

# *Dimension*

## *ES-1016A/ES-1024A* *Unmanaged 16/24-Port Ethernet Switch*

### *User's Guide*

Version 1.0

April 2004



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- Warranty information.
- Date you received your product.
- Brief description of the problem and the steps you took to solve it.

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<sup>1</sup> “+” is the (prefix) number you enter to make an international telephone call.

Dimension ES-1016A/ES-1024A Ethernet Switch

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# Preface

Congratulations on your purchase of the Dimension ES-1016A/ES-1024A Ethernet Switch.

## **About the Dimension ES-1016A/ES-1024A Ethernet Switches**

The Dimension ES-1016A/ES-1024A switch is a cost effective Fast Ethernet switch ideal for setting up a small workgroup or for bridging two separate networks.

The ES-1016A comes with 16 10/100M ports and the ES-1024A with 24 10/100M ports.

## **General Syntax Conventions**

For brevity's sake, we will use "e.g." as shorthand for "for instance", and "i.e." as shorthand for "that is" or "in other words" throughout this manual.

The Dimension ES-1016A/ES-1024A Ethernet Switch will be referred to as "the ES" or, simply, as "the switch" in this manual.

Unless specified, images of the ES-1024A are used throughout this document. The ES-1016A has 16 available Ethernet ports however the images used in this User's Guide show the 24 available ports that are featured on the ES-1024A. Images that directly relate to the ES-1016A are used when referring to the key differences between the two models.

## **Related Documentation**

### **ZyXEL Web Site**

The ZyXEL download library at [www.zyxel.com](http://www.zyxel.com) contains additional support documentation and an online glossary of networking terms.

## **User Guide Feedback**

Help us help you! E-mail all User Guide-related comments, questions or suggestions for improvement to [techwriters@zyxel.com.tw](mailto:techwriters@zyxel.com.tw) or send regular mail to The Technical Writing Team, ZyXEL Communications Corp., 6 Innovation Road II, Science-Based Industrial Park, Hsinchu, 300, Taiwan. Thank you!



# Chapter 1

## Getting to Know Your Switch

*This chapter describes the key features, benefits and applications of your switch.*

### 1.1 Introduction

The switch is a multi-port switch that can be used to build high-performance switched workgroup networks. The switch is a store-and-forward device that offers low latency for high-speed networking. The switch is designed for workgroups, departments or backbone computing environments for SME (small, medium enterprise) businesses.



**Figure 1-1 ES-1016A**



**Figure 1-2 ES-1024A**

### 1.2 Features

The following are the essential features of the switch.

- Conforms to IEEE 802.3, 802.3u, and 802.3x standards.
- Auto-negotiating 10/100Mbps Ethernet RJ-45 ports.
- Auto-negotiating crossover for all 10/100Mbps Ethernet RJ-45 ports.

- IEEE 802.1p supports two priority queues for outgoing traffic.
- Back-Pressure-Base flow control on Half-duplex ports.
- Pause-Frame-Base flow control on Full-duplex ports.
- Store-and-forwarding switching architecture for abnormal packet filtering.
- Supports automatic address learning.
- No-Blocking full wire speed architecture.
- Fan free design.
- Embedded 4K MAC address table providing 4000 MAC addresses entries.
- Power, LNK/ACT and FDX/COL LEDs.
- Standard 19-inch rack-mount design.

### **1.2.1 IEEE 802.1p Class of Service**

The IEEE 802.1p Class of Service (CoS) provides two queues for high and low priority traffic. This improves network efficiency and performance by giving higher priority to outgoing traffic. For example, the lower queue has a priority value in the range of zero to three and the higher queue has a priority value in the range four to seven.

## **1.3 Package Contents**

Compare the contents of your ES package with the checklist below. If any item is missing or damaged, please contact your local dealer.

- ES-1016A/ES-1024A Ethernet switch
- Power cord
- Quickstart Guide
- This User's Guide in CD-ROM format.
- Four rubber feet
- Rack mount brackets

## **1.4 Ethernet Switching Technology**

Ethernet Switching Technology has dramatically boosted the total bandwidth of a network, eliminated congestion problems inherent with CSMA/CD (Carrier Sense multiple access with Collision Detection) protocol, and greatly reduced unnecessary transmissions.

This revolutionized networking in a number of ways:

By allowing two-way, simultaneous transmissions over the same port (Full-duplex), which essentially doubled the bandwidth.

Reducing the collision domain to a single switch-port, which eliminated the need for carrier sensing.

Using the store-and-forward technology's approach of inspecting each packet to intercept corrupt or redundant data, switching eliminated unnecessary transmission that slowed the network.

By employing address learning, which replaced the inefficient receiving port.

Auto-negotiation regulates the speed and duplex of each port, based on the capability of both devices. Flow-control allows transmission from a 100Mbps node to a 10Mbps node without loss of data. Auto-negotiation and flow-control may require disablement for some networking operations involving legacy equipment. Disabling the auto-negotiation is accomplished by fixing the speed or duplex of a port.

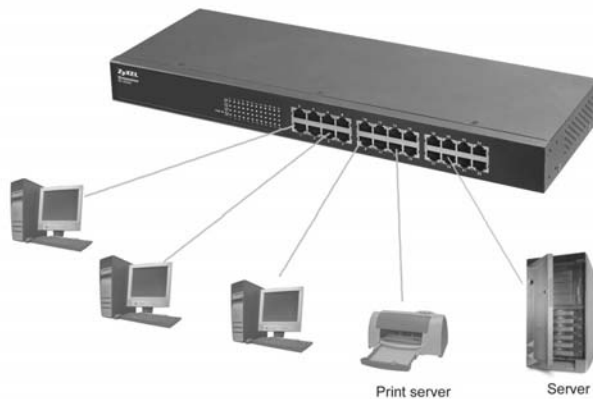
Ethernet Switching Technology supplied higher performance at costs lower than other solutions. Wider bandwidth, no congestion, and the reduction in traffic is why switching is replacing expensive routers and inefficient hubs as the ultimate networking solution.

## 1.5 Applications

This section provides two network topology examples in which the switch is used.

### 1.5.1 Standalone Workgroup

The switch can be used as a standalone switch to which computers, servers and printer server are directly connected to form a small workgroup.

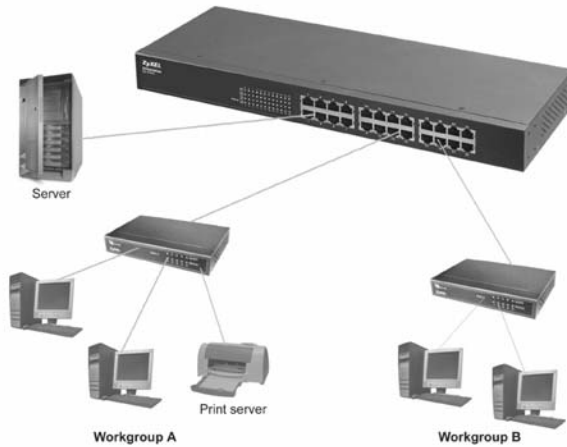


**Figure 1-3 Standalone Workgroup Example**

### 1.5.2 Bridging

With its large address table (4000 MAC address entries) and high performance, the switch is an ideal solution for department networks to connect to the corporate backbone or for connecting network segments.

The following figure depicts a typical segment bridge application of the switch in an enterprise environment. The two workgroups, the standalone server and the two servers can all communicate with each other and share all network resources.



**Figure 1-4 Bridging Example**

## Chapter 2

# Hardware Description and Installation

*This chapter describes the hardware installation and gives a functional overview of the switch.*

### 2.1 Installation Option

The switch is suitable for an office environment where it can be rack mounted on standard EIA racks or as a standalone.

---

**For proper ventilation, allow at least 4 inches (10 cm) of clearance at the front and 3.4 inches (8 cm) at the back of the switch. This is especially important for enclosed rack installations.**

---

#### 2.1.1 Desktop Installation

- Step 1.** Make sure the switch is clean and dry.
- Step 2.** Set the switch on a smooth, leveled and sturdy flat space strong enough to support the weight of the switch and the connected cables. Make sure there is a power outlet nearby.
- Step 3.** Make sure there is enough clearance around the switch to allow air circulation and the attachment of cables and the power cord.
- Step 4.** Remove the adhesive backing from the supplied rubber feet.
- Step 5.** Attach the rubber feet to each corner on the bottom of the switch. These rubber feet help protect the switch from shock or vibration and ensure space between devices when stacking.



**Figure 2-1 Attaching Rubber Feet**

---

**Do not block the ventilation holes. Leave space between switches when stacking.**

---

### **2.1.2 Rack-Mount Installation**

The switch can be mounted on an EIA standard size, 19-inch rack or in a wiring closet with other equipment. Follow the steps below to mount your switch on a standard EIA rack using the included rack-mounting kit.

- Step 1.** Align one bracket with the holes on one side of the switch and secure it with the bracket screws smaller than the rack-mounting screws. Similarly, attach the other brackets.



**Figure 2-2 Attaching Mounting Brackets and Screws**

- Step 2.** After attaching both mounting brackets, position the switch in the rack by lining up the holes in the brackets with the appropriate holes on the rack. Secure the switch to the rack with the rack-mounting screws.





**Figure 2-3 Mounting the ES to an EIA standard 19-inch rack**

## 2.2 Rear Panel

The three-pronged power receptacle is located on the rear panel of the switch. Refer to the *Product Specifications* for power specification.



**Figure 2-4 Rear Panel**

### 2.2.1 Rear Panel Power Connection

Connect one end of the supplied power cord to the power receptacle on the back of the switch and the other end to the appropriate power source.

## 2.3 Front Panel

The front panel of the switch includes the auto-negotiating 10Base-T/100Base-TX RJ-45 ports and the LEDs.

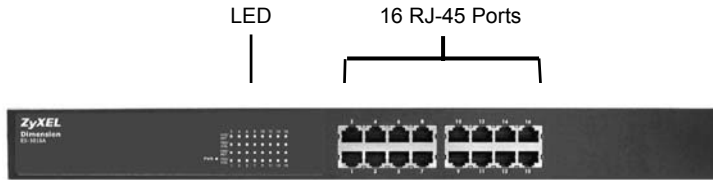


Figure 2-5 Front Panel: ES-1016A

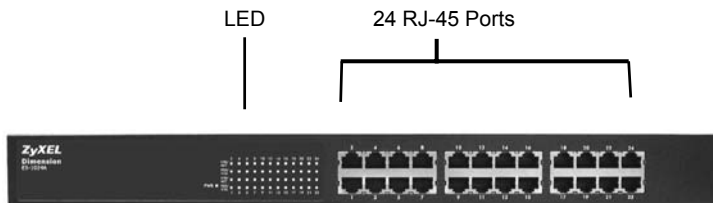


Figure 2-6 Front Panel: ES-1024A

### 2.3.1 10Base-T/100Base-TX RJ-45 auto-negotiating ports

Your switch comes with 16 or 24 10Base-T/100Base-TX RJ-45 ports depending on the model of your switch. The auto-negotiation feature allows the switch to detect the speed of incoming transmission and adjust appropriately without manual intervention. It allows data transfers of either 10 Mbps or 100 Mbps in either half-duplex or full-duplex mode depending on your Ethernet network.

### 2.3.2 Auto-crossover ports

Each 10Base-T/100Base-TX RJ-45 MDI/MDIX port allows you to connect to a computer or to a hub using either a straight-through or a crossover Ethernet cable.

### 2.3.3 Front Panel Connections

You can use unshielded twisted pair (UTP) or shielded twisted-pair (STP) Ethernet cables for RJ-45 ports. The following table describes the types of network cable used for the different connection speeds.

---

**Make sure the cable length between connections does not exceed 100 meters (328 feet).**

---

Table 2-1 Network Cable Types

SPEED	NETWORK CABLE TYPE
10 Base-T	100Ω 2-pair UTP/STP Category 3, 4 or 5
100 Base-TX	100Ω 2-pair UTP/STP Category 5

### 2.3.4 Front Panel LEDs

The LED Indicators give real-time information about the status of the switch. The following table provides descriptions of the LEDs.



Figure 2-7 Front Panel LEDs: ES-1016A

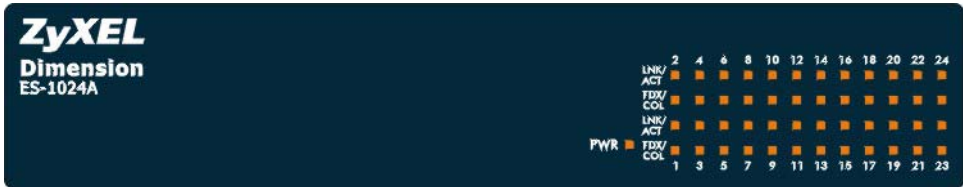


Figure 2-8 Front Panel LEDs: ES-1024A

Table 2-2 The Front Panel LED Descriptions

SYSTEM			
LED	COLOR	STATUS	DESCRIPTION
PWR	Green	On	The switch is on and receiving power.
		Off	The switch is not receiving power.
RJ-45 Ports			
LED	COLOR	STATUS	DESCRIPTION
LNK/ACT	Green	On	The port is connected to an Ethernet network.
		Blinking	The port is receiving or transmitting data.
		Off	The port is not connected to an Ethernet network.
FDX/COL	Amber	On	The port is operating in full-duplex mode.
		Blinking	Packet collision occurred on this port.
		Off	The port is operating in half-duplex mode.



# Chapter 3

## Troubleshooting

*This section describes common problems you may encounter with the switch and possible solutions.*

### 3.1 Introduction

Troubleshoot the switch using the LEDs to detect problems.

#### 3.1.1 PWR LED

The PWR LED on the front panel does not light up.

**Table 3-1 Troubleshooting Power LED**

STEPS	CORRECTIVE ACTION
1	Check the connections from your switch to the power source. Make sure you are using the supplied power cord and that you are using an appropriate power source. Refer to the <i>Product Specifications</i> section.
2	Make sure the power source is turned on and that the switch is receiving sufficient power.
3	If these steps fail to correct the problem, contact your local distributor for assistance.

#### 3.1.2 LNK/ACT LED

The LNK/ACT LED does not light up when a device is connected.

**Table 3-2 Troubleshooting LNK/ACT LED**

STEPS	CORRECTIVE ACTION
1	Verify that the attached device(s) is turned on and properly connected to your switch.
2	Make sure the Network Interface Cards (NICs) are working on the attached devices.
3	Verify that proper network cable type is used and its length does not exceed 100 meters. For more information on network cable types, see the <i>Front Panel Connections</i> section.

#### 3.1.3 FDX/COL LED

The FDX/COL LED blinks.

**Table 3-3 Troubleshooting FDX/COL LED**

STEP	CORRECTIVE ACTION
1	Some collisions in the network are normal. If the FDX/COL LED blinks continuously, proceed to the steps below.
2	Verify that proper network cable type is used and its length does not exceed 100 meters. For more information on network cable types, see the <i>Front Panel Connections</i> section.
3	Your network is busy. Try sending large files later, reduce the number of users or segment your network.

## 3.2 Improper Network Cabling and Topology

Improper network cabling or topology setup is a common cause of poor network performance or even network failure.

**Table 3-4 Troubleshooting Improper Network Cabling and Topology**

DESCRIPTION	PROBLEMS AND CORRECTIVE ACTION
Faulty cables	Using faulty network cables may affect data rates and have an impact on your network performance. Replace with new standard network cables.
Non-standard network cables	Non-standard cables may increase the number of network collisions and cause other network problems that affect your network performance. Refer to the <i>Front Panel Connections</i> section for more information on network cable types.
Cabling Length	If you use longer cables than are needed, transmission quality may be affected. The network cables should not be longer than the limit of 100 meters.
Too many hubs between the computers in the network	Too many hubs (or repeaters) between the connected computers in the network may increase the number of network collision or other network problems. Remove unnecessary hubs from the network.
A loop in the data path	A data path loop forms when there is more than one path or route between two networked computers. This results in broadcast storms that will severely affect your network performance. Make sure there are no loops in your network topology.

# Appendix A

## Product Specifications

*This section provides the specifications of the switch.*

### PRODUCT SPECIFICATIONS

General	
Standards	IEEE 802.3 10BASE-T Ethernet IEEE 802.3u 100BASE-TX Fast Ethernet IEEE802.3x Flow Control and Back-pressure IEEE802.1p Class of Service
Protocol	CSMA/CD
Interface	16 / 24 10/100M Ethernet Ports Auto-crossover Compliant with IEEE 802.3/3u Back pressure on half duplex Flow control on full duplex Connector: RJ-45
Data Transfer Rate	Ethernet: 14,880 pps per Ethernet port Fast Ethernet: 148,800 pps per Ethernet port
Network Cables	10BASE-T: 2-pair UTP/STP Cat. 3, 4, 5 cable EIA/TIA-568 100-ohm (100m) 100BASE-TX: 2-pair UTP/STP Cat. 5 cable EIA/TIA-568 100-ohm (100m) STP (100 m max.)
Full/Half Duplex	Full/Half duplex for 10/100Mbps speeds
Media Interface Exchange	All ports are auto-crossover (auto-MDI-X) and auto-negotiating.
Performance and Management	
Back plane	Non-Blocking full wire speed forwarding rate: ES-1016A: 3.2Gbps ES-1024A: 4.8Gbps
Packet Forwarding Rate	14880 PPS for 10BASE-T 148800 PPS for 100BASE-TX
Switching Method	Store-and-forward
Priority Queues	IEEE 802.1p Class of Service
MAC Address Table	4K Mac with Auto Learning
Data Buffer	1.25Mbits
Physical and Environmental	
Weight	ES-1016A: 1.4Kg ES-1024A: 1.5Kg

**PRODUCT SPECIFICATIONS**

LED	For the whole switch: PWR (green): Light on or off: Power on or off Ethernet ports: LNK/ACT, FDX/COL
Layer 2 features	Bridging: 4K MAC addresses Switching Method: ES-1016A: 7.2Gbps ES-1024A: 8.8Gbps Class of Service: IEEE 802.1p Frame size: 1522 bytes Broadcast storm control
Dimensions	19" rack mountable enclosure 440(W) x 120(D) x 44(H) mm
Power Supply	ES-1016A: 100-240VAC 50/60Hz 0.8A MAX ES-1024A: 100-240VAC 50/60Hz 0.8A MAX
Power Consumption	ES-1016A: 14W ES-1024A: 19W
Operating Temperature	0°C ~ 45°C (32°F to 113°F)
Operational Humidity	10% to 90% (Non-condensing)
EMI	FCC Class A, CE
Safety	UL, cUL



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