Al Mustaqbal University
College of Medicine

Computer Science

Lecture 4
Communications and Networks

Dr Mohammed Fadhil
mohammed.fadhil1@uomus.edu.iq
and
Dr Ahmed Hasan Al-Janabi
Ahmed.Janabi@uomus.edu.iq

Objectives Overview

- Discuss the purpose of the components required for successful communications and identify various sending and receiving devices
- Differentiate among LANs, MANs, WANs, and PANs
- Differentiate between client/server and peer-to-peer networks
- Differentiate among a star network, bus network, and ring network
- Describe the various network communications standards and protocols
- Explain the purpose of communications software

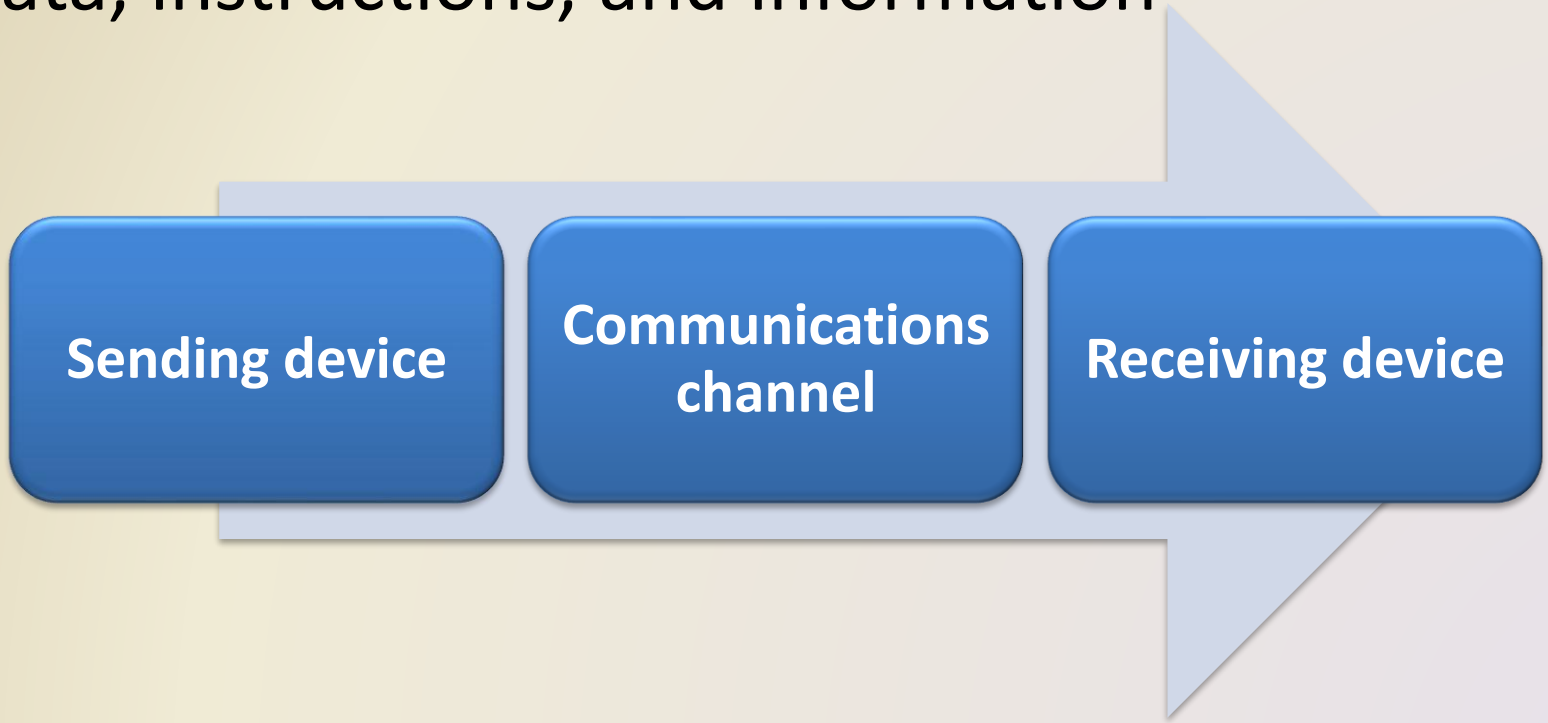
Objectives Overview

Describe various types of communications lines

Describe commonly used communications devices

Communications

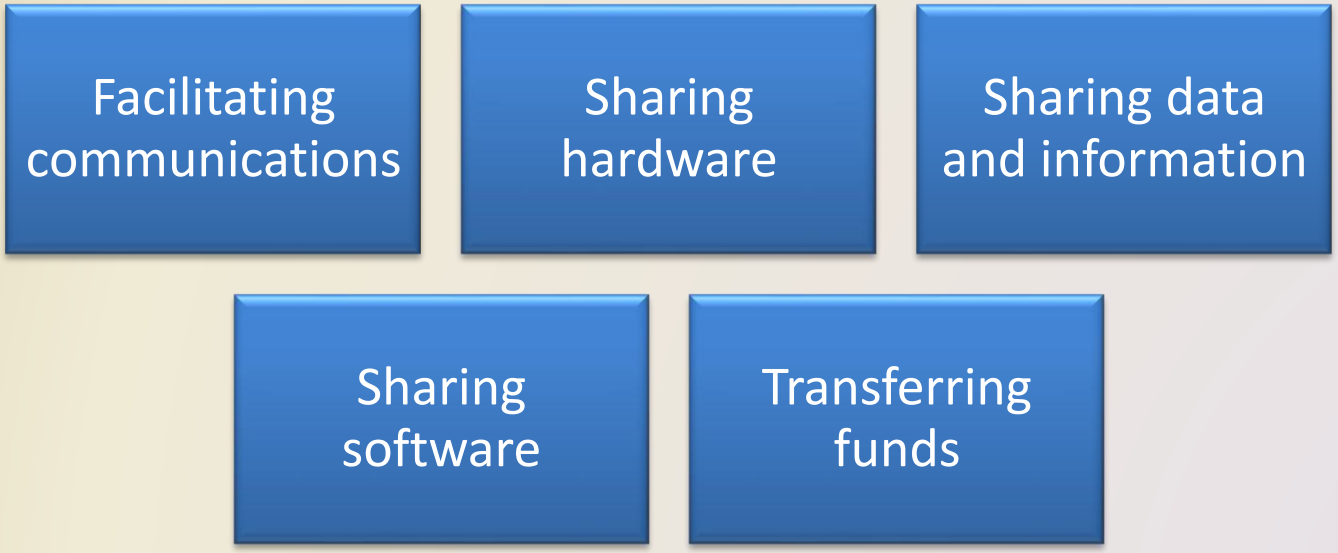
- Digital communications describes a process in which two or more computers or devices transfer data, instructions, and information



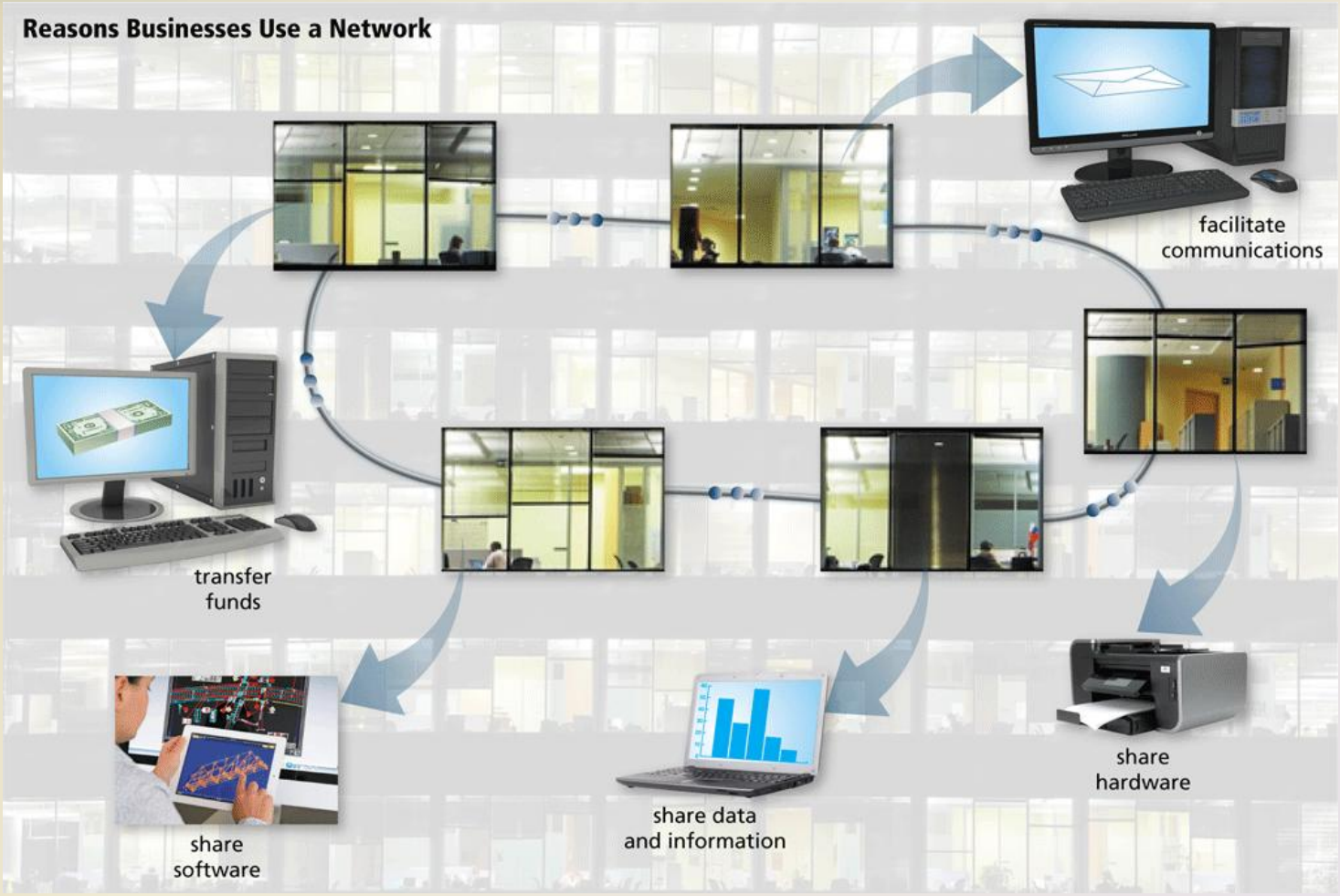
Communications

Networks

- A **network** is a collection of computers and devices connected together via communications devices and transmission media
- Advantages of a network include:

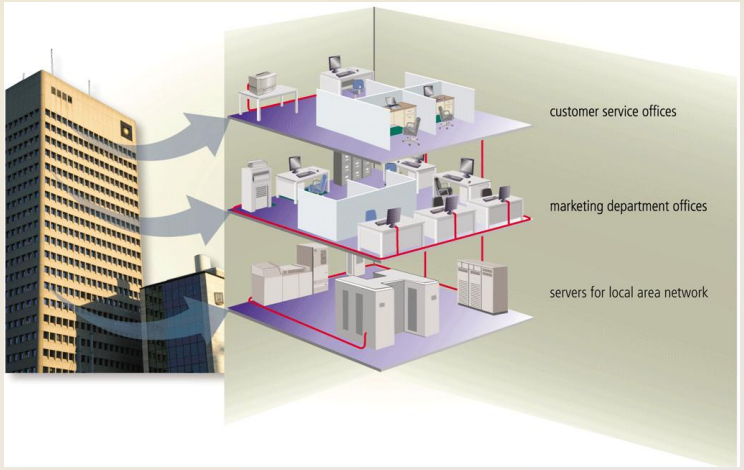


Networks


Reasons Businesses Use a Network
facilitate communications
transfer funds
share software
share data and information
share hardware

Types of Networks

- A **local area network** (**LAN**) is a network that connects computers and devices in a limited geographical area
- A **wireless LAN** (**WLAN**) is a LAN that uses no physical wires



Types of Networks

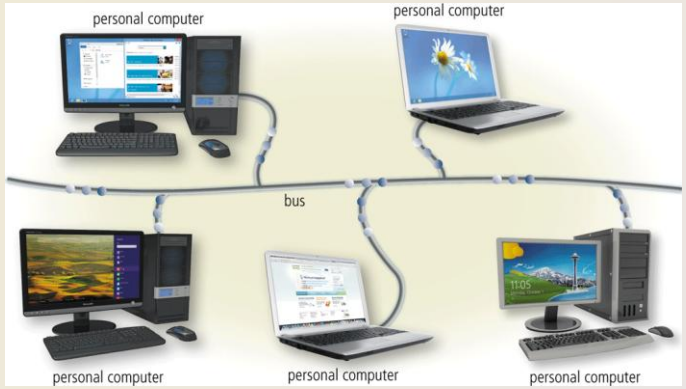
- A **metropolitan area network** (MAN) connects LANs in a metropolitan area
- A **wide area network** (**WAN**) is a network that covers a large geographic area
- A **personal area network** (**PAN**) is a network that connects computers and devices in an individual's workspace with wired and wireless technology

Networks

- A **network topology** refers to the layout of the computers and devices in a communications network

Star network

Bus network



Ring network

Network Communications Standards and Protocols

Ethernet	Token ring	TCP/IP	Wi-Fi
Bluetooth	UWB	IrDA	RFID
	NFC	WiMAX	

Network Communications Standards and Protocols

Ethernet is a network standard that specifies no central computer or device on the network (nodes) should control when data can be transmitted

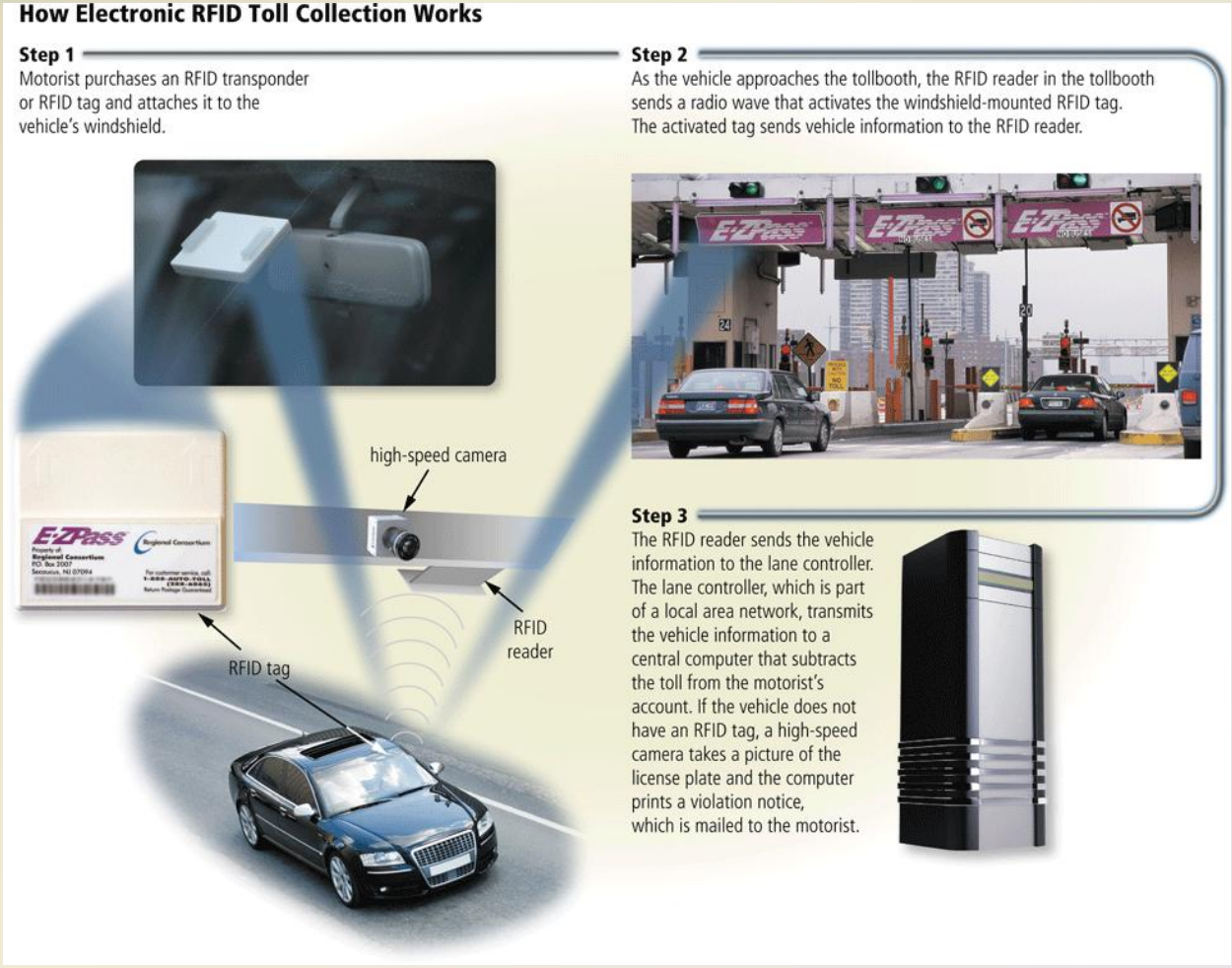
The **token ring** standard specifies that computers and devices on the network share or pass a special signal (token)

TCP/IP is a network protocol that defines how messages (data) are routed from one end of a network to another

Network Communications Standards and Protocols

- **Wi-Fi** identifies any network based on the **802.11** standard that specifies how two wireless devices communicate over the air with each other
- **Bluetooth** is a network protocol that defines how two Bluetooth devices use short-range radio waves to transmit data
- **UWB** (**ultra-wideband**) is a network standard that specifies how two UWB devices use short-range radio waves to communicate at high speeds with each other
- **IrDA** transmits data wirelessly via infrared (IR) light waves
- **RFID** is a protocol that defines how a network uses radio signals to communicate with a tag placed in or attached to an object, an animal, or a person

Network Communications Standards and Protocols



Network Communications Standards and Protocols

NFC

- Protocol based on RFID
- Uses close-range radio signals
- Devices or objects should be placed within an inch or two of each other

WiMAX (802.16)

- Developed by IEEE
- Towers can cover a 30-mile radius
- Two types are fixed wireless and mobile wireless

Communications Software

- **Communications software** consists of programs and apps that:

Help users establish a connection to another computer, mobile device, or network

Manage the transmission of data, instructions, and information

Provide an interface for users to communicate with one another

Communications Lines

- **Dedicated line**
- Cable
- **DSL**
- ISDN
- **FTTP**
- **T-Carrier**
- **ATM**

Communications Lines

Table 10-2 Speeds of Various Dedicated Digital Lines

Type of Line	Transfer Rates
Cable	256 Kbps to 52 Mbps
DSL	256 Kbps to 8.45 Mbps
ISDN	Up to 1.54 Mbps
FTTP	5 Mbps to 300 Mbps
Fractional T1	128 Kbps to 768 Kbps
T1	1.544 Mbps
T3	44.736 Mbps
ATM	155 Mbps to 622 Mbps, can reach 10 Gbps

Summary

Various types of network architectures, topologies, and standards and protocols

Communications software

Communications lines and communications devices

THANK YOU ☺