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).

– It also includes components like video cards, compact disc (CD) players, hard disk drives, floppy disk drives, and sound cards.
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)
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 Interface Card Installation and Configuration

Network Protocol Installation window

Select Network Component Type

Select Network Protocol

Manufacturers:
- Banyan
- IBM
- Microsoft
- Novell

Network Protocols:
- Fast Infrared Protocol
- IPX/SPX-compatible Protocol
- Microsoft 32-bit DLC
- Microsoft DLC
- NetBEUI
- TCP/IP
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.