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INTRODUCTION TO NETWORKING DEVICES

Overview

- Network components.
- Different types of cabling.
- Installation and configuration of a network interface card.

Network Components

- Basic network components.
- Functionality of network components.
- Network connectivity.

Basic Network Components

Basic computer components:

- The monitor is a video display that provides the computer a means of communicating with the user.
- It connects to the computer and displays the actions performed by the user on the computer.
- It can also be used to input or enter data into a computer.

Basic Network Components

Basic computer components (continued):

- The keyboard is a means of communicating with the computer.
- It has additional multiple keystroke combinations that can be used to invoke special features.
- It can also be used to replace normal letters to create special characters.

Basic computer components (continued):

- The system unit holds the essential electronic circuits like the central processing unit (CPU), read-only memory (ROM), and random access memory (RAM).
- It also includes components like video cards, compact disc (CD) players, hard disk drives, floppy disk drives, and sound cards.

Basic Network Components

Basic computer components (continued):

- The mouse provides a means of pointing to a specific area on the screen and communicating with the computer.
- It converts the up-and-down and left-and-right motions to vectors by directing an arrow or another graphic depiction called a cursor on the computer's screen.

Basic Network Components

Basic computer components (continued):

- The system unit holds the essential electronic circuits like the central processing unit (CPU), read-only memory (ROM), and random access memory (RAM).
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Basic Network Components

Electronic data:

- Electronic data is one of the basic components that are shared across networks.
- It is created and stored for later retrieval and take advantage of the computer speed.

Basic Network Components

Additional computer:

- Network data refers to the information that can be shared over connected computers.
- Additional computers are used to share the data available on the network.

Basic Network Components

Connection medium:

- The connection medium, also called the networking medium, establishes a connection between each of the computers in the network.
- The connection is made up of the networking medium and a network interface.

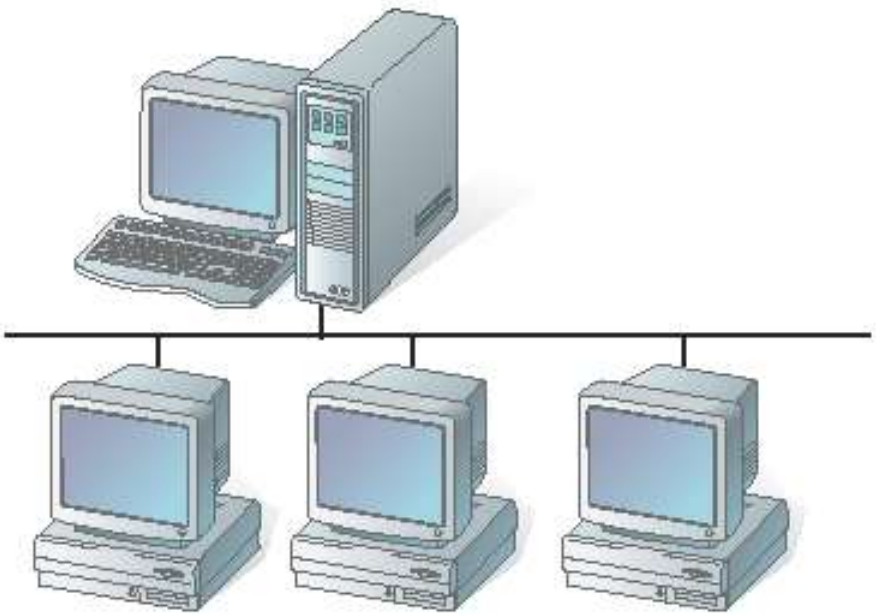
Functionality of Network Components

- Server
- Client
- Workstation

Server

- A network server or server is a computer that offers its services and/or its resources to clients, workstations, and other servers over a computer network.
- A server commonly has multiple processors, large hard drives, and large amounts of RAM.
- A server provides centralized management of resources, security, and expanded access to networked resources in a network.

Server



Server and clients

Client

- A network client or client is a device on a computer network that requests services or resources from a server.
- Clients can be printers, workstations, servers, or any other device connected to the computers on a network.
- The most common network clients are workstations.

Workstation

- A workstation is a computer that operates independently of the network.
- It manages its own files and processing.
- Workstations connect to the network for the purpose of security and centralized management of networked resources.

Network Connectivity

- Communication medium.
- Network interface card (NIC).
- Concentrators.

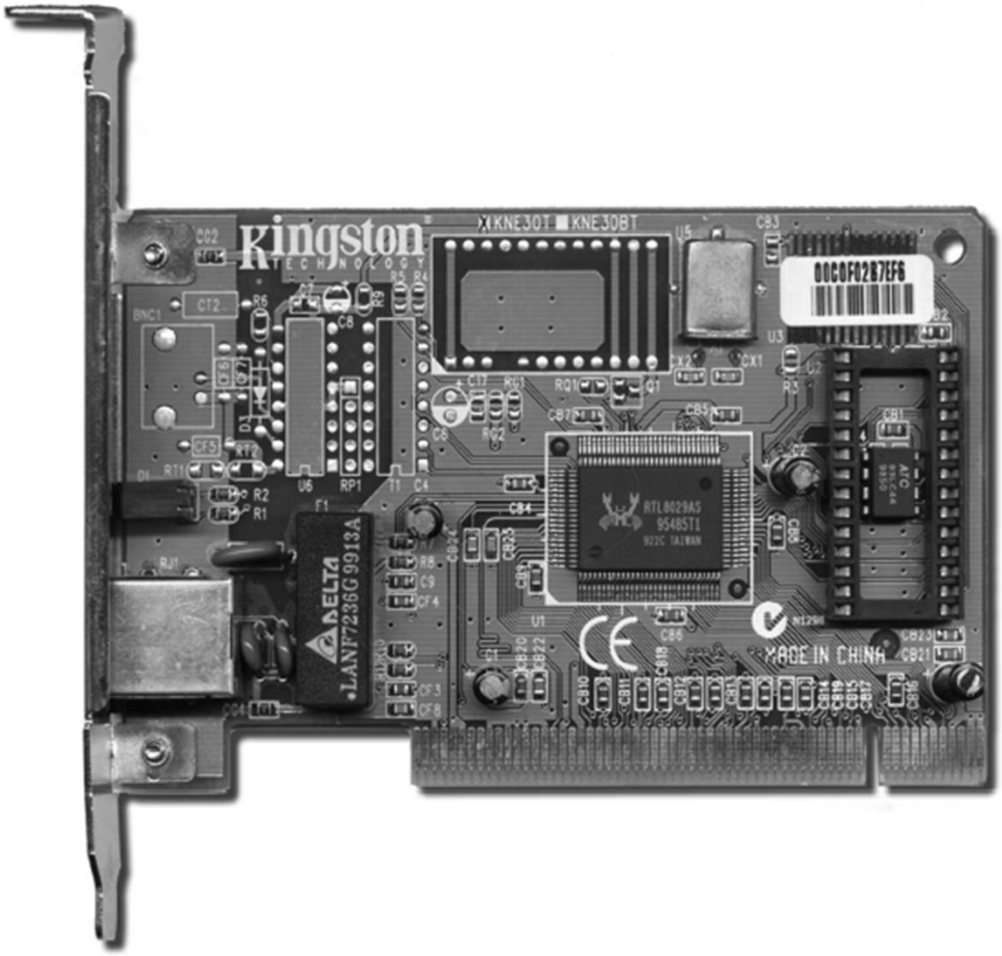
Communication Medium

- A communication medium is the physical path between the networked resources.
- The medium used is either a coaxial cable or a twisted-pair wire.
- Fiber-optic cabling and wireless medium have gained widespread acceptance as a network communication medium.

Network Interface Card (NIC)

- A NIC, also known as the network board, is used to connect the networked components to the physical cable.
- The NIC provides a physical connection to the device and also creates and sends signals from one networked device to another.

Network Interface Card (NIC)



Network interface card

Concentrators

- Network concentrators allow users to connect multiple cables together to enable numerous connections to networked resources.

Concentrators

Hub:

- A hub is the central meeting point where cables join to carry information to other resources through a network.
- It contains several wiring ports that can be used to receive data and pass on the same to any other device on a network.
- Hubs have a simple design and they rarely wear out.
- They provide the additional connections necessary, but end up using much of the network capacity.

Concentrators

Switches:

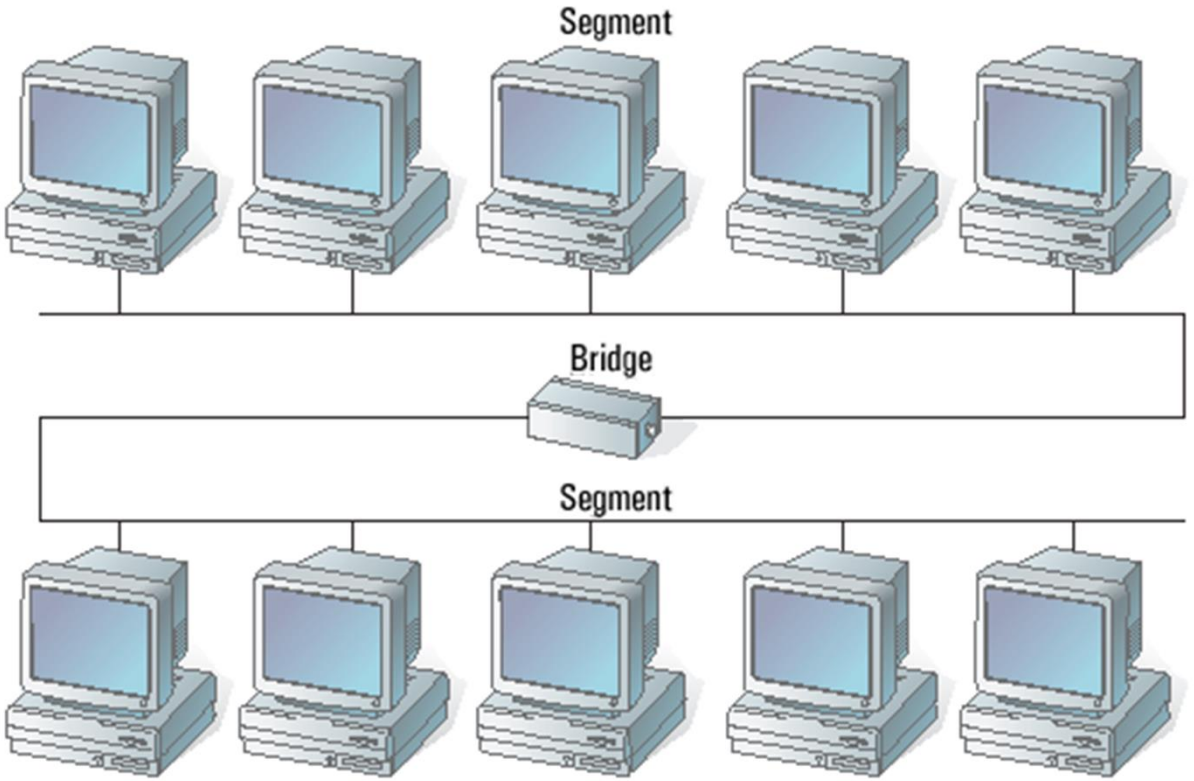
- Switches, like hubs, provide a centralized connection.
- They include network monitoring and selective configuration capabilities, thereby reducing network traffic.
- Shared data can directly be sent to an individual resource instead of every networked resource.
- Switches are more economical to use.

Concentrators

Bridges:

- A bridge connects dissimilar networks together.
- The basic function of a bridge is to join two or more separate networks that use the same networking language, called protocol.

Concentrators



A bridge segments a network

Concentrators

Routers:

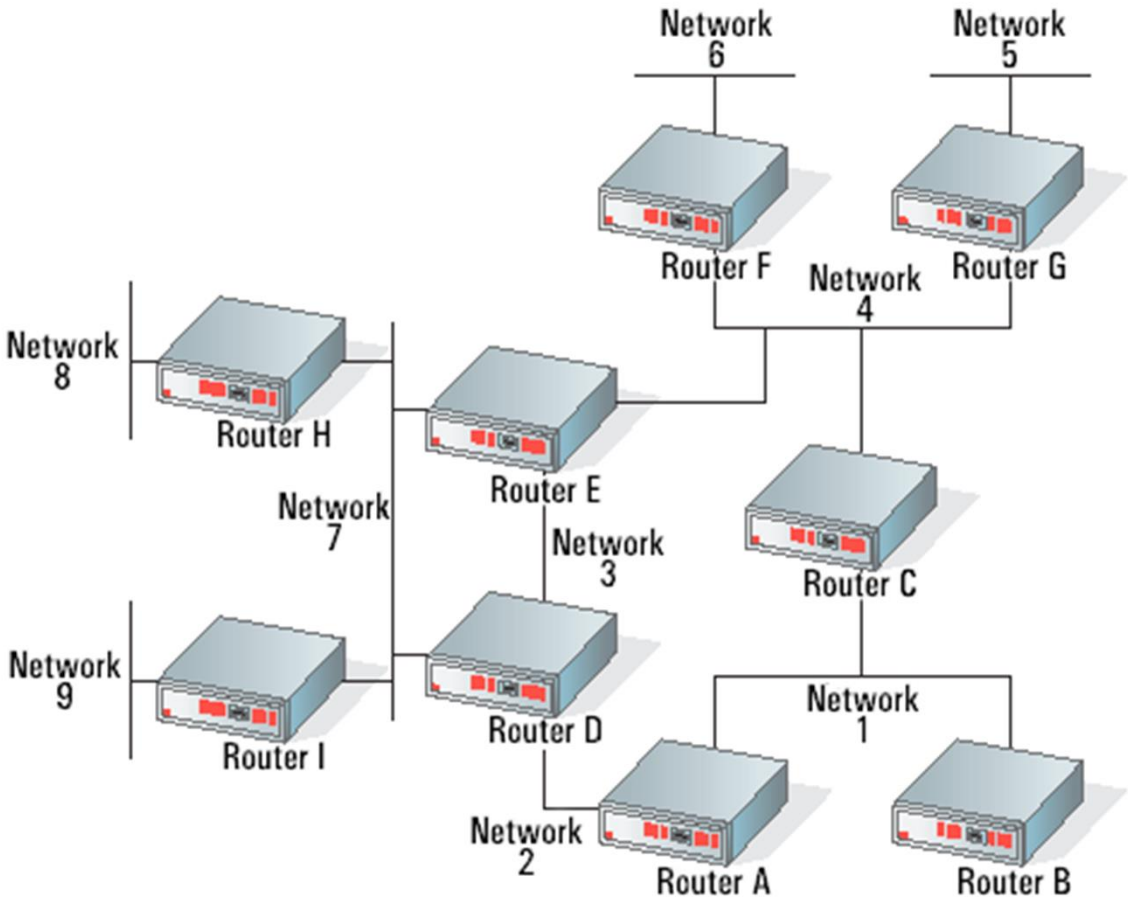
- A router is used to send specific portions of messages directly to the intended destination in a separate network.
- Information is directly transmitted between the networks without causing any network traffic.

Concentrators

Routers (continued):

- Networks served by a router are not required to use the same protocol.
- Routers are frequently used to place additional security on sensitive networked resources.

Concentrators



Networks are separated by routers

Different Types of Cabling

- Network cabling is the physical connection that runs between networked resources.
- The four basic types of networking medium are coaxial cable, twisted-pair cable, fiber-optic cable, and wireless.

Coaxial Cable

- The term coaxial is derived from the terms, ‘Co’ and ‘axial’, where ‘Co’ refers to the two conductors and axial refers to the same axis.
- The two coaxial conductors cannot be separated easily.

Coaxial Cable

- Thick coax cable or thicknet was the first widely used network-cabling medium.
- Thicknet cables are approximately half an inch in diameter and carry Ethernet signals reliably for up to 500 meters (1,650 feet).

Coaxial Cable

- Thin coax cables came into use shortly after thicknet.
- They weigh less and are also significantly less expensive.
- A thinnet cable is approximately a quarter of an inch in diameter and carries an Ethernet signal reliably for up to 185 meters (610 feet).

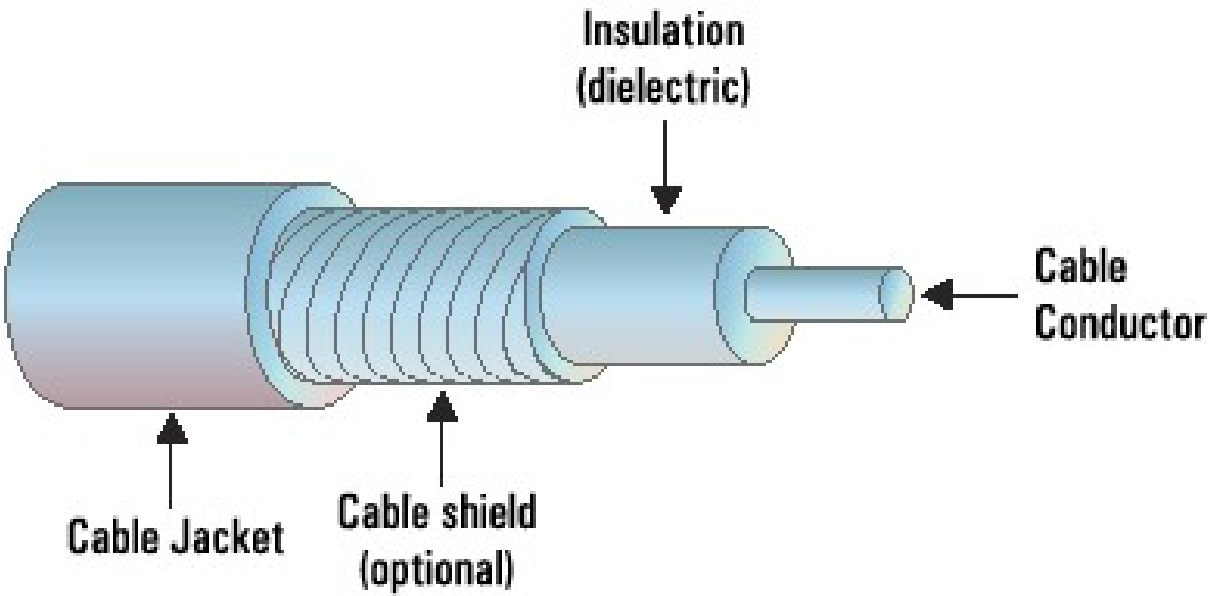
Coaxial Cable

Both ends of a thinnet coaxial cable.

Coaxial Cable

- A coaxial cable is used to connect computers in a line from one to another, called daisy chaining.
- At each end of a thinnet coax cable, there is a twisted barrel-like connection called a BNC connector.
- At each network interface card, a separate T-connector is inserted into the BNC connector.

Coaxial Cable



A cross-section of a coaxial cable shows its layers

Coaxial Cable

- At both ends of the daisy chain, a connector is twisted into the T-connector to terminate signals.
- The terminator is a device that absorbs any residual signal at the end of the network and ensures that it does not bounce back over the cable medium.

Coaxial Cable

A BNC T-connector showing a terminator and typical wiring connector.

Twisted-Pair Cable

- A twisted-pair (TP) cable has eight individually insulated wires bundled together.
- The cable is constructed such that the eight wires are grouped as four pairs inside a protective casing.

Twisted-Pair Cable

- There are two types of twisted-pair cables – shielded twisted pair (STP) and unshielded twisted pair (UTP).
- Both types of cable are easy to maintain and are inexpensive.
- UTP is the most commonly used network-cabling medium.

Fiber-Optic Cable

- A fiber-optic cable consists of a central fiber-optic core surrounded by a cladding material and coated with a protective plastic covering.
- The central fiber-optic core is highly refined plastic or glass that has a high degree of light transmission capability.

Fiber-Optic Cable

- Fiber-optic cables use light signals for data transmission.
- Either laser or other light producing mechanism, such as light emitting diodes (LEDs), are used as the source of light.
- Using a laser is more dependable, but more costly, so most fiber-optic networks use LEDs as the source of light.

Wireless

- Wireless networking is used very frequently since it is mobile and convenient.
- Most wireless networks use infrared or radio waves, while others use microwave and satellite networks.
- Physical connections, such as wiring, are not found in locations where mobile users are connected.

Installation and Configuration of a Network Interface Card

The following components are required for installing a NIC:

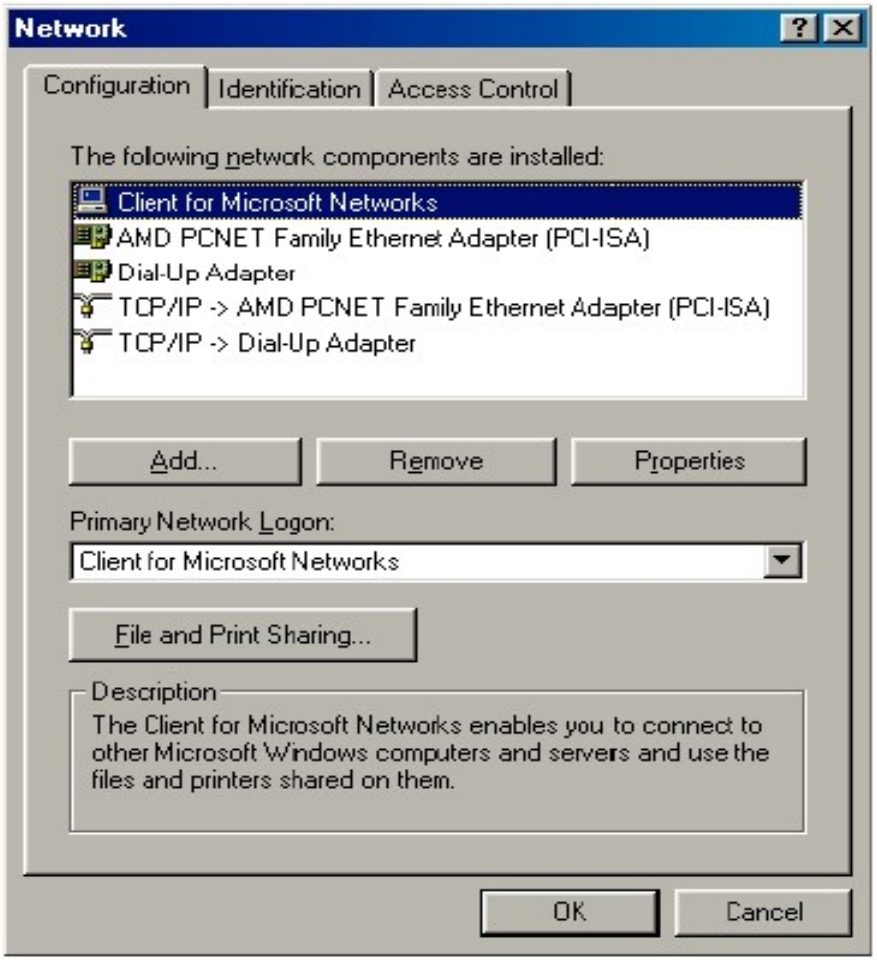
- One NIC per computer or networked device.
- A computer running Windows 98 or higher.
- A crossover network cable.
- An appropriate driver for the NIC.

Installation and Configuration of a Network Interface Card

The following things must be ensured before installing the NIC:

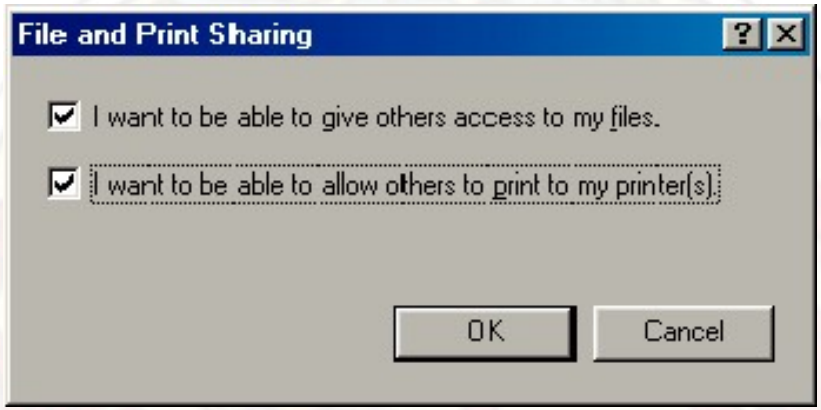
- The computer must be turned off, and the unit must be unplugged from its power source.
- All cables connected to the system unit must be disconnected.
- Only insulated or nonconductive tools must be used.

Installation and Configuration of a Network Interface Card



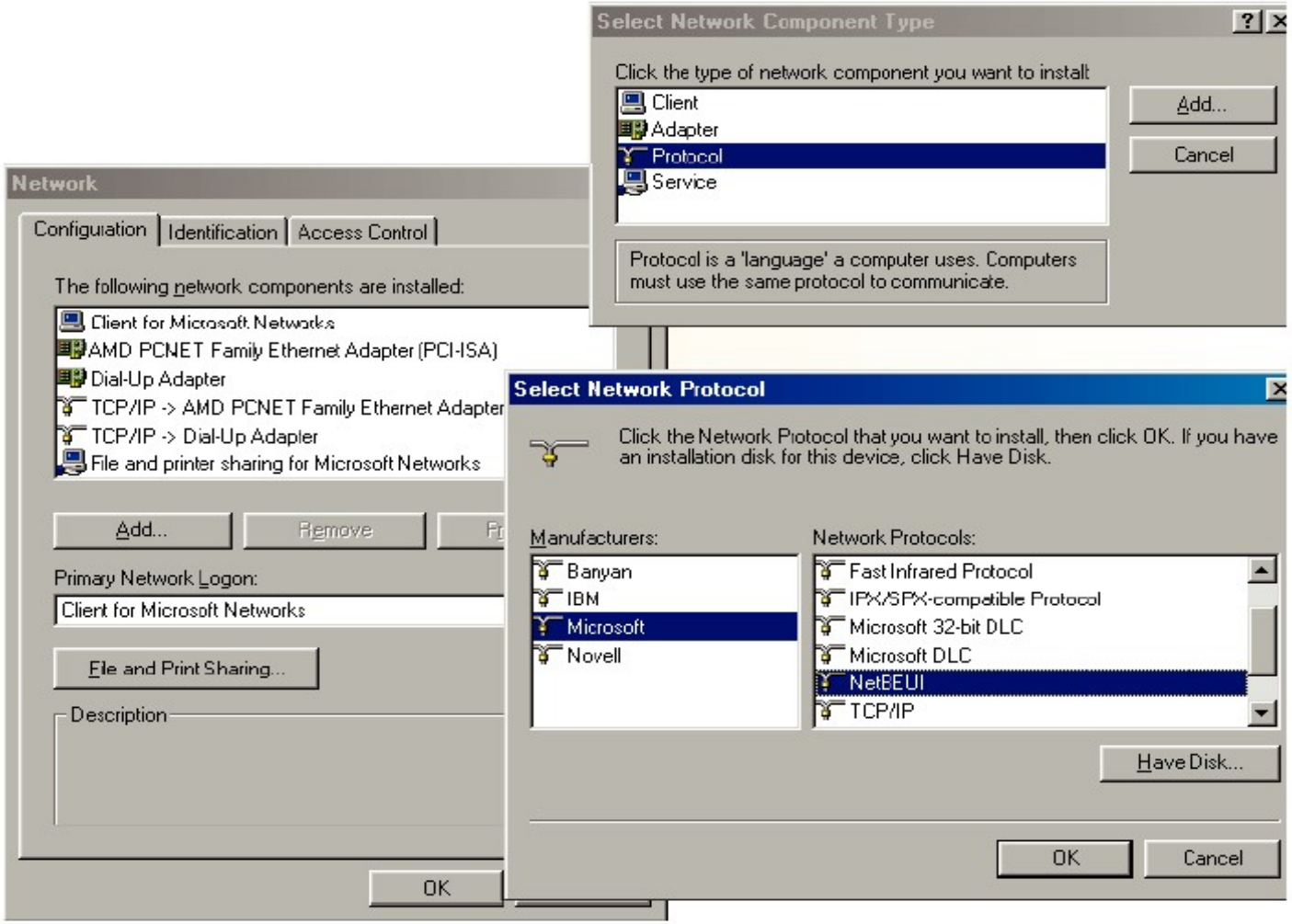
Network Properties dialog box

Installation and Configuration of a Network Interface Card



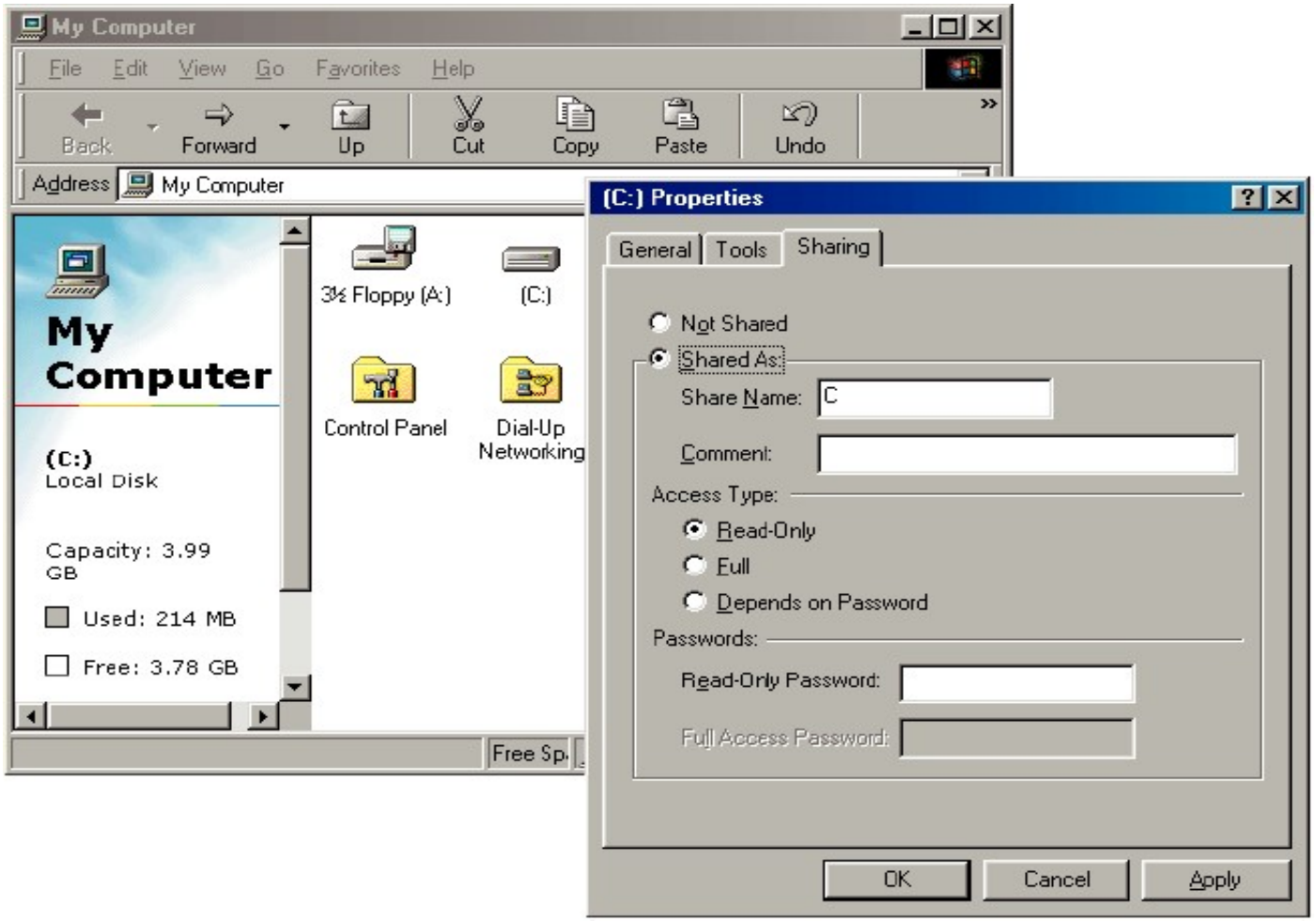
File and Print Sharing dialog box

Installation and Configuration of a Network Interface Card



Network Protocol Installation window

Installation and Configuration of a Network Interface Card



Sharing tab

Summary

- Basic network components include the stand-alone system, the electronic data to be shared, the additional computer, and the connection medium.
- The networked computers are interconnected using twisted-pair cables, coaxial cables, or fiber-optic cables.

Summary

- The cabling connects the computers through network interface cards.
- Hubs, switches, bridges, and routers act as connections in a network and furnish additional services for passing information around the network.