



100BASE-T4 and 100BASE-TX

Fast Ethernet solution for UTP cabling

Introduction

As the use of high performance PCs and servers and high-bandwidth applications increases, the use of high throughput networking grows. The most popular method for high performance PC and server connections is 100BASE-T Fast Ethernet. Fast Ethernet provides a high performance solution at a low cost and simple integration with 10BASE-T Ethernet.

With broad usage of Fast Ethernet products has come the need to support a broader range of network cabling types. Many

buildings contain unshielded twisted pair (UTP) wiring which was installed many years ago. While the majority of desktop PC connections are made with Category 5 UTP (data grade UTP) cabling, many connections are made with Category 3 or Category 4 UTP (voice-grade UTP) cabling.

3Com now provides a complete set of products which support 100Mbps Fast Ethernet on Category 3, Category 4, or Category 5 UTP cable.

100BASE-T Fast Ethernet Cabling Standards Overview

100BASE-T Fast Ethernet is an IEEE 802.3 international standard for Ethernet at 100Mbps. Fast Ethernet utilizes the same protocol (CSMA/CD Media Access Control) as standard 10BASE-T Ethernet. This high speed performance along with 3 cable type specifications (100BASE-TX, 100BASE-T4, 100BASE-FX) allow 100Mbps connections across most types of network cabling

100BASE -T4 (see diagram)

The 100BASE-T4 specification defines 100Mbps Ethernet transmission across Category 3, Category 4, or Category 5 UTP cable at distances up to 100 meters. 100BASE-T4 uses 4 pairs (8 wires) in the wire bundle.

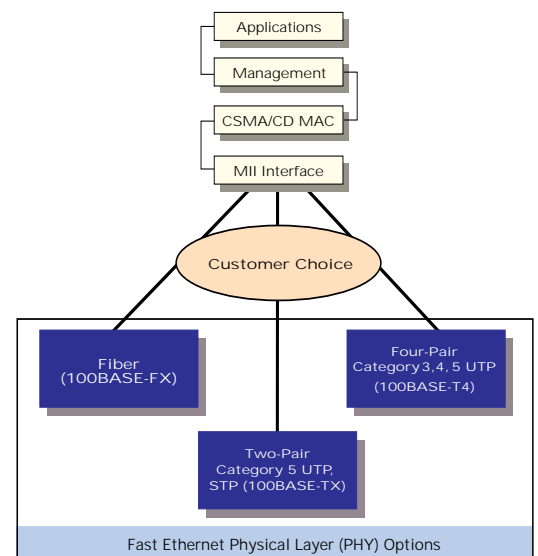
100BASE-TX (see diagram)

The 100BASE-TX specification defines 100Mbps Ethernet transmission across Category 5 UTP cable and Type 1 STP cable at distances up to 100 meters. 100BASE-TX uses 2 pairs (4 wires) in the

wire bundle. Most 100BASE-TX products support category 5 UTP cabling only.

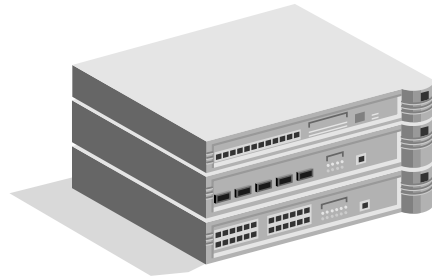
100BASE-FX (see diagram)

The 100BASE-FX specification defines 100Mbps Ethernet transmission across 62.5/125 micron multimode fiber at distances up to 412 meters (distances up to 2 K supported with full duplex 100BASE-FX). 100BASE-FX uses 2 strands of multi-mode fiber.



TX - T4 - FX Integration

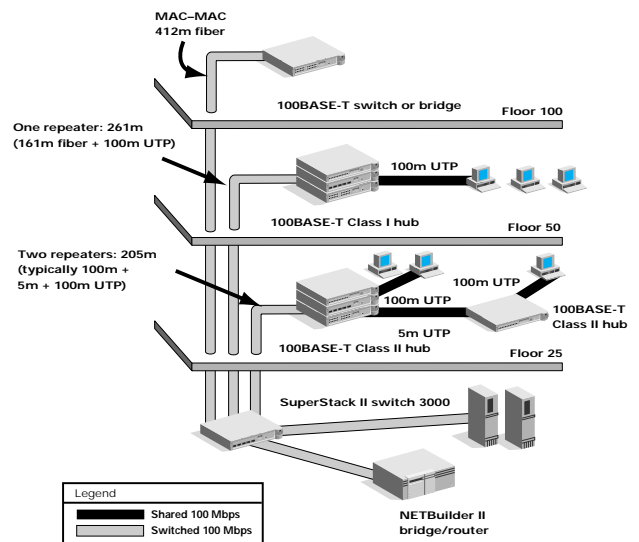
Connections between 100BASE-T4, 100BASE-TX, and 100BASE-FX are made easily through the 3Com SuperSack II Hub 100 stackable Fast Ethernet hub. Bridging or routing is not required to connect together these technologies. The FMS 100 allows stackability of 100BASE-TX and 100BASE-T4 units with centralized SNMP and RMON Management using the SuperSack II Hub 100 Management Unit.



100BASE-T Topology Rules

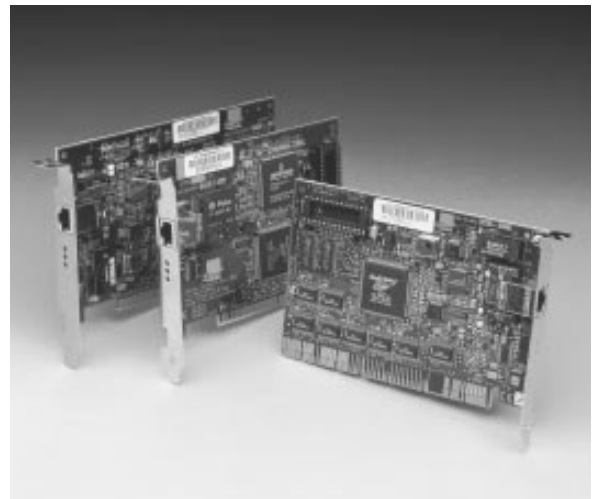
When creating a Fast Ethernet network, it is important to follow the IEEE 802.3 topology rules. One main difference between 10BASE-T Ethernet and 100BASE-T Fast Ethernet is the use of hub (or repeater) classifications. Fast Ethernet repeaters are either Class I or Class II repeaters depending on how many “hops” or stacks of repeaters are allowed in one segment, or collision domain. A Class I repeater supports 1 repeater or repeater stack in one segment. A Class II repeater supports up to 2 repeater or repeater stacks (“hops”) in one segment. Most 100BASE-T4 repeaters are Class I repeaters.

This diagram shows the topology rules for constructing a Fast Ethernet network. All distances shown for UTP cable are the same for 100BASE-TX and 100BASE-T4.



100BASE-T4 Product Overview

■ Fast EtherLink 10/100BASE -T4 PCI Network Interface Card (3C595-T4) 3Com combines the highest performance 10BASE-T and 100BASE-T NIC into one solution with 100BASE-T4 support. With bus mastering technology and 3Com’s patented Parallel Tasking, Fast EtherLink provides the highest throughput available in either 100BASE-T or 100BASE-T4 modes. Fast EtherLink has a single RJ-45 UTP connector which allows automatic configuration and connection to either 10BASE-T or 100BASE-T4 networks. No hardware or software changes are needed to move between network speeds - Fast EtherLink automatically senses the speed of the hub. Fast EtherLink also comes in versions for 10/100BASE-TX PCI or 10/100BASE-TX EISA. All 3Com NIC come with integrated network management and a lifetime guarantee.



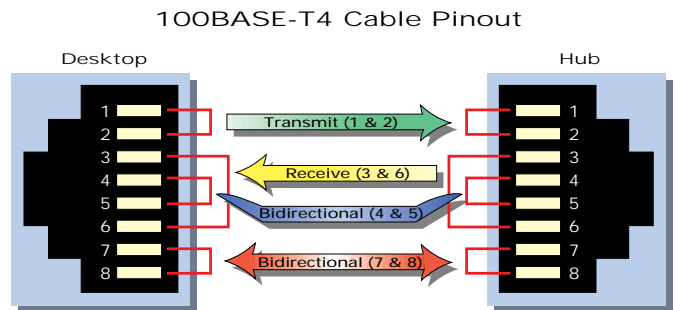
Category 3/Category 4/Category 5 UTP Cable Comparison

Category 5 UTP cable is the most common type of UTP cable in use today for data communications, such as for 10BASE-T Ethernet. Many installations, however, have some or all desktop PCs connected using Category 3 or Category 4 UTP. The chart below compares these common cable types:

Cable Type	Manufac. Specs	Common Prod.#	E-net/Fast E-net Distance	E-net/F-net spec.
Cat. 3 UTP	up to 20 MHz	AT&T 1010/20100 AT&T 2001c/2001d	100 meters	10BASE-T(2 pairs) 100BASE-T4(4 pairs)
Cat. 4 UTP	up to 33 MHz	AT&T 1261/2261 AT&T 2014a	100 meters	10BASE-T(2 pairs) 100BASE-T4(4 pairs)
Cat. 5 UTP	up to 100 MHz	AT&T 1061 AT&T 2061	100 meters	10BASE-T(2 pairs) 100BASE-TX(2 pairs) 100BASE-T4(4 pairs)

100BASE-T4 Connector Pin Out

100BASE-T4 utilizes 4 pairs of wire in a Category 3, 4 or 5 UTP bundle. 100BASE-T4 connections from a hub to a PC are normally straight-through

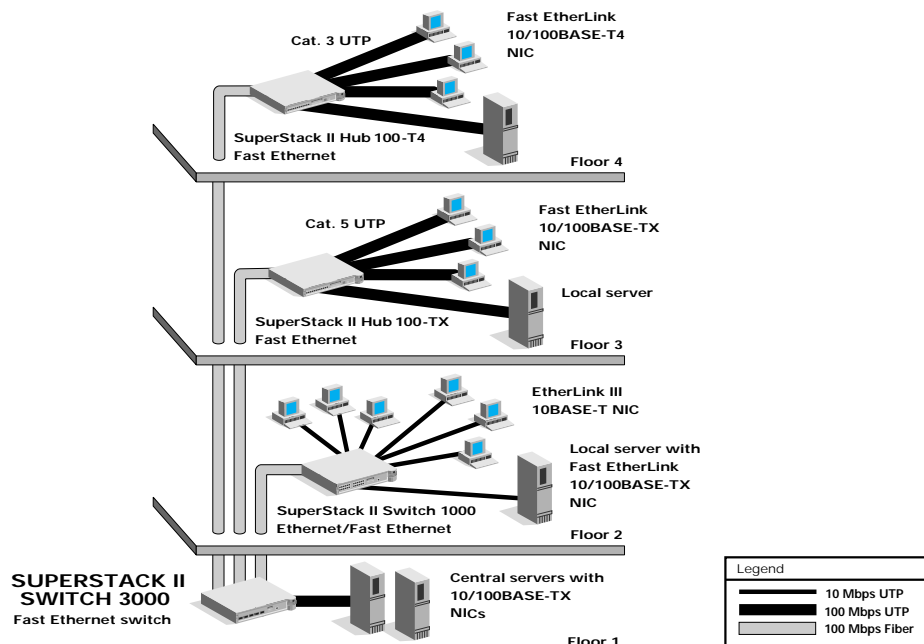


Note: Like 10BASE-T, 100BASE-T transmit/receive crossover is in the hub. RJ-45 connectors are shown here.

100BASE-T4 Recommended Usage

Specification Comparison:

Specification	Advantages	Disadvantages	Recommended Usage
100BASE-T4	-Category 3,4 UTP support -Reliable in unknown UTP environment	-No support for full duplex -Requires 4 pairs in wire bundle	-Cat. 3 or 4 UTP PC or server connections -Mixed category 3/4/5 UTP environment -Cat. 5 envir. w/ components of unknown quality
100BASE-TX	-Most common equipment type -Support for full duplex	-No support for cat. 3 or 4 UTP -Requires all components be Cat. 5 certified	-Cat. 5 UTP PC or server connections -Any connection which may use full duplex Fast Ethernet
100BASE-FX	-Longer distances -Fiber support	-Expensive -Not common for PC or server connections	-Any fiber connection -Long distance connections





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SuperStack II Hub 100-T4 Hub (3C250-T4)

3Com adds Category 3 UTP support to the market leading SuperStack II Hub 100. Fully stackable with SuperStack II Hub 100-TX, the Hub 100-T4 integrates support for Category 3 and Category 4 UTP into new and existing Fast Ethernet workgroups. Along with full 100Mbps throughput over Category 3, 4 or 5 UTP cabling, optional SNMP and RMON management minimizes troubleshooting efforts and enhances network availability. Through 3Com's SuperStack system architecture, the FMS 100 family provides the industry's first manageable, stackable, integrated TX/T4 solutions.



Other Fast Ethernet Products from 3Com:

Product	Description	Order #	Interfaces Supported
Fast EtherLink 10/100BASE-TX PCI	10/100BASE-TX PCI NIC	3C595-TX	10BASE, 100BASE-TX
Fast EtherLink 10/100BASE-TX EISA	10/100BASE-TX EISA NIC	3C597-TX	10BASE, 100BASE-TX
SuperStack II Hub 100 TX	Stackable TX hub	3C250-TX/I	100BASE-TX, 100BASE-FX
SuperStack II Hub 100 TX Transceiver Module	optional transceiver module	3C252-TX	100BASE-TX
SuperStack II Hub 100 FX Transceiver Module	optional transceiver module	3C262-FX	100BASE-FX
SuperStack II Hub 100 Management Unit	SNMP Management	3C215	N/A
SuperStack II Switch 1000	10-100 workgroup switch	3C16900, 3C16901	10BASE-T, 100BASE-TX, 100BASE-FX, ATM
SuperStack II Switch 3000	100 Mbps switch	3C16942, 3C16941	10BASE-T, 100BASE-TX, 100BASE-FX, ATM
LANplex 2500	10-100 enterprise switch	3C250100, 3C250200	10BASE-T, 100BASE-TX, 100BASE-FX, FDDI, ATM
NetBuilder II	multiprotocol router	3C6000, 3C6001 3C6002	many (inc. 100BASE-TX and 100BASE-FX)

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