1-5 types of computer networks:

The types of networks can be divided according to the following classifications:
1) According to the delivery method:
- Wired connection
-Wireless connection
-Advanced networks.
2) According to the engineering design of the networks Network Topology:
-Bus (Linear) Network
-Star Network
- Ring Network
-A mesh .
-Tree
-Hybrid network
3) By type of service: Service
-Peer To Peer Network
-Client / Server Network
4) According to the network band coverage:
-Local Area Network (LAN)
- City network or mid-network. Metropolitan Area Network (MAN).
-Wide Area Network (WAN).

1-5-1 Classification of networks according to connection method:

The types of networks are divided according to the method of connection into the following:

- Wired network: It is the interconnected network between them by wired connection either with twisted copper wires or coaxial or optical fibers. The level of protection is greater, the stability is more, and the amount and speed of data (up to (1Gbps)) is greater in the wired network than in the wireless network.
- Wireless networks: With the passage of time, the human aspiration has become to find faster ways to transmit data with less effort and cost, and this is what wireless networks have provided that depend on the connection between networks by means of radio waves, and wireless networks have made a great revolution in the world of information transmission technology that has increased The need for it, and wireless networks have become of interest to many who work in this field because they are distinguished by the following:
i. Ease of use: ease of installation, speed and reasonable price compared to wired networks, thus making some network components mobile from one place to another, thus providing a backup alternative for any existing or intended network.

ii. Providing the possibility of expanding and expanding networks in a region. The use of wireless networks has expanded to include public facilities such as airports, restaurants, hotels and cafes that provide free internet service to their customers.

iii. Ease of planning: its ability to extend and cover areas that cannot be reached by wired networks due to its ability to penetrate walls and other obstacles, and the location of the receiving devices does not matter as long as they are in the field of broadcasting, so these networks are suitable for places where it is difficult to connect a wired network, such as museums and buildings Old.

One of the disadvantages of these networks is that they are vulnerable to electromagnetic interference and can be intercepted and spied on.

- **Evolved networks: They are networks that use satellite signals through which devices are connected to each other through these signals sent to the ground, which are the fastest networks on Earth.**

1-5-2 Classification of networks by engineering design Network Topology:
There are five ways to connect networks according to the engineering design, and they are:

1. *Linear network*: Bus (Linear) Network The network depends on a fast data transmission line called Bus. Each subscriber is connected to this line through a T-shaped connection point, and data is transferred from one computer to another through the connection points. This type of network is characterized by the use of a smaller quantity of conductors and thus less in cost, but in the event of faults, it is not subject to diagnosis, and when any break in the connected line leads to a disconnection with the rest of the network.

2. *Star network*: In this type of network, the main service device transfers data to users through the Hub (central device), and connects to the network with each subscriber through a special star-shaped connector, and more than one hub can be used (so it requires a quantity A large number of connectors), so the advantage of this type of network is that when one of the pieces fails, the rest of the devices can communicate with each other and continue to work, and the detection of the broken piece is very simple, so it is more rapid and efficient than the previous type, so that every subscriber connects Directly via a special connector, and if the hub fails, communication between all subscribers connected to the same hub is excused.

3. *Ring network*: Ring connects all network devices sequentially to form a ring, that is, this type of network depends on connecting all the computers involved in the closed circuit method, so if one device in this scheme fails to work, the entire loop (network) will be disrupted. The data is transferred through the closed circuit communication points, and the ring network operates at a greater density and speed than other networks, as data is transferred across both directions of

the ring, and network programs are used in particular to regulate the traffic of data across the network and prevent collision or interference of data.
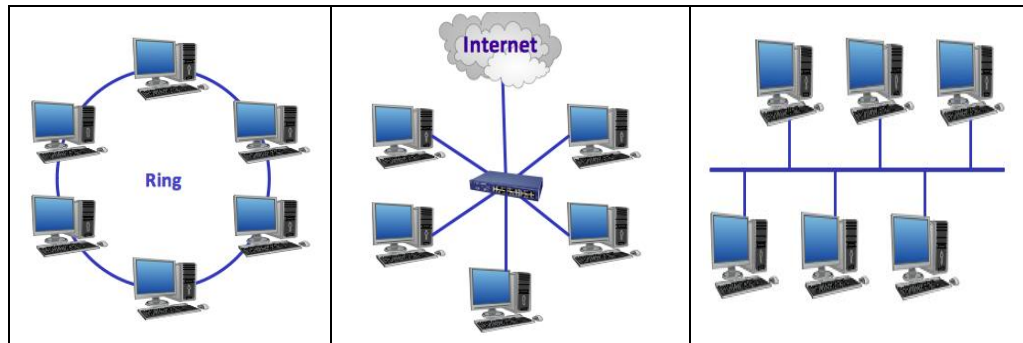

Figure (1-8) shows a diagram of the linear network, the star network, and the ring network.

4. *The mesh or mesh network*: Mesh is usually used in the construction of large networks, and this scheme was used initially for telephone networks. This scheme is reliable because any device in the network fails, and in all cases there is a path that the data or information can take to the desired station.

5. *Tree network*: This type of network is a state of stellar connectivity, meaning that the tree connection is formed by linking or merging two or more networks of the star type together through an intermediate part, which is the Hub complex, which is responsible for controlling data traffic in the network However, not all devices are connected to it. Rather, some of them are connected to a hub / switch, which in turn connects to the central hub / switch.

In this linking, there is a central root (the first level) and it is connected to one or more nodes at a lower level (the second level), and the connections between them are a node to a node, as well as these points that connected to the root will connect from another side to one or more points from a lower level with a node link to a node (Point To Point), and for each node there is a specific and fixed number of nodes that connect to it from the lower level, this number is called the branching factor. And tree-wired networks must have at least three levels, that is, a tree network with a branching factor equal to 1 converts to a linear network.

6- *Hybrid network*: It results when more than one connection is used in the network (such as the link between the star network and the mesh network).
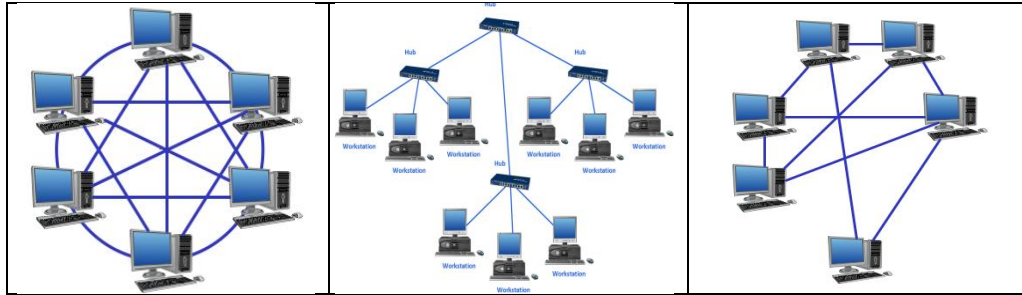
Figure (1-9) shows a schematic for each of the mesh network, tree network and hybrid network.

1-5-3 Classification of networks according to service type:

Networks can be classified, depending on the type of service, into:

1. *Peer-to-peer (P2P) networks.* **A computer acts as both a server and a client, including Skype and Bit Torrent. It is a network of all terminals with parallel capabilities, and between them the sharing of resources and the exchange of files, and it is also called a work group, which is a group of computers connected to each other and their users share in all disk drives, printers and any other device, and there is no specific computer to operate the network , Since each user can set the permissible level for others to enter his device,**

The degree of this configuration depends on the software used to operate the peer-to-peer network.

This network is suitable for the needs of small networks whose members perform similar tasks (such as networks in computer training offices), as it is suitable in the following cases:

      a. **That the number of devices in the network does not exceed ten devices.**

      b. **The network security should not be of critical importance.**

      c. **That the presumed users of this network are located in the same location as this network.**

      d. **That the institution has no intention of developing such networks and developing them in the near future.**

One of the advantages of peer-to-peer networks **is that it has limited costs and does not require additional software on the operating system. You do not need robust hardware because the tasks of managing network resources are spread across network devices and not on a specific server machine.**

Installing and setting up the network is easy, so all you need is a simple networking system of wires connected to network cards in every network device. The main disadvantage of this type of network is that it is not suitable for large networks, because as the network grows, the number of users increases.

2. *The server and client network:* **It consists of: Servers that are considered to be very capable of storage and have large processing capabilities and are used for**

storing and processing information files, network databases and various programs in it, and from the client, subscriber or client, and often They are personal computers or terminals that are used by network workers to obtain data and information over the network from servers. In this type of network, the network resources are concentrated in one device, the server, which makes accessing the information or the required resource much easier than if it were distributed on different devices, and it also facilitates better data management and control. For example, web pages are stored on servers and for the purpose of viewing them, the client terminal must request data from the server, for the server to process the request, and send the data to the browser for display. The advantage of this network is to protect data from loss or damage with central control and management of data. The use of the network by thousands of users.
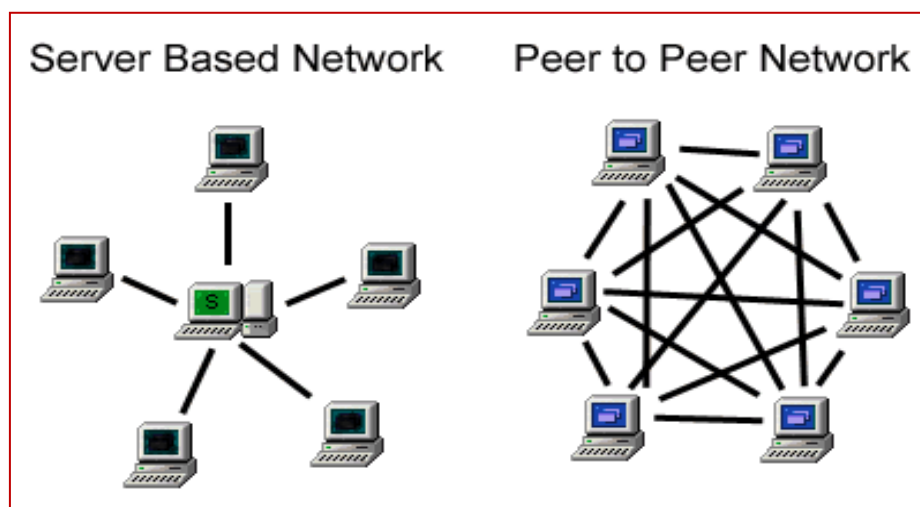

Figure 1-10 shows two comparison charts between a peer-to-peer network and a server / client network.

1-5-4 Classification of networks according to network scope:

Computer networks can be classified according to the geographical extent covered by the network transmission into:

1. *Local Area Network (LAN)*: It is a network located in a relatively limited geographical area such as home networks and office networks. It is a network of private ownership, and is often used to connect a group of personal computers and workstations in the offices of a company or factory to enable them to participate with the peripheral devices. Like printers and exchange information and files between them. Figure (1-11) shows a diagram of a local network.

A local computer network is characterized by:

1. The data transfer rate is high and it is measured in megabyte / second.

2. In some forms of these networks, if a device malfunctions, all devices will fail.

3. The data transmission error rate is relatively low.
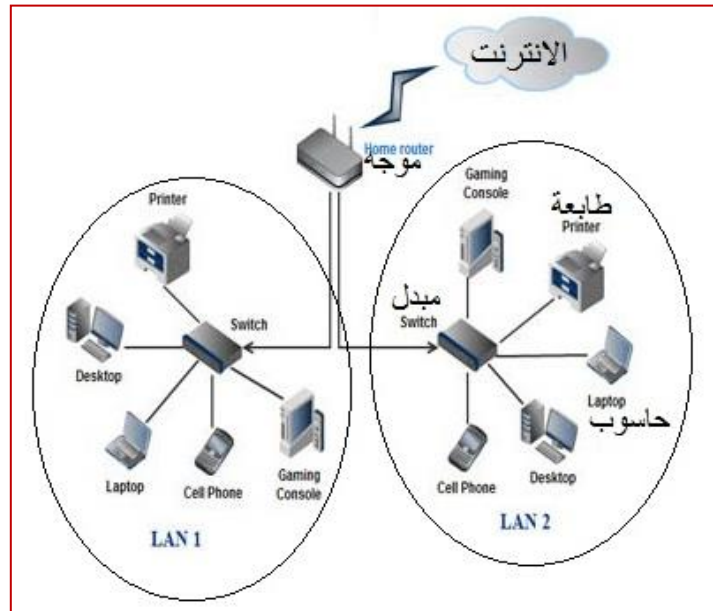
4. The cost is relatively low.

Figure 1-11 Local Area Network (LAN)

2. ***Metropolitan Area Network (MAN):*** **covers large areas such as cities by connecting a number of local networks, meaning that the medium network is an enlarged version of LAN (it can contain a number of LAN), and it is used by government agencies and banks. These networks are for inter-city interconnection for co-operation. Man uses microwave or double wires, optical fibers, wireless or digital means to transmit data and information. Figure (1-12) shows a diagram of a medium network.**
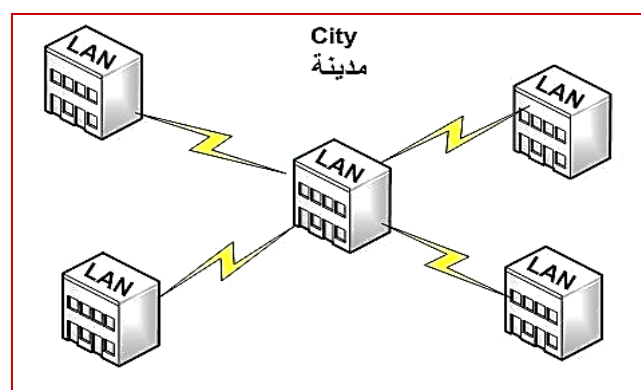

Figure (12-1) City network or MAN medium network

3. Wide Area Network (WAN): Also called the international network, it appeared in the early seventies, and it is a network that covers a large geographical area such as an entire country, and uses wide communication systems to achieve communication between multiple computers (or a small group of networks). Far from each other by distances that may exceed the borders of the region and the state. As in Figure (1-13).

In addition, any two divergent local networks can communicate with each other through their association with one of the wide networks, as wide networks represent the backbone that connects local networks due to the vast areas they cover.
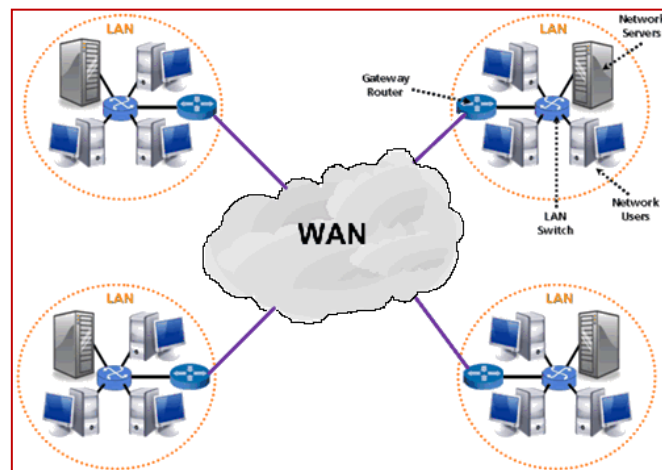

Figure 1-13 WAN

The network uses types of links between local networks and devices that extend their transmission over long distances, such as telephone lines and microwave waves, and the Internet is one of the most important types of wide networks, as it connects thousands of institutions and individuals around the world together. Among the *characteristics of the broadband network are:*

1. The size of the network and the number of devices are not limited, so a failure of a device in the network does not mean that the rest of the devices are down.

2. Often times it is not owned by a specific person or organization.

3. Devices such as satellites are used to connect computers.

4. The cost of establishing a network of this type is relatively high.