

D-Link[®]

DSS-16+
16-port 10/100Mbps Switch
User's Guide

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RECYCLABLE

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ABOUT THIS GUIDE

Congratulations on your purchase of DSS-16+. This device integrates 100Mbps Fast Ethernet and 10Mbps Ethernet network capabilities in a highly flexible package.

Purpose

This guide discusses how to install your DSS-16+.

Terms/Usage

In this guide, the term “**Switch**” (first letter upper case) refers to your DSS-16+, and “**switch**” (first letter lower case) refers to other Ethernet switches.

Overview of this User’s Guide

Introduction. Describes DSS-16+ and its features.

Unpacking and Installation. Helps you get started with the basic installation of DSS-16+.

Identifying External Components. Describes the front panel, rear panel and LED indicators of DSS-16+.

Connecting the Switch. Tells how you can connect DSS-16+ to your Ethernet network.

Technical Specifications. Lists the technical (general, physical and environmental, and performance) specifications of DSS-16+.

RJ-45 Pin Specification. Describes the RJ-45 receptacle/connector and the *straight through* and *crossover* cable connector.

INTRODUCTION

This chapter describes the features of DSS-16+ and 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, 100BASE-TX (Fast Ethernet) provides a non-disruptive, smooth evolution from the current 10BASE-T technology. The non-disruptive and smooth evolution 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 Switch is compatible with all 10Mbps Ethernet environments, it provides a straightforward upgrade and takes advantage of the 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 and transmits Ethernet packets at the MAC address level of the Ethernet protocol, among connected Ethernet or Fast Ethernet LAN segments.

Switching is a cost-effective way of increasing the total network capacity available to users on a local area network. A switch increases capacity and decreases network loading by dividing a local area network into different *segments*. Each *segment* has its own bandwidth and it does not compete with others for network transmission capacity.

A switch acts as a high-speed selective *bridge* between the individual segments. The switch forwards traffic from origin segment to destination segment, without interfering with any other segments. By doing this, the total network capacity is 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 uplinking Fast Ethernet 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. The switch supports both traditional 10Mbps Ethernet and 100Mbps Fast Ethernet, which is also ideal for bridging between the existing 10Mbps networks and the new 100Mbps networks.

LAN Switching technology is a marked improvement over the previous generation of network bridges, which were criticized by their higher latencies. *Routers* have also been used to segment local area networks. But, the *router* expensive, difficult to setup, and maintenance intensive, these make it relatively impractical for the network. Switch, on the other hand, is less expensive, easier to setup, and practically maintenance free, which make it an ideal solution to today’s local area network congestion problems.

Features

This high performance DSS-16+ was designed for a network environment where traffic and the number of users increase continuously.

DSS-16+, with their small, desktop size, was specifically design for small to middle workgroups. It provides immediate access to a rapidly growing network through a wide range of user-reliable functions.

DSS-16+ is ideal for shared bandwidth 10Mbps or 100Mbps workgroups with multiple high-speed servers. With the highest bandwidth at 200Mbps (Full-Duplex mode), each port can provide a workstation with congestion-free data-pipe for simultaneous access to the server.

DSS-16+ is expandable by cascading two or more switches together. As all ports support 200Mbps (Full-Duplex mode), the Switch can be cascaded from any port and to any number of switches.

DSS-16+ is a perfect choice for 10Mbps network site that could be upgraded to Fast Ethernet in the future. Ethernet workgroups can connect to the Switch now, and change adapters and hubs anytime later without changing the Switch or reconfiguring the network.

DSS-16+ combines dynamic memory allocation with store-and-forward switching method to ensure that the buffer is effectively allocated for each port. It also controls the data flow between transmit and receive nodes to guarantee against all possible packet loss.

DSS-16+ is an unmanaged 10/100Mbps Fast Ethernet Switch that offers solutions to increase Ethernet workgroup bandwidth. Other key features are as followed:

- ◆ Uplink/MDI-II (media dependent interface) port for uplink to another switch or hub.
- ◆ Store and forward switching scheme. As the result of complete frame checking and error frame filtering, this scheme prevents error packages from transmitting among segments.

- ◆ NWay Auto-negotiation for any port. This allows auto-sensing of speed (10/100Mbps) thereby providing you with automatic and flexible solutions for your network.
- ◆ IEEE 802.3x flow control for full-duplex mode operation.
- ◆ Back pressure flow control for half-duplex mode operation.
- ◆ Data Forwarding Rate (per port) at wire-speed for both 10Mbps and 100Mbps speed.
- ◆ Data Filtering Rate (per port) at wire-speed for both 10Mbps and 100Mbps speed; eliminates all error packets, runts, etc.
- ◆ 16K active MAC address entry table with self-learning and table ageing.
- ◆ 512KBytes RAM buffer per device.
- ◆ Broadcast storm protection.

UNPACKING AND INSTALLATION

This chapter provides unpacking and setup information for DSS-16+.

Unpacking

Open the shipping cartons and carefully unpacks its contents. The carton should contain the following items:

- ◆ One 16-port 10/100M NWay Fast Ethernet Switch
- ◆ One external power adapter
- ◆ Four rubber feet to be used for shock cushioning
- ◆ User's Guide

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

Installation

The site where you install DSS-16+ may greatly affect its performance. When installing, consider the following pointers:

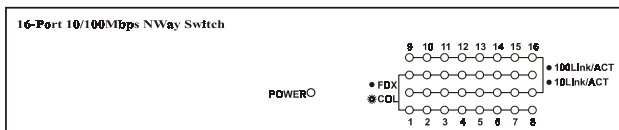
- Install DSS-16+ in a fairly cool and dry place. See *Technical Specification* for the acceptable operating temperature and humidity ranges.
- Install DSS-16+ in a site free from strong electromagnetic source, vibration, dust, and direct sunlight.
- Leave at least 10cm of space at the left and right hand side of DSS-16+ for ventilation.
- Visually inspect the DC power jack and make sure that it is fully secured to the power adapter.

IDENTIFYING EXTERNAL COMPONENTS

This section identifies all the major external components of DSS-16+. Both the front and rear panel is shown, followed by a description of each panel's feature. The LED indicator panel is described in detail in the next chapter.

Front Panel

The figure below shows the front panels of DSS-16+.

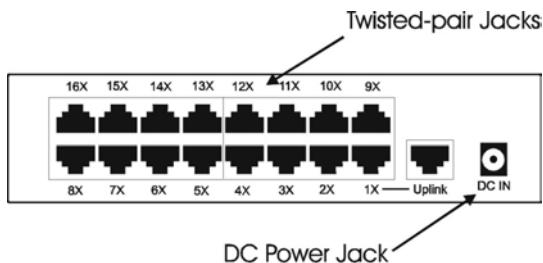


16-port 10/100Mbps NWay Fast Ethernet Switch

LED Indicator Panel

Refer to the next chapter for detailed information about each LED indicator.

Rear Panel



Twisted-Pair Ports

Use any of these ports to connect network devices (workstations, hubs, switches, etc.) to DSS-16+. These ports are MDI-X ports and you can use ordinary straight-through twisted-pair cables to connect PCs, workstations, and Servers to DSS-16+. If you need to connect these ports to devices with MDI-X ports, you need to use crossover cables, or connect using the Uplink port (described below).

Uplink Ports

The Uplink port is a MDI-II port, which means you can connect this port to another device's MDI-X port using an ordinary straight-through twisted-pair cable.

Port 1 and the Uplink port is really the same port, except that their pin-outs are different. ***Do not use both Port 1 and the Uplink port at the same time.***

DC Power Jack:

Power is supplied through an external AC power adapter. Check the technical specification section for information about the AC power input voltage.

Since DSS-16+ does not include a power switch, plugging its power adapter into a power outlet will immediately power it on.

AC Power Connector:

For the power cord.

LED Indicators

Power (Power Indicator)

This indicator lights green when the hub is receiving power. This LED is off indicating no power.

10/100M FDX and 10/100M COL (10/100Mbps Full-Duplex and 10/100Mbps Collision Indicator)

This LED indicator lights green when the respective port is in full-duplex (FDX) mode. It remains off for half-duplex operation. This LED blinks green when collision occurs on the respective port.

Note: the full-duplex LED lights green when the connected device supports full-duplex operation.

10M Link/ACT and 100M Link/ACT (10Mbps Link/Activity (amber) and 100Mbps Link/Activity (green) Indicator)

This indicator lights green when the port is connected to a 100Mbps device.

The DSS-16+ blinks green when transmitting or receiving data on the 100Mbps network.

This indicator lights amber when the port is connected to a 10Mbps device. The DSS-16+ blinks amber when transmitting or receiving data on the 10Mbps network.

CONNECTING THE SWITCH

This chapter describes how to connect DSS-16+ to your Fast Ethernet network.

PC to Switch

A PC can be connected to DSS-16+ via a two-pair Category 5 UTP/STP straight cables. The PC (equipped with a RJ-45 10/100Mbps) should be connected to any of the 16 ports (1x - 16x)

Note: Use CAT5 (or better) cable for 100Mbps connection.

After the connection is made, the port LED on DSS-16+ will show the status of the connection. If LED indicator does not light after making a proper connection, check the PC LAN card, DSS-16+, and DSS-16+ port.

The following are the possible LED indicator status for PC to Switch connection:

1. The “LINK/ACT” LED indicator lights green for 100Mbps connection or lights amber for 10Mbps connection.
 2. The “FDX/COL LED” indicator lights green if the LAN adapter is in full-duplex mode. The LED remains off when the adapter is in half-duplex mode.
-

Hub to Switch

A hub (10 or 100BASE-TX) can be connected to DSS-16+ via a two-pair Category 5 UTP/STP straight cables. *Note: Use CAT5 (or better) cable for*

100Mbps connection. The connection is accomplished from the hub's uplink (MDI-II) port to any of DSS-16+'s 1~16 (MDI-X) ports.

A. 10BASE-T Hub

For a 10BASE-T hub, DSS-16+ LED indicators should light up as the following:

"FDX/COL" LED indicator is *OFF*.

"LINK/ACT" LED indicator lights amber.

B. 100BASE-TX Hub

When connecting to a 100BASE-TX hub, DSS-16+ LED indicator should light up as the following:

"FDX/COL" LED indicator is *OFF*.

"LINK/ACT" LED indicator lights green.

Hub without Uplink (MDI-II) port

If a hub is not equipped with an uplink (MDI-II) port, connection can be made using either straight cable or crossover cable.

A. Using straight cable

When using straight cable, the connection can be made from Switch's uplink (MDI-II) port to any port of the Hub.

B. Using crossover cable

When using crossover cable, the connection can be made from any regular ports of DSS-16+ to any port of the Hub.

Switch to Switch (other devices)

DSS-16+ can be connected to another switch or other devices (routers,

bridges, etc.) via a two-pair Category 5 UTP/STP straight or crossover cable.
Note: Use CAT5 (or better) cable for 100Mbps connection.

A. Using straight cable

When using straight cable, this is done from DSS-16+'s uplink (MDI-II) port (Switch A) to any of the 10Mbps or 100Mbps (MDI-X) port of the other switch (switch B) or other device.

B. Using crossover cable

When using crossover cable, this is done from any (MDI-X) port of DSS-16+ (Switch A) to any of the 10Mbps, 100Mbps (MDI-X) port of the other switch (switch B) or other device.

1. The "LINK/ACT" LED indicator lights green indicating 100Mbps connection or it lights amber indicating 10Mbps speed.
2. The "FDX/COL LED" indicator lights green if the connection is in full-duplex mode. The LED remains off when the connection is in half-duplex mode.

Port Speed & Duplex Mode

After a connection is made between DSS-16+ and another Ethernet device, the system uses auto-negotiation to determine the transmission mode for this twisted-pair connection:

If the attached device does not support auto-negotiation or has auto-negotiation disabled, an auto-sensing process is initiated to select the speed and set the duplex mode to **half-duplex**.

TECHNICAL SPECIFICATIONS

General	
Standards	IEEE 802.3 10Base-T Ethernet IEEE 802.3u 100 Base-TX Fast Ethernet ANSI/IEEE 802.3 NWay auto-negotiation IEEE 802.3x flow control
Protocol	CSMA/CD
Data Transfer Rate	Ethernet: 10Mbps (half duplex), 20Mbps (full duplex) Fast Ethernet: 100Mbps (half duplex), 200Mbps (full duplex)
Topology	Star
Network Cables	10BASE-T: 2-pair UTP Cat. 3,4,5; EIA/TIA- 568 100-ohm STP 100BASE-TX: 2-pair UTP Cat. 5; EIA/TIA-568 100-ohm STP
Number of Ports	16 x 10/100Mbps NWay MDI-X ports
Uplink Port	1 x 10/100Mbps NWay MDI-II port, shared with port 1

Physical and Environmental

DC inputs	3.3VDC/3A
Power Consumption	10 watts. (Max.)
Temperature	Operating: 0° ~ 50° C, Storage: -10° ~ 70° C
Humidity	Operating: 10% ~ 90%, Storage: 5% ~ 90%
Dimensions	184 x 124 x 44 mm (W x H x D)
EMI:	FCC Class A, CE Mark Class A, VCCI Class A

Performance

Transmits Method:	Store-and-forward
RAM Buffer:	512KBytes per device
Filtering Address Table:	16K entries per device
Packet Filtering/Forwarding Rate:	10Mbps Ethernet: 14,880/pps 100Mbps Fast Ethernet: 148,800/pps
MAC Address Learning:	Automatic update

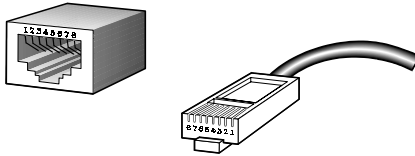
RJ-45 PIN SPECIFICATION

When connecting your 16-port 10/100M NWay Ethernet Switch to another switch or other Ethernet device, a modified crossover cable maybe necessary. Please review your network 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.

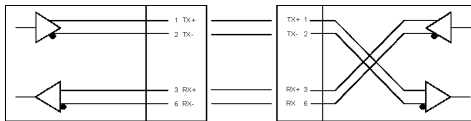
RJ-45 Connector pin assignment	
Contact	Media Direct Interface Signal
1	TX + (transmit)
2	TX - (transmit)
3	Rx + (receive)
4	Not used
5	Not used
6	Rx - (receive)
7	Not used
8	Not used

The standard cable, RJ-45 pin assignment

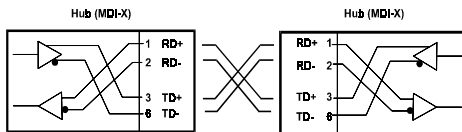


The standard RJ-45 receptacle and connector

The following shows straight cable and crossover cable connections:



MDI-II (uplink) port to MDI-X port connection using Straight Cable for connecting from Switch to switch or from Switch to other network device.



MDI-X port to MDI-X port connection using Straight Cable for connecting from Switch to switch or from Switch to other network device.

FCC Certifications

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Shielded interface cables must be used in order to comply with emission limits.

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2)

This device must accept any interference received, including interference that may cause undesired operation.

CE Mark Warning

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

VCCI Warning

注意

この装置は、情報処理装置等電波障害自主規制協議会(VCCI)の基準に基づく第一種情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

LIMITED WARRANTY

D-Link provides this limited warranty for its product only to the person or entity who originally purchased the product from D-Link or its authorized reseller or distributor.

Limited Hardware Warranty: D-Link warrants that the hardware portion of the D-Link products described below (“Hardware”) will be free from material defects in workmanship and materials from the date of original retail purchase of the Hardware, for the period set forth below applicable to the product type (“Warranty Period”) if the Hardware is used and serviced in accordance with applicable documentation; provided that a completed Registration Card is returned to an Authorized D-Link Service Office within ninety (90) days after the date of original retail purchase of the Hardware. If a completed Registration Card is not received by an authorized D-Link Service Office within such ninety (90) period, then the Warranty Period shall be ninety (90) days from the date of purchase.

<i>Product Type</i>	<i>Warranty Period</i>
Product (excluding power supplies and fans)	One (1) Year
Power Supplies and Fans	One (1) Year
Spare parts and spare kits	Ninety (90) days

D-Link’s sole obligation shall be to repair or replace the defective Hardware at no charge to the original owner. Such repair or replacement will be rendered by D-Link at an Authorized D-Link Service Office. The replacement Hardware need not be new or of an identical make, model or part; D-Link may in its discretion may replace the defective Hardware (or any part thereof) with any reconditioned product that D-Link reasonably determines is substantially equivalent (or superior) in all material respects to the defective Hardware. The Warranty Period shall extend for an additional ninety (90) days after any repaired or replaced Hardware is delivered. If a material defect is incapable of correction, or if D-Link determines in its sole discretion that it is not practical to repair or replace the defective Hardware, the price paid by the original purchaser for the defective Hardware will be refunded by D-Link upon return to D-Link of the defective Hardware. All Hardware (or part thereof) that is replaced by D-Link, or for which the purchase price is refunded, shall become the property of D-Link upon replacement or refund.

Limited Software Warranty: D-Link warrants that the software portion of the product (“Software”) will substantially conform to D-Link’s then current functional specifications for the Software, as set forth in the applicable documentation, from the date of original delivery of the Software for a period of ninety (90) days (“Warranty Period”), if the Software is properly installed on approved hardware and operated as contemplated in its documentation. D-Link further warrants that, during the Warranty Period, the magnetic media on which D-Link delivers the Software will be free of physical defects. D-Link’s sole obligation shall be to replace the non-conforming Software (or defective media) with software that substantially conforms to D-Link’s functional specifications for the Software. Except as otherwise agreed by D-Link in writing, the replacement Software is provided only to the original licensee, and is subject to the terms and conditions of the license granted by D-Link for the Software. The Warranty Period shall extend for an additional ninety (90) days after any replacement Software is delivered. If a material non-conformance is incapable of correction, or if D-Link determines in its sole discretion that it is not practical to replace the non-conforming Software, the price paid by the original licensee for the non-conforming Software will be refunded by D-Link; provided that the non-conforming Software (and all copies thereof) is first returned to D-Link. The license granted respecting any Software for which a refund is given automatically terminates.

What You Must Do For Warranty Service:

Registration Card. The Registration Card provided at the back of this manual must be completed and returned to an Authorized D-Link Service Office for each D-Link product within ninety (90) days after the product is purchased and/or licensed. The addresses/telephone/fax list of the nearest Authorized D-Link Service Office is provided in the back of this manual. FAILURE TO PROPERLY COMPLETE AND TIMELY RETURN THE REGISTRATION CARD MAY AFFECT THE WARRANTY FOR THIS PRODUCT.

Submitting A Claim. Any claim under this limited warranty must be submitted in writing before the end of the Warranty Period to an Authorized D-Link Service Office. The claim must include a written description of the Hardware defect or Software nonconformance in sufficient detail to allow D-Link to confirm the same. The original product owner must obtain a Return Material Authorization (RMA) number from the Authorized D-Link Service

Office and, if requested, provide written proof of purchase of the product (such as a copy of the dated purchase invoice for the product) before the warranty service is provided. After an RMA number is issued, the defective product must be packaged securely in the original or other suitable shipping package to ensure that it will not be damaged in transit, and the RMA number must be prominently marked on the outside of the package. The packaged product shall be insured and shipped to D-Link, 53 Discovery Drive, Irvine CA 92618, with all shipping costs prepaid. D-Link may reject or return any product that is not packaged and shipped in strict compliance with the foregoing requirements, or for which an RMA number is not visible from the outside of the package. The product owner agrees to pay D-Link's reasonable handling and return shipping charges for any product that is not packaged and shipped in accordance with the foregoing requirements, or that is determined by D-Link not to be defective or non-conforming.

What Is Not Covered:

This limited warranty provided by D-Link does not cover:

Products that have been subjected to abuse, accident, alteration, modification, tampering, negligence, misuse, faulty installation, lack of reasonable care, repair or service in any way that is not contemplated in the documentation for the product, or if the model or serial number has been altered, tampered with, defaced or removed;

Initial installation, installation and removal of the product for repair, and shipping costs;

Operational adjustments covered in the operating manual for the product, and normal maintenance;

Damage that occurs in shipment, due to act of God, failures due to power surge, and cosmetic damage; and

Any hardware, software, firmware or other products or services provided by anyone other than D-Link.

Disclaimer of Other Warranties: EXCEPT FOR THE LIMITED WARRANTY SPECIFIED HEREIN, THE PRODUCT IS PROVIDED "AS-IS" WITHOUT ANY WARRANTY OF ANY KIND INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY, FITNESS

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GOVERNING LAW: This Limited Warranty shall be governed by the laws of the state of California.

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