

# Introduction

# Network Definition

- A **network** is a group of systems that are connected to allow sharing of resources such as files or printers or sharing of services such as an Internet connection.

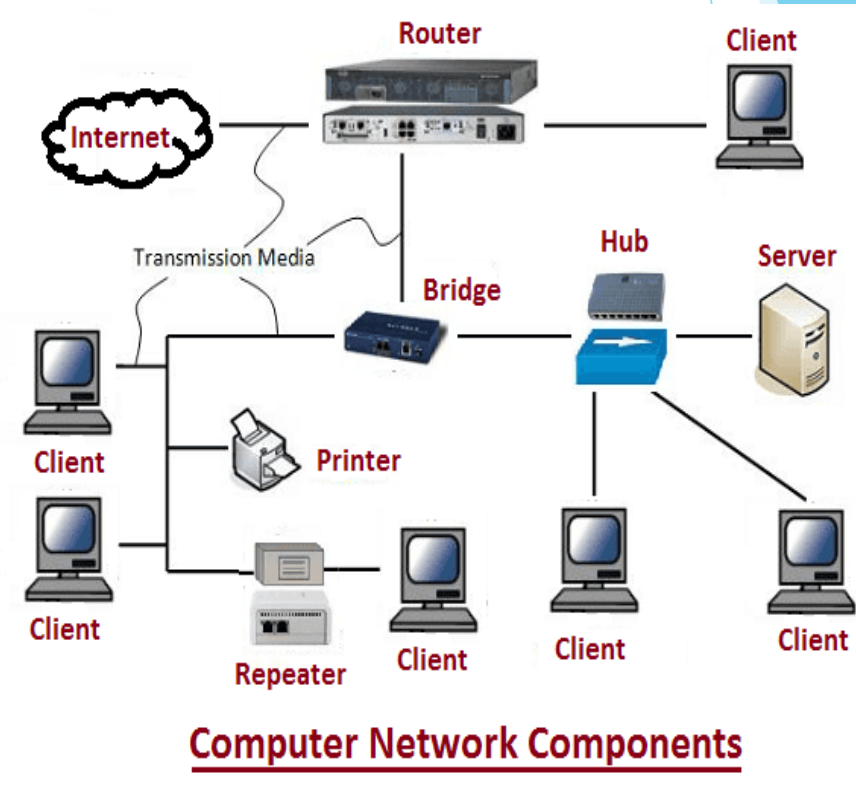
- ▶ **Network Components**

1. **Network Hardware**

Main server, workstation ,peripherals(printer, modem) and transmission media

2. **Network Software**

Networking Operating System, Protocol and application SW



# Advantages of using a network

- ▶ facilitating communications
- ▶ sharing hardware
- ▶ sharing data and information
- ▶ sharing software

# Classification of Computer Networks

- ▶ Computer network can be classified base on various factors
  - ❖ **Geographical span :** PAN, LAN , MAN ,WAN and internet
  - ❖ **Inter-connectivity:** mesh , bus, star
  - ❖ **Administration:** private and public
  - ❖ **Architecture:** Client-Server, peer-to-peer or hybrid

# Classification of network base on Geographical span



# Classification of network base on Geographical span

## 1. Personal Area Network (PAN) :

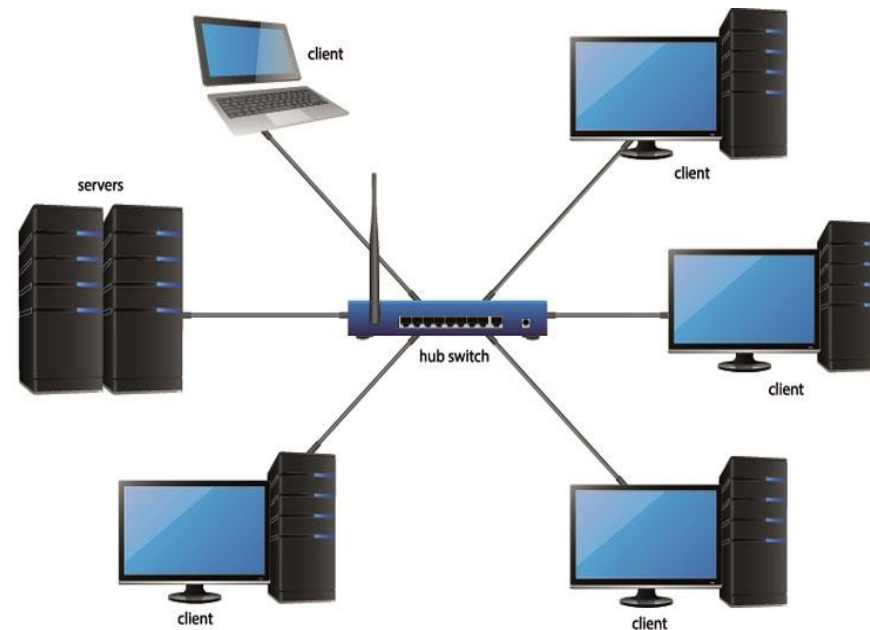
- ▶ smallest network which is very personal to a user
- ▶ Use technologies such as Bluetooth and infrared for communication
- ▶ PAN may include wireless computer keyboard and mouse, Bluetooth enabled headphones, wireless printers, and TV remotes .



# Classification of network base on Geographical span (Cont)

## 2. Local Area Network(LAN)

- ▶ Spanned inside a building and operated under single administrative system
- ▶ Example such as a home, school computer laboratory, office building.
- ▶ LAN can be wired, wireless, or in both forms at once.

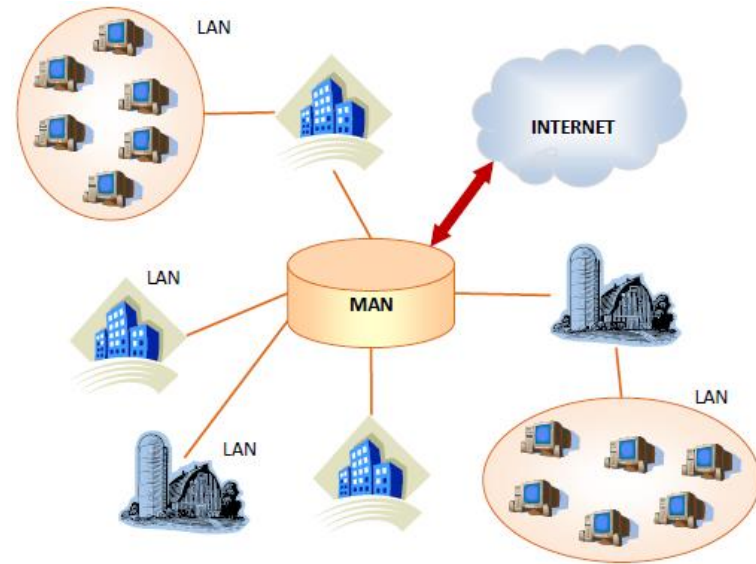


LAN Network Diagram

# Classification of network base on Geographical span (Cont)

## 3. Metropolitan Area Network

- ▶ a MANs covers the larger area of a city or town.
- ▶ MAN works in between Local Area Network and Wide Area Network

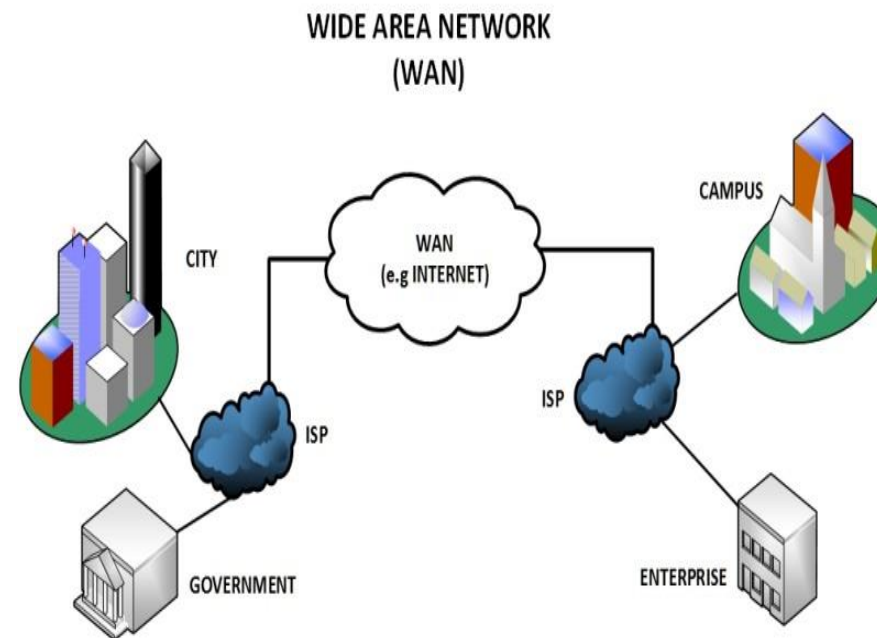




# Classification of network base on Geographical span (Cont)

## 4. Wide Area Network (WAN)

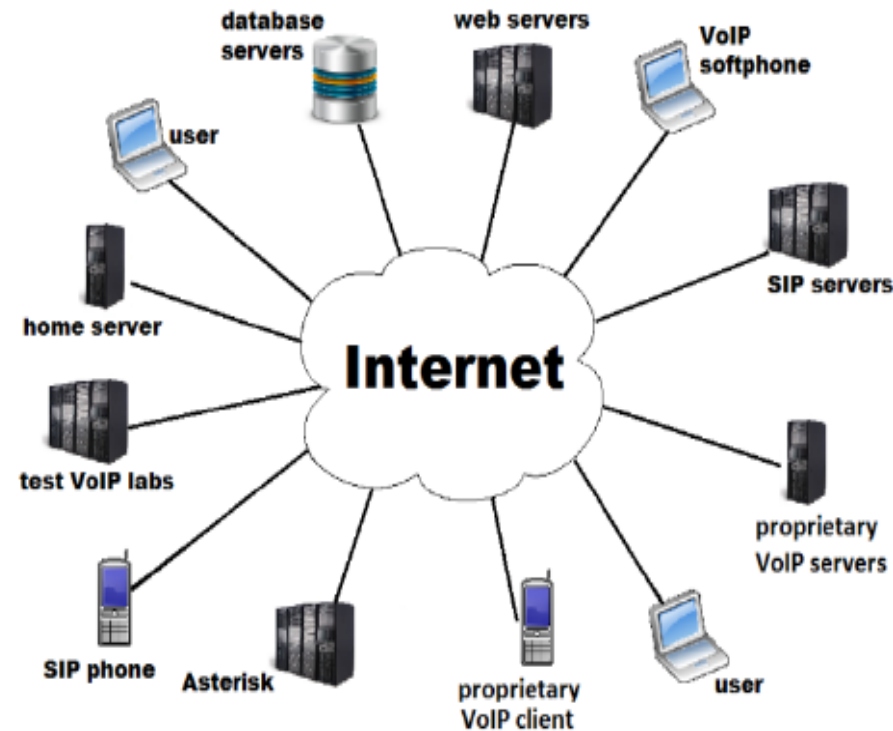
- ▶ covers a wide area which may span across provinces and even a whole country
- ▶ provide connectivity to MANs and LANs
- ▶ WAN may be managed by multiple administration



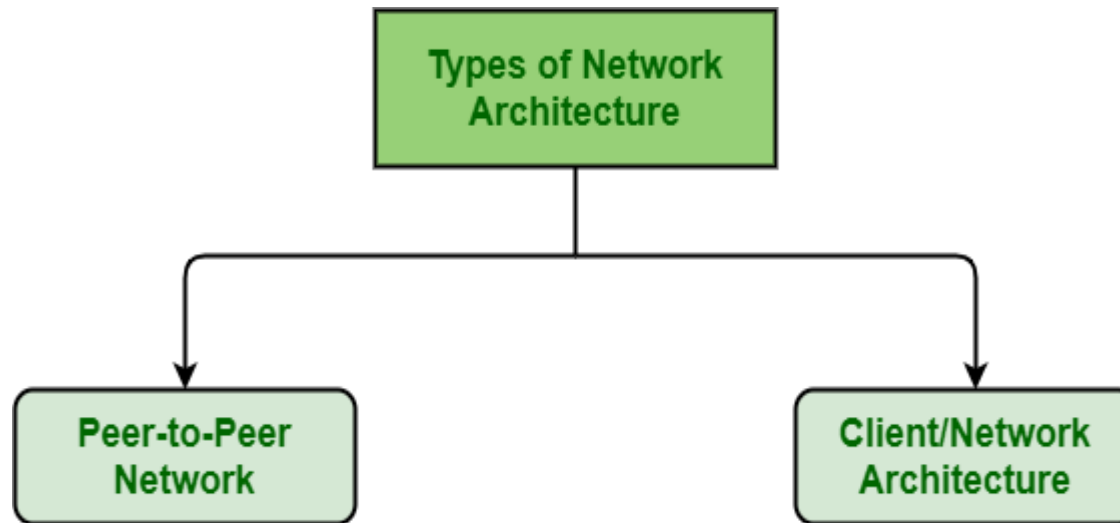
# Classification of network base on Geographical span (Cont)

## 5. Internetwork: the connection of two or more networks

- ▶ The worldwide Internet is certainly the best-known example of an internetwork.
- ▶ It is the largest network in existence on this planet
- ▶ Internet uses TCP/IP protocol suite and uses IP as its addressing protocol
- ▶ internet works on Client-Server model.
- ▶ Internet uses very high speed backbone of fiber optics



# Classification of network based on Architecture



# Classification of network based on Architecture

1. **A peer-to-peer (P2P) network:** is one in which two or more PCs share files and access to devices such as printers without requiring a separate server computer or server software.
  - ▶ Every connected PC is at once a server and a client
  - ▶ **Advantages :**
    - ❖ Dedicated server or centralized is not very essential, so P2P network is less costly and is very cheaper.
    - ❖ P2P is very simple and not complex.
  - ▶ **Disadvantages :**
    - ❖ Security is one of major issues in this type of network. This is because message that is sent flows freely among connected computers.
    - ❖ Performance, security, and access can also become major problem and headache with an increase in number of computers on this network.

# Classification of network based on Architecture

2. **Client/Server Network** : special computers called servers handle network tasks such as authenticating users, storing files, managing printers, and running applications such as database and e-mail programs.

► **Advantages :**

- ❖ It is also very easy and simple to set up and manage data updates.
- ❖ The server usually controls resources and data security.
- ❖ This network also boosts speed of sharing resources

► **Disadvantages :**

- ❖ If anyhow server goes down or crashes, entire will be affected by this.
- ❖ It is very expensive as compared to P2P.

# COMPUTER NETWORK MODEL

## ► OSI Model

Open System Interconnect is an open standard for all communication systems. OSI model is established by International Standard Organization (ISO). This model has seven layers



# What Is a MAC Address?

- ▶ The MAC address is a unique value associated with a network adapter.
- ▶ MAC addresses are also known as **hardware** addresses or **physical** addresses.
- ▶ They uniquely identify an adapter on a LAN.
- ▶ MAC addresses are 12-digit hexadecimal numbers (48 bits in length). By convention,  
MAC addresses are usually written as the following format:  
MM:MM:MM:SS:SS:SS or MM-MM-MM-SS-SS-SS

# Domain Name Service (DNS)

- ▶ DNS is a popular and important naming service based on the client/server model;
- ▶ DNS translates names into IP addresses. You can use friendly names like `www.trainsolutions.com` to refer to computers instead of unfriendly IP addresses like `192.168.24.31`.



# Dynamic Host Configuration Protocol (DHCP)

- ▶ DHCP used to provide IP configuration information to hosts on boot up. DHCP manages addressing by leasing the IP information to the hosts. This leasing allows the information to be recovered when not in use and reallocated when needed.
- ▶ DHCP Information can include:
  - ❖ IP address.
  - ❖ Subnet mask.
  - ❖ Default gateway.
  - ❖ Domain name.
  - ❖ DNS Server.

# Network Devices

- ▶ **NIC** :The network interface card (NIC) is the expansion card you install in your computer to connect, your computer to the network
- ▶ **Hub**  
A hub is probably the most common Physical layer device found on networks. A hub serves as a central connection point for several network devices. It repeats what it receives on one port to all other ports, including the port on which the signal was received



# Network Devices

## ► Switch

The *switch* is more intelligent than a hub in that it can actually understand the frames that pass through it. Switch builds a table of the MAC addresses of all the devices connected to it.

- When two devices attached to the switch want to communicate, the sending device sends its data on to its local segment. This data is heard by the switch (similar to the way a hub functions). However, when the switch receives the data it examines the Data Link header for the MAC address of the destination device and forwards it to the correct port.

# Network Devices

- ▶ **Router**

Routers are Network layer devices that connect multiple networks or segments to form a larger internetwork. They are also the devices that facilitate communication within this internetwork.

- ▶ The main functions of routers as a gateway that connect LAN to WAN either it can make intelligent decisions about how best to get network data to its destination based on network performance data that it gathers from the network itself

# Network Devices

- ▶ **Gateways**

A *gateway* is any hardware and software combination that connects dissimilar network environments. Gateways are the most complex of network devices because they perform translations at multiple layers of the OSI model.

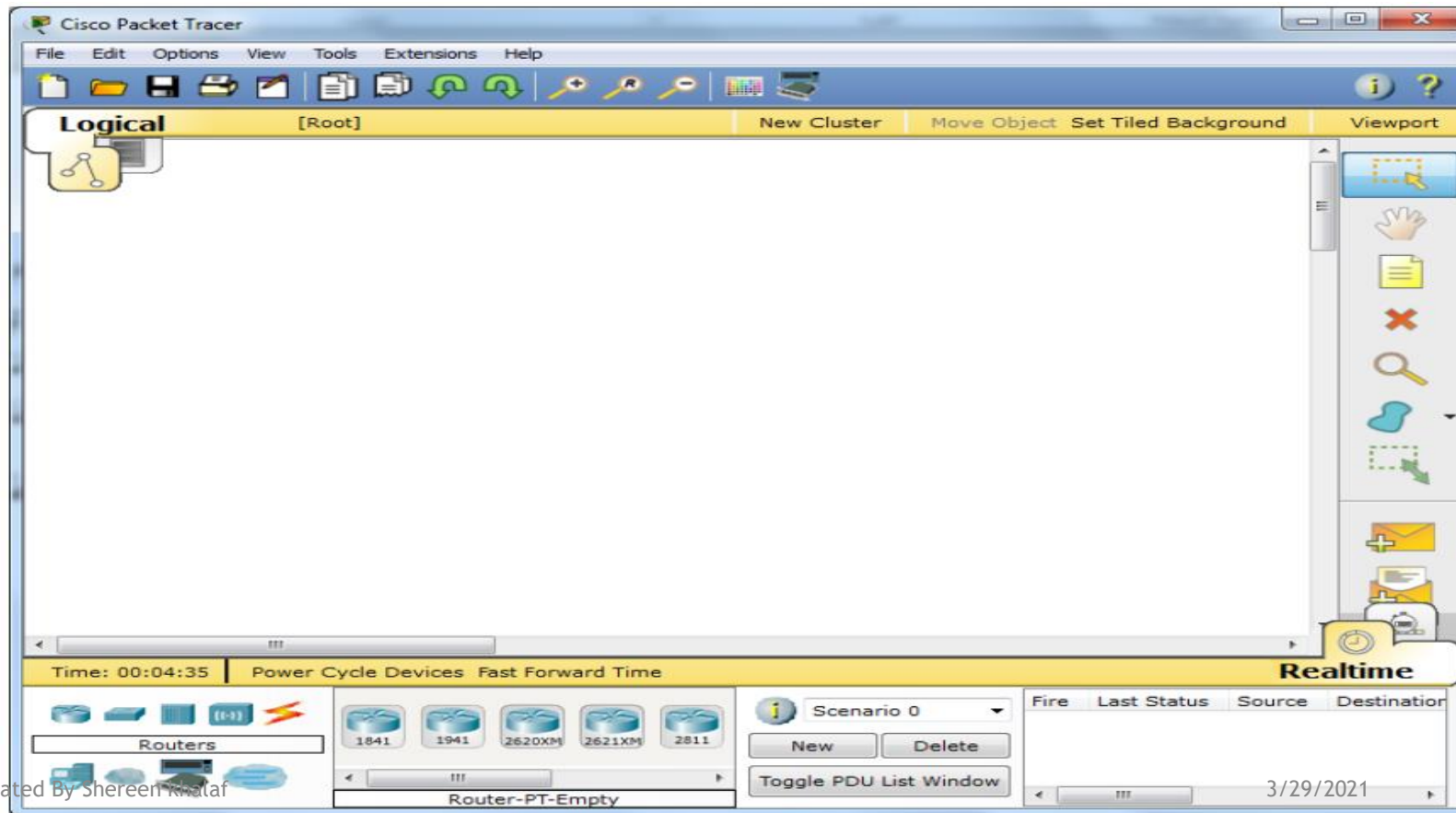
- ▶ router considered as a gateway because it combine LAN environment and WAN environment.

# Network Devices

- ▶ **The Wireless Access Point (WAP)**  
Layer 2 device that connect multiple wireless computers to an existing wired network.
- ▶ The WAP is essentially a wireless bridge (or switch, as multiple end devices can connect simultaneously). In addition, it can connect those wireless clients to a wired network.



# Cisco Packet Tracer



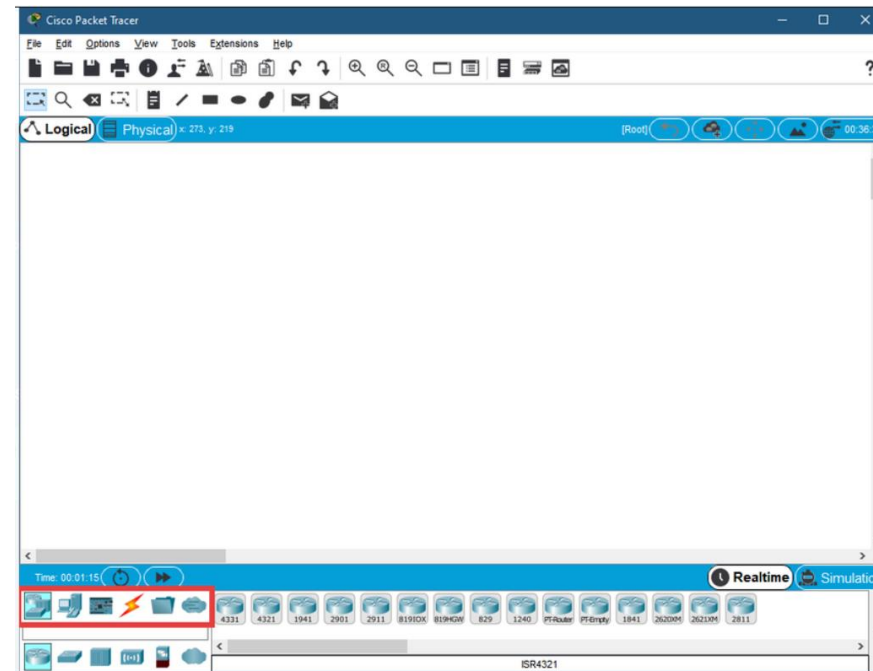
# Cisco Packet Tracer

- ▶ Cisco Packet Tracer is an innovative network simulation and visualization tool. This free software helps you to practice your network configuration and troubleshooting skills via your desktop computer, or an Android or iOS based mobile device.
- ▶ With Packet Tracer you can choose to build a network from scratch, use a pre-built sample network, or complete classroom lab assignments.
- ▶ Packet Tracer allows you to easily explore how data traverses your network. Packet Tracer provides an easy way to design and build networks of varying sizes without expensive lab equipment.

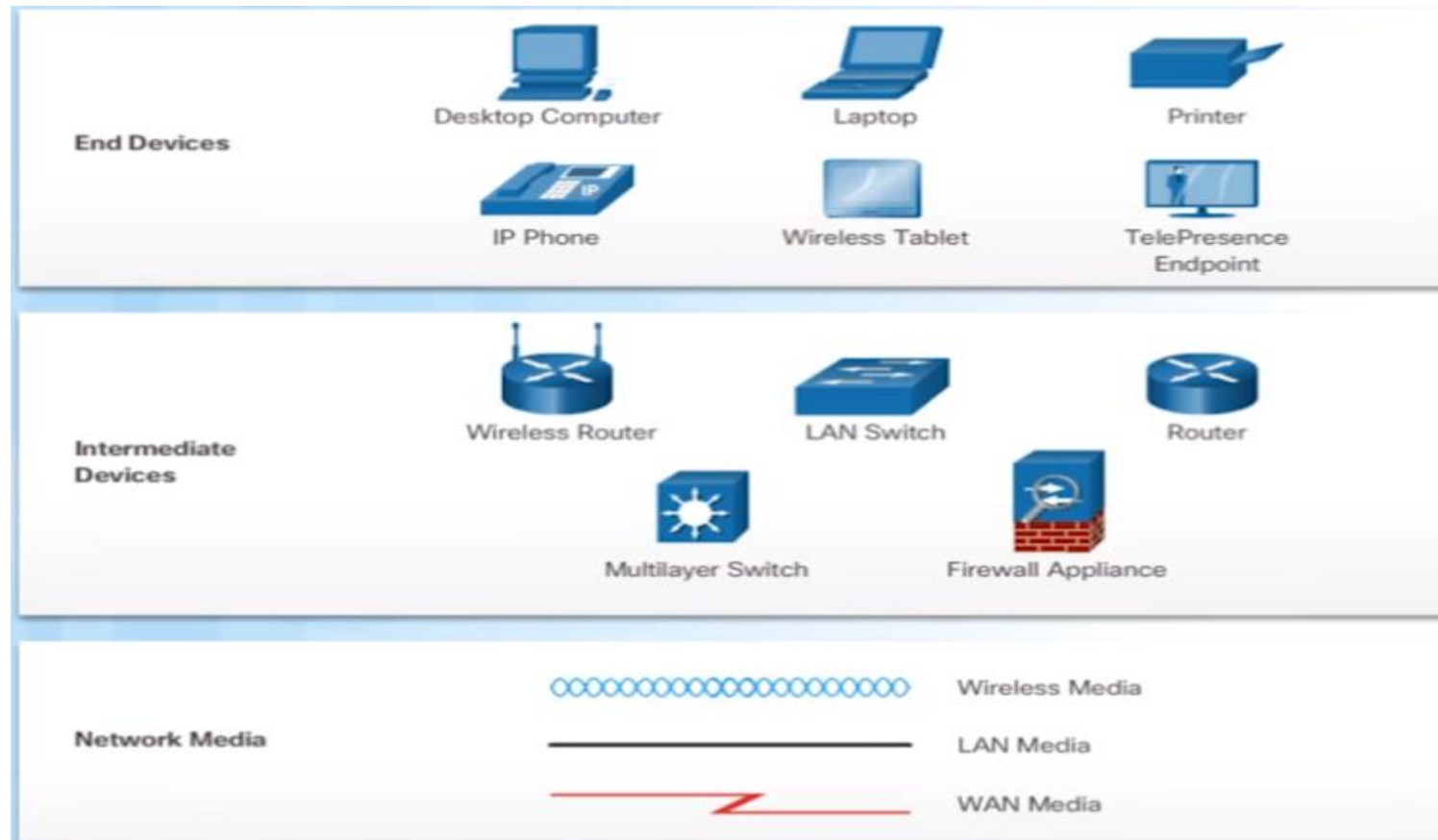


# Locate and Deploy Devices

- ▶ The top row of icons represents the category list consisting of: [Networking Devices], [End Devices], [Components], [Connections], [Miscellaneous], and [Multiuser]. Each category contains at least one sub-category group.



# Packet Tracer - Deploy and Cable Devices



# Course content

1. Switch Configuration (LAN)
2. VLAN(LLC and MAC protocol)
3. VTP(VLAN Trunking Protocol ) (ETHERNET )
4. Router architecture and configuration
5. WLAN
6. Network Troubleshooting ( Error Detection and Correction)
7. Security(ch#6) port security , device security , secure password
8. WLAN Security

The background of the slide is composed of various shades of blue and white geometric shapes, including triangles and polygons, creating a modern, abstract design. The shapes are layered, with some appearing more prominent than others, giving a sense of depth.

# *Thank You*