EtherFast 10/100 Dual-Speed Switches

Use this guide to install these Linksys products:

EtherFast 10/100 12-Port Switch (DSSX12)
EtherFast 10/100 16-Port Switch (DSSX16)
EtherFast 10/100 24-Port Switch (DSSX24)

User Guide

LINKSYS®

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LIMITED WARRANTY
Linksys guarantees that every EtherFast 10/100 12-Port, 16-Port, and 24-Port Switch is
free from physical defects in material and workmanship under normal use for five (5)
years from the date of purchase. If the product proves defective during this warranty
period, call Linksys Customer Support in order to obtain a Return Authorization num-
ber. BE SURE TO HAVE YOUR PROOF OF PURCHASE ON HAND WHEN CALLING.
RETURN REQUESTS CANNOT BE PROCESSED WITHOUT PROOF OF PUR-
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FCC STATEMENT
This equipment has been tested and found to comply with the limits for a Class A digi-
tal 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 according to the instructions, may cause harmful interference to radio com-
munications. However, there is no guarantee that interference will not occur in a partic-
ular installation. If this equipment does cause harmful interference to radio or television
reception, which is found 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 or device
• Connect the equipment to an outlet other than the receiver's
• Consult a dealer or an experienced radio/TV technician for
  assistance

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Introduction

Congratulations on purchasing your new EtherFast 10/100 Dual-Speed Switch for your network's 10/100 migration needs. Ready to run right out of the box, the EtherFast 10/100 Dual-Speed Switch is the easiest, most flexible way to boost your network's performance with full duplex data transfer and dedicated bandwidth to each of your nodes while migrating to the power of Fast Ethernet. Unlike a standard hub that wastes network bandwidth by bouncing packets around until they finally reach their destinations, a switch forwards packets only to their intended recipients, immediately reducing network traffic congestion and improving overall efficiency for your entire network.

Whether you're planning on moving to a Fast Ethernet network now or later, every Linksys EtherFast 10/100 Dual-Speed Switch is ready to go to work for you immediately. Use its switching power on your 10BaseT network to improve traffic efficiency tremendously. Connect your file server to the switch to improve access times for all of your users in one step. And when you're ready, migrate your entire network to 100BaseTX while using switching to achieve full duplex speeds of up to 200Mbps – the speed is yours!

Every 12, 16, and 24-Port Switch comes with a built-in expansion slot. Now you can take advantage of the biggest craze in high-speed networking technology -- fiber optics! The 100BaseFX Distance Extender Module lets you uplink to fiber backbones and send your data up to 2 kilometers -- that's 2000 meters (6560 feet).

Every switch packs a full suite of error detection and correction features for reliable communication every time. Auto partitioning, data collision control, and incoming frame retiming ensure that not a single bit of data is lost, even during the heaviest moments of network traffic. Built to last, your new switch is optimized to deliver high-end video, multimedia, database, and other speed-intensive applications at blazing speeds.

About Fast Ethernet

As the demand for desktop video, multimedia development, imaging, and other speed-intensive applications continues to rise, the need for high performance, fault tolerant LAN technology will become more critical.

Standard **Ethernet**, which has been the most popular networking technology to date with a maximum data throughput of **10 Mbps**, is becoming insufficient to handle the latest video, multimedia, and other speed-intensive client/server LAN applications.

Among the proposed solutions to the dilemma of network speed, Fast Ethernet has emerged as the most viable and economical. Capable of sending and receiving data at **100 Mbps** (megabits per second), it is more than fast enough to handle even the most demanding video and other real-time applications.

Although there are a number of different competing Fast Ethernet implementations, **100BaseTX** is by far the most popular. Operating on two pairs of Category 5 unshielded twisted-pair (UTP) cabling, 100BaseTX supports high speed signaling and is relatively inexpensive. Because it uses four wires for data transmission and the same packet format, packet length, error control, and management information as 10BaseT, 100BaseTX can be made to communicate with older 10BaseT equipment when routed through a switch.

This **scalability** is one of 100BaseTX's major advantages over other forms of Fast Ethernet: it allows critical, speed-dependent network segments to be upgraded to 100BaseTX speeds as needed without rewiring, refitting, and retraining an entire site. Heterogeneous networks can now mix both slow and fast network segments for different users or for different departments. Publishing, R&D, video, multimedia, or accounting departments can enjoy a 100Mbps pace, while other corporate segments can operate at slower and more economic 10Mbps speeds.

A network without a switch is often called a **shared-bandwidth network** because the net's overall bandwidth is shared among all of the nodes – each PC, file server, or other node gets a piece of the bandwidth. In a shared network, data packets are sent to all available nodes until they fall upon their destination. Much of the bandwidth, consequently, is wasted because some packets have to spend time "looking" for their destinations.

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Switched Ethernet, by contrast, is closer to the notion of individual telephone lines: a switching hub examines the incoming MAC addresses of network packets and forwards them directly to their destinations without repetition, reducing bandwidth waste and resulting in more predictable network performance. Each node receives its own full-speed pipeline -- bandwidth isn't divided up. Switched Ethernet can improve data transfer speeds and overall efficiency for 10BaseT networks, 100Mbps networks, or both.

The Advantages of Switching

The two main advantages of using a switch like the 10/100 Dual-Speed Switch are migration and performance boosts.

100BaseTX and 10BaseT networks are not automatically compatible with each other. Because of their different speeds, their hardware is not readily interchangable – a 10BaseT network adapter, for example, cannot be connected directly to a 100BaseTX network segment. By using a switch, 10BaseT and 100BaseTX hardware can be made to communicate with each other so you don't need to discard your slower 10Mbps network hardware as you migrate to Fast Ethernet.

As for performance, switching technology boosts any network's efficiency right away. A network without a switch is called a shared network, which means that the network's total bandwidth is equal to its speed divided by the number of users who are actively using the net. A switched network, by contrast, gives each user a full-speed pipeline that isn't shared by any other users, which causes an immediate speed and/or efficiency increase of up to 80%.

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Here are some scenarios in which a switch can be applied:

· Speeding up a 10BaseT Network

On a 10BaseT network, you might connect users to one of the switch's 10/100 ports and the file server to the other, allowing the server to service more users faster because it enjoys its own switched pipeline into the network.

· Mixing 10BaseT with 100BaseTX

10BaseT and 100BaseTX hardware not readily compatible with each other. With a switch you can create 10Mbps network segments for servicing users that don't need tremendous speed, and 100Mbps segments for users who depend on graphics, video, multimedia, database, or other speedy applications.

· Adding 10Mbps Network Peripherals

In addition, since 100BaseTX is a relatively new standard, there aren't as many network peripherals available for it as there are for 10BaseT. Most network modems, print servers, sniffers, and other network peripherals are made to operate at a speed of 10Mbps, making them incompatible with 100Mbps networks unless you have a switch. A switch can add 10Mbps hardware to your network wherever you want it.

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Planning Your Network

The rules that govern how switches are distributed in Fast Ethernet are slightly different from 10BaseT networking rules. Cabling specifications, distance limits, and other topology rules must be followed in order to avoid network collisions and data loss. Here are the most important rules to follow:

· 100BaseTX requires four-pair, Category 5 UTP (EIA 568, Cat 5)cabling.

· The maximum cable length from a node to a repeater, switch, or hub is **100 meters** (328 feet).

· The maximum length for a Category 5 100BaseTX cable between a workstation and a stackable or other shared bandwidth hub is **100 meters** (328 feet).

· A single or stacked 100Mbps hub is counted as one repeater in Fast Ethernet rules; a 10/100 switch or 10BaseT hub is not counted as a repeater.

· You can install as many switches as you want on the same network, given you don't position the switches more than **100 meters** (328 feet) apart.

· The maximum distance between 2 100Mbps hubs without a switch connected in between is **5 meters** (16.4 feet).

The diagram below shows one possible configuration of a 12-Port Switch in a Fast Ethernet environment; if you have an 16 or 24-Port Switch, the configuration remains the same. Note that like all Fast Ethernet network hardware, the switch requires Category 5 UTP network cabling, which is available at most computer stores.

In this example, each workstation has access to all of the resources on the network -- 10Mbps users can access the 100Mbps stations, and vice-versa. While allowing the 10Mbps and 100Mbps segments to communicate, the switch helps optimize traffic by adding switching to the network, which can improve performance by up to 80% (even on the slower 10Mbps segment). Notice that the servers are both connected directly to the switch. This improves server access times for all users.

File Server

Web Server

DSSX12

10Mbps Segment

100Mbps Segment

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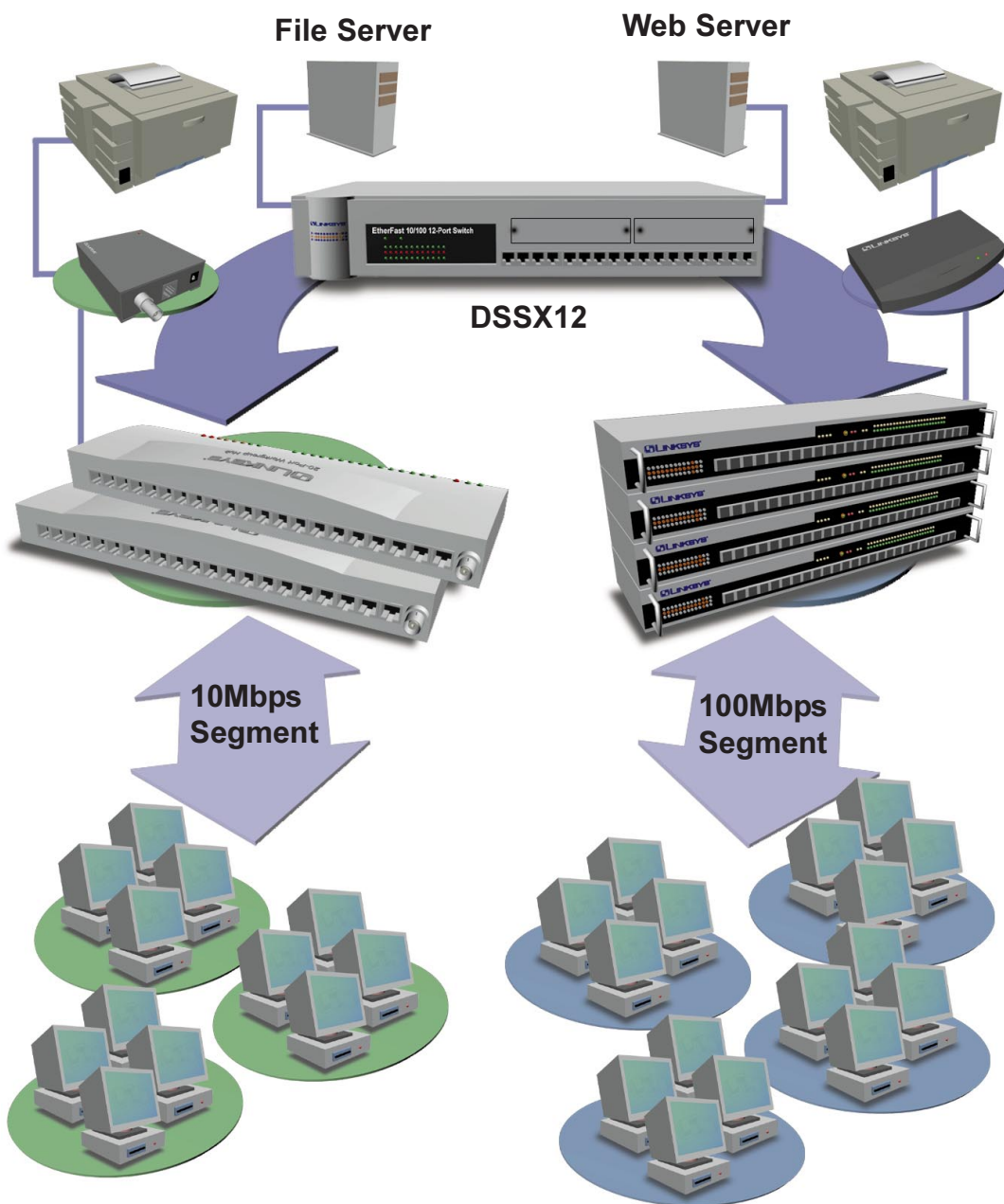
Installing the Switch

Package Contents

Carefully remove the switch from its packaging. Make sure that you received all of the items listed below. If any items are missing or damaged, contact your Linksys dealer for replacement part(s).

· EtherFast 10/100 Dual-Speed, Autosensing 12, 16 or 24-Port Switch
· Rack Mounting Hardware
· AC Power Cord
· User Guide and Registration Card

Rack Mounting Your Switch

Every 12-Port, 16-Port and 24-Port Switch is equipped with mounting holes that can be used to secure it in a stationary or movable rack. After screwing a mounting bracket into each side of the switch, lift the switch into your rack and secure the brackets in place with additional screws.

mounting
bracket
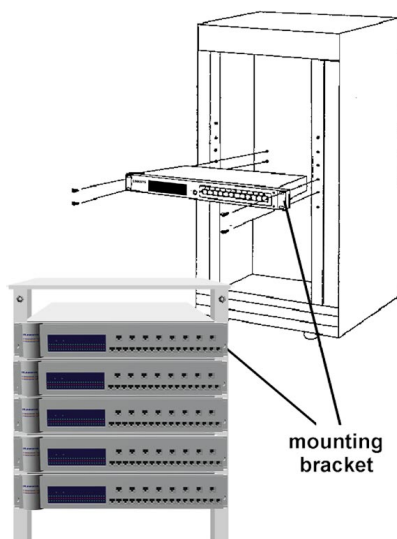
Connecting Nodes to the Switch

The front of the 12-Port Switch has twelve RJ-45 ports the 24-Port Switch has twenty-four. Each switch also has an uplink port (shared with the port 12 on the 12-Port model and port 16 on all other switches). Each port automatically detects the speed, type, and duplex of the cabling attached to it, and can operate in either half or full duplex, giving possible speeds of 200Mbps, 100Mbps, 20Mbps, or 10Mbps.

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Each switch can be connected to workstations, PCs, file servers, hubs, repeaters, bridges, or other switches. Each cable connected to the switch must be a Category 5 UTP network cable with RJ-45 tips, and should not exceed 100 meters (328 feet), in length. Ready-to use network cables of various lengths can be purchased at most computer stores. See page 15 for more details.

Connecting Workstations and PCs

Workstations and PCs should be connected to the switch with straight-through Category 5 network cabling. If connecting a computer directly to one of the switch's ports, connect one end of the cable into the switch, then plug the other end of the cable into the computer's 10Mbps or 100Mbps network adapter.

Uplinking- Connecting to Other Switches and Hubs

Each 10/100 Dual-Speed Switch has a shared **uplink port** -- which sits right next to port 12 or 16 on the switch (depending on the model you have) for connecting or "cascading" the switch to other devices. This uplink port is **shared**, meaning that when it is in use, the port next to it on the switch cn no longer be used. Since the uplink port crosses the polarity of your cabling for you, there is no need to use any special cables. A regular, straight-through Cat 5 RJ-45 Fast Ethernet cable will do. Connect one end of the cable to the switch, then connect the other end to any standard RJ-45 port on your hub or other device.

Powering On the Switch

Plug in the switch's AC power cord. When the switch is first powered up, it will put itself into a Diagnostic/Self-check mode, which should only take a few moments, and the Power LED will light up. As your network cables are connected to the switch, each port's corresponding Link/Activity, Speed (10 or 100) and Full Duplex LEDs will light up. When data is transmitted or received, the Link/Activity (LK/ACT) LEDs will or flicker. Finally, the Full Duplex/Collision (FDX/COL) LED will flicker or change color as data collisions on the network are detected and corrected.

If the switch experiences excessive data collisions, verify that your network cabling is securely crimped and installed correctly.

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Appendix

LED Displays

Power	ON when unit is powered on
Link/Activity (LK/ACT)	ON when a link has been established, flickering when activity on the port is detected
Full Duplex/Collision (FDX/COL)	ON when port is operating at full duplex, changing color or flickering when collision is detected
100/10	ON when port is running at 100Mbps

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Expanding Your 10/100 Dual-Speed Switches

The EtherFast 12, 16 and 24-Port Switches are equipped with an expansion slot in the back of the switch into which expansion modules with different features can be inserted.

The 100BaseFX Fiber Optic Distance Extender Module allows you to connect your EtherFast 10/100 Dual-Speed Switch to other switches, hubs, routers, or high-speed network backbones using fiber optic cabling. The 100BaseFX Fiber modules have either an ST or SC-Type connector for use with high-bandwidth multi-mode fiber optic cabling. Fiber cable is capable of carrying data up to **2000 meters** (about 6560 feet) without requiring any signal boosting. The modules, model numbers: **DSSXFXST** (ST-Type) and **DSSXFXSC** (SC-Type) are available through your Linksys dealer.

If you are installing a Fiber Optic Distance Extender module of any kind, make sure that you consult the special section on Fiber Optics in the Appendix before connecting any cabling.

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Installing the Fiber Expansion Modules

To install an expansion module on the back of the EtherFast 10/100 Dual-Speed Switches, follow these instructions:

1. Power off your Switch and remove the AC power cord before beginning. If the switch is installed in a rack, it is recommended to remove the switch from the rack temporarily and reinstall it after the add-on module is installed.

2. Remove the metal faceplate from the back of your Switch by loosening the screws on either side (use the knobs, a screwdriver is not required).

3. Remove the expansion module from its package.

3. Carefully insert the expansion module and gently slide it into the switch.

4. The fiber module should fit snugly into the slot inside the switch.

5. Tighten the screws on the expansion module to secure it in place. You may now reinstall the switch into its rack (if required), reconnect the AC power cord and power on the switch to resume normal operation.

If you are installing a Fiber Optic Distance Extender module of any kind, make sure that you consult the special section on Fiber Optics included in the Appendix before connecting any cabling.

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Fiber Optic Modules

There are different 100BaseTX fiber add on modules available switches:

Modules with ST or SC-Type Fiber Optic Distance Extender Ports (can used on the back of all the switches):

DSSXFXST   ST-Type Single-Port Fiber Module
DSSXFXSC   SC-Type Single-Port Fiber Module

The following chart shows the distance limitations when using any of the above fiber modules:

Distance (m/ft)	Cable Type	Module in Switch A	Module in Switch B
412/1330 (Half Duplex)	Multi-Mode 62.5/125uM Fiber Optic Cable	Any ST or SC-Type 100BaseFX Fiber Optic Distance Extender	Any ST or SC-Type 100BaseFX Fiber Optic Distance Extender
2000/6560 (Full Duplex)	Multi-Mode 62.5/125uM Fiber Optic Cable	Any ST or SC-Type 100BaseFX Fiber Optic Distance Extender	Any ST or SC-Type 100BaseFX Fiber Optic Distance Extender

When using fiber, **noise loss** must be accounted for. Noise loss means the integrity of your data transfer over fiber optic lines, which occurs in fiber connections, e.g. where the fiber is converted to copper lines in the switch, or where the fiber cabling is not properly crimped on its connector tips. For example, if your fiber cabling has ST connectors and you have an SC-type fiber module, an SC to ST converter must be used. Otherwise, you can also replace the ST connector with an SC connector.

If you have never worked with fiber cabling before, consult a networking professional who is familiar with fiber cabling.

> **NOTE:** Changing connectors must be done professionally, and proper tools must be used. If you have never worked with fiber cabling, consult the help of a professional who is familiar with fiber.

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Specifications

|	
Standards	IEEE 802.3 and IEEE 802.3u
Protocol	CSMA/CD
Ports	12, 16 or 24 10BaseT/100BaseTX Dual-Speed Autosensing RJ-45 Ports, One Shared Uplink Port
Speed per Port	10Mbps or 100Mbps (Half Duplex) 20Mbps or 200Mbps (Full Duplex)
Duplex Modes	Half or Full Duplex, per port
MAC Addresses	Unicast Entries: 16,384 Addresses Multicast Broadcast Addresses: Unlimited Addresses
Max Frame Size	1536 Bytes
Buffer Memory	64K Per Port
Cabling Type	10BaseT/100BaseTX Category 5 UTP or Better
LED Indicators	Power, Full Duplex/Collision per port, Link/Activity per port, 100/10 per port
Dimensions	17.3" x 9.8" x 2.6"
Weight	6.6 to 7.7 lbs.
AC Power	90-250V AC, 50-60Hz
Power Consumption	35-40 Watts
Certifcations	FCC Class A, CE Mark Commercial

Twisted-Pair Wiring

There are different grades, or categories, of twisted-pair cabling. Category 5 is the most reliable and widely compatible, and is required for Fast Ethernet networks.

You can buy Category 5 cabling that is pre-crimped, or you can crimp your own. Category 5 cables can be purchased or crimped as either straight-through or crossed. A Category 5 cable has 8 thin, color-coded wires inside that run from one end of the cable to the other. Only wires 1, 2, 3, and 6 are used by Ethernet networks. In a straight-through cable, wires 1, 2, 3, and 6 at one end of the cable are also wires 1, 2, 3, and 6 at the other end. In a crossed cable, the order of the wires change from one end to the other: wire 1 be-comes 3, and 2 becomes 6 and vice versa.

straight-through cable		crossed cable	
Wire	**Becomes**	**Wire**	**Becomes**
1	1	1	3
2	2	2	6
3	3	3	1
6	6	6	2

The color code for the 4 wires should be as follows: **Wire 1**, white with an orange stripe; **Wire 2**, orange; **Wire 3**, white with a green stripe; **Wire 6**, green. The other four wires have to be connected as follows: **Wire 4**, blue; **Wire 5**, white with a blue stripe; **Wire7**, white with a brown stripe, **Wire 8**, brown.

spring clip on bottom

Pin 1
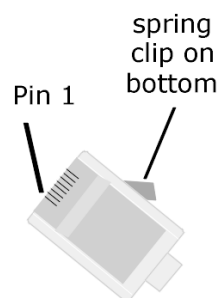
To figure out which wire is wire number 1, hold the cable so that the end of the plastic RJ-45 tip (the part that goes into a wall jack first) is facing away from you. Flip the clip so that the copper side faces up (the springy clip will now be parallel to the floor).When looking down on the coppers, wire 1 will be on the far left.

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Customer Support

For help with the installation or operation of your EtherFast 10/100 12-Port, 16-Port or 24-Port Dual-Speed Switch, contact Linksys Customer Support at one of the phone numbers or Internet addresses below.

Customer Support	(800) 326-7114
	(949) 261-1288
Fax	(949) 261-8868
Email	support@linksys.com
Website	http://www.linksys.com
FTP Site	ftp.linksys.com

Notes

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