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Practical Assignment - 1

1) Computer Network - Introduction

A computer network is a collection of inter-connected device, such as computers, servers, routers and switches, that communicates and share resource with each other.

Network can be wired or wireless, enabling efficient data exchange and collaboration.

Purpose:

computer Network facilitate the sharing of information, resources and services among connected device. They enable activities like file sharing, printing, internet access, email communication and real-time collaboration, leading to increased productivity and efficiency

2) Types of Network

1) Local Area Network (LAN):

a) **Scope:** covers a small geographic area, such as a single building, office or home.

b) **Purpose:** primarily used for connecting devices within a limited area to share resources like files, printers and internet access.

c) Technology:
Typically employs Ethernet cables or Wi-Fi connections.

2) Wide Area Network (WAN):
a) Scope: Spans larger geographic areas, often connecting multiple LANs across cities, countries or continents.
b) Purpose: Enable communication between geographically distant locations and facilitates access to centralized resources.
c) Technology:
Utilizes public or private networks, including leased lines, fiber optics and satellite links.

3) Mehopolitan Area Network (MAN):

a) Scope:
Cover a mehopolitan area or city, bridging the gap between LANs and WANs.
b) Purpose:
Offers high-speed connections for organizations or institutions spread across a city.
c) Technology:
Combines elements of both LAN and WAN technologies.

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3) Network categories :

Computer Network can be categorized based on different criteria such as their size, purpose, topology and ownership.

1) Based on size :
   a) Local Area Network (LAN)
   b) Metropolitan Area Network (MAN)
   c) Wide Area Network (WAN)

2) Based on purpose :
   a) client-server Network
   b) peer-to-peer Network

3) Based on topology :
   a) Star Network
   b) Bus Network
   c) Ring Network
   d) Mesh Network

4) Based on ownership and Access :
   a) public Network
   b) private Network
   c) Intranet
   d) Extranet

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5) Based on Technology:

a) Wired Network

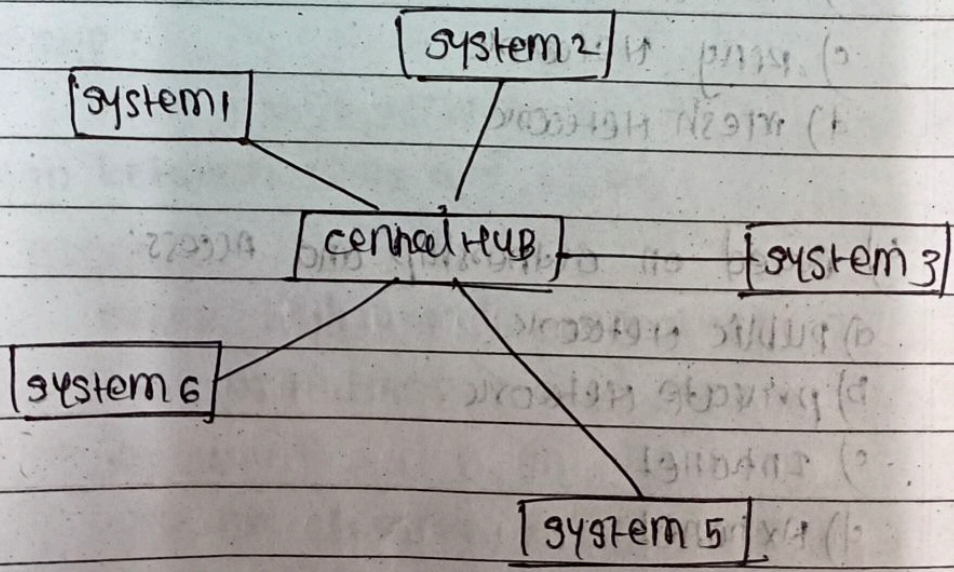
b) Wireless Network

4) Network Topologies

It refers to the arrangement or layout of devices and their connection in a computer network.

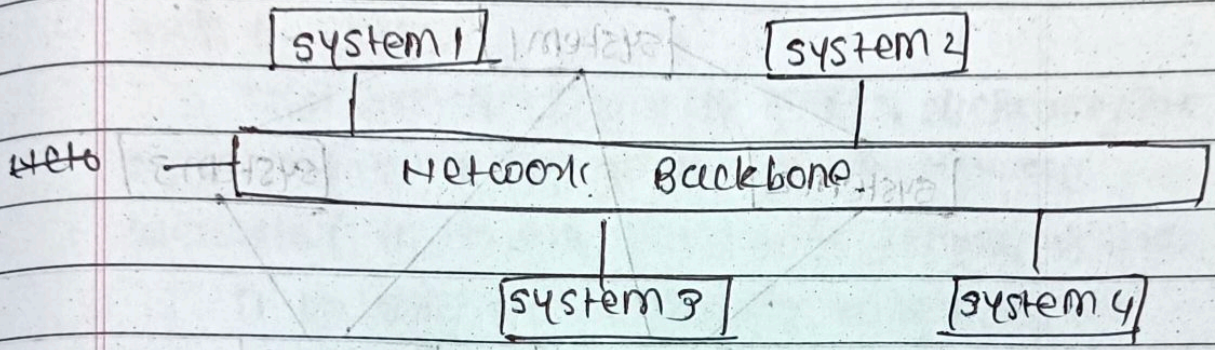
i) Star Topology:

In a star topology, all devices are connected to a central hub or switch. communication between devices occurs through this central Hub. If one connection fails, it only affects the connected device



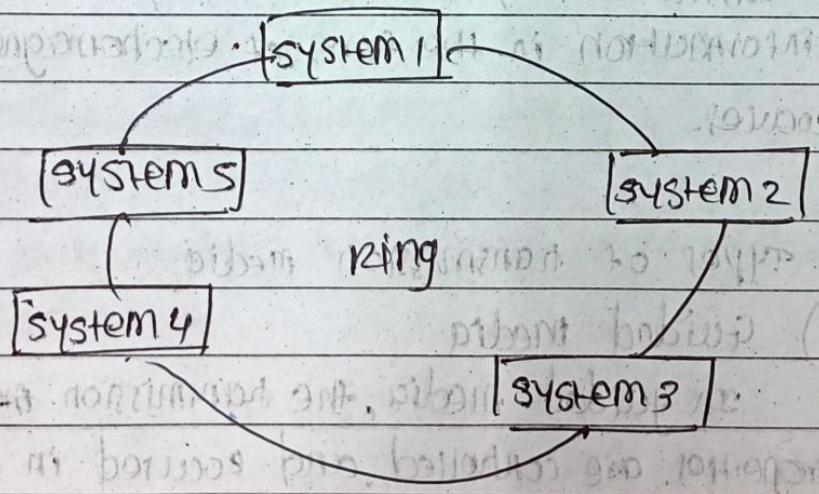
2) Bus Topology:

Devices are connected in a linear sequence along a single communication line (the Bus). Data sent by one device is received by all devices on the Bus, and the intended recipient processes the data.



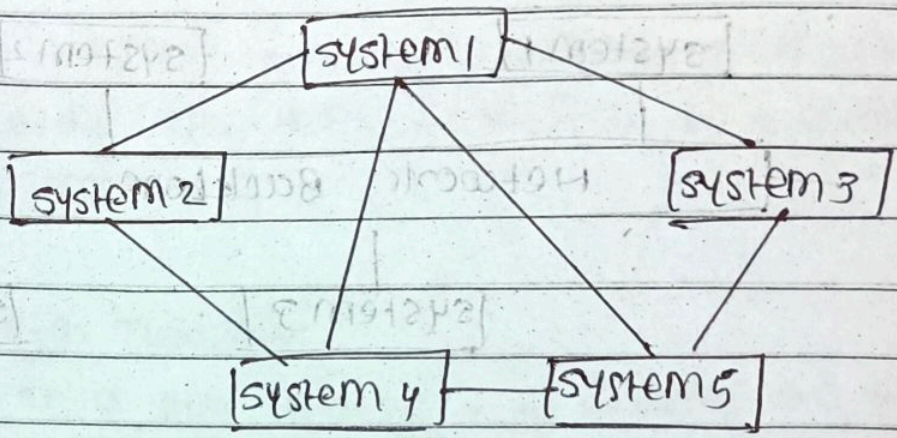
3) Ring Topology:

Devices are connected in a closed loop or ring, where data circulates in one direction. Each device receives the data and forwards it to the next device until it reaches the intended recipient.



4) Mesh topology :

In a mesh topology, every device is connected to every other device, creating redundant paths for data transmission. This redundancy enhances network reliability and fault tolerance.



5) Types of transmission media

Transmission media is a means of establishing a communication medium to send and receive information in the form of electromagnetic signal waves.

Types of transmission media

1) Guided media

In guided media, the transmission ~~media~~ signal properties are controlled and focused in a fixed constricted channel, which can be implemented with the help of physiologically connected contacts.

guided media includes twisted pair, optical fiber, microstripline, coaxial and stripline cable.

2) Unguided media

It can be described as a wireless transmission medium without a physical link to the Network's node or servers.

In comparision to guided media, electromagnetic signal waves are less secure because they are transmitted in the air over a wide geographic area.

It includes the radiowaves, microwaves and infrared waves.

3) Network Devices

1) HUB

i) Hardware device that divide the network connection among multiple devices.
2) hubs create a single collision domain.
3) hubs operate in half-duplex mode.
4) the use of hubs is obsolete.
5) It is replaced by switches, routers due to their limitations

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2) Switch:

1) hardware device that connects multiple devices on a computer network.
2) contains more advanced features than Hub.
3) contain the updated table that decides where the data is transmitted or not.
4) provide a direct connection between the source and destination.
5) support full-duplex operation

3) Bridge:

A bridge operates at the data link layer of the osi model. It can read only the outmost hardware address of the packet but cannot read the IP address. It reads the outmost section of the data packet to tell where the message is going.

4) Router:

Router are small physical devices that operate at the network layer to join multiple networks together. Routers may also be used to connect two or more logical groups of computer devices known as subnets, each with a different subnetwork address.

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5) Gateway:

A gateway is an internetworking capable of joining together two networks that use different base protocols.

A network gateway can be implemented completely in software, hardware or a combination of both, depending on the type of protocols they support.

7) Details of twisted pair cable and preparation using RJ-45 connectors.

There are two types of twisted pair cable.

1) UTP (unshield twisted pair):
1) UTP cable transmit data using electrical signals
2) all pairs are wrapped in a single plastic sheath.
3) UTP can transmit data at 10 Mbps, 100 Mbps, 1 Gbps and 10 Gbps.
4) cables use the same RJ-45 modular connector.
5) UTP cables are the backbone of most Ethernet network.

2) STP (shielded twisted pair):
1) each pair is wrapped with an additional metal shield.
2) used in industrial networking, data centres.
3) use connectors like RJ 45 connector

4) cost and complexity of STP cables may be higher compared to UTP cables.
5) helps maintain signal integrity and reduce signal loss.

8) METHOD Network

INSTITUTE is having the 250 MBPS internet connectivity which is available through both media. on fiber optic cable as well as RF connectivity.

Internet connection is available in all the laboratories and on the all computer systems. seperate computer center is available for the students for browsing the internet which remains open all weekdays except the holiday.

Monday to Friday : 8:30 AM to 8:30 PM
saturday and sunday : 9:00 AM to 5:00 PM

All the systems in the campus on local Area Network.

Shrikrupa