



**Ministry of Higher Education and Scientific
Research Al-Mustaqbal University College
Department of Technical Computer Engineering**

Lecture Number: 2

Computer Networks 3rd Stage

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Introduction and classify the computer network

Data communications are the exchange of data between two devices via some form of transmission medium such as a wire cable.

Characteristics Data communications system depends on:

- 1- DELIVERY
- 2- ACCURACY
- 3- TIMELINESS
- 4- JITTER

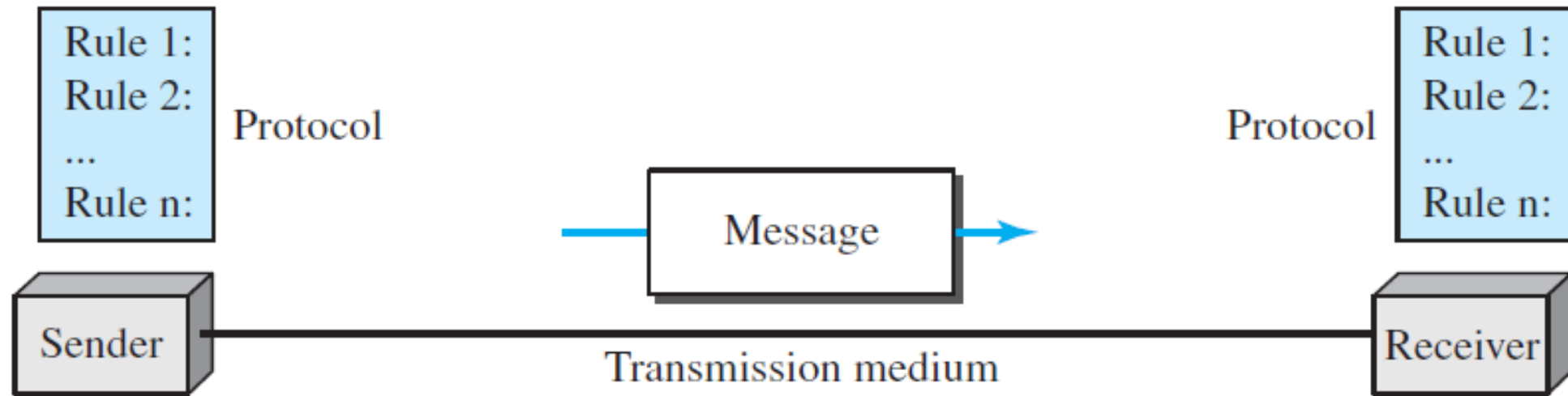
Introduction and classify the computer network

- 1- **Delivery.** The system must deliver data to the correct destination. Data must be received by the intended device or user and only by that device or user.
2. **Accuracy.** The system must deliver the data accurately. Data that have been altered in transmission and left uncorrected are unusable.
3. **Timeliness.** The system must deliver data in a timely manner. Data delivered late are useless. In the case of video and audio, the Delivery called real-time transmission.
4. **Jitter.** Jitter refers to the variation in the packet arrival time. It is the uneven delay in the delivery of audio or video packets.

Introduction and classify the computer network

Components of Communication System

- 1. Message.** The message is the information (data) to be communicated. Popular forms of information include text, numbers, pictures, audio, and video..



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Components of Communication System

- 2. Sender.** The sender is the device that sends the data message. It can be a computer, workstation, telephone handset, video camera, and so on.
- 3. Receiver.** The receiver is the device that receives the message. It can be a computer, workstation, telephone handset, television, and so on.
- 4. Transmission medium.** The transmission medium is the physical path by which a message travels from sender to receiver.
- 5. Protocol.** A protocol is a set of rules that govern data communications. It represents an agreement between the communicating devices..

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Data Representation:

Information comes in different forms such as **text**, **numbers**, **images**, **audio**, and **video**.

- 1. Text:** In data communications, text is represented as a bit pattern, a sequence of bits (0s or 1s). Different sets of bit patterns have been designed to represent text symbols. Each set is called a code, and the process of representing symbols is called coding (ASCII).
- 2. Numbers:** Numbers are also represented by bit patterns. However, a code such as ASCII is not used to represent numbers.
- 3. Images:** Images are also represented by bit patterns. In its simplest form, an image is composed of a matrix of pixels (picture elements), where each pixel is a small dot.

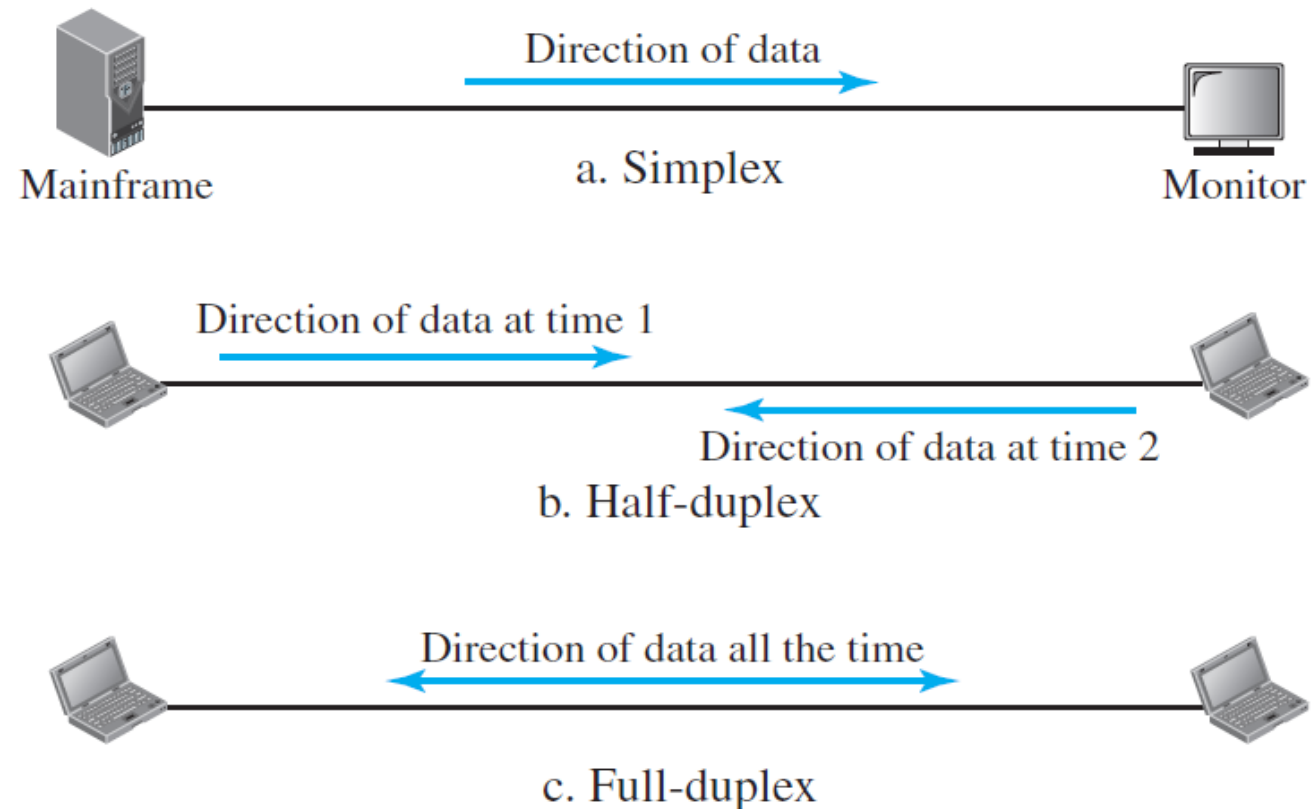
Introduction and classify the computer network

4. **Audio:** Audio refers to the recording or broadcasting of sound or music. Audio is by nature different from text, numbers, or images. It is continuous, not discrete.
5. **Video:** Video refers to the recording or broadcasting of a picture or movie. Video can either be produced as a continuous entity (e.g., by a TV camera), or it can be a combination of images, each a discrete entity, arranged to convey the idea of motion.

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Transmission Technology or Data Flow:

Communication between two devices can be simplex, half-duplex, or full-duplex.



Introduction and classify the computer network

Transmission Technology or Data Flow:

Communication between two devices can be simplex, half-duplex, or full-duplex.

- **Simplex** : In simplex mode, the communication is unidirectional, as on a one-way street. Only one of the two devices on a link can transmit; the other can only receive.
- **Half-Duplex** : In half-duplex mode, each station can both transmit and receive, but not at the same time. When one device is sending, the other can only receive, and vice versa.
- **Full-Duplex** : In full-duplex mode (also called duplex), both stations can transmit and receive simultaneously.

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Network

A network is a set of communication devices (often refers to as node or host) connected by media links.

A device can be a large computer, desktop, laptop, workstation, cellular phone, or security system and/or can be a connecting device such as a router, which connects the network to other networks, a switch, which connects devices together, a modem (modulator-demodulator), which changes the form of data, and so on.

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Network Criteria

A network must be able to meet a certain number of criteria. The most important of these are:

1. **performance;**
2. **reliability;**
3. **security.**

1. Performance: Performance can be measured in many ways, including transit time and response time.

Transit time is the amount of time required for a message to travel from one device to another.

Response time is the elapsed time between an inquiry and a response.

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Network Criteria

The performance of a network depends on a number of factors which are:

- ✓ **The number of users**
- ✓ **The type of transmission medium**
- ✓ **The connected hardware**
- ✓ **The efficiency of the software**

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Network Criteria

2. Reliability

In addition to accuracy of delivery, network reliability is measured by the frequency of failure, the time it takes a link to recover from a failure, and the network's robustness in a catastrophe.

3. Security

Network security issues include protecting data from unauthorized access, protecting data from damage and development.

Introduction and classify the computer network / Physical Structures

Type of Connection

A network is two or more devices connected through links. A link is a communications pathway that transfers data from one device to another.

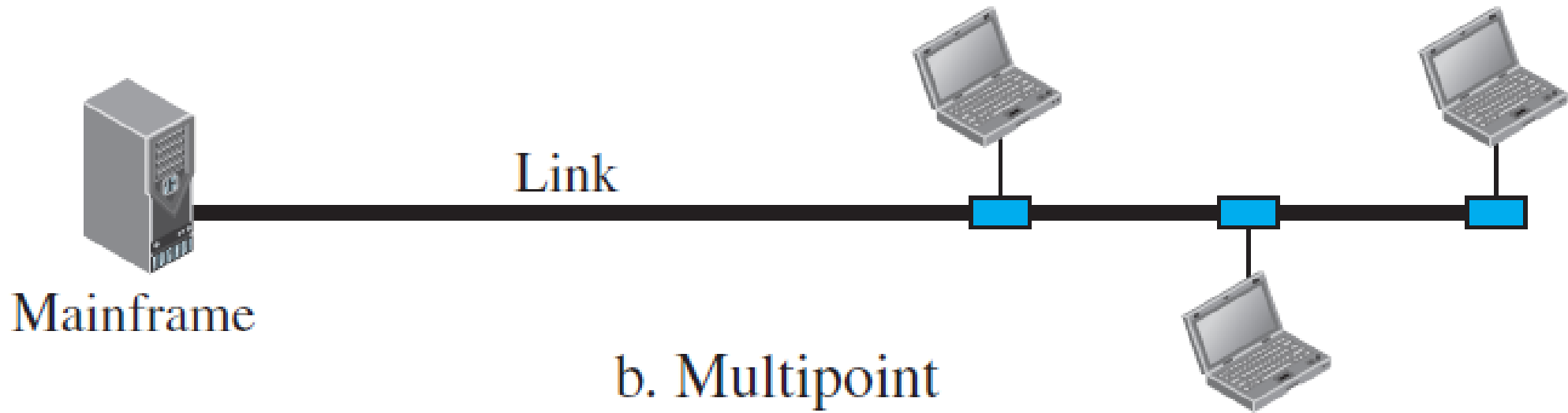
Point-to-Point: A point-to-point connection provides a dedicated link between two devices. The entire capacity of the link is reserved for transmission between those two devices.

Multipoint: A multipoint (also called multidrop) connection is one in which more than two specific devices share a single link (see Figure 3b). In a multipoint environment, the capacity of the channel is shared, either spatially or temporally.

Types of connections: point-to-point and multipoint



a. Point-to-point



b. Multipoint