Lection 7
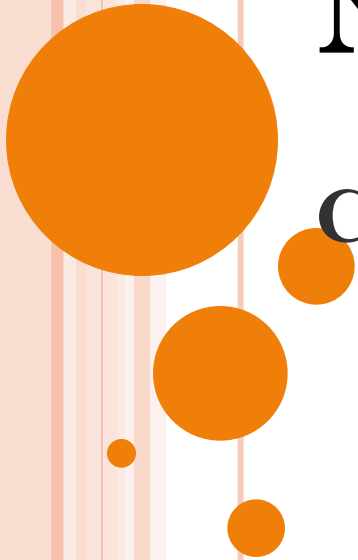
NETWORKS AND TELECOMMUNICATIONS.

СЕТИ И ТЕЛЕКОММУНИКАЦИИ

CONTENTS

- End devices, data transfer devices, transmission medium.
- Types of networks.
- Stack protocols: TCP/IP, OSI. IP addressing.
- Wire and wireless network technologies.
- DHCP protocol.
- Technologies of connection to the Internet.

DICTIONARY

End device	Конечное устройство
Network	Сеть
Switches	Коммутатор
Twisted pair	Витая пара
Telecommunications	Телекоммуникации
Equipment	Оборудование
Transfer	Передача

TELECOMMUNICATIONS

- **transmission and reception of any information on the distance for different electromagnetic systems (wired and wireless communication channels).**
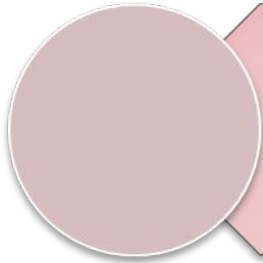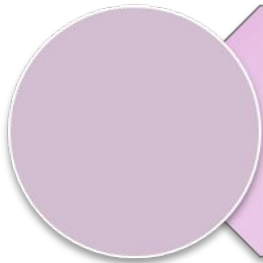
TELECOMMUNICATION NETWORKS

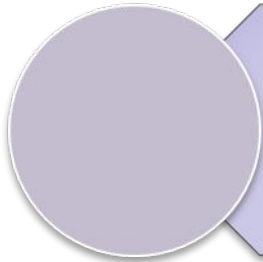- system of technical means by which telecommunications are implemented

TELECOMMUNICATION NETWORKS
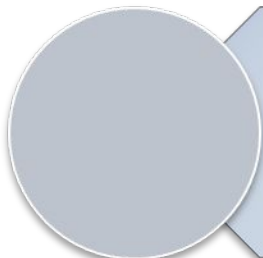
Computer networks

Telephone network

Radio network

Television network

COMPUTER NETWORK

- combination of computers and telecommunications equipment, providing communication of the computers on the network.

END DEVICES

Computers

Network printers

VoIP phones

Cameras

Mobile devices

DATA TRANSFER DEVICE (INTERMEDIATE DEVICES)

network adapters

repeaters, switches, hubs, multiplexers, bridges, routers

gateways and modems, terminating the operation of computers by data transmission channels.

ENVIRONMENT INFORMATION TRANSFER

 lines or communication channels by which information is exchanged between computers

MEDIA DEVICES

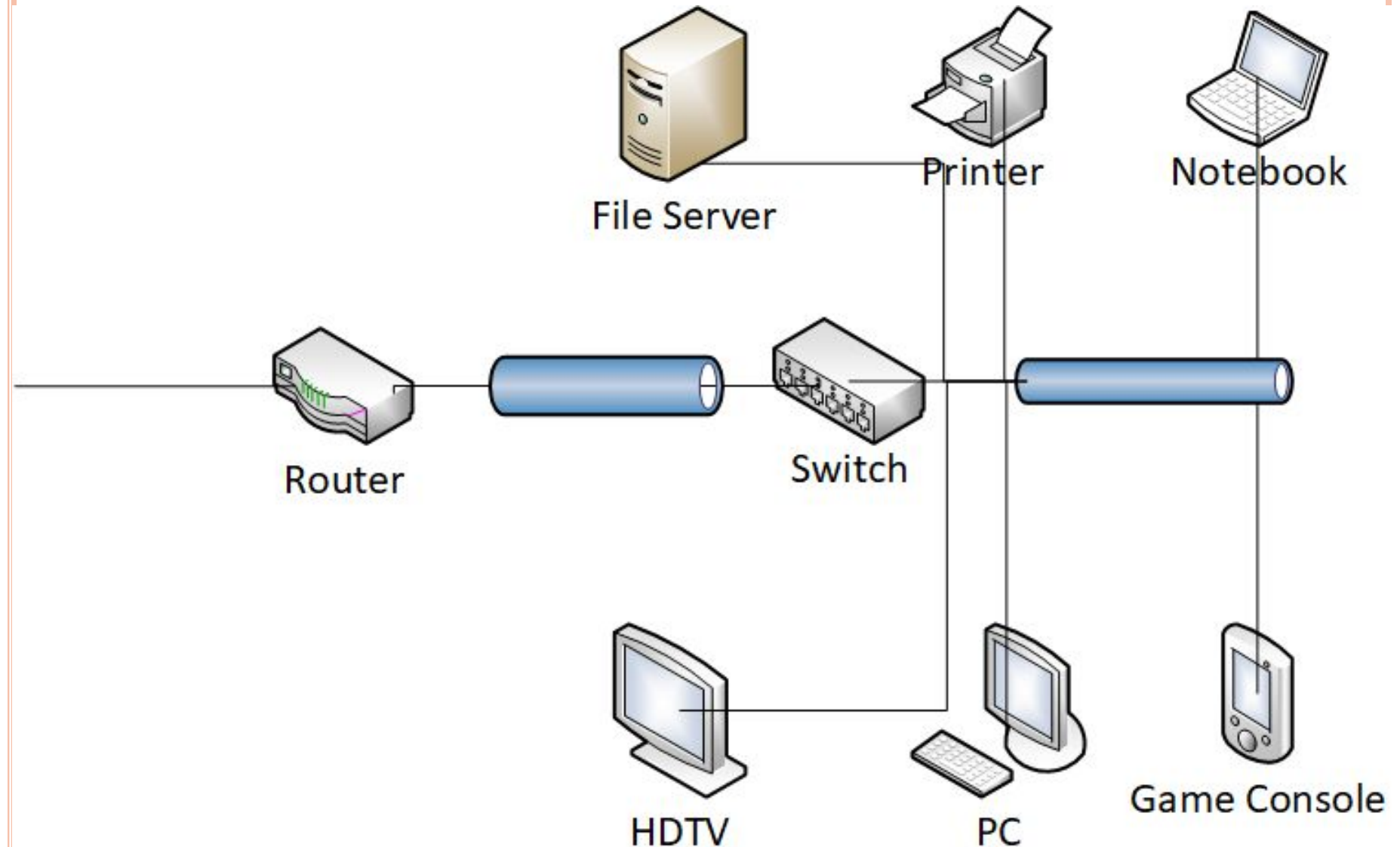Copper transmission medium (Cooper media)

Twisted pair

Coaxial cable

Fiber optic cable

Wireless media (Wireless media): Wi-Fi, Mobile communication, Bluetooth, Satellite communications

BASIC HARDWARE COMPONENTS OF A COMPUTER NETWORK

SERVERS

- The servers are sufficiently powerful computers, since the need to provide high speed data transmission and query process
- File server performs the following functions:
  - data storage;
  - archiving of data;
  - synchronize data changes by different users;
  - data transfering.

CLIENT

- The client is called a workstation on which the software is installed, providing the solution of problems generated in the process of the user.

COMMUNICATION CHANNELS

- Communication channel (or communication line), the physical medium in which information signals are transmitted to the data communication equipment.

DATA TRANSMISSION EQUIPMENT

The data transfer equipment serves for the direct connection of the computers to the communications line.

NETWORKS BY TERRITORIAL PREVALENCE

Local Area Network - LAN

Regional (Metropolitan Area Network) - MAN

Global (Wide Area Network) - WAN

NETWORKS BY SPEED OF INFORMATION TRANSFER

Low speed

Mid speed

High speed

NETWORKS BY THE MANAGEMENT METHOD

Peer-to-peer

- Одноранговая сеть

Network with a dedicated server
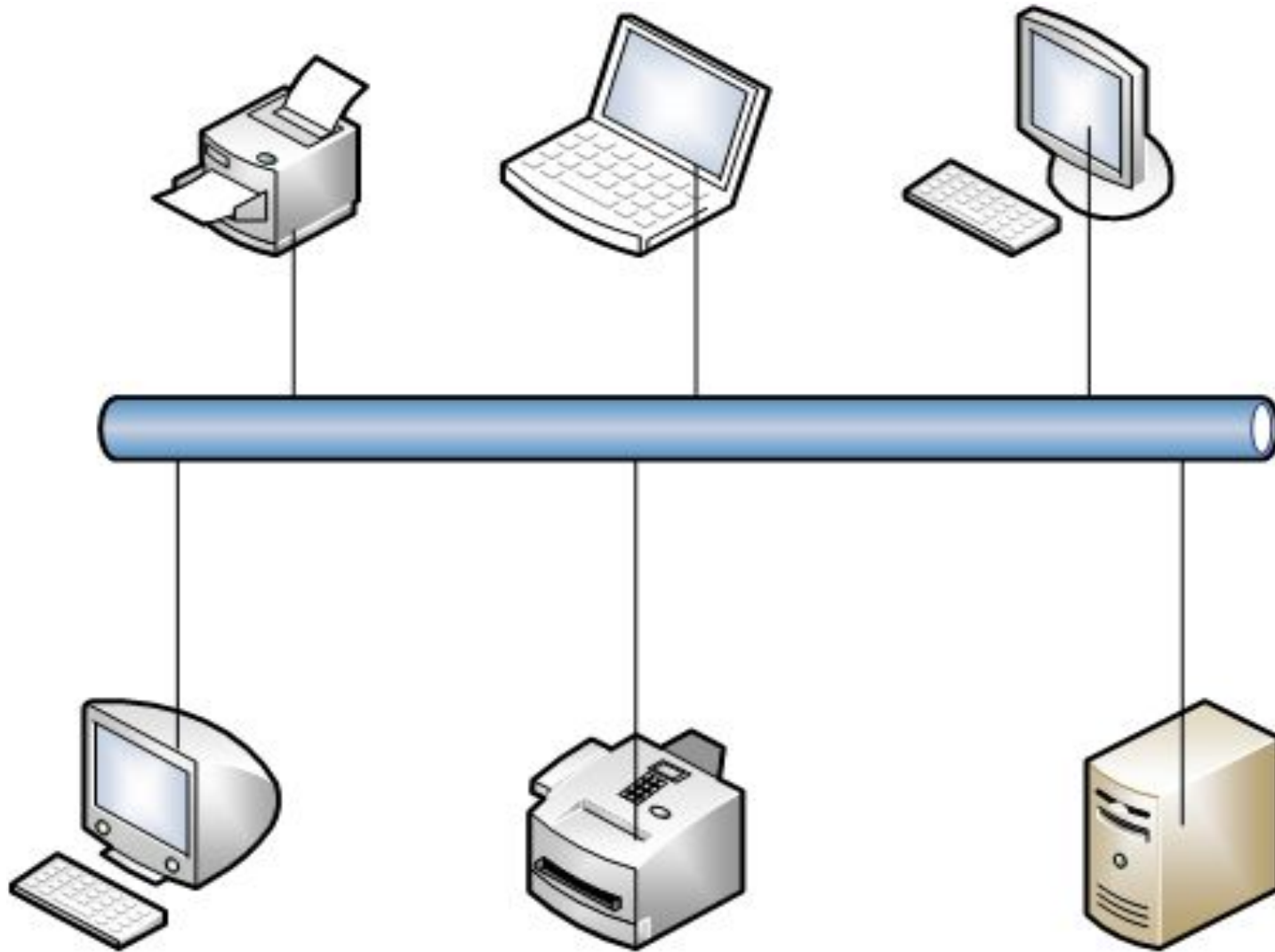
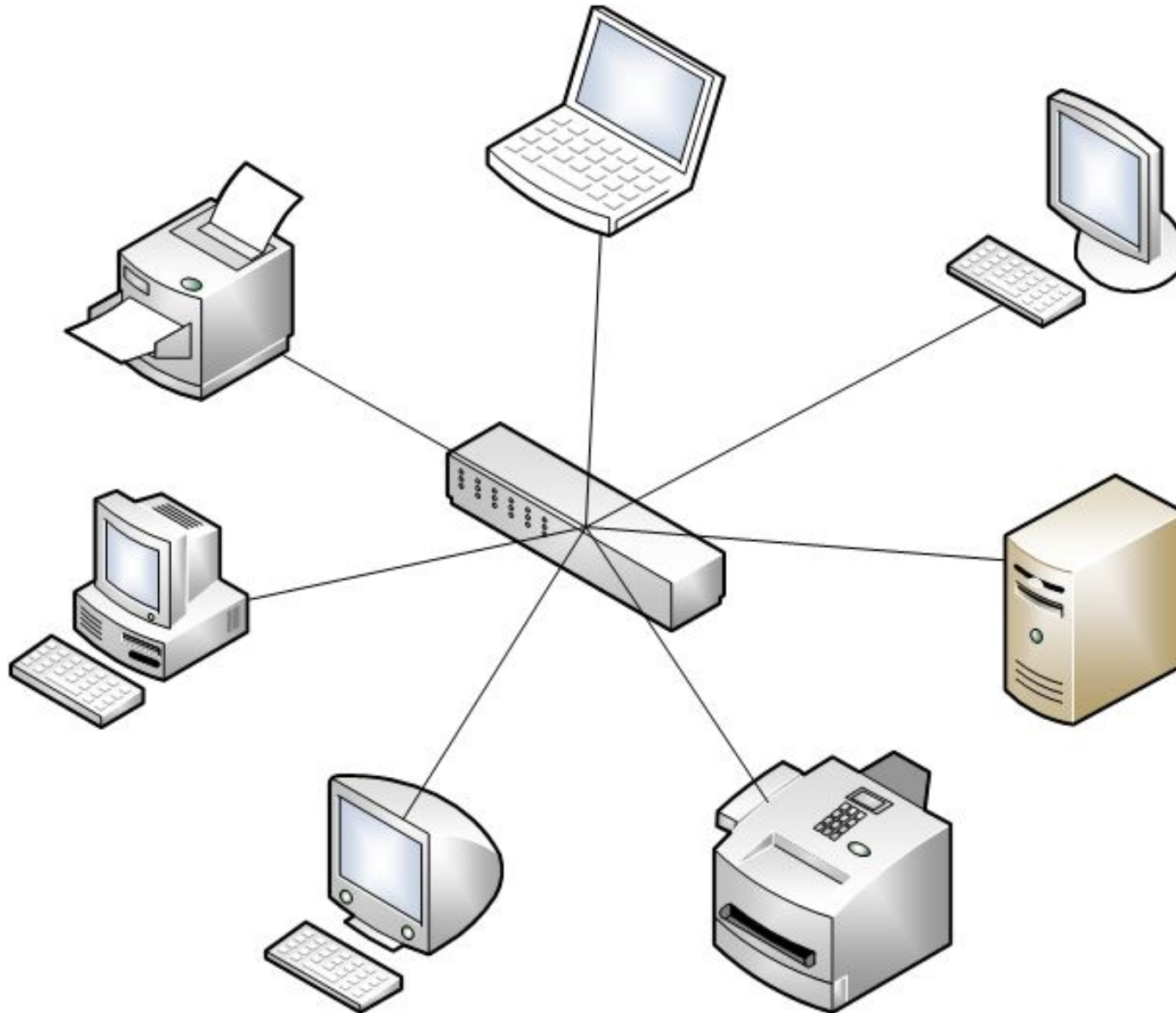- Сеть с выделенным сервером

BASIC TOPOLOGY

- Under the topology (layout, configuration, structure) of a computer network generally refers to a physical location of the computers on your network, one on one, and a way to connect them with lines.
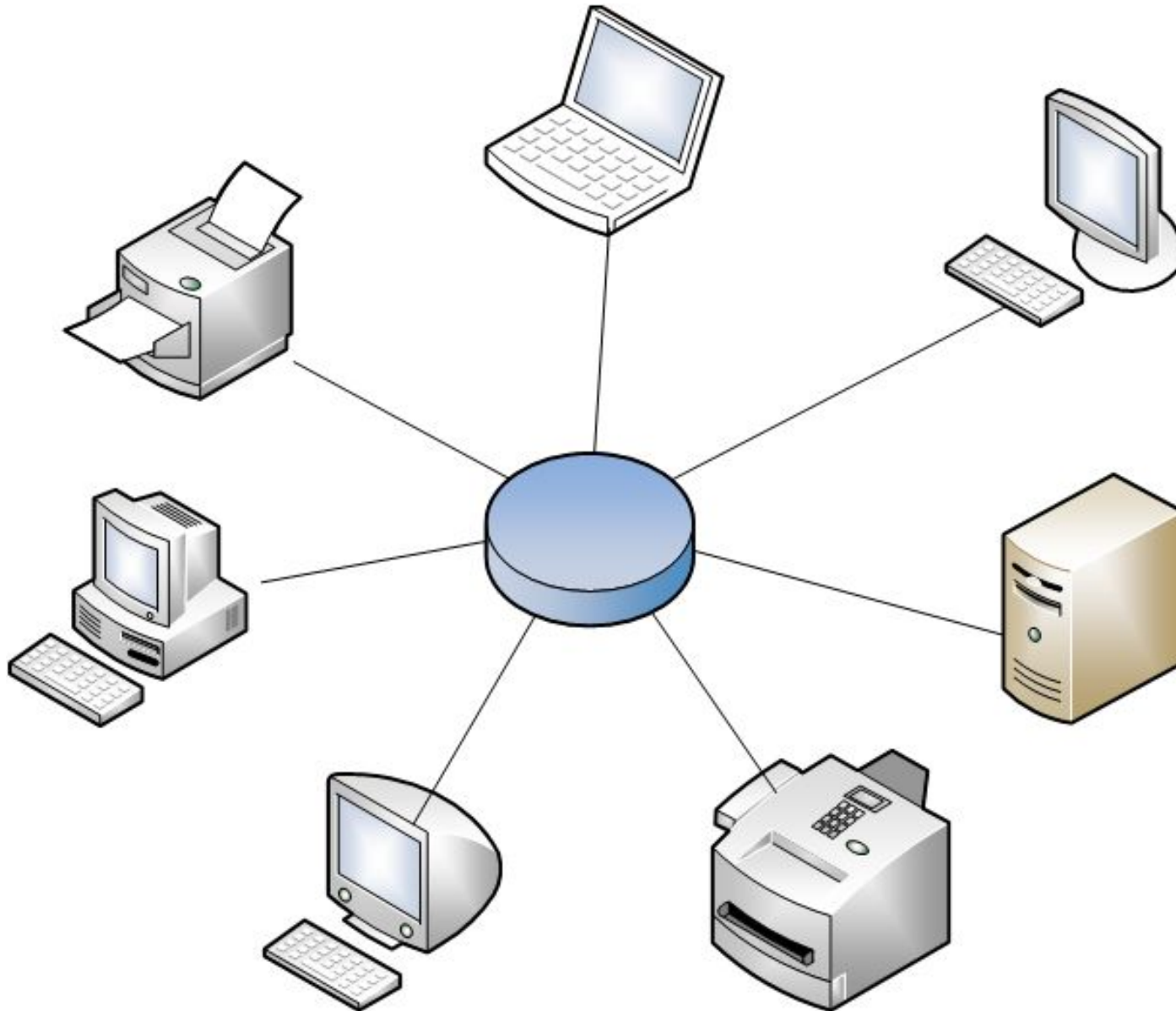
NETWORK TOPOLOGY BUS

NETWORK TOPOLOGY STAR

NETWORK TOPOLOGY RING

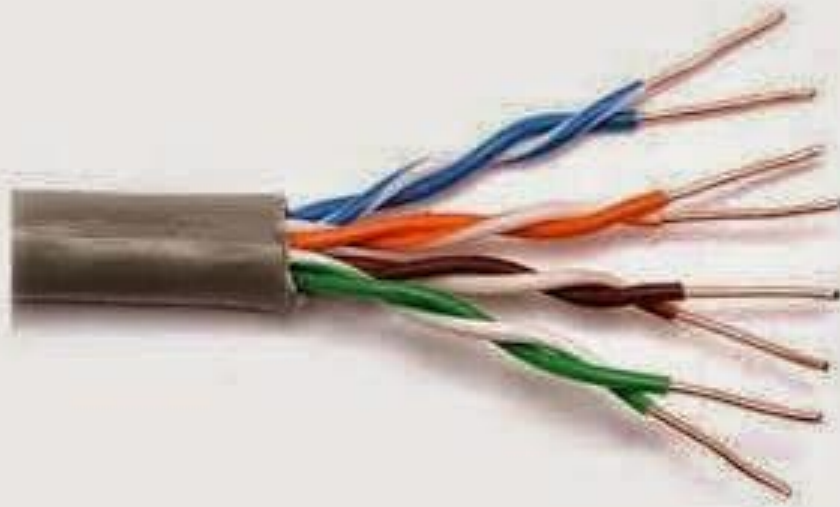# NETWORK CABLE OF THE PHYSICAL TRANSMISSION MEDIUM

Type of cable	The maximum transmission distance	The maximum transmission rate
coaxial cable	185-500 m	10 Mbit/sec
≪twisted pair≫	30-100 m	10 Mbit/sec – 1 Gb/sec
fiber optic	2 km	10 Mbit/sec – 2 Gb/sec

COAXIAL CABLE
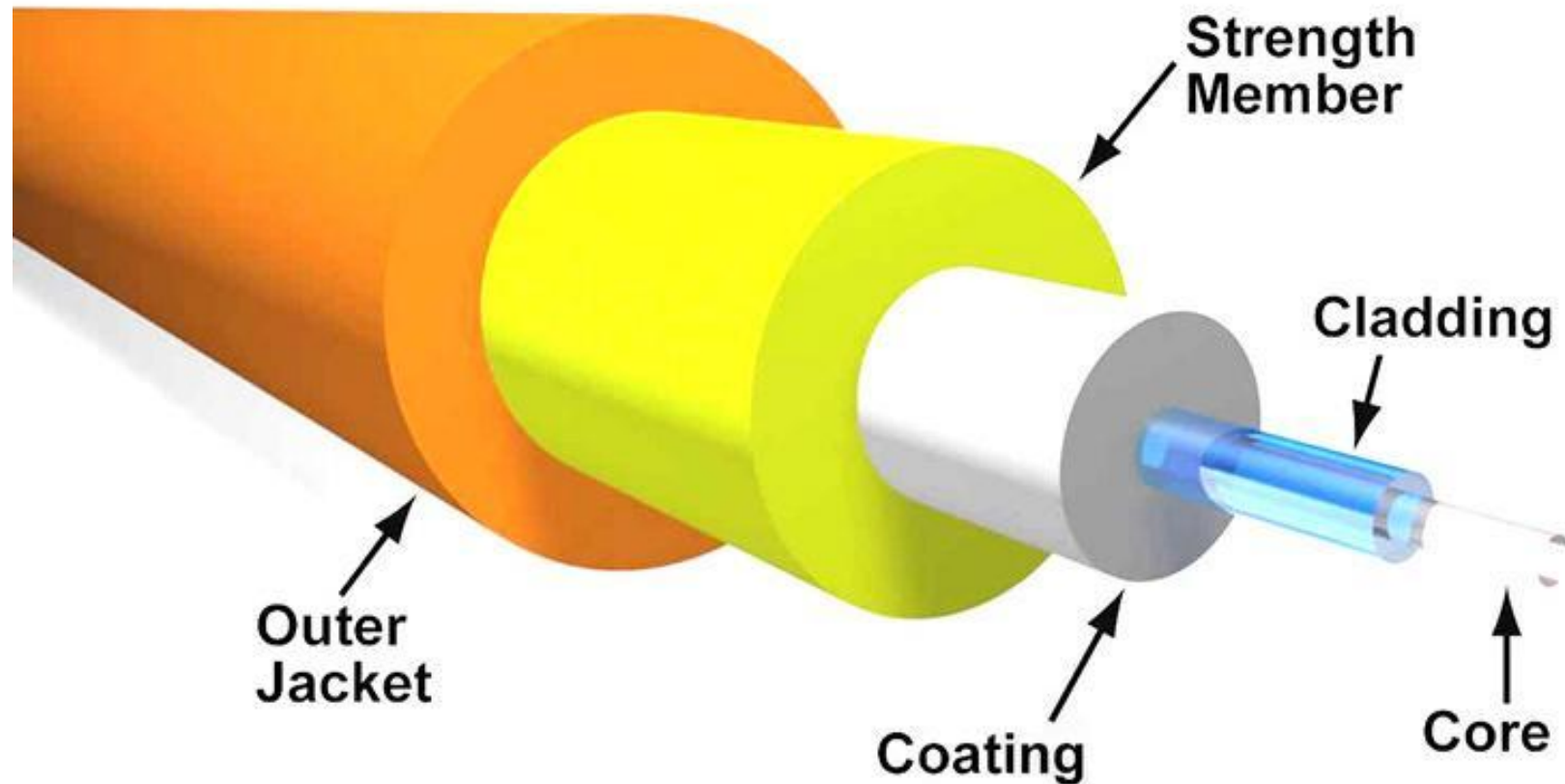
TWISTED PAIR

UTP Cable

STP Cable

FIBER OPTIC CABLE

PROTOCOL

- **a set of agreements about the ways of presenting the data that ensure their transmission in the desired direction and correct interpretation of data by all participants in the information exchange**

OSI MODEL

- Protocols of OSI are seven-layer and are known as protocols of basic reference model of open systems interconnection.

OSI MODEL

7 Application - app access to the network

6 Presentation - data conversion

5 Session - organization of the communications between endpoint machines

4 Transport - divides the information flows at a sufficiently small fragments (packets) for transmission

OSI MODEL

3 Network - divides of users into groups.

2 Data Link - ensures the creation, transmission and reception of data frames

1 Physical - receives data packets and converts them into optical or electrical signals

TCP/IP

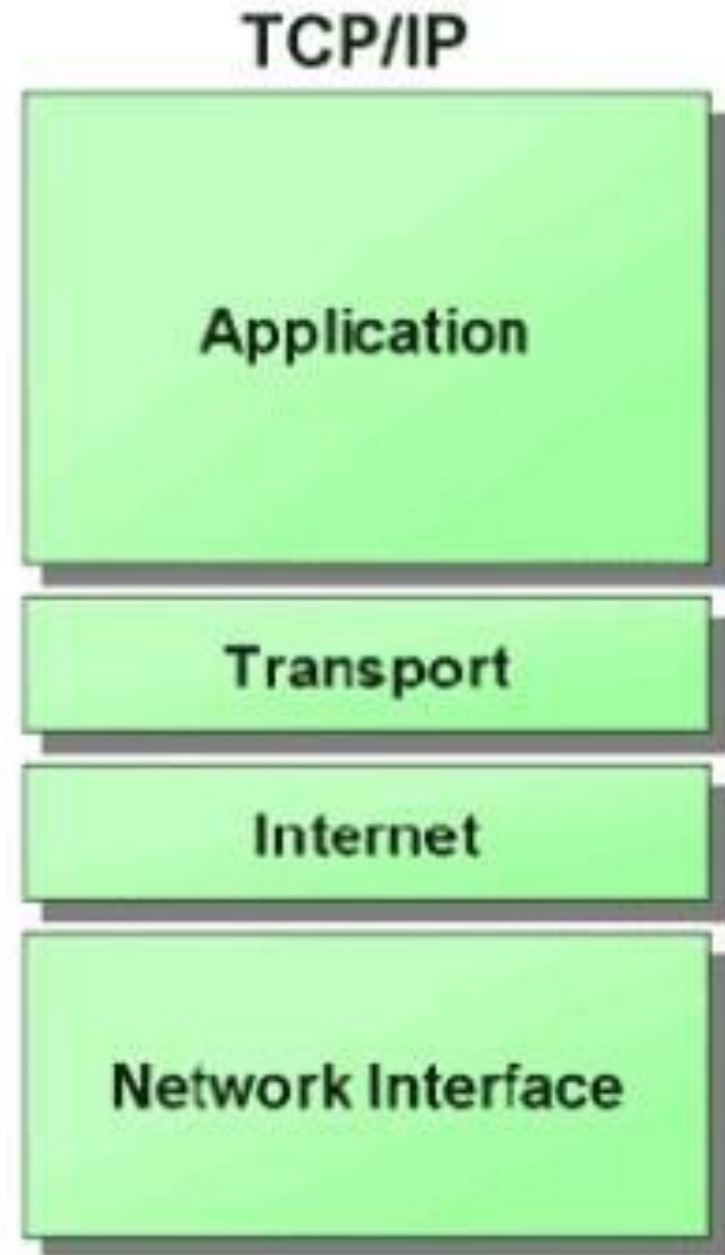- a set of network data transfer protocols used in networks, including the Internet

TCP/IP

1 Application

2 Transport

3 Internet

4 Link

OSI – TCP/IP

OSI Model	TCP/IP
Application	Application
Presentation	
Session	
Transport	Transport
Network	Internet
Data-link	Network Interface
Physical	

KINDS OF NODES' ADDRESSES

HardWare

- Аппаратные

Symbol

- Символьные

Numeric (IP)

- Числовые

IP ADDRESS

An IPv4 address (dotted-decimal notation)

172 . 16 . 254 . 1

10101100 .00010000 .11111110 .00000001
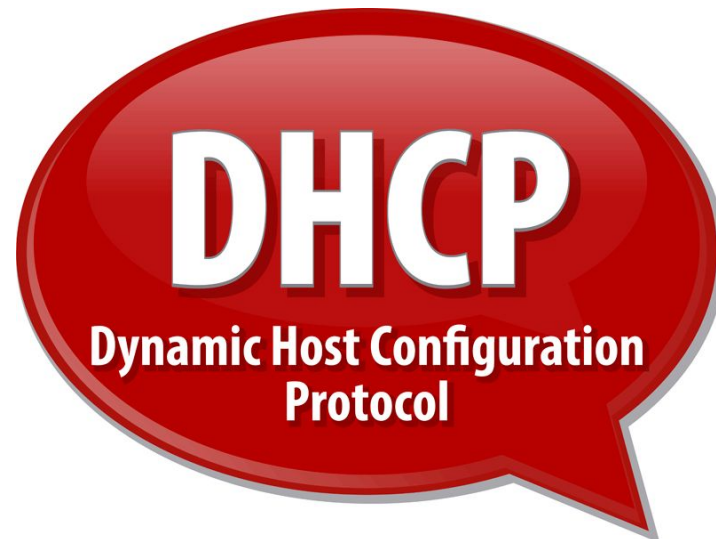
One byte = Eight bits

Thirty-two bits (4 x 8), or 4 bytes

NETWORKS' CLASSES

DYNAMIC HOST CONFIGURATION PROTOCOL (DHCP)

- was developed in order to perform dynamic assignment of IP addresses

TYPES OF DHCP IP ADDRESSES' ASSIGNMENT

Dynamic

Manual

Automatic static

WIRED NETWORK TECHNOLOGIES

LAN (Local Area Network)

DSL (Digital Subscriber Line)

Cable TV

OAN (Optical Access Networks)

WIRELESS NETWORK TECHNOLOGIES

WPAN — Wireless Personal Area Networks (Bluetooth)

WLAN — Wireless Local Area Networks (Wi-Fi)

WMAN — Wireless Metropolitan Area Networks (WiMAX)

WWAN — Wireless Wide Area Network (CSD, GPRS, EDGE, EV-DO, HSPA)

INTERNET CONNECTION TECHNOLOGIES

Telephone line (channel switching)

DSL, ADSL

Broadband access

ISDN

Cable TV network

Satellite channel

PLC

1G,2G,3G,4G,5G

CONCLUSION

- **Computer network is a combination of computers and telecommunications equipment, providing communication of the computers on the network**
- **Network's work is based on TCP/IP protocols.**
- **3 types of addresses in networks.**
- **8 types of Internet access technologies.**