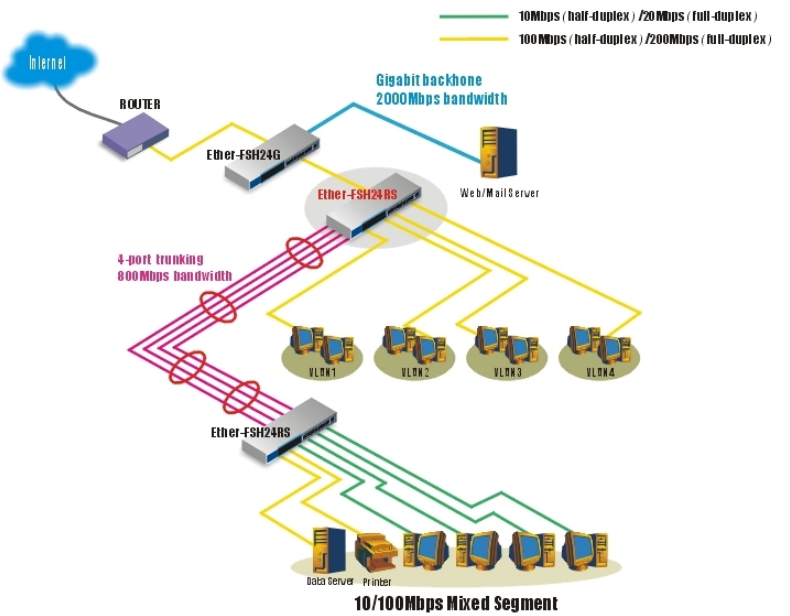


Fig. 3-1 Quick Installation

Rack Mounting

Ether-FSH24RS Smart Fast Ethernet Switch can also be mounted on a standard size 19-inch rack, which can in turn be placed in a wiring closet with other equipments.

Before you can mount the switch on the rack, first you must attach the mounting brackets on both sides of the switch with screws, and then mount it as a unit on the rack.

To mount the unit on a rack, please follow the steps below:

1. First, align the holes on the bracket with the holes on both side of the switch.
2. Insert screws into the holes and then fasten the bracket on one side of the switch with a screwdriver.
3. Repeat Step 1 and 2 to fasten the bracket on the other side of the switch.
4. Mount the unit on the rack and align the notches on both brackets with mounting holes on the rack, and then secure the unit with suitable screws.

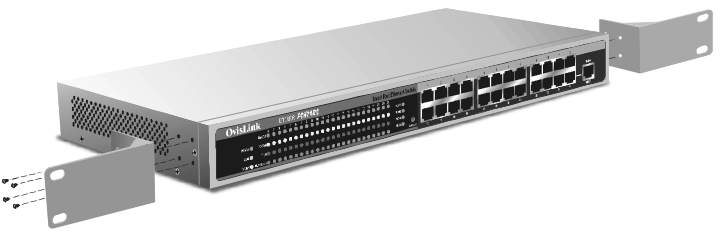


Fig. 3-2 Fastening the brackets on the switch

Fig. 3-3 Attaching the Switch to a standard-size rack

Desktop Installation

Ether-FSH24RS Smart Fast Ethernet Switch has four rubber pads attached on each corner of its underside. These pads serve as cushioning against vibration and prevent the switch from sliding off its position. They also allow adequate ventilation space when you place the switch on top of another device.

Fig. 3-4 Desktop installation

The location you choose to install your switch and the way you configure your network may greatly affect its performance. The following sections will provides you with a step-by-step reference to the following networking requirements:

- **Installation site preparation**
- **Cabling requirements**
- **Connecting to power**

Installation Site Preparation

You can mount **Ether-FSH24RS Smart Fast Ethernet Switch** either on a table or on a standard-size rack. If you plan to mount the switch on the table, please choose a steady, level surface in a well-ventilated area that is free from excessive dust. In any case, the installation site chosen for your switch has to comply with the following requirements:

- The surface where you want to mount the switch must be able to sustain at least 3.8 kg.
- Do not place heavy objects on top of the switch.
- The location must preferably be free from excessive dust, away from heat vent or other warm-air exhaust and direct sunlight. The switch should not be placed near large electric motors or other electromagnetic equipments. As a reference, the strength of the electromagnetic field on site should not exceed the (RFC) standards for IEC 801-3, Level 2(3V/M) field strength.
- The air temperature in the location should be within a range of 32 to 122 ° F (0 to 55 °C).
- The relative humidity in the location should not exceed 95% non-condensing humidity.
- The power outlet should be located within 6 feet from the device.
- The distance between the RJ-45 port and the standard network interface should not exceed 100 meters.
- Adequate space should be allowed in front of all the ports, so that each port is easily accessible for cable connections.

Cabling Requirements

Ether-FSH24RS Smart Fast Ethernet Switch is primarily targeted as a switching device to concentrate your network traffic in a workgroup environment. It fits well into the 10 BASE-T and 100 BASE-TX cabling architecture to facilitate UTP end-station connections to 10BASE-T/ 100BASE-TX network. The Uplink port also provides a switch-to-switch cabling extension up to 100 meters.

The 24 RJ-45 station ports (MDI-X), which require either UTP or STP cable connection, is compliant with 10/100 BASE Fast Ethernet standard. Thus, when configuring within the 10BASE-T/100BASE-TX cabling architecture, the UTP cabling distance should be within a maximum distance of 100m.

RJ-45 station port cable requirements:

- **10BASE-T**
  100 ohm Category 3,4 or 5 unshielded or shielded twisted-pair (UTP/STP) cables.

- **100BASE-TX**
  100 ohm Category 5 unshielded twisted-pair (UTP/STP) cables.

Other 10/100BASE-T/TX twisted-pair cable requirement

Under most conditions, the 24 station ports on the Switch may accept normal, straight-through cables, i.e., standard UTP cables, which are the only ones that can be used with a RJ-45 pin layout.

In some circumstances, however, crossover cables may be required. If a cable is used for a hub or switch connection, the transmit (TD) and receive (RD) leads to one end of the connectors must be reversed or connected to the uplink port on another hub or switch.

The table below describes which types of cable should be used in which circumstances:

Connection	To a node	To another Switch or Hub
10/100BASE-T/TX	Twisted-pair (RJ-45)Port	Twisted-pair (RJ-45)Port
Cable to use	Straight-through	Crossover
Maximum Cable Length	100M	100M

Table 3-1: Using straight-through and crossover cables

10/100BASE-T/TX networks require a 4-pair, data grade UTP/STP cabling system. The cabling system could be found in most existing network installations. The pin assignments for a straight-through cable are shown in Figures 3-5 and 3-6.

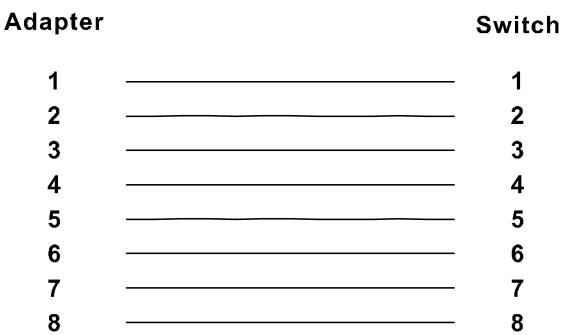
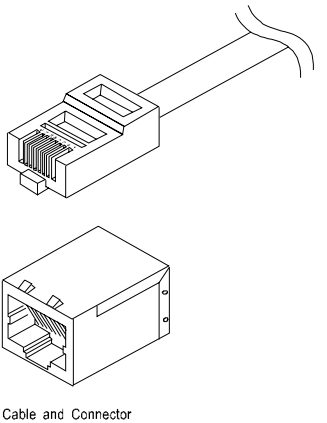


Fig 3-5 Pin assignments for straight-through cabling



RJ-45 Connector	
Contact	Media Direct Interface Signal
1	Tx+(transmission)
2	Tx-(transmission)
3	Rx+(reception)
4	Not used
5	Not used
6	Rx-(reception)
7	Not used
8	Not used

Fig 3-6 RJ-45 connector pin assignments

Connecting to Power

Ether-FSH24RS Smart Fast Ethernet Switch features a universal auto-select power supply unit, which allows a power connection to a wide range of input voltage: 90 ~ 240V$_{AC}$ @ 50 ~ 60Hz.

To establish its power connection, simply plug the female end of the power cord into the power connector on the rear of the switch and the male end of the power cord into a suitable power outlet. Once the you have correctly plugged in the power, you can then turn on the **Power Switch** to activate the switch.

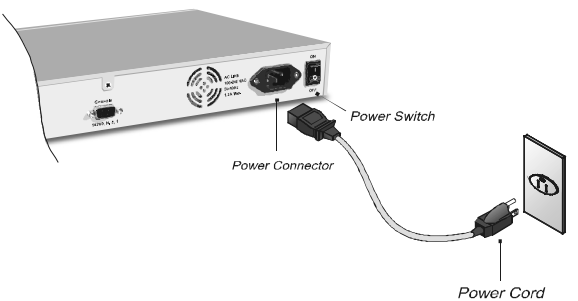


Fig 3-7 Connecting the Switch to power outlet

4 Expanding Your Network

Ether-FSH24RS Smart Fast Ethernet Switch is primarily targeted not only as a central switching device to manage your workgroup traffic within Ethernet/Fast Ethernet; but it also offers a powerful 800Mbps trunking bandwidth to help boost your network performance and relieve your network bottleneck. Its built-in VLAN function offers instant connection without further administration efforts. Furthermore, its secure VLAN feature offers a packet-level security for your virtual workgroups. With your existing Ethernet/Fast Ethernet infrastructure, you can very easily connect, expand or migrate to virtual workgroup computing in an Ethernet/Fast Ethernet environment.
The following sections will introduce to you the basics of network connectivity in virtual workgroup computing within Ethernet/Fast Ethernet environment as well as trunking and VLAN configuration.

Connectivity Rules

10 Mbps Connection

Ethernet (10Mbps) networks should be configured according to the following connectivity rules:

- The maximum length for UTP cables must not exceed 100 meters from end station to a shared-access 10Base-T hub.
- Between any two end stations in a collision domain, there may be up to five cable segments and four intermediate repeaters at most.
- If there is a path between any two end-stations containing five segments and four repeaters, then at least two of the cable segments must be point-to-point link segments (e.g. 10BASE-T, 10BASE-5), while the remaining segments may be of mixed segments (e.g.: 10BASE-2 or 10BASE-5).

100 Mbps Connection

Fast Ethernet (100Mbps) network should be configured according to the following connectivity rules:

- The maximum length for UTP cables is 100 meters from end station and a shared-access 100Base-TX hub.
- The maximum cabling length is 100 meters between end station and switch/repeater; and 100 meters between switch and switch/ repeater, thus making possible a maximum distance of 300 meters between two end stations.

Hub-to-Switch connection

Ether-FSH24RS Smart Fast Ethernet Switch allows a 10Base-T or 100Base-TX hub to be connected to the Switch via a 4 -pair UTP / STP straight cable (Category 3, 4 or 5). The cable length can be up to 100 meters long (328 feet). The hub-to-switch connection is made through the Uplink daisy-chain port (MDI-II) on the hub to any of the station ports (MDI-X) on the Switch.

For a 10BASE-T or 100BASE-TX hub connection, the LED indicators on the Switch should give the following signals to indicate a proper and functional connection the specific port:

- **Link/Act LED** indicator of that port should be ON
- **100 M LED** indicator of that port should be ON if connected to 100BASE-TX, otherwise it should be OFF

Both 10BASE-T and 100BASE-TX network environments allow uplinking, but each follows different rules for connection.

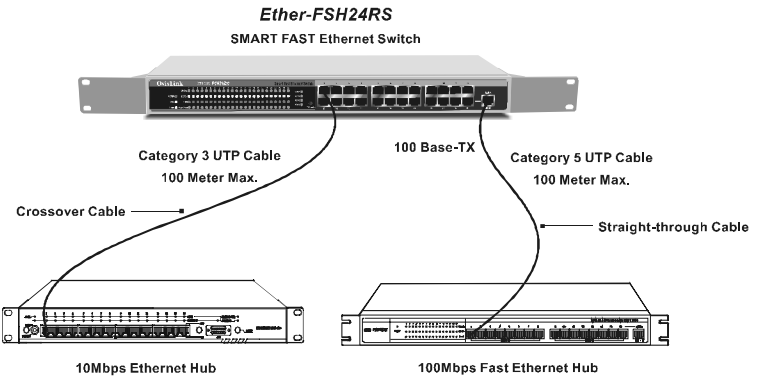


Fig. 4-1 Connecting to hubs using crossover or straight-through cables

Switch-to-switch (Other Device) Connection

Ether-FSH24RS Smart Fast Ethernet Switch can be connected to another switch or other device such as a router or bridge by a two-pair UTP / STP Straight or Crossover cable (Category 3, 4, 5).

Using a Straight Cable

When using a straight cable, the switch-to-switch connection is done through the Uplink daisy-chain port (MDI-II) of the Switch to any of the 10Mbps or 100Mbps station port (MDI-X) of another switch or device.

Using a Crossover Cable

When connecting any 10/100 Mbps station port (MDI-X) of other switch or device with any station port (MDI-X) of **Ether-FSH24RS**, it is required that you use a crossover cable.

The LED indicators on **Ether-FSH24RS Smart Fast Ethernet Switch** corresponding to the respective connected port should give the

following signals to indicate a proper and functional connection:

- **Link/Act** indicators should be ON
- **100M LED** is ON for a 100BASE-TX connection, otherwise it is OFF
- **FDX/Col LED** status will depends on the status of the other connected switch or device

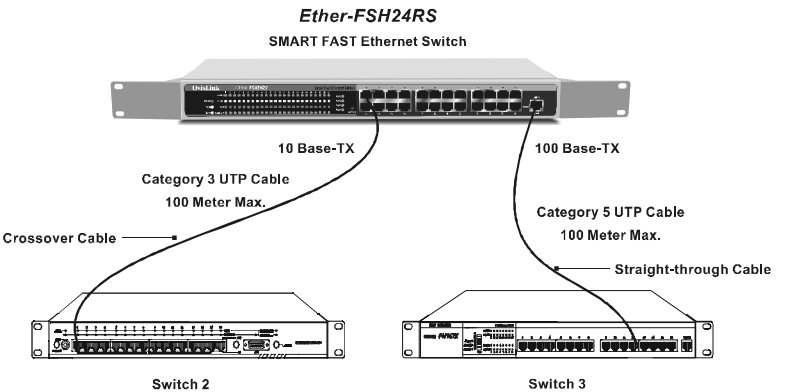


Fig. 4-2 Connecting to other switches using straight-through or crossover cables

Connecting with a Switch (or Hub) without Uplink Port

If the switch (or hub) to be connected to **Ether-FSH24RS Smart Fast Ethernet Switch** is without an Uplink daisy-chain port (MDI-II), a switch-to-switch connection can still be made either using a straight-through cable or a crossover cable.

● Straight-through Cable Connection

When using a straight-through cable, the connection can be made through the Uplink daisy-chain port (MDI-II) of the Switch to any station port (MDI-X) of the other switch or hub.

When using a crossover cable, the switch-to-switch connection can be made from any station port (MDI-X) of **Ether-FSH24RS Smart Fast Ethernet Switch** to any station port (MDI-X) of the other switch or hub.

This requirement differs somehow from the switch-to-node connection. For the pin assignments of crossover cabling please refer to Fig 4-5.

Summary:

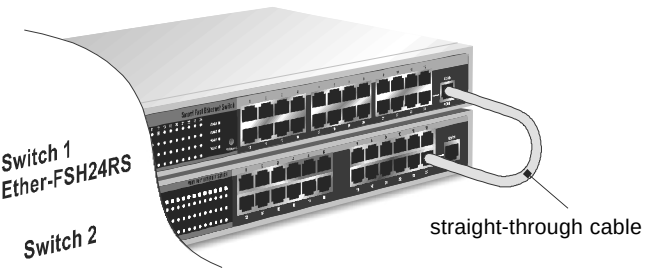


Fig. 4-3 Use straight-through cable to connect Uplink port of Ether-FSH24RS to any station port of the other other switch

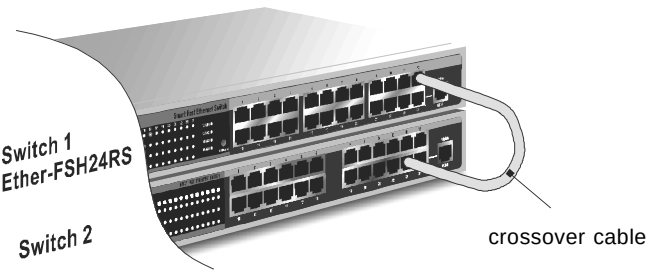


Fig. 4-4 Use crossover cable to connect any station port of Ether-FSH24RS to any station port of the other switch.

Do not plug a phone jack connector into any RJ-45 port. This may damage the port. Instead, use only twisted-pair cable with RJ-45 connector that conforms with FCC standards.

Notes:

1. *Port 24 is shared with the Uplink daisy-chain port, although their pinouts are different.* ***Do not use both port 24 and the Uplink Port (MDI-II) at the same time.***
2. *Make sure each twisted-pair cable does not exceed 100 meters.*
3. *To connect to another switch or hub, you may make a connection with station ports (MDI-X) at both ends if you use crossover cable.*

RJ-45 Port Description

RJ-45 station ports (MDI-X) can be attached to any devices, which use a standard network interface (e.g., a workstation, server, bridge or router). But the Uplink daisy-chain port (MDI-II) can be cascaded to a station port on similar networking devices (e.g. another switch or hub).

When cascading multiple switches (or hubs), it is important that the UTP cables should be of crossed-over type as shown in the diagram above. Also, make sure you use the same pair of wire for pin pairs 1-2, 3-6,4-5 and 7-8.

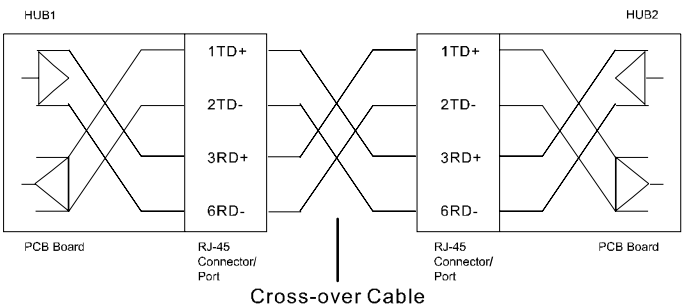


Fig. 4-5 Pin assignment for crossover cable

The wire schematics for both straight-through and crossover twisted-pair cables is shown as below:

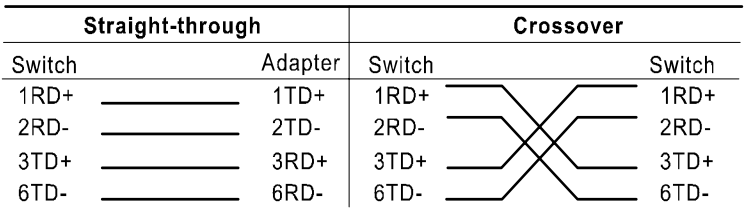


Fig 4-6 Wire Schematics for *Straight-through* and *Crossover* cable

Connecting via Console port to Host PC

Be sure you have properly connected the console port of your Ether-FSH24RS to the COM port of your host PC.

If you want to perform ***smart configuration*** *of VLAN groups and trunking ports*, use a **RS-232 cable** to connect the console port of your **Ether-FSH24RS** to one of the **COM** ports of your Host PC (as shown in Fig. 4-5). *For detailed information on configuring the VLAN and trunking function, please refer to the software manual.*

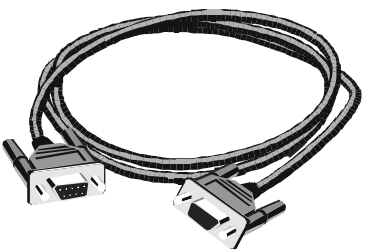


Fig. 4-7 Optional RS-232 Cable

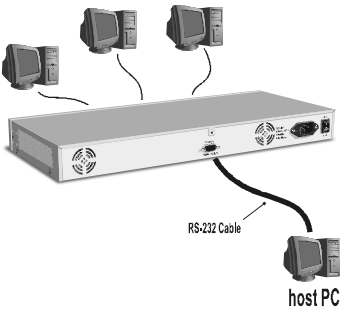


Fig. 4-8 Connecting to the Host PC via Console Port

Enabling Trunking Function of Ether-FSH24RS

Before you can configure trunking function of Ether-FSH24RS, make sure that it is properly connected to the host PC via its console port, using a RS-232 cable. Note that the RS-232 connection must be properly established to make the trunking configuration possible.

Note:
For the details of how to use a RS-232 cable to connect the console port of your ***Ether-FSH24RS*** *to the COM port (either COM1 or COM2) of your host PC, please refer to the previous section.*

Setting up a 800Mbps trunk (4-port trunking) between 2 switches

Step 1: Prepare 4 crossover cables, and connect each of them to one of the trunking ports (Port #6, 7, 18, 19) of **Ether-FSH24RS**.

Step 2: Connect the trunking ports of **Ether-FSH24RS** to any station port of the second switch.

Step 3: Enable the trunking function of **Ether-FSH24RS** from the host PC.

Setting up two 400Mbps trunks (2 × 2-port trunking) among 3 switches

Step 1: Prepare 4 crossover cables, and connect each of them to one of the trunking ports (Port #6, 7, 18, 19) of **Ether-FSH24RS**.

Step2: Connect any two of the trunking ports of **Ether-FSH24RS** to any station ports of the second switch.

Step 3: Then, connect the other two trunking ports of **Ether-FSH24RS** to any station ports of the third switch.

Step 4: Enable the trunking function of **Ether-FSH24RS** from the host PC.

Note:

For the details of how to enable trunking function, please refer to Chapter 6, Configuring your Network for VLAN and Trunking.

Note:

To establish a trunk between any two switches, you can use two Ether-FSH24RS Switches, although ***the second (and/or the third) switch does not have to be Ether-FSH24RS. Instead, the second (and/or the third) switch can be any other switch****. Only that, if you use two Ether-FSH24RS Switches to establish a trunk, only one of them should be enabled for its trunking function.*

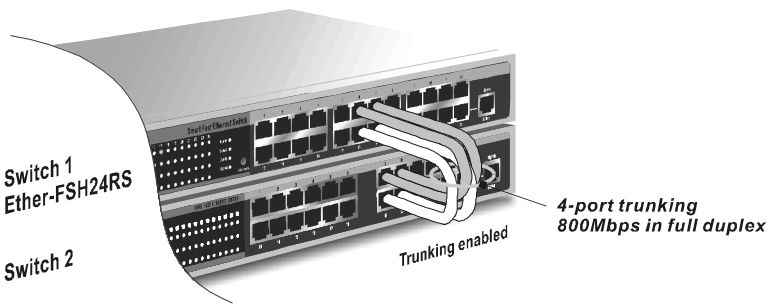


Fig. 4-9 ***800Mbps 4-port trunking using four cross over cables***

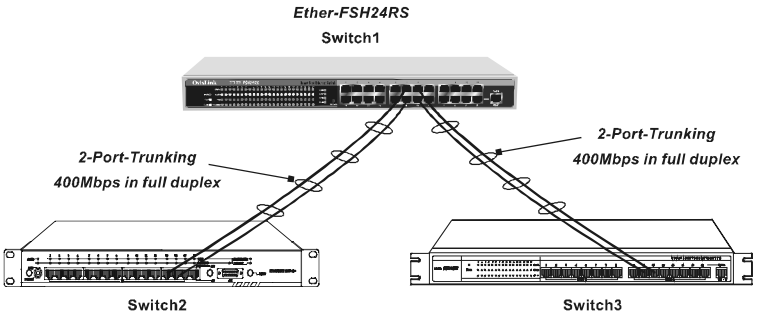


Fig. 4-10 2 × 400Mbps 2-port trunking, each using 2 cross over cables

Summary :

General Connectivity

- When connecting a computer to a switch, use a straight-through UTP cable.
- When connecting **Ether-FSH24RS** to any station port (MDI-X) of another hub or switch via its Uplink port (MDI-II), use a straight-through UTP cable. Please note that the cabling distance is 100 meters maximum.
- When using crossover cable, the connection can be made from any station ports (MDI-X) of **Ether-FSH24RS** to any station ports (MDI-X) of other hub/switch.

4-port Trunking Connectivity

- ***4-port Trunking between 2 switches:*** when setting up a trunk (800Mbps) between two switches, use 4 crossover cables to connect port #6, 7, 18, 19 of **Ether-FSH24RS** to any station ports of the second switch.

2-port Trunking Connectivity

- ***2 × 2-port Trunking among 3 switches:*** when setting up 2 trunks (400Mbps each) among three switches, use 4 crossover cables to connect port #6, 7 18, 19 of **Ether-FSH24RS**, then you can connect any two trunking ports to the second switch and the rest 2 trunking ports to the third switch.

Note:
*If you want to implement **overlapping VLANs** to institute a server farm in your corporate environment, you must disable trunking function since shared ports are not allowed for VLAN if trunking is enabled on **Ether-FSH24RS**.*

Transmission Mode

General Transmission

All 10/100Mbps ports of **Ether-FSH24RS Smart Fast Ethernet Switch** utilize auto-negotiation to determine the transmission mode for any new connection. This means, if auto-negotiation is supported on both ends of the connection, the Switch is initiated to negotiate for one of the following transmission modes:

- 200Mbps/FDX
- 100Mbps/HDX
- 20Mbps/FDX
- 10Mbps/HDX

Trunking Transmission

With trunking ports are properly set up, you can enjoy exceptional total trunking bandwidth as high as 800Mbps in full duplex.

- 4-port trunking bandwidth 800Mbps (= 200Mbps × *4*) in full duplex, when Ether-FSH24RS is connected to 1 switch. (Total Trunking Bandwidth = 1× 800Mbps = 800Mbps)
- 2-port trunking bandwidth 400Mbps (= 200Mbps × *2*) in full duplex, when Ether-FSH24RS is connected to 2 switches. (Total Trunking Bandwidth = 2× 400Mbps = 800Mbps)

General Applications

LAN Microsegmentation through Switching Technology

In addition to workgroup performance improvement, ***Ether-FSH24RS Smart Fast Ethernet Switch*** *can also effectively segment your network, significantly increasing both bandwidth and throughput. Any port on the Switch can either be attached to a hub (i.e., shared collision domain) or serve as a dedicated link to a single network device (e.g., a workstation or a server). When a port on the Switch is connected to an Ethernet hub (i.e., a 10 or 100 Mbps repeater), the bandwidth provided by that port is shared by all the devices connected to the attached hub. However, when a port is connected to an end node or to a device that breaks up the collision domain (e.g., another Switch, bridge or router), the attached device has access to the full bandwidth provided by that port.*
Microsegmentation of an existing LAN can improve network latency and increase overall performance. Figure 4 – 11 shows an example of microsegmentation of the 10/100 BASE Fast Ethernet workgroup environment.

For detailed information on the cabling requirements, please refer to Chapter 3 and 4.

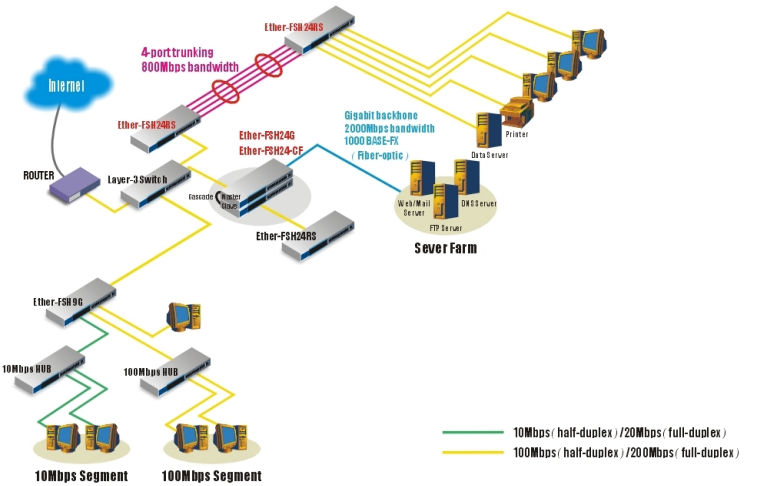


Fig. 4-11 Microsegmenting a LAN into different collision domains through switching technologies

Easy Migration to Virtual Workgroup Computing

Ether-FSH24RS Smart Fast Ethernet Switch *serves primarily as a concentrator to converge your workgroup traffic, and as a highly efficient switching device to forward the incoming data to destination network segments. With its auto-sensing and –negotiating functions, it makes your mixed Ethernet/Fast Ethernet networking environment as efficient and compatible. It is a perfect solution to cater to your network expansion needs. With its Uplink Port,* ***Ether-FSH24RS*** *is also extremely flexible in network configuration. Through uplinking multiple switches, hubs or other devices, plenty of flexibility and expandability is left for the network administrator to apply in future LAN configuration and expansion.*

Furthermore, with its VLAN and trunking function, ***Ether-FSH24RS*** *can set up virtual workgroups with packet-level security and offer a trunking bandwidth as impressive as 800Mbps. It provides such a cost-effective way to gear up your network performance toward virtual workgroup computing.*

In fact, we can envision a VLAN workgroup environment as complex as what is shown in Fig. 4-12, 4-13. Often challenged with a heavy traffic load generated by workgroup applications, you need a device such as ***Ether-FSH24RS,*** *not only to act as a central switching device to take care of the traffic flow, but also to relieve your network congestion with trunking.*

With its 24-port capacity, it can adopt as many end stations and servers or even connect to other network devices. Through uplinking with other devices, you can even expand this capacity in a very easy and cost-effective way.

If you demand a much higher bandwidth that cannot be satisfied by uplinking two switches, you can always choose to set up trunking with other any other one or two switches to create a trunking bandwidth of an exceptional 800Mbps.

With its VLAN grouping capability, it not only offers instant connection with no administration efforts and plus a security on the packet-level. Its capability to set up overlapping VLANs with shared ports also satisfies corporate needs to establish a centralized server farm. For details about benefits of VLAN, please refer to the next section.

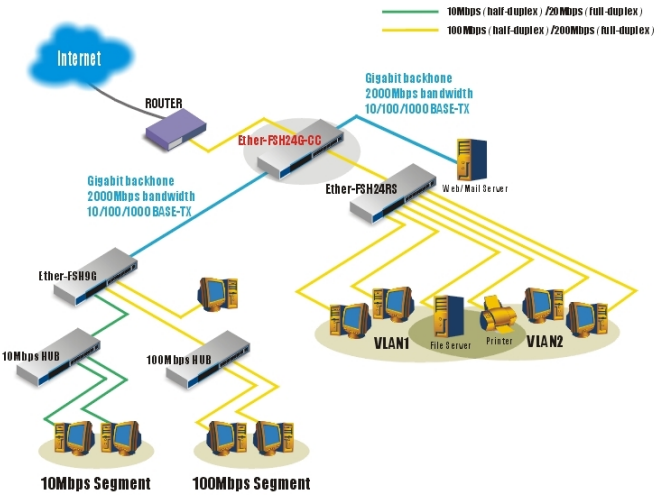


Fig. 4-12 Setting up overlapping VLANs to institute a server farm (only when trunking function is disabled)

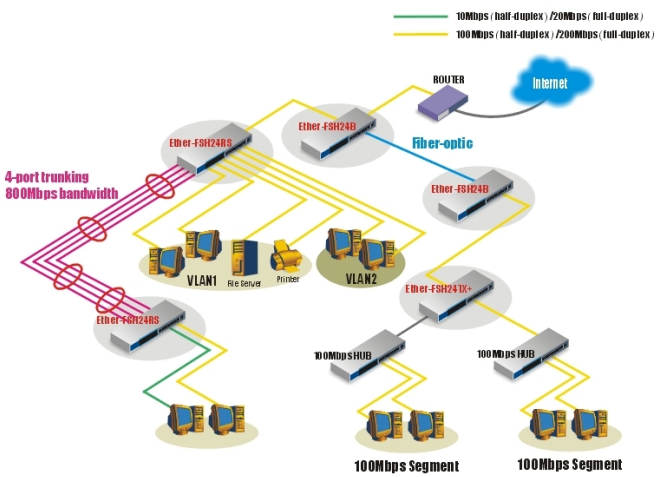


Fig. 4-13 When trunking function is in use, it is not allowed to set up overlapping VLANs

Benefits of VLAN

Advantage of VLAN Switching over Routing

I*n a network using only routers for segmentation, segments and broadcast domains correspond on a one-to-one basis. With the introduction of switching, organizations were able to divide the network into smaller, layer 2-defined segments, enabling increased bandwidth per segment. And broadcast domains could now span multiple switched segments. However, the continued deployment of switches will divide the network into more and more segments (with fewer and fewer users per segment) Thus, VLANs represent an alternative solution to routers for broadcast containment, since VLANs allow switches to also contain broadcast traffic. And each network segment can contain as few as one user (approaching private port LAN switching).*

The primary benefits of VLANs over routing are the creation of broadcast domains without the disadvantages of routing and a reduction in the cost of moves and changes in the network .

Virtual Workgroups

One of the more ambitious VLAN objectives is the establishment of the virtual workgroup model. With full VLAN implementation across the enterprise network, members of the same department or section can all appear to share the same "LAN," with most of the network traffic staying within the same VLAN broadcast domain. Someone moving to a new physical location but remaining in the same department could move without having workstations reconfigured. Conversely, a user would not have to change his or her physical location when changing departments—the network manager would simply change the user's VLAN membership.

Centralized Server Farms

Server farms refer to the placement of departmental servers in a data center, where they can be provided with consolidated backup, uninterrupted power supply, and a proper operating environment. The trend toward server farm architecture has accelerated recently and is expected to continue in order to ease administrative costs. Overlapping VLANs enable traffic between a centralized server and clients not belonging to that server's VLAN, thus offering a switching efficiency that is better than the original routing solution.

Higher Performance and Reduced Latency

As the network expands, more and more routers are required to divide the network into broadcast domains. As the number of routers increase, latency begins to degrade network performance. It is particularly troublesome for newer applications that feature delay-sensitive multimedia and interactivity. Switches that employ VLANs can accomplish the same division of the network into broadcast domains, but can do so at latencies much lower than those of routers. In addition, performance, measured in packets per second, is usually much higher for switches than for traditional routers.

Ease of Administration

Routers require much more complex configuration than switches. Reducing the number of routers in the network saves time spent on network management.

Saving Costs

Router ports are more expensive than switch ports. Also, by utilizing cheaper switch ports, switching and VLANs allow networks to be segmented at a lower cost than would be the case if routers alone were used for segmentation.

Routing Between VLANs

VLANs can be used to establish broadcast domains within the network as routers do, but they cannot forward traffic from one VLAN to another. Routing is still required for inter-VLAN traffic. Optimal VLAN deployment is predicated on keeping as much traffic from traversing the router as possible. Minimizing this traffic reduces the chance of the router developing into a bottleneck.

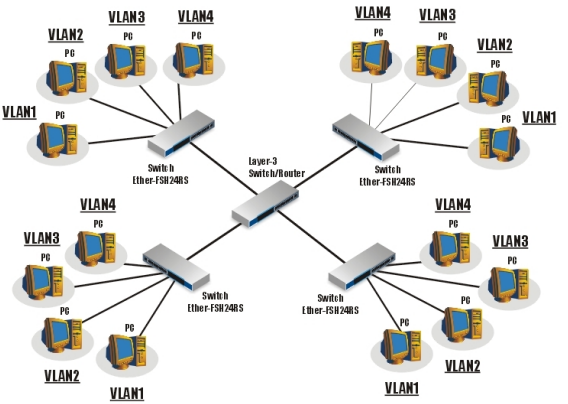


Fig. 4-14 Routing between VLANs through a layer-3 Switch/Router

Security

The ability of VLANs to create firewalls can also satisfy more stringent security requirements and thus replace much of the functionality of routers in this area. This is primarily true when VLANs are implemented in conjunction with private port switching. The only broadcast traffic on a single-user segment would be from that

user's VLAN (that is, traffic intended for that user). Conversely, it would be impossible to "listen" to broadcast or unicast traffic not intended for that user (even by putting the workstation's network adapter in promiscuous mode), because such traffic does not physically traverse that segment.

Reduction of Routing for Broadcast Containment

One of the primary benefits of VLANs is that LAN switches supporting VLANs can be used to effectively control broadcast traffic, reducing the need for routing. Broadcast traffic from servers and end-stations in a particular VLAN is replicated only on those switch ports connected to end-stations belonging to that VLAN. Broadcast traffic is blocked from ports with no end-stations belonging to that VLAN, in effect creating the same type of broadcast firewall that a router provides. Only packets that are destined for addresses outside the VLAN need to proceed to a router for forwarding. The benefits for utilizing VLANs to reduce routing are numerous:

Infrastructural VLANs

An infrastructural approach to VLANs is based on the functional groups (that is, the departments, workgroups, sections, etc.) that make up the organization. Each functional group, such as accounting, sales, and engineering, is assigned to its own uniquely defined VLAN. The majority of network traffic is assumed to be within these functional groups, and thus within each VLAN. In this model, VLAN overlap occurs at network resources that must be shared by multiple workgroups. These resources are normally servers, but could also include printers, routers providing WAN access, workstations functioning as gateways, and so forth. The amount of VLAN overlap in the infrastructural model is minimal, involving only servers rather than user workstations— making

VLAN administration relatively straightforward.
Initially, VLANs should be seen as a solution to at least one of two problems:
Containment of broadcast traffic to minimize dependence on routers
Reduction in the cost of network moves and changes
However, most large enterprise networks are now experiencing one or both of these problems, which VLAN implementation can be an effective and cost-saving solution.

5 LED Indicators

Before connecting any network device to **Ether-FSH24RS Smart Fast Ethernet Switch**, you should take a few minutes to look over this chapter and get familiar with the front panel LED indicators of your Switch. The front-panel LED indicators of **Ether-FSH24RS Smart Fast Ethernet Switch** comprise *three* sets of LEDs: *System Status LEDs*, *Station Port LEDs* and *VLAN Group LEDs*. Each set of LEDs give specific information concerning either the Switch status or the port status:

System LEDs

System LEDs enable users to monitor the System Status (*Power* On/Off, *VLAN* and *Trunking status* for the Switch). **Power LED** indicates the power on/off status of the switch. **VLAN LED** shows whether there is any VLAN group being set up. And **Trunk LED** indicates whether trunking function has being enabled on the Switch.

Station Port LEDs

Station Port LEDs show the port status of each of its 24 10/100 Mbps station ports (*Link/Act*, *FDX/Col*, *100M* and *VLAN/Trunk status* per port). There are **Link/Act** (Link/Activity), **FDX/Col** (Full-duplex/ Collision) and **100M LED** to indicate its corresponding Linking and transmission status. **VLAN/Trunk LEDs** indicates the VLAN or Trunking status of that specific port.

VLAN Group LEDs

VLAN Group LEDs indicate which ports belong to that specific VLAN group currently being displayed by the *VLAN/Trunking LEDs* for the station ports. The VLAN display selection button (*VLAN disp. sel.*) can select which VLAN group be displayed by the *VLAN/Trunking LEDs* for the station ports.

For the layout of LED indicators, please refer to Fig. 5-1 below.

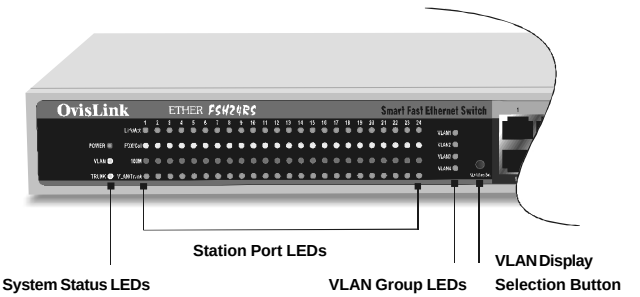


Fig. 5-1 Front-panel LED indicators

LED Status during Power-on Self Test

If the network connections and power source has been properly established, you are then ready to activate the Switch. While first turning on the switch, **Power LED** light is on to indicate the Switch is activated. Meanwhile, all *other* LEDs will blink about 3 seconds. During this brief period, the Switch is performing an auto-checking on LEDs to ensure they can function properly. The flashing duration for LEDs is determined by the RC value.

After the Power-on Self Test is over, **Power LED** will remain lighted as long as the Switch is not turned off, while each **port station LEDs** (**Link/Act**, **FDX/Col, 100 M LEDs** and **VLAN/Trunk**) will begin to function and give specific information to reflect its corresponding port status.

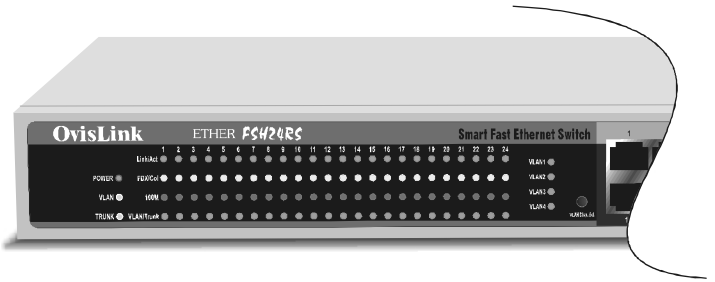


Figure 5-2: LED blinking during Power-On Self Test

The specific function of each LED will be described in full details in the following sections:

System Status LEDs

● Power LED

Power LED will give a **solid green light** when you turn on the Switch, and will be off when the Switch being turned off. You can simply check the **Power LED** status to see if the Switch is being activated or not. Before turning on the Switch, please verify that the power cord has been properly connected the Switch to the power outlet on the wall.

● VLAN LED

VLAN LED will give a **solid yellow light** when there is any VLAN group being set up. If there is no VLAN group being set up, this LED will be off. Therefore, you can check the VLAN status of the Switch by this LED.

● Trunk LED

When the *trunking* function is enabled on the Switch, the Trunk LED will show a **solid yellow light**. If no trunking ports are enabled, this LED will be off. Check this LED to know trunking status on the Switch.

Station Port LEDs (for Port #1 to Port #24)

● Link/Act LED

Link/Act LED giving a **solid green light** indicates that a data link has been established between the corresponding port and the device. If the connection is faulty, it will be off. While the port is transmitting or receiving data, you will see a **blinking green light**.

If you've made a connection but the **Link/Act LED** does not light up as expected, you should check whether the RJ-45 connectors are damaged, or the cable type or pin-out is not correct, or the cable length exceeds the 100 meter limit.

● FDX/Col LEDs

FDX/Col LED shows the transmission mode as well as the presence of collision on the network.

When in full-duplex transmission mode, **FDX/Col LED** gives forth a **solid yellow light**. When in half-duplex mode, it will be **off**. But, when in half-duplex mode, there are two or more end stations on the same network segment attempting to transmit data at the same time, a collision occurs. If there is a collision detected on specific network segment, the corresponding **FDX/Col LED** shows a **blinking yellow light**. When a collision occurs, all of the stations involved will recognize the collision, wait a random amount of time, and retransmit.

***FDX/Col LED** status is summarized as follows:*

- ON :Transmission in full-duplex.
- OFF: Transmission in half-duplex.
- Blinking: Collision detected.

● 100 M LEDs (Transmission Speed Indicator)

100M LED showing a **solid red light** indicates that the line speed going through that specific 10/100 Mbps port is operating at 100Mbps mode. If the transmission speed operates only at 10 Mbps, it is **off**.

● VLAN/Trunk LEDs (VLAN/Trunking status Indicator)

VLAN/Trunk LED indicates the VLAN or Trunking status of a specific port.

If only VLAN function is enabled and trunking function still not in use (as you can see the VLAN LED is on and Trunk LED is off), t***he VLAN/Trunk LED just indicates whether that specific port has joined the VLAN that is being currently displayed*** (as you can verify the currently displayed VLAN group by looking at which VLAN group LED is on). Hence, in this case, it does not display for the trunking function.

If trunking function is enabled (while VLAN grouping will be automatically configured, as you can see the Trunk LED is on and VLAN LED is on too), ***the VLAN/Trunk LED just indicates whether that port has been enabled for trunking function (****not indicating VLAN function anymore* ***) .***
For the configuration of VLAN and trunking function, please refer to *Chapter 6, Configuring Your Network for VLAN and Trunking*.

A summary of the station port LED status is listed in Table 5-1 below:

LED	Color	Status	Meaning
Link/Rx	Green	ON	A connection is made between the port and the connevted node.
		Blinking	The port is transmitting or receiving data.
FDX/Col	Yellow	ON	The port is operating in full-duplex mode.
		OFF	The port is operating in half-duplex mode.
		Blinking	Collision detected on the port.
100M	Red	ON	The current line speed for the 10/100M port is 100M
		OFF	The current line speed for the 10/100M port is 10M
VLAN/Trunk	Green	ON	***If Trunking disabled (Trunk LED is off):*** **The Port has joined the VLAN group as indicated by the *VLAN Group LED*** ***If Trunking enabled (Trunk LED is on):*** **The Port is functioning as a trunking port**
		OFF	***If Trunking disabled (Trunk LED is off):*** **The Port does *not* belong to the VLAN group as indicated by the *VLAN Group LED*** ***If Trunking enabled (Trunk LED is on):*** **The Port is *not* functioning as a trunking port**

Table 5-1: Station Port LEDs

VLAN Group LEDs and VLAN Display Selection Button

VLAN Group LEDs indicate which VLAN group is being displayed by the VLAN/Trunk LEDs for the station ports. There are four VLAN Group LEDs representing VLAN 1, VLAN 2, VLAN 3 and VLAN 4 respectively. At any time, the VLAN group LEDs will have at most one LED that is on (If there are no VLAN group being set up, there won't be any VLAN Group LED that is on). By default, **VLAN 1 LED** will be on if your VLAN grouping has been set up. If you want to switch to the next VLAN group for display by the VLAN/Trunk LEDs, you can press the *VLAN disp. sel.* button. Further presses on the VLAN disp. sel. button will rotate the VLAN group display in a cyclic manner.

VLAN Display Selection Button

The **VLAN disp. sel.** (VLAN Display Selection) button functions as a control to switch among which VLAN group is to be displayed by the VLAN/Trunk LEDs for the station ports. The default status of this button is set at displaying VLAN 1. Once you press the button once, the VLAN/Trunk LEds will dispaly the next VLAN group, that is, VLAN 2. A subsequent press will switch the display to the next VLAN group in cyclical sequence (that is, it will rotate through VLAN 1/2/3/4 in a round-robin fashion). As you press the VLAN disp. sel. button, you can see the next VLAN group LED will be on to indicate which VLAN group is being displayed by the VLAN/Trunk LEDs for the station ports.

Note:
Note that, ***when trunking function is enabled on the switch****, VLAN group setting is done automatically by the Switch and won't allow user configuration for VLAN grouping. Specifically, VLAN 1 will comprise Port #1 ~ #6; VLAN 2 will*

comprise Port #7 ~ #12; VLAN 3 will comprise Port #13 ~ #18; and VLAN 4 will comprise Port #19 ~ #24. Since which station ports are assigned to which VLAN is fixed in advance, there is no further need for VLAN group display by the ***VLAN/ Trunk LEDs*** *for the station ports. As a result, the VLAN Group LEDs and VLAN disp. sel. button will be disabled while trunking function is in use. And also the VLAN/Trunk LEDs for the station ports will also be displaying trunking information instead of VLAN information.*

6 Configuring Your Network for VLAN and Trunking

Ether-FSH24RS Smart Fast Ethernet Switch offers you a very convenient and secure way to configure your Switch for *VLAN* and *Trunking* function through a RS-232 cable that connects its console port and the host PC. Using Windows Hyperterminal (on Windows 95/ 98/2000) or utilities such as Telix or Procomm (on DOS environment), you can easily configure station ports on **Ether-FSH24RS** for VLAN and Trunking function. But before you can actually configure VLAN and Trunking function by your host PC, you should establish a proper RS-232 cable connection between the console port of your switch and the COM port of your host PC.

Making RS-232 Cable Connection between Ether-FSH24RS and the Host PC

The way to make a RS-232 cable connection is simple. Just prepare a proper RS-232 cable and, with it, connect the console port of your **Ether-FSH24RS** and the COM port (either COM1or COM2) of your host PC.

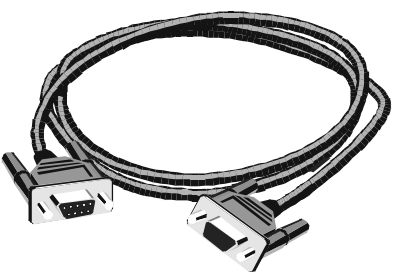


Figure 6-1: Optional RS-232 Cable

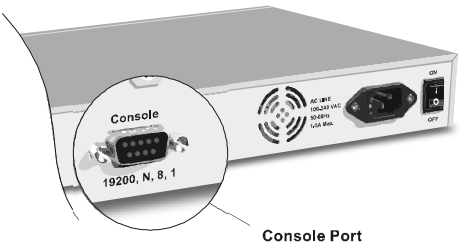


Figure 6-2: Console Port

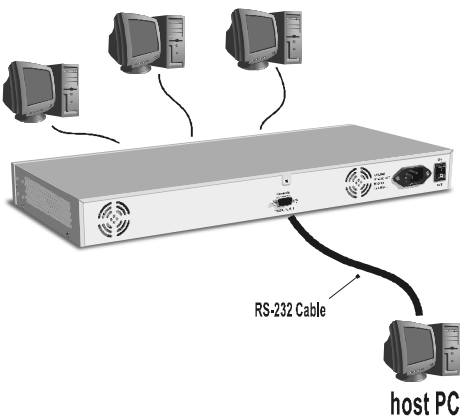


Fig. 6-3 Connecting to the Host PC via Console Port

Note:
After you have established a RS-232 cable connection between Ether-FSH24RS and your host PC, if your ***Ether-FSH24RS*** *or the host PC is not powered on, you should power them up before you can configure VLAN and trunking function.*

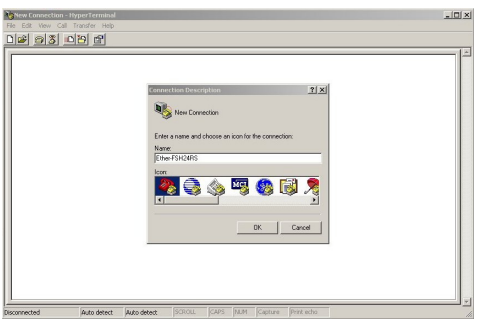
Using Windows Hyperterminal for Smart Configuration of VLAN and Trunking

After you have properly established a RS-232 cable connection between the console port of **Ether-FSH24RS** and the host PC. You can now begin configuring station ports for the VLAN and Trunking function. Generally, you can use Windows *Hyperterminal* (on Windows 95/98/ 2000) or utilities such as *Telix* or *Procomm* (on DOS environment) to access the Switch and perform configuration. In the following section, we will offer you a configuration example using Windows Hyperterminal on Windows 95/98/2000 platform.

Run Windows Hyperterminal utility

Step 1:
After the RS-232 connection is properly made, you should then run Windows *Hyperterminal* by accessing ***Start* menu/*Accessory/ Communication/Hyperterminal***.

Step 2:
The Hyperterminal window appear with a dialog box to prompt you to "Enter a name and choose an icon for the connection".



Step 3:

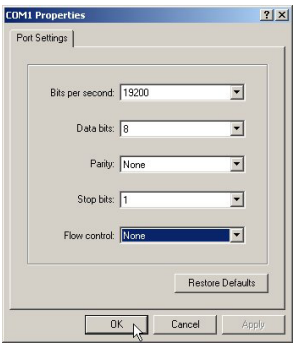
Ether any name you would like to have this connection (in this example, we use *Ether-FSH24RS* as name for the connection) and choose an icon. Click **OK**.

Step 4:

The *Connect to* dialog box appear. Since the Hyperterminal connection is made through console port instead of a phoneline, you need only to configure the *Connect using:* drop-down combo box (that means the settings of the rest of the combo box or list boxes can simply be ignored). Choose the COM port that your RS-232 is connected to (in this case, it is COM1).

After you select the COM port, click **OK**.

Step 4:
The COM port properties dialog box (in this case, *COM1 Properties* dialog box) appears.

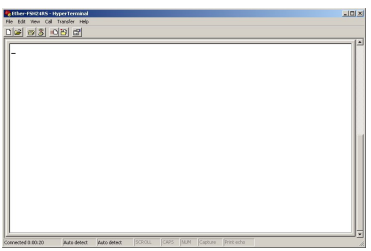


Configure the various port settings such as followings:

Bits per second: **19200**
Data bits: **8**
Parity: **None**
Stop bits: **1**
Flow Control: **None**

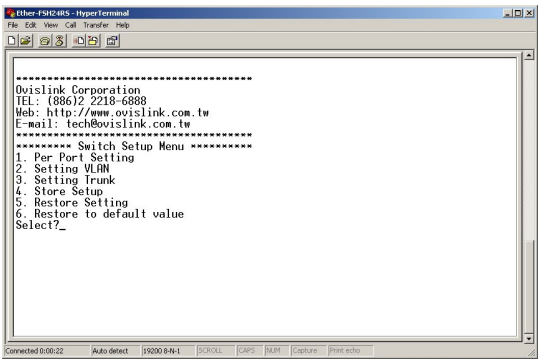
Click **OK**.

Step 5:
A blank Hyperterminal window appears.



Press **Enter** key.

Step 6:
The *Switch Setup Menu* appears.



The Switch Setup Menu is where you can begin configuration of VLAN and Trunking function. The function of each selection item will be described as below:

1. ***Per Port Setting:*** This is where you can configure the transmission parameters, such as *Auto-negotiation*, *Full Duplex/Half Duplex*, etc. for each station port.
2. ***Setting VLAN:*** This is the item you should choose if you want to specify which ports should be included in which VLAN group.
3. ***Setting Trunk:*** This item is useful when you want to enable/disable the trunking function of your Ether-FSH24RS.
4. ***Store Setup:*** If you want to store all the settings you have specified so far, just select this item to save your setting in the Flash ROM.
5. ***Restore Setting:*** If you want to restore settings to those specified in your Flash ROM (that is, the settings you use *"4. Store Setup"* to save in the Flash ROM previously), just select this item.
6. ***Restore to default value:*** If you want to restore the settings to factory default, just select this item.

In the following sections, we will explain the configuration details for each selection item.

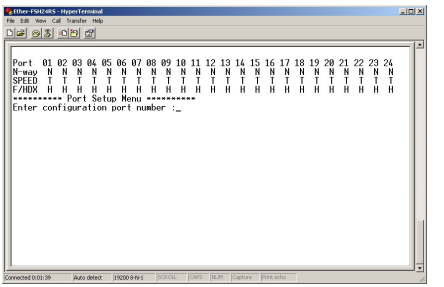
Per Port Setting

Per Port Setting submenu is where you can configure transmission settings such as auto-negotiation, full duplex/half duplex feature for each station port.

The steps for configuring Per Port Setting are as follows:

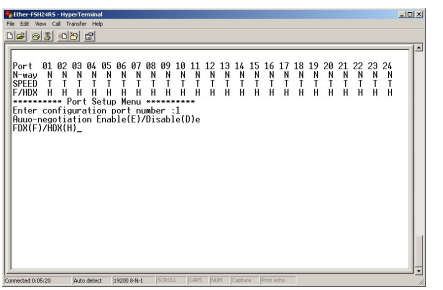
Step 1:

On the Switch Setup Menu, select *1. Per Port Setting* and the following *Per Port Setting* submenu appears:



Step 2:

Select the number of the port that you want to configure (in this case, we select port #1), and then select the transmission settings you want for that specific port as whether you want *auto-negotiation* enabled or not and whether you want to enable *full duplex* or *half duplex*.



After you have finished setting parameters for this specific port, the window will return to the Per Port Setting submenu again for you to select another port. You can select another port for configuration, or press ESC button to return to the Switch Setup Menu.

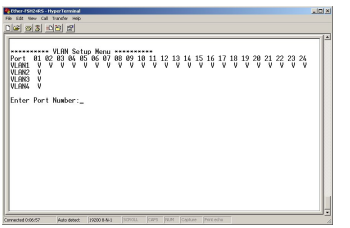
Setting VLAN

Setting VLAN submenu is where you can assign station ports to a certain VLAN Group (that is either VLAN 1/2/3/4).

The steps for Setting VLAN are as follows:

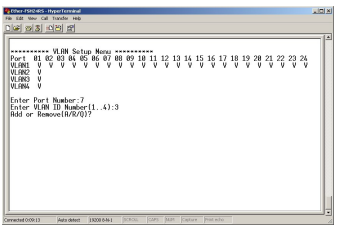
Step 1:

On the Switch Setup Menu, select *2. Setting VLAN* and the following VLAN submenu status appears:

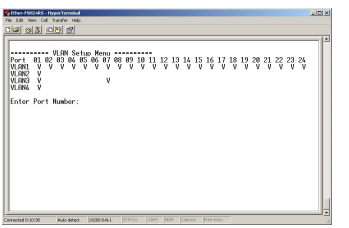


Step 2:

Add a port to a VLAN Group: Enter the port number of the port that you want to add (in this case, we select port #7) to a VLAN , then enter the VLAN ID Number (in this case, we select VLAN 3).



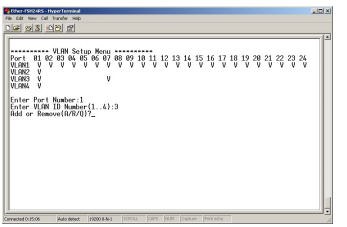
Select **A** (Add) to add that specific port to that VLAN (in this case, we select **A** to add port #7 to VLAN 3) as you can see port #7 has been added to VLAN 3.



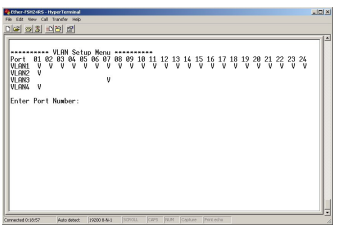
The window return to the Setting VLAN submenu.

Step 3:

Remove a port from a VLAN Group: Enter the port number of the port that you want to remove (in this case, we select port #1) from a VLAN, then enter the VLAN ID Number (in this case, we select VLAN 3).



Select **R** (Remove) to remove that specific port from that VLAN (in this case, we select **R** to remove port #1 from VLAN 3) as you can see port #1 has been removed from VLAN 3.



The window return to the Setting VLAN submenu.

You can continue configuring other ports, or if you want to quit, just press **Q** (Quit) to return to the Switch Setup Menu.
The window return to the Setting VLAN submenu.

Note:

Any of the station port of Ether-FSH24RS must at least belong to one VLAN group. If you try to remove a port from its only VLAN group, you will find that it is not allowed. This feature of belonging to at least one VLAN group is to ensure the readiness for communication with other ports when VLAN is enabled.

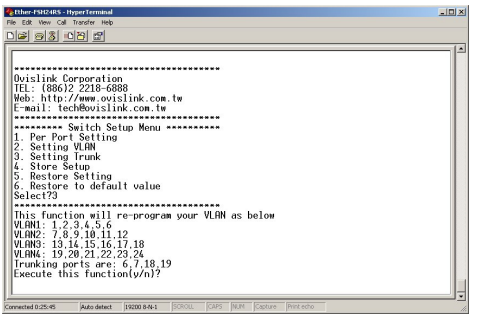
Setting Trunk

Setting Trunk submenu is where you can enable/disable trunking function of the switch.

The steps for setting trunking function are as follows:

Step 1:

On the Switch Setup Menu, select *3. Setting Trunk* and the following *Setting Trunk* submenu appears:



As you can see, the message tell you about that, under trunking, VLAN grouping will be reprogrammed as:

VLAN1: port #1 ~ #6

VLAN2: port #7 ~ #12

VLAN3: port #13 ~ #18

VLAN4: port #19 ~ #24

and Trunking ports are port #6, #7, #18 and #19.

And the prompting message asks you whether you want to execute this function.

Step 2:

Enable Trunking Function: Press **y** (Yes) to enable the trunking function.

Step 3:

Disable Trunking Function: Press **n** (No) to disable the trunking function.

Store Setup

Store Setup submenu is the option you should choose if you want to store all the settings you have specified so far, just select this item to save your setting in the Flash ROM.

Restore Setting

Restore Setting submenu is the option you should choose if you want to restore settings to those specified in your Flash ROM (that is, the settings you use *"4. Store Setup"* to save in the Flash ROM previously).

Restore to default value

Restore to default value submenu is the option you should choose if you want to restore the settings to factory default.

Appendix A

Product Specifications

Standard Compliance	- IEEE 802.3 10BASE-T Ethernet - IEEE 802.3u 100BASE-TX Fast Ethernet - ANSI/IEEE Std 802.3 Nway auto-Negotiation - IEEE 802.3 Frame Type - IEEE 802.1q VLAN standard
Topology	Star
Protocol	CSMA/CD
Port Configuration	24 × 100 BASE-TX Ports (4 × trunking port : Port 6, 7, 18, 19) 1 × Uplink Port
Date Rate	*Ethernet* 10 Megabit/sec (half-duplex) 20 Megabit/sec (full-duplex) *Fast Ethernet* 100 Megabit/sec (half-duplex) 200 Megabit/sec (full-duplex)
Transmission method	Store and Forward
Full Duplex	Auto-negotiation
Global Memory Buffer	shared by all ports

Trunking bandwidth

- 800Mbps (4-port trunking in full duplex)
- 2 × 400Mbps (2-port trunking in full duplex) for each

VLAN grouping

- 4 VLAN groups max.
- Secure VLAN

VLAN & Trunking configuration

- Smart configuration through RS-232 cable connection through console port
- Windows Hyperterminal support (on Windows 95/98/ 2000)
- Telix, Procomm support (on DOS environment)

Active Flow Control	- IEEE 802.3x compliant flow control for full duplex - Back Pressure option for half duplex
Filtering Address Table	2048 MAC address
Packet Filtering/ Forwarding Rate	Fully non-blocking architecture Wire speed for 10/100 Mbps
MAC Address Learning	Automatic update
Cabling Type	***100BASE-TX*** 4-pair 100 ohm [Category UTP *or* STP (100 m) cable] ***10BASE-T*** 4-pair 100 ohm [Category 3,4,5 UTP(100 m) cable]

Cabling distance	100 meters for switch-to-repeater connection 100 meters for switch-to-station
LED layout	**System Status LEDs** - Power LED - VLAN LED - Trunk LED **Station port LEDs** - Link/Act LEDs - FDX/Col LEDs - 100 M LEDs - VLAN/Trunk LEDs **VLAN Group LEDs** - VLAN 1 - VLAN 2 - VLAN 3 - VLAN 4 **VLAN disp. sel. button** (for VLAN group LED display selection)
Dimensions	432 × 193 × 44 m/m. (L × W × H)
Net Weight	3.8 kg
Power Input	100~240 VAC, 50 ~ 60 Hz, 1.0 A
Power Consumption	40 Watts max, @100 ~ 240 V AC
Operating Temperature	32 ~ 122 °F / 0 ~ 50 °C
Storage Temperature	- 40 ~ 149 °F / -40 ~ 65 °C

Humidity	< 95% (non-condensing)
Safety / EMI Certificates	UL, TUV, VDE, FCC Class A, CE

Appendix B

Troubleshooting

This appendix contains information to help you identify and solve problems. If your switch does not function properly, please make sure it is set up according to the instructions on the manual.
If you suspect your switch is not connected correctly to your network, check the following points before you contact your local dealer for support.

- Make sure that the maximum cable length between switch and end node does not exceed 100 m.
- Make sure that the maximum switch-to-repeater cable distance does not exceed 100 meters.
- Verify that the cabling type used is correct (Category 5 UTP).
- Check the **Link/Act LED** on the front panel to see if it lights up. If it does not light up, that means a faulty connection. Check the status of the cable attachment. If the problem persists, try a different cable.
- Check the **Power LED** to see if it lights up. If it does not light up, that means you haven't powered up your switch properly.
- Check the **VLAN LED** to see if it lights up. If it does not light up, that means you haven't used this function or you haven't properly configured this function.
- Check the **Trunk LED** to see if it lights up. If it does not light up, that means you haven't used this function or you haven't properly configured this function.
- Try another port on the Switch.
- Turn off power supply to the Switch. After a while, turn it on again to see if it resumes to its normal function.

If you find out where the problem is but can not solve it by yourself, or you simply cannot locate what is at fault, please contact your local dealer for technical support.