

# **D-Link<sup>®</sup>**

## 10/100Mbps Ethernet/Fast Ethernet Switch Model DES-2218

### User's Guide

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Managed Switches	Three years *
Unmanaged switches	Lifetime *
Repeaters, MAUs , transceivers, media converters	One year
Concentrators	One year
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# TABLE OF CONTENTS

<b>ABOUT THIS GUIDE.....</b>	<b>XI</b>
------------------------------	-----------

<b>INTRODUCTION .....</b>	<b>1</b>
---------------------------	----------

<i>DES-2218 Ethernet/Fast Ethernet Switch .....</i>	<i>1</i>
---	----------

Ports .....	1
-------------	---

Switching .....	2
-----------------	---

Management.....	2
-----------------	---

<i>100Mbps Fast Ethernet Introduction.....</i>	<i>3</i>
--	----------

<i>100BASE-TX Technology Overview .....</i>	<i>3</i>
---	----------

Cables and Connectors.....	4
----------------------------	---

Topology.....	4
---------------	---

Network.....	5
--------------	---

Hubs .....	5
------------	---

Connectivity Rules.....	5
-------------------------	---

<i>Ethernet Switching Introduction.....</i>	<i>6</i>
---	----------

<b>EXTERNAL FEATURES .....</b>	<b>9</b>
--------------------------------	----------

<i>Front Panel.....</i>	<i>9</i>
-------------------------	----------

<i>LED Indicators .....</i>	<i>11</i>
-----------------------------	-----------

<i>Rear Panel.....</i>	<i>12</i>
------------------------	-----------

<b>INSTALLATION .....</b>	<b>13</b>
---------------------------	-----------

<i>Unpacking the Switch.....</i>	<i>13</i>
----------------------------------	-----------

<i>Installing the Switch .....</i>	<i>14</i>
------------------------------------	-----------

Location .....	14
Rack Mounting.....	14
<i>Connecting Power</i> .....	15
Replacing the Fuse .....	16
<b>MAKING NETWORK CONNECTIONS .....</b>	<b>17</b>
<i>10BASE-T Connection</i> .....	17
<i>100BASE-T Connection</i> .....	18
<i>MII Connection</i> .....	19
<b>USING THE CONSOLE INTERFACE.....</b>	<b>21</b>
<i>Connecting to the Switch</i> .....	21
<i>Console Usage Conventions</i> .....	22
<i>First Time Connecting To The Switch</i> .....	23
Steps to create a Super User or General User:.....	24
Super and General User Privileges.....	24
<i>Login On The Switch Console By Registered Users</i> .....	27
Changing your Password.....	28
Adding and Deleting Users .....	29
<i>Setting up the Switch</i> .....	31
TCP/IP Settings.....	31
Out-of-band management and console settings.....	33
Software Updates .....	34
SNMP Information and Console Timeout.....	36
SNMP Traps.....	37
SNMP Security (Community Names) .....	38
<i>Switch Configuration</i> .....	38
Controlling Individual Ports.....	39
<i>Forwarding Configuration</i> .....	40
<i>Spanning Tree Protocol and Configuration</i> .....	42
Introduction to Spanning Tree Protocol Parameters .....	43

Setting Spanning Tree Protocol Parameters .....	45
<i>Monitoring the Switch</i> .....	49
Displaying Port Statistics .....	49
<i>Resetting the Switch</i> .....	51
System Reset.....	51
Factory Reset.....	52
<b>PRODUCT SPECIFICATIONS.....</b>	<b>55</b>
<i>General</i> .....	55
<i>LED Indicators</i> .....	56
<i>Environmental and Physical</i> .....	56
<b>CABLES AND CONNECTORS.....</b>	<b>57</b>
<i>10BASE-T/100BASE-TX Connectors</i> .....	57
<i>Crossover Cable</i> .....	59
<i>MII Connector</i> .....	59
<i>RS-232 (DB9) Pin Specification</i> .....	61
<b>BOOT CONFIGURATION FILE .....</b>	<b>65</b>
<b>INDEX .....</b>	<b>68</b>



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# ***ABOUT THIS GUIDE***

This manual explains how to set up and use the D-Link DES-2218 18-port Ethernet/Fast Ethernet switch. The contents include:

- ◆ **Chapter 1 Introduction** Introduces the features of the DES-2218.
- ◆ **Chapter 2 External Features** Introduces the external features (including the front panel, LED indicators, and rear panel) of the DES-2218 Ethernet switch.
- ◆ **Chapter 3 Installation** Tells how to unpack and install the switch.
- ◆ **Chapter 4 Making Network Connections** Tells how to connect the switch to network stations and to other parts of your network.
- ◆ **Chapter 5 Using the Console Interface** Explains the use of the console interface, which you can use to configure the switch with a terminal or `telnet` connection.
- ◆ **Appendix A Product Specifications** Lists the switch's specifications, the standards it meets, and certifications it has passed.
- ◆ **Appendix B Cables and Connectors** Gives pinout information for the 10BASE-T, 100BASE-TX, MII (Media Independent Interface) and console connectors on the switch.
- ◆ **Appendix C Boot Configuration File** Gives details on how to use downloadable configuration files with the switch.

For information about how to manage your DES-2218 using a network management system, see the appropriate *Management User's Guide*.



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# ***INTRODUCTION***

This chapter introduces the D-Link DES-2218 switch, and the technologies that it uses to give you improved network performance and reliability.

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## **DES-2218 Ethernet/Fast Ethernet Switch**

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The DES-2218 is an Ethernet/Fast Ethernet switch for networks needing improved performance, the ability to interconnect between 10Mbps and 100Mbps Ethernet networks, and SNMP network management capability.

### ***Ports***

The DES-2218 has eighteen ports, two NWay 10BASE-TX Ethernet/100BASE-TX Fast Ethernet ports, and sixteen 10BASE-T twisted-pair Ethernet ports. Among the Fast Ethernet ports, one of the ports can also use an industry-standard MII connector, making it possible to interface to different types of 100BASE-X Fast Ethernet network media, such as 100BASE-FX fiber optic cable or 100BASE-T4 twisted pair.

The other 10BASE-T/100BASE-TX port can optionally serve as an uplink port, making it possible to connect the port to an Ethernet or Fast Ethernet hub without using a crossover cable.

All of the ports can operate in either half-duplex or full-duplex mode. Full-duplex operation, allowing the port to transmit and receive at the same time, can double overall network bandwidth in many applications.

## ***Switching***

The DES-2218 uses store-and-forward technology to bridge packets between ports. Forwarding and filtering occurs at full “wire speed,” 148,800 packets per second (pps) for Fast Ethernet, and 14,880 pps for Ethernet. It has 2MB of buffer memory for the 10Mbps ports, and 4MB for the 100Mbps ports.

The switch automatically learns Ethernet (MAC) addresses and stores them in a forwarding table. In addition, it also supports static filtering, allowing network administrators to define custom filters for network security or other purposes.

The switch supports the IEEE 802.1d Spanning Tree Protocol, allowing you to design your network with redundant bridge links.

## ***Management***

You can use any network management software supporting SNMP (the Simple Network Management Protocol) to manage the DES-2218, including D-Link’s Windows-based D-View management system. The DES-2218’s internal intelligent management agent supports several standard SNMP MIBs, along with its own proprietary management information base.

SNMP management can be done in-band, over the Ethernet or Fast Ethernet network, or out-of-band, over the DES-2218’s RS-232 console port, using SLIP (the Serial Line Internet Protocol).

In addition, you can manage the switch with an easy-to-use console interface, either directly over the RS-232 console port, or over the network using the Telnet protocol.

The management agent's software is stored in Flash ROM, allowing easy upgrade over the network.

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## 100Mbps Fast Ethernet Introduction

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Computers today have become increasingly powerful, with the capability to accommodate very sophisticated uses such as multimedia applications, video-conferencing, and CAD/CAM. To utilize these technologically advanced applications more efficiently, there is also a growing demand for faster networks that can handle heavy network traffic.

Recognizing this need for greater bandwidth and lower latency, a variety of technologies such as FDDI, ATM, and 100Mbps Fast Ethernet have been adopted by many vendors. 100Mbps Fast Ethernet technology stands out as the most inexpensive and smoothest migration path for existing 10Mbps Ethernet users.

100Mbps Fast Ethernet is a relatively new standard specified by the IEEE 802.3 networking standards 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 without wasting the company's existing investment in hardware, software, and trained personnel.

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## 100BASE-TX Technology Overview

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This section briefly describes a few of the technical aspects of using a 100Mbps Ethernet network.

# ***Cables and Connectors***

Category 5 unshielded twisted-pair (UTP) cables are supported. Cat 5 UTP cable uses the same RJ-45 connector used with 10BASE-T, wired in exactly the same configuration. However, the punch-down blocks in the wiring closet must be Category 5 certified. Where these blocks do not meet the standard, an upgrade is necessary.

## ***Topology***

A Fast Ethernet workgroup is configured in a star topology and is built around a maximum of two repeaters. Each workgroup forms a separate LAN (also known as a segment or collision domain), and these workgroups can be easily interconnected through switches, bridges, or routers to form one LAN large enough to encompass a high-rise building or campus environment. Recent innovations in LAN hub technology such as stackable hubs, coupled with the decreasing cost of switches, bridges, and routers, allow the design of low-cost, efficient Fast Ethernet workgroups and enterprise LANs.

The following factors strongly influence the architecture of Fast Ethernet networks:

- ◆ The EIA/TIA 568 Wiring Standard imposes a 100 meter limit on horizontal runs of twisted-pair cables; that is, connections from the wiring closet to the end-station.
- ◆ Fast Ethernet's increased operational speed reduces the maximum distance between all elements of the LAN (see below).
- ◆ The EIA/TIA 568 Wiring Standard does not support the use of coaxial cables for horizontal wiring.

## ***Network***

Network diameter, which is the distance between two end-stations in the same collision domain, is the primary difference between traditional Ethernet and Fast Ethernet. Due to the increased speed in Fast Ethernet and adherence to the EIA/TIA 568 wiring rules, the network diameter of a Fast Ethernet collision domain is limited to 205 meters; in contrast, the maximum 10BASE-T Ethernet collision domain diameter can be up to 2500 meters.

## ***Hubs***

Unlike 10BASE-T hubs, which are all functionally identical, Fast Ethernet repeater hubs are divided into two distinct types: Class I and Class II. A Class I hub repeats all incoming signals on one port to the other ports by first translating them to digital signals and then retranslating them back to line signals. These translations are necessary when connecting various network media to the same collision domain, such as when combining two wire-pair 100BASE-TX media with four wire-pair 100BASE-T4 media. Only one Class I hub can exist within the same collision domain, thus this type of hub cannot be cascaded. A Class II repeater, on the other hand, immediately repeats all incoming line signals on one port to the other ports; no translations are performed. This type of hub connects identical media to the same collision domain; for example, TX to TX. At most, two Class II hubs can exist within the same collision domain. The cable used to cascade these hubs is called an inter-repeater link (IRL).

As mentioned earlier, stackable hubs can be used to increase the number of available nodes in a collision domain. An entire hub stack counts as a single repeater.

## ***Connectivity Rules***

Fast Ethernet networks should respect the following limitations:

- ◆ The maximum length of a twisted-pair segment (that is, distance between a port in the hub to a single-address network device such as a PC, server, or LAN switch) is 100 meters.
- ◆ The maximum diameter in a collision domain is about 205 meters using two Class II hubs and 200 meters using one Class I hub.
- ◆ Between any two end-stations in a collision domain, there may be up to three segments and two Class II hubs or two segments and one Class I hub.

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## Ethernet Switching Introduction

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Another approach to pushing beyond the limits of Ethernet technology is the development of switching technology. A switch bridges Ethernet packets at the lowest (MAC address) level between 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* (also called *collision domains*) 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 100BASE-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.



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# ***EXTERNAL FEATURES***

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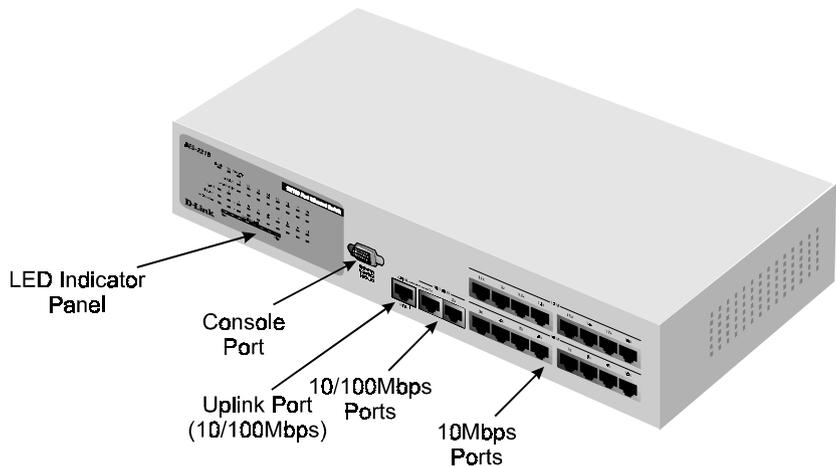
This chapter explains the features visible on the front and rear panels of the DES-2218 Ethernet switch.

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## **Front Panel**

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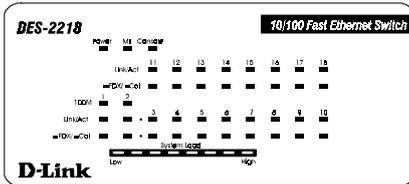
A front view of the DES-2218 Ethernet switch is shown below.



- ◆ **LED Indicator Panel** Gives status information about the switch itself, as well as each of the switch ports. The LED indicator panel is described in detail in the next section.
- ◆ **Console Port** The diagnostic console port is a standard RS-232 DB-9 connector, which can be used to connect a terminal or terminal emulator to the switch, in order to configure or manage the switch. The port can also be used for out-of-band network management. See the *Using the Console Interface* chapter starting on page 21 for complete information about using the console port.
- ◆ **100Mbps Ports** The 10/100Mbps ports (ports 1 and 2) are NWay 10BASE-T/100BASE-TX MDI-X ports, suitable for connecting directly to Ethernet or Fast Ethernet hosts or other network equipment. The NWay feature allows the switch to automatically detect the speed of the network connection.
- ◆ **10Mbps Ports** The 10Mbps ports (ports 3 through 18) are 10BASE-TX MDI-X ports, suitable for connecting directly to Ethernet hosts or other network equipment.
- ◆ **Uplink Port** The Uplink Port is identical to Port 1, except that it is an MDI port instead of an MDI-X port. This means that you can use it to connect directly to a Fast Ethernet hub or switch without using a crossover cable.

Note that the Uplink Port and Port 1 are really the same port, which means you can't connect devices to both Port 1 and the Uplink Port at the same time.

# LED Indicators

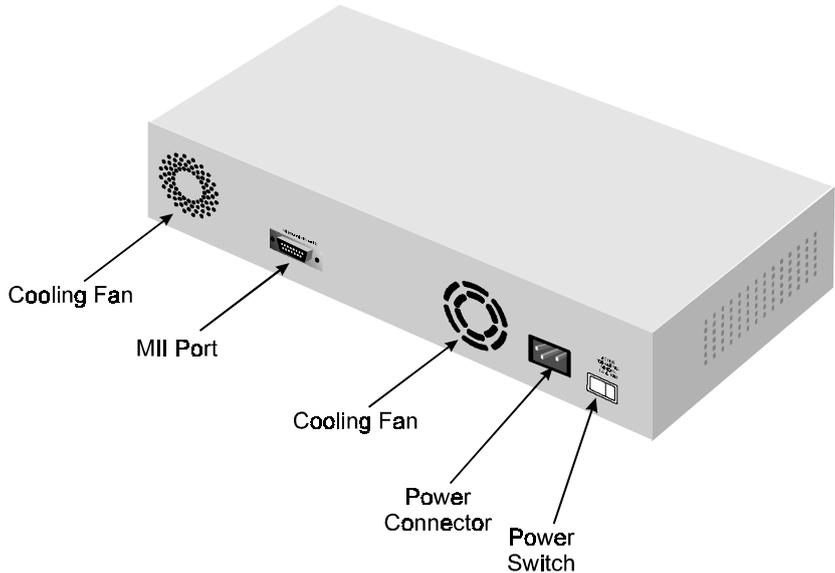


- ◆ **Power** Lights when the DES-2218 Ethernet switch is powered on.
- ◆ **Console** Lights when the DES-2218 console interface is in use.
- ◆ **MII** Lights when the switch's MII port is being used to connect to a transceiver. If there is an active connection on the MII port, then the Link/Act LED for port 2x will also light.
- ◆ **100M** (Ports 1 and 2 ) Lights when the port is operating at 100Mbps. Ports 1 through 4 are NWay ports that can automatically detect whether 10BASE-T Ethernet or 100BASE-TX Fast Ethernet twisted-pair cable is connected.
- ◆ **Link/Act** (Ports 1 through 18) Lights green when the port is connected to a powered-on Ethernet/Fast Ethernet station, and blinks off briefly when information is transmitted or received on the port.
- ◆ **FDX/Col** (Ports 1 through 18) Lights green when the port is operating in full-duplex mode. Briefly blinks amber when a collision occurs on the Ethernet/Fast Ethernet segment.
- ◆ **System Load** Shows a bar graph giving an indication of the network load, ranging from Low to High.

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## Rear Panel

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- ◆ **Cooling Fans** Used to control the temperature within the switch's enclosure. When installing the switch, be sure not to block the fan openings or otherwise restrict airflow.
- ◆ **MII Port** Used for connecting Fast Ethernet transceivers, which can be used for attaching other Fast Ethernet media such as 100BASE-FX (fiber optic) or 100BASE-T4 (4-wire twisted pair).

The MII port is shared with Port 2. If you are using the MII port, then the 10BASE-T/100BASE-TX port labeled 2x cannot be used.

- ◆ **Power Connector** Used for connecting the power cord.
- ◆ **Power Switch** Used to turn the switch on (1 position) or off (0 position).

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# ***INSTALLATION***

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This chapter explains how to unpack and install your DES-2218 Ethernet switch.

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## **Unpacking the Switch**

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

- ◆ One DES-2218 Ethernet/Fast Ethernet switch
- ◆ One AC power cord
- ◆ Four rubber feet to be used for shock cushioning
- ◆ Eight screws and two mounting brackets
- ◆ This *User's Guide*

Inspect the switch and all accompanying items. If any item is damaged or missing, report the problem immediately to your dealer.

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# Installing the Switch

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## ***Location***

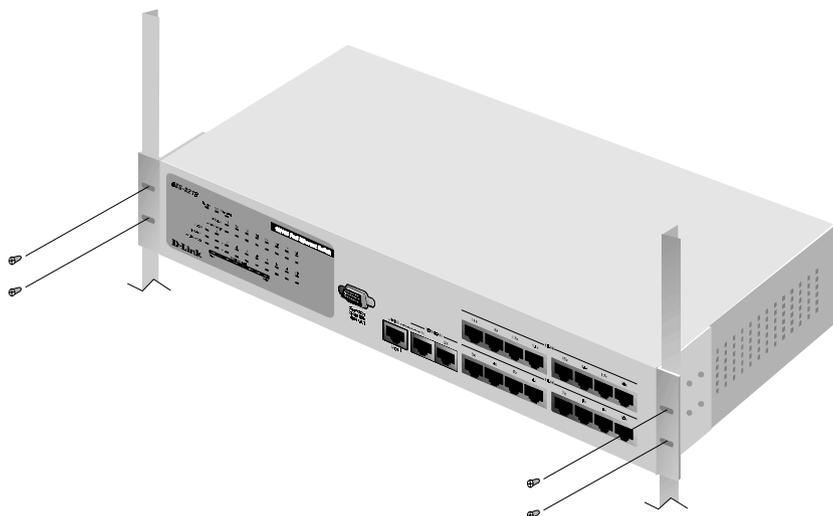
The site where you install the switch may greatly affect its performance. When installing, consider the following factors:

- ◆ Install the switch in a cool and dry place. See Appendix A, *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 10 cm of space at the front and rear of the switch for ventilation.
- ◆ Install on a sturdy, level surface that can support at least the weight of the switch, or in an EIA standard-size rack. For information on rack installation, see the next section, *Rack Mounting*.

When installing the switch on a level surface, be sure to attach the rubber feet at the bottom of the device. The rubber feet act as cushioning devices.

## ***Rack Mounting***

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



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## Connecting Power

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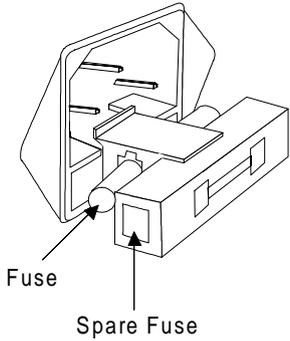
The switch features a power supply unit that automatically adjusts to the level of the input voltage. Supported voltage levels range from 100V to 240V at 50 or 60 Hz. Your local voltage level should fall within this range.

To turn on the DES-2218, plug in the provided AC power cord into the power connector at the rear of the system, then flip the rocker power switch to the “1” position. After turning on the power, the Power indicator on the front panel should light.

It is *not* necessary to turn off the DES-2218's power when connecting or disconnecting network cables (*except for the MII port*) or console port connections.

# Replacing the Fuse

A 2.0A fuse protects the switch's power supply unit from power surges. In case of a power surge, the fuse will burn out, thus cutting off the connection and preventing high voltages from reaching the power supply or the other sensitive parts of the device. The fuse, and a spare one, are contained in a fuse case located just beneath the AC power connector. When replacement becomes necessary, pry open this case with a small screwdriver and replace the damaged fuse. You may also purchase a new 2.0A fuse, which is readily available in most local stores.



**WARNING!** *DO NOT* defeat the purpose of the fuse by using a jumper (such as a wire) in place of a damaged one. Doing so may cause serious damage to the switch.

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# ***MAKING NETWORK CONNECTIONS***

This chapter explains how to connect your switch to network stations, to other switches or to Ethernet hubs in your network.

---

## **10BASE-T Connection**

---

Ports 3 through 18 are 10BASE-T 10Mbps Ethernet ports that you can use to connect the switch to network devices using 10BASE-T shielded or unshielded twisted-pair cable (STP or UTP). The X label marked on each port means the ports are MDI-X ports, which connect to workstations and servers using straight-through twisted-pair cables, and to hubs or switches using crossover cables.

(Ports 1 through 4 are NWay 10/100Mbps ports that can also be used for 10BASE-T connection, provided you don't need to use the ports for 100BASE-TX).

To connect a network station, use ordinary Ethernet twisted-pair cable, Category 3 or better, either directly or through a central wiring punch block. The cable can be at most 100 meters long. Only two wire pairs (four wires) in the cable are used for 10BASE-T Ethernet.

One wire pair should be connected to pins 1 and 2 of the connector, and another wire pair should be connected to pins 3 and 6. Detailed pinout information for 10BASE-T/100BASE-TX connectors can be found in Appendix B.

Plug the RJ-45 connector at one end into the network station, and at the other end into a free 10BASE-T port (ports 3 through 18) at the front of the switch. When both the switch and the device at the other end of the connection are turned on, and the cable is connected at both ends, then the Link/Act LED should light. If it does not, then:

- ◆ Be sure that the connectors are seated correctly at both ends of the cable.
- ◆ Check the continuity of the wires in the cable, as well as the pin assignments on the RJ-45 connectors.
- ◆ Be sure that the network station to which the port is connected is plugged in and powered on.
- ◆ Be sure that you are using a Category 3 or better straight-through (not crossover) cable.

If you are connecting the switch to an Ethernet hub (or another Ethernet switch with an MDI-X port), you will need to use a crossover cable. A crossover cable can be made easily; pinout information for 10BASE-T/100BASE-TX crossover cables can be found in Appendix B.

---

## 100BASE-T Connection

---

The procedure for connecting 100BASE-TX Ethernet stations to the switch is the similar to that for 10BASE-T. Cabling for 100BASE-TX should be certified as Category 5 or better, and should be installed by a professional cable installer.

Ports 1 through 4 are NWay 10/100Mbps ports. When you connect a station to one of these ports, the corresponding port Link/Act LED should light. For 100Mbps connections, the corresponding 100M LED indicator should also light.

When connecting to a hub or an Ethernet switch with an MDI-X port, you can use a crossover cable, or you can directly use the Uplink port. You can connect the uplink port directly to a 100BASE-TX Ethernet hub or switch using straight-through cable.

**NOTE:**        *Port 1 and the Uplink port are MDI-X and MDI versions of the same port. If you are using the Uplink port, you cannot use Port 1, and vice versa.*

---

---

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## MII Connection

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The switch's back panel features an industry-standard MII connector, allowing you to attach transceivers for other types of 100BASE-X media, such as 100BASE-FX or 100BASE-T4.

To connect a device using the switch's MII port,

1. Make sure that the switch is *turned off* whenever connecting a transceiver to the MII port (or when removing it).
2. Set the transceiver's address setting to **2**, if it has one. (The MII port is shared with the switch's port 2).
3. Attach the transceiver to the MII port at the rear of the switch.
4. Power on the switch. If there is a good link through the transceiver connected to the MII port, both the MII-II LED and the Link/Act LED for port 2 should light.

**NOTE:** *Port 2 and the MII port form one logical port. Only one of these ports can be used at any given time.*

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# ***USING THE CONSOLE INTERFACE***

Your DES-2218 Ethernet switch supports a console management interface that allows you to set up and control your switch, either with an ordinary terminal (or terminal emulator), or over the network using the TCP/IP Telnet protocol. You can use this facility to perform many basic network management functions. In addition, the console program will allow you to set up the switch for management using D-View or another SNMP-based network management system. This chapter describes how to use the console interface to access the switch, change its settings, and monitor its operation.

---

## **Connecting to the Switch**

---

You can use the console interface by connecting to the switch using an ordinary RS-232C serial cable and a VT100-compatible terminal or a computer running an ordinary terminal emulator program (such as the terminal program included with the Windows operating system.) Your terminal parameters will need to be set to:

- ◆ VT-100/ANSI compatible
- ◆ Arrow keys enabled
- ◆ 9600 bits per second

- ◆ 8 data bits
- ◆ No parity
- ◆ One stop bit

You can also access the same functions over the `Telnet` interface. Once you have set an IP address for your switch, you can use a `Telnet` program (in a VT-100 compatible terminal mode) to access and control the switch. All of the screens are for the most part identical, whether accessed from the console port or from the `Telnet` interface.

---

## Console Usage Conventions

---

The console interface makes use of the following conventions:

1. Items after a colon **:** are read-only values, displayed for information purposes. The cursor cannot be moved to these items.
2. Items in *<angle brackets>* can be toggled on or off using the space bar.
3. Items in *[square brackets]* can be changed by typing in a new value. You can use the backspace and delete keys to erase characters behind and in front of the cursor.
4. The up and down arrow keys, the left and right arrow keys, and the tab key, can be used to move between selected items. The currently selected item will be shown in reverse video.
5. Items in UPPERCASE are commands. Moving the selection to a command and pressing `Enter` will execute the chosen command.

---

## First Time Connecting To The Switch

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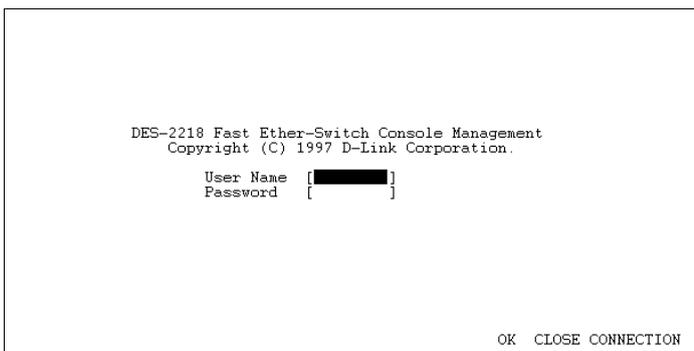
The Switch supports user-based security that can allow you to prevent unauthorized users from accessing the Switch or changing its settings. This section tells how to log onto the Switch.

*Note:*            *The passwords used to access the Switch are case sensitive; therefore, "S" is not the same as "s."*

---

---

When you first connect to the Switch, you will be presented with the **first login screen** (shown below).



**Figure 6-1. Initial screen, first time connecting to the Switch**

Move the cursor to OK and press Enter (Note: *Leave the User Name and Password fields blank*). You will see the **Main Menu** shown below:

```
DES-2218 Fast Ethernet Switch - Main Menu

System Configuration
TCP/IP Parameters Configuration
Statistics Counters
Port Configuration
Spanning Tree Algorithm Parameters
Out-of-Band/Console Configuration
User Account Change
SNMP Trap Manager Configuration
SNMP Manager Configuration
System Reset
Software Update
Factory Reset NV-RAM to Default Value

HELP LOGOFF
```

Figure 6-2. Main Menu for Super User

The first user automatically gets super user privileges (See Table 6-1) and is recommended to create at least one Super User for the Switch.

### ***Steps to create a Super User or General User:***

From the screen above, move the cursor to the **User Account Change** and press Enter, then the **User Account Change Menu** appears.

1. Choose **Create New User** from the **User Account Change Menu** and the **Create New User Menu** appears.
2. Enter the new user name, and assign an initial password. Determine whether the new user should have **Super User** or **General User** privileges.
3. Choose **SAVE** and press **Enter** to let the user addition take effect.
4. Choose **EXIT** to leave the **Create New User menu**.

### ***Super and General User Privileges***

There are two levels of user privileges: *Super User* and *General User*. Some menu selections available to users with *Super User* privileges may not be

available to *General Users*. The main menus shown are the menus for users with *Super User* and *General User* privileges:

```

DES-2218 Fast Ethernet Switch - Main Menu

System Configuration
TCP/IP Parameters Configuration
Statistics Counters
Port Configuration
Spanning Tree Algorithm Parameters
Out-of-Band/Console Configuration
User Account Change
SNMP Trap Manager Configuration
SNMP Manager Configuration
System Reset
Software Update
Factory Reset NV-RAM to Default Value

HELP                                LOGOFF

```

**Figure 6-3. Main Menu for Super User**

```

DES-2218 Fast Ethernet Switch - Main Menu

System Configuration
TCP/IP Parameters Configuration
Statistics Counters
Port Configuration
Spanning Tree Algorithm Parameters
Out-of-Band/Console Configuration
User Account Change
SNMP Trap Manager Configuration
SNMP Manager Configuration

HELP                                LOGOFF

```

**Figure 6-4. Main Menu for General User**

The following table summarizes Super User and General User privileges:

Menu	Super User	General User
	Privilege	
System Config.	Yes	Yes, view only.

Menu	Super User	General User
	Privilege	
TCP/IP Parameter Configuration	Yes	Yes, view only.
Statistic Counters	Yes	Yes .
Port Configuration	Yes	Yes, view only.
Spanning Tree Algorithm Parameters		
Forwarding Table	Yes	Yes, view only.
Custom Filtering Table	Yes	Yes, view only.
Protocol Parameters	Yes	Yes, view only.
STAP Port Parameters	Yes	Yes, view only.
Out-of-Band/ Console Configuration	Yes	Yes, view only.
User Account Change		
Create New User	Yes	No
Change Access/ Delete Users	Yes	No
Change Password	Yes	Yes
SNMP Trap Manager Configuration	Yes	Yes, view only.
SNMP Manager Config.	Yes	Yes, view only.
System Reset	Yes	No
Software Update	Yes	No
Factory Reset NV-RAM to Default Value	Yes	No

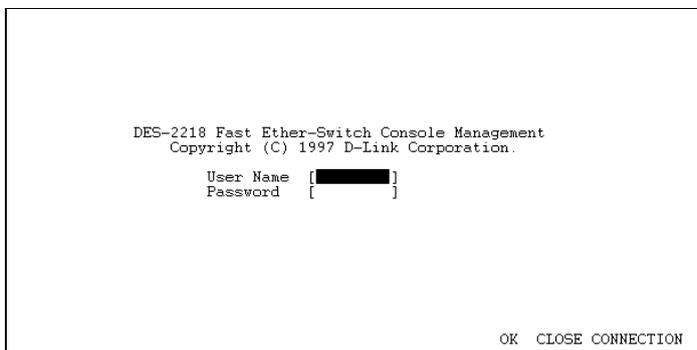
**Table 6-1. Super User and General User Privileges**

establishing a **Super User**, you are now ready to operate the Switch. Now issue a **LOGOFF** command from the main menu, the login screen<sup>1</sup> appears as follows.

---

## Login On The Switch Console By Registered Users

---



**Figure 6-5. Login Screen**

To log in,

1. Type in your user name and press Enter.
2. Type in your password and press Enter.

---

<sup>1</sup> If the Switch is not used within five (5) minutes, the following message appears at the bottom of the console's main menu: "Console time out press ENTER to continue..." At this time, press ENTER and login screen will be displayed.

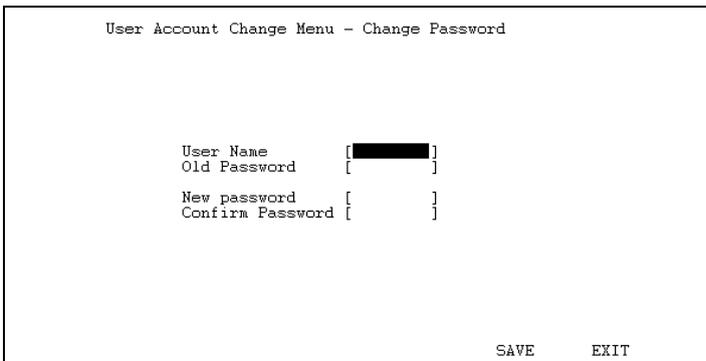
3. With the cursor on the OK selection, press Enter. The main menu screen will be displayed based on your Super User or General User access level or privilege.

The following describes the differences between the user privileges.

## ***Changing your Password***

To change your user password:

1. Choose **User Account Change** from the main menu.
2. Choose **Change Password**.



```

User Account Change Menu - Change Password

User Name      [          ]
Old Password   [          ]
New password   [          ]
Confirm Password [          ]

                                SAVE   EXIT

```

**Figure 6-6. Change Password**

3. Type in your **user name** and press Enter.
4. Type in your **old password** and press Enter.
5. Type in the new password you have chosen, and press Enter. Type in the same new password in the following blank to verify that you have not mistyped it.
6. Choose the SAVE command to let the password change take effect.

7. Choose EXIT to exit this screen.

This method can also be used by a *Super User* to change another user's password.

## ***Adding and Deleting Users***

Access to the console, whether using the console port or via **TELNET**, is controlled using a user name and password. Up to three of these user names can be defined. The console interface will not let you delete the current logged-in user, however, in order to prevent accidentally deleting all of the users with *Super User* privilege.

Only users with the *Super User* privilege can add new and delete users.

### **Adding a New User**

To add a new user:

1. Choose **User Account Change** from the main menu.



**Figure 6-7. User Account Change Menu**

2. Choose **Create New User** from the User Account Change menu.

3. Enter the new user name, and assign an initial password. Determine whether the new user should have *Super User* or *General User* privileges.

```
User Account Change Menu - Create New User

User Name      [ ██████████ ]
Password       [          ]
Confirm Password [          ]
Access Level   <Super User >

                               SAVE   EXIT
```

**Figure 6-8. Adding a New User**

4. Choose SAVE and press Enter to let the user addition take effect.
5. Choose EXIT to leave the Create New User menu.

### Deleting a User

To delete a user,

1. Choose **User Account Change** from the main menu.
2. Choose **Delete Users** from the User Account Change menu.
3. Toggle the Delete field of the user you wish to remove to Yes.

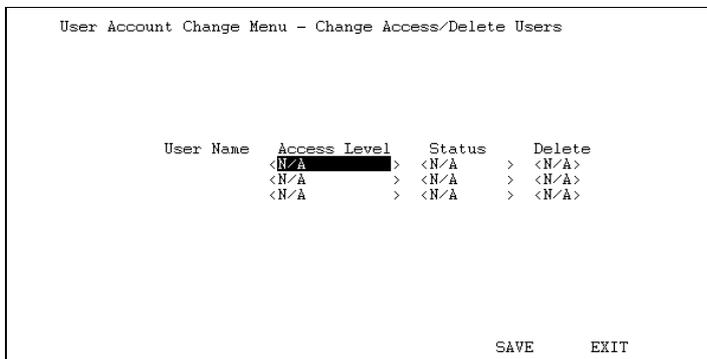


Figure 6-9. Deleting a User

4. Choose SAVE and press Enter to let the user addition take effect.
5. Choose EXIT to leave the Delete Users menu.

---

## Setting up the Switch

---

This section describes the settings you will need to change to allow you to be able to manage the switch from an SNMP-based Network Management System such as D-Link's D-View, or to be able to access the switch using the Telnet protocol.

### **TCP/IP Settings**

The switch needs to have a TCP/IP address assigned to it so that the network management system or Telnet client can find it on the network. The TCP/IP Parameters Configuration Menu allows you to change the settings for the two different interfaces used on the switch: the Ethernet interface used for in-band communication, and the SLIP interface used over the console port for out-of-band communication.

Each of the fields on this menu takes effect the next time the system is restarted. Fields that can be set include:

- ◆ **IP Address:** determines the IP address used by the switch for receiving SNMP and Telnet communications. Should be of the form *xxx.xxx.xxx.xxx*, where each *xxx* is a number (represented in decimal) between 0 and 255. This address should be a unique address on a network assigned to you by the central Internet authorities. The same IP address is shared by both the SLIP and Ethernet network interfaces.
- ◆ **Subnet Mask:** bitmask that determines the extent of the subnet that the switch is on. Should be of the form *xxx.xxx.xxx.xxx*, where each *xxx* is a number (represented in decimal) between 0 and 255. If no subnetting is being done, the value should be 255.0.0.0 for a Class A network, 255.255.0.0 for a Class B network, and 255.255.255.0 for a Class C network.
- ◆ **Default Gateway:** IP address that determines where frames with a destination outside the current subnet should be sent. This is usually the address of a router or a host acting as an IP gateway. If your network is not part of an internetwork, or you do not want the switch to be accessible outside your local network, you can leave this field blank.
- ◆ **Send BOOTP Request Upon Power Up:** determines whether the switch should send out a BOOTP broadcast request when it is powered up. The BOOTP protocol allows IP addresses, network masks, and default gateways to be assigned on a central BOOTP server; if this option is set the switch will first look for a BOOTP server to provide it with this information before using the supplied settings.

```
DES-2218 Fast Ethernet Switch - TCP/IP Parameters Configuration Menu

Current Setting
IP Address:          10.2.0.5
Subnet Mask:        255.0.0.0
Default Gateway:    202.39.74.251

System Restart Setting
IP Address          [10.2.0.5 ]
Subnet Mask         [255.0.0.0 ]
Default Gateway     [202.39.74.251 ]

Send BootP Request Upon Power Up  <No >

                                     SAVE      EXIT
```

Figure 6-10. TCP/IP Parameters Configuration Menu

## ***Out-of-band management and console settings***

You can use the Out-of-Band/Console Setting menu to choose whether to use the switch's RS-232C serial port for console management or for out-of-band TCP/IP communication using SLIP, and to set the bit rate used for SLIP communications.

The following fields can be set:

- ◆ **System Restart Out-of-Band Baud Rate:** determines the serial port bit rate that will be used the next time the switch is restarted. Applies only when the serial port is being used for out-of-band (SLIP) management; it does not apply when the port is used for the console port. Available speeds are 2400, 9600, 19200, and 38400 bits per second.
- ◆ **Out-of-Band Dial Up Phone Number:** stored as a reference for the benefit of the system manager; does not actually cause the switch to dial out.

- ◆ **System Restart Serial Port Setting:** determines whether the serial port should be used for out-of-band (SLIP) management or for console management, starting from the next time the switch is restarted.

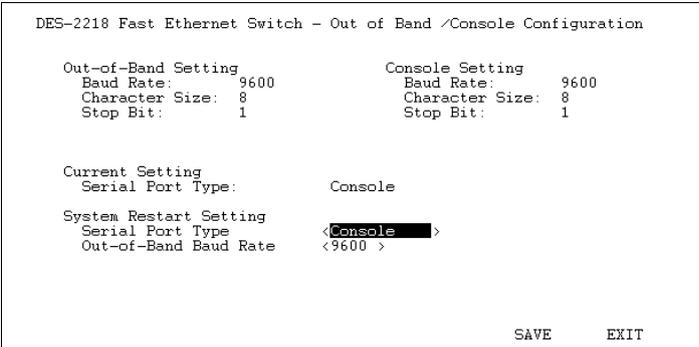


Figure 6-11. Out-of-Band/Console Setting Menu

## Software Updates

The switch is capable of obtaining its boot-time configuration information, as well as updated versions of its internal firmware, using TFTP (the Trivial File Transfer Protocol) and BOOTP (the BOOTstrap Protocol). You can use the Software Update menu to control this feature.

The fields you can set on this menu are:

- ◆ **Software Update** Determines whether or not the switch will try to look for a configuration file over the network. If set to Disable, none of the fields below have any effect.
- ◆ **Software Update Mode** Set to either Network or Out-of-band. Determines whether configuration file should be obtained through the Ethernet network or through the console port.

- ◆ **Boot Protocol** Set to either TFTP ONLY or BOOTP&TFTP. Applies only if the *S/W Update Control* is enabled.
- ◆ **Boot Server IP Address** The IP address of the TFTP server where the configuration file is located. This entry is used only if the *S/W Update Control* is enabled and your boot protocol is `tftp only`; if you are using `bootp-tftp` mode, or if *Send BOOTP Request on Power Up* is enabled, the address will be obtained from the BOOTP server.
- ◆ **Boot File Name** The pathname of the configuration file on your TFTP server. If you are using D-View as your TFTP server, this is the pathname of the `.CFG` file on your hard disk. This entry is used only if your boot protocol is TFTP ONLY; if you are using BOOTP&TFTP mode, or if *Use Bootp to get IP after start up* is enabled, the pathname will be obtained from the BOOTP server.

```

DES-2218 Fast Ethernet Switch - Software Update

Software Update          <Disable>
Software Update Mode    <Network  >

Boot Protocol           <BOOTP&TFTP>
Boot Server IP Address  [10.1.1.1  ]
Boot File Name          [\des2218.cfg ]
Last Boot Server IP Address: 10.1.1.1

                                     SAVE  EXIT

```

**Figure 6-12. Software Update Menu**

For more information about DES-2218 configuration files, consult the appendix. For detailed information about using the TFTP and BOOTP servers, consult the *D-View User's Guide*.

## SNMP Information and Console Timeout

The System Configuration Menu screen shows various pieces of information about your switch, and allows you to set the System Name, System Location, and System Contact. These settings can be retrieved from the switch using SNMP requests, allowing these settings to be used for network management purposes. Each of these fields can contain up to 64 characters:

- ◆ **System Name:** corresponds to the SNMP MIB II variable `system.sysName`, and is used to give a name to the switch for administrative purposes. The switch's fully qualified domain name is often used, provided a name has been assigned.
- ◆ **System Location:** corresponds to the SNMP MIB II variable `system.sysLocation`, and is used to indicate the physical location of the switch for administrative purposes.
- ◆ **System Contact:** corresponds to the SNMP MIB II variable `sysContact`, and is used to give the name and contact information for the person responsible for administering the switch.

```
DES-2218 Fast Ethernet Switch - System Configuration Menu

Boot PROM Firmware Version: 1.15
Software Version: 1.01
Hardware Version: 1.00
MAC Address: 00:80:C8:10:27:03

System Description:
  D-Link Fast Ethernet Switch.
System Name [DES-2218]
System Location [ ]
System Contact [D-Link Technical Support.]
Console/Telnet Display Timeout in Minutes(1-32767) [5 ]

SAVE EXIT
```

Figure 6-13. System Configuration Menu



# SNMP Security (Community Names)

SNMP (version 1) implements a rudimentary form of security by requiring that each request include a *community name*. A community name is an arbitrary string of characters used as a “password” to control access to the switch. If the switch receives a request with a community name it doesn’t recognize, it will trigger an authentication trap.

The DES-2218 allows up to four different community names to be defined, and the access rights for each community can be separately set to *either read only* or *read/write*. The community names `public` and `private` are defined by default; you can change these names in addition to adding others. You will need to coordinate these names with the community name settings you use in your network management system.

```
DES-2218 Fast Ethernet Switch - SNMP Manager Configuration

SNMP Community String      Access Right      Status
[public]                   ] <Read/Write>    <Valid >
[                           ] <Read Only >   <Invalid>
[                           ] <Read Only >   <Invalid>
[                           ] <Read Only >   <Invalid>

                                SAVE      EXIT
```

Figure 6-15. SNMP Manager Configuration

---

## Switch Configuration

---

Several important switch parameters useful in the day-to-day management of the switch can be viewed and controlled using the Port State menu.

## Controlling Individual Ports

The Port Configuration Menu, accessible from the Network Monitoring menu, allows you to view the status of individual ports and to control their settings. The available settings are:

- ◆ **Port** Determines which port is displayed.
- ◆ **Port State** This toggle determines whether the port should be enabled or disabled (manually partitioned). Setting the Port State to Disabled will isolate the port from the rest of the network.
- ◆ **Port Status** Shows whether or not there is a good link to a station connected to the port.
- ◆ **Auto Negotiation** Determines whether or not the NWay automatic speed detection feature is enabled for the port.
- ◆ **Media Speed (100/10Mbps)** Displays the transmission speed of the selected port, either 100 (Ports 1 through 4, 100BASE-TX) or 10 (Ports 3 through 18, 10BASE-T).
- ◆ **Duplex Mode** Shows whether the port is operating in half-duplex or full-duplex mode.

```
DES-2218 Fast Ethernet Switch - Port Configuration

Port(1-18)      [ 1 ]
Port State      <Enable >
Port Status:    Link Down
Auto Negotiation <Enable >
Media Speed(100/10Mbps) 10
Duplex Mode     Half

PREPORT      NEXTPORT      SAVE      EXIT
```

Figure 6-16. Port Configuration Menu

You can use the PREPORT and NEXTPORT commands to switch to another port. You can also enter the port's Port ID number.

---

## Forwarding Configuration

---

The switch monitors all of the Ethernet segments to which it is connected. Since Ethernet frames include the MAC (Ethernet) address of the originating station, the switch can automatically learn what segment the frame's destination is connected to, and forward the frame to only that segment. (If the switch hasn't yet learned what segment a station belongs to, it forwards the packet to all ports.)

To display the forwarding table, the switch's current idea of what stations are attached to what ports,

1. Choose Spanning Tree Algorithm Parameters from the main menu.
2. Choose Forwarding Table.

```
Spanning Tree Algorithm Menu - Forwarding Table
Age out Time (10-1000000 sec)          [300]
Source Address      Port      Status
00:40:05:40:0C:85  3      Learned
00:80:C8:10:27:03  0      Self
00:80:C8:2C:B9:99  3      Learned
00:80:C8:68:90:9B  3      Learned

PREPAGE  NEXTPAGE  SAVE  EXIT
```

**Figure 6-17. STA, Forwarding Table**

The switch removes entries from the forwarding table when they get too "old." This permits the switch to adapt when you move a station from one

segment to another. You can control the aging time, the amount of time an entry can be idle before the switch removes it from the forwarding table, by:

1. Choose Spanning Tree Algorithm Parameters from the main menu.
2. Choose Protocol Parameters.
3. Enter the desired age time, in seconds.

Occasionally you may want to manually add entries to the switch's forwarding table. To add an entry for a station,

1. Choose Spanning Tree Algorithm Parameters from the main menu.
2. Choose Custom Filtering Table.

```

Spanning Tree Algorithm Menu - Custom Filtering Table
Source Address      Source Port      Status
-----
Entry Edit
Source Address      Source Port(0-18)  Status
[00:00:00:00:00:01] [0 ] < Permanent >
PREPAGE    NEXTPAGE    SAVE    EXIT

```

**Figure 6-18. Custom Filtering Table**

3. In the “Source Address” field, enter the Ethernet (MAC) address of the station, in the form `xx:xx:xx:xx:xx:xx`; each `xx` must be a hexadecimal number between `00` and `FF`.
4. In the “**Source Port**” field, type in the port number to which the station is to be connected. For example: the value “1” in this field would represent that the station will be connected to port 1 of this switch; the value “0” would represent that the station can not be

connected to any port of the switch, and the switch will filter out all packets from the station.

5. Set the Status of the entry to Permanent in order to enter and save the settings in the memory of the switch.
6. Choose SAVE to add the entry to the forwarding table.

---

## Spanning Tree Protocol and Configuration

---

The DES-2218 implements the IEEE 803.1d Spanning Tree Protocol (STP) to provide the following functions:

- ◆ **Network loop detection and prevention.** There should only be one path between any two stations on the network. If there is more than one path, packets will be forwarded in loops forever. The spanning tree protocol detects any looping paths, and selects the path with the lowest *path cost* as the active path, while blocking other paths and using them as backups.
- ◆ **Automatic topology reconfiguration.** If a path for which there is a backup path fails, the backup path will be automatically activated, and the spanning tree protocol will automatically reconfigure the network topology.

STP parameters are mainly used to determine the root bridge and root ports on the network. If there is a loop in the network, data packets will go through the root bridge. If the bridge has several ports, then the root port will be used to pass data packets to the root bridge.

STP settings are complex, so you probably want to leave these default parameter values as they are. If you really need to modify their values, please refer to the following discussion.

## ***Introduction to Spanning Tree Protocol Parameters***

The Spanning Tree Protocol works on two levels: the bridge (i.e., switch) and port levels. At the bridge level, the STP algorithm calculates a bridge identifier for each bridge and then determines the root bridge and the designated bridges. On the port level, the spanning tree protocol determines the root port and designated ports.

On the bridge level, these terms are used:

- ◆ **Root Bridge** The bridge with the lowest-numbered bridge identifier. The root bridge should be the best bridge among the bridges on the loop to ensure the highest network reliability and performance.
- ◆ **Designated Bridge** A bridge becomes the designated bridge for a network segment if it has a lower root path cost to the root bridge than the other bridges on the same segment. If all bridges have the same root path cost, then the one with the lowest bridge identifier becomes the designated bridge. Since the root path cost of the root bridge is zero, the root bridge automatically becomes the designated bridge for the segments connected onto it.
- ◆ **Bridge Identifier** This is a combination of the bridge priority (a parameter you can set) and the bridge MAC address (a unique, unchangeable number set at the factory). A lower bridge identifier results to a higher priority for the bridge, thus increasing its chance of being selected as the root bridge.
- ◆ **Root Path Cost** The root path cost of a bridge is the sum of the path cost of the port from which a packet is forwarded and the root path costs of all the bridges the packet goes through. The root path cost of the root bridge is zero.
- ◆ **Bridge Priority** This parameter can be set. The smaller the number you set, the higher the bridge priority is. The higher the bridge priority, the more chance the bridge has of becoming the root bridge.

A bridge priority ranges from 0 to 65535, with 0 being the highest bridge priority.

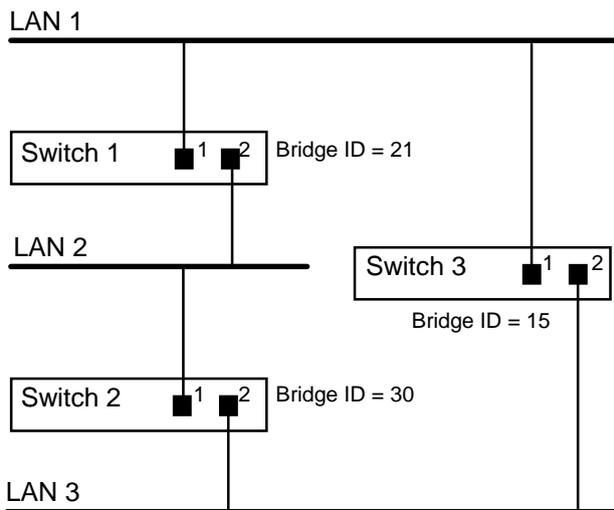
On the port level, these terms are used:

- ◆ **Root Port.** Each bridge has a root port except for the root bridge. This is the port that has the lowest path cost to the root bridge. In case there are several such ports, then the one with the lowest port identifier becomes the root port.
- ◆ **Port Identifier** This is a combination of the port priority (a parameter that can be set) and the physical port number (a unique, unchangeable number assigned by the bridge).
- ◆ **Designated Port** This is the port on each designated bridge that is attached to the LAN segment for which the bridge is the designated bridge.
- ◆ **Port Priority** This parameter can be set. The smaller the number you set, the higher the port priority is. The higher the port priority, the higher the chance the port has for becoming the root port. Port priority ranges from 0 to 255, with 0 being the highest port priority.
- ◆ **Path Cost** Use this parameter to specify preferred paths on the network. The smaller the path cost, the more chance the port of becoming the root port. By convention, a 10 Mbps LAN port has a path cost of 100, while a 100 Mbps port has a path cost of 10.

In the following figure, three DES-2218 switches are used to bridge three LANs together. Switch 3 is selected as the root bridge because it has the lowest bridge ID. Switch 3, as the root bridge, also becomes the designated bridge for LANs 1 and 3. Switch 1 becomes the designated bridge for LAN 2.

Only designated bridges have designated ports, so Switch 2 does not have any designated ports. Port 2 of Switch 2 becomes the root port because it has a lower root path cost to the root bridge than Port 1. For Switch 1, Port 1 is the root port, while Port 2 is the designated port. For Switch 3, both ports are designated ports.

The Spanning Tree Protocol puts all root ports and designated ports in the forwarding state, while placing the others in the blocking state.



## ***Setting Spanning Tree Protocol Parameters***

To set the STP bridge parameters for the switch,

1. Choose Spanning Tree Algorithm Parameters from the main menu.
2. Choose Protocol Parameters from the Spanning Tree Algorithm Parameters menu.
3. The Protocol Parameters menu displays the current status of the Spanning Tree Algorithm's operation on the DES-2218, and allows you to change several of the bridge parameters. All of these settings are described below.

```

Spanning Tree Algorithm Menu - Protocol Parameters

Spanning Tree Protocol          <Disable>
Time Since Topology Changes (sec): 0
Topology Change Count:         315
Designed Root:                  0000000000000000
Root Cost (Hex):                0
Root Port:                      0
Max Age(sec):                   0
Forward Delay(sec):             0
Hold Time(sec):                 0

Bridge Max Age (6-40 sec)      [ 0 ]
Bridge Hello Time (1-10 sec)   [ 0 ]
Bridge Forward Delay (4-30 sec) [ 0 ]
Bridge Priority (0-0xFFFF)    [8000]

Note: 2*(Forward Delay-1)>=Max Age
      Max Age>=2*(Hello Time+1 second)

                                     SAVE      EXIT

```

**Figure 6-19. Protocol Parameters Menu**

4. Choose SAVE and press Enter to let any changes take effect.

The status variables shown are:

- ◆ **Time Since Topology Change** The last time that changes were made to the network topology, such as might occur when a backup path is activated due to a primary path failure.
- ◆ **Topology Change Count** How many times the network bridge topology has changed since the DES-2218 was turned on.
- ◆ **Designated Root** The MAC (Ethernet) address of the bridge/switch on the network that has been chosen as the STA root.
- ◆ **Root Cost** Displays the cost for the path between this switch and the root bridge. If the DES-2218 is the root bridge, then this field displays zero.
- ◆ **Root Port** Identifies the port (on this bridge) that offers the least path cost from this bridge to the root bridge. In the event of a network loop, data packets will pass through the root port.
- ◆ **Max Age (sec)** Indicates the maximum age of spanning tree information learned from the network (on any port) before it is discarded.

- ◆ **Forward Delay (sec)** Indicates how fast any port on the DES-2218 can change its spanning state when moving towards the forwarding state. This value determines how long the port stays in each of the listening and learning states, which precede the forwarding state.
- ◆ **Bridge Max Age** When the value you set for this parameter expires, and the DES-2218 still has not received a BPDU from the root bridge, it will start sending its own BPDU to all other bridges for permission to become the root bridge. If it turns out that the DES-2218 has the lowest bridge identifier, it will then become the root bridge. Bridge Max Age ranges from 6 to 40 seconds, with 20 seconds as the default value.
- ◆ **Bridge Hello Time** This is the interval between two consecutive transmissions of BPDU packets sent by the root bridge to inform all other bridges that it is indeed the root bridge. If you set a Bridge Hello Time for a bridge that is not the root bridge, the setting will be used if and when this bridge becomes the root bridge. Bridge Hello Time ranges from 1 to 10 seconds, with 2 seconds as default.
- ◆ **Bridge Forward Delay.** Bridge Forward Delay ranges from 4 to 30 seconds. This is the time any port on the DES-2218 spends in the “listening state” while moving from “blocking state” to “forwarding state”.

Use the following formulas when setting this parameter:

$$\text{Bridge Max Age} \geq 2 \cdot (\text{Bridge Hello Time} + 1 \text{ second})$$

$$\text{Bridge Max Age} \leq 2 \cdot (\text{Bridge Forward Delay} - 1 \text{ second})$$

- ◆ **Bridge Priority** This parameter sets the priority number of the system. Valid value ranges from 0 to 65535, with 0 being the highest bridge priority. Default value is 32768.

To set the STP port parameters for the switch,

1. Choose Spanning Tree Algorithm Parameters from the main menu.

2. Choose Port Parameters from the Spanning Tree Algorithm Parameters menu.
3. Select the port number that you wish to set parameters for.
4. The Protocol Parameters menu displays the current status of the port concerning the Spanning Tree Algorithm's operation, and allows you to modify some of the parameters.

```

Spanning Tree Algorithm Menu - STAP Port Parameters

Port Number(1-18):      [ 1 ]
State:                  Disabled
Designated Root:       0000000000000000
Designated Cost:       0
Designated Bridge:     0000000000000000
Designated Port:       0

Port Path Cost (1-0xFFFF)[64 ]
Port Priority (0-0xFF)  [80]

PREPORT  NEXTPORT  SAVE  EXIT

```

**Figure 6-20. STAP Port Parameters**

- ◆ **State** Indicates the current state of the port. A port can have the following states: Disabled, Blocking, Listening, Learning, Forwarding, and Broken. A broken state means that the link on the port has been broken because the port is malfunctioning. Blocking means that the port has been blocked because it is neither a root port nor a designated port. In STP, only root and designated ports are used.
- ◆ **Designated Root** Indicates the MAC (Ethernet) address of the switch/bridge that is the STP designated root for the network.
- ◆ **Designated Cost** Displays the path cost from this port to the designated root.

- ◆ **Designated Bridge** Displays the MAC address of the switch/bridge that is the designated bridge for the segment to which the port is attached.
- ◆ **Designated Port** This is the port on each designated bridge that is attached to the LAN segment for which the bridge is the designated bridge
- ◆ **Port Path Cost** (1–65535) Allows you to specify a path cost for the port. By convention, 10Mbps ports are given a path cost of 100, and 100Mbps ports are given a path cost of 10.
- ◆ **Port Priority** (0–255) Allows you to set a priority for the port. The priority is used in conjunction with the physical port number to compute the port ID used for selecting the root port. The lower the port ID, the more likely the port is to become the root port.

---

## Monitoring the Switch

---

The switch supports several monitoring functions, allowing you to keep statistics on the operation of each port.

### *Displaying Port Statistics*

The switch collects Ethernet transmission statistics for each individual port. All counters start at 0 when you enter the statistics display. The statistics displayed are:

- ◆ **MAC Rx Errors** Counts receive errors occurring on the port.
- ◆ **CRC Errors** Counts otherwise valid frames that fail the CRC check.
- ◆ **Oversize Frames** Counts frames longer than the 1518-byte (octet) limit set by the Ethernet standard. This is likely caused by a software problem.

- ◆ **Fragments** Counts packets less than 64 bytes with either bad framing or an invalid CRC. These are normally the result of collisions.
- ◆ **Jabber Frames** Counts frames with length more than 1518 bytes and with CRC error or misaligned (bad framing).
- ◆ **Collision** Counts collisions on the Ethernet segment.
- ◆ **Late Collisions** The number of collisions that occurred at or after the 64<sup>th</sup> byte (octet) in the frame.
- ◆ **Bytes Tx** Counts the number of bytes successfully sent from the port.
- ◆ **Bytes Rx:** Counts the number of bytes successfully received at the port. This also includes local and dropped packets.
- ◆ **Total Octs Rx:** Counts the number of bytes (octets) received on the port, in both good frames and error frames.
- ◆ **Multicast Rx Frames** Counts the number of good multicast frames received. This includes local and dropped multicast packets.
- ◆ **Broadcast Rx Frames** Counts the number of good broadcast frames received. This includes local and dropped broadcast packets.
- ◆ **Rx (Good) Frames** Counts the number of good frames received. This also includes local and dropped packets.
- ◆ **Tx (Good) Frames** Counts the number of good frames sent from the respective port.
- ◆ **64 Octs, 65-127 Octs, 128-255 Octs, 256-511 Octs, 512-1023 Octs, 1024-1518 Octs** Counts frames of various length ranges, both valid and invalid.
- ◆ **Total Rx Frames** Counts the number of frames received, both good frames and error.

DES-2218 Fast Ethernet Switch - Statistics Counters					
Port(1-18)	[1]	Frames	Frames/Sec	Frames	Frames/Sec
MAC Rx Errors:	0	0	Multicast Rx:	1344	2
CRC Errors:	28	0	Broadcast Rx:	51187	122
Oversize Frames:	0	0	Rx(Good):	52904	125
Fragments:	2338	2	Tx(Good):	30	0
Jabber:	0	0	64 Octs:	10954	8
Collisions:	0	0	65-127 Octs:	27105	12
Late Collisions:	0	0	128-255 Octs:	32052	103
			256-511 Octs:	3922	4
			512-1023 Octs:	883	0
			1024-1522 Octs:	13102	0
Bytes Tx:	11121	165	Total Frames Rx:	90326	131
Bytes Rx:	10245552	27618			
Total Bytes Rx:	32145653	27874			
			PREPORT	NEXTPORT	CLEAR COUNTER
					EXIT

Figure 6-21. Statistics Counters

You can use the PREPORT, and NEXTPORT commands to switch ports. The CLEAR COUNTER command will start all of the counters over at 0.

---

## Resetting the Switch

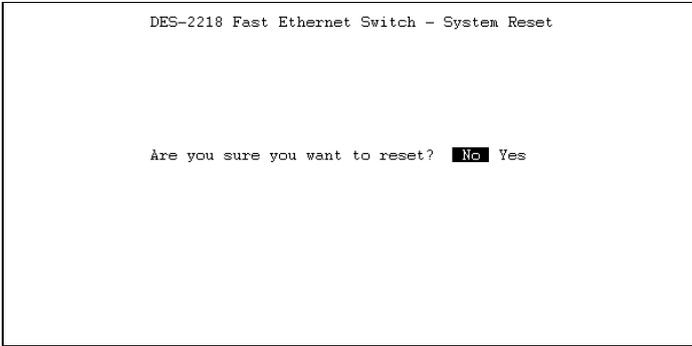
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You can use the console interface to reset the switch, either doing a System Reset (which restarts the switch and is identical to powering the switch off and back on again) or a Factory Reset (which sets all of the switch's parameters to what they were when the switch was delivered from the factory).

### ***System Reset***

To perform a system reset,

1. Choose System Reset from the main menu.



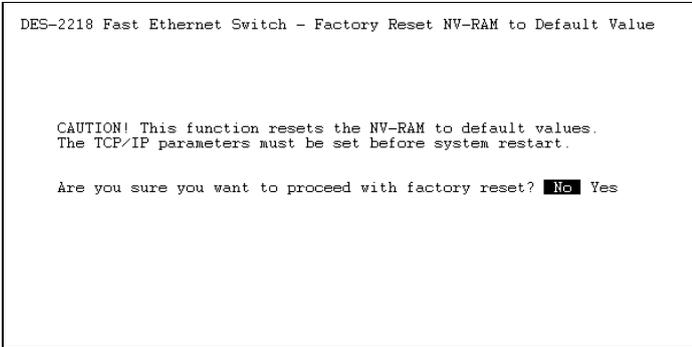
**Figure 6-22. System Reset**

2. Move the cursor to Yes to confirm the reset and press Enter. The switch should restart.

## ***Factory Reset***

Before performing a factory reset, be absolutely certain that this is what you want to do. Once the reset is done, all of the switch's settings stored in NVRAM (including TCP/IP parameters, SNMP parameters, the enabled/disabled settings of ports, security settings, etc.) will be erased and restored to their factory default settings.

1. Choose Factory Reset NVRAM to Default Value from the main menu.



**Figure 6-23. Factory Reset**

2. Move the cursor to Yes to confirm the reset and press Enter. The switch should restart, and all of its parameters will be reset to their default values.





---

# *PRODUCT SPECIFICATIONS*

---

## **General**

---

**Standards:** IEEE 802.3 10BASE-T Ethernet, IEEE 802.3u 100BASE-TX Fast Ethernet Class II repeater; ANSI X3T9.5 Twisted-Pair Transceiver

**Topology:** Star

**Protocol:** CSMA/CD

**Network Data Transfer Rate:** 10Mbps/100Mbps

**Number of Ports:** 16 10BASE-T ports, 2 10BASE-T/100BASE-TX NWay ports

**Network Media:** 10BASE-T: UTP Cat 3/4/5, 100-ohm unshielded twisted pair (100m max.); 100BASE-TX: UTP Cat 5, 100-ohm unshielded twisted-pair (100m max.).

---

## LED Indicators

---

**Switch Status LEDs:** Power, System Load bar graph

**Port Status LEDs:** 100M, Link/Activity, Full Duplex/Collision

---

## Environmental and Physical

---

**Power Supply:** 100 to 240 VAC, 50 or 60 Hz internal universal power supply

**Power Consumption:** 40 watts max.

**Dimensions:** 441mm × 209mm × 72mm (1.5U height), 19-inch rack-mountable

**Weight:** approx. 4.5kg

**Operating Temperature:** 0 to 50°C

**Storage Temperature:** -30 to 55°C

**Humidity:** 5% to 95% non-condensing

**DC Fans:** two 60mm × 60mm

**Emissions:** FCC Class A, CE Mark, VCCI Class 1

**Safety:** UL, CSA, TUV/GS



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# ***CABLES AND CONNECTORS***

This appendix describes the pinouts of the switch's cables and connectors.

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## **10BASE-T/100BASE-TX Connectors**

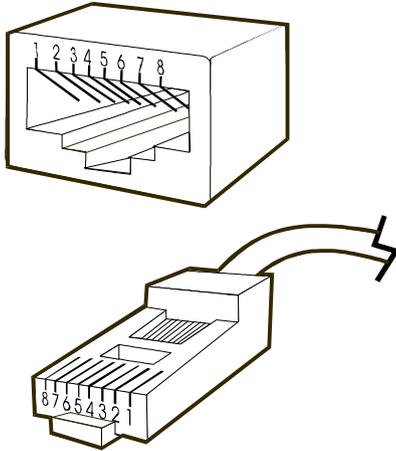
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Ports 1 and 2 are MDI-X 10BASE-T/100BASE-TX Ethernet ports with NWay capability, allowing them to automatically detect port speed. The Uplink port is identical to Port 1x, except that it has an MDI pinout instead. (You cannot use Port 1x and the Uplink port at the same time.)

Ports 3 through 18 are MDI-X 10BASE-T Ethernet ports.

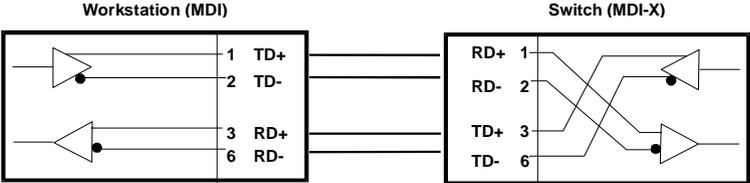
10BASE-T/100BASE-TX connection requires a twisted-pair cable, at most 100 meters long, with RJ-45 connectors at both ends. You can use shielded twisted-pair cable or 0.4-0.6 mm (22-26 AWG) 8-wire unshielded twisted-pair cable for the connection. 100BASE-TX connection requires Category 5 twisted-pair cabling.

The following diagram and table show the standard RJ-45 receptacle/connector and their pin assignments. Numbering of the pins and contacts shown in the diagram correspond to the entries in the subsequent table. Only pin/contact signals relevant to the switch are listed.



**RJ-45 Connectors**

RJ-45 Connector		
Contact	MDI-X Signal	MDI Signal
1	RD+ (receive)	TD+ (transmit)
2	RD- (receive)	TD- (transmit)
3	TD+ (transmit)	RD+ (receive)
4		Not used
5		Not used
6	TD- (transmit)	RD- (receive)
7		Not used
8		Not used

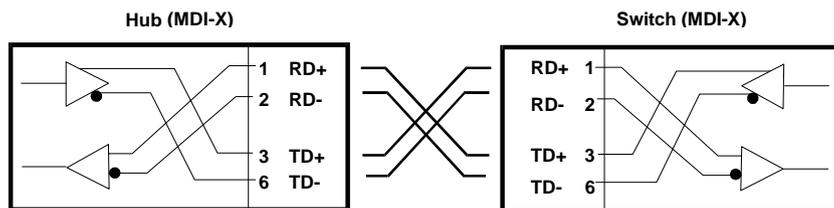


**Straight-through Cable**

## Crossover Cable

When cascading or connecting the switch to a hub, bridge, or another switch through the UTP port, a modified crossover cable is necessary. With a crossover cable, two pairs of wires are switched at one connector end. Carry out the following steps to create a customized, crossover twisted-pair cable:

1. Leave one end of the cable as is, with the RJ-45 connector intact. The wiring at just one end of the cable needs to be modified.
2. At the other end of the cable, connect wires 1 and 2 to contacts 3 and 6 respectively. Likewise, connect wires 3 and 6 to contacts 1 and 2. Refer to the following diagram:

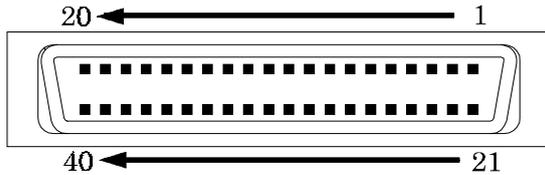


Crossover Cable

## MII Connector

The MII (Media-Independent Interface) is a standard 40-pin connector that you can use to connect other types of 100Mbps network media to your DES-2218. Using a transceiver connected to the MII port on the rear panel of your switch, you can connect the switch to a 100BASE-FX or 100BASE-T4 link.

This appendix shows the pin assignments for the MII connector, which is specified in the IEEE 802.3u Fast Ethernet standard.



MII Connector Pin Assignment					
Contact	MII Signal	Signal Name	Contact	MII Signal	Signal Name
1	+5 V	Voltage	21	+5 V	Voltage
2	MDIO	MAC Data Input Output	22	---	Ground
3	MDC	MAC Data Clock	23	---	Ground
4	RXD<3>	Receive Data 3 bit	24	---	Ground
5	RXD<2>	Receive Data 2 bit	25	---	Ground
6	RXD<1>	Receive Data 1 bit	26	---	Ground
7	RXD<0>	Receive Data 0 bit	27	---	Ground
8	RX_DV	Receive Data Valid	28	---	Ground
9	RX_CLK	Receive Clock	29	---	Ground
10	RX_ER	Receive Error	30	---	Ground
11	NOT USED	Not Used	31	---	Ground
12	TX_CLK	Transmit Clock	32	---	Ground
13	TX_EN	Transmit Enable	33	---	Ground
14	TXD<0>	Transmit Data 0 bit	34	---	Ground
15	TXD<1>	Transmit Data 1 bit	35	---	Ground
16	TXD<2>	Transmit Data 2 bit	36	---	Ground
17	TXD<3>	Transmit Data 3 bit	37	---	Ground
18	COL	Collision	38	---	Ground

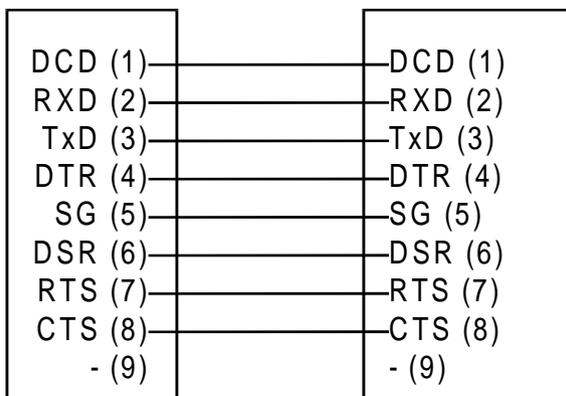
MII Connector Pin Assignment					
Contact	MII Signal	Signal Name	Contact	MII Signal	Signal Name
19	CRS	Carry Sense	39	---	Ground
20	+5 V	Voltage	40	+5 V	Voltage

## RS-232 (DB9) Pin Specification

The RS-232 serial port of the switch uses a 9-pin female connector. The port can be connected to a VT-100 type terminal, a PC, or a workstation emulating a VT-100 terminal. The connection can be either local, or remote through a modem. For a remote connection, a modem cable with a 9-pin male connector on the switch side is needed. The figures below show the connections necessary for local and remote connection to 9-pin and 25-pin RS-232 devices.

Console Port  
(DCE, DB-9)

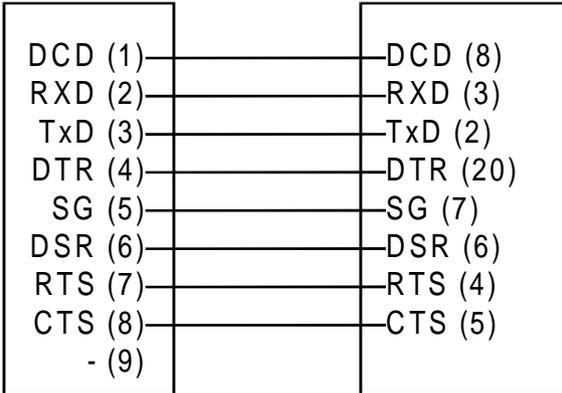
Terminal/PC Serial Port  
(DTE, DB-9)



Local Connection to 9-Pin Serial Port

Console Port  
(DCE, DB-9)

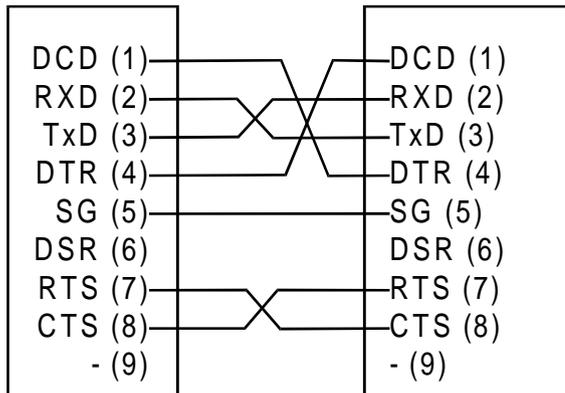
Terminal/PC Serial Port  
(DTE, DB-25)



**Local Connection to 25-Pin Serial Port**

Console Port Connector  
(DCE, DB-9)

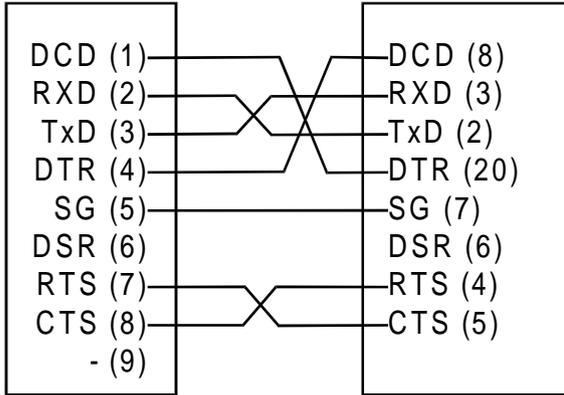
Modem  
(DCE, DB-9)



**Remote (Modem) Connection to 9-Pin Serial Port**

Console Port  
(DCE, DB-9)

Modem  
(DCE, DB-25)



**Remote (Modem) Connection to 25-Pin Serial Port**





---

# ***BOOT CONFIGURATION FILE***

The switch supports a powerful configuration file which allows many of the switch's configuration parameters to be stored on a centralized server. When the switch starts up, it can be configured to read its configuration file from the server using the TFTP protocol. This can make it easier to manage a large number of switches, since all of the configuration parameters for all of the switches can be managed in a single place.

The configuration file is a text file, usually stored on the server with a `.CFG` extension. It can be up to 10 kilobytes long. Lines beginning with `#` are considered comments which are ignored by the switch. All other lines are commands, which are interpreted by the switch.

The configuration file commands accepted by the switch are:

- ◆ `sysdescr string`

Takes *string* as the System Name, corresponding to the SNMP MIB II variable `system.sysName`. This field is used to give a name to the switch for administrative purposes. The switch fully qualified domain name is often used, provided a name has been assigned. The *string* can be up to 64 characters long.

- ◆ `syscontact string`

Takes *string* as the System Contact, corresponding to the SNMP MIB II variable `sysContact`. This field is used to give the name and contact information for the person responsible for administering the switch. The *string* can be up to 64 characters long.

◆ `syslocation string`

Takes *string* as the System Location, corresponding to the SNMP MIB II variable `sysLocation`. This field is used to indicate the physical location of the switch for administrative purposes. The *string* can be up to 64 characters long.

◆ `baud-rate n`

Sets the console port transmission rate used when the port is being used in out-of-band mode. Legal values for the parameter *n* are: 2400, 4800, 9600, 19200, and 38400.

◆ `image-file string`

Takes *string* (which may be up to 64 characters long) as the filename on the TFTP server of the image file to be used. When the switch boots, it will load the given image file from the server and execute it. This command may be used to update the switch's software when a new version is available from D-Link.

◆ `ip-netmask mask`

Uses *mask* as the network mask for the local network. The *mask* should be in the form `xxx.xxx.xxx.xxx`, where each *xxx* is a number between 0 and 255. For a class C network with no subnetting, the netmask should be `255.255.255.0`.

◆ `ip-default address`

Uses *address* as the switch's IP address. The *address* should be in the form `xxx.xxx.xxx.xxx`, where each *xxx* is a number between 0 and 255.

◆ `auth-trap enable/disable`

Enables or disables authentication failure traps for invalid SNMP community names. The argument may be `enable` or `disable`.

◆ `clear-SNMP-comm-table`

Clears the switch's SNMP community name table.

◆ `SNMP-community community permissions`

Adds `community` to the switch's list of SNMP communities, with access permissions. The community name can be up to 32 characters long. Permissions can be `read`, for read-only community access, or `write`, for read-write community access.

◆ `clear-ip-trap-manager-table`

Removes all entries from the switch's trap manager list.

◆ `ip-trap-manager address community`

Adds the host at `address` to the switch SNMP trap manager list. Traps sent to the host will use community name `community`, which may be a string up to 32 characters long.

◆ `PFT-Entry mac-address rcv-port allowed-ports`

Adds entries to the switch's forwarding table. The `mac-address` corresponds to the source Ethernet address, in the form `xx:xx:xx:xx:xx:xx`. The `rcv-port` is the port from which packets from the station may be received. The `allowed-ports` field lists the ports to which packets from the station may be forwarded, separated by slashes.

---

# INDEX

- 100BASE-FX, 21, 63
- 100BASE-T4, 21, 63
- 100M LED, 21
- 100M LEDs, 11
- 19-inch rack, 16
- Adding a New User, 31
- Adding and Deleting Users, 31
- address, Ethernet, 2
- age time, 44
- brackets, 15
- bridge identifier, 46
- bridge priority, 47
- broadcast RX frames statistic counter, 54
- buffer memory, 2
- bytes RX statistic counter, 54
- bytes TX statistic counter, 54
- Changing your Password, 30
- Class I Fast Ethernet repeater, 5
- Class II Fast Ethernet repeater, 5
- collision domain, 5
- collision domains, 6, 7
- Collision statistic counter, 54
- collisions, 11
- Console LED, 11
- console port, 10
- cooling fans, 12
- CRC Errors statistic counter, 53
- Deleting a User, 33
- designated bridge, 46, 52
- designated cost, 52
- designated port, 46, 47, 52
- designated root, 50, 52
- factory reset, 56
- FDX/Col LEDs, 11
- feet, rubber, 15, 16
- fiber optic cable, 1
- forwarding table, 2, 43, 44
- Fragments statistic counter, 53
- front panel, 9
- full-duplex mode, 2, 11
- fuse, 18
- General User, 27
- half-duplex mode, 2
- inter-repeater link, 5
- jabber frames statistic counter, 54
- late collisions statistic counter, 54
- LED indicator panel, 10
- Link/Act LED, 21, 22
- Link/Act LEDs, 11, 20
- Logging In on the Console Screen, 25
- Logging In on the Switch Console, 25
- MAC address, 2
- MAC address level, 6
- MAC Rx Errors statistic counter, 53
- maximum age, 50
- Media-Independent Interface. *See* MII
- MII, 1, 21, 63
- MII LED, 11, 22
- MII port, 12, 22
- multicast RX frames statistic counter, 54
- NVRAM, 56
- NWay, 1, 10, 11, 21, 42
- Oversize Frames statistic counter, 53
- path cost, 47

---

port identifier, 47  
port path cost, 53  
port priority, 47, 53  
Port State, 52  
ports, 100Mbps, 10  
ports, 10Mbps, 10  
ports, MII, 12  
power connector, 12  
power cord, 15  
Power LED, 11, 17  
power supply, 17  
power switch, 13, 17  
Prevent Unauthorized Users, 25  
rack mounting, 16  
reset, factory, 56  
reset, system, 55  
root bridge, 46  
root cost, 50  
root path cost, 47  
root port, 46, 47, 50  
RX (good) frames statistic counter, 54  
segments, 6  
SNMP, 2  
Spanning Tree Protocol, 2, 45  
static filtering, 2  
statistic counters, 53  
store-and-forward, 2  
STP. *See* Spanning Tree Protocol  
Super and General User Privileges, 27  
Super User, 27  
switch, 6  
Switching LAN technology, 7  
switching technology, 6  
System Load bar graph LEDs, 11  
system reset, 55  
topology change count, 50  
topology change, time since last, 49  
total octets RX statistic counter, 54  
Total Rx Frames statistic counter, 54  
Tx (Good) Frames statistic counter, 54  
unshielded twisted-pair, 4  
uplink port, 2, 10

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# D-Link<sup>®</sup> Offices

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# Registration Card

*Print, type or use block letters.*

Your name: Mr./Ms \_\_\_\_\_  
 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 \_\_\_\_\_
9. **Would you recommend your D-Link product to a friend?**  
Yes No Don't know yet

**10. Your comments on this product?**

\_\_\_\_\_

PLEASE  
PLACE STAMP  
HERE

**TO:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**D-Link®**