

**SmartSTACK
ELS100-8TXUF2
FAST ETHERNET SWITCH**

**INSTALLATION
AND
USER GUIDE**

9033029

CABLETRON
SYSTEMS



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73/23/EEC

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Conformance to Directive(s)/Product Standards: **EC Directive 89/336/EEC**
EC Directive 73/23/EEC
EN 55022
EN 50082-1
EN 60950

Equipment Type/Environment: Networking Equipment, for use in a
Commercial or Light Industrial
Environment.

We the undersigned, hereby declare, under our sole responsibility, that the equipment packaged with this notice conforms to the above directives.

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Location

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PREFACE

Purpose

This guide provides information about the features and applications of the Cabletron ELS100-8TXUF2 switch.

Audience

This guide is intended for Ethernet local area network (LAN) administrators and Management Information Systems (MIS) personnel with the following background:

- Working knowledge of Ethernet LANs
- Familiarity with Transmission Control Protocol/Internet Protocol (TCP/IP) and Simple Network Management Protocol (SNMP)

Conventions

This section describes the conventions used in this guide.

Message Formats

Two types of messages, identified by icons, appear in the text:



A note informs you of special circumstances.



A caution indicates the possibility of equipment damage.

Organization

Chapter 1. Product Overview: Describes the features of the switch, front and rear panel components and application examples.

Chapter 2. Installation: Describes the content of your switch shipment, lists site requirements, and provides mounting instructions. Instructions for making connections and powering up the switch are provided as well.

Appendix A. Technical Specifications: Provides a list of standards compliance and certifications as well as physical and operational specifications.

Appendix B. Flow Control: Describes how the flow control features are used to provide a mechanism for protecting the switch from overload conditions and to keep additional traffic off the network.

Appendix C. Acronyms and Abbreviations: Provides definitions for a list of common acronyms and abbreviations used within the user guide and the networking industry.

1. PRODUCT OVERVIEW

Description

This installation and user guide describes the Cabletron Systems ELS100-8TXUF2 Ethernet switch. This unit is IEEE 802.1D bridging compliant, and supports eight IEEE 802.3u 100Base-TX Fast Ethernet ports. Each of the RJ-45 ports can alternatively operate as an IEEE 802.3i 10Base-T port. In addition, the switch also includes one port that supports Fast Ethernet over fiber (IEEE 802.3u 100Base-FX).

The Cabletron Systems ELS100-8TXUF2 switch automatically learns end-station addresses from the network and stores them in a Media Access Control (MAC) address forwarding table. Incoming packets are then forwarded to the appropriate output port based on the addresses in the packet. Each port on the switch operates at full Fast Ethernet wire speed with full address and frame filtering. This switch also supports advanced features such as flow control and broadcast throttling.

The ELS100-8TXUF2 switch can be conveniently mounted on a desk or shelf. LEDs on the front panel provide information about the operating status of the switch. The back panel of the switch contains a connector for an external power adapter that is provided with the switch.

This chapter provides the following information:

- Product Description
- Features
- Front and Rear Panel Component Descriptions
- Feature Summaries
- Application Examples

Features

- Ports:
 - 8 dual-speed 10Base-T/100Base-TX ports using RJ-45 connectors (MDI-X)
 - 1 100Base-FX port using SC connectors

Note: When attaching a device to Port 8, use the toggle switch on the front panel to select the RJ-45 or fiber connector.

- Architecture:
 - 8-port switch ASIC in a distributed switching architecture
 - 1.6 Gbps internal switching fabric
 - Up to 1024 KB packet buffering (128 KB/port)
 - Forwarding table holds up to 1K MAC addresses per system

- IEEE 802.3u auto-negotiation for full/half duplex and 10/100 Mbps speed operation on all RJ-45 10/100 ports
- High performance store-and-forward switching
- Performance
 - Forwarding and Filtering:
 - at 10 Mbps, 14,880 packets-per-second (64 byte packets)
 - at 100 Mbps, 148,800 packets-per-second (64 byte packets)
- Traffic Management:
 - Flow control per port: IEEE 802.3x frame-based for full duplex; back-pressure for half duplex
 - Broadcast throttling for broadcast storm control
- LED Indicators:
 - 10Base-T/100Base-TX Ethernet ports: Link, Speed, Collision
 - System: Power

Front Panel

Figure 1-1 shows the front panel of the Cabletron ELS100-8TXUF2. Table 1-1 defines the ELS100-8TXUF2 front panel components.

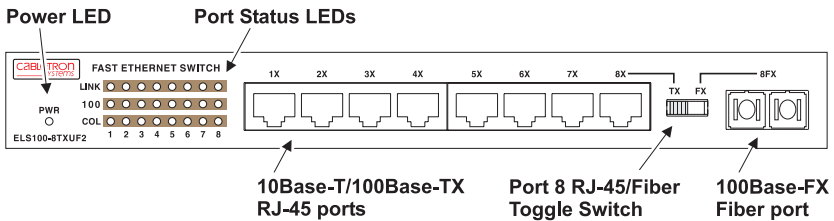


Figure 1-1. ELS100-8TXUF2 Front Panel

Table 1-1. Front Panel Components

Name	Function
10Base-T/100Base-TX RJ-45 ports (Ports 1-8)*	Copper port using RJ-45 port connectors. These ports are wired MDI-X.
100Base-FX Fiber Ports (Port 8)*	Fiber ports using SC fiber connectors.
Ports LEDs	Indicates Link, Speed and Collision information (see Table 1-2 for details).
Power LED	Lights steady green to indicate power is supplied to the switch. Off indicates no power is supplied to the switch.

* When using Port 8, use the toggle switch on the front panel to select the RJ-45 connector or fiber connector.

Figure 1-2 shows the port Link, Speed and Collision LEDs. The port LEDs are grouped to the left of their corresponding RJ-45 ports. Table 1-2 defines the performance of the port LEDs.

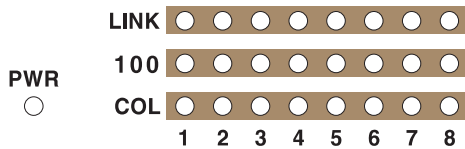


Figure 1-2. Port LEDs

Table 1-2. Port LEDs Defined

LED	Function
Link LED	On: Indicates a valid connection (link) on the associated port. Off: Indicates no link on the associated port.
100 LED	On: Indicates the port is in the 100Base-TX mode. Off: Indicates the port is in the 10Base-T mode.
Collision LED	Flashing: Indicates packet collisions detected on this port. This is a normal situation for CSMA/CD Ethernet. Note that collisions do not occur on full-duplex links. Off: Indicates no packet collisions detected on this port.

Rear Panel

Figure 1-3 shows the ELS100-8TXUF2 rear panel, which includes a connector for the DC power adapter.

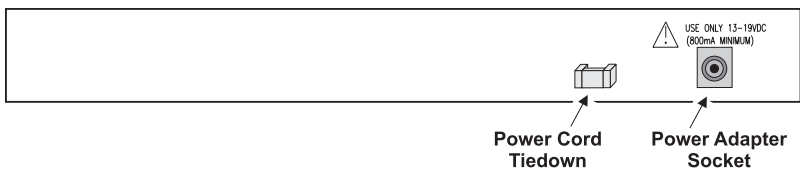


Figure 1-3. ELS100-8TXUF2 Rear Panel

Feature Summaries

The following summaries provide a brief description of ELS100-8TXUF2 features in areas such as standards compliance, functionality, performance, and options.

IEEE 802.1D Bridge

The ELS100-8TXUF2 switch is fully compliant with IEEE 802.1D transparent bridging specifications. An aggregate address table containing 1K address entries is provided for learning, filtering, and forwarding. Addresses are automatically learned by the switch.

Frame Buffering and Frame Latency

The ELS100-8TXUF2 switch is a store-and-forward switching device. Each frame is copied into switch memory before being forwarded to another port. This method ensures that all forwarded frames conform to a standard Ethernet frame size and have a correct cyclic redundancy check (CRC) for data integrity. This switching method prevents bad frames from traversing the network and using up valuable network bandwidth, as with cut-through switching technology.

To minimize the possibility of dropping frames on congested ports, the ELS100-8TXUF2 switch provides 128 KB frame buffer per port. This buffer space is used to queue packets for transmission on congested networks. This is an additional advantage over cut-through switching technology, which drops packets immediately when experiencing collisions.

Auto-negotiation

Auto-negotiation is a process that permits the switch to automatically select the operational modes of its ports. Upon first being connected, the switch detects the speed of the network the port is connected to, either 10Mbps or 100Mbps, and the type of communication setting, half or full duplex. The port is then automatically set by the switch to operate in the proper mode without user intervention. It is not required that the network device being connected to the switch supports auto-negotiation as the ELS100-8TXUF2 switch automatically adjusts to the network device's communication settings.

Broadcast Throttling

The ELS100-8TXUF2 switch has the capability to throttle (or limit) the flooding of packets through the switch. Broadcast, multicast, and unknown destination address unicast packets received by the switch are typically flooded to all ports on the switch. When the number of these types of packets being forwarded is large, the performance of the switch in forwarding packets of other types may suffer.

A broadcast cutoff threshold rate has been set in the switch for the forwarding of broadcast and unknown destination address packets. If the cutoff rate is exceeded, further packets of these types are dropped. This capability helps to alleviate broadcast storms, a problem often encountered in Ethernet networks.

LEDs

The switch port LEDs provide a quick and accurate display of the status of switch connections. The port LEDs indicate link integrity, speed, and collisions (for half-duplex connections).

Full Duplex Mode

The full duplex mode of operation on a port can double the throughput of switch connections. This mode disables the collision detection portion of the Ethernet Carrier Sense Multiple Access with Collision Detection (CSMA/CD) protocol allowing for two-way traffic.

Flow Control

Flow control allows you to manage network traffic during congestion periods and to prevent the loss of packets when port buffer thresholds are exceeded. Flow control also serves to deny access to additional traffic that could add to a congestion condition. The ELS100-8TXUF2 switch supports flow control per the IEEE 802.3x standard. See Appendix C "Flow Control" for more information on this feature.

Spanning Tree

This product is intended to be used as an end-switch and does not support spanning tree. There is *no* loop detection. The user is cautioned to understand and avoid configurations that can create a loop.

Application Examples

The exploding popularity of the Internet and of corporate intranets, as well as new, high-bandwidth desktop applications are driving the demand for Fast Ethernet. The increase in multimedia traffic and the need to support legacy protocols alongside new, data intensive applications is driving the need for network segmentation and traffic prioritization.

The ELS100-8TXUF2 switch is ideal for meeting the needs of today's high performance networks. The switch's low cost makes it attractive and affordable for dedicated 10/100Mbps connections to the desktop.

The following sections illustrate the ELS100-8TXUF2 switch employed in application examples:

- Client/Server Network
- Local Backbone

Client/Server Network Application

To improve workstation performance in a client/server environment, the ELS100-8TXUF2 switch can be configured to provide 200 Mbps full duplex Fast Ethernet connections to servers by connecting each to a dedicated switch port (Figure 1-4). Users can be accommodated through connections to hubs, both at 10Mbps and 100Mbps speeds, through 10Mbps switches with 100Mbps uplinks, or through direct connections. The fiber uplink is available to connect the switch to a remote location, such as another building floor or a separate building.

The ELS100-8TXUF2 switch can be used in a local backbone application, connecting network segments together and providing file-server access. Workgroup hubs are provided with a single connection to the switch while servers are put on dedicated 100 Mbps ports. Routers and other networking devices can connect off of the switched backbone as well. The fiber uplink is available to connect the switch to a remote location, such as another building floor or a separate building.

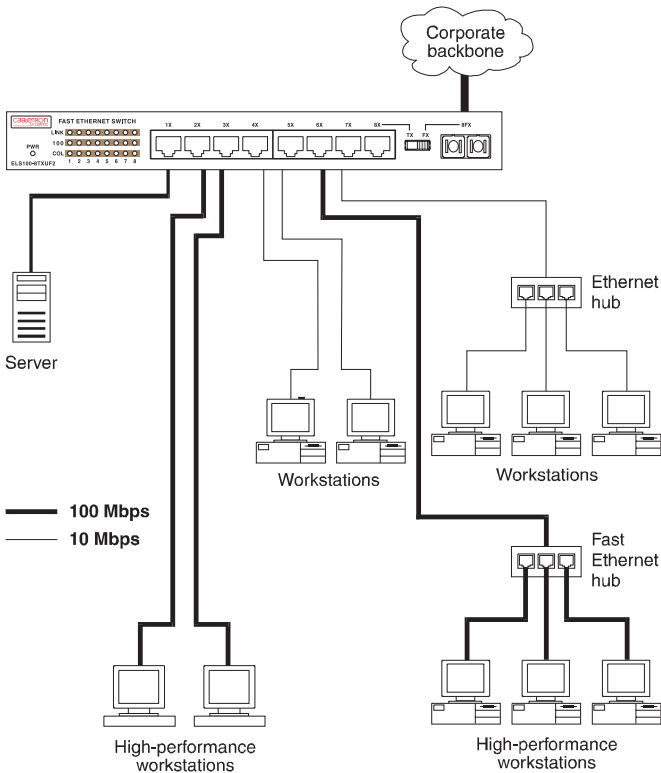


Figure 1-4. Client/Server Network Application

2. INSTALLATION

Inspecting Your Shipment

When you receive the shipment of your switch, check the package contents and make sure you have the following items:

- ELS100-8TXUF2 Fast Ethernet switch
- Mounting velcro
- Rubber feet
- Power adapter
- This document

Site Requirements

Before you install the switch, make sure the site meets the following requirements:

- **Mounting**
Provide a flat table, wall or shelf surface.
- **Power source**
Provide a power source within six feet (1.8 m) of the installation location. This source must provide 100 VAC to 240 VAC, and 50 Hz to 60 Hz power, with a 100 VA minimum. Power specifications for the switch are shown in Appendix A, "Technical Specifications."
- **Environmental**
Install the ELS100-8TXUF2 switch in a dry area, with adequate air circulation. Avoid placing the switch in direct sunlight or near other heat sources, such as hot-air vents. For temperature and humidity specifications, see Appendix A, "Technical Specifications."
- **Ventilation**
Do not restrict airflow by covering or obstructing air inlets on the side of the switch.

Mounting the Switch on a Table or Shelf

First attach the rubber feet to the indentations on the bottom of the switch. Then mount the switch on a table or shelf in a position that allows access to the front panel RJ-45 ports, visibility of the port LEDs, and access to the power cord. Make sure that the mounting surface can safely support the switch and that there is adequate space around the switch for ventilation and cooling.



The rubber feet improve the switch's grip on the mounting surface, and provide ventilation between switches when stacked together.

Mounting the Switch on a Wall

The module ships with one (1) velcro strip. The velcro strip is used to attach the switch to the wall.

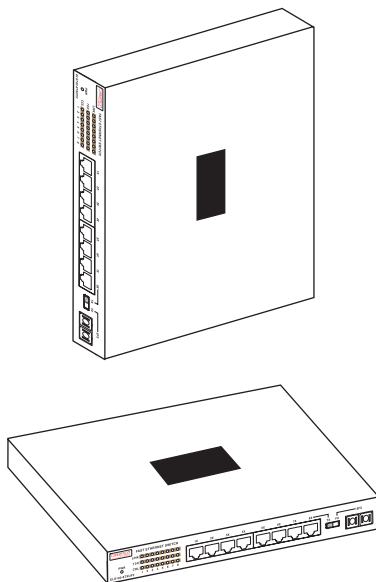


Do not attach rubber feet to the switch when mounting the switch to the wall with velcro.

Figure 2-1 illustrates two recommended orientations for wall mounting the switch. This figure also shows where to position velcro on the switch. To attach velcro do the following:

1. Place the switch on a flat surface with the Cabletron logo on the left and the 100Base-FX ports on the right.
2. Attach the velcro to the center of the switch using the supplied 2 x 4 inch strip of velcro.
3. Position the switch on a wall surface that can safely support the switch.

Figure 2-1. Mounting the Switch on a Wall



Powering the Switch

To supply power to the switch, do the following:

1. Connect the power adapter to the switch and to a grounded three-prong wall outlet (Figure 2-2). Secure the power cord to the tiedown bracket on the back of the switch to prevent it from being accidentally disconnected from the switch. See Appendix A, "Power Adapter Set Requirements," for more information regarding specific international power adapter requirements.

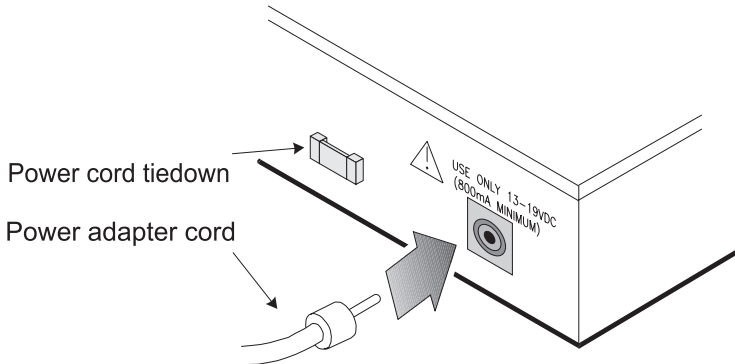


Figure 2-2. Connecting the Power Cord to the Switch

2. Check the Power LED.

The Power LED lights green (see Figure 1-1). If it does not, check to make sure that the power cord is plugged in correctly and that the power source is good.

Power-Up Verification

When you connect the power cord, the switch conducts a series of hardware and software tests to verify correct operation.

Network Cable Requirements

Copper

Table 2-1 specifies the cable types and length constraints for the various copper interfaces on the ELS100-8TXUF2.

Table 2-1. Copper Cable Specifications

Interface Type	Cable Requirement	Maximum Length
10Base-T	Category 3 or 5 Unshielded Twisted Pair (UTP)	100m (328 ft.)
100Base-TX	Category 5 UTP	100m (328 ft.)

Fiber

Table 2-2 specifies the fiber types, bandwidth requirements, and length constraints for the Fast Ethernet fiber interface on the ELS100-8TXUF2.

Table 2-2. Fast Ethernet Fiber Specifications

Interface Type	Fiber Type	Fiber Diameter (microns)	Maximum Length (m)
100Base-FX	multi-mode	62.5/125	2,000m (6,560 ft.)

10Base-T/100Base-TX Ports

The 10Base-T/100Base-TX ports use RJ-45 connectors. Figure 2-3 shows an RJ-45 connector being inserted into a port.

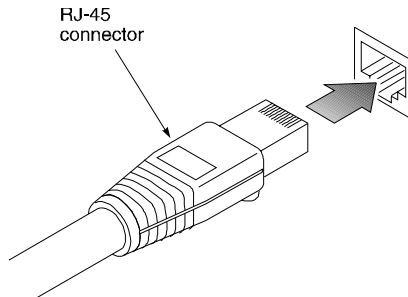


Figure 2-3. Inserting an RJ-45 Connector into a Port

The 10Base-T/100Base-TX ports interface to UTP cabling for connection to 10Base-T or 100Base-TX network segments or end-stations. These UTP connections meet the requirements of ISO 8877, specified by 10Base-T, Section 14 of the IEEE 802.3 specification. The ports are wired with the MDI-X function implemented. Workstations or servers can be connected to the ELS100-8TXUF2 switch using standard straight-through wired cables.

For connections to hubs or other switches, a crossover cable may be necessary (refer to the “MDI/MDI-X Crossover Cable Wiring” section in Appendix A). See Table A-2 for 10Base-T/100Base-TX connector pin assignments.

100Base-FX Fiber Ports

The 100Base-FX Fiber port uses SC connectors. Figure 2-4 shows an SC fiber connector being inserted into the fiber port on the ELS100-8TXUF2.

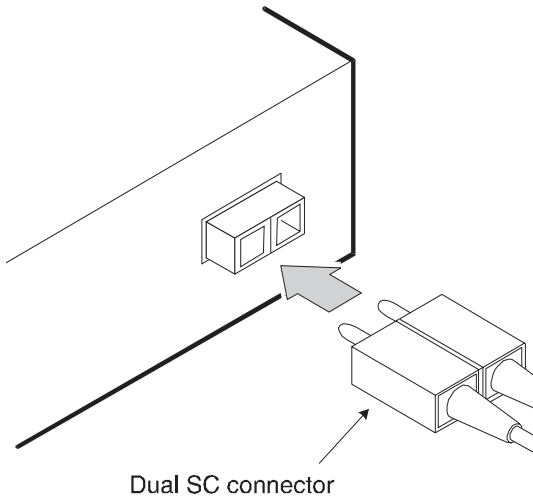


Figure 2-4. Inserting a Dual SC Connector into a Port

This port supports multi-mode 62.5/125mm fiber. The 100Base-FX port uses SC fiber connectors. The SC fiber connectors are configured as a receive (RX) and transmit (TX) pair. The RX connector is positioned on the left side of the port and the TX connector on the right side of the port.

APPENDIX A. TECHNICAL SPECIFICATIONS

General

Standards Compliance

IEEE 802.1D Transparent Bridging Specifications (ISO/IEC 10038)

IEEE 802.2 Local Area Networks, Logical Link Control (LLC)

IEEE 802.3 CSMA/CD 9 (ISO/IEC 8802-3)

IEEE 802.3i 10Base-T (ISO/IEC 8802-3, clause 14)

IEEE 802.3u 100Base-TX (ISO/IEC 8802-3, clause 25)

IEEE 802.3x Flow Control

Certification

Emissions: FCC Part 15, Subpart B, Class B; EN55022 (CISPR 22), Class B; VCCI Class B

Safety: CSA/NRTL (C22.2.950,UL1950), TÜV/GS (EN60950)

CE Directives: 89/336/EEC; 93/68/EEC; 73/23/EEC

Data Rate

10Mbps Manchester encoded or 100Mbps 4B/5B encoded.

Environmental Specifications

Operating temperature: 32° to 104° F (0° C to 50° C)

Operating humidity: 5 to 95% relative, non-condensing

Storage temperature: -13° to 158°F (-25° C to 70° C)

Storage humidity: 5 to 95% relative, non-condensing

Electrical Specifications

Input voltage (mains): 90-127* VAC, 220-240 VAC

Input frequency (mains): 50-60 Hz

Output voltage (adapter): 13-19 VDC

Maximum output current (adapter) 800 mA

Minimum power consumption: 15.2 VA

* Input specifications are dependant on the Country (refer to Table A-2).

Physical

Height:	1.46 in. (3.7 cm)
Length:	4.65 in. (11.6 cm)
Width:	9.88 in. (24.9 cm)
Weight:	1.8 lb. (0.815 kg)

Memory

Packet Buffer Memory:	128 KB per port
-----------------------	-----------------

Port Specifications

10Base-T and 100Base-TX Ports

Table A-1 shows the 10Base-T/100Base-TX pinouts. These ports are wired MDI-X. All undefined pins are not used.

Table A-1. 10Base-T/100Base-TX Pinouts

Pin	MDI-X Signal Name
1	RD+
2	RD-
3	TD+
6	TD-

MDI/MDI-X Crossover Cable Wiring

Figure A-1 shows the wiring scheme for implementing a crossover cable if needed for connection to the switch's 10Base-T or 100Base-TX ports. Such a cable may be required when connecting the switch to another switch or a hub device.

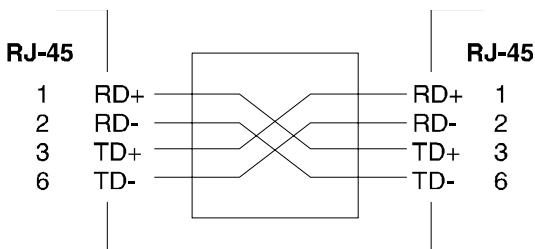


Figure A-1. External Crossover Cable Wiring

Power Adapter Requirements

Table A-2 shows the power adapter requirements.

Table A-2. Power Adapter Requirements

Country	Adapter P/N	Input Specifications*	Output Specifications*
USA:	0950-3274	110-127 VAC, 60Hz	19 VDC, 800 mA
Japan:	0950-3267	90-110 VAC, 50 Hz	19 VDC, 800mA
Australia:	0950-3269	230-240 VAC, 50 Hz	19 VDC, 800mA
UK:	0950-3270	220-240 VAC, 50 Hz	19 VDC, 800mA
Europe:	T4190800SE	220-240 VAC, 50Hz	19 VDC, 800 mA

* Specifications are shown on the adapter label.

APPENDIX B. FLOW CONTROL

Flow control is a mechanism that controls the flow of data in both directions to prevent data loss, buffer deadlock, overload conditions and minimizing communications overhead during transmission. Figure B-1 illustrates flow control for both half and full duplex applications.

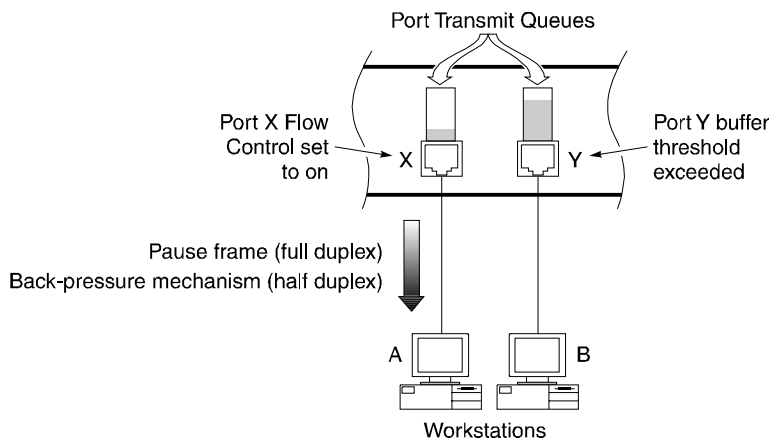


Figure B-1. Flow Control for Full and Half Duplex Applications

Each port of the switch has a transmit queue which buffers frames to be sent out on that port. In this example, large amounts of data are being sent from Workstation A (connected to port X) and other ports on the switch to Workstation B (connected to port Y). The buffer on port Y starts filling up with data until it reaches a pre-determined threshold. The packet which causes the threshold to be exceeded triggers the Flow Control function on the port from which the packet entered the switch, in this case port X.

Since port X is configured with Flow Control set to Enabled, the switch responds by initiating a pause frame (full duplex applications) or back-pressure mechanism (half duplex applications). The pause frame causes Workstation A to stop sending packets. After a certain amount of time has elapsed, determined by a value in the pause frame, Workstation A will resume sending data. Similarly, the back-pressure mechanism forces Workstation A to stop sending packets by inducing collisions on port X. Note that for the full duplex pause frame mechanism to work, the device connected to the switch port must also support IEEE 802.3x flow control.

The pause frame flow control mechanism supported by the ELS100-8TXUF2 switch conforms with the IEEE 802.3x specification for full duplex flow control.

APPENDIX C.ACRONYMS AND ABBREVIATIONS

Term	Definition
10Base-T	10Mbps twisted-pair Ethernet
100Base-TX	100Mbps twisted-pair Fast Ethernet
100Base-FX	100Mbps fiber optic Fast Ethernet
ANSI	American National Standards Institute
ASIC	Application Specific Integrated Circuit
CAT5	Category 5
CSMA/CD	Carrier Sense Multiple Access/Collision Detection
IEEE	Institute of Electrical and Electronics Engineers
LAN	Local Area Network
MAC	Media Access Control
LED	Light Emitting Diode
MDI	Media Device Interface
MDI-X	Media Device Interface-crossover cable wiring
RFC	Request for Comment
UTP	Unshielded Twisted Pair
end-switch	A switch that terminates a branch. Also known as a leaf switch.

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