



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

Lecture Number: 1

Computer Networks 3rd Stage

Lecturer: Hussein Ali Ameen

hussein-awadh@mutaqbal-college.edu.iq

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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

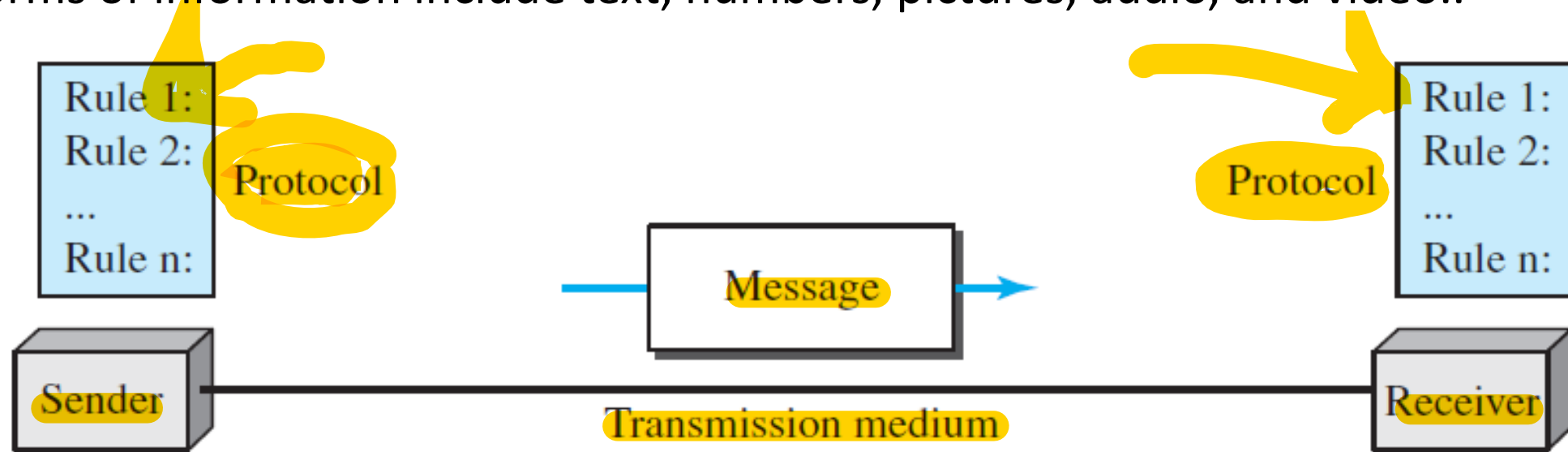
Introduction and classify the computer network

- 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.

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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.

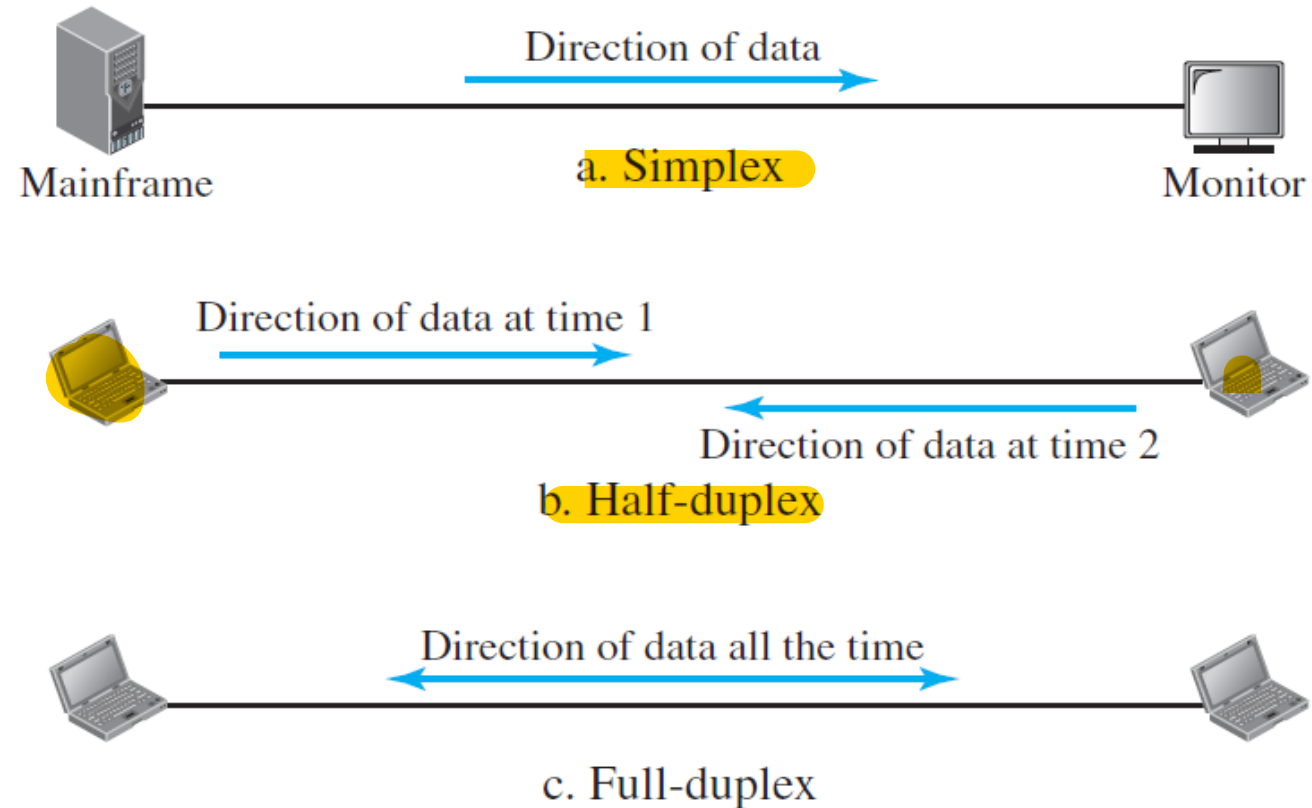
Introduction and classify the computer network

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.

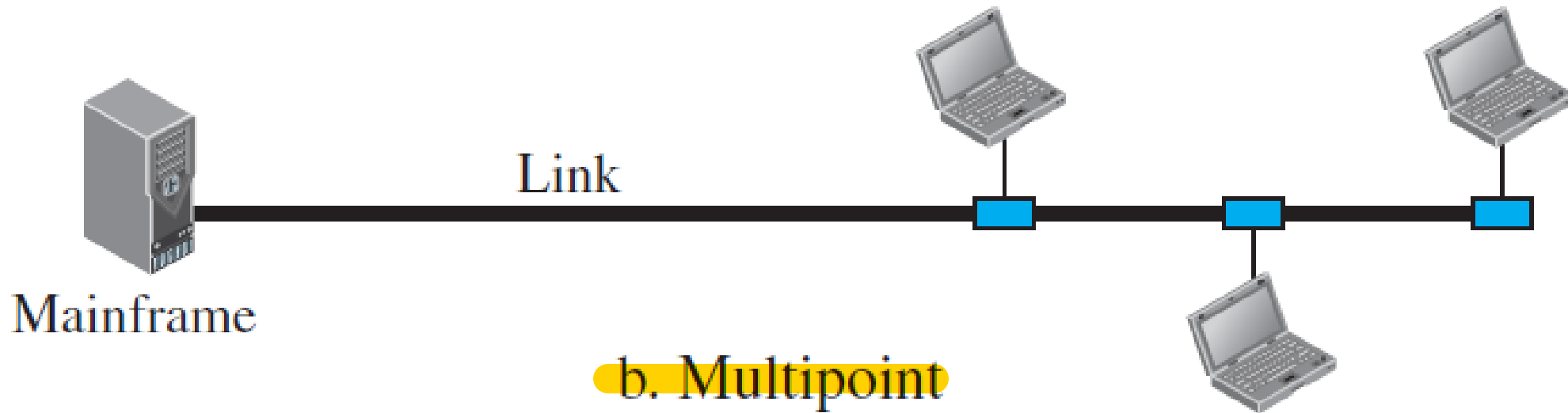
Point-to-Point: A point-to-point connection provides a dedicated link between two devices. The entire capacity of the link is reserved for transmission between those two devices.

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