STUDY GUIDE FOR MODULE NO. 2

Unit 2 – Types of Computer Network

⊙ MODULE OVERVIEW

In this module we will discuss the various types of computer networks available. We can classify them according to their size as well as their purpose. The size of a network has to be expressed by the geographic area and number of computers, which are a part of their networks. It includes devices housed in a single room to millions of devices spread across the world.

✎ MODULE LEARNING OBJECTIVES

At the end of this, students are expected to:

1. Enumerate and describe the different types of computer network and its implementation.

🖹 LEARNING CONTENTS Types of Network)

Types of Network

1. **LAN** – Local Area Network (Figure1)
2. **WAN** – Wide Area Network (Figure 2)
3. **MAN** – Metropolitan Area Network (Figure 3)
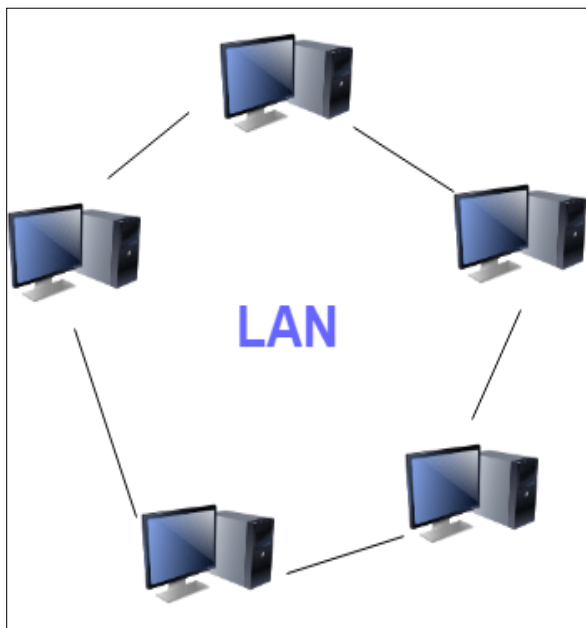4. **PAN** – Personal Area Network (Figure 4)
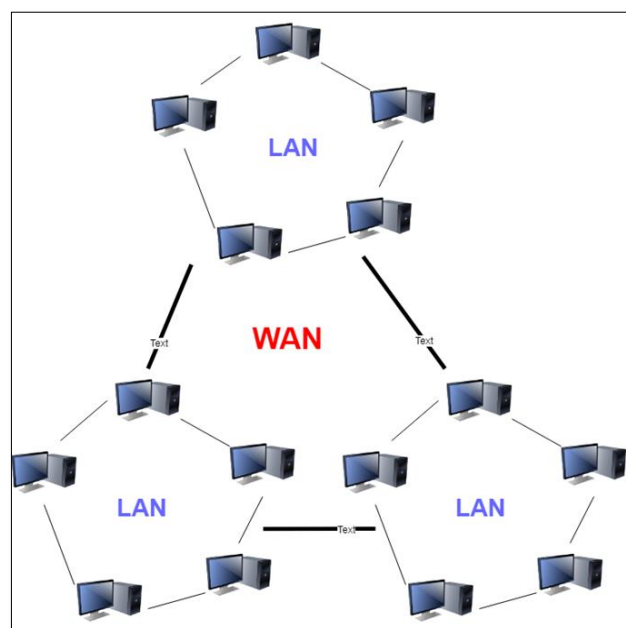

Figure1. LAN
(*source: guru99.com*)

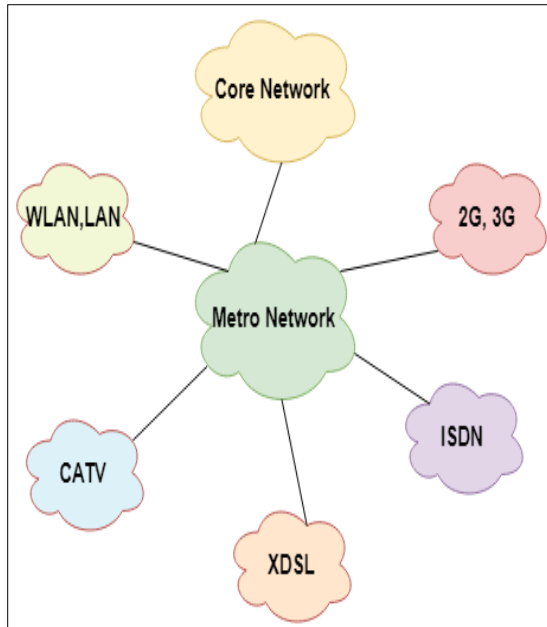

Figure1. WAN
(*source: guru99.com*)

Figure3. MAN
(*source: guru99.com*)

Figure4. PAN
(*source: docplayer.net*)

What is LAN?

- Figure1 presents LAN. A **L**ocal **A**rea **N**etwork (LAN) is a group of computer and peripheral devices which are connected in a limited area such as school, laboratory, home, and office building. It is a widely useful network for sharing resources like files, printers, games, and other application. The simplest type of LAN network is to connect computers and a printer in someone's home or office. In general, LAN will be used as one type of transmission medium.
- It is a network which consists of less than 5000 interconnected devices across several buildings.

Characteristics of LAN

Here are important characteristics of a LAN network:
- It is a private network, so an outside regulatory body never controls it.
- LAN operates at a relatively higher speed compared to other WAN systems.
- There are various kinds of media access control methods like token ring and ethernet.

Advantages of LAN

Here are pros/benefits of using LAN:
- Computer resources like hard-disks, DVD-ROM, and printers can share local area networks. This significantly reduces the cost of hardware purchases.
- You can use the same software over the network instead of purchasing the licensed software for each client in the network.
- Data of all network users can be stored on a single hard disk of the server computer.
- You can easily transfer data and messages over networked computers.
- It will be easy to manage data at only one place, which makes data more secure.
- Local Area Network offers the facility to share a single internet connection among all the LAN users.

Disadvantages of LAN

Here are the important cons/ drawbacks of LAN:

- LAN will indeed save cost because of shared computer resources, but the initial cost of installing Local Area Networks is quite high.
- The LAN admin can check personal data files of every LAN user, so it does not offer good privacy.
- Unauthorized users can access critical data of an organization in case LAN admin is not able to secure centralized data repository.
- Local Area Network requires a constant LAN administration as there are issues related to software setup and hardware failures

What is WAN

- Figure2 shows WAN (Wide Area Network) which is spread across a large geographical area. WAN network system could be a connection of a LAN which connects with other LAN's using telephone lines and radio waves. It is mostly limited to an enterprise or an organization.

Characteristics of LAN:
- The software files will be shared among all the users; therefore, all can access to the latest files.
- Any organization can form its global integrated network using WAN.

Advantages of WAN
Here are the benefits/ pros of using WAN:
- WAN helps you to cover a larger geographical area. Therefore business offices situated at longer distances can easily communicate.
- Contains devices like mobile phones, laptop, tablet, computers, gaming consoles, etc.
- WLAN connections work using radio transmitters and receivers built into client devices.

Disadvantage of WAN
- Here are drawbacks/cons of using WAN:
- The initial setup cost of investment is very high.
- It is difficult to maintain the WAN network. You need skilled technicians and network administrators.
- There are more errors and issues because of the wide coverage and the use of different technologies.
- It requires more time to resolve issues because of the involvement of multiple wired and wireless technologies.
- Offers lower security compared to other types of networks.
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What is MAN?

- Figure3 is a Metropolitan Area Network (MAN) which consist of a computer network across an entire city, college campus, or a small region. This type of network is large than a LAN, which is mostly limited to a single building or site. Depending upon the type of configuration, this type of network allows you to cover an area from several miles to tens of miles.

Characteristics of MAN
Here are important characteristics of the MAN network:
- It mostly covers towns and cities in a maximum 50 km range
- Mostly used medium is optical fibers, cables

- Data rates adequate for distributed computing applications.

Advantages of MAN
Here are pros/benefits of using MAN system:
- It offers fast communication using high-speed carriers, like fiber optic cables.
- It provides excellent support for an extensive size network and greater access to WANs.
- The dual bus in MAN network provides support to transmit data in both directions concurrently.
- A MAN network mostly includes some areas of a city or an entire city.

Disadvantages of MAN
Here are drawbacks/ cons of using the MAN network:
- You need more cable to establish MAN connection from one place to another.
- In MAN network it is tough to make the system secure from hackers

What is PAN?
Personal Area Network (PAN), as shown in Figure4, is a computer network formed around a person. It generally consists of a computer, mobile, or personal digital assistant. PAN can be used for establishing communication among these personal devices for connecting to a digital network and the internet.

Characteristics of PAN
- It is mostly personal devices network equipped within a limited area.
- Allows you to handle the interconnection of IT devices at the surrounding of a single user.
- PAN includes mobile devices, tablet, and laptop.
- It can be wirelessly connected to the internet called WPAN.
- Appliances use for PAN: cordless mice, keyboards, and Bluetooth systems.

Advantages of PAN
Here, are important pros/benefits of using PAN network:
- PAN networks are relatively secure and safe
- It offers only short-range solution up to ten meters
- Strictly restricted to a small area

Disadvantages of PAN
Here are important cons/ drawback of using PAN network:
- It may establish a bad connection to other networks at the same radio bands.
- Distance limits.

📖 LEARNING CONTENTS (Other Types of Netwrok)

Other Types of Networks
1) Wireless Local Area Network (WLAN)
- helps you to link single or multiple devices using wireless communication within a limited area like home, school, or office building. It gives users an ability to move around within a local coverage area which may be connected to the network. Today most modern day's WLAN systems are based on IEEE 802.11 standards.

2) Storage-Area Network (SAN)

- a type of network which allows consolidated, block-level data storage. It is mainly used to make storage devices, like disk arrays, optical jukeboxes, and tape libraries.

3) System-Area Network
- System Area Network is used for a local network. It offers high-speed connection in server-to-server and processor-to-processor applications. The computers connected on a SAN network operate as a single system at quite high speed.

4) Passive Optical Local Area Network
- POLAN is a networking technology which helps you to integrate into structured cabling. It allows you to resolve the issues of supporting Ethernet protocols and network apps.
- POLAN allows you to use optical splitter which helps you to separate an optical signal from a single-mode optical fiber. It converts this single signal into multiple signals.

5) Home Area Network (HAN):
- A Home Area Network is always built using two or more interconnected computers to form a local area network (LAN) within the home. For example, in the United States, about 15 million homes have more than one computer.
- This type of network helps computer owners to interconnect with multiple computers. This network allows sharing files, programs, printers, and other peripherals.

6) Enterprise Private Network :
- ❖ Enterprise private network (EPN) networks are built and owned by businesses that want to securely connect numerous locations in order to share various computer resources.

7) Campus Area Network (CAN):
- ❖ A Campus Area Network is made up of an interconnection of LANs within a specific geographical area. For example, a university campus can be linked with a variety of campus buildings to connect all the academic departments.

8) Virtual Private Network:
- ❖ A VPN is a private network which uses a public network to connect remote sites or users together. The VPN network uses "virtual" connections routed through the internet from the enterprise's private network or a third-party VPN service to the remote site.

📑 LEARNING CONTENTS (Differences)

Table1. DIFFERENTIATIONS BETWEEN LAN, WAN, MAN

Parameters	LAN	WAN	MAN
Ownership of Network	Private	Private or Public	Private or Public
Geographical area covered	Small	Very large	Moderate
Design and maintenance	Easy	Not easy	Not easy
Communication Medium	Coaxial Cable	Satellite links	Coaxial cables, optical fiber, cables, wires
Bandwidth	Low	High	Moderate
Data rates (Speed)	High	Low	Moderate

Table1 portrays the differences between LAN, WAN and MAN in terms of ownership of network, geographical area covered, design and maintenance, communication medium, bandwidth and speed.

NETWORK CLASSIFICATION BY THEIR COMPONENT ROLE

1. **PEER TO PEER NETWORK.** In this network each computer is responsible for making its own resources available to other computers on the network. Each computer is responsible for setting up and maintaining its own security for these resources. Also, each computer is responsible for accessing the required network resources from peer-to-peer relationships.

   Peer to peer network is useful for a small network containing less than 10 computers on a single LAN. In this network each computer can function as both client and server.

   Peer to peer networks do not have a central control system. There are no servers in peer networks. Peer networks are amplified into home group.

Advantages:	Disadvantages:
Use less expensive computer hardware	Not very secure
Easy to administer	No central point of storage or file archiving
No NOS required	Additional load on computer because of
More built-in redundancy	resource sharing
Easy setup & low cost	Hard to maintain version control

2. **CLIENT/SERVER NETWORK** In this network, certain computers act as server and other act as clients. A **server** is simply a computer, that available the network resources and provides service to other computers when they request it. A **client** is the computer running a program that requests the service from a server. Local Area Network(LAN) is based on client server network relationship. A client-server network is one in which all available network resources such as files, directories, applications and shared devices, are centrally managed and hosted and then are accessed by client.

   Client server network are defined by the presence of servers on a network that provide security and administration of the network.

Advantages:	Disadvantages:
Very secure	Requires professional administration
Better performance	More hardware-intensive
Centralized backup	More software-intensive
Very reliable	Expensive dedicated software

TYPES OF SERVERS

1. **File server**
   ❖ These servers provide the services for storing, retrieving and moving the data. A user can read, write, exchange and manage the files with the help of file servers.

2. **Printer server**
   ❖ This is used for controlling and managing printing on the network. It also offers the fax service to the network users.

3. **Application server**
   ❖ The expensive software and additional computing power can be shared by the computers in a network with the help of application servers.

4. **Message server**
   ❖ It is used to co-ordinate the interaction between users, documents and applications. The data can be used in the form of audio, video, binary, text or graphics.

5. **Database server**
   ❖ It is a type of application server. It allows the user to access the centralized strong database.

☑ LEARNING ACTIVITY 2 (Quiz)

Direction. Read each item carefully. Choose and encircle the correct answer.

1. Arrange the following types of networks according to their size, from smallest to largest.
   a. LAN, WAN, MAN   c. LAN, MAN, WAN
   b. WAN, LAN, MAN   d. MAN, LAN, WAN

2. Mr. Rodriguez is an independent venture man that run a computer hardware, he has been encountering issue with his little computer shop office which he relies upon to furnish him with the sales report. He needs to have the option to divide data among his seven PC station and have on centralized printing area, what type of network would you suggest to him?
   a. MAN   c. LAN
   b. WAN   d. PAN

3. True or False. Local Area Network normally require an internet connection.
   a. True   b. False

4. Mr. Ang wants to have internet for his 2 children with phones and tablets, which connection type should he use?
   a. Wired   c. Modem
   b. Wireless   d. Router

5. Mr. Ong allow computers to communicate with each other in the same building. What type of network he used?
   a. LAN   c. WAN
   b. MAN   d. None of the above

6. Mr. Teh allow computers to communicate with each other across the world. What type of network he used?
   a. MAN   c. LAN
   b. WAN   d. None of the above

7. Internet is an example of _____ network.
   a. Local Area   c. Metropolitan Area
   b. Personal Area   d. Wide Area

8. Mr. Kin's company has three divisions. Each group has a network, and all the networks are joined together. What type of network he has?
   a. WAN   c. MAN
   b. LAN   d. PAN

9. Which type of network supports transmitting voice, video and data?
   a. WAN   c. MAN
   b. LAN   d. All of the above

10. The three main services used in a LAN are __.
    a. File Server   c. Database Server
    b. Print Server   d. All of the above

🖺 SUMMARY

❖ Type of computer networks can categorize according to their size as well as their purpose
❖ PAN is a computer network which generally consists of a computer, mobile, or personal digital assistant
❖ LAN (local area network) is a group of computer and peripheral devices which are connected in a limited area
❖ WAN (Wide Area Network) is another important computer network that which is spread across a large geographical area

❖ A metropolitan area network or MAN is consisting of a computer network across an entire city, college campus, or a small region
❖ WLAN is a wireless local area network that helps you to link single or multiple devices using. It uses wireless communication within a limited area like home, school, or office building.
❖ SAN is a storage area network is a type of network which allows consolidated, block-level data storage
❖ System area network offers high-speed connection in server-to-server applications, storage area networks, and processor-to-processor applications
❖ POLAN is a networking technology which helps you to integrate into structured cabling
❖ Home network (HAN) is a always built using two or more interconnected computers to form a local area network (LAN) within the home
❖ Enterprise private network (EPN) networks are build and owned by businesses that want to securely connect various locations
❖ Campus area network (CAN) is made up of an interconnection of LANs in a specific geographical area
❖ A VPN is a private network which uses a public network to connect remote sites or users together

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