ALLOY
Computer Products

NS-16T01FS
16-Port 10/100Mbps
Fast Ethernet
Smart Switch

User's Guide

FCC Warning

This equipment has been tested and found to comply with the regulations for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with this user's guide, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

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This is a product of VCCI Class A Compliance.

CE Mark Warning

This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

Australian C-Tick Compliant

N866

UL Warning

a) Elevated Operating Ambient Temperature- If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the manufacturer's maximum rated ambient temperature (Tmra).

b) Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.

c) Mechanical Loading - Mounting of the equipment in a rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

d) Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of circuits might have on over current protection and supply wiring. Appropriate consideration of equipment power ratings should be taken when addressing this concern.

e) Reliable Earthing - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g., use of power strips).

P/N:1907SMSW16B7280

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Safety Wa

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ABOUT THIS GUIDE

Congratulations on your purchase of your Alloy 16-Port 10/100Mbps Fast Ethernet Smart Switch. This device integrates 100Mbps Fast Ethernet and 10Mbps Ethernet network capabilities in a highly flexible package.

Purpose

This guide discusses how to install your 16-Port 10/100Mbps Fast Ethernet Smart Switch.

Terms/Usage

In this guide, the term "**Switch**" (first letter upper case) refers to your 16-Port 10/100Mbps Fast Ethernet Smart Switch, and "**switch**" (first letter lower case) refers to other Ethernet switches.

INTRODUCTION

This chapter describes the features of the 16-Port 10/100Mbps Fast Ethernet Smart Switch and some background information about Ethernet/Fast Ethernet and Switching technology.

Fast Ethernet Technology

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

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

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Switching Technology

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

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

The switch acts as a high-speed selective bridge between the individual segments. The switch, without interfering with any other segments, automatically forwards traffic that needs to go from one segment to another. By doing this the total network capacity is multiplied, while still maintaining the same network cabling and adapter cards.

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

VLAN (Virtual Local Area Network)

A VLAN is a group of end-stations that are not constrained by their physical location and can communicate as if in a common broadcast domain, a LAN. The primary utility of using VLAN is to reduce latency and need for routers, using faster switching instead. Other VLAN features include:

➢ **Security**

Security is increased with the reduction of opportunity for eavesdropping on a broadcast network because data will be switched only to those users within the particular VLAN.

➢ **Cost Reduction**

VLANs can be used to create multiple broadcast domains, thus eliminating the need for expensive routers.

Port-based (or port-group) VLAN is the common method of implementing a VLAN, and is the one implimented in this Switch. Each Switch port can belong to one or more of up to sixteen VLANs.

Features

➢ **16×10/100Mbps Auto-negotiation Ethernet ports**

➢ **All ports support auto MDI/MDIX, so there is no need to use cross-over cables or an up-link port**

➢ **Full/half duplex transfer mode for each port**

➢ **Wire speed reception and transmission**

➢ **Store-and-Forward switching scheme with capability to support rate adaptation and ensure data integrity**

➢ **Broadcast storm protection**

➢ **Up to 4K unicast address entities per device, self-learning, and table aging**

➢ **256KBytes on-chip packet buffer for each eight ports**

➢ **Supports IEEE 802.3x flow control for full-duplex mode ports**

➢ **Supports Back-pressure flow control for half-duplex mode ports**

➢ **Optional one port 100BASE-FX Fibre module in the rear panel for extended distance communications**

➢ **Supports Port-base VLAN and IEEE 802.1p QoS**

➢ **RS-232 DCE console port for setting up and managing the Switch via connection to a console terminal or PC using a terminal emulation program**

➢ **Standard 19" Rack-mount size**

UNPACKING AND INSTALLATION

This chapter provides unpacking and setup information for the Switch.

Unpacking

Open the shipping carton of the Switch and carefully unpack its contents. The carton should contain the following items:

➢ **One 16-Port 10/100Mbps Fast Ethernet Smart Switch**

➢ **One AC power cord, suitable for your area's electrical power connections**

➢ **Four rubber feet to be used for shock cushioning**

➢ **Screws and two 19" rack mounting brackets**

➢ **One console cable**

➢ **This User's Guide**

If any item is found missing or damaged, please contact your local reseller for replacement.

Installation

The site where you install the hub stack may greatly affect its performance. When installing, consider the following pointers:

➢ **Install the Switch in a fairly cool and dry place. See** *Technical Specifications* **for the acceptable temperature and humidity operating ranges.**

➢ **Install the Switch in a site free from strong electromagnetic field generators (such as motors), vibration, dust, and direct exposure to sunlight.**

➢ **Leave at least 10cm of space at the front and rear of the Switch for ventilation.**

➢ **Install the Switch on a sturdy, level surface that can support its weight, or in an EIA standard-size equipment rack. For information on rack installation, see the next section,** *Rack* **.**

➢ **When installing Switches on a level surface, attach the rubber feet to the bottom of each device. The rubber feet cushion the Switch and protect the case from scratching.**

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Rack Mounting

The switch can be mounted in an EIA standard-size, 19-inch rack, which can be placed in a wiring closet with other equipment. Attach the mounting brackets at the switch's front panel (one each side), and secure them with the screws provided.
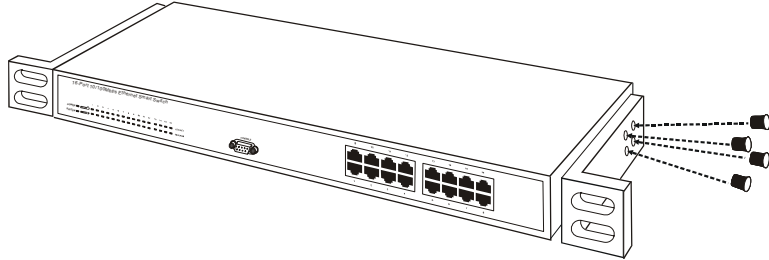
Figure 1. Combine the Switch with the provided screws

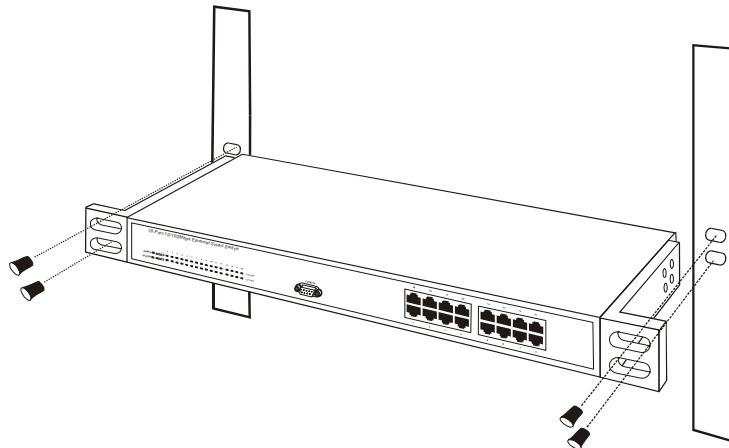Then, use screws provided with the equipment rack to mount each switch in the rack.

Figure 2. Mount the Switch in the rack

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Connecting Network Cable

The Switch supports 10Mbps Ethernet or 100Mbps Fast Ethernet and it runs both in half and full duplex modes.

The Switch ports are Auto-MDI types. The Switch can automatically change all ports between MDI-II & MDI-X types alleviating any worry about using standard or crossover type cables.

AC Power

The Switch can be used with an AC power supply of 100~240V AC, 50~60 Hz. The Switch's power supply will adjust to the local power source automatically and may be turned on without having any, or having some/all, LAN segment cables connected.

IDENTIFYING EXTERNAL COMPONENTS

This chapter describes the front panel, rear panel, and LED indicators of the Switch.

Front Panel

The figure below shows the front panels of the Switch.

10/100 BASE-T X Twisted-Pair Ports

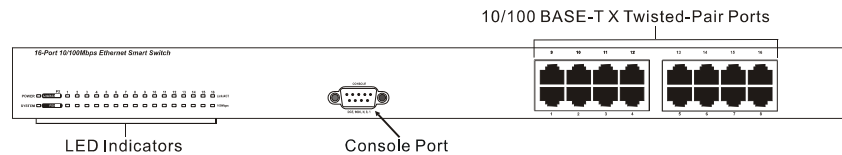
LED Indicators   Console Port

Figure 3. Front panel of 16-port 10/100Mbps Fast Ethernet Switch

➢ **LED Indicator**

Comprehensive LED indicators display the status of the switch and the network (see the *LED Indicators* chapter below).

➢ **10/100BASE-T Twisted-Pair Ports**

These ports support network speeds of either 10Mbps or 100Mbps, and can operate in half- and full- duplex transfer modes. These ports also support automatic MDI/MDIX crossover detection function which gives true "plug and play" capability, you just need to plug in the network cable to the hub without worrying about whether the other end is a hub or NIC.

An RS-232 DCE console port is supplied for Switch management via a connection to a console terminal or PC using a terminal emulation program.

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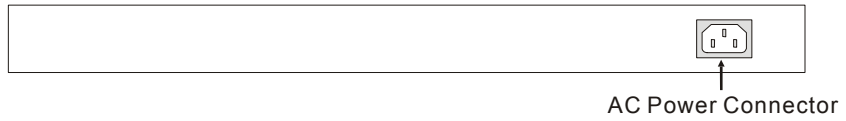## Rear Panel

AC Power Connector

Figure 4. Rear panel of the Switch

➢ **AC Power Connector**

This is a three-pronged (IEC) connector that supports the power cord. Plug the female connector of the provided power cord into this connector, and the male into a power outlet. Supported input voltages range from 100~240V AC at 50~60Hz.

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UNDERSTANDING LED INDICATORS

The front panel LEDs provide instant status feedback, and help monitor and troubleshoot when needed.
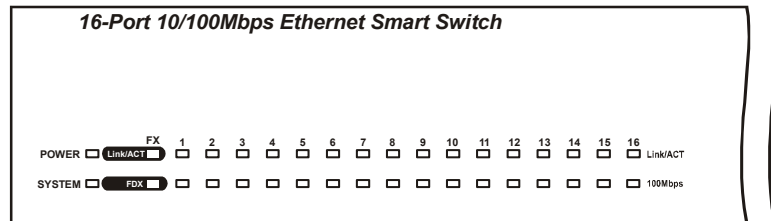
Figure 5. LED indicators of the Switch

Power and System LEDs

> ### POWER : Power Indicator

On	:	When the Power LED lights on, the Switch is receiving power.
Off	:	When the Power turns off or the power cord has improper connection.

> ### SYSTEM: Management Indicator

Blinking	:	When the CPU is working, the System LED is blinking.
On/Off	:	The CPU is not working.

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Ports 1~16 Status LEDs

➢ Link/ACT

On	:	When the Link/ACT LED lights on, the respective port is successfully connected to an Ethernet network.
Blinking	:	When the Link/ACT LED is blinking, the port is transmitting or receiving data on the Ethernet network.
Off	:	No link.

➢ 100Mbps

On	:	When the 100Mbps LED lights on, the respective port is connected to a 100Mbps Fast Ethernet network.
Off	:	When the respective port is connected to a 10Mbps Ethernet network

Fibre Module LEDs

➢ FX Link/ACT

On	:	When the fibre module is installed and connected to an Ethernet network, the FX Link/ACT LED lights on.
Blinking	:	When the FX Link/ACT LED is blinking, the fibre module is transmitting or receiving data on an Ethernet network.
Off	:	No link.

➢ FDX

On	:	When the FDX LED lights on, the fibre port is in full duplex mode.
Off	:	When the green light is off, the fibre port is in half duplex mode.

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CONFIGURATION

This Switch is an unmanaged, but "smart" Switch because programmable administration parameters make it operate more effectively than regular unmanaged (dumb) switches. This chapter describes how to configure the Switch.

Console Port (RS-232 DCE)

The console configuration requires connecting a terminal, such as a Workstation or a PC running a terminal emulation program (such as HyperTerminal, which is automatically installed with Microsoft Windows) to the RS-232 DCE console port of the Switch.

The console port is set at the factory for the following configuration:

- ■ Baud rate: 9,600
- ■ Data width: 8 bits
- ■ Parity: none
- ■ Stop bits: 1
- ■ Flow control: None

Make sure the terminal or PC you are using to make this connection is configured to match these settings.

For example, run the Hyperterminal program packaged with Windows 98/ME/2000/XP, the process will procede as follow:

Step 1. Click *Start   Accessories   Communications   Hyper Terminal* (Figure 6), and then the *Connection Description* screen will be shown as Figure 7.
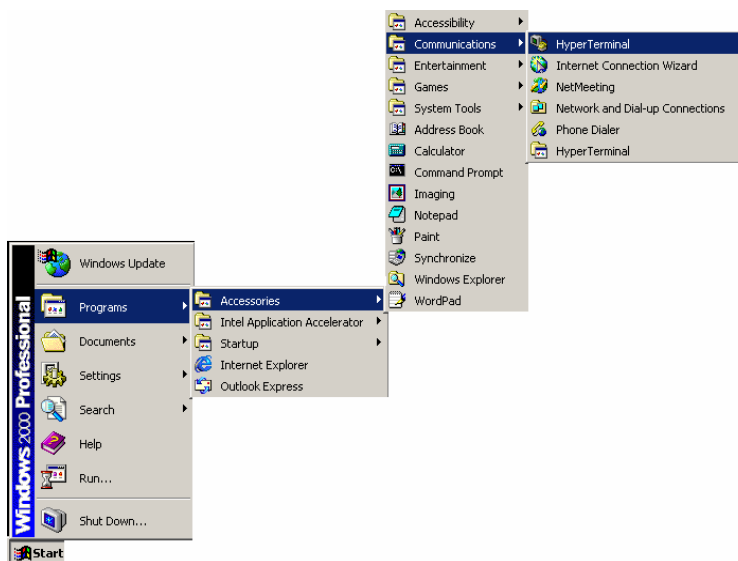

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Figure 6. Start Hyper Terminal function

Step 2. Enter a name in the blank to set up a new connection, and then press *OK*.
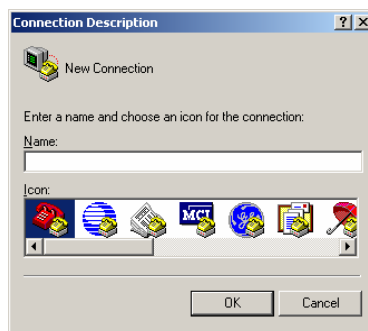

Figure 7. Connection Description

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Step 3. The *Connect To* screen will appear as below. Pull down the *Connect using* and choose the COM port that the Switch has been connected to, then press *OK*.

Figure 8. Connect To

Step 4. Make sure the Switch serial port parameters have been set as per the factory default settings (Figure 9). Click *OK* to configure the Switch.
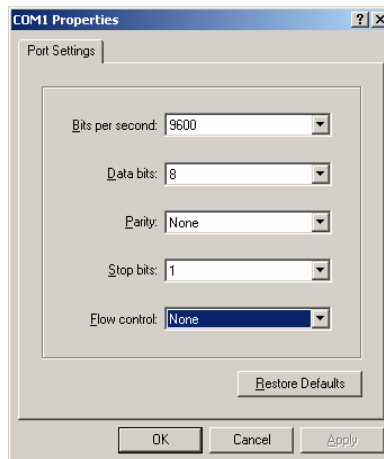

Figure 9. Port Settings

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Configuring the Switch

The 16-Port 10/100Mbps Fast Ethernet Smart Switch has a menu-driven console interface for smart switch configuration. The Switch can be configured through the serial port. A network administrator can manage, control and monitor the switch from the console program. This section indicates how to configure the Switch to enable its smart functions including:

➢ **Setup**

There are two items, Port Configuration and VLAN, shown in the Setup screen. Each function of these two items will be illustrated in the following sections.

➢ **System**

In the System screen, Factory Reset, Change Password, Confirm Password, Refresh Time, and Login Timeout, can be viewed and changed. System Uptime can't be altered and is governed by the Switch.

➢ **File**

The Switch can have its configuration file uploaded or downloaded by using Upload Configuration or Download Configuration settings in the File setting screen.

➢ **Statistics**

In the Statistics menu screen, each port's data transmit and receive status can be viewed, but not changed.

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Login

First execute the terminal emulation program on the remote workstation, and turn on the Switch. When logging into the Switch, the following screen (Figure 10) prompt appears:

Password:

```
Smart Switch                                            V0.90t




                        Password : [_                    ]




                                                        Login
  [DOWN/TAB] [UP] [ENTER] [SPACE] [BACKSPACE] [DIGIT] [LETTER]
  Please Enter Password
```

Figure 10. Login

Insert the password into the blank space and then press *Enter* to log in to the Main Menu. If you are managing the Switch for the first time, you should input the factory default password "***admin***" to log in to the Switch. To change the password, first highlight ***System Change Password*** to input your new password, and then highlight ***Confirm Password*** to input your new password again for confirmation.

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Main Menu

The main menu appears, as shown in Figure 11. Note the console keys in the lower part of the display. Move to highlight a desired option by using *Up Arrow*, *Down Arrow* and *Tab* keys, and then press the *Enter* key to confirm. There are four options: Setup, System, File, and Statistics, shown in the Main Menu screen.

```
Smart Switch                                                V0.90t




                            Setup
                            System
                            File
                            Statistics




                                                            Logout
  [DOWN/TAB] [UP] [ENTER]
```

Figure 11. Main Menu

Configuring Setup Menu

Note that there are two items, Port Configuration and VLAN, in Setup menu as shown in Figure 12.

```
Smart Switch                                                V0.90t
/Setup




                              Port Configuration
                              VLAN






                                                          Exit
    [DOWN/TAB] [UP] [ENTER]
    Configure Fast Ethernet Ports
```

Figure 12. Setup Menu

➢ **Port Configuration**

In the Port Configuration menu (Figure 13), each port's (inc. port 17: Fibre port) Speed, Flow Control, and QoS can be controlled. Link Status is automatically determined by the Switch and can't be shifted.

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```
Smart Switch                                              V0.90t
/Setup/Port Configuration
<=====================  STATUS  =====================>
Port      Speed       FlowCtrl    QoS     | Link Status
------    ---------   --------    -------   ------------
01        Auto        ON          High    | Down
02        Auto        ON          High    | Down
03        Auto        ON          High    | Down
04        Auto        ON          High    | Down
05        Auto        ON          High    | Down
06        Auto        ON          High    | Down
07        Auto        ON          High    | Down
08        Auto        ON          High    | Down
09        Auto        ON          High    | Down
10        Auto        ON          High    | Down
11        Auto        ON          High    | Down
12        Auto        ON          High    | Down
<=====================  SETTING  =====================>
                                                    Save
Port[01]  {Auto    }  {ON }       {High }           Next

                                                    Exit
[DOWN/TAB] [UP] [ENTER] [BACKSPACE] [DIGIT]
```

Figure 13. Port Configuration

(1) Speed

There are five modes— *Auto*, *100M Full*, *100M Half*, *10M Full*, and *10M Half*—for speed selections. To change the speed setting, highlight Port and enter the port number to select the desired port, next highlight Speed, click *Enter*, and use *Space Bar* to switch between the five different options.

(2) Flow Control

This setting determines whether or not the Switch will be handling flow control. To change the flow control setting, highlight Port and enter the port number to select the desired port. Set *FlowCtrl* to *ON* for avoiding data transfer overflow, or set it to *OFF* where there is either no flow control, or this is handled by other hardware/software management.

(3) QoS

If some ports need to have priority for data management transfer, then QoS can be changed. QoS has two settings to choose from,

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High and *Low*. The default setting for QoS on all ports is *High*. To change the QoS setting, highlight Port and enter the port number to select the desired port. Set QoS as required to determine which ports will always transfer their data first.

(4) Link Status

This value is automatically determined by the Switch and can't be changed. If there is a valid connection to the Switch through the indicated port, the Link Status will show the connection speed. The status will be *Down* if there is no connection through that port.

➤   **VLAN (Virtual Local Area Network)**

Grouping of individual ports into a small "virtual" network of their own being independent of all other ports. To change the VLAN, locate the port that needs to be set, select "V" for joining the VLAN group and "-" for not joining. The default setting of VLAN is shown as Figure 14.

Figure 14. VLAN Configuration

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For example, there are five computers (PC1~PC5) connected to the Switch's port 1~5. They had been divided into two VLAN groups: VLAN1 (PC1~PC4) and VLAN2 (PC2~PC5). There is no way to connect PC1 and PC5, as shown in Figure 15. If PC1 has to connect to PC5, it should with it in the same VLAN.
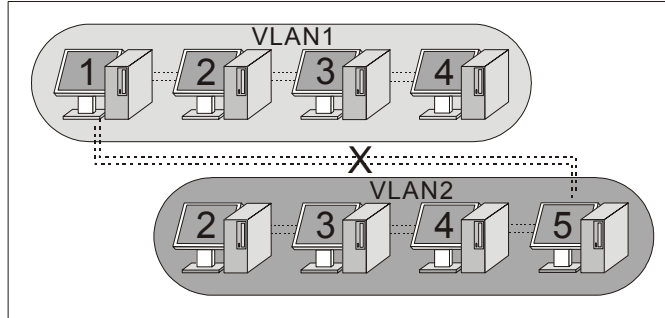

Figure 15. There is no connection between PC1 and PC5

Using VLAN, the Switch can be divided into many independent small switches. For example, in Figure 16, the Switch has been divided into two VLAN groups. Both VLAN groups are independent and there's no link between these VLAN groups. The Switch can be regarded as two smaller switches.
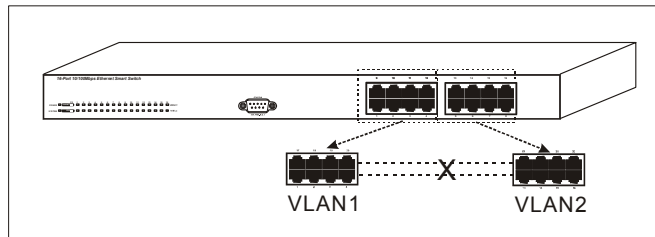

Figure 16. Dividing the Switch into two smaller switches

Configuring System Setting

The System Configuration Menu screen (shown in Figure 17) indicates the following information:

➢ **Factory Reset**: Press to revert to factory settings if the configuration becomes corrupt.

➢ **Change Password**: Change the input password.

➢ **Confirm Password**: Confirm the new input password.

➢ **Refresh Time**: Set the refresh time of the device for Statistics.

➢ **Login Timeout**: Set the console idle time-out to log out the smart menu if it has been forgotten to do this.

➢ **System Uptime**: Indicate the time for which the Switch has been powered up.

```
 Smart Switch                                                V0.90t
 /System




                         Factory Reset
                         Change Password : [                    ]
                         Confirm Password : [                    ]
                         Refresh Time     : [5 Sec. ]
                         Login Timeout    : [5 Min. ]
                         System Uptime : 0 days, 0 hours, 6 mins, 9 secs



                                                            Save


                                                            Exit
          [DOWN/TAB] [UP] [ENTER]
```

Figure 17. System Setting

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Configuring File Setting

The Switch can have its configuration files uploaded or downloaded by using the File screen shown in Figure 18.

➢ **Upload Configuration**: Select this for uploading the configuration file to the device.

➢ **Download Configuration**: Select this for backing up the current configuration to another device.
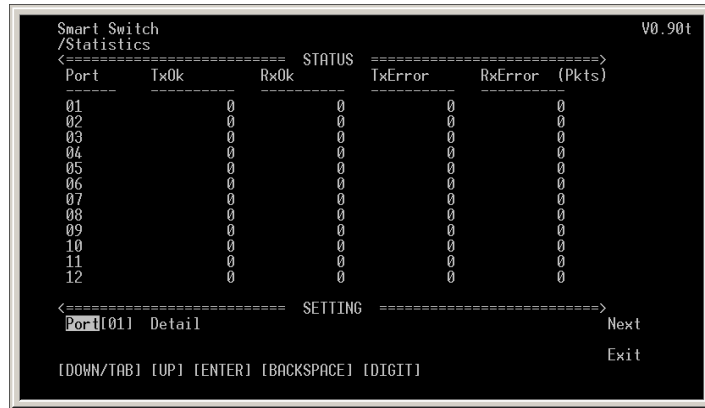

Figure 18. File installation

Statistics

➢ **Statistics Menu**

In the Statistics menu screen, shown in Figure 19, the transmit (Tx) and receive (Rx) status summaries can be viewed.

Figure 19. Statistics

➢ **Statistics Detail**

Highlight Port and enter port number to view the statistics details (see Figure 20).

Figure 20. Statistics Detail

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TECHNICAL SPECIFICATIONS

General	
Standards	IEEE 802.3 10BASE-T Ethernet IEEE 802.3u 100 BASE-TX, 100BASE-FX Fast Ethernet
Protocol	CSMA/CD
Data Transfer Rate	Ethernet: 10Mbps (half duplex), 20Mbps (full duplex) Fast Ethernet: 100Mbps (half duplex), 200Mbps (full duplex)
Topology	Star
Network Media	10BASE-T: 2-pair UTP/STP Cat. 3, 4, 5/5e; up to 100m 100BASE-TX: 2-pair UTP/STP Cat. 5/5e; up to 100m 100BASE-FX: 50/125 or 62.5/125μm multimode fibre with SC connector
Number of Ports	16 × 10/100Mbps Auto-MDIX STP ports 1 × expansion slot for 100BASE-FX fibre module

Physical and Environmental	
AC input:	100~240V AC, 50/60 Hz internal universal power supply
Power Consumption:	12 watts. (max.)
Temperature:	Operating: 0°~40°C, Storage: -10°~70°C
Humidity:	Operating: 10%~90% RH, Storage: 5%~90% RH
Dimensions:	440 x 140 x 44 mm (W x H x D)
Weight:	2.0kg
Emissions:	C-Tick, FCC Class A, CE Mark Class A, VCCI Class A
Safety:	cUL(1950), CB(IEC60950)
Performance	
Transmits Method:	Store-and-forward
RAM Buffer:	512K bytes per device
Filtering Address Table:	4K entries per device
Packet Filtering/Forwarding Rate:	10Mbps Ethernet: 14,880/pps 100Mbps Fast Ethernet: 148,800/pps
MAC Address Learning:	Automatic update

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