SECTION 1

Introduction

Ethernet 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 are proposed to provide greater bandwidth and improve client/server response times. Among them, Fast Ethernet, or 100BASE-T, provides a non-disruptive, smooth evolution from 10BASE-T technology.

100Mbps Fast Ethernet is a standard specified by the IEEE 802.3 LAN committee. It is an extension of the 10Mbps Ethernet standard with the ability to transmit and receive data at 100Mbps, while maintaining the Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Ethernet protocol.

Gigabit Ethernet Technology

Gigabit Ethernet is an extension of IEEE 802.3 Ethernet utilizing the same packet structure, format, and support for CSMA/CD protocol, full duplex, flow control, and management objects, but with a tenfold increase in theoretical throughput over 100Mbps Fast Ethernet and a one hundred-fold increase over 10Mbps Ethernet. Since it is compatible with all 10Mbps and 100Mbps Ethernet environments, Gigabit Ethernet provides a straightforward upgrade without wasting a company's existing investment in hardware, software, and trained personnel.

The increased speed and extra bandwidth offered by Gigabit Ethernet are essential to coping with the network bottlenecks that frequently develop as computers and their busses get faster and more users use applications that generate more traffic. Upgrading key components, such as your backbone and servers to Gigabit Ethernet can greatly improve network response times as well as significantly speed up the traffic between your subnetworks.

Gigabit Ethernet enables fast optical fiber connections to support video conferencing, complex imaging, and similar data-intensive applications. Likewise, since data transfers occur 10 times faster than Fast Ethernet, servers outfitted with Gigabit Ethernet NIC's are able to perform 10 times the number of operations in the same amount of time.

In addition, the phenomenal bandwidth delivered by Gigabit Ethernet is the most cost-effective method to take advantage of today and tomorrow's rapidly improving switching and routing internetworking technologies.

D-Link's Green Technology

D-Link's Green Technology implements special power-saving features under speed at 1000Mbps that detect cable length and link status and adjust power usage accordingly.

Further, D-Link Green implement the newly ratified IEEE 802.3az Energy Efficient Ethernet standard for reducing energy consumption of network links during periods of low utilization by transitioning interfaces into low-power state without interrupting the network connection.

- IEEE 802.3az Energy-Efficient Ethernet (EEE):

  It is the first standard in the history of Ethernet to address proactive reduction in energy consumption for networked devices. The IEEE 802.3 EEE standard defines mechanisms and protocols intended to reduce the energy consumption of network links during periods of low utilization, by transitioning interfaces into a low-power state without interrupting the network connection.

- Power Saving Technology:
  - Power saving by link status.

    If there is no link on a port, such as when there is no computer connected to the port or the connected computer is powered off, D-Link's Green Technology will enter a "sleep mode", drastically reducing power used for that port.
  - Power saving by cable length: 0~20m, 21~50m, 51~100m.

    D-Link's Green Technology detects the length of connected Ethernet cable and adjusts power usage accordingly without affecting performance. This way, a port connected to a less than 20m cable only uses as much power as it needs, instead of using full power, which is only needed for 100m cables.

Switching Technology

Another key development pushing the limits of Ethernet technology is in the field of switching technology. A switch bridges Ethernet packets at the MAC address level of the Ethernet protocol transmitting among connected Ethernet or fast Ethernet LAN segments.

Switching is a cost-effective way of increasing the total network capacity available to users on a local area network. A switch increases capacity and decreases network loading by making it possible for a local area network to be divided into different *segments* that do not compete with each other for network transmission capacity, decreasing the load on each segment.

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

For Fast Ethernet or Gigabit 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, for example, 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.

Switch Description

The GoSwitch5G/GoSwitch8G Switch is equipped with five ports providing dedicated 10, 100, or 1000 Mbps bandwidth. These ports can be used for connecting PCs, printers, servers, routers, Switches, hubs, and other network devices. The five multi-speed ports use standard twisted pair cabling and are ideal for segmenting networks into small, connected subnets. Each port can support up to 2000 Mbps of throughput in full-duplex mode. This stand-alone Switch enables the network to use some of the most demanding multimedia and imaging applications concurrently with other user applications without creating bottlenecks.

Features

The GoSwitch5G/GoSwitch8G 5/8-Port 10/100/1000BASE-T Gigabit Ethernet Switch was designed for easy installation and high performance in an environment where traffic on the network and the number of users increase continuously.

- 5/8 10/100/1000BASE-T Gigabit Ethernet ports
- D-Link's Green Technology
  · IEEE 802.3az Energy-Efficient Ethernet (EEE)
  · Power Saving Technology:
    · Power saving by link status.
    · Power saving by cable length
- Supports Auto-Negotiation for 10/100/1000Mbps and duplex mode
- Supports Auto-MDI/MDIX for each port
- Supports Full/Half duplex transfer mode for 10 and 100Mbps
- Supports Full-duplex transfer mode for 1000Mbps
- Full wire speed reception and transmission

- Store-and-Forward switching method
- Supports 2K(GoSwitch5G)/ 8K(GoSwitch8G) absolute MAC addresses
- Supports 128KBytes RAM for data buffering
- IEEE 802.3x flow control for full duplex
- Back pressure flow control for half duplex
- Jumbo Frame Support at 1000Mbps (9216Bytes)

Front-Panel Components

The top case of the Switch consists of LED indicators, 5/8 (10/100/1000 Mbps) Ethernet ports.

Figure 1-1. Front Panel View of the Switch

Comprehensive LED indicators display the status of the Switch and the network.

LED Indicators

The LED indicators of the Switch include Power, Link/Act and Speed. The following shows the LED indicators for the Switch along with an explanation of each indicator.

Figure 1-2. LED Indicators

Comprehensive LED indicators display the conditions of the Switch and status of the network. A description of these LED indicators follows (see LED Indicators). The LED indicators of the Switch include Power and Link/Act , as described below.

For GoSwitch5G:

- **Power Indicator**

  This green indicator light is on when the Switch is receiving power; otherwise, it is off.

- **Link/Act**

  This LED indicator light is green when the port is connected to a device.The green indicator blinks as data is transmitted or received.

For GoSwitch8G:

- **Power Indicator**

  This green indicator light is on when the Switch is receiving power; otherwise, it is off.

- **Link/Act**

  This LED indicator light is green when the port is connected to a device.The green indicator blinks as data is transmitted or received.

Rear Panel Description

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.

Figure 1-3. Rear panel view of the Switch

10/100/1000BASE-T Ports:

Five and eight (5/8) Gigabit Ethernet, Auto-Negotiating ports (10/100/1000Mbps)

Comprehensive LED indicators display the conditions of the Switch and status of the network.

SECTION 2

Installation

Package Contents

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

- One GoSwitch5G/GoSwitch8G 5/8-Port 10/100/1000BASE-T Gigabit Ethernet Switch
- One external power adapter
- Quide installation guide and warranty guide

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

Before You Connect to the Network

The site where you install the Switch may greatly affect its performance. Please follow these guidelines for setting up the Switch.

- Install the Switch on a sturdy, level surface that can support at least 3 kg (6.6 lbs.) of weight. Do not place heavy objects on the Switch.
- The power outlet should be within 1.82 meters (6 feet) of the Switch.
- Visually inspect the power cord and see that it is fully secured to the AC power port.
- Make sure that there is adequate space for proper heat dissipation from and adequate ventilation around the Switch. Leave at least 10 cm (4 inches) of space at the front and rear of the Switch for ventilation.
- Install the Switch in a fairly cool and dry place 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.
- When installing the Switch on a level surface, attach the rubber feet to the bottom of the device. The rubber feet cushion the Switch, protect the casing from scratches, and prevent it from scratching other surfaces.

Power On

Plug one end of the AC to DC power adapter into the power connector of the Switch and the other end into the local power source outlet.

After the Switch is powered on, the LED indicators will momentarily blink. This blinking of the LED indicators represents a reset of the system.

Power Failure

As a precaution, in the event of a power failure, unplug the Switch. When power is resumed, plug the Switch back in.

Section 3

Connecting The Switch

Switch To End Node
Switch To Hub or Switch
Connecting To a Server

NOTE: All 5/8 high-performance NWay Ethernet ports can support both MDI-II and MDI-X connections.

Switch To End Node

End nodes include PCs outfitted with a 10, 100, or 1000 Mbps RJ-45 Ethernet/Fast Ethernet Network Interface Card (NIC) and most routers.

An end node can be connected to the Switch via a twisted-pair Category 3, 4, 5, or 5e UTP/STP cable. The end node can be connected to any of the ports of the Switch.

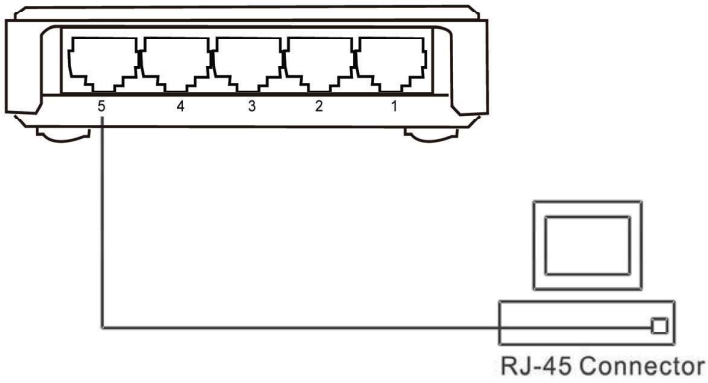

Figure 3-1. Switch connected to an end node

Switch to Hub or Switch

These connections can be accomplished in a number of ways using a standard Ethernet cable.

- A 10BASE-T hub or switch can be connected to the Switch via a twisted-pair Category 3, 4, 5, or 5e UTP/STP cable.
- A 100BASE-T hub or switch can be connected to the Switch via a twisted -pair Category 5 or better UTP/STP cable.
- A 1000BASE-T switch can be connected to the Switch via a twisted -pair Category 5 or better UTP/STP cable.

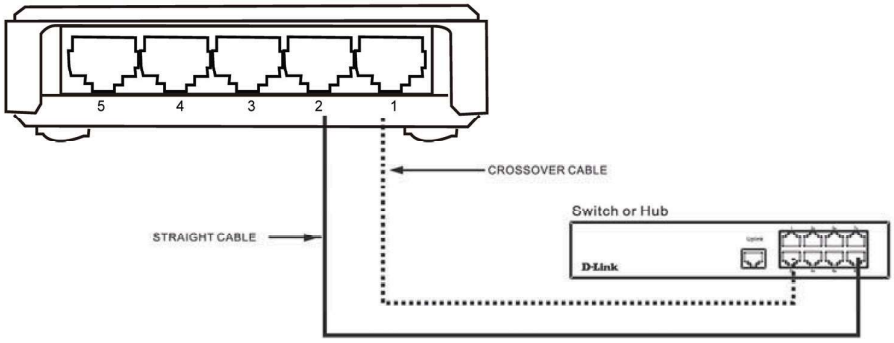

Figure 3-2. Switch connected to a port on a hub or switch using either a straight or crossover cable–any standard Ethernet cable is fine

Connecting To Network Backbone or Server

Any of the five Gigabit Ethernet ports are ideal for uplinking to a network backbone or network server.

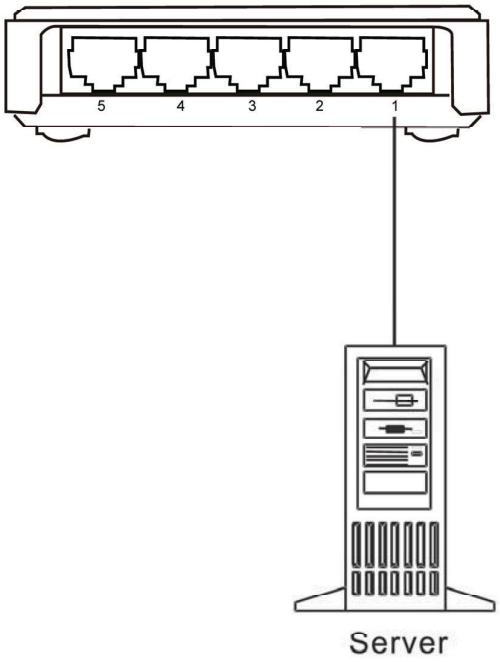

Figure 3-3. Connection to a Server

Appendix A

Technical Specifications

General			
Standards:	IEEE 802.3ab 1000BASE-T IEEE 802.3u 100BASE-TX IEEE 802.3 10BASE-T IEEE 802.3x Flow Control IEEE 802.3az Energy-Efficient Ethernet (EEE)		
Protocol:	CSMA/CD		
Data Transfer Rate:	Ethernet:	10Mbps	(Half-duplex)
		20Mbps	(Full-duplex)
	Fast Ethernet:	100Mbps	(Half-duplex)
		200Mbps	(Full-duplex)
	Gigabit Ethernet:	2000Mbps	(Full-duplex)
Topology:	Star		
Network Cables:	Ethernet:	2-pair UTP Cat. 3,4,5, Unshield Twisted Pair (UTP) Cable	
	Fast Ethernet:	2-pair UTP Cat. 5, Unshield Twisted Pair (UTP) Cable	
	Gigabit Ethernet:	4-pair UTP Cat. 5, Unshield Twisted Pair (UTP) Cable	
Number of Ports:	Five/Eight 10/100/1000BASE-T Gigabit Ethernet ports		

Physical and Environmental	
DC Inputs:	AC-DC 5V/1A
Operating Temperature:	0 °C ~ 40℃(32°F ~ 104F °)
Storage Temperature:	-10°C ~ 70°C (14°F ~ 158°F)
Humidity:	5% ~ 95% RH, non-condensing
Dimensions:	GoSwitch5G :97 x 79 x 25 mm GoSwitch8G: 128 x 68.5 x 25.4 mm
EMI	CE Class B
Safety:	LVD

Performance	
Transmission Method:	Store-and-forward
RAM Buffer:	128KBytes per device
Filtering Address Table:	2K(GoSwitch5G) / 8K(GoSwitch8G) MAC address per device
Packet Filtering/ Forwarding Rate:	Full wire speed
MAC Address Learning:	Self-learning, auto-aging

Glossary

1000BASE-SX – A short laser wavelength on multimode fiber optic cable for a maximum length of 550 meters.

1000BASE-LX – A long wavelength for a "long haul" fiber optic cable for a maximum length of 10 kilometers.

100BASE-FX – 100Mbps Ethernet implementation over fiber.

100BASE-TX – 100Mbps Ethernet implementation over Category 5 and Type 1 Twisted Pair cabling.

10BASE-T – The IEEE 802.3 specification for Ethernet over Unshielded Twisted Pair (UTP) cabling.

aging – The automatic removal of dynamic entries from the Switch Database which have timed-out and are no longer valid.

ATM – Asynchronous Transfer Mode. A connection oriented transmission protocol based on fixed length cells (packets). ATM is designed to carry a complete range of user traffic, including voice, data, and video signals.

auto-negotiation – A feature on a port, which allows it to advertise its capabilities for speed, duplex, and flow control. When connected to an end station that also supports auto-negotiation, the link can self-detect its optimum operating setup.

backbone port – A port that does not learn device addresses, and that receives all frames with an unknown address. Backbone ports are normally used to connect the Switch to the backbone of your network. Note that backbone ports were formerly known as designated downlink ports.

backbone – The part of a network used as the primary path for transporting traffic between network segments.

Bandwidth – Information capacity, measured in bits per second, that a channel can transmit. The bandwidth of Ethernet is 10Mbps, the bandwidth of Fast Ethernet is 100Mbps.

baud rate – The switching speed of a line. Also known as *line speed*.

BOOTP – The BOOTP protocol allows you to automatically map an IP address to a given MAC address each time a device is started. In addition, the protocol can assign the subnet mask and default gateway to a device.

bridge – A device that interconnects local or remote networks no matter what higher level protocols are involved. Bridges form a single logical network, centralizing network administration.

broadcast – A message sent to all destination devices on the network.

broadcast storm – Multiple simultaneous broadcasts that typically absorb available network bandwidth and can cause network failure.

console port – The port on the Switch accepting a terminal or modem connector. It changes the parallel arrangement of data within computers to the serial form used on data transmission links. This port is most often used for dedicated local management.

CSMA/CD – Channel access method used by Ethernet and IEEE 802.3 standards, in which devices transmit only after finding the data channel clear for some period of time. When two devices transmit simultaneously, a collision occurs and the colliding devices delay their retransmissions for a random amount of time.

data center switching – The point of aggregation within a corporate network where a switch provides high-performance access to server farms, a high-speed backbone connection, and a control point for network management and security.

Ethernet – A LAN specification developed jointly by Xerox, Intel, and Digital Equipment Corporation. Ethernet networks operate at 10Mbps using CSMA/CD to run over cabling.

Fast Ethernet – 100Mbps technology based on the Ethernet/CD network access method.

Flow Control – (IEEE 802.3x) A means of holding packets back at the transmit port of the connected end station. Prevents packet loss at a congested switch port.

forwarding – The process of sending a packet toward its destination by an internetworking device.

full duplex – A system that allows packets to be transmitted and received at the same time and, in effect, doubles the potential throughput of a link.

half duplex – A system that allows packets to be transmitted and received, but not at the same time. Contrast with *full duplex*.

IP address – Internet Protocol address. A unique identifier for a device attached to a network using TCP/IP. The address is written as four octets separated with full-stops (periods), and is made up of a network section, an optional subnet section and a host section.

IPX – Internetwork Packet Exchange. A protocol allowing communication in a NetWare network.

LAN – Local Area Network. A network of connected computing resources (such as PCs, printers, servers) covering a relatively small geographic area (usually not larger than a floor or building). Characterized by high data rates and low error rates.

latency – The delay between the time a device receives a packet and the time the packet is forwarded out of the destination port.

line speed – See *baud rate*.

main port – The port in a resilient link that carries data traffic in normal operating conditions.

MDI – Medium Dependent Interface. An Ethernet port connection where the transmitter of one device is connected to the receiver of another device.

MDIX – Medium Dependent Interface Cross-over. An Ethernet port connection where the internal transmit and receive lines are crossed.

MIB – Management Information Base. Stores a device's management characteristics and parameters. MIBs are used by the Simple Network Management Protocol (SNMP) to contain attributes of their managed systems. The Switch contains its own internal MIB.

multicast – Single packets copied to a specific subset of network addresses. These addresses are specified in the destination-address field of the packet.

protocol – A set of rules for communication between devices on a network. The rules dictate format, timing, sequencing, and error control.

resilient link – A pair of ports that can be configured so that one will take over data transmission should the other fail. See also *main port* and *standby port*.

RJ-45 – Standard 8-wire connectors for IEEE 802.3 10BASE-T networks.

RMON – Remote Monitoring. Subset of SNMP MIB II, which allows monitoring and management capabilities by addressing up to ten different groups of information.

RPS – Redundant Power System. A device that provides a backup source of power when connected to the Switch.

server farm – A cluster of servers in a centralized location serving a large user population.

SLIP – Serial Line Internet Protocol. A protocol that allows IP to run over a serial line connection.

SNMP – Simple Network Management Protocol. A protocol originally designed to be used in managing TCP/IP internets. SNMP is presently implemented on a wide range of computers and networking equipment and may be used to manage many aspects of network and end station operation.

Spanning Tree Protocol – (STP) A bridge-based system for providing fault tolerance on networks. STP works by allowing you to implement parallel paths for network traffic, and to ensure that redundant paths are disabled when the main paths are operational and enabled if the main paths fail.

stack – A group of network devices that are integrated to form a single logical device.

standby port – The port in a resilient link that will take over data transmission if the main port in the link fails.

switch – A device that filters, forwards, and floods packets based on the packet's destination address. The Switch learns the addresses associated with each switch port and builds tables based on this information to be used for the switching decision.

TCP/IP – A layered set of communications protocols providing Telnet terminal emulation, FTP file transfer, and other services for communication among a wide range of computer equipment.

Telnet – A TCP/IP application protocol that provides virtual terminal service, letting a user log in to another computer system and access a host as if the user were connected directly to the host.

TFTP – Trivial File Transfer Protocol. Allows you to transfer files (such as software upgrades) from a remote device using your switch's local management capabilities.

UDP – User Datagram Protocol. An Internet standard protocol that allows an application program on one device to send a datagram to an application program on another device.

VLAN – Virtual LAN. A group of location- and topology-independent devices that communicate as if they are on a common physical LAN.

VLT – Virtual LAN Trunk. A Switch-to-Switch link which carries traffic for all the VLANs on each Switch.

VT100 – A type of terminal which uses ASCII characters. VT100 screens have a text-based appearance.