MegaBit[SM]
LANbook

USWEST

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What You Need to Read

If you are self-installing MegaBit Services on a local area network in your home or business, start with *Chapter 1: Welcome to the MegaBit LANbook* on page 7.

If a U S WEST technician set up your local area network and installed MegaBit Services, start with *Chapter 6: How to Secure your LAN with MegaBit Services* on page 34.

Important! Regardless of whether you or a U S WEST technician installed your LAN and MegaBit Services, you are responsible for the security of your LAN with MegaBit Services.

If you need to make changes to your LAN with MegaBit Services, see the appropriate appendix:

■ *How to Add a Telephone Set or Fax* on page 52

■ *How to Add a Computer* on page 55

■ *How to Move your LAN with MegaBit Services* on page 56

■ *How to Configure the Modem with a Static IP Address* on page 57

■ *How to Use an Analog Modem* on page 59

What this LANbook Covers

■ Cisco 675 digital modem (not other types of digital modems)

■ Ethernet local area networks (not other types of networks such as Token Ring)

■ Peer-to-peer networks (not server-based networks)

C O N T E N T S

C H A P T E R   1

Welcome to the MegaBit LANbook

The *MegaBit LANbook* explains how to set up a network of two or more computers in your home or business and give all the computers in the network high-speed digital access to the Internet.

MegaBit Services from U S WEST provides the high-speed digital access over your existing telephone line. With MegaBit Services, many computers can share the high-speed access, with up to 10 computers accessing the Internet at the same time. All this can happen while you are using a phone or fax machine on the same telephone line.

Fast Internet Access for your Network

A network of computers in your home or business with a high-speed MegaBit Services digital connection to the Internet has three parts.

1   A *local area network* (LAN) connects the computers in your home or business to each other and to the Cisco 675 digital modem. See *Local Area Networks* on page 10 for more information.

2   *MegaBit Services* provides a high-speed digital connection over your phone line from the Cisco 675 digital modem in your home or business through a U S WEST Central Office to a MegaCentral Internet Service Provider (ISP). See *MegaBit Services* on page 15 for more information.

3   The MegaCentral ISP provides access to the Internet. See *Internet Access* on page 19 for more information.

Figure 1 shows these three parts.

Figure 1
High-speed Internet access: a LAN plus MegaBit Services plus a MegaCentral ISP

7
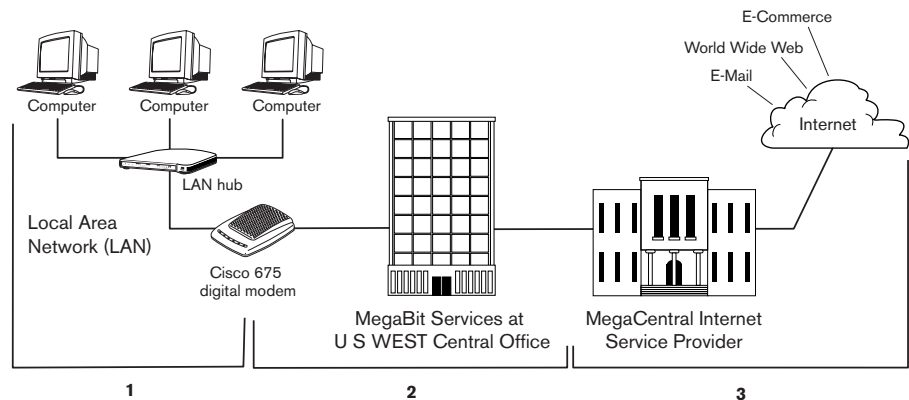
Why does Figure 1 show the Internet as a cloud?

The Internet is a large, global network of computers. Data traveling from one computer to another over the Internet can take many different paths. The cloud is a way of showing that once data goes into the Internet, the path it travels can vary. If Figure 1 showed multiple ISPs, each one would connect to the Internet cloud.

What Does a LAN with MegaBit Services Offer?

A LAN with MegaBit Services gives you all the benefits of a regular LAN. For example, all the computers on your network that are running the same operating system (Windows or Macintosh) can share data, software applications, and hardware such as printers. By sharing, you can save money on hardware and software.

In addition, a LAN with MegaBit Services lets all the computers (Windows and Macintosh) on your network share one high-speed digital connection to the Internet. By sharing, you can save money on the high-speed digital connection.

In some situations – depending on how you configure the Internet connection to your LAN – you can also share a single Internet account with a MegaCentral ISP.

Does sharing a high-speed Internet connection make access to the Internet slower?

In most situations, no. Here's why. Computers break data down into very small pieces called packets and then send each packet over the Internet separately. One computer doesn't tie up an Internet connection until it's finished sending or receiving data. Instead, all the computers on your network send and receive their small packets of data at the same time. With a high-speed Internet connection that can send and receive lots of small packets quickly, several computers can share Internet access without reducing the access speed. The Cisco 675 digital modem supports up to 10 Internet connections at one time.

If several computers are sending or receiving video or other extremely large data files, access to the Internet may be slow even with a high-speed connection.

MegaBit Services provides different speed options for different data transmission needs. See "How to Choose Cost-Effective MegaBit Service" on page 17 for more information.

Who Supports your LAN with MegaBit Services?

When you have a problem with your LAN with MegaBit Services, it's important to know whether the problem is in your LAN, your MegaBit Services connection, or your Internet access. Who you contact for help with the problem depends on where the problem is.

■ You support your LAN. When you install a LAN, you choose someone in your business or family to be the *network administrator,* the person who maintains your LAN. That person is responsible for solving problems with your LAN.

If you need help with basic LAN with MegaBit Services needs such as connecting the Cisco 675 digital modem to your LAN or configuring the Cisco 675 digital modem for your LAN, call U S WEST MegaBit Services technical support at 1-800-247-7285.

Please note: This is Tier 1 support for basic LAN with MegaBit Services needs only. You are responsible for maintaining your LAN.

For help with advanced LAN support needs such as setting up and maintaining file and printer sharing and other LAN tasks that don't involve the Cisco 675 digital modem, contact your network administrator or a local data networking company. See *Who to Call* on page 48*.*

■ U S WEST supports your high-speed MegaBit Services connection. For help, contact MegaBit Services technical support at 1-800-247-7285.

■ Your Internet Service Provider supports your connection to the Internet. For help, contact your ISP.

How to Troubleshoot Problems on page 41 explains how to identify where the problem is occurring.

Figure 2
Three different organizations support your LAN with MegaBit Services.

Problem here? Contact your network administrator.

Problem here? Contact U S WEST MegaBit LAN support.

Problem here? Contact your ISP's technical support.
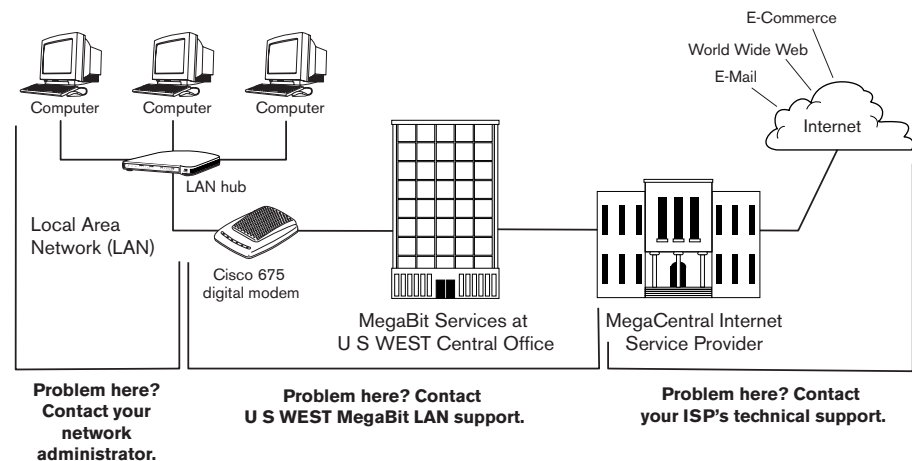
Local Area Networks

This chapter explains how to set up a local area network in your home or business.

A Network Lets You Share Resources

A local area network lets you share data, software applications, and hardware as well as an Internet connection. The simple network in Figure 3 lets three Windows computers share a monochrome laser printer, a color inkjet printer, and the high-speed Cisco 675 digital modem. In addition, any of the computers can access data and run software applications on the other computers' hard disks.

Figure 3

Local area network with three Windows computers, two printers, and the Cisco 675 digital modem

Computer #1
network administrator

Printer #1
laser printer

LAN hub

Computer #2

MegaBit Services
Cisco 675
digital modem

Computer #3

Printer #2
color inkjet
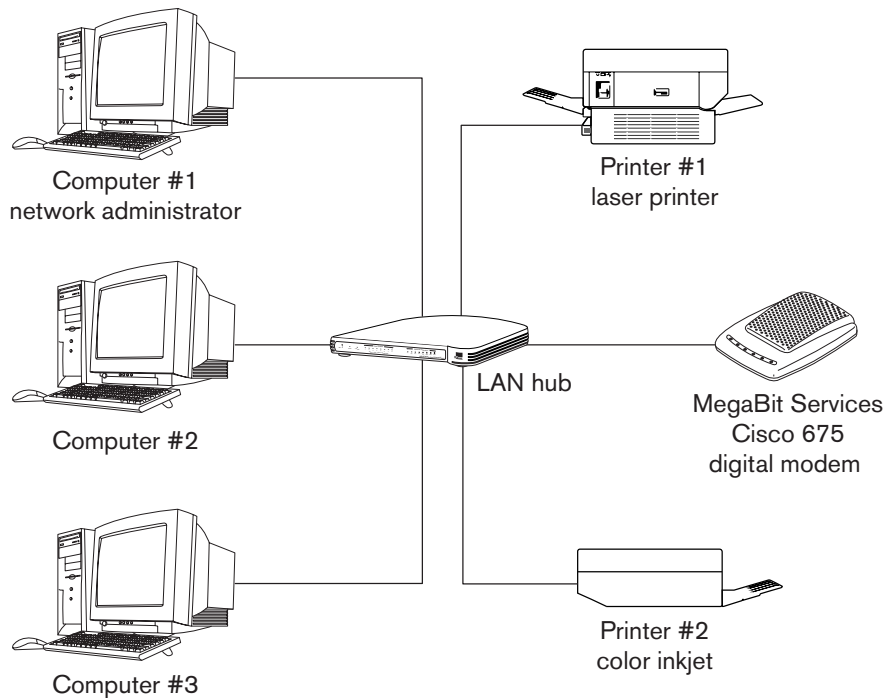
Can Windows and Macintosh computers share data and hardware?

Yes. You'll need special networking software. See "Who to Call" on page 48 for help if you want to set up this kind of network.

Ethernet

There are many different types of networks with different topologies and networking protocols. For homes and small businesses, the easiest network to set up and manage is usually an Ethernet network. An Ethernet network is also very economical. ***MegaBit Services supports Ethernet LANs only.***

Ethernet is a very common local area network wiring scheme. *10Base-T Ethernet* transmits data at 10 megabits per second (Mbps). *100Base-TX Fast Ethernet* transmits data at 100 Mbps.

10Base-T and 100Base-TX Ethernet connections use two-pair *twisted pair* cabling with RJ-45 connectors. Two pairs of wires in the RJ-45 connector connect to each port on the local area network.

Figure 4
RJ-45 connector

Network Protocols

A network protocol is a formal description of messages to be exchanged and rules to be followed for two or more systems to exchange information. For example, TCP/IP is a suite of protocols used to exchange information over the Internet. Ethernet supports a variety of protocols, including TCP/IP. ***MegaBit Services supports TCP/IP only.***

How to Set Up an Ethernet LAN

To set up an Ethernet network, you need:

- An Ethernet network interface card (NIC) for each hardware device

- An Ethernet hub

- Ethernet cables

- Figure 5 shows these three components.

Figure 5
Ethernet components: network interface card, hub, and cables

Ethernet hub with eight ports

Ethernet network interface card (NIC) in computer

Ethernet cable (Category 5) with RJ-45 connectors
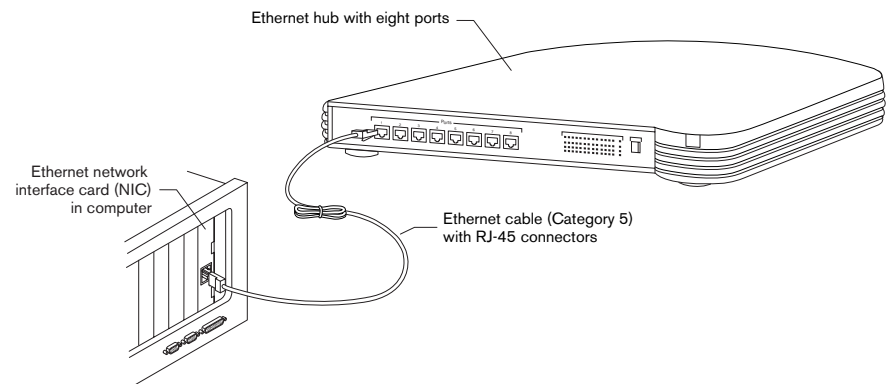
Network Interface Cards

To attach to an Ethernet network, a device must have an Ethernet network interface card (NIC), often called a network adapter. See Figure 6.

Figure 6
Typical Ethernet network interface card

Many new Windows computers and all recent Macintosh computers have a built-in Ethernet card. If a computer doesn't have a built-in Ethernet card, you must add one.

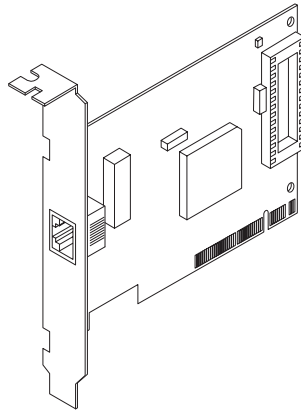Not all printers and peripherals support Ethernet. If the printer or peripheral does support Ethernet, it may have a built-in Ethernet card, or you may need to purchase a special Ethernet card. For information about whether your peripheral supports Ethernet, consult the documentation that came with the peripheral.

Ethernet Hub

You connect all the devices including the Cisco 675 digital modem to a port on the Ethernet hub. This type of connection is called a *star* topology because the connections to all the devices radiate out from a central hub. In Figure 3 on page 10, for example, data travels from Computer #1 to Computer #2 through the Ethernet hub, and data travels from Computer #3 to Printer #1 through the hub.

The hub, which is also called a *repeater,* connects all the devices and regenerates data signals to improve the quality of the transmission. Another feature of a hub is that if a device fails, transmissions between the other devices in the Ethernet network are not affected by the failure.

Figure 7
Typical eight-port Ethernet hub
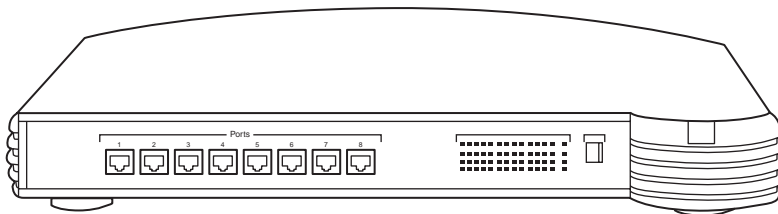
Unmanaged and Managed Hubs

For most home and small business networks, an *unmanaged* Ethernet hub is the best choice. *Managed* hubs cost more and have additional features that are useful in large networks.

Ports

To determine the number of ports you need on your hub, count the number of devices – computers, printers, other peripherals, and the Cisco 675 digital modem – you want to connect to the Ethernet network. Add at least one or two ports for future growth. Remember, networks almost always grow. They seldom shrink.

If you outgrow your hub, there are two ways to add ports:

■ Replace the hub with a new hub that has more ports.

■ Keep the hub and establish an uplink connection to a new hub.

Types of Hubs and Network Speed

Three types of Ethernet hubs work with the Cisco 675 digital modem:

■ 10Base-T Ethernet

■ 100Base-TX Fast Ethernet

■ Auto-negotiating 10Base-T and 100Base-TX

10Base-T hub: All the devices you connect to it must be 10Base-T or auto-sensing 10Base-T and 100Base-TX. The maximum speed of any Ethernet connection will be 10 Mbps.

100Base-TX hub: All the devices you connect to it must be 100Base-TX or auto-sensing 10Base-T and 100Base-TX. The maximum speed of any Ethernet connection will be 100 Mbps.

Auto-negotiating 10Base-T and 100Base-TX hub: All the devices you connect to it must be 10Base-T, 100Base-TX, or auto-sensing 10Base-T and 100Base-TX. When the hub connects two 100Base-TX devices, the maximum speed of the connection will be 100 Mbps. When the hub connects two 10Base-T devices or a 10Base-T device and a 100Base-TX device, the maximum speed of the connection will be 10 Mbps.

Auto-negotiating 10Base-T and 100Base-TX hubs cost somewhat more than 10-Base-T or 100Base-TX hubs, but they allow you to connect 10Base-T devices while taking advantage of the faster connection speed of 100Base-TX devices.

Most new Windows computers with built-in Ethernet cards and all new Macintosh computers support 100Base-TX Fast Ethernet.

The Cisco 675 digital modem is auto-sensing: it can transmit data at either 10 Mbps or 100 Mbps. For more information about the modem, see *Cisco 675 Digital Modem* on page 16.

Cables

Ethernet cables are two-pair twisted pair, and they are assigned categories. Category 1 is the lowest quality. Use Category 5 (CAT-5) cabling, which supports both Ethernet and Fast Ethernet. Don't use any cabling lower than Category 5.

Maximum Cable Length

When installing Ethernet cables, measure the distance between the hub and the device you are connecting to it and buy the closest length possible. Common lengths are 1, 2, 3, 5, 7, 10, 14, 20, 25, 50, and 100 feet.

The maximum recommended distance for an Ethernet connection is 300 feet (90 meters).

When making an uplink connection between hubs, the cable should not exceed 15 feet (5 meters).

Straight-through Cables and Crossover Cables

When you connect a device to an Ethernet hub, always use a straight-through or "straight" cable. Never connect a computer or peripheral to a hub with a crossover cable. Crossover cables are used to connect two Ethernet devices to each other without going through a hub. If you're not sure whether an Ethernet cable is straight or crossover, examine the colors of the wires in the RJ-45 connectors. If the colors are in the same sequence, the cable is "straight." If the colors are in different sequences, the cable is crossover. If you ask for "Ethernet cables" without specifying the type, you'll get straight-through cables.

Peer-to-Peer and Server-based LANs

An Ethernet LAN with computers and peripherals connected to an Ethernet hub (see Figure 3 on page 10) is a *peer-to-peer* LAN. In this architecture, any of the computers connected to the hub can be a file or print *server* – a computer that provides services or resources to other computers on a network. ***MegaBit Services supports peer-to-peer LANs only.***

In a *server-based* LAN, an Internet server such as a web server or an e-mail server is connected between the Cisco 675 digital modem and the Ethernet hub.

Need help with your LAN?

MegaBit Services

MegaBit Services uses broadband technology over a digital subscriber line to provide customers with a dedicated high-speed connection to the Internet.

Broadband technology can send signals from two or more independent networks (for example, voice and data networks) over a single cable. Signals from one network do not interfere with signals from another network because the signals are sent at different frequencies.

A *digital subscriber line* (DSL) is a telephone line that can transmit high-speed digital data in addition to analog data such as voices. With a digital subscriber line, you can surf the Internet and talk on the phone at the same time because the data and voice signals are sent at different frequencies.

Figure 8
A MegaBit Services digital subscriber line connects your Cisco 675 digital modem to a U S WEST Central Office.

Cisco 675
digital modem

MegaBit Services at
U S WEST Central Office

MegaCentral Internet
Service Provider
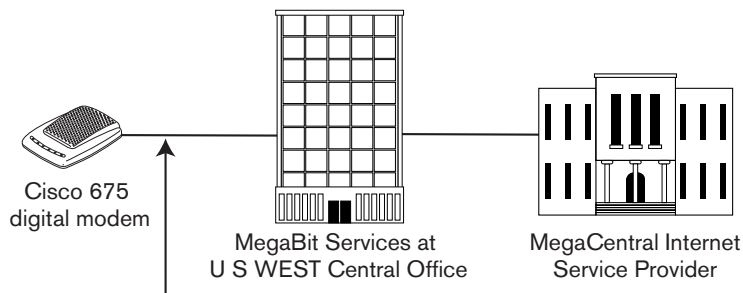
Digital subscriber line

With DSL technology, MegaBit Services can provide data transfer rates of up to 7 Mbps downstream (from the Internet to you) and 1 Mbps upstream (from you to the Internet). The basic 256 kilobits per second (Kbps) service costs about the same as a second phone line to your home or office.

Do I need a separate phone line for my MegaBit Services connection?

No. If you currently have a second line that you use to access the Internet, you can disconnect that line. Or you can use it for another purpose such as a second voice line or a dedicated fax line.

Can I get MegaBit Services anywhere?

No. MegaBit Services are not available to all homes and businesses. Your home or business must be served by a MegaBit Service-equipped U S WEST central office, and there is a distance limitation (currently, around two miles). Some homes and businesses do not qualify for the service because of other telephone line requirements. U S WEST is constantly researching and testing new technologies to improve MegaBit Services availability.

Digital Subscriber Lines

A digital subscriber line can provide multiple connections to the Internet using rate-adaptive DSL.

Multiple Connections to the Internet

By connecting your LAN to the Internet using your DSL connection, you can have multiple computers accessing the Internet at the same time. You do not need multiple phone lines to connect multiple computers.

As long as your computers remain connected on your LAN, they can maintain a continuous, uninterrupted connection to the Internet. All of the computers on your LAN can take advantage of your DSL high-speed connection to transmit large files in minutes.

Rate-Adaptive DSL

MegaBit Services uses *Rate Adaptive DSL (RADSL)* technology, which keeps the quality of the digital transmissions within specified parameters.

Using RADSL, U S WEST can offer MegaBit Services at speeds ranging from 256 Kbps to 7 Mbps.

In comparison, people who use a "dial-up" analog modem to access the Internet over an analog phone line usually connect at speeds ranging from 14.4 to 56 Kbps. A computer user with the slowest MegaBit Services speed option (256 Kbps) can send and receive data over the Internet nine times faster than a computer user with a 28.8 Kbps "dial-up" connection to the Internet.

Cisco 675 Digital Modem

When you subscribed to MegaBit Services, you chose to purchase a Cisco 675 digital modem. It connects your local area network to your Internet Service Provider over the MegaBit Services digital subscriber line.

Figure 9
Cisco 675 digital modem
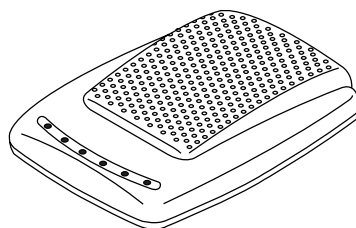
The Cisco 675 digital modem can get up to 99% more capacity out of your DSL phone line without interfering with your regular phone service. You can surf the World Wide Web and download files at speeds that are up to 125 times faster than standard 56 Kbps modems. These ultra-fast speeds are possible because DSL's digital coding allows the Cisco 675 digital modem to both send and receive digital signals. A standard dial-up modem must convert an analog signal to digital for downstream traffic and digital to analog for upstream traffic.

How to Choose Cost-Effective MegaBit Service

To choose the MegaBit Services speed option that best meets your home or business needs, you should determine the maximum number of computers that will be:

■ Connected to the Internet at the same time

■ Sending or receiving large amounts of data *at the same time*

Remember that most Internet use – such as surfing the World Wide Web, sending e-mail messages, and transacting business online – involves small amounts of data in short bursts. When several computers are transmitting small amounts of data, they can share a 256 Kbps MegaBit Services connection without any noticeable loss in speed.

On the other hand, if several computers on your LAN will be transmitting large data files *at the same time,* speed will decrease.

Use Table 1 to select the best MegaBit Service speed option for your needs.

For each **Speed Option,** Table 1 shows:

■ **Max. Rec.** column – the maximum recommended number of computers

■ **1 User, 2 Users,** through **10 Users** columns – the minimum throughput in Kbps when from one to ten computers are transmitting data over the MegaBit Services connection

Table 1: MegaBit Services Support for Concurrent Internet Users

Speed Option	Max. Rec.	1 User	2 Users	3 Users	4 Users	5 Users	6 Users	7 Users	8 Users	9 Users	10 Users
256 Kbps	4	256	128	64	32	-	-	-	-	-	-
512 Kbps	8	512	256	128	64	32	16	8	4	-	-
768 Kbps	12	768	384	192	96	48	24	12	6	3	1
1 Mbps	16	1000	500	250	125	62	31	16	8	4	2
4 Mbps 1 Mbps	24	4000 1000	2000 500	1000 250	500 125	250 62	125 31	62 16	31 8	16 4	8 2
7 Mbps 1 Mbps	24	7000 1000	3500 500	1750 250	875 125	437 62	219 31	109 16	55 8	27 4	14 2

Follow these steps:

1 Go to the **Users** column for the maximum number of computers that will be sending large amounts of data *at the same time.*

2 Go down the column until you find the minimum acceptable throughput.

3 Note which speed option supports that throughput.

For example, three computers will be sending large data files at the same time every afternoon, and the minimum acceptable throughput is 128 Kbps. Go to the **3 Users** column and find the value closest to 128 Kbps. Go to the left end of the row and note the value in the **Speed Option** column: 512 Kbps. This is the MegaBit Services speed option that provides the minimum acceptable throughput in this example.

Notes

■ The two fastest MegaBit Service speed options – 4/1 Mbps and 7/1 Mbps – transmit data downstream (from the Internet to your network) and upstream (from your network to the Internet) at different speeds. They transmit data downstream at either 4 Mbps or 7 Mbps, and they transfer data upstream at 1 Mbps.

■ The faster the MegaBit service speed, the closer your home or business must be to the U S WEST MegaBit Services central office. For example, your telephone line may qualify for the 256 Kbps service but not for any of the faster services, or your telephone line may qualify for some of the faster services but not all of them.

■ 256 Select MegaBit Service is *not* recommended for local area networks because it is not an "always on" service, and it is not compatible with the Cisco 675 digital modem.

■ The Cisco 675 digital modem supports up to 10 simultaneous Internet connections. You can connect any number of computers to your LAN, but a maximum of 10 can connect to the Internet at one time.

Internet Access

To access the Internet from your LAN over a MegaBit Services digital subscriber line, you must choose a *MegaCentral* Internet Service Provider, that is, an ISP that supports MegaBit Services.

A MegaCentral ISP is independent from MegaBit Services, but the ISP has the equipment required to support high-speed access through a MegaBit Services DSL connection.

Figure 10
A MegaCentral ISP supports
MegaBit Services.

MegaBit Services DSL support
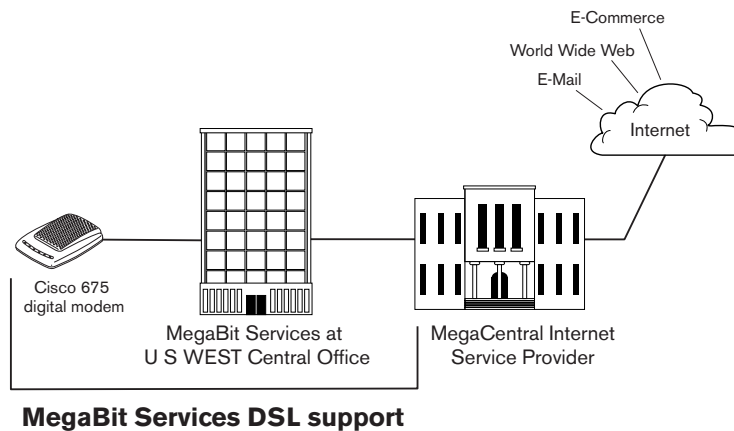
For a list of ISPs that support MegaBit Services connections, go to the MegaBit Services web site:

http://uswest.com/products/dsl/isplist.html

How to Choose an Internet Service Provider

When you choose a MegaCentral ISP, you should be take into account all of the following items:

- Monthly cost and access time charges (if any)

- E-mail addresses

- Web hosting

- Type of DSL connection

- Internet Protocol addressing

Monthly Cost and Access Time Charges

ISPs offer many different service packages and options. For example, a package might include multiple e-mail accounts and web site hosting. To get the best value for your home or business, you must determine what options you need.

Your MegaBit Services DSL connection to your ISP is "always on" – the users on your LAN won't have to dial in to the ISP each time that they want to make a connection. In most situations, you won't be charged for access time. But make sure you know whether the ISP has any access time restrictions.

E-Mail Accounts

You can get Internet service with one e-mail account or with multiple e-mail accounts. Do you want each computer on your LAN to have a separate e-mail address, or will one e-mail address be sufficient? Many ISPs provide e-mail account packages – for example, a set of five e-mail addresses for a fixed fee.

Web Hosting

Many ISPs provide web *hosting,* that is, they let you put your web site on their computer. With an "always on" connection, you can put your web site on one of the computers on your LAN, and the web site will always be available to people surfing the Internet. But there are certain advantages to letting your ISP host your web site.

One of the biggest advantages is **security.** When you have a web site on your computer, it is very easy for someone on the Internet to access your computer for malicious purposes. You may end up paying more to secure the computer hosting your web site than you would pay to have your ISP host the web site. For more information, see *How to Secure your LAN with MegaBit Services* on page 34.

Some ISPs provide free web site hosting; others charge for this service. Most ISPs that provide free web site hosting restrict the amount of data that you can put on their computer.

Type of DSL Connection

Your Cisco 675 digital modem connects to the Internet differently from a dial-up analog modem. You can connect in either routing mode or bridging mode. Some ISPs offer both types of connections; others offer only one type. For more information, see *Routing and Bridging Mode Connections* on page 21.

Internet Protocol Addresses

To connect to the Internet, each computer on your LAN must have an Internet Protocol (IP) address. The IP address is used to communicate with the computer. Your ISP can assign IP addresses in different ways. For more information, see *Dynamic and Static IP Addresses* on page 22.

Routing and Bridging Mode Connections

The type of DSL connection you have with your ISP is very important because it determines:

■ How you configure your Cisco 675 digital modem

■ How you access the Internet

■ What you need to do to add another computer to your LAN

The Cisco 675 digital "modem" is actually a router that can also serve as a bridge; it sends digital signals across a telephone line equipped with MegaBit Services.

A *router* is a device that makes decisions about which path network or Internet traffic will follow. It uses a routing protocol to gain information about the network, and it uses procedures to choose the best route.

A *bridge* is a device that connects two or more physical networks and forwards data between them.

If you are connecting to your ISP in routing mode, you are using the Cisco 675 modem as a router. If you are connecting to your ISP in bridging mode, you are using the Cisco 675 modem as a bridge.

Routing Mode with Point-to-Point Protocol

When you have a Point-to-Point Protocol (PPP) connection to your ISP, your Cisco 675 digital modem serves as a router. A router can separate two networks. For example, a router lets you have a private network for your home or business that is separate from the Internet The Internet is a giant, world-wide network of computers. The router uses a routing table move data between the two networks.

Point-To-Point-Protocol (PPP) provides router-to-router and host-to-network connections.

Advantages

■ You can set up your own private network separate from the Internet.

■ You have better security and support for multi-point connections.

■ If a faulty network interface card or another source starts broadcasting large amounts of bad data, the router contains this "broadcast storm" so that it is not sent to all the computers on the network.

Disadvantages

■ In a small network, there are no disadvantages to routing mode with PPP.

Bridging Mode

When you have a bridging mode connection to your ISP, your Cisco 675 digital modem serves as a bridge.

In bridging mode, the Cisco 675 digital modem behaves like a wire connecting a personal computer directly to an Internet Service Provider's network. A bridge connects two networks together, creating one overall network.

Advantages

■ A bridging mode connection is easy to implement in a small network.

Disadvantages

■ A bridge makes your LAN part of the Internet's giant network of computers. You shouldn't use file and print sharing because everyone on the Internet will be able to see the computers on your LAN that are sharing files and printers. In addition, you can't scale your LAN to meet your networking needs.

■ Because your LAN doesn't have a router as a single point of contact with the outside world, all administrative traffic from the Internet is sent to each computer on your LAN.

■ If a faulty network interface card or another source starts broadcasting large amounts of bad data, this "broadcast storm" is sent to all the computers on the network, disabling them.

Dynamic and Static IP Addresses

To connect to the Internet through routing mode, your router must have an IP address, and each computer on your LAN must have an IP address. To connect to the Internet through bridging mode, each computer on your LAN must have an IP address. There are two methods that your ISP can use to assign your router or your computers an IP address:

■ Dynamic IP addressing

■ Static IP addressing

What are IP addresses?

An Internet Protocol (IP) address is a way to address a computer on the Internet by using a number in the form of x.x.x.x where x is a number from 0 to 255. For example, a computer might have the Internet address 172.28.78.111 and another computer might have the Internet address 172.28.78.112. Any packet of data with an IP address of 172.28.78.111 will be sent to the same computer. The first three numbers in the IP address indicate a destination on the Internet. All data packets whose IP addresses start with 172.28.78, for example, might be sent to your ISP. The last number in the IP address indicates routing within the destination. For example, data packets with IP address 172.28.78.111 might go to one of your ISP's customers, and data packets with IP address 172.28.78.167 might go to another customer.

What's the difference between public and private IP addresses?

Public IP addresses are the external "street addresses" for data sent across the Internet. No two destinations can have the same public IP address. Private IP addresses are internal to a network. Your LAN must have at least one public IP address, and that IP address can't conflict with any other public IP address. But the computers on your LAN can have private IP addresses that conflict with public IP addresses. The private IP addresses are converted to your LAN's public IP address before data is sent across the Internet.

Dynamic IP Addressing

When your ISP assigns your router or your computer a dynamic IP address, the address changes each time that you connect to the ISP's server. For example, the first time that you connect, the server might assign your router or computer the IP address 172.28.78.23. The next time that you connect, the server might assign your router or computer the IP address 172.28.78.115.

Dynamic Host Configuration Protocol (DHCP)

DHCP is a protocol for assigning dynamic IP addresses to devices on a network. This simplifies network administration because the software keeps track of IP addresses rather than requiring you to manage the task.

Advantages

■ You can quickly add a new computer to your LAN. You don't need to manually assign network settings such as IP address, default gateway, and DNS servers to the computer, and you don't need to reconfigure the Cisco 675 digital modem. This simplifies network administration because the software keeps track of the IP addresses.

Disadvantages

■ You have less control over IP addresses because they are change every time that you connect to your ISP.

■ If you want to host a web site from your personal computer, a static IP address is required.

Static IP Addressing

A static IP address doesn't change. If you have the static IP address 172.28.78.111, your router or your computer uses that IP address each time that you connect to your ISP.

There are two ways that you can get static IP addresses:

■ Your ISP can assign you static IP addresses.

■ You can purchase registered IP addresses. This is usually done through your Internet Service Provider. The organization responsible for the administration and registration of IP address numbers in North and South America is the American Registry for Internet Numbers (ARIN).

If you purchase a registered IP address, that IP address is yours. You can take it with you when you change ISPs. If your ISP assigns you a static IP address, your IP address will change when you change ISPs.

Advantages

■ Static IP addresses provide you with better control of public IP addresses because the IP addresses don't change.

■ If you want to host a web site from your personal computer, a static IP address is required.

Disadvantages

■ Assigning a static IP address to a computer is more complicated than using dynamic IP addresses. When you add a new computer to a network, you must manually assign its network settings, like IP address, default gateway, and domain name server DNS).
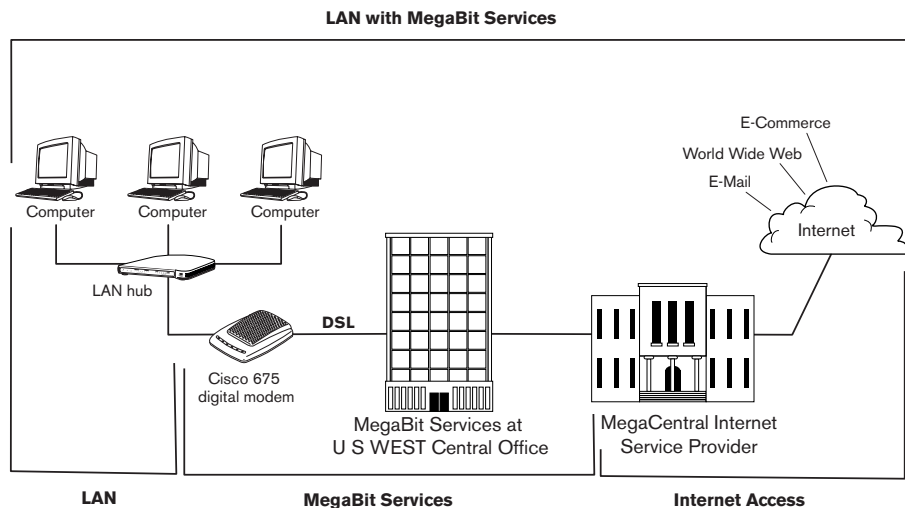
Your LAN with MegaBit Services – Fast Internet Access

Sharing your MegaBit Services high-speed access line by connecting the Cisco 675 digital modem to your LAN is a great way to maximize the value and economics of Internet access.

Figure 11
LAN with MegaBit Services: LAN plus MegaBit Services plus Internet access

How to Set Up and Operate a LAN with MegaBit Services

How you set up your LAN with MegaBit Services depends on how you are connecting your LAN to your Internet Service Provider. You **must** know:

■ The type of connection to your ISP – routing mode with PPP or bridging mode. For more information, see *Routing and Bridging Mode Connections* on page 21.

■ Whether your ISP is using dynamic or static Internet Protocol (IP) addressing. For more information, see *Dynamic and Static IP Addresses* on page 22.

Once you know this information, you're ready to set up your LAN with MegaBit Services. Go to either:

■ *Routing Mode Setup* on page 26

■ *Bridging Mode Setup* on page 29

Routing Mode Setup

If you are connecting to your ISP through routing mode with a DHCP server – which assigns dynamic IP addresses – see *Routing Mode with a DHCP Server and Network Address Translation* below.

If you are connecting to your ISP through routing mode with static IP addresses, see *Routing Mode with Multiple Static IP Addresses* on page 28.

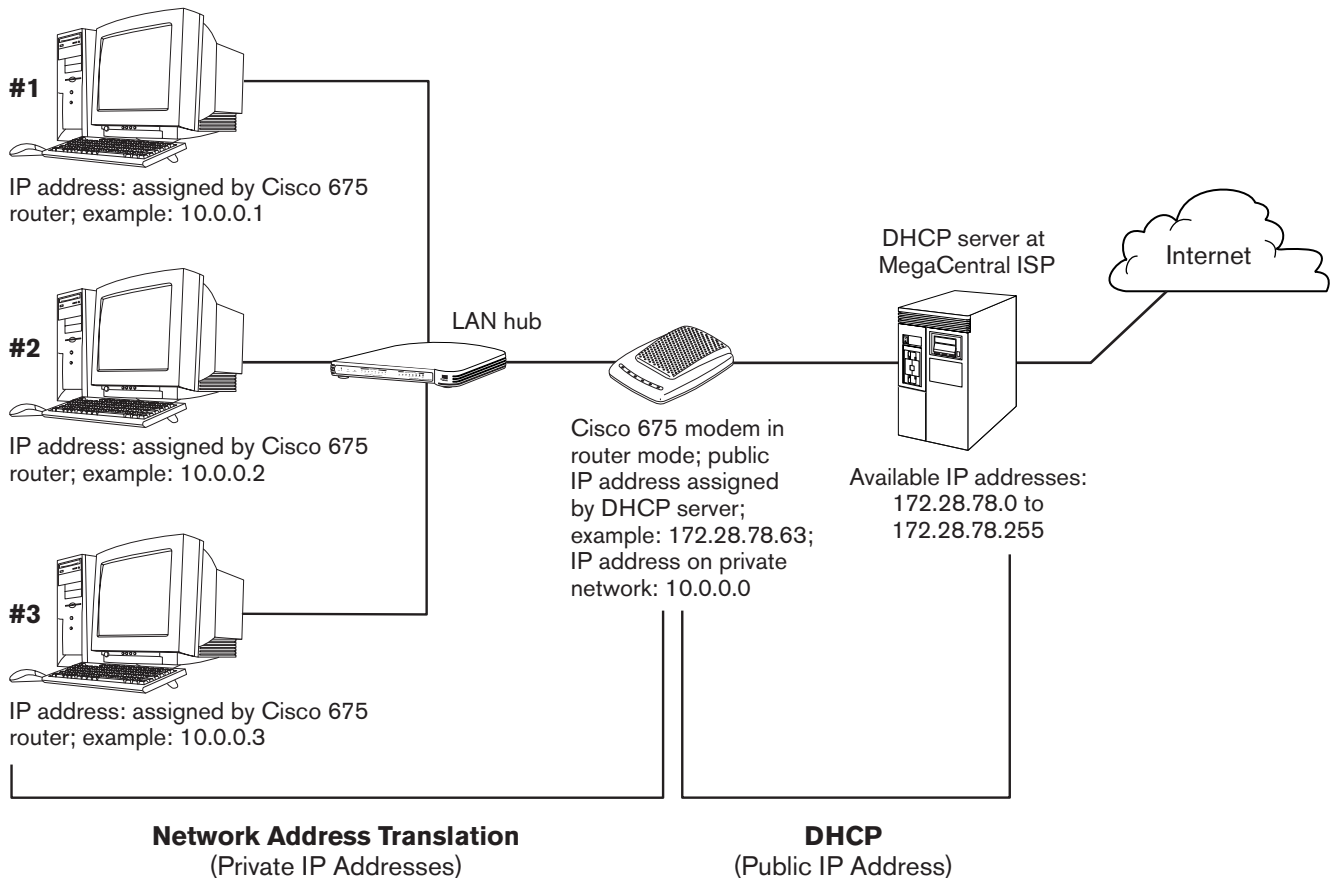## Routing Mode with a DHCP Server and Network Address Translation

In this mode, each time your Cisco 675 digital modem connects to the Internet, your ISP's DHCP server assigns your Cisco 675 digital modem – which is serving as a router – a dynamic IP address.

Figure 12 shows a network of three computers connected to the Internet through a routing mode connection to a DHCP server. The Cisco 675 digital modem uses Network Address Translation to assign internal IP addresses to the computers on the LAN.

This is the easiest way to configure a LAN with MegaBit Services!

Figure 12
Network of three computers and routing mode connection to ISP's DHCP server

#1

IP address: assigned by Cisco 675 router; example: 10.0.0.1

#2

IP address: assigned by Cisco 675 router; example: 10.0.0.2

#3

IP address: assigned by Cisco 675 router; example: 10.0.0.3

LAN hub

Cisco 675 modem in router mode; public IP address assigned by DHCP server; example: 172.28.78.63; IP address on private network: 10.0.0.0

DHCP server at MegaCentral ISP

Internet

Available IP addresses: 172.28.78.0 to 172.28.78.255

Network Address Translation
(Private IP Addresses)

DHCP
(Public IP Address)

Remember! All public IP addresses are examples. Your public IP addresses will be different.

Figure 12 shows an example of how an ISP's DHCP server might assign a dynamic public IP address to the Cisco 675 router and how the router would assign private IP addresses to three computers in a LAN. The ISP's DHCP server has a pool of public IP addresses from 172.28.78.0 to 172.28.78.255 that it can assign to customers.

In the example, the DHCP server assigns the Cisco 675 router the public IP address 172.28.78.63 when the router receives a request from computer #1 (the network administrator's computer) to connect to the Internet. The Cisco 675 router uses Network Address Translation to assign computer #1 the private IP address 10.0.0.1. When the next computer (for example, computer #2) requests an Internet connection, the Cisco 675 router assigns it private IP address 10.0.0.2. When the third computer (for example, computer #3) requests an Internet connection, the Cisco 675 router assigns it private IP address 10.0.0.3. The router assigns itself the private IP address 10.0.0.0.

Network Address Translation

Network Address Translation (NAT), an Internet standard, allows the Cisco 675 router to use one set of private IP addresses for internal traffic on its LAN and a second set of public IP addresses for external traffic. The Cisco 675 router makes all necessary IP address translations.

NAT serves two purposes:

- It provides simple network security by hiding internal IP addresses from other people on the Internet.

- It lets multiple computers on your LAN use a single public IP address. (Public IP addresses are becoming more and more scarce.) The Cisco 675 router assigns each computer a private IP address. Because you are using the private IP addresses within your home or business LAN, it doesn't matter whether other companies and organizations on the Internet are using the same IP addresses.

When the Cisco 675 router uses NAT, it is "configurationless" because you don't need to assign IP addresses to the computers on your LAN.

Configuration Instructions

- The Cisco 675 digital modem must be configured for routing mode with a DHCP server. If you are self-installing MegaBit Services on your LAN, the Cisco 675 digital modem should be pre-configured and ready to "plug and play."

  If you must configure the Cisco 675 digital modem manually, see "Set the Modem to PPP for a DHCP Server" in your *MegaBit Services Cisco 675 User Guide,* which is provided with your modem.
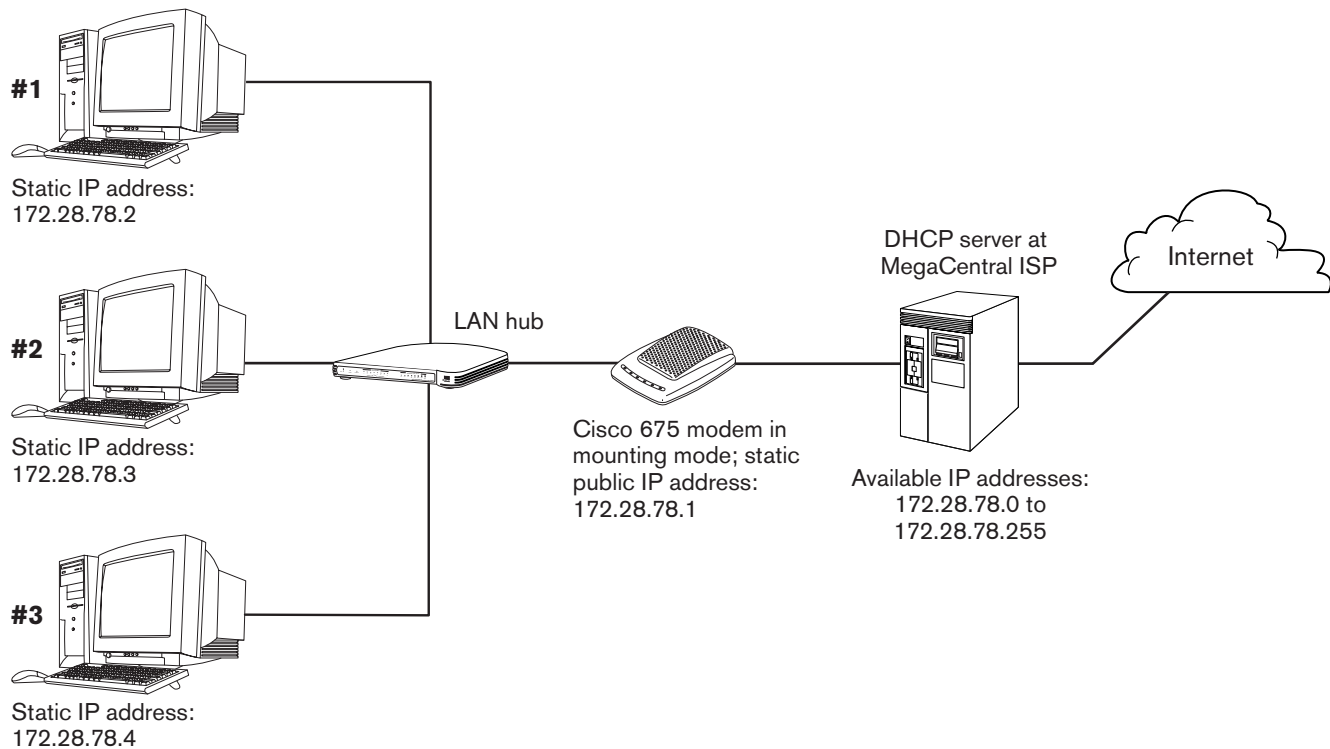
- You must configure each computer on your LAN for dynamic IP addresses through a DHCP server. See "Check for and Configure TCP/IP" in your *MegaBit Services Cisco 675 User Guide.*

Routing Mode with Multiple Static IP Addresses

In this mode, you acquire a public IP address for each computer on your network, either by registering them or by purchasing them through your ISP. (See page 23.) Figure 13 shows a network of three computers connected to the Internet through a routing mode connection and three static public IP addresses.

Figure 13

Network of three computers that have static public IP addresses and routing mode connection to ISP's server

#1

Static IP address:
172.28.78.2

#2

Static IP address:
172.28.78.3

#3

Static IP address:
172.28.78.4

LAN hub

Cisco 675 modem in mounting mode; static public IP address: 172.28.78.1

DHCP server at MegaCentral ISP

Available IP addresses: 172.28.78.0 to 172.28.78.255

Internet

Remember! All public IP addresses are examples. Your public IP addresses will be different.

Figure 13 shows an example of three static public IP addresses assigned to three computers in a LAN. The ISP in this example has a pool of public IP addresses from 172.28.78.0 to 172.28.78.255, and the ISP sells static public IP addresses in groups of 2, 8, or 16. You have acquired eight public IP addresses: 172.28.78.0, through 172.28.78.7. The subnet mask is 255.255.255.248.

The IP network address is 172.28.78.0, and the IP broadcast address is 172.28.78.7.

Here is how you have assigned the remaining six static IP addresses:

- 172.28.78.1: Cisco 675 router

- 172.28.78.2: computer #1

- 172.28.78.3: computer #2

- 172.28.78.4: computer #3

- 172.28.78.5 and 172.28.78.6: available for additional computers

Because computer #1 has been assigned the static public IP address 172.28.78.2, every time it connects to the ISP's server, it connects with the same public IP address: 172.28.78.2.

Configuration Instructions

■ You must manually configure the Cisco 675 digital modem for routing mode with multiple static IP addresses. See *How to Configure the Modem with a Static IP Address* on page 57.

■ You must configure each computer on your LAN with a static IP address and a subnet mask, DNS entries, and a default gateway. See "Check for and Configure TCP/IP" in your *MegaBit Services Cisco 675 User Guide,* which is provided with your modem.

For example, to configure Computer #1 in Figure 13 on page 28, you would use these values:

  ▪ IP address 172.28.78.2

  ▪ Subnet mask 255.255.255.248

  ▪ DNS entries provided by your ISP

  ▪ Gateway 172.28.78.1 (the Cisco 675 router's IP address)

Bridging Mode Setup

If you are connecting to your ISP through bridging mode with a DHCP server – which assigns dynamic public IP addresses – see *Bridging Mode with a DHCP Server* below.

If you are connecting to your ISP through bridging mode with static public IP addresses, see *Bridging Mode with Static IP Addresses* on page 31.

Bridging Mode with a DHCP Server

In this mode, each time a computer in your local area network connects to the Internet, your ISP's DHCP server assigns it a dynamic public IP address. Figure 14 shows a network of three computers connected to the Internet through a bridging mode connection to a DHCP server.
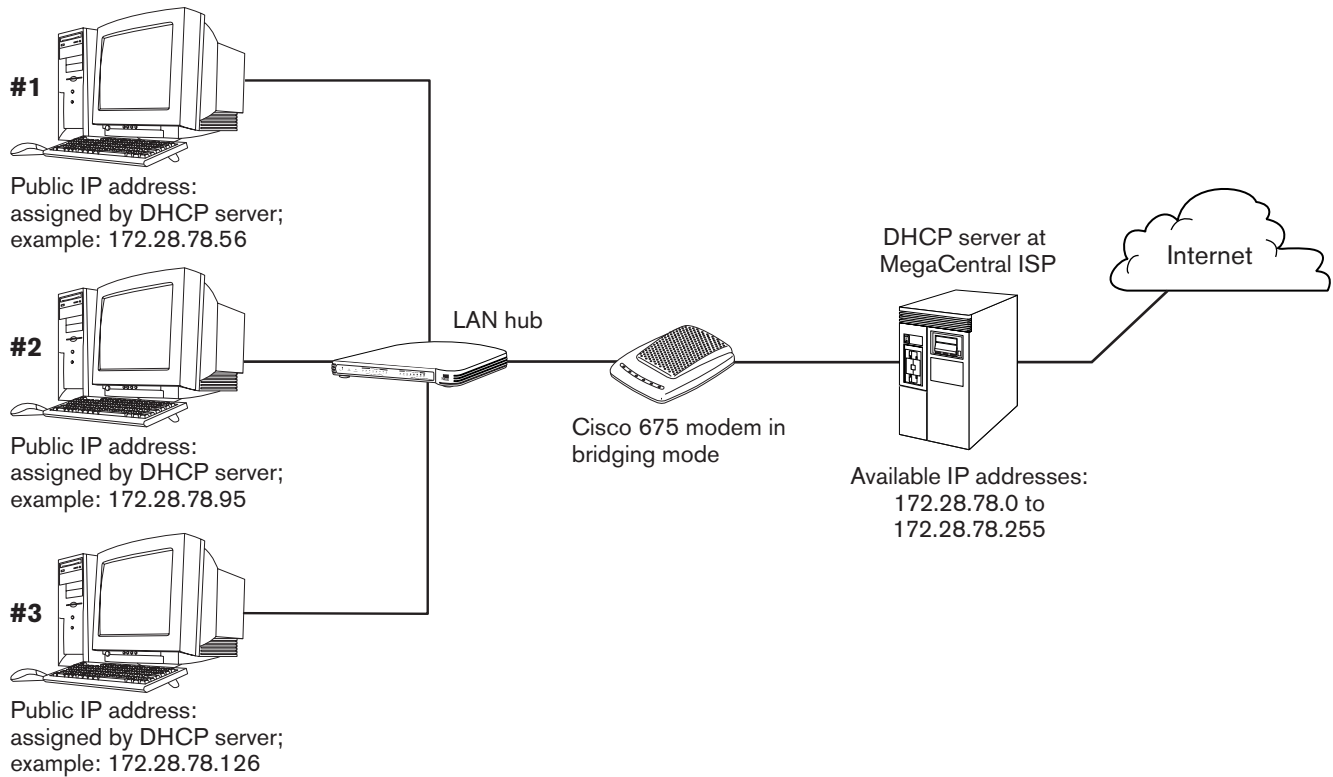
Please note: your ISP may charge you extra for multiple public IP addresses if you are configuring your Cisco 675 digital modem in bridging mode and using public IP addresses dynamically assigned by the ISP's DHCP server.

Remember! All public IP addresses are examples. Your public IP addresses will be different.

Figure 14 shows an example of how an ISP's DHCP server might assign dynamic public IP addresses through a bridging mode connection to three computers in a LAN. The ISP's DHCP server has a pool of public IP addresses from 172.28.78.0 to 172.28.78.255 that it can assign to customer's computers.

Figure 14
LAN with three computers and bridging mode connection to ISP's DHCP server

#1

Public IP address:
assigned by DHCP server;
example: 172.28.78.56

#2

LAN hub

DHCP server at
MegaCentral ISP

Internet

Public IP address:
assigned by DHCP server;
example: 172.28.78.95

Cisco 675 modem in
bridging mode

#3

Available IP addresses:
172.28.78.0 to
172.28.78.255

Public IP address:
assigned by DHCP server;
example: 172.28.78.126

In the example, the DHCP server assigns computer #1 the public IP address 172.28.78.56 when it connects to the Internet. When computer #2 connects to the Internet, it receives public IP address 172.28.78.95. When computer #3 connects to the Internet, it receives public IP address 172.28.78.126. When a computer disconnects from the Internet and then reconnects, the DHCP server assigns it another public IP address. For example, if any computer in the network disconnects and then reconnects, it might be assigned the public IP address 172.28.78.12.

Configuration Instructions

■ The Cisco 675 digital modem must be configured for bridging mode. If you are self-installing MegaBit Services on your LAN, the Cisco 675 digital modem should be pre-configured and ready to "plug and play."

　If you must configure the Cisco 675 digital modem manually, see "Set the Modem to Bridging Mode" in your *MegaBit Services Cisco 675 User Guide,* which is provided with your modem.

■ You must configure each computer on your LAN for dynamic IP addresses through a DHCP server. See "Check for and Configure TCP/IP" in your *MegaBit Services Cisco 675 User Guide.*

Bridging Mode with Static IP Addresses

In this mode, you acquire a public IP address for each computer on your network, either by registering them or by purchasing them through your ISP. Figure 15 shows a network of three computers connected to the Internet through a bridging mode connection and three static public IP addresses.

Figure 15
LAN with three computers that have static public IP addresses and bridging mode connection to ISP's server
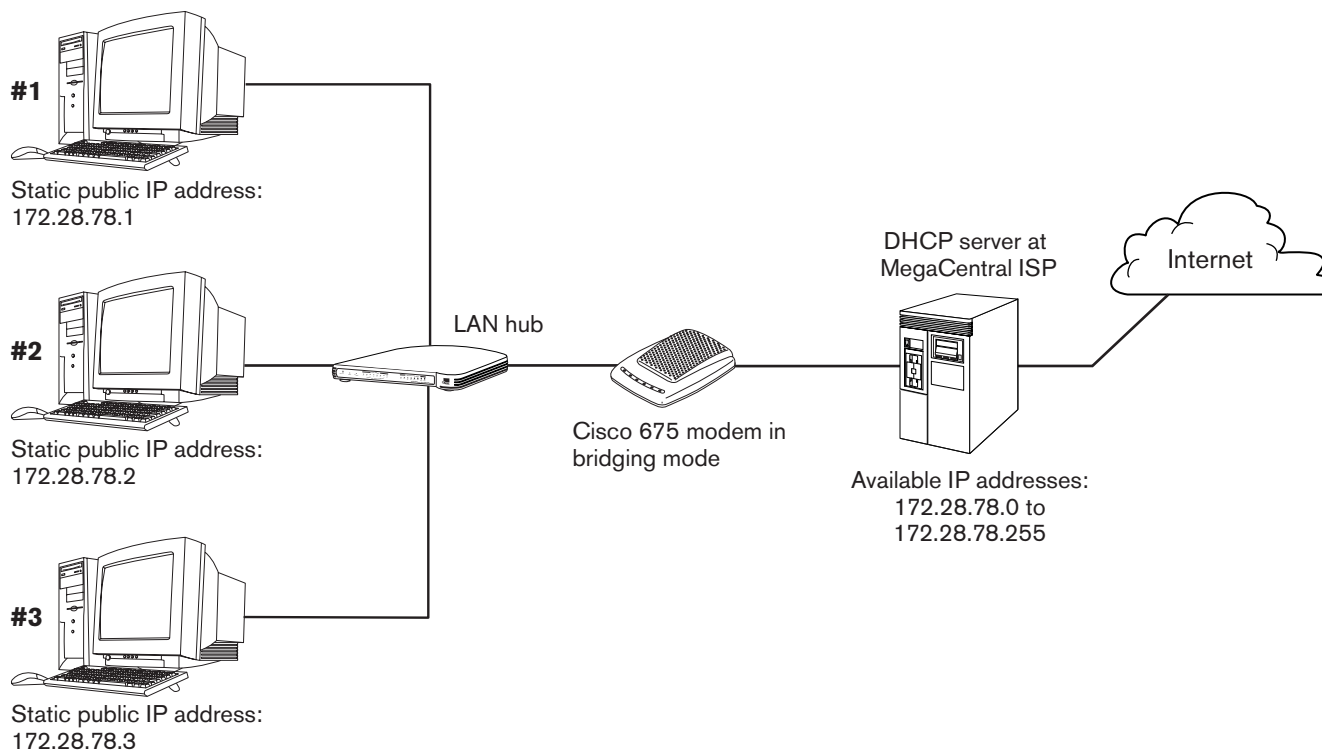
#1
Static public IP address:
172.28.78.1

#2
Static public IP address:
172.28.78.2

#3
Static public IP address:
172.28.78.3

LAN hub

Cisco 675 modem in bridging mode

DHCP server at MegaCentral ISP

Available IP addresses:
172.28.78.0 to
172.28.78.255

Internet

Remember! All public IP addresses are examples. Your public IP addresses will be different.

Figure 15 shows an example of three static public IP addresses assigned to three computers in a LAN. The ISP in this example has a pool of public IP addresses from 172.28.78.0 to 172.28.78.255, and the ISP sells static public IP addresses in groups of 2, 8, or 16. You have acquired eight public IP addresses: 172.28.78.0, through 172.28.78.7. The subnet mask is 255.255.255.248.

The IP network address is 172.28.78.0, and the IP broadcast address is 172.28.78.7.

Here is how you have assigned the remaining six static IP addresses:

■ 172.28.78.1: computer #1

■ 172.28.78.2: computer #2

■ 172.28.78.3: computer #3

■ 172.28.78.4, 172.28.78.5, and 172.28.78.6: available for additional computers

Because computer #1 has been assigned the static public IP address 172.28.78.1, every time it connects to the ISP's server, it connects with the same public IP address: 172.28.78.1.

Configuration Instructions

■ The Cisco 675 digital modem must be configured for bridging mode. If you are self-installing MegaBit Services on your LAN, the Cisco 675 digital modem should be pre-configured and ready to "plug and play."

If you must configure the Cisco 675 digital modem manually, see "Set the Modem to Bridging Mode" in your *MegaBit Services Cisco 675 User Guide,* which is provided with your modem.

■ You must configure each computer on your LAN with a static IP address and a subnet mask, DNS entries, and a default gateway. See "Check for and Configure TCP/IP" in your *MegaBit Services Cisco 675 User Guide.*

For example, to configure Computer #1 in Figure 15 on page 31, you would use these values:

  ▪ IP address 172.28.78.1

  ▪ Subnet mask 255.255.255.248

  ▪ DNS entries provided by your ISP

  ▪ Gateway provided by your ISP

Setup Overview

Follow these high-level steps to set up your peer-to-peer Ethernet LAN with MegaBit Services.

1 Choose a network administrator.

2 Set up your LAN:

  ▪ Make sure all computers and peripherals have Ethernet cards.

  ▪ Connect all computers, printers, and other peripherals to the Ethernet hub with Category 5 twisted pair cables.

  See *Local Area Networks* on page 10.

3 Test your LAN to make sure all the networking features such as file sharing and printer sharing work.

4 Install microfilters on all telephone sets connected to your MegaBit Services telephone line.

  See "Install Microfilters on Telephone Sets" in your *MegaBit Services Cisco 675 User Guide,* which is provided with your modem. For more information, see *How to Add a Telephone Set or Fax* on page 52 of this book.

5 Follow the "Configuration Instructions" for your LAN with MegaBit Services setup:

- *Routing Mode with a DHCP Server and Network Address Translation* on page 27

- *Routing Mode with Multiple Static IP Addresses* on page 29

- *Bridging Mode with a DHCP Server* on page 30

- *Bridging Mode with Static IP Addresses* on page 32

6 Connect the Cisco 675 digital modem's cables.

Follow the instructions in "Connect the Modem's Cables" in your *MegaBit Services Cisco 675 User Guide* with one exception:

- Don't use the yellow Ethernet crossover cable to connect the Cisco 675 digital modem to a single computer. Instead, use a standard Ethernet "straight" cable to connect the Cisco 675 digital modem to one of the ports on your LAN hub.

7 Load the Cisco 675 Commander software on your network administrator's computer.

See "Install the Cisco 675 Commander" in your *MegaBit Services Cisco 675 User Guide.*

The Commander software is required on one computer only. Do **not** install it on all computers.

Windows 95: Install the Winsock2 update. See your *MegaBit Services Cisco 675 User Guide.*

8 Use the Cisco 675 Commander software on your network administrator's computer to connect to your ISP.

See "Connect to your ISP or Network" in your *MegaBit Services Cisco 675 User Guide.*

9 Use the Cisco 675 Commander software on your network administrator's computer to check your MegaBit Services connection.

See "Check your MegaBit Connection" in your *MegaBit Services Cisco 675 User Guide.*

10 Important! Secure your network. Don't allow others on the Internet access to your computers. You could lose all your data or someone could access sensitive personal or business information.

See *How to Secure your LAN with MegaBit Services* on page 34.

11 Manage your network.

See *How to Manage your LAN with MegaBit Services* on page 39.

If you have a PPP (routing mode) connection to your ISP, your network administrator must use the Cisco 675 Commander to log in to your ISP with your PPP user ID and password before the other computers on your LAN can access the Internet.

33

How to Secure your LAN with MegaBit Services

You are responsible for the security of your computer network and the Cisco 675 digital modem when you access the Internet.

This chapter explains what you need to know to keep your LAN with MegaBit Services secure.

The Internet is a giant network of computers all over the world. When any computer on your network is connected to the Internet, it can exchange information with any other computer on the Internet. This lets you send e-mail, transact business, surf the World Wide Web, download files, and buy products and services online, but it also makes your computer network vulnerable to attack from persons intent on doing malicious mischief.

Unless you control access to your computer network, someone on the Internet can access the information on your computers, and they can damage or destroy that information.

I didn't worry about security with my dial-up modem. What's different about digital modems?

Dial-up access to the Internet provides a fair amount of security because you're connected to the Internet only while you're dialed in. When you disconnect, someone on the Internet can no longer access your computer. In contrast, a connection through the Cisco 675 digital modem is "always on." Your LAN with MegaBit Services is always connected to the Internet. If you haven't secured your LAN, people on the Internet always have access to your computers.

How to Get Security Information

The MegaBit Services web site explains how to secure your computers and the Cisco 675 digital modem from attack.

Go to **http://www.uswest.com/products/data/dsl/security.html**

Or go to **http://www.megaspeed.com** and click the *MegaBit Services Security* topic.

You'll learn about:

- Modem security
- Computer operating system security
- Physical system security

The following paragraphs briefly discuss some major security concerns and explain the risks involved.

Please go to the MegaBit Services web site for full explanations and instructions.

Figure 16

Security options for your LAN with MegaBit Services

LAN with MegaBit Services
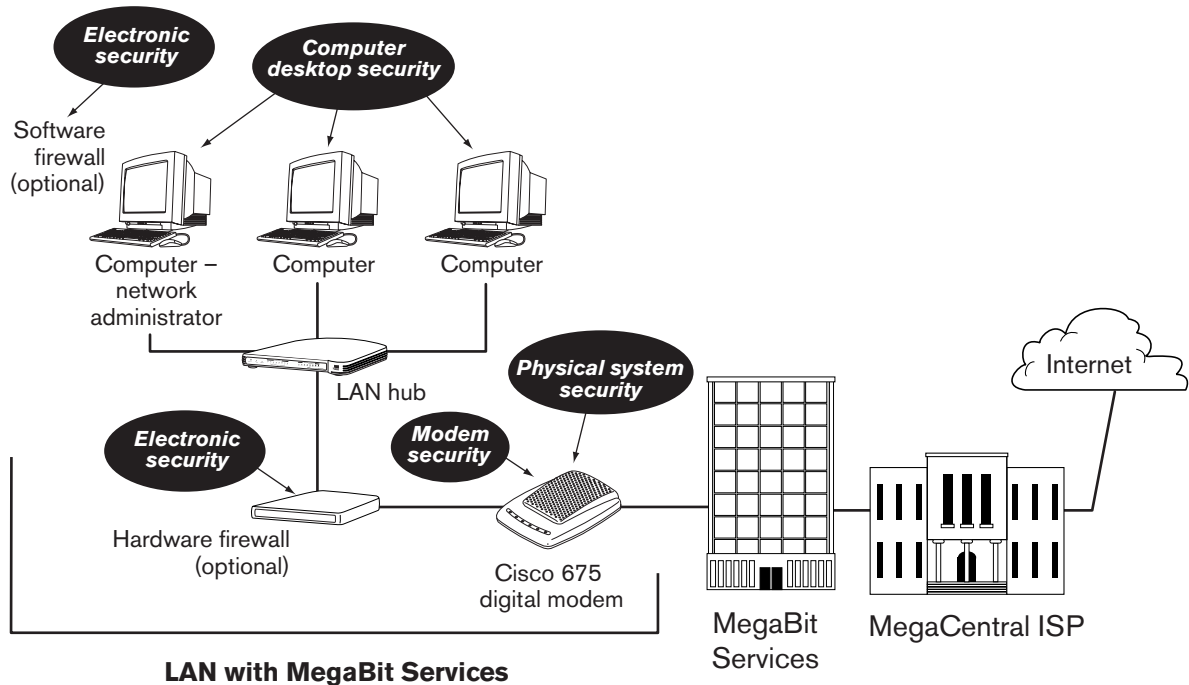
Modem Security

Routing Mode with PPP

If you are connecting to your ISP through routing mode with Point-to-Point Protocol (PPP), be sure to give your modem an "exec" password. If you don't, someone on the Internet can access your modem and change its configuration or steal your PPP user ID and password. For instructions on setting the modem's exec password, see your *MegaBit Services Cisco 675 User Guide,* which is provided with your modem.

Bridging Mode

If you are connecting to your ISP through bridging mode, people on the Internet cannot access any valuable information in your modem.

LAN Security

Three common features of LANs – file and print sharing, Internet servers, and network applications that allow remote access to your computers – are also major areas of concern for LAN security. If you implement any of these features, you should take appropriate security precautions.

File and Printer Sharing

If the users on your LAN don't need to share files and printers, turn off File and Print Sharing.

Routing Mode with PPP Connection to your ISP

If the users on your LAN need to share files and printers, make sure each user who can access your computer has a user ID and password. (The best passwords combine numbers and letters.) Don't activate a "guest" account that lets anyone access your computer without a password. ***Always disable all guest accounts.***

If users don't need unrestricted access to other computers on the LAN, create a single shared "public" folder on each computer. This way, users can share any files that they place in the "public" folder while preventing others from reaching sensitive data on their computers.

Windows 95 and 98: The *Access Control* tab on the *Network Control Panel* lets you control access to shared resources either by assigning a password to each shared resource or by specifying users and groups who have access to shared resources. To share a folder, select the folder, go to the *File* menu, select *Properties,* and then select *Sharing.*

Windows NT4: By default, Windows NT4 sets up a guest account when you activate file sharing. ***You must disable the guest account!*** On the Windows *Start* menu, select *Administrative Tools (Common),* and then select *User Manager.* Double-click the *Guest Account* entry on the list of users. Place a check mark in the box next to *Account Disabled.* If there's no check mark next to the guest account's *Account Disabled* box, anyone can access your computer from the Internet.

Windows NT4 offers more powerful security features than Windows 95, Windows 98, or the Mac OS.

Macintosh: The *File Sharing Control Panel* turns file sharing on and off. If you turn file sharing on, use the *Users and Groups Control Panel* to set up users with passwords. To share a folder, select the folder, go to the *File* menu, select *Get Info,* and then select *Sharing....*

Bridging Mode Connection to your ISP

You ***must*** turn off file sharing and print sharing. If they're on, anyone can see your network neighborhood. If you're going to use file and print sharing, make sure you have a routing mode Point-to-Point Protocol (PPP) connection to your ISP.

Internet Server

Don't make any of the computers on your LAN a web server, an e-mail server, or any other kind of Internet server. This allows anyone on the Internet full access to your computer.

If you must have an Internet server on your LAN, install a *firewall.* See *Physical System Security* on page 38 for details.

U S WEST MegaBit Services technical support provides information and assistance for peer-to-peer networks only. Server-based networks must be supported entirely by your network administrator. If your network administrator needs help, see *Tier 2 LAN Support* on page 48.

Network Applications

Network applications such as software programs that allow remote access to the computers on your LAN also make then vulnerable to access from other people on the Internet. If you must use a network application that allows remote access, install a firewall.

Computer Desktop Security

All the computers on your LAN should have anti-virus programs, and the virus definitions should be updated on a regular basis – at least once a month.

In addition, your computer users should never run a program they receive as an attachment to an e-mail message unless they know for sure that the program is safe. A program from an unknown source can install a "back-door" software application that lets people on the Internet gain access to the computer without the computer user's knowledge.

Users should always exit their Internet browsers (for example, Internet Explorer or Netscape Navigator). Users should never "minimize" their browsers or leave them open in the background. Breaking into a computer is easy when an Internet browser is running.

Electronic Security

Here are two methods to secure your LAN electronically.

Network Address Translation

If you have a PPP connection to your ISP using dynamic IP addresses through a DHCP server, you are using Network Address Translation (NAT). NAT provides a very basic level of security. The Cisco 675 router has an external IP address, but all the computers on your network have internal IP addresses assigned by the Cisco 675 router. These private IP addresses are unknown to the outside world.

Keep in mind that someone who understands how the Cisco 675 digital modem works will be able to guess what your private IP addresses are. A better solution is a firewall, which is described in the next topic.

Firewalls

The safest way to prevent attacks on your computer is through a *firewall* – a hardware device or software program that protects the computers on your local area network from unauthorized access by controlling who can access your LAN and by monitoring the transmissions between your LAN and the Internet.

Hardware and software firewall products are changing rapidly as more homes and businesses establish high-speed digital connections between their local area networks and the Internet. For more information about firewalls, including vendors who sell firewall products, go to:

http://www.uswest.com/products/data/dsl/security.html

Firewall products are available from computer and networking equipment retailers. See *Tier 2 LAN Support* on page 48 for suggestions on who to call for help selecting and setting up a firewall product.

Physical System Security

If possible, unplug the power from the Cisco 675 digital modem when your MegaBit Services connection is not in use. This is the ultimate security. No one can access your network when your MegaBit Services connection is down.

Note: If you are using PPP (routing mode), your network administrator must use the Cisco 675 Commander application to log in to your ISP after you power on the Cisco 675 digital modem. The Commander application gives the ISP your PPP user ID and password.

The Bottom Line

Without a firewall, someone who is skilled at hacking can get into any computer on your local area network while you are connected to the Internet.

How to Manage your LAN with MegaBit Services

To manage your LAN with MegaBit Services, you need to choose someone in your business or family to be the *network administrator,* the person who maintains your LAN. The person you choose will be responsible for solving problems with your LAN and, if possible, should enjoy working with computers.

If your network administrator needs help, see *Who to Call* on page 48.

How to Set Up the Network Administrator

1 Load the Cisco 675 Commander software on the network administrator's computer. For instructions, see the step entitled "Install the Cisco 675 Commander" in the *MegaBit Services Cisco 675 User Guide,* which is provided with your modem.

   Note: You must use Commander version 1.2 or greater.

   Your network administrator will use the Cisco 675 Commander to monitor and test your MegaBit Services connection.

   If you have a routing mode Point-to-Point protocol (PPP) connection to your ISP, your network administrator must make the initial connection between the Cisco 675 digital modem and your ISP. See the next topic: *How to Make a PPP Connection to your ISP*.

   If you have a bridging mode connection to your ISP, continue with step 2 below.

2 The network administrator should become acquainted with MegaBit Services diagnostics by following the instructions in the step entitled "Check your MegaBit Connection" in the *MegaBit Services Cisco 675 User Guide.*

How to Make a PPP Connection to your ISP

If you have a routing mode Point-to-Point Protocol (PPP) connection to your ISP, your network administrator must use the Cisco 675 Commander application to make the initial connection between the Cisco 675 digital modem and your ISP. The Commander application gives the ISP your PPP user ID and password.

For instructions, see "Connect to your ISP or Network" and "Using MegaBit Services" in the *MegaBit Services Cisco 675 User Guide.*

Note: Your network administrator must enter your modem's exec password.

How to Disconnect from the Internet

To help maintain security when no one is using the Internet connection, your network administrator can disconnect your LAN from the Internet by powering down the Cisco 675 digital modem.

If you have a routing mode PPP connection to your ISP, your network administrator can disconnect from the Internet by clicking the Cisco 675 Commander's *Disconnect* button. To reconnect to the Internet, your network administrator would click the Commander's *Connect* button.

Note: If the Cisco 675 digital modem is powered down and then repowered while the Cisco 675 Commander application is disconnected, the modem will make a new connection.

How to Monitor Network Performance

The status lights on your Ethernet hub indicate whether a port is connected properly and show when the port is sending or receiving data. For more information on the hub's status lights, see *Ethernet Hub* on page 43.

The hub's collision light blinks when there is more traffic than the hub can handle. A few blinks per minute are normal. If the light blinks every few seconds, there is too much traffic.

For information about solving network performance problems, see *How to Troubleshoot Problems* on page 41.

How to Make Changes to Your LAN with MegaBit Services

From time to time, you'll need to make changes to your LAN with MegaBit Services. For help, see:

- *How to Add a Telephone Set or Fax* on page 52

- *How to Add a Computer* on page 55

- *How to Move your LAN with MegaBit Services* on page 56

- *How to Configure the Modem with a Static IP Address* on page 57

- *How to Use an Analog Modem* on page 59

CHAPTER 8

How to Troubleshoot Problems

General technical support number for U S WEST MegaBit Services and Tier 1 LAN connectivity is: 1-800-247-7285

Please note: This is Tier 1 support for peer-to-peer LANs being connected to U S WEST MegaBit Services only. You or your network administrator are responsible for maintaining your LAN.

For product information and answers to frequently asked questions, point your browser at: **http://www.uswest.com/megabit/**

How to Identify the Source of a Problem

When you have a problem with your LAN with MegaBit Services, the first thing to do is identify whether the problem is in:

❶ Your LAN

❷ Your MegaBit Services connection

or

❸ Your Internet access.

Who you contact for help with the problem depends on where the problem is.

Figure 17
Three different organizations support your LAN with MegaBit Services.
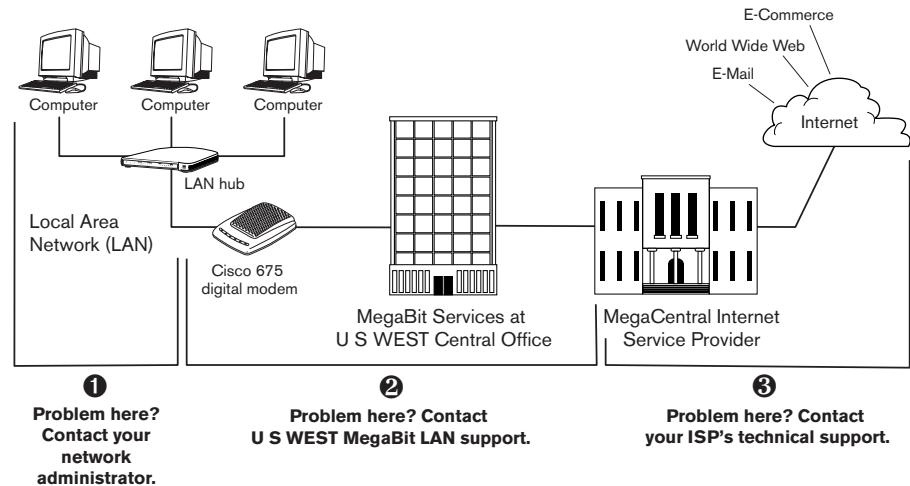
Here's how to identify the source of a problem.

1   Does your Cisco 675 digital modem have a MegaBit Services DSL
    connection to the U S WEST central office?

    ▪ Yes. Your problem is with your LAN or with your Internet access. Go to
      step 2.

    ▪ No. Your problem is with your Cisco 675 digital modem or your MegaBit
      Services connection. Call U S WEST MegaBit Services technical support at
      1-800-247-7285.

    If you don't know, here's how to check. If the Cisco 675 digital modem's green
    WAN LNK light is on and steady, you have a MegaBit Services connection.
    You can also start the Cisco 675 Commander, go to the *Link* tab, and check
    the *Link State. It* should be *Trained.* See the *MegaBit Services Cisco 675
    User Guide* for an example of the Cisco 675 Commander's *Link* tab.

2   Check *Troubleshooting Tips* on page 44 to identify where the problem is
    located.

    ▪ If your problem is in your LAN, fix the problem yourself using this
      troubleshooting guide, or get help. See *Who to Call* on page 48.

    ▪ If the problem is with your Internet access, call your ISP's technical support
      number.

Diagnostic Lights

Both your Cisco 675 digital modem and your Ethernet hub have diagnostic lights
to help you identify and solve problems with your local area network and your
DSL connection to MegaBit Services.

Modem

The Cisco 675 digital modem has six diagnostic lights.

Figure 18
Diagnostic lights on modem

WAN ACT (yellow)
WAN LNK (green)
LAN ACT (yellow)
LAN LNK (green)
ALARM (red)
POWER (green)
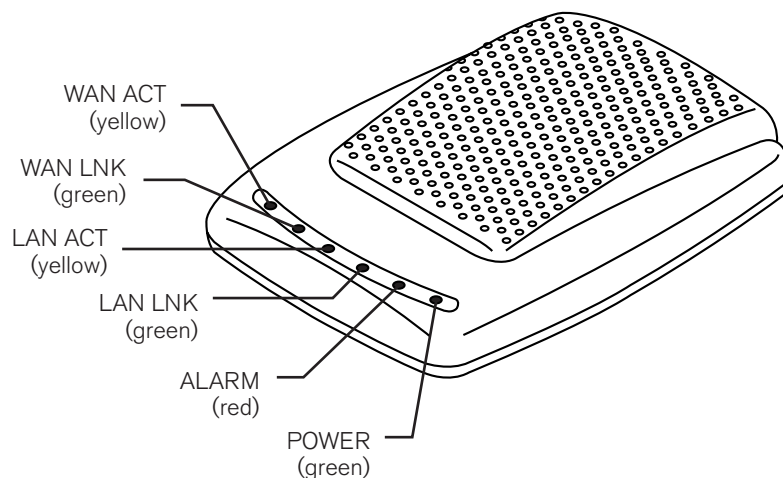
WAN LNK: Steady green shows that the modem has made a connection through the telephone line to MegaBit Services. (WAN stands for wide area network.)

WAN ACT: Blinking yellow shows that the modem is talking over the phone line to the telephone company's equipment or to a destination on the Internet.

LAN LNK: Steady green shows that the modem has made a connection to a computer on your LAN.

LAN ACT: Blinking yellow shows that the modem and a computer on your LAN are talking to each other.

ALARM: A red light warns that the modem has an internal problem.

POWER: Steady green shows that the modem is receiving power.

Ethernet Hub

Here is a listing of basic diagnostic lights on a typical Ethernet hub. The lights on your hub may differ from this example. For more information, see the documentation that came with your hub.

Figure 19

Diagnostic lights on typical Ethernet hub
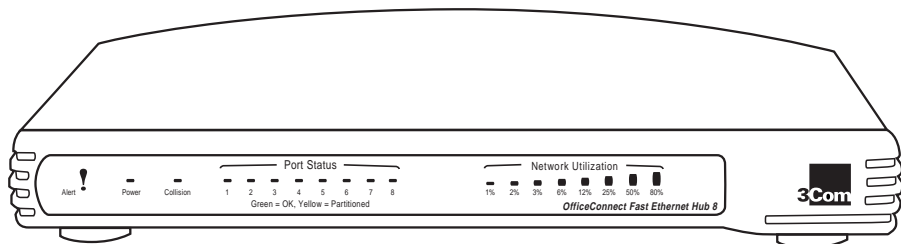
POWER: This light shows that the hub is receiving power from a power outlet.

ALERT: This optional light shows that the LAN has a problem.

COLLISION: This light shows the amount of collisions on all ports. More collisions result in less throughput. A few blinks per minute are normal. If the light blinks every few seconds, there is too much traffic.

PORT STATUS: These lights show which ports are connected. Each port's light flashes when data is being transmitted to that port.

NETWORK UTILIZATION: These optional lights show the percentage of network use. Anything over 40% indicates heavy use or a problem with one of the devices on the LAN. If your LAN's normal utilization is over 40%, you should consider upgrading from 10Base-T to 100Base-TX Ethernet. If you already have 100Base-TX Ethernet, you should consider breaking down the network into segments. For help. see *Tier 2 LAN Support* on page 48.

Troubleshooting Tips

Do you have dial tone on your telephone sets?

If you do not have dial tone on any of your telephone sets within your house or business, call U S WEST Repair.

- Residential Repair: 1-800-573-1311

- Business Repair: 1-800-954-1211

If you have dial tone on some telephone sets within your house or business, verify that you have dial tone at the RJ-11 jack connector where your Cisco 675 digital modem is connected.

You hear static on phone line.

If you hear static noise on the telephones connected to the telephone line providing the MegaBit service, check to make sure you installed the microfilters correctly. Note that microfilters with "phone" and "wall" labels must be installed in the correct direction. See *How to Add a Telephone Set or Fax* on page 52.

If you have two phone lines, see the troubleshooting topic *MegaBit Service is on your second telephone line.*

If you continue to have trouble, call U S WEST MegaBit Services technical support at 1-800-247-7285.

You have an alarm system or other security device that accesses the MegaBit Services telephone line.

You must filter the security device if it accesses the telephone line that is providing MegaBit Service to your home or business. Contact your security organization for more information.

MegaBit Service is on your second telephone line.

The wall jack with built-in microfilter and the in-line microfilters all filter your first telephone line. If MegaBit Service is coming into your home or office on your second telephone line, the microfilters won't filter the line.

Most wall jacks and phone cords have four wires: yellow, green, red, and black. Line 1 generally uses the green and red wires. Line 2 generally uses the yellow and black wires. The microfilters filter line 1 – the green and red wires.

If you are receiving MegaBit Service over line 2, you can attach a telephone set to the **PHONE** port on your Cisco 675 digital modem.

If you are receiving MegaBit Service over line 2, you'll hear noise on line 2 of a two-line telephone unless line 2 is attached to the **PHONE** port on your Cisco 675 digital modem.

For an example of a MegaBit Services connection on line 1, see Figure 20 on page 53.

For an example of a MegaBit Services connection on line 2, see and Figure 21 on page 53.

For more information about using MegaBit Services on your second phone line, call U S WEST MegaBit Services technical support at 1-800-247-7285.

The modem's green POWER light does not light.

The modem is not receiving power.

First, plug another electrical device into the power outlet to check that the outlet is working correctly. Next, check to make sure the connection to the **PWR** port on the back of the modem is tight.

If the modem's **POWER** light still fails to light, call U S WEST MegaBit Services technical support at 1-800-247-7285.

The modem's green WAN LNK light blinks and goes out.

The modem has failed to establish a MegaBit connection.

If you are using Point-to-Point Protocol (PPP) to connect to your Internet Service Provider, you may have entered your PPP user ID or password incorrectly. If either of these is incorrect, the number of Authentication Failures shown on the Cisco 675 Commander's *Call* tab will increase by one each time you try to connect. If necessary, re-enter your PPP user ID and password.

Here are some potential problems occasionally encountered: an alarm system or other security device, an apartment security buzzer, or a water meter connected to the phone line. If you have any of these, call U S WEST MegaBit Services technical support at 1-800-247-7285.

Signal Quality is less than 18 dB.

If the green **WAN LNK** light is steady, but the modem does not reach a Signal Quality value of 18 dB or greater, you may have trouble with MegaBit Services later on.

To check your signal quality, see "Check your MegaBit Connection" in your *MegaBit Services Cisco 675 User Guide,* which is provided with your modem.

Sometimes, problems with wiring inside or outside of the building may affect the signal quality. If you do not reach 18 dB, we recommend that you call U S WEST MegaBit Services technical support at 1-800-247-7285 and discuss how you have connected the modem to the wiring inside your building.

The modem's LAN LNK light is out.

If the modem's **LAN LNK** light is out after you have connected the modem to the computer's Ethernet port using an RJ-45 Ethernet "straight" cable, the modem and the computers on your LAN are not communicating.

Check to make sure the cable is connected to both the modem and the Ethernet hub.

Check to make sure the Ethernet hub is receiving power.

Important! When you connect the Cisco 675 digital modem to the LAN hub, you must use a regular Ethernet "straight" cable. Don't use the Ethernet crossover cable supplied in the modem package. That cable is used to connect the Cisco 675 digital modem directly to a single computer.

No computers on your LAN can reach the Internet.

If you are using file and print sharing, can your computers exchange data?

If no, you may have a problem with the LAN. Check the status lights on the Ethernet hub and the **LAN LNK** light on the Cisco 675 digital modem.

If yes, check the TCP/IP configuration. Follow the "Configuration Instructions" for your LAN with MegaBit Services setup:

- *Routing Mode with a DHCP Server and Network Address Translation* on page 27

- *Routing Mode with Multiple Static IP Addresses* on page 29

- *Bridging Mode with a DHCP Server* on page 30

- *Bridging Mode with Static IP Addresses* on page 32

One computer on your LAN can reach the Internet but the other computers can't.

See the answer to the previous question: *No computers on your LAN can reach the Internet.*

One computer on your LAN can't reach the Internet, but the other computers can.

If you have just added the computer to your LAN, make sure it meets the minimum requirements for use with the Cisco 675 digital modem. The operating system must be Windows 95, 98, or NT4 or Macintosh OS 8.5 or greater. Windows computers must have a Pentium processor.

Make sure the computer is configured properly. Check the computer's TCP/IP configuration. Follow the "Configuration Instructions" for your LAN with MegaBit Services setup:

- *Routing Mode with a DHCP Server and Network Address Translation* on page 27

- *Routing Mode with Multiple Static IP Addresses* on page 29

- *Bridging Mode with a DHCP Server* on page 30

- *Bridging Mode with Static IP Addresses* on page 32

You may have a problem with the Ethernet cable. Swap cables between two computers to see if the problem changes from one computer to the other.

You may have a problem with the network interface card. On a Windows computer, check "Confirm the Network Interface Card Installation" in the *MegaBit Services Windows Cisco 675 User Guide*. If the computer has two network interface cards, make sure that the Ethernet cable is plugged into the correct card.

Also check the Cisco 675 digital modem's PPP or bridging mode configuration.

You can't connect to your ISP or company network.

Check to make sure your IP addresses are configured properly.

Windows Instructions

1 Click the *Start* button.

2 Select *Programs.*

3 For Windows 95 or 98, click *MS-DOS Prompt.*

For Windows NT4, click *Command Prompt.*

4 For Windows 95 or 98, type: **winipcfg** and press **[ENTER]**.

For Windows NT4, type: **ipconfig** and press **[ENTER].**

IP Address, Subnet Mask, and Default Gateway appear.

5 Check for the following:

IP Address. . . . . : 206.218.176.33

Subnet Mask . . . . : 255.255.255.0

Default Gateway . . . . . . : 206.218.176.1

These IP addresses are examples. Your IP addresses will be different.

- If the IP addresses for IP Address and Subnet Mask are 0.0.0.0, you do not have TCP/IP configured properly. Repeat TCP/IP configuration. For help, call U S WEST MegaBit Services technical support at 1-800-247-7285.

- If IP addresses appear for IP Address and Subnet Mask, you may have a problem with the configuration of your browser, or your ISP may be having difficulties providing service. For help, call your ISP's technical support line.

Macintosh Instructions

See "Configure TCP/IP" in the *MegaBit Services Macintosh Cisco 675 User Guide,* which is provided with your modem.

CHAPTER 9

Who to Call

LAN Equipment/MegaBit Service

If you are interested in LAN equipment and/or MegaBit service, you may contact:

- Small Business customers, please call your U S WEST Sales Representatives, or:
  - Customers in Arizona or New Mexico, call 1-800-288-4044
  - Customers in Colorado, Montana, or Wyoming, call 1-800-289-9091
  - Customers in Idaho, Oregon, or Washington, call 1-800-222-2121
  - Customers in Iowa, Minnesota, Nebraska, North Dakota, or South Dakota, call 1-800-999-2021
- Home Office customers, please call 1-800-898-WORK (9675)
- Residential customers, please call 1-800-244-1111

Technical Support

Who you call depends on whether the problem is in your LAN, your MegaBit Services connection, or your access to the Internet.

Tier 1 MegaBit Services Connectivity to your LAN

For help with basic LAN with MegaBit Services needs such as connecting the Cisco 675 digital modem to your LAN or configuring the modem for your LAN, call U S WEST MegaBit Services technical support at 1-800-247-7285.

Please note: This is Tier 1 support for per-to-peer LANs with MegaBit Services only. You are responsible for maintaining your LAN.

Tier 2 LAN Support

For help with advanced LAN support needs such as setting up and maintaining file and printer sharing, web hosting and web servers, and firewall products; troubleshooting faulty equipment; and other LAN tasks that don't involve the Cisco 675 digital modem, contact a local data networking company. We recommend getting a reference from a data networking professional or a computer retailer you trust. Or look in the phone directory under a topic like *Computers – Networking.*

MegaBit Services

Call U S WEST MegaBit Services technical support at 1-800-247-7285.

Internet Access

Call your ISP's technical support number.

Frequently Asked Questions

The frequently asked questions in this chapter are divided into:

- Technical questions

- Product questions

Additional U S WEST MegaBit Service information and FAQs are located at **http://www.uswest.com/megabit/**

Technical Questions

How will my telephone service connection be affected?

The RJ-11 telephone jack that provides you with telephone service connections will remain unchanged. You will be able to share the same telephone jack for standard telephone services as well as connecting your computer network to MegaBit Services. You can use the **PHONE** port on the Cisco 675 digital modem to connect a telephone set.

What kind of performance can I expect from my computer applications using MegaBit Services?

Your computer applications' performance will be based on the end-to-end throughput of the connection to the host site running the applications. Throughput will be determined by four factors:

- The MegaBit Services peak data rate (e.g., 256 kbps, 512 kbps, 768 kbps, 1 Mbps, 4/1 Mbps, 7/1 Mbps).

- The number of computers on your LAN that are transmitting data *at the same time.*

- The amount of bandwidth that the ISP or your company's network administrator has purchased for the host connection (this connection is referred to as U S WEST MegaBit MegaCentral Service).

- Internet software applications (commonly referred to as browsers) will be subject to the overall performance of the Internet.

Why do my computers need to meet certain requirements when using MegaBit Services?

MegaBit Services enable you to access and receive data external to your computers at much higher speeds than technologies such as analog modems. Your computers' operating system (e.g., Windows 95, 98, or NT4 or Mac OS 8.5 or higher) manages the necessary hardware and software applications required to communicate with data sources external to your computer. In order for you to take full advantage of the transmission speeds that are enabled by MegaBit Services, your computers need special networking hardware and software as well as software applications (e.g., browser software) to communicate with data external sources (e.g., ISP servers) at faster speeds.

What are some examples of special computer hardware and software networking components required for MegaBit Services?

One example of a computer hardware device required for MegaBit Services is the Ethernet card inside your computer. Most Ethernet cards have special requirements such as the processor type (e.g., Pentium processors), processor speed (e.g., 133 Mhz), and computer memory (also called RAM) required to operate efficiently. The Ethernet card talks to the computer's operating system and the MegaBit Services equipment using networking software.

Networking software and software applications such as browsers (Netscape's Navigator or Microsoft's Internet Explorer, for example) used to access data on the Internet or on your company's organizational network also have special computer processor type, speed, and memory requirements.

How will I know if all my computers meet the processor type, process speed, and memory requirements when using MegaBit Services to access the Internet?

Consult your ISP regarding special requirements for the ISP's preferred browser software, and your U S WEST Sales Representative regarding computer requirements for your MegaBit Services.

How do I use the built-in analog modem in my computers?

Your computer's analog modem may still be used for faxing or for dial-up access to another host network. If you are using Windows 95, 98, or NT4, no modifications should be needed.

For more information, see *How to Use an Analog Modem* on page 59.

Will my telephone services be impaired or disrupted if my MegaBit Services (data) are disrupted?

With MegaBit Services, your telephone and data services are separated at the U S WEST Serving Office. Disruption of MegaBit Services will not necessarily impact your telephone service. Disruption of data service at the MegaCentral Site (or corporate host site) will not impact your telephone service. For instance, if the ISP's network experiences a service outage, you will still be able to use your telephone.

If you lose electrical power to your home or business, your MegaBit modem will lose power and cease to function until power is restored. However, if your telephone set works today without electrical power, it will continue to work without electrical power.

Product Questions

Where is MegaBit Services available?

The availability of MegaBit Services to your home or business is subject to certain specifications, including your distance from the U S WEST Serving Office, whether that office is equipped to offer the service, and other technical telephone line qualifications.

Not all customers who are served by MegaBit Service-equipped serving offices and who meet the distance limitations will qualify for the service because of the special technical telephone line requirements. U S WEST is constantly researching and testing new technologies to improve MegaBit Services availability. Your Sales Representation can discuss availability with you.

How will I be billed for MegaBit Services?

You can be billed for MegaBit Services on the same monthly bill that you receive from U S WEST for your telephone service. Any additional service options you order will be itemized on the same statement. These additional services may include inside wiring, promotional packages, enhanced MegaBit Services customer support, and so forth.

If you have more than one telephone line in your home or business, MegaBit Services together with the line provisioned with MegaBit Services will be established on a U S WEST billing record separate from the billing record for the other line(s). If you wish, the two billing records can be combined so that you receive a single billing statement.

Who should I call if I have billing inquiries regarding my U S WEST billing statement?

Contact the number listed in the monthly telephone billing statement.

How to Add a Telephone Set or Fax

To add a telephone set, fax machine, or other telecommunications device on the MegaBit telephone line (the telephone line that connects to the Cisco 675 modem), you must install a microfilter.

Figure 20 and Figure 21 on page 53 show how to install microfilters on two-line telephone systems. Figure 22 on page 54 shows how to connect microfilters to telecommunications devices.

See also *Step 1: Install Microfilters on Telephone Sets* in your *Cisco 675 User Guide,* which is provided with your modem.

If you don't install microfilters properly, there will be electrical "noise" when you attempt to use the new telecommunications device, and the Cisco 675 digital modem will lose the MegaBit Services signal.

Need more microfilters?

Microfilters are available for a nominal charge by calling your Customer Service Representative. Each package contains three in-line microfilters and one phone wall jack with a built-in microfilter.

Do you have an alarm system or other security device that accesses the MegaBit Services telephone line?

If you have an alarm system or other security device that accesses the telephone line providing MegaBit Service to the Cisco 675 digital modem, you must filter the security device. Contact your security organization for more information.

Do you have two telephone lines?

If you have two telephone lines and if your MegaBit Service is on line 1, you don't need to filter line 2.

If you have two telephone lines and your MegaBit Service is on line 2, then the microfilters won't work. They filter line 1 only; they don't filter line 2.

*If MegaBit Service is coming into your home or office on line 2, you can attach a telephone set to the **PHONE** port on the Cisco 675 digital modem. (The modem filters it's **PHONE** port.) For more information, go to page 44 and see the troubleshooting topic "MegaBit Service is on your second telephone line."*

Figure 20

Installing a LAN with MegaBit Services on line 1 of a 2-line phone system

Wall phone connected to wall jack with built-in microfilter

In-line microfilter

DO NOT install a microfilter between phone line and modem.

In-line microfilter

LAN

Phone lines into building

Line 1 with MegaBit Services DSL connection

Cisco 675 digital modem
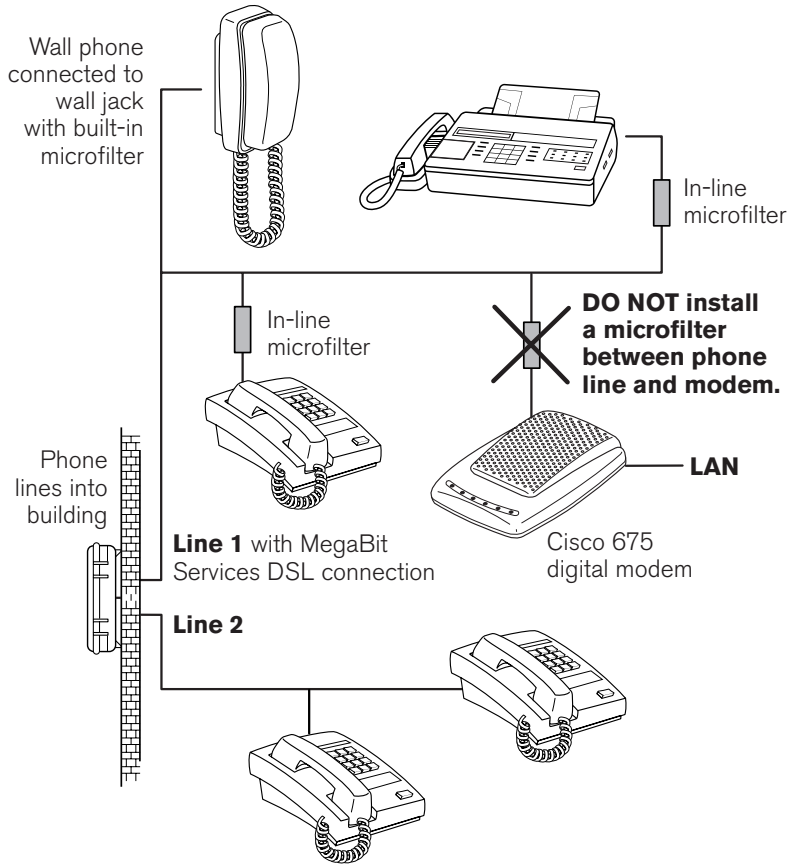
Line 2

Figure 21

Installing a LAN with MegaBit Services on line 2 of a 2-line phone system

Phone lines into building

DO NOT install a phone directly on line 2. It must be connected to the Cisco 675 digital modem

Line 1

Line 2 with MegaBit Services DSL connection

LAN

DO NOT install a microfilter between phone line and modem.

Cisco 675 digital modem

53
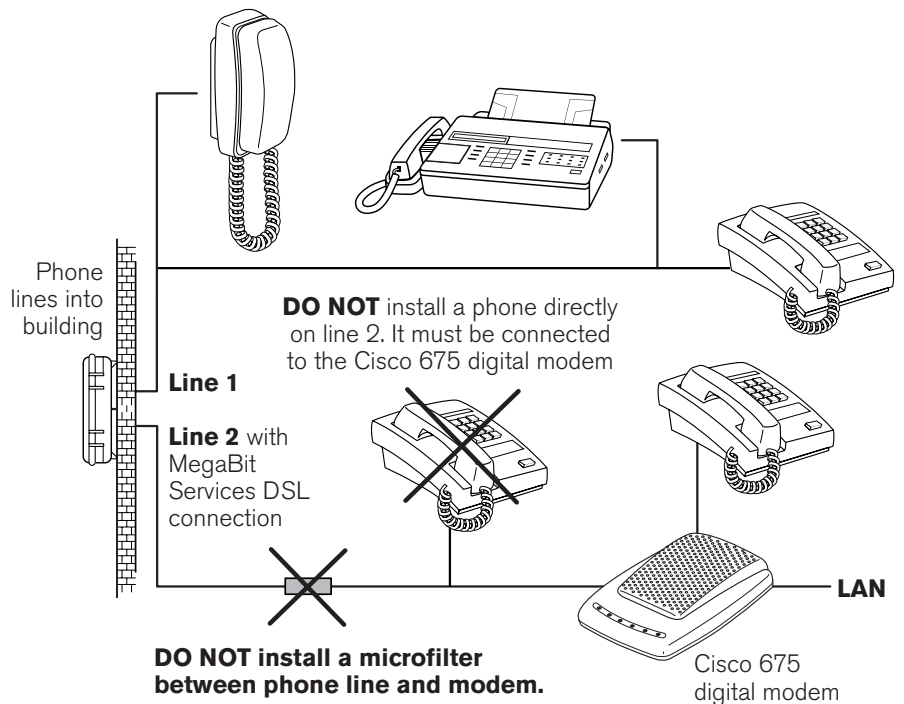
Figure 22
Microfilter installation

*If you don't have a wall phone, you don't need
to use this wall jack with buit-in microfilter*
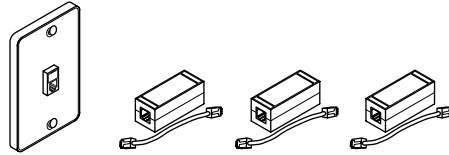
Microfilters supplied in MegaBit modem package

Phone wall jack
with built-in
microfilter

Replace the wall jack for
your wall phone with the wall
jack with built-in microfilter.

Phone
wall jack

In-line
microfilter

Plug an in-line microfilter into
the phone line between your
desk phone and the wall jack.

Phone
wall jack

In-line
microfilter

Plug an in-line microfilter into
the phone line between your
fax machine and the wall jack.

*If you have a security device that accesses the
telephone line, you must put a microfilter on it.*

How to Add a Computer

1 Hook your computer up to the LAN.

If necessary, add an Ethernet card to your computer. Follow the instructions that came with your card.

Connect the computer to the Ethernet hub with Category 5 twisted pair cables.

If you don't have an available port on your Ethernet hub, see "How to Expand your Hub" below.

2 If you are using static IP addresses, determine which IP address, subnet mask, DNS entries, and default gateway will be assigned to the computer you are adding.

If you are using dynamic IP addresses assigned by a DHCP server, go to the next step.

3 Install and configure TCP/IP.

Windows: Follow the instructions in the step entitled "Check for and Configure TCP/IP" in the *MegaBit Services Windows Cisco 675 User Guide,* which is provided with your modem.

Macintosh: Follow the instructions in the step entitled "Configure TCP/IP" in the *MegaBit Services Macintosh Cisco 675 User Guide,* which is provided with your modem.

How to Expand your Hub

If you don't have an available port on your Ethernet hub, you can:

■ Replace the hub with a new hub that has more ports

This might be a good strategy if you have a 10Base-T hub and would like to upgrade to a 100Base-TX Fast Ethernet hub.

■ Keep the hub and establish an uplink connection to a new hub

To do this, buy another Ethernet hub and make an uplink connection between the two hubs using a Category 5 twisted-pair straight-through cable. You must connect the cable to each hub's uplink port and set the port switch to "uplink." If one of your hubs doesn't have an uplink port, you can connect the two hubs with a Category 5 twisted pair crossover cable.

How to Move your LAN with MegaBit Services

When you move, you will need to disconnect your LAN with MegaBit Services and then reconnect it at your new home or office. Here are some high-level instructions.

1   Arrange for MegaBit Services at your new location.

    Remember! MegaBit Services is not available in all locations.

2   Disconnect your LAN with MegaBit Services.

3   Identify the MegaBit Services line at your new location.

4   If you have 2 telephone lines and you are installing your LAN with MegaBit services on **line 1,** install a microfilter on each telephone set, fax machine, or other telecommunications device on MegaBit Services telephone line. See Figure 20 on page 53.

    If you have two telephone lines and you are installing your LAN with MegaBit services on **line 2,** you can't connect any telephone set, fax machine, or other telecommunications device directly to this line. ***The microfilters supplied with the Cisco 675 digital modem do not filter line 2.*** You can connect a telephone set, fax machine, or other telecommunications device to the **PHONE** port on the back of the Cisco 675 digital modem, because the modem provides filtering for the **PHONE** port. See Figure 21 on page 53.

    For more information, see *How to Add a Telephone Set or Fax* on page 52.

5   Reconnect all the computers and peripherals on the LAN with MegaBit Services to your Ethernet hub.

6   Connect the Cisco 675 digital modem to the telephone line providing MegaBit service.

7   Use the Cisco 675 Commander software on your network administrator's computer to connect to your ISP.

    See "Connect to your ISP or Network" in your *MegaBit Services Cisco 675 User Guide,* which is provided with your modem.

8   Use the Cisco 675 Commander software on your network administrator's computer to check your MegaBit Services connection.

    See "Check your MegaBit Connection" in your *MegaBit Services Cisco 675 User Guide.*

How to Configure the Modem with a Static IP Address

You'll need to use HyperTerminal (Windows) or ZTerm (Macintosh).

Important! These instructions assume that your Cisco 675 digital modem has been preconfigured for a PPP connection to a DHCP server. If your modem has *not* been preconfigured for a PPP connection to a DHCP server, go to "Manual Modem Configuration" in your *MegaBit Services Cisco 675 User Guide,* which is provided with your modem. Enter the commands for "Set the Modem to PPP for a DHCP Server." When you are done, follow the instructions in this appendix.

■ Connect the modem's serial cable and run HyperTerminal or ZTerm. Follow the instructions in "Manual Modem Configuration" in your *MegaBit Services Cisco 675 User Guide,* which is provided with your modem.

■ At the *cbos>* prompt in HyperTerminal or ZTerm, type:

enable

and press **[ENTER].**

A *Password* prompt appears.

■ At the *Password* prompt, press **[ENTER].**

You don't need to enter a password unless you have already given the Cisco 675 digital modem an enable password. If you have given the modem an enable password, enter it here.

The Cisco Broadband Operating System prompt *cbos#* appears.

■ At the *cbos#* prompt, type:

set dhcp server disable

and press **[ENTER].**

■ At the *cbos#* prompt, type:

set nat disable

and press **[ENTER].**

■ At the *cbos#* prompt, type:

set interface eth0 address <type your static IP address here>

For example, if your static IP address is 172.28.78.2,

type: *set interface eth0 address 172.28.78.2*

(The 0 in eth0 is a zero, not the letter O.)

Press **[ENTER].**

■ At the *cbos#* prompt, type:

set interface eth0 netmask <type your subnet mask here>

For example, if your subnet mask is 255.255.255.248,

type: *set interface eth0 netmask 255.255.255.248*

Press **[ENTER].**

■ At the *cbos#* prompt, type:

write

and press **[ENTER]** to save your changes.

This message appears: *NVRAM written.*

■ At the *cbos#* prompt, type:

reboot

and press **[ENTER]** to reboot the modem.

The welcome message *Hello!* appears with the CBOS software version number.

■ Press **[ENTER].**

The user access verification password prompt appears.

■ Press **[ENTER].**

The *cbos>* prompt appears.

■ Go to "Quit HyperTerminal" or "Quit ZTerm" in your *MegaBit Services Cisco 675 User Guide.*

Tier 1 MegaBit Services Connectivity to your LAN

For help, call U S WEST MegaBit Services technical support:1-800-247-7285.

How to Use an Analog Modem

If you have been making an Internet connection using an analog "dial-up" modem and you have replaced that connection with MegaBit Services, you don't need to use your analog modem any longer.

The Cisco 675 digital modem can't be used in place of your analog modem to make direct calls to other companies' modems over regular telephone lines.

For example, if you are making a direct connection to an analog modem at a customer's or vendor's company, the Cisco 675 digital modem can't make that connection.

The Cisco 675 digital modem makes a connection to your ISP through a MegaBit Services digital subscriber line. It can't make a connection over a regular telephone line.

If you still need to use your analog modem to make connections over a regular telephone line, follow these instructions.

Windows: As long as your analog modem is using Windows Dial-Up Networking, you don't need to make any changes. The TCP/IP settings you need for your analog modem are stored in the Dial-Up Networking software.

Macintosh: You can create two sets of TCP/IP configurations and change between them.

- To create another TCP/IP configuration: Open the TCP/IP Control Panel. Select *Configurations* on the *File* menu. Select your current TCP/IP configuration file. Click the *Duplicate* button. The *Duplicate Configuration* window appears. Enter a name, and click *OK.* At the *Configurations* window, click the name of the new TCP/IP configuration file. Click the *Make Active* button. Change the settings as needed. Click the box in the upper left corner to close the TCP/IP window.

- To change TCP/IP configurations: open the TCP/IP Control Panel. Select *Configurations* on the *File* menu. In the *Configurations* window, select the TCP/IP configuration file you want. Click the *Make Active* button. Click the box in the upper left corner to close the TCP/IP window.

Remember! Because your Cisco 675 digital modem is using the MegaBit Services digital subscriber line and your analog modem is using the regular voice telephone line, you can use them both at the same time!

How to Find More Information

To learn more about installing and using the Cisco 675 digital modem on a local area network, consult the following resources.

Web Site

MegaBit Services: **http://www.uswest.com/megabit/**

Printed Manuals

The *Cisco 675 ADSL Router Installation and Operation Manual, Cisco Broadband Operating System User's Guide,* and *MegaBit Services Cisco 675 User Guide* are provided with your Cisco 675 digital modem. Depending on the platform you requested when you ordered MegaBit Services, you received either a Windows or Macintosh version of the *MegaBit Services Cisco 675 User Guide.*

■ *Cisco 675 ADSL Router Installation and Operation Manual*

This manual explains how to install, configure, and operate the Cisco 675 digital modem. While chapters 1 and 2 duplicate information in the *MegaBit Services Cisco 675 User Guide,* Chapter 3, "Configuration Procedures," provides advanced network configuration information that network administrators may find helpful. Chapter 4, "Troubleshooting," contains advanced troubleshooting tips.

■ *Cisco Broadband Operating System User's Guide*

This user's guide explains how the Cisco Broadband Operating System (cbos) works and contains a command reference. Network administrators who are taking advantage of the Cisco 675 digital modem's advanced features will find this user's guide helpful.

■ *MegaBit Services Macintosh Cisco 675 User Guide.*

This user guide for Macintosh OS 8.5 and greater explains how to install the Cisco 675 digital modem with a single Macintosh. Much of the information also applies to the computers on a local area network.

■ *MegaBit Services Windows Cisco 675 User Guide.*

This user guide for Windows 95, 98, and NT4 explains how to install the Cisco 675 digital modem with a single Windows computer. Much of the information also applies to the computers on a local area network.

bps
Bits per second. A standard measurement of the speed at which digital data is transmitted.

bridge
A device that joins two or more physical networks so that they act as one network. The Cisco 675 digital "modem" can serve as either a bridge or a router. See also modem and router.

broadband technology
A technology that can send signals from two or more independent networks over a single cable. Traffic from one network does not interfere with traffic from another network because the "conversations" happen at different frequencies.

client
A computer on a network that receives services or resources from a server.

DHCP
Dynamic Host Configuration Protocol. Assigns IP addresses and other Internet configuration parameters dynamically to a computer connecting to the Internet. Each time that the computer connects to the Internet, it can receive a different IP address from the DHCP server.

digital subscriber line
A telephone line that can transmit high-speed digital data in addition to analog data such as voices. You can surf the Internet and talk on the phone at the same time because the data and voice signals are sent at different frequencies.

DNS
Domain name server. A computer that maps public IP addresses to domain names.

domain name
The name of an organization on the Internet, for example, *MyBusiness.com, MyNotForProfit.org,* or *MySchool.net.* A domain name server maps domain names to public IP addresses.

downstream rate
The line rate for return messages or data transfers from the network equipment to a user's computer. See also upstream rate.

DSL
Digital subscriber line.

Ethernet
A very common local area network (LAN) wiring scheme. Ethernet has a transmission rate of 10 Mbps; Fast Ethernet will carry 100 Mbps.

hub
A hardware device, also called a repeater, that connects all the devices such as computers and peripherals on a local area network in a star topology. The hub regenerates data signals to improve transmission quality.

IP
Internet Protocol. The network layer protocol for the Internet protocol suite.

IP address
An address assigned in blocks of numbers to user organizations accessing the Internet. Each address is in the form of x.x.x.x where x is a number from 0 to 255. Internet Service Providers can assign IP addresses dynamically whenever a customer's computer connects to the Internet, or they can give a customer a static IP address that never changes.

ISP
Internet Service Provider. A company that allows home and corporate users to connect to the Internet.

Kbps
Kilobits per second.

LAN
Local Area Network. A limited distance, high-speed network that supports two or more computers, printers, and other computer peripherals.

line rate
The speed by which data is transferred over a particular line type, expressed in bits per second (bps).

Mbps
Megabits per second.

MegaBit Services
A U S WEST product offering that provides customers with a very fast connection to the Internet or a corporate LAN. The service uses RADSL technology on the customer's existing telephone wire to support simultaneous voice and data traffic.

MegaCentral ISP
An Internet Service Provider that supports MegaBit Services.

modem
A device that converts or "modulates" a computer's digital signals into analog signals that can be sent across a voice telephone line to another modem, which "demodulates" the signals. The Cisco 675 digital "modem" is actually a router; it sends digital signals across a telephone line equipped with MegaBit Services. See also bridge and router.

NAT
Network Address Translation. Converts private IP addresses on a LAN or other private network to public IP addresses that are on a wide area network (WAN) or other registered network. NAT operates on a router that connects two or more networks together.

network interface card
A card in a computer that connects, or "interfaces," the computer to a network.

NIC
Network interface card.

peer-to-peer LAN
A LAN with computers and peripherals connected to an Ethernet hub. A peer-to-peer LAN does not have an Internet server connected between the Cisco 675 digital modem and the hub.

PPP
Point-To-Point-Protocol. PPP provides router-to-router and host-to-network connections.

protocol
A formal description of messages to be exchanged and rules to be followed for two or more systems to exchange information.

RADSL
Rate Adaptive Digital Subscriber Line. A technique for keeping the quality of transmissions within specified parameters.

router
A device that makes decisions about which path network or Internet traffic will follow. It uses a routing protocol to gain information about the network, and it uses procedures to choose the best route. The Cisco 675 digital "modem" is a router that can also serve as a bridge. See also bridge and modem.

server
A computer on a network that provides services or resources to client computers. An Internet Service Provider's DHCP server assigns dynamic IP addresses to other computers.

server-based LAN
A LAN in which an Internet server such as a web server or an e-mail server is connected between the Cisco 675 digital modem and the Ethernet hub.

subnet
A sub-network such as a local area network in a home or business.

subnet mask
A number in the form x.x.x.x used to select portions of an Internet address for subnet addressing. The mask selects the network portion of the Internet address and part of the local portion.

TCP
Transmission Control Protocol. The major transport protocol in the Internet suite of protocols providing reliable, connection-oriented data transmission.

TCP/IP
See TCP and IP.

upstream rate
The line rate for message or data transfer from a user's computer to the network equipment. See also downstream rate.

WAN
Wide Area Network. A data communications network that spans any distance and is usually provided by a public carrier (such as a telephone company).

workstation
A client computer on a network. A workstation runs applications and is connected to a server from which it obtains data shared with other client computers.

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The availability of MegaBit Services to your home or business is subject to certain specifications, including your distance from the U S WEST Serving Office, whether that office is equipped to offer the service, and other technical telephone line qualifications.

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