Preface

This manual describes how to install and use the EtherWAN 24-port Ethernet switch, Xpresso 1624. It features twenty-four ports that auto negotiate the presence of 100/10Mbps and full or half duplex mode. An optional 100BASE-FX multi-mode module enables long-distance connection. An optional BNC connection for the module enables backwards compatibility.

To get the most out of this manual, you should have an understanding of networking concepts such as bridging, IEEE 802.3 Ethernet and 100BASE-TX Fast Ethernet, and local area networks (LANs).

For more information about these topics, please refer to the Appendices.

In this manual, you will find:

- Benefits of Ethernet switches
- Xpresso 1624 and its features
- LED functions illustration
- Installation instructions
- Configuration instructions for VLAN and port speed
- Specifications
- Ethernet technology, LAN, and VLAN tutorial information
- Definitions of terms used in this manual

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Introduction

Benefits of Switching

Ethernet switching technology dramatically boosted the total bandwidth of a network, eliminated congestion problems inherent with carrier sense multiple access with collision detection (CSMA/CD) protocol, and greatly reduced unnecessary transmissions.

This revolutionized networking. First, by allowing two-way, simultaneous transmissions over the same port (full-duplex), which essentially doubled the bandwidth. Second, by reducing the collision domain to a single switch-port, which eliminated the need for carrier sensing. Third, by using the store-and-forward technology's approach of inspecting each packet to intercept corrupt or redundant data, switching eliminated unnecessary transmissions that slow the network. Fourth, by employing address-learning, which replaced the inefficient method of constant broadcasting to every node in search of the correct receiving 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. Switching brought a whole new way of thinking to networking, and raised the level of expectations for high-end users.

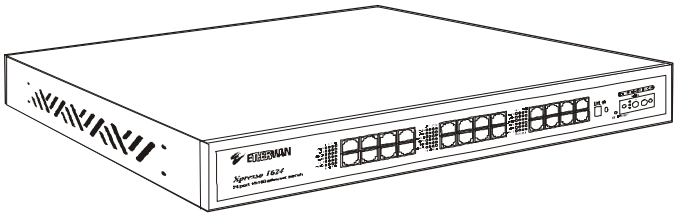
Today, the demand is for higher transmission speed. Although 10BASE-T Ethernet, at 10Mbps, had been the standard, current

applications require fast Ethernet, at 100Mbps. At ten times the speed, fast Ethernet satisfies the demands of power-users and those using engineering software and multi-media applications.

With this quick rise to higher speed, many users were left with slower, but still serviceable switches. To solve this problem, quality switches now automatically negotiate between 10BASE-T Ethernet and 100BASE-TX fast Ethernet, efficiently integrating legacy equipment into a higher performance network. Auto-negotiation ensures a path for users to add, change, and migrate to fast Ethernet as warranted.

Ultimately, switching provides a low cost answer to today's computing needs.

EtherWAN Xpresso 1624 Switch



The EtherWAN Xpresso 1624 is a 24-port Fast Ethernet switch. It has twenty-four RJ-45 ports and each of them is capable of auto-negotiating 10/100 Mbps and full or half-duplex mode.

Addressing the demand for fiber, EtherWAN provides an optional multi-mode or single-mode fiber module for Xpresso 1624 as an

optimum solution for long-distance connectivity. The module supports one SC, ST, MT-RJ, or VF-45 port. An available BNC connection addresses the backwards compatibility issue.

The Xpresso 1624 enables the linking of a 100Mbps Fast Ethernet network to an existing 10Mbps Ethernet network. Its internal cache buffers the traffic from the higher bandwidth 100Mbps segment to the 10Mbps segment. If you later decide to make both segments 100Mbps Fast Ethernet, the EtherWAN Xpresso 1624 will automatically sense the change and adjust to 100Mbps operation.

In addition to the integration of 10Mbps and 100Mbps networks, the EtherWAN Xpresso 1624 switch also provides for segmentation to reduce excess traffic that bogs down the network. By splitting the network into several segments and bridging them, you can cut the traffic load on your network and reduce collisions on each segment.

Through the store-and-forward architecture, Xpresso 1624 automatically examines and appropriately forwards each packet to the right destination. This reduces broadcasting to each node in the network and increases the data flow on each segment. Further reduction in traffic is achieved by connecting users that communicate most frequently within the same segment.

The EtherWAN Xpresso 1624 fully complies with IEEE802.3u, 100BASE-TX/FX, and IEEE802.3, 10BASE-T standards.

Xpresso 1624 facilitates an affordable and efficient migration path to 100Mbps fast Ethernet while providing the fiber connection necessary for today.

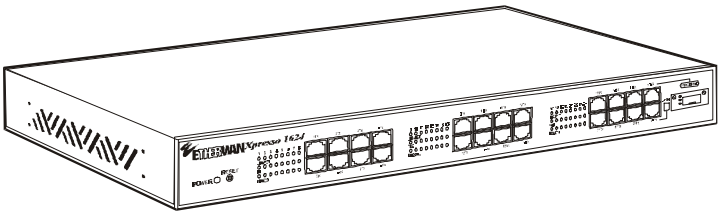
Product Features

- 24 ports with auto-negotiation 10/100Mbps
- Optional 1-port module
- Plug-and-play
- Auto-negotiation for speed and duplexity
- True non-blocking architecture
- Full wire speed forwarding
- Store-and-forward mechanism
- Back pressure and IEEE 802.3x compliant flow control
- Supports 1K MAC address
- Port based VLAN
- Programmable re-configuration for fixed speed and duplex modes
- One uplink port activated by the push of a button
- Front panel reset button
- Front panel status LEDs
- Standard 19" rack-mountable size

Packing List

When you unpack this product, you should find the items listed below. Please inspect the contents, and report any apparent damage or missing items immediately to your authorized reseller.

- Xpresso 1624
- User's Manual
- AC power cord
- Rack Mount Ears with screws
- Serial Cable



Xpresso 1624 Front Panel LEDs

The array of LED indicators on the front panel conveys status and configuration information to help you monitor and trouble-shoot the switch.

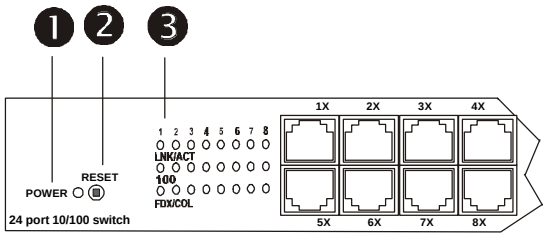


Figure 1: Xpresso 1624 LEDs

❶ Power
Indicates that there is electrical power to the switch.

❷ Reset Button
Push to reset the switch should it become unresponsive.

❸ Status LEDs
A set of three LEDs displays the status of each port. Consult the following chart for clarification.

Table 1: Status LEDs

LED	State	Indication
LNK/ACT	Steady	LINK: The port has established a valid network connection
	Flashing	ACTIVITY: The port is transmitting or receiving data
100	Steady	100Mbps: The port has established a valid 100Mbps network connection
FDX/COL	Steady	FULL-DUPLEX: The connection is in full duplex mode
	Flashing	COLLISION: Collision occurred in the 10/100 domain.
	Off	The connection is in half duplex mode

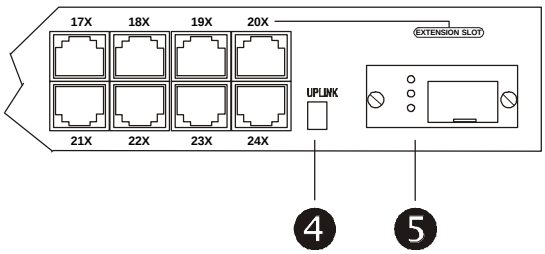


Figure 2: Optional module LEDs and uplink button

❹ Uplink Button
Depress for uplink function or leave in normal port operation. Affects port 24 only.

❺ Status LEDs
A set of three LEDs displays the status of the optional modular port. Consult the following chart for clarification.

Table 2: Optional module port LEDs

LED	State	Indication
LNK/ACT	Steady	The port has established a valid network connection
	Flashing	The port is transmitting data
RX	Flashing	The port is receiving data
FDX/COL	Steady	The connection is in full duplex mode
	Flashing	The port is receiving data

Installation

Selecting a Site for the Switch

As with any electronic device, do not subject the EtherWAN Xpresso 1624 to extreme temperatures, humidity, or electromagnetic interference. Specifically, the site you select should meet the following requirements:

- Room temperature of between 32 and 104 degrees Fahrenheit (0 to 40 degrees Celsius).
- Relative humidity of less than 90 percent, non-condensing.
- Adequate ventilation. Do not block the ventilation holes on the side of the switch or the fan exhaust port on the rear of the switch.
- Power outlet located within 1.8 Meter of the switch.
- Electromagnetic field (RFC) of any other surrounding devices not to exceed standards for IEC 801-3, Level 2 (3V/M) field strength.

Connecting to Power

Connect the supplied AC power cord to the receptacle on the back of the switch, and then plug the cord into a standard AC outlet with a voltage range from 100 to 240 VAC.

Turn on the EtherWAN Xpresso 1624 by flipping the ON/OFF switch on the rear of the unit to the **I** (ON) position. The **O** position is OFF.

Connecting to Your Network

Prepare cable with corresponding connectors for each type of port in use. Consult Table 3 below for cabling requirements based on connectors and speed. Once the connections are made, the switch is operational.

Table 3: Cable Specifications

Speed	Connector	Port Speed Half/Full Duplex	Cable	Distance
100BASE-TX	RJ-45	100/200 Mbps	Category 5 UTP	100 meters
10BASE-T	BNC	10/20Mbps	Coaxial	na
10BASE-T	RJ-45	10/20 Mbps	Category 3, 4, or 5 UTP	100 meters
100BASE-FX	ST, SC, MT-RJ, VF-45	200 Mbps	62.5/125 micron fiber-optic cable	2 km

Optional Module Installation

The Xpresso 1624 offers an optional one-port module. It is available in either single or multi-mode. The multi-mode fiber module supports either SC, ST, MT-RJ, or VF-45. BNC connection can be substituted to allow for even more versatility.

The optional module is inserted in the extension slot and the module utilizes port 20. Before installation, ensure that the power is disconnected. The module is not hot-swappable. Unscrew the cover plate in the extension slot. Pull out the cover plate, which has a non-wired board attached. Slide the module in slowly, following the metal guides. Once it is slid in fully, snap in the module to make a proper connection and tighten the screws.

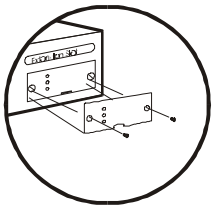


Figure 3: Removal of cover plate

Jumper Settings

The module arrives with pre-set jumpers and should not be reset. Use the jumper settings for trouble-shooting purposes only.

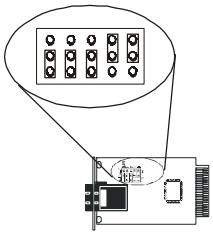


Figure 4: Proper jumper settings for fiber module (BNC connection does not have a jumper)

Networking Examples

The following illustrates ways in which the Xpresso 1624 is utilized.

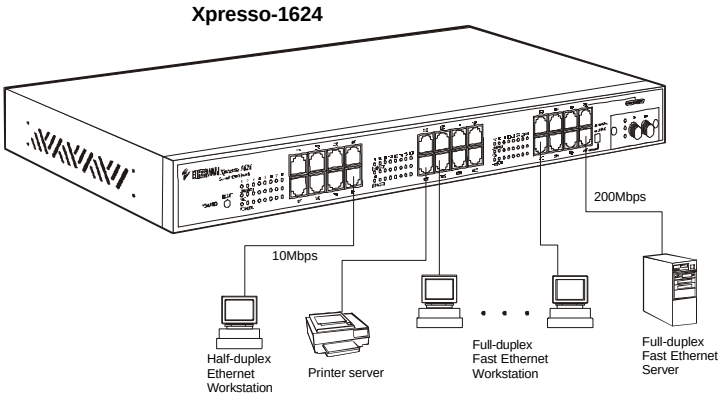


Figure 5: High-speed connections for a small workgroup

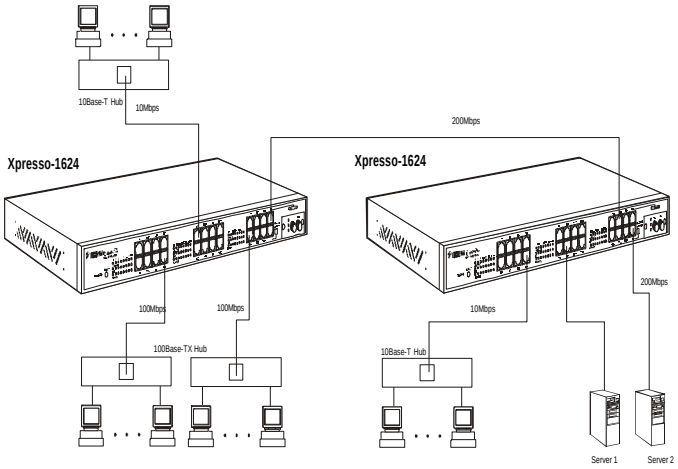


Figure 6: Collapsed backbone for workgroups

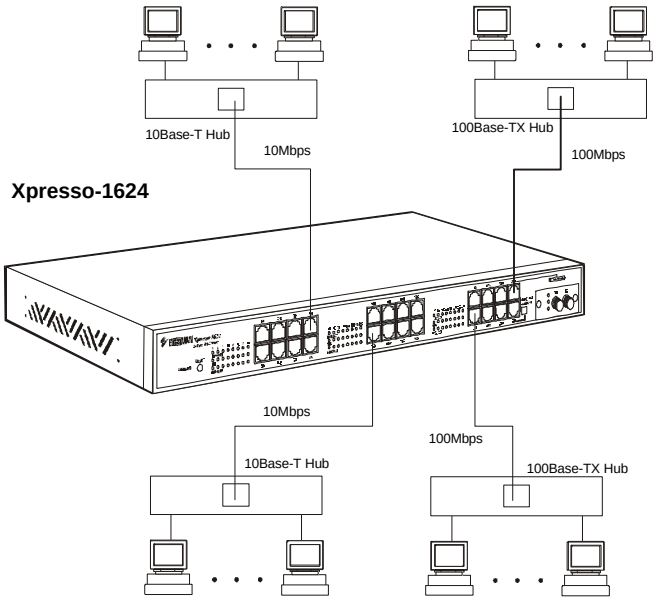


Figure 7: Bridging existing hub-based 100BASE-TX and 10BASE-T network

VLAN and Speed/Duplex Port Settings

This section explains the port operations through which the VLAN, flow-control, speed, and duplex function is accessed for more advanced configurations.

Virtual Local Area Networking (VLAN) enables efficient traffic separation, provides better bandwidth utilization, and alleviates

scaling issues by logically segmenting the physical LAN so that packets are switched only between ports within the same VLAN. This creates secure segments and the resulting security is yet another reason to utilize a VLAN.

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. Disablement of flow-control is also performed on an individual port basis.

Establishing Console Port Connection

For these features to operate through the console port, it is necessary to first configure in DOS or a terminal emulation program such as HyperTerminal.

- Check all switches, cables, and computers for proper installation before configuration.
- Attach a PC or any VT100 compatible terminal to the console port on the back of the switch (see figure 8) using the following settings:

Terminal type	VT100
Port type	(COM 1~4)
Communication Mode	8 data bits, 1 stop bit, no parity and 9600bps (for initial configuration)
Flow Control	None
Hardware Compression	NA

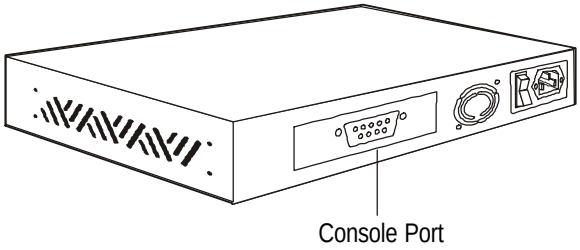


Figure 8: Console Port

- Turn on the switch and press any key to view the main menu shown below:

```
VLAN    Port List
--------  ---------
V1      1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24
V2      <empty>
V3      <empty>
V4      <empty>

Port    Mode    Flw    VLAN List   Port Mode    Flw    VLAN List
-----   -------  -----  -------------  ------------  ----  -------------
 1      Auto-    On        V1       13  Auto     On        V1
 2      Auto-    On        V1       14  Auto     On        V1
 3      Auto-,   On        V1       15  Auto     On        V1
 4      Auto-    On        V1       16  Auto     On        V1
 5      Auto-    On        V1       17  Auto     On        V1
 6      Auto-    On        V1       18  Auto     On        V1
 7      Auto-    On        V1       19  Auto     On        V1
 8      Auto-    On        V1       20  Auto     On        V1
 9      Auto-    On        V1       21  Auto     On        V1
 10     Auto-    On        V1       22  Auto     On        V1
 11     Auto-    On        V1       23  Auto     On        V1
 12     Auto-    On        V1       24  Auto     On        V1

VLAN, Mode, Default  (V/M/D) ?
```

Figure 9: Console port displaying default settings

Valid Commands:

[V] Configure VLAN groups
[M] Select 10/100Mbps and half or full-duplex mode
[D] Restore the default settings
[ESC] Abort and return to the menu

Default Settings:

All ports are in the V1 group with auto-negotiation, and flow control while the default setting is active.

Virtual LAN

Virtual Local Networks (VLANs) enable segmentation of the LAN without regards to physical location. Assign each port to a group or set of groups according to accessibility needs.

Follow these steps to assign ports to a VLAN group.

- Enter **[V]** from the Main Menu
- Select a VLAN group:
  [V1], **[V2]**, **[V3],** or **[V4]**
- Enter the port #.

To return to the default settings, enter **[D]** from the main menu. A prompt appears to verify this action.

The system only allows one VLAN group definition with each entry. Continue selecting each desired VLAN group and assigning ports until all ports are assigned to at least one VLAN group. Though each VLAN grouping does not need to be utilized, each port must be assigned to at least one VLAN group. Hit the **[ESC]** key when done.

VLAN Example:

- Key **[V1]** (no [**enter]**)
- Key 1,2,3,4,5,6,7,8,9,10,11,12
  or 1-12

- [**ENTER]**

Proceed with the assignment of the remainder of the ports into any VLAN grouping. Ports may be assigned to more than one VLAN.

- Key [**V2**] (no **[ENTER]**)
- Key 13,14,15,16,17,18,19,20
  or 13-20
- [**ENTER]**
- Key [**V3**] (no **[ENTER]**)
- Key 21,22,23,24
  or 21-24
- [**ENTER]**

*Note: [**ESC**] key will not return the screen to the main menu until each port is assigned to a VLAN.*

```
VLAN    Port List
--------  ---------
V1      1,2,3,4,5,6,7,8,9,10,11,12,
V2      13,14,15,16,17,18,19,20
V3      21,22,23,24
V4      <empty>

Port  Mode    Flw   VLAN List   Port Mode    Flw   VLAN List
-----  -------  -----  ------------  ----------  ----  ------------
  1   Auto-   On      V1      13  Auto   On      V2
  2   Auto-   On      V1      14  Auto   On      V2
  3   Auto-,  On      V1      15  Auto   On      V2
  4   Auto-   On      V1      16  Auto   On      V2
  5   Auto-   On      V1      17  Auto   On      V2
  6   Auto-   On      V1      18  Auto   On      V2
  7   Auto-   On      V1      19  Auto   On      V2
  8   Auto-   On      V1      20  Auto   On      V2
  9   Auto-   On      V1      21  Auto   On      V3
  10  Auto-   On      V1      22  Auto   On      V3
  11  Auto-   On      V1      23  Auto   On      V3
  12  Auto-   On      V1      24  Auto   On      V3

Please enter the VLAN# or ESC to Abort (V1-V4)->
```

Figure 10: Console port displaying revised VLAN assignments according to above example.

Port Settings

The duplex and speed of each port can be altered and the flow-control can be turned off to accommodate special needs.

Follow these steps to change the speed/duplex mode setting or to toggle flow control ON/OFF:

- Key **[M]** (no **[ENTER]**)
- Select a port
- [**ENTER]**
- Select the media from the list that appears on the screen

Note: Only one port can be changed at a time.

Consult the following charts for a brief description:

Table 4: TX Port Settings

#	**Communication Media**	**Description**
0	Flow Control	Toggles ON/OFF
1	Auto	Auto-Negotiation
2	100 FL	100Mbps at full-duplex
3	100 HF	100Mbps at half-duplex
4	10 FL	10Mbps at full-duplex
5	10 HF	10Mbps at half-duplex

Media Setting Example:

- Key [M] (no [enter])
- Select port 10

- Select mode 5

Hit the **[ESC]** key when done. To return to the default settings, enter **[D]**. A prompt appears to verify this command.

```
VLAN    Port List
--------  ---------
V1      1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24
V2      <empty>
V3      <empty>
V4      <empty>

Port    Mode    Flw     VLAN List   Port Mode   Flw     VLAN
        List
-----   -------  -----  ----------  ----------  ----  ----------
 1      Auto-    On        V1       13  Auto    On       V1
 2      Auto-    On        V1       14  Auto    On       V1
 3      Auto-,   On        V1       15  Auto    On       V1
 4      Auto-    On        V1       16  Auto    On       V1
 5      Auto-    On        V1       17  Auto    On       V1
 6      Auto-    On        V1       18  Auto    On       V1
 7      Auto-    On        V1       19  Auto    On       V1
 8      Auto-    On        V1       20  Auto    On       V1
 9      Auto-    On        V1       21  Auto    On       V1
 10     10 HF    On        V1       22  Auto    On       V1
 11     Auto-    On        V1       23  Auto    On       V1
 12     Auto-    On        V1       24  Auto    On       V1

VLAN,Mode,Default  (V/M/D) ?
```

Figure 11: Console port displaying mode change

Specifications

Xpresso 1624

Applicable Standards	10BASE-T, IEEE 802.3 100BASE-TX & 100BASE-FX, IEEE 802.3u	
Ports	24 10/100-BASE-T/TX	
Speed	100BASE-FX:	200Mbps full-duplex 100Mbps half-duplex
	100BASE-TX:	200Mbps full-duplex 100Mbps half-duplex
	10BASE-TX:	20Mbps full-duplex 10Mbps half-duplex
Performance	148,800pps forwarding rate per port.	
LED Indicators	Power, Link, Activity, 100Mbps, Full-duplex,Collision	
Module LED Indicators	Link, Activity, Full-duplex	

Dimensions	440 X 205 X 45 mm Rackmount Size
	17.3 X 8.1 X 1.8 in Rackmount Size
Weight	kg
	lb
Power Input	100 ~ 250 Vac, 47/63 Hz, 2 A
Power Consumption	20 W
Operating Temperature	0° ~ 40°C
	32° ~ 104°F
Humidity	10 ~ 90%, non-condensing
Altitude	3048 m
	10,000 ft
Emissions	FCC part 15 Class A, CISPR Class A,
	VCCI-I CE Mark
Safety	UL, CSA, TUV/GS

Appendix A - Connector Pinouts

Pin arrangement of RJ-45 connectors

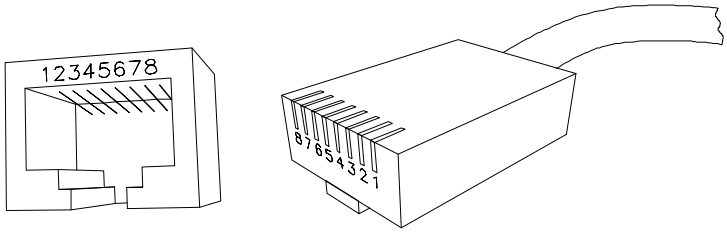


Figure 12: RJ-45 Connector and Cable Pins

The following table lists the pinout of 10/100BASE-T/TX ports

Table 5: Connector Pin-Out

Pin	Regular Ports	Uplink port
1	Input Receive Data +	Output Transmit Data +
2	Input Receive Data -	Output Transmit Data -
3	Output Transmit Data +	Input Receive Data +
4	NC	NC
5	NC	NC
6	Output Transmit Data -	Input Receive Data -
7	NC	NC
8	NC	NC

Appendix B - Introduction to LAN & Ethernet Technologies

As communication and business applications become increasingly complex, computer networking has evolved as a very important part of the infrastructure.

Communication systems like Local Area Network (LAN) evolved into sophisticated, powerful, yet flexible technology. Among the different types of LAN technologies, Ethernet represents the best in speed, cost, ease of installation, and supportability.

LAN

Local Area Network (LAN) technology gave personal computers the power to share resources of hardware and software. LAN connects personal computers, file servers, printers, etc. together within a geographical area, usually a single building. Multiple, widely dispersed LAN systems are referred to as a wide area network (WAN).

Ethernet Technologies

More than 80 percent of all LANs utilize Ethernet technology. The Institute of Electrical and Electronic Engineers (IEEE) standardized Ethernet in IEEE 802.3, which provides for configuration rules, interaction requirements, types of media, and data rate.

Fast Ethernet

For networks that need higher transmission speeds, a faster speed was developed and IEEE next established IEEE 802.3u, raising the

Ethernet speed from 10 Mbps to 100 Mbps. Thus, fast Ethernet arose and users quickly began converting from 10Mbps to 100Mbps.

Ethernet Gigabit

The demand for even higher speed created the gigabit Ethernet at 1000Mbps (or 1Gbps). The newer IEEE standard for gigabit Ethernet is IEEE 802.3z. The only cabling media approved is the fiber-optic pair. Watch for 10gig Ethernet.

Ethernet Products

Hub

One of the earlier connection solutions for Ethernet, a hub (also called a repeater) operates by broadcasting data to all ports simultaneously, only to repeat it when it is not received. The hub works through a "shared network" with all of the nodes in the network segment sharing the same collision domain. Switches and bridges emerged because of a need to separate collision domains that are too large, therefore improving performance and network reliability.

Switch

A switch solves the collision problem by working as a single domain. A Switch maps the physical Ethernet addresses of the nodes residing on each network segment and then allows only the necessary traffic to pass through. Packets of data are transmitted along with the destination and source segment.

There are two basic architectures of LAN switches, cut-through and store-and-forward. Cut-through switches consider only the destination address before forwarding it on to its destination

segment, but store-and-forward architecture accepts and then analyzes the entire packet before forwarding. This allows the switch to stop certain packet errors from propagating through the network. The store-and forward switch eliminates redundant or corrupted packets, thus increasing the efficiency of the network transmission.

Appendix C – VLANs

Virtual local area network (VLAN) is a network configuration in which nodes are grouped into logical, rather than physical networks. Figure 13 & 14 below shows the difference between LAN and VLAN. The segmentation in VLAN creates secured areas where sensitive information is not shared and creates its own broadcast domain within the group to effectively reduce broadcast traffic, providing higher network efficiency and security.

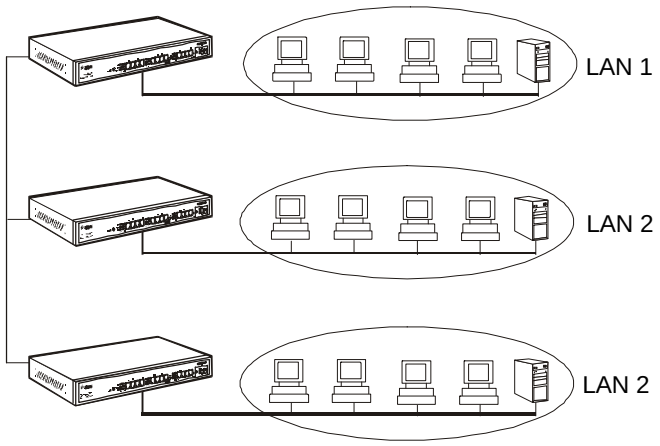


Figure 13: LAN Segmentation

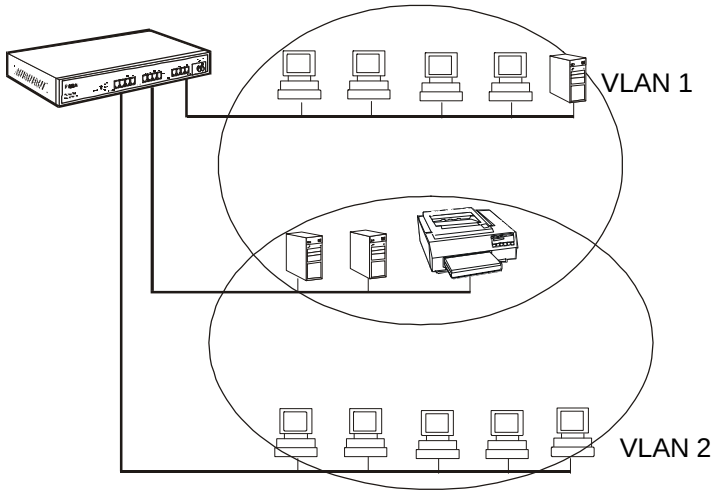


Figure 14: VLAN Segmentation

Appendix D – Glossary

10BASE-T	networking standard for twisted-pair cabling capable of carrying data at 10Mbps; also called Twisted Pair Ethernet
100BASE-T	networking standard for twisted-pair cabling capable of carrying data at 100Mbps; also called Fast Ethernet
100BASE-TX	networking standard for two pairs of high-quality twisted-pair wires carrying data at 100Mbps
10BASE-F	networking standard for fiber-optic cabling capable of carrying data at 10Mbps
100BSE-FX	networking standard for fiber-optic cabling capable of carrying data at 100Mbps
100BASE-X	networking standard for carrying data at 100Mbps
Adapter (network)	expansion card that enables a computer to attach to a network
ASIC	application-specific integrated circuit; a chip designed for a particular application and built by connecting an existing arrangement of circuit building blocks in new ways; ASICs are commonly used in networking devices to maximize performance with minimum cost
ATM	asynchronous transfer mode; network technology capable of transmitting data, voice, video, and frame-relay traffic in real time

Auto-discovery	process by which a network device automatically searches through a range of network addresses and discovers all known types of devices present in that range
Auto-negotiation	two-part process by which a network device automatically senses the speed and duplex capability of another device
Backbone	interconnection within a LAN or WAN between subnetworks or workgroups within an enterprise
Backplane	bus or switching matrix that resides within a switch or hub chassis; all traffic through such a device crosses the backplane at least once
Bandwidth	amount of data that can be transmitted in a fixed amount of time; usually expressed in bits or bytes per second
Broadcast	message forwarded to all destinations on a network
Bus	connector or set of connectors that serve as the interconnection between related devices; common bus types in personal computers include Industry-Standard Architecture (ISA), Extended Industry-Standard Architecture (EISA), and Peripheral Component Interconnect (PCI)
Bus-type stack	stack arrangement where the individual components are connected along a single shared cable
Category 5	networking standard certifying that a copper wire cable can carry data at up to 100Mbps

Client/ Server	distributed computing model where desktop "clients" can access and share information resources from multiple "servers"
Collapsed backbone	LAN architecture in which the subnetwork interconnection is concentrated within a switching hub or router
Collision	concurrent Ethernet transmissions from two or more devices on the same segment
Concentrator	device used in a LAN to combine transmissions from a cluster of nodes; often called a hub
CRC	cyclical redundancy check; a procedure used to check for errors in data transmission
DAS	dual-attach station; a type of node that offers two connections, with each connection going to another node or concentrator
Desktop switch	a switching hub designed to support a single MAC address, or client on each port
EIFO	Ethernet in, FDDI out
Ethernet	networking standard for transmitting data at 10Mbps
Fast Ethernet	networking standard for transmitting data at 100Mbps
FDDI	fiber distributed data interface; networking standard for 100Mbps fiber-optic LANs; widely used as a backbone technology to interconnect several Ethernet or Token Ring networks
Fiber-optic cable	cable made of thin glass threads that carry data in the form of light pulses
Firmware	software routines that are permanently written onto read-only memory
Full-duplex	communications technique that allows two-

	way, simultaneous transmission between two devices on a single 10BASE-T segment
Gigabit Ethernet	networking standard for transmitting data at 1000Mbps
half-duplex	a communications technique in which one device on a segment transmits while the other receives, then the process is reversed
HTTP server	software that serves HTML documents and associated files requested by clients such as Web browsers
Hub	a device providing a common connection among computers in a star-type network; all ports within a hub share the total bandwidth of the domain
IEEE 802	set of Institute of Electrical and Electronic Engineers standards for defining methods of access and control on LANs
In-band	transmission of control information within the bandwidth frequencies that transfer a network's data
LAN	local area network; a network where computers are connected in close proximity, such as in the same building or office park; a system of LANs connected at a distance is called a wide-area network (WAN)
MAC address	media access control address; a hardware address that uniquely identifies each node of a network
MIB	management information base; a database containing the names of all the information resources a management program might need

Master	any device that controls another device; controlled devices are called slaves
Mbps	millions of bits per second
MDA	media-dependent adapter
OEM	original equipment manufacturer; a manufacturer that typically purchases components from other manufacturers, integrates them into its own products, and sell the products to the public
Out-of-band	transmission of control information outside the bandwidth frequencies that transfer a network's data
PCI	peripherals component interface; a standard developed by Intel Corporation that defines a local bus system; most modern PCs include a PCI bus in addition to a more general ISA expansion bus
Port density	number of ports, either physical or logical, per network device
Port mirroring	advanced feature of switching hubs that allows one port's MAC layer data to be replicated to another port for monitoring by a network analyzer
Power-Link(tm)	group of port connections between switches that allow traffic loads to be balanced among these connections to increase the total bandwidth of the interconnection; this term is trademarked by NPI
RMON	remote monitoring; a network management protocol that allows network information to be gathered at a single workstation
Runt	any frame that is shorter than the minimum valid size of 64 bytes; runt frames are

	usually caused by collisions or faulty network interface cards
Segment	section of a network that is bounded by bridges, routers, hubs, or switches; dividing an Ethernet into multiple segments is a common way to increase bandwidth on a LAN
SAS	single-attach station; a type of node that allows for a single cable connection to a concentrator
Slave	any device that is controlled by another device; the controlling device is called a master
SNMP	simple network management protocol; a standard for gathering statistical data about network traffic and the behavior of network components; SNMP uses management information bases (MIBs), which define what information is available from any manageable network device
Spanning-tree algorithm	a process used to eliminate redundant data routes and increase network efficiency
Stand-alone	type of device that does not require support from another device to function
Star-type stack	stack arrangement with the components connected to one another via a centralized hub
Store-and-forward	switching feature where the receiving port receives the entire incoming frame and stores it in the buffers before forwarding it to the destination port; unlike cut-through switching, this method checks for runts and

	error frames and forwards only the good packets to the destination
Switch	device that filters and forwards packets between LAN segments
Switch motherboard	main board inside a switch where the switching circuitry is located
Switching fabric	a term used to specify the maximum bandwidth of a switch at the backplane
UTP	unshielded twisted pair; cabling with wires that are twisted around each other; the individual wires are uninstalled
VAR	value-added reseller; a company that buys hardware and software and resells it to the public with added services such as user support
VLAN	virtual LAN; a process that defines network segment membership through the use of software; VLANs allow the network administrator to resegement the network without physically rearranging the devices or network connections
WAN	wide-area network; a network that uses telecommunications technology to connect computers or networks over long distances
Wire speed	the ability to handle the fastest rate of traffic that a generator can deliver without dropping packets; on a 100Mbps connection, wire-speed traffic is 148,809 packets per second using 64 byte frames or 8,127 packets per second using 1,518 byte frames
Work - Group	collection of computers that are grouped for sharing resources such as data and peripheral