



DES-1016/DES-1024 10/100 Fast Ethernet Switch

User's Guide

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RECYCLABLE

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ABOUT THIS GUIDE

Congratulations on your purchase of the 10/100 Fast Ethernet Switch. This device integrates trunking and VLAN network capabilities in a highly flexible package.

Purpose

The purpose of this manual is to discuss the installation and use of your DES-1016/DES-1024 10/100 Fast Ethernet Switch.

Terms/Usage

For simplicity, this documentation uses the term “Switch” (first letter upper case) to refer to the DES-1016/DES-1024 10/100 Fast Ethernet Switch, and “switch” (first letter lower case) to refer to all Ethernet switches, including the DES-1016/ DES-1024.

For simplicity and brevity, this manual discusses two 10/100 Fast Ethernet Switch models. The DES-1016 is a sixteen port model, and the DES-1024 is a twenty-four port model. These models are similar in every respect except for the number of ports. Therefore, all information provided in this manual is applicable to both, and when necessary, the differentiating elements between them will be mentioned.

Overview of this User's Guide

- ◆ Chapter 1, *Introduction*. Describes the Switch and its features.
- ◆ Chapter 2, *Unpacking and Setup*. Helps you get started with the basic installation of the Switch.
- ◆ Chapter 3, *Identifying External Components*. Describes the front panel, rear panel, and LED indicators of the Switch.
- ◆ Chapter 4, *Connecting the Switch*. Tells how you can connect the DES-1016/DES-1024 to your Ethernet network.
- ◆ Chapter 5, *Programming the Switch*. This chapter describes the programmable parameters of the Switch and use of the configuration program.
- ◆ Appendix A, *Technical Specifications*. Lists the technical (general, physical and environmental, and performance) specifications of the Switch.
- ◆ Appendix B, *RJ-45 Pin Specification*. Describes the RJ-45 receptacle/ connector and the straight and crossover cable connector.

1

INTRODUCTION

This section describes the features of the DES-1016/DES-1024, as well as giving some background information about Ethernet/Fast Ethernet switching technology.

Fast Ethernet Technology

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

100Mbps Fast Ethernet is a new standard specified by the IEEE 802.3 LAN committee. It is an extension of the 10Mbps Ethernet standard with the ability to transmit and receive data at 100Mbps, while maintaining the CSMA/CD Ethernet protocol. Since the 100Mbps Fast Ethernet is compatible with all other 10Mbps

Ethernet environments, it provides a straightforward upgrade and takes advantage of the company's existing investment in hardware, software, and personnel training.

Switching Technology

Another approach to pushing beyond the limits of Ethernet technology is the development of switching technology. A switch 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 making it possible for a local area network to be divided into different *segments* which don't compete with each other for network transmission capacity, giving a decreased load on each.

The switch acts as a high-speed selective bridge between the individual segments. Traffic that needs to go from one segment to another is automatically forwarded by the switch, without interfering with any other segments. This allows the total network capacity to be multiplied, while still maintaining the same network cabling and adapter cards.

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

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

Trunking Technology

Basically, trunking is a method of adding multiple physical links into a single logical link, thus increasing the throughput of the logical link by adding the physical link's relevant throughputs as well. In other words, trunking is a method to treat multiple physical links as a single logical link (link aggregation). Without trunking, the maximum bandwidth in a link is determined by the media speed of the link. The benefit of trunking is to be able to group multiple lower speed links into one higher speed link.

Other benefits of trunking include:

- **Fault Tolerance** A trunk will continue to operate as long as there is at least one link operating. This was formerly available only through the Spanning Tree Protocol or use of residual links.
- **Scalability** Trunking gives Network and MIS managers a building block, providing a smooth transition from today's Fast Ethernet to tomorrow's Gigabit Ethernet.
- **Congestion Relief** Existing equipment can be utilized more efficiently by relieving the congestion between the Switch and the server. Connections to a server can be made simply by adding more network interface cards.

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 utility include:

- **Virtual Workgroups** These are workgroups that have been formed for a limited time. During this time, communication between workgroup members will be high. A VLAN will eliminate the need of using a router for workgroup communication, thus, increasing performance.
- **Security** Security is increased with the reduction of opportunity in eavesdropping on a broadcast network because data will be switched to only those confidential users within the VLAN.
- **Cost Reduction** VLANs can be used to create multiple broadcast domains, thus eliminating the need of expensive routers.

Port-based (or port-group) VLAN is the common method of implementing a VLAN, and is the one supplied in the Switch. Each Switch port can belong from one to sixteen VLAN (one to eight, if using the DES-1016 model).

Features

The Switch is designed for easy installation and high performance in an environment where traffic on the network and the number of users increase continuously.

The Switch is specifically designed to relieve the bottleneck between the server and switch. The design improves performance (bandwidth) between the workstations and server. These Switches can provide immediate access to a rapidly growing network through a wide range of user-reliable functions.

The Switch is ideal for deployment with multiple graphics workstations demanding a fast flow of data from a single high-speed server. The Switch's trunking ability, it's main feature, permits up to an 800 Mbps Ethernet connection (full-duplex) using existing equipment. In full-duplex mode, any four ports can provide their workstations with a simultaneous access, congestion-free 800 Mbps data pipe to the server.

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

The Switches are a perfect choice for site planning to upgrade to Gigabit Ethernet in the future

The Switch combines dynamic memory allocation with store-and-forward switching to ensure that the buffer is effectively allocated for each port; while, data flow is controlled between the transmitting and receiving nodes to guarantee against all possible packet loss.

The Switch is unmanaged, but a smart, 10/100 Fast Ethernet switch that offers solutions to improve the performance of multiple workstations using shared resources.

Performance features

- ◆ Provides 4 or 6 trunking links for up to 800 Mbps data links, each, depending on DES-1016 or DES-1024 model respectfully.

- ◆ Supports up to 8 or 16 (depending on model) port-based VLANs.
- ◆ 16 or 24 UTP/STP ports (depending on model) all come with Nway auto-Negotiation and operate at 10/100 Mbps for connection to servers and hubs. All ports can auto-negotiate for full or half-duplex operation.
- ◆ Two up-Link ports to cascade 2 relative devices in 200 Mbps full-duplex mode or adapt to an external interface with 2 km connectivity (100BASE-FX).
- ◆ One slot (plug-in) module with 2 ports to support either 10BASE-T, 100BASE-TX or 100BASE-FX.
- ◆ Store and forward switching scheme capability to support rate adaptation and ensure data integrity.
- ◆ Auto-polarity detection for correction of incorrect polarity on the receive twisted pair at each port.
- ◆ Data forwarding rate 148,800 pps per port at 100% of wire-speed for 100Mbps speed.
- ◆ Data forwarding rate 14,880 pps per port at 100% of wire-speed for 10Mbps speed.
- ◆ Data filtering rate eliminates all error packets, runts, etc. at 148,800 pps per port at 100% of wire-speed for 100Mbps speed.
- ◆ Data filtering rate eliminates all error packets, runts, etc. at 14,880 pps per port at 100% of wire-speed for 10Mbps speed.
- ◆ 1K active address entry table per device with self learning and table aging.
- ◆ 1 MB packet buffer per eight ports.

- ◆ Optional IEEE802.3x flow control for full duplex and backpressure flow control for half duplex.

2

UNPACKING AND SETUP

This chapter provides unpacking and setup information for the Switches.

Unpacking

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

- ◆ One DES-1016 or DES-1024 10/100 Fast Ethernet Switch
- ◆ One AC power cord
- ◆ One IEEE 1284 compliant parallel printer cable
- ◆ This User's Guide
- ◆ Diskette containing configuration software
- ◆ Four rubber feet with adhesive backing
- ◆ Screws and two L-type brackets for rack mounting

If any item is found missing or damaged, please contact your local D-Link Reseller for replacement.

Setup

The setup of the Switch can be performed using the following steps:

- ◆ The surface must support at least 5kg for the Switch.
- ◆ The power outlet should be within 1.82 meters (6 feet) of the device.
- ◆ Visually inspect the power cord and see that it is fully secured to the AC power connector.
- ◆ Make sure that there is proper heat dissipation from and adequate ventilation around the Switch. Do not place heavy objects on the Switch.

Desktop or Shelf Installation

When installing the Switch on a desktop or shelf, the rubber feet included with the device must be first attached. Attach these cushioning feet on the bottom at each corner of the device. Allow enough ventilation space between the device and the objects around it.

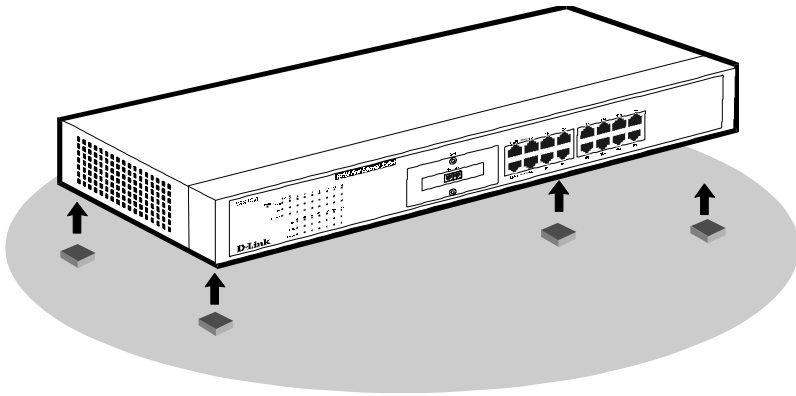


Figure 2.1 10/100 Fast Ethernet Switch installed on a Desktop or Shelf

Rack Installation

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

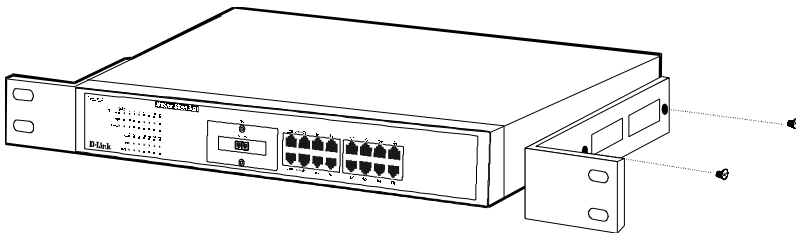


Figure 2.2 Attaching the mounting brackets to the 10/100 Fast Ethernet Switch

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

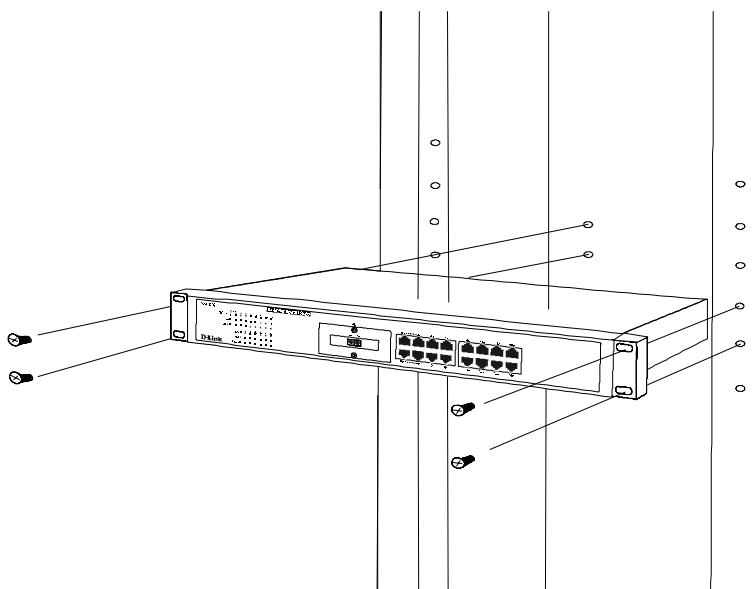


Figure 2.3 Installing the Switch in an equipment rack

Power on

The Switch can be used with AC power sources 100 - 240 VAC, 50 - 60 Hz. The power switch is located at the rear of the unit adjacent to the AC power connector and the system fan. To turn the Switch on, press the power switch to the on or “1” position. The Switch’s power supply will adjust to the local power source automatically and may be turned on without having any or all LAN segment cables connected.

LED Indicators

After the switch is turned on, the LED indicators should respond as follows:

- ◆ All of the LED indicators will blink momentarily. This blinking of the LED indicators represents a reset of the system.
- ◆ The power LED indicator will remain ON.

Power Failure

As a precaution, the Switch should be turned **OFF** in case of a power failure. Press the power switch to the off or "0" position. When power is resumed, turn the Switch **ON**. At all times, avoid leaving the Switch ON if a power failure is anticipated.

3

IDENTIFYING EXTERNAL COMPONENTS

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

Front Panel

The front panel of the Switch consists of 16 (10/100 Mbps MDI-X) ports in the DES-1016 or 24 (10/100 Mbps MDI-X) ports in the DES-1024, 2 up-Link (MDI-II) ports and LED indicators. A description of the ports appear in the *Introduction* of this User's Guide (see *Features*, Chapter 1).

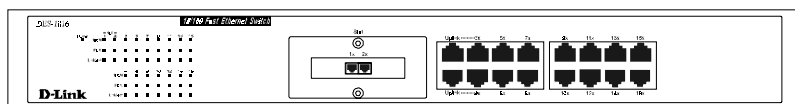


Figure 3.1 Front panel view of the DES-1016 Switch

Rear Panel

The rear panel of the Switch consists of a power switch, an AC power connector and two system fans.

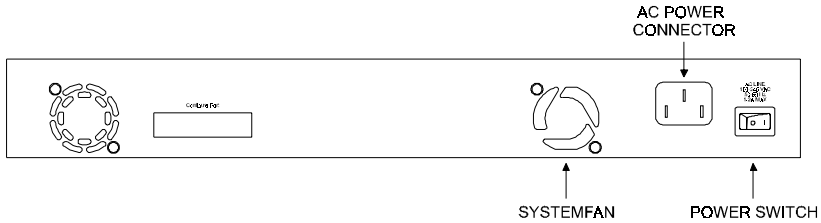


Figure 3.2 Rear panel view of the DES-1016 switch

- ◆ **System Fans** The fans are used to circulate air inside the Switch and also to dissipate heat. The sides of the system also provide heat vents to serve the same purpose. Do not block these openings, and leave adequate space at the rear and sides of the Switch for proper ventilation. Be reminded that without proper heat dissipation and air circulation, system components might overheat, which could lead to system failure.
- ◆ **AC Power Connector** This is a three-pronged connector that supports the power cord. Plug in the female connector of the provided power cord into this connector, and the male into a power outlet. Supported input voltages range from 100 ~ 240 VAC at 50 ~ 60 Hz.
- ◆ **Power Switch** This turns the Switch on and off. To turn on the system, press the switch to the “1” position; to turn off, press the switch to the “0” position.

LED Indicators

The LED indicators of the Switch include Power, 100M, Link/Act (Link/Activity) and FDX (Full-duplex). The LED indicators are used to facilitate monitoring and troubleshooting of the Switch. The following shows the LED indicators for the Switch along with an explanation of each indicator.

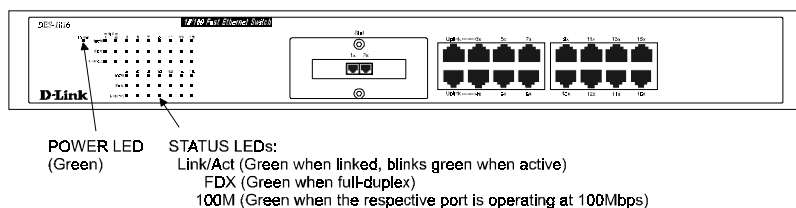


Figure 3.3 The DES-1016 Switch LED indicators

- ◆ **Power** This indicator operates when the Switch is turned on. If this indicator is not lit, check the AC power connector to ensure proper insertion of the power cord and that the power switch is turned ON.
- ◆ **100M** The LED indicator lights **green** when a 100 Mbps device is connected to a respective port or the up-Link port. If a 10 Mbps device is connected to a respective port or the up-Link port, the LED indicator is OFF.
- ◆ **Link/Act** These LED indicators are lighted up **green** when there is a secure connection (or link) to a device at any of the ports. The LED indicators blink **green** whenever there is reception or transmission (i.e. Activity—Act) of data occurring at a port.

- ◆ **FDX** This LED indicator is **green** when a respective port is in full duplex (FDX) mode. Otherwise, it is OFF for half duplex (HDX) operation.

Slide-In Port Modules

The Switch supports two types of slide-in modules: DES-116, a module consisting of two RJ-45 N-Way ports; and DES-116F, a module consisting of two 100Mbps SC Fiber ports.

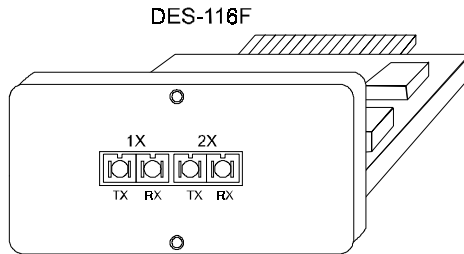


Figure 3.4 DES-116F Fiber Module for Fast Ethernet

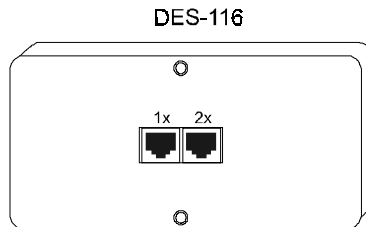


Figure 3.5 DES-116 TP N-Way Module for 10/ 100Mbps Ethernet

To install either module, first, power OFF the Switch. Unscrew and remove the cover from the front panel of the Switch. Slide-in and securely screw the module into slot of the Switch.

4

CONNECTING THE SWITCH

This chapter describes how to connect the DES-1016/DES-1024 to your Fast Ethernet network. In each of the following figures, the DES-1016 is shown; however, similar cable connections can be attained on the DES-1024 because of product similarities.

Switch to PC

A PC can be connected to the Switch via a two-pair Category 3, 4, 5 UTP/STP straight cable. The PC (equipped with a RJ-45 10/100 Mbps jack) should be connected to any of the sixteen ports (1x - 16x) for the DES-1016 or twenty-four ports (1x - 24x) for the DES-1024.

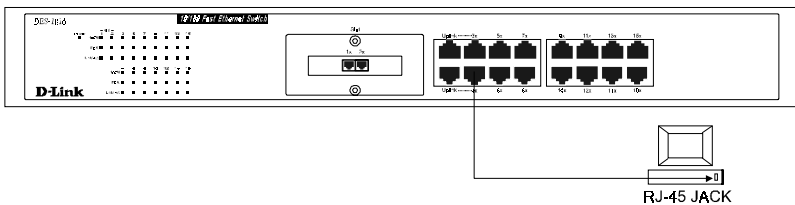


Figure 4.1 DES-1016 Switch connected to a PC or Workstation

The LED indicators for PC connection are dependent on the LAN card capabilities. If LED indicators are not illuminated after making a proper connection, check the PC's LAN card, the cable, Switch conditions and connections.

The following are LED indicator possibilities for a PC to Switch connection:

1. The 100 M LED indicator comes on for a 100 Mbps and stays off for 10 Mbps.
2. The Link/Act LED indicator illuminates upon hookup.
3. The FDX LED indicator depends upon LAN card capabilities, illuminating for full duplex operation and remaining dark otherwise.

Switch to Hub (with Uplink)

A hub (10 or 100BASE-TX) can be connected to the Switch via a two-pair Category 3, 4, 5 UTP/STP straight cable. The connection is accomplished from the hub's Uplink (MDI-II) port to any of the Switch's (MDI-X) ports.

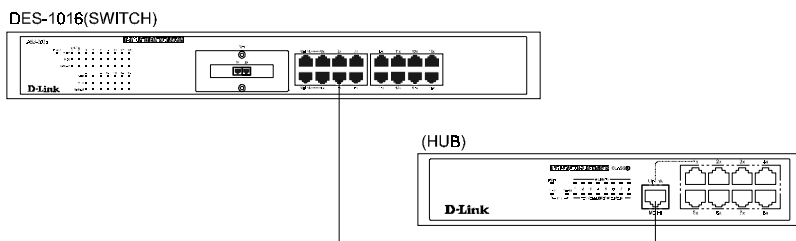


Figure 4.2 DES-1016 Switch connected to a 10 or 100BASE-TX Hub

10BASE-T Hub

For a 10 BASE-T hub, the Switch's LED indicators should illuminate the following:

- ◆ 100M LED speed indicator is OFF.
- ◆ Link/Act indicator is ON.
- ◆ FDX indicator is OFF.

100BASE-TX Hub

For a 100Base-TX hub, the Switch's LED indicators should illuminate the following:

- ◆ 100M LED speed indicator is ON.
- ◆ Link/Act is ON.
- ◆ FDX LED indicator is OFF.

Hub without Uplink (MDI-II) port

If a hub is not equipped with an Uplink (MDI-II) port, then a connection can be made using either straight cable or crossover cable (see *Appendix B, Pin Specification* for cable requirement).

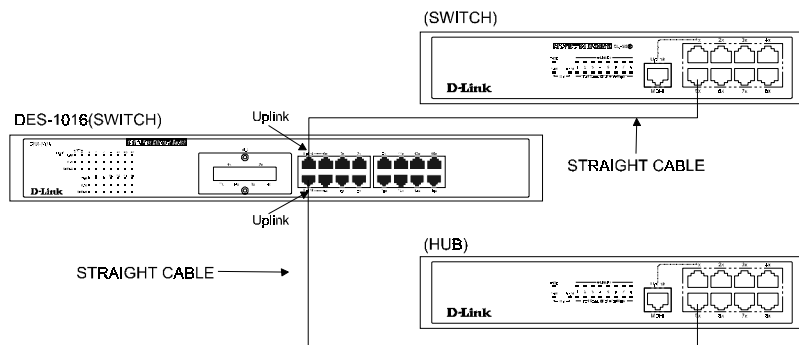


Figure 4.3 DES-1016 Switch connected to a Hub without Uplink (MDI-II) port using the Straight or crossover cable option

Using straight cable

When using straight cable, the connection can be made from the Uplink (MDI-II) port of the Switch to any port of the Hub (see figure 11).

Using crossover cable

When using crossover cable, the connection can be made from any MDI-X ports of the Switch to any port of the Hub (see Figure 4.2).

Switch to Switch (and/or Hub)

The Switch provides two Uplink ports to connect 2 Switches or Hubs using Category 3, 4, 5 UTP/STP straight cable (see *Appendix B, Pin Specification* for cable requirement).

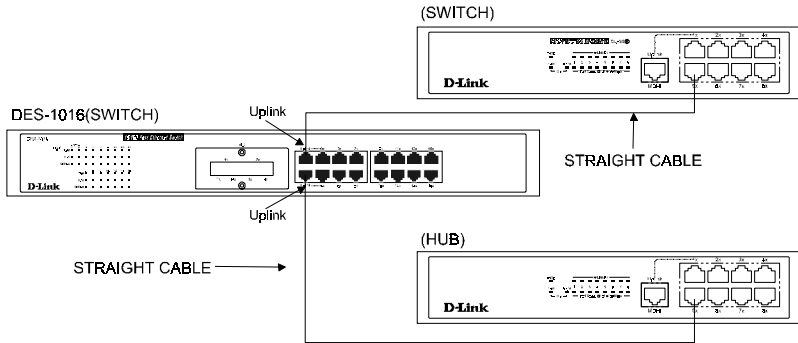


Figure 4.4 DES-1016 Switch to switch/ hub connections using the straight cable.

Using straight cable

When using straight cable, this is done from the Uplink (MDI-II) port of the Switch to any of the 10 Mbps or 100 Mbps (MDI-X) ports of the other switch or other devices (see Figure 4.4).

Using crossover cable

When using crossover cable, this is done from any (MDI-X) port of the Switch to any of the 10 Mbps or 100 Mbps (MDI-X) ports of the other switch or other devices.

The Switch's LED indicators for the respective connected ports are as follows:

- ◆ 100M is ON for 100BASE-TX, otherwise OFF.
- ◆ Link/Act is ON.
- ◆ FDX depends on the connected switch or other device.

5

PROGRAMMING THE SWITCH

The Switch is an unmanaged, but “smart” Switch because programmable administration parameters make the Switch operate more effectively than unmanaged (dumb) switches. This chapter will describe the use of the Switch configuration program.

Switch Configuration

The Switch can be configured through its configuration port, using a PC and the configuration software supplied with the Switch. To configure the Switch using the configuration software, the PC's BIOS must support either EPP[†] (Enhanced Parallel Port) or ECP[‡] (Extended Capabilities Port). An IEEE 1284 compliant parallel printer cable is included to connect the PC to the Switch. Once the switch is configured, you **MUST** disconnect the parallel printer cable from the Switch. Then, power off and power on the Switch. If this is not done, the device will not work properly.

Two configuration programs are supplied with the Switch. One runs in the Windows 95 environment, the other in DOS.

[†] EPP is an IEEE 1284 standard.

[‡] ECP is a Hewlett-Packard and Microsoft enhancement.

Aging Control

Address aging is the process of aging idle, dynamic (learned) addresses to remove them from the forwarding table. The aging time can be set to any minute between 1 and 5 minutes -or- disabled.



Figure 5.1 Screen shot of the configuration menu of the Win95 Switch Configuration Software



Figure 5.2 Screen shot of the configuration menu of the DOS Switch Configuration Software

Port Configurations

The Switch has six port configuration parameters that can be set. These parameters are briefly described below:

- ◆ **Flow Control** This allows the port to optionally apply flow control (enable/disable). In full duplex mode, IEEE 802.3X port-based flow control is implemented. In half duplex mode, collision-based backpressure jamming (802.3 CSMA/CD MAC protocol) is implemented. Flow control can be port disabled for links that have no flow control capability.
- ◆ **Security** This can be enabled on a port-by-port basis and insures that only selected machines can transmit through the port. Before enabling security, make sure the sources allowed to transmit through the port have been previously defined on the static MAC address table.
- ◆ **100Mbps** This parameter determines the transmission speed of the selected port, either 100Mbps (100BASE-TX) or 10Mbps (10BASE-T).
- ◆ **Full Duplex** Set this parameter to choose whether the port is operating in half-duplex or full-duplex mode. In half-duplex mode, ports can either send or receive data, while in full-duplex mode ports can send and receive data at the same time.
- ◆ **Nway** Enabling this allows the port to take advantage of Nway Auto-Negotiation technology on a port-by-port basis on dual-speed devices. If Nway is implemented on a port it will automatically sense the connection speed (10 or 100 Mbps) and duplex mode (full or half) of any device connected to that port. Nway will establish the connection at the highest speed attainable by both devices and will use full duplex transmission if both devices have this capability.
- ◆ **Port Enable** Specific ports on the switch can be enabled or disabled, cutting off the connected ports from the rest of the

network. Disabling a port may be necessary for testing purposes, or if the connected node is causing excessive errors due to a hardware or software problem.

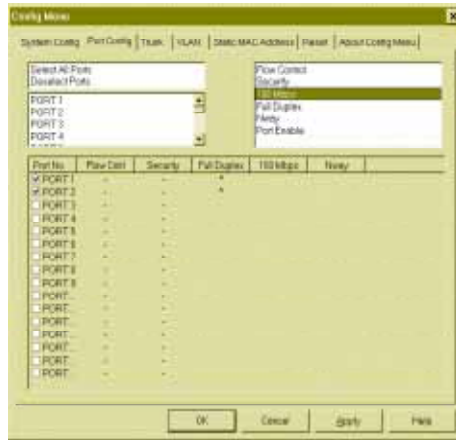


Figure 5.3 Screen shot of the port configuration parameters of the Switch Configuration Software

```

D-Link DES-1016 Fast Ethernet Switch - Port Configuration Menu

Port Tx/Rx : < V > < V > < V > < V > < V > < V > < V > < V > < V >
Flow Control : < > < > < > < > < > < > < > < > < >
Security : < > < > < > < > < > < > < > < > < >
Nway : < V > < V > < V > < V > < V > < V > < V > < V > < V >
Speed 100Mbps : < V > < V > < V > < V > < V > < V > < V > < V > < V >
Full Duplex : < V > < V > < V > < V > < V > < V > < V > < V > < V >

PREPAGE  NEXTPAGE  APPLY  EXIT
    
```

Figure 5.4 Screen shot of the port configuration parameters of the Switch Configuration Software

Static Forwarding Table

Eighteen static MAC addresses (physical addresses of devices) can be assigned to specific ports. These 18 static entries will not be aged or removed by the Switch.



Figure 5.5 Screen shot of the static forwarding table of the Switch Configuration Software

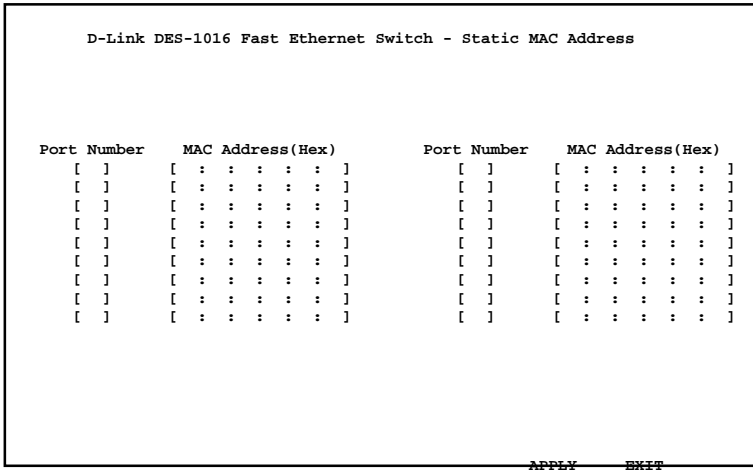


Figure 5.6 Screen shot of the static forwarding table of the Switch Configuration Software

Trunk Assignments

The DES-1024 Switch can support up to 6 trunks, and DES-1016 can support up to 4 trunks. The Switch considers a trunk as a single port entity, regardless of the trunk composition.

Each enabled trunk is comprised of four contiguous ports.



Figure 5.7 Screen shot of the trunk assignment menu of the Switch Configuration Software

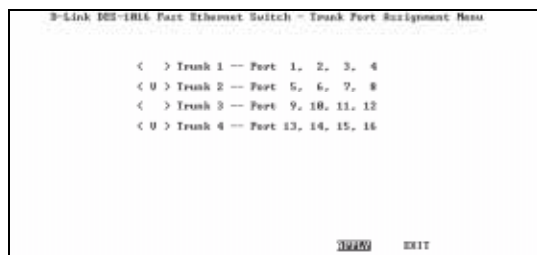


Figure 5.8 Screen shot of the trunk assignment menu of the Switch Configuration Software

VLAN Assignments

A VLAN (Virtual Local Area Network) 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.

Up to sixteen VLAN (eight with the DES-1016) groups can be assigned with any number of port configurations.

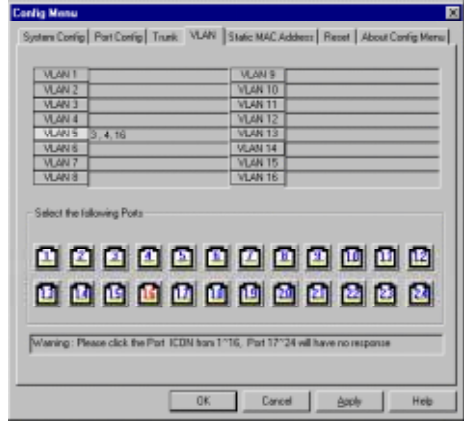


Figure 5.9 Screen shot of the VLAN configuration menu of the Switch Configuration Software



Figure 5.10 Screen shot of the VLAN configuration menu of the Switch Configuration Software

Note: *The network manager must reconfigure VLAN membership when a station changes to another port.*

System and Factory Reset

A System Reset will restart the Switch keeping the values of the last (current) user-set parameters.

A Factory Reset will reset all parameters to their original factory default values and restart the Switch.

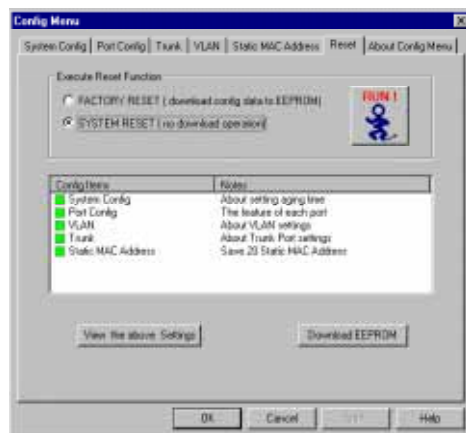


Figure 5.11 Screen shot of the system reset of the Switch Configuration Software



Figure 5.12 Screen shot of the system reset of the Switch Configuration Software



TECHNICAL SPECIFICATIONS

General	
Standards:	IEEE 802.3 10BASE-T Ethernet IEEE 802.3u 100 BASE-TX/ FX Fast Ethernet IEEE 802.3 Frame types: Transparent
Protocol:	CSMA/CD Ethernet
Data Transfer Rate:	Ethernet: Fast Ethernet: 10 Mbps (half duplex) 100Mbps (half duplex) 20 Mbps (full duplex) 200Mbps (full duplex)
Topology:	Star

General

Network Cabling:	<p>10BASE-T:</p> <p>2-pair UTP Cat. 3,4,5 (100 m)</p> <p>EIA/TIA- 568 100-ohm STP (100 m)</p> <p>100BASE-TX:</p> <p>2-pair UTP Cat. 5 (100 m)</p> <p>EIA/TIA-568 100-ohm STP (100 m)</p> <p>100BASE-FX:</p> <p>Multi-mode (62.5/125μm or 50/125μm) fiber cabling with an IEEE recommended SC connector</p>
Number of Ports:	<p>DES-1016: 16 x 10/100 Mbps ports</p> <p>DES-1024: 24 x 10/100 Mbps ports</p>
Media Interface Exchange:	2 x MDI-II RJ-45 shared with port 3x and 4x

Physical and Environmental

AC inputs:	100 - 240 VAC, 50/60 Hz (internal universal power supply)
Power Consumption:	50 watts maximum
DC fans:	2 built-in 40x40 mm fans
Operating Temperature:	32 ° ~ 122 °F (0 ° ~ 50 °C)
Storage Temperature:	-22 ° ~ 140 °F (-30 ° ~ 60 °C)
Humidity:	5% ~ 95% non-condensing

Physical and Environmental	
Dimensions:	441 x 236 x 55 mm (1.25U), 19-inch rack-mount width
Weight:	DES-1016: 4 Kg DES-1024: 4.5 Kg
EMI:	FCC Class A, CE Mark Class A, VCCI Class A, BCIQ A
Safety:	UL (UL 1950), CSA (CSA950), TUV/GS (EN60950)

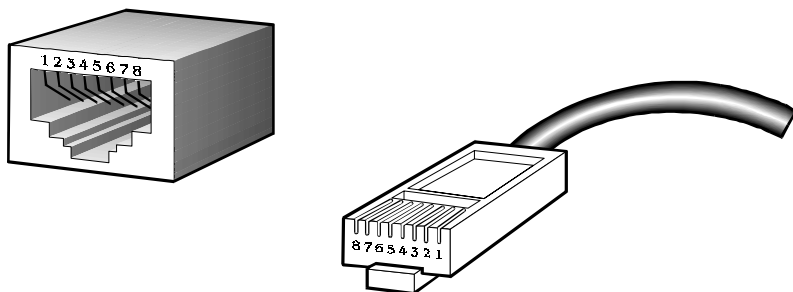
Performance	
Transmission Method:	Fast Store-and-forward
RAM Buffer:	DES-1016: 2 M bytes per device DES-1024: 3 M bytes per device
Filtering Address Table:	1 K active entries per device
Packet Filtering/Forwarding Rate:	14,880 pps per port (for 10Mbps) 148,800 pps per port (for 100Mbps)
MAC Address Learning:	Automatic update Max age: 1 to 5 minutes -or- none



RJ-45 PIN SPECIFICATION

When connecting the DES-1016/DES-1024 Switch to another switch, a bridge or a hub, a modified crossover cable is necessary. Please review these products for matching cable pin assignment.

The following diagram and tables show the standard RJ-45 receptacle/connector and their pin assignments for the switch-to-network adapter card connection, and the straight/ crossover cable for the Switch-to-switch/hub/bridge connection.

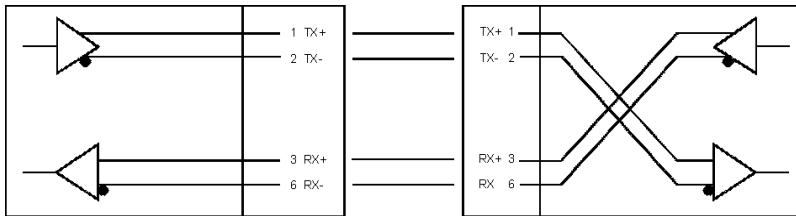


The standard RJ-45 receptacle/connector

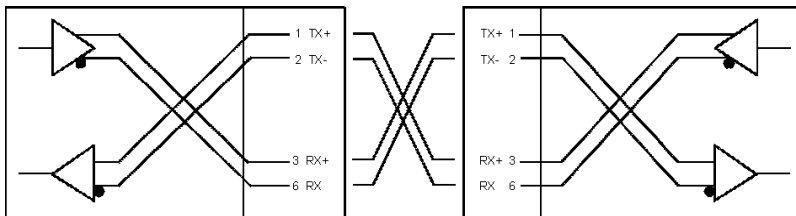
RJ-45 Connector pin assignment	
Contact	Media Direct Interface Signal
1	Tx + (transmit)
2	Tx - (transmit)
3	Rx + (receive)
4	Not used
5	Not used
6	Rx - (receive)
7	Not used
8	Not used

The standard Category 3 cable, RJ-45 pin assignment

The following shows straight cable and crossover cable connection:



Straight cable for Switch (Uplink MDI-II port) to switch/Hub or other devices connection



Crossover cable for Switch (MDI-X port) to switch/hub or other network devices (MDI-X port) connection

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 Organization: _____ Dept. _____
 Your title at organization: _____
 Telephone: _____ Fax: _____
 Organization's full address: _____

 Country: _____
 Date of purchase (Month/Day/Year): _____

Product Model	Product Serial No.	* Product installed in type of computer (e.g., Compaq 486)	* Product installed in computer serial No.

(* Applies to adapters only)

Product was purchased from:

Reseller's name: _____
 Telephone: _____ Fax: _____
 Reseller's full address: _____

Answers to the following questions help us to support your product:

1. **Where and how will the product primarily be used?**
Home Office Travel Company Business Home Business Personal Use
2. **How many employees work at installation site?**
1 employee 2-9 10-49 50-99 100-499 500-999 1000 or more
3. **What network protocol(s) does your organization use ?**
XNS/IPX TCP/IP DECnet Others _____
4. **What network operating system(s) does your organization use ?**
D-Link LANsmart Novell NetWare NetWare Lite SCO Unix/Xenix PC NFS 3Com 3+Open
Banyan Vines DECnet Pathwork Windows NT Windows NTAS Windows '95
Others _____
5. **What network management program does your organization use ?**
D-View HP OpenView/Windows HP OpenView/Unix SunNet Manager Novell NMS
NetView 6000 Others _____
6. **What network medium/media does your organization use ?**
Fiber-optics Thick coax Ethernet Thin coax Ethernet 10BASE-T UTP/STP
100BASE-TX 100BASE-T4 100VGAnyLAN Others _____
7. **What applications are used on your network?**
Desktop publishing Spreadsheet Word processing CAD/CAM
Database management Accounting Others _____
8. **What category best describes your company?**
Aerospace Engineering Education Finance Hospital Legal Insurance/Real Estate Manufacturing
Retail/Chainstore/Wholesale Government Transportation/Utilities/Communication VAR
System house/company Other _____
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10. **Your comments on this product?**



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