Subject Code: LPCIT-103

Subject Name: Data Communication and Computer Networks Laboratory

Programme: B.Tech. (IT)	**L: 0 T: 0 P: 2**
Semester: 3	**Teaching Hours:** 26
Theory/Practical: Practical	**Credits:** 1
Internal Marks: 30	**Percentage of Numerical/Design Problems:** 100%
External Marks: 20	**Duration of End Semester Exam(ESE):** 1.5 hr
Total Marks: 50	**Elective Status:** Compulsory

Prerequisites: Fundamentals of Computers.

On Completion of the course, the student will have the ability to:

CO#	Course Outcome
CO1	Demonstrate the hardware components, transmission media and tools used in computer networks.
CO2	Implement the LAN based on different topologies.
CO3	Execute various networking commands related to troubleshooting.
CO4	Performing initial switch and router configuration.
CO5	Understanding the network IP.
CO6	Design and execute projects in networking in multi-disciplinary teams.

Special Instruction related to resources requirement: Hardware requirement: RJ-45 connector, twisted pair cable, crimping tool

Software requirement: C language, Open Source Simulation Tools, Packet Tracer

Detailed Contents

Prerequisite: Fundamentals of Computers

1. Study of different types of network cables and practically implement the cross-wired cable and straight through cable using clamping tool
2. Study of network devices in detail
3. Study of network IP
4. Connect the computers in Local Area Network
5. Study the basic network commands and network configuration commands
6. Performing an initial switch configuration

7. Performing an initial routing configuration
8. Configuring and troubleshooting a switched network
9. Mini Project: Student has to do a project assigned from course contents in a group of two or three students. The group of students must submit a project report of 8 to 10 pages (approximately) and the team will have to demonstrate as well as have to give a presentation of the same

Reference Books

1. http://www.rpsinstitutions.org/downloads/lab%20manual/cnlab.pdf
2. Cisco Learning network https://learningnetwork.cisco.com/thread/118264
3. https://www.experts-exchange.com/questions/24163288/How-to-implement-an-ARQ-stop-and-Wait-Protocol.html

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SN	Name of experiment	Date	Signature
*	Introduction to DCCN	21/08/23	21/8/23
1	Study of different types of Network cables and practically implement the cross-wired cable and straight through cable using clamping tool.	11/9/23	11/9/23
2	Study of Network device in detail.	18/9/23	
3	(a) Packet tracer and Significance of Packet tracer.	18/9/23	
	(b) Installation of packet tracer.	18/9/23	
4	Study of different network devices in detail.	18/9/23	
5	A. To find IP address of given PC. write steps and diagram of steps. B. Subnetting and supernetting.		18/9/23
6	Implementing different types of command to observe networking process	25/10/23	
7	Connect the computers in local Area network.	30/10/23	

Introduction to DCCN

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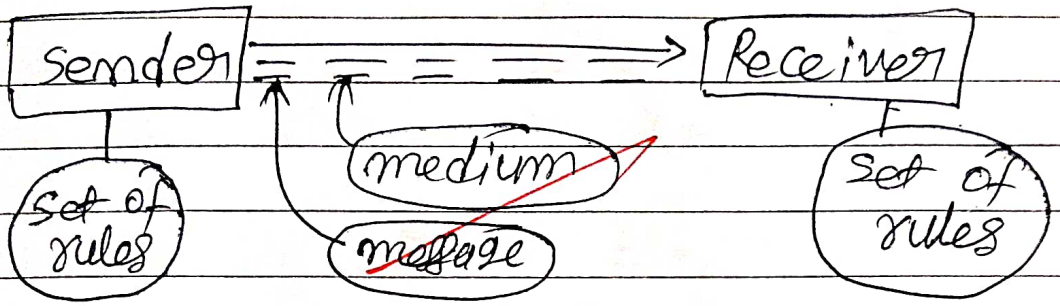
DCCN: DCCN is a device which is capable of sending & receiving the data over a communication medium.



Computer Network: It refers to the interconnected computer devices to exchange the data and to share the resources with each-other, connection can be wireless or a wired, hardware and software are used to connect the computers.

Need of dccn

(i) Resource Sharing: DCCN enables efficient sharing of resources such as printers, files, and databases across a network, reducing redundancy and increasing productivity.

(ii) Communication: Networks allow seamless communication between individuals, organizations and devices, enabling real-time collaborating and information exchange.

(iii) Global Connectivity: With the rise of the internet, DCCN facilitates global connectivity, services, and entertainment from around the world.

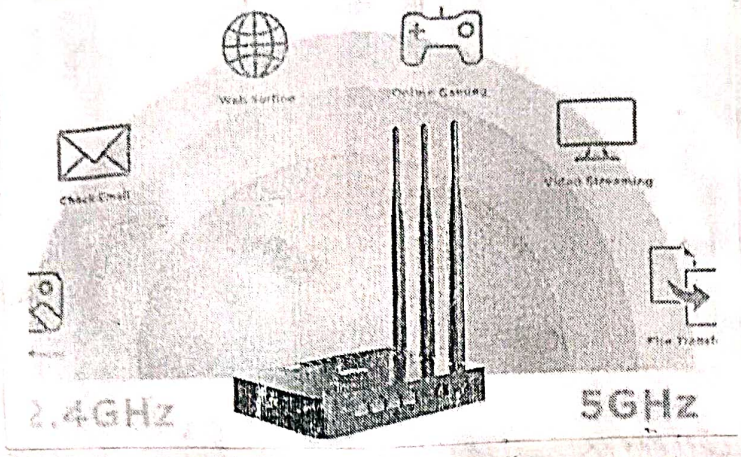
(iv) Remote Access: DCCN allows users to access data and applications remotely.

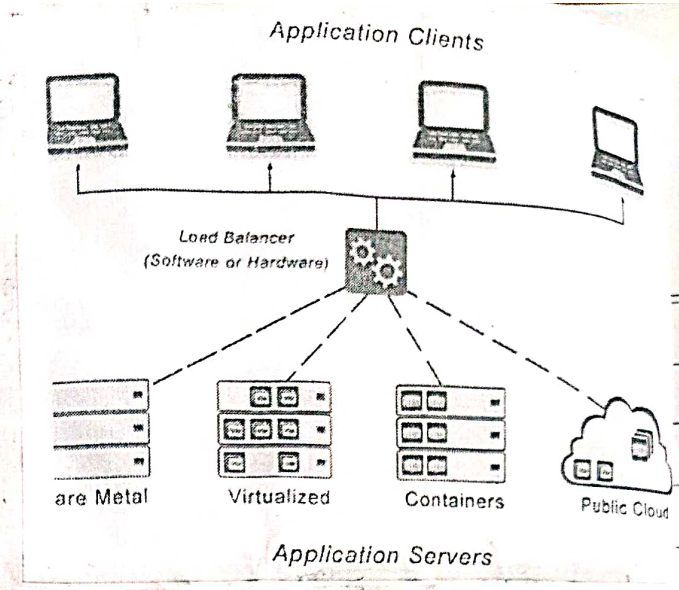
(v) Data Sharing and storage: Networks enable the sharing and centralized storage of data, making it easier to manage and secure valuable information.

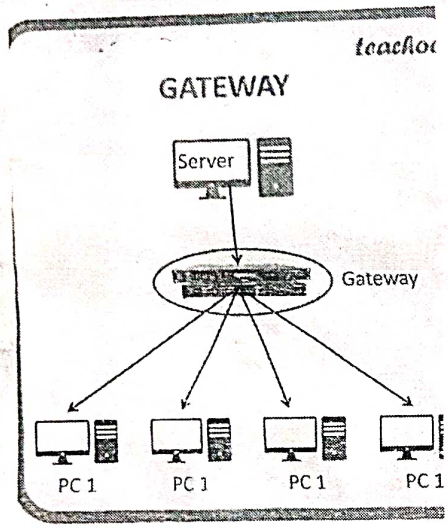
(vi) Research and Development: Scientists and researchers use networks to collaborate on projects, share findings, and access specialized resources.

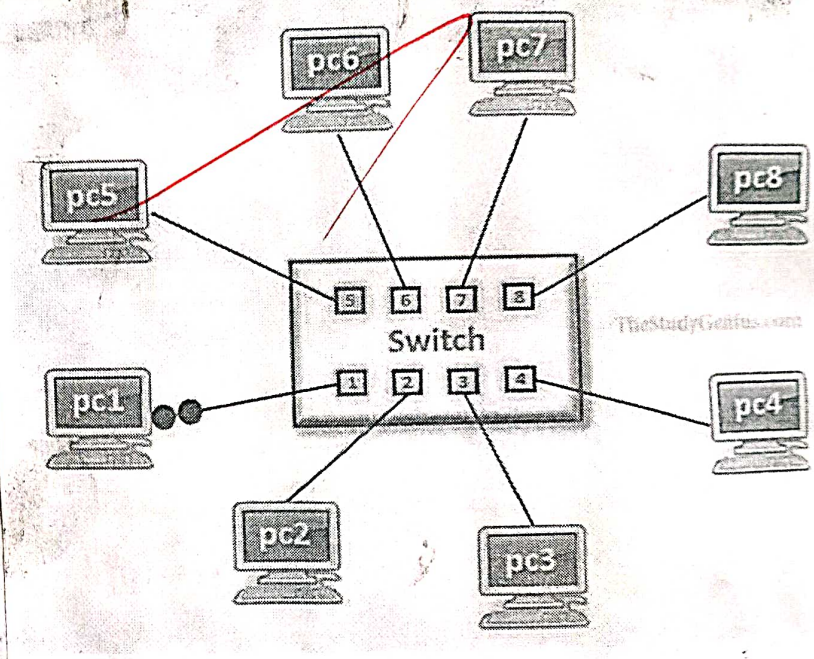
(vii) Entertainment and Media: Streaming services, online gaming, and social media rely on DCCN to deliver content to users worldwide.

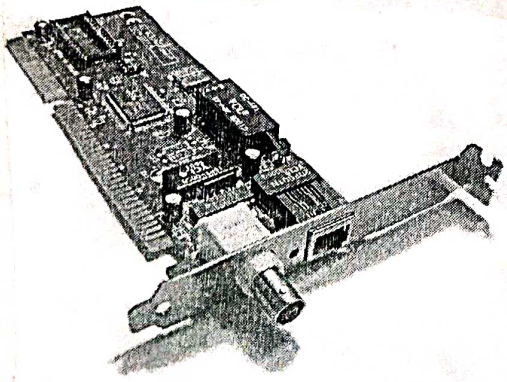
(viii) Emergency Services: Networks support communication during emergencies, enabling timely coordination and response efforts.

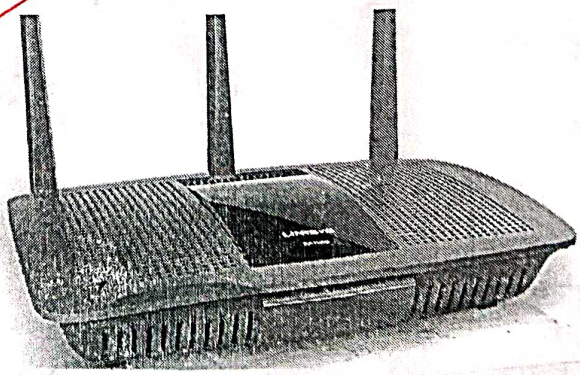

2.4GHz
5GHz


Application Clients
Load Balancer
(Software or Hardware)
are Metal
Virtualized
Containers
Public Cloud
Application Servers


GATEWAY
Server
Gateway
PC 1
PC 1
PC 1
PC 1


pc6
pc7
pc5
pc8
Switch
pc1
pc4
pc2
pc3





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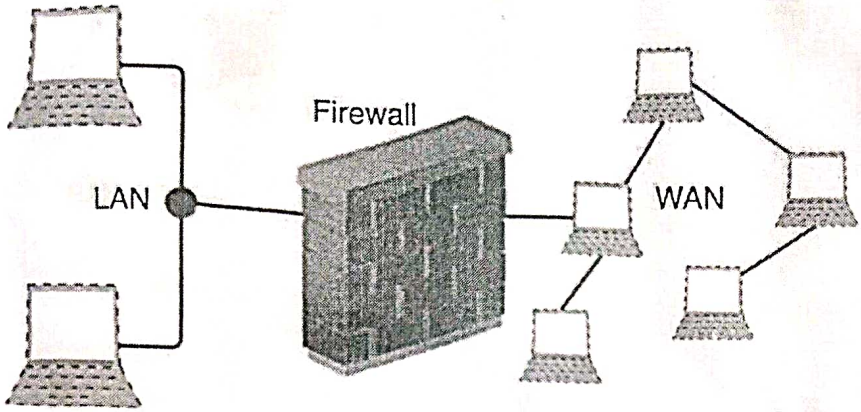
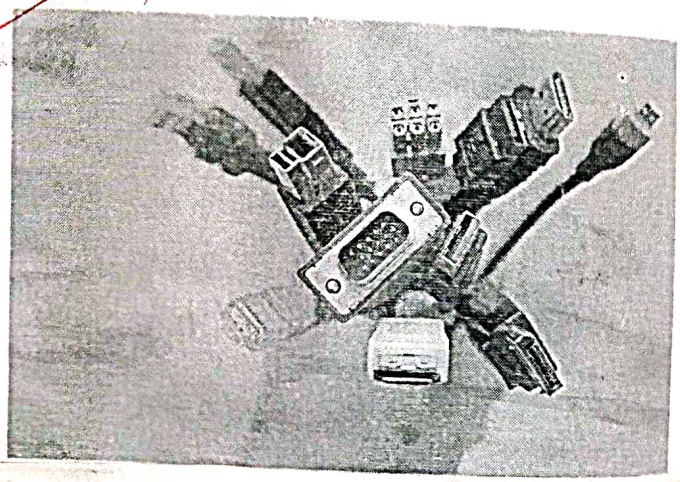
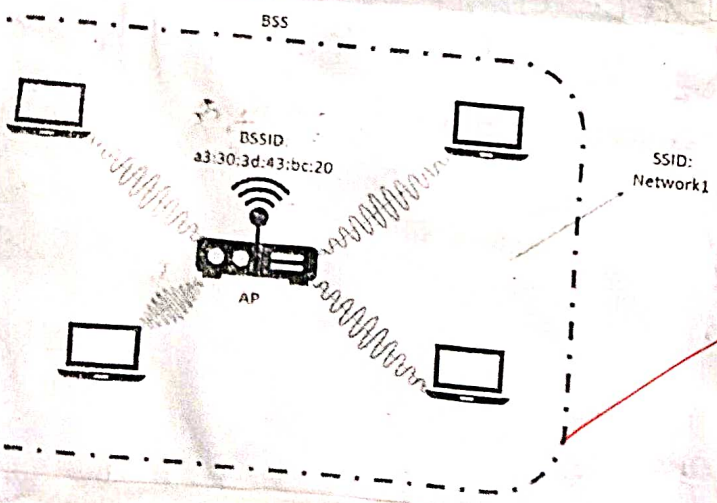
Various hardware and software requires for dccn.

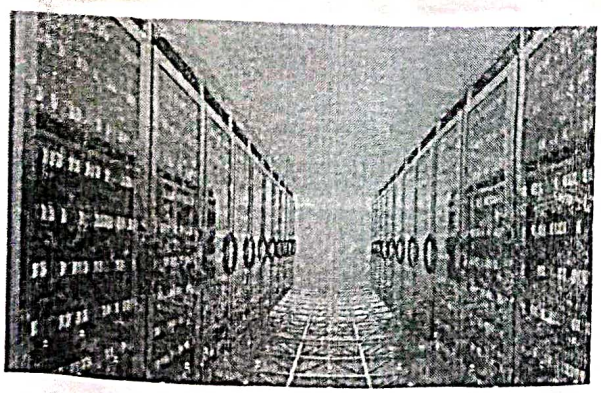
Hardware:

1. Routers: Devices that direct data packets between different networks. (provide)
2. Switches: Devices that manage data traffic within a network.
3. Network interface cards (NICs): Hardware that connects computers to the network
4. Modems: Convert digital data from computers into analog singnals for transmission over telephone ~~different~~ lines.
5. Gateways: Devices that connect different networks using different protocols.
6. Firewalls: Hardware appliances that filter and control network trafic.
7. Load Balancers: Distribute incoming network trafic across multipe servers to ensure efficient resource utilization.


Firewall
LAN
WAN




BSS
BSSID
a3:30:3d:43:bc:20
SSID:
Network1
AP



8. Cables and connectors: Ethernet cables, fiber optics, and connectors for physical connectivity.

9. Wireless Across points (WAPs): Devices that enable wireless connectivity.

10. Network servers: Powerful computers that provide services like file sharing, email, and web hosting.

Software

1. Operating systems: System like Windows, Linux, or Unix that provide the foundation for running network protocols and applications

2. Network protocols: TCP/IP, HTTP, FTP, SMTP, etc., for communication between devices.

3. Network Management Software: Tools for monitoring, managing issues, like Nagios or Wireshark.

4. Firewall and security software: Protects the network from unauthorized access and threats.

5. Routing and Switching Software: Manages data traffic flow within the network.

6. Virtualization Software: For creating virtual networks and machines, such as VMware or VirtualBox.

7. Packet Analyzers: Tools for capturing and analyzing network traffic to diagnose issues.

8. Network simulation Software: Used to simulate network behavior for testing and research purposes.

Bibliography

- Chatgpt
  Chat.openai.com

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* LAN :- A local area network is a network of computers and devices within a limited geographic area, such as office or campus.

* WAN :- A wide area network is a network that spans a large multiple geographical area, connecting multiple local area networks over a significant distance.
  Ex ⇒ Multiple cities
  A bank, including its branch offices and ATM machine.

* Topologies :- In computer network topology refers to the arrangement of the various components within a network, it defines how devices like computers, routers, switches, and servers are connected to one another.

* wired network :- A wired network is a type of computer network where devices are connected to each other using cables. such as ethernet cables, fiber optics.

Wireless network :- A wireless network is a type of computer network where devices are connected to each other using wireless connection instead of cables.
like → smartphones, tablets.

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Types of topologies

1. Star topology : All devices are connected to a central hub.

2. Bus topology : Devices are connected in a linear fashion along a single communication line.

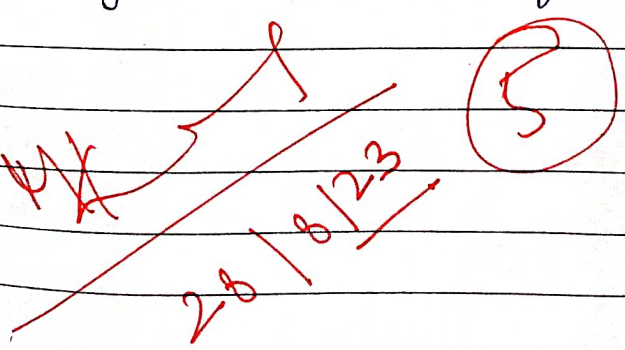
3. Ring Topology : Devices are connected in a circular manner, where each device is connected to exactly two other devices.

4. Mesh Topology : Every device is connected to ~~every~~ each other device in the network.

5. Tree Topology : A combination of star and bus topologies.

6. Hybrid Topology : A mixture of two or more different network topologies.

7. point-to-point Topology : Also known as a "link", this topology connects two devices directly without any intermediaries.



Practical -1: Study of different types of network cables and practically implement the cross-wired cable and straight through cable using clamping tool.

Transmission Medium of Communication computer Network
In Computer Networks, the transmission medium refers to the physical or logical path through with data is transmitted from one device to another. The choice of transmission medium can significantly impact the speed, reliability, and cost of network communication.

Transmission media use electromagnetic signals to carry information from the semder to receiver. The information is called over in foram of bits through a local area Network (LAN)

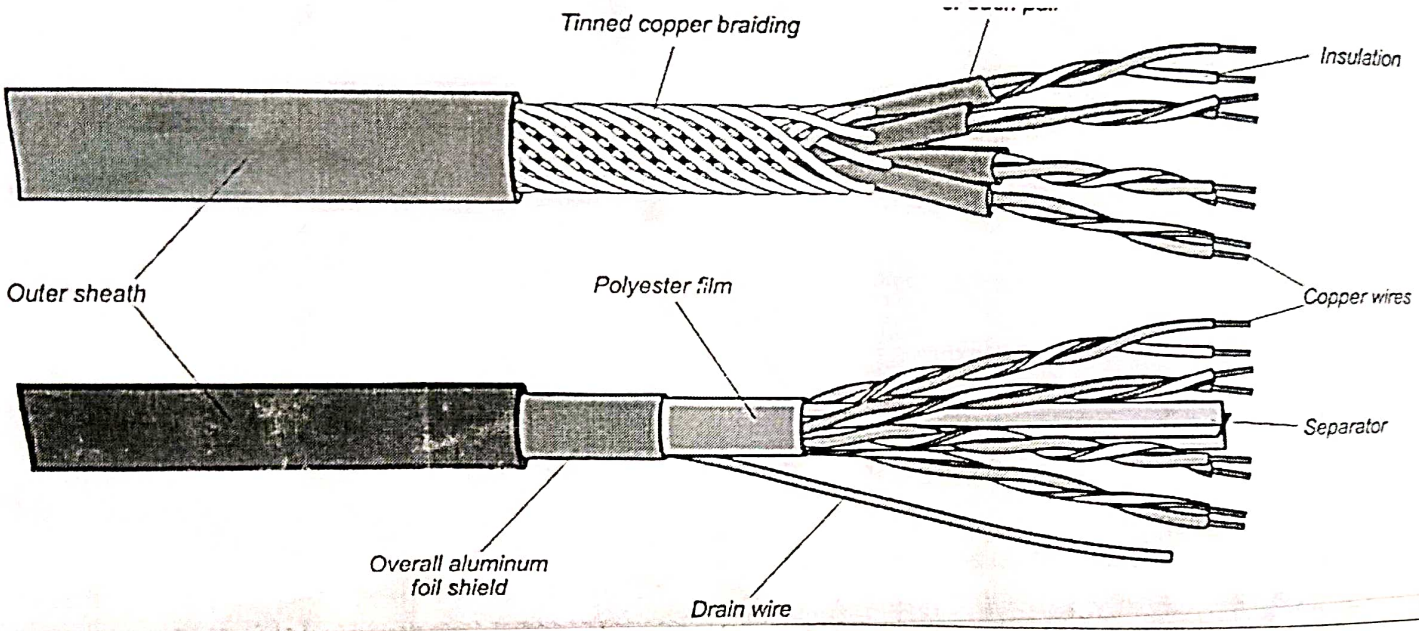
* There are two types of transmission media:
1. Guided Media / Bounded media
2. Unguided media / Unbounded media

* Guided Media includes:
1. Twisted pair cables
2. Coaxial cables
3. fiber optic cables

* Unguided transmission media include:-
1. Magnetic Media
2. Copper Media.

Difference between Guided and unguided Media

	Guided Media	unguided Media
1.	In guided Media, the signal energy communicates via wires	In unguided media, the signal energy communicates through the air.
2.	Guided media is generally preferred when we want to execute direct communication.	Unguided media is generally perferred by radia broadcasting in all direction.
3.	The guided media formed the different network topologies.	The unguided media formed the continous network topologies.
4.	The signals are in state of current and voltage.	The signals are in the state of electromagnetic waves
5.	In case of guided media the transmission capacity can be boosted by counting more wires	In case of unguided media, it is not posible to acquire more capacity.
6.	Open wire, Twisted pair, coaxial cable and optical fibre are different kind of guided media.	Microwave, Transmission, Radio Transmission and Infrared Transmission are the types of unguided media.


Tinned copper braiding
Insulation
Outer sheath
Polyester film
Copper wires
Separator
Overall aluminum foil shield
Drain wire

1.1.1 Twisted pair cable: It consists of 2 separately insulated conductor wires wounded about each other. Generally, several such pairs are bounded together in a protective sheath. They are most widely used transmission media

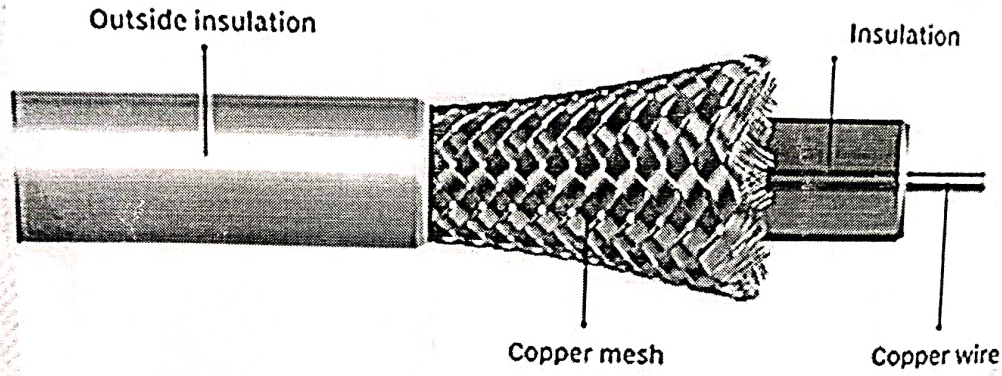
Twisted pair is of two types:
1. unshielded Twisted pair (UTP)
2. shielded Twisted pair (STP)

1. Unshielded Twisted pair: UTP consists of two insulated copper wires twisted around one another. This type of cable has the ability to block interference and doesn't depend on physical shield. It is used for telephonic applications.
Advantage: (i) least expensive (ii) Easy to install
(iii) High speed capacity

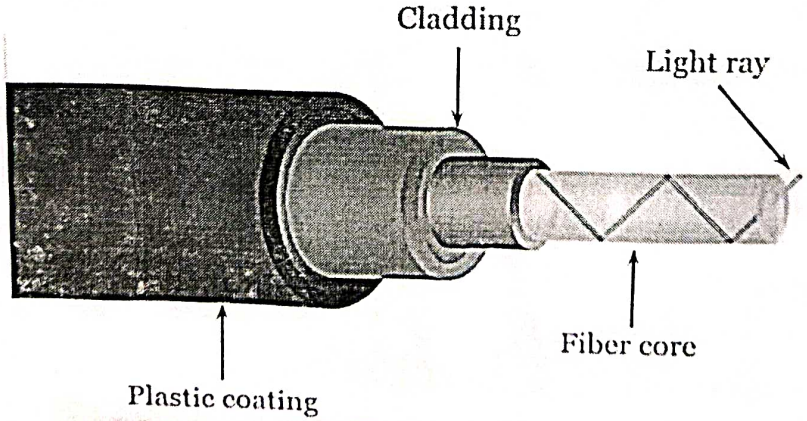
Disadvantages: (i) Susceptible to external interference
(ii) Lower capacity and performance in comparison to STP.
(iii) Short distance transmission due to attenuation.

2. Shielded Twisted pair: This type of cable consists of a special jacket to block external interferance. It is used to fast data rate ethernet and in voice and data channels of telephone lines.
Advantage: (i) Better performance at a higher data rate in comparison to UTP
(ii) eliminate crosstalk.
(iii) comparatively faster.

Coaxial cable



Optical Fiber



Disadvantages : (i) Comparatively difficult to install and manufacture.
(ii) More expensive
(iii) Bulky

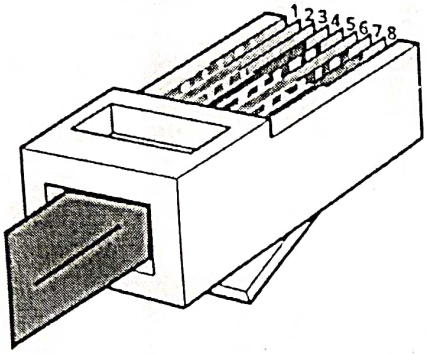
Coaxial Cable : It has an outer plastic covering containing an insulation layer made of PVC and 2 parallel conductors each having a separate insulated protection cover. The co-axial cable transmits information in two modes :
(i) Baseband Mode (ii) Broadband Mode
Advantages : (i) High bandwidth (ii) Better noise Immunity (iii) Easy to install and expand (iv) Inexpensive.

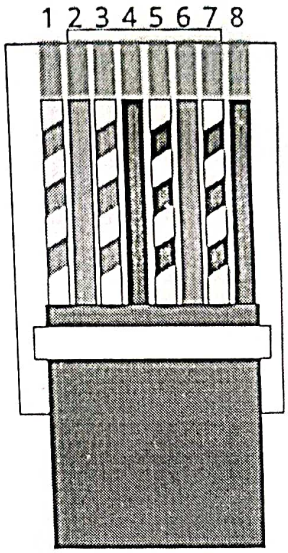
Disadvantages : Single cable failure can disrupt the entire network

Application : Radio frequency signals are sent over coaxial wire, It can be used for cable television signal distribution, digital audio, computer network connection like ethernet and feedlines that connects radio transmission and receivers to their antennas.

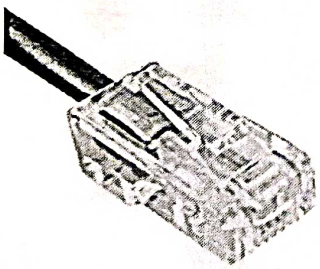
Optical fiber cable : It uses the concept of refraction of light through a core member made up of glass or plastic. The core is surrounded by a less dense glass or plastic covering called the cladding It is used for the transmission of large volume of data.

RJ45 Pinout
T-568B

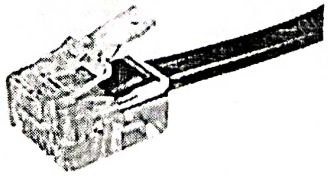




1. White Orange	5. White Blue
2. Orange	6. Green
3. White Green	7. White Brown
4. Blue	8. Brown



RJ45



RJ11

The cable can be unidirectional or bidirectional. The WDM(wavelength Division multiplexer) supports two modes, mainely unidirectional and bidirectional Mode.

Advantages :- (i) Increased capacity and bandwidth
(ii) lightweight
(iii) less signal attenuation
(iv) Immunity to electromagnetic interference
(v) Resistance to corrosive Material.

Disadvantages :- (i) Difficult to install and Maintain
(ii) High cost
(iii) fragile

Application:- (i) Medical purpose :- used in several types of medical instruments
(ii) Defence purpose: used to transmission of data in aerospace.
(iii) for communication :- This largely used in formation of internet cables.

Registered Jack (RJ) :- It is a standardized network interface for connecting voice and data telecommunication equipment. The Registered Jack connectors - RJ45 and RJ11 are used with the UTP cables.

	RJ-45	RJ-11
1.	RJ-45 are used with ethernet cable	RJ-11 used for connecting telephone wires
(2)	The structure of RJ-45 of large size	The structure of RJ11 is comparatively small.
(3)	Bandwidth supported by RJ-45 is 10 Gbps over ethernet	Bandwidth supported by RJ-11 is 24 Mbps

(4) The no of wires connected with RJ is 8	The no of wires connected with RJ is 4
5. RJ45 is an 8P8C connector	The RJ-11 is 6PUC connector

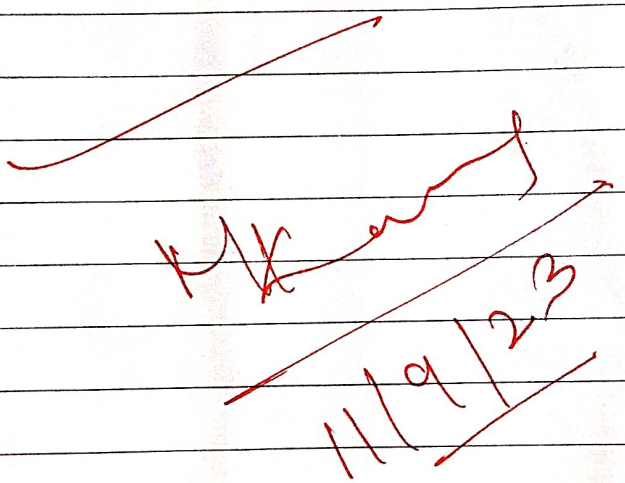
Types of ethernet cable

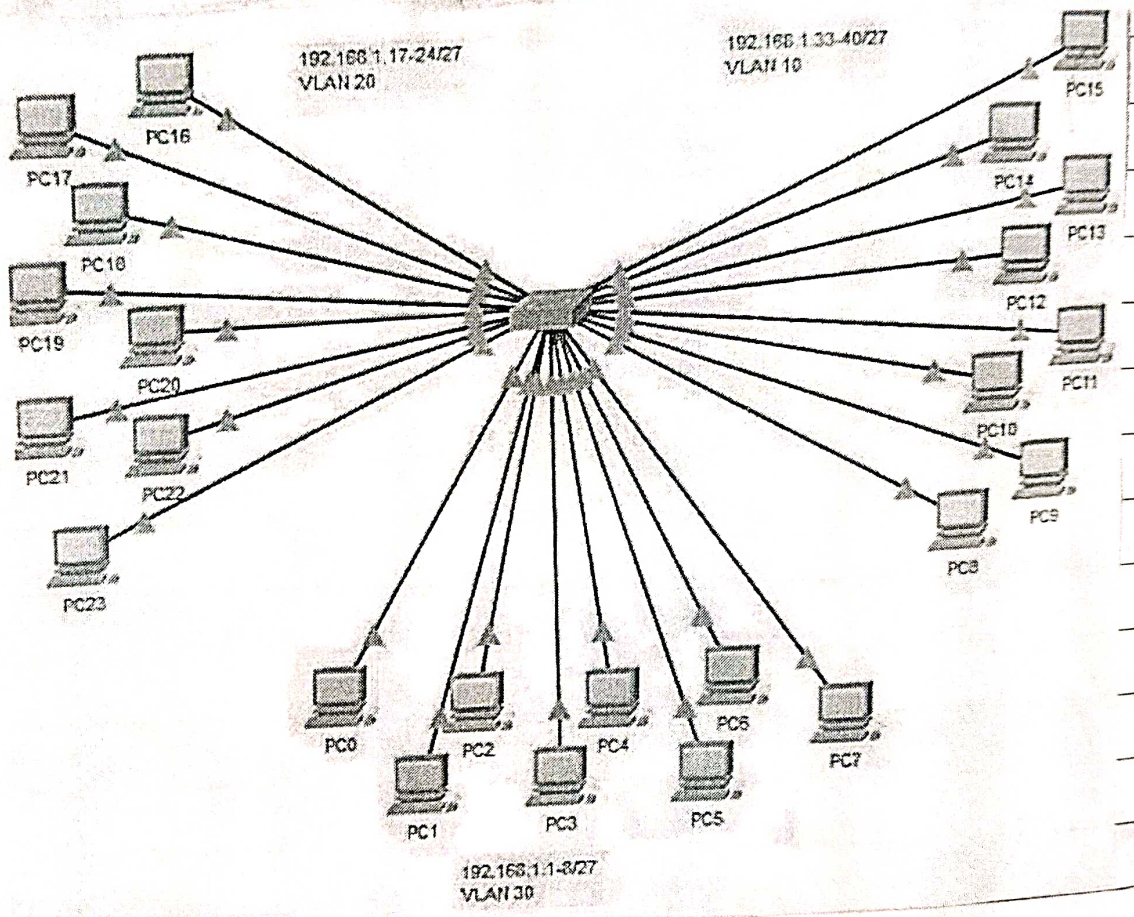
(i) straight cables (ii) crossover cables
They used in networking to connect devices like computers, switches, routers and other networking equipment. They are wired differently and serve specific purpose in network setups.

Straight cables	Crossover cables
ose :- A straight cable is used to nect devices of different types. Such as mputer to a switch, a computer to ter, a computer to a modem.	A crossover cables used to connect device of same types such as two computer 2 switches, without the need for an intermediate networking device like switch
ing In straight through cable both ends of cable have the same wiring scheme which means that wire at pin 1 on the end is connected to pin 1 on the other end and so on. The wiring cheme typically follows T568B ndards color-coding: pin - white/orange pin2 → orange n3 → white/green n4 → Blue n5 - white/Blue n6 - green pin7 - white/Brown pin8 - Brown	The wiring is different at each end. One end follows the T568A wiring standard and other end follows the T568B standard. This crossover configuration allow the transmitting signal from one device to match the receiving signals on other device

One End (T568A)	other end (T568B)
pin1 white/green	white/orange

pin2 green	orange
pin3 white/orange	white/green
pin4 Blue	Blue
pin5 white/Blue	white/Blue
pin6 orange	green
pin7 white/Brown	white/brown
pin8 Brown	Brown




192.168.1.17-24/27
VLAN 20
192.168.1.33-40/27
VLAN 10
192.168.1.1-8/27
VLAN 30
PC0
PC1
PC2
PC3
PC4
PC5
PC6
PC7
PC8
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PC13
PC14
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PC23

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Experiment no. 2 : Study of Network devices in detail.

Q What is the Packet Tracer & what is its significance?

Ans Cisco Packet Tracer is a powerful network simulation and visulation tool by cisco to practice networking, IOT and cybersecurity skills. The virtual learning environment comes in handy to learn courses, professional training, work planning and so on.
This software is built by cisco and can be used to practice Networking related labs virtually. Packet traces is an excellent tool for having hands-on experience on devices like Cisco Routes, switches, HUB and end devices like PC, laptop, server and many more
It holds significance for several reasons :-

1. Network learning and Education : Packet Tracer is widly used in networking courses and certifications. Such as cisco's CCNA and CCNP. It allows students to practice configure, troubleshooting, and visulizing network scenarios in a controlled environment

2. Hands-On Practice : Users can create and experiment with network topologies, Networks, switches and other ~~networks topologies, networks, switches and other~~

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Networking devices without the need for physical hardware. This hands-on experience is crucial for gaining practical networking skills.

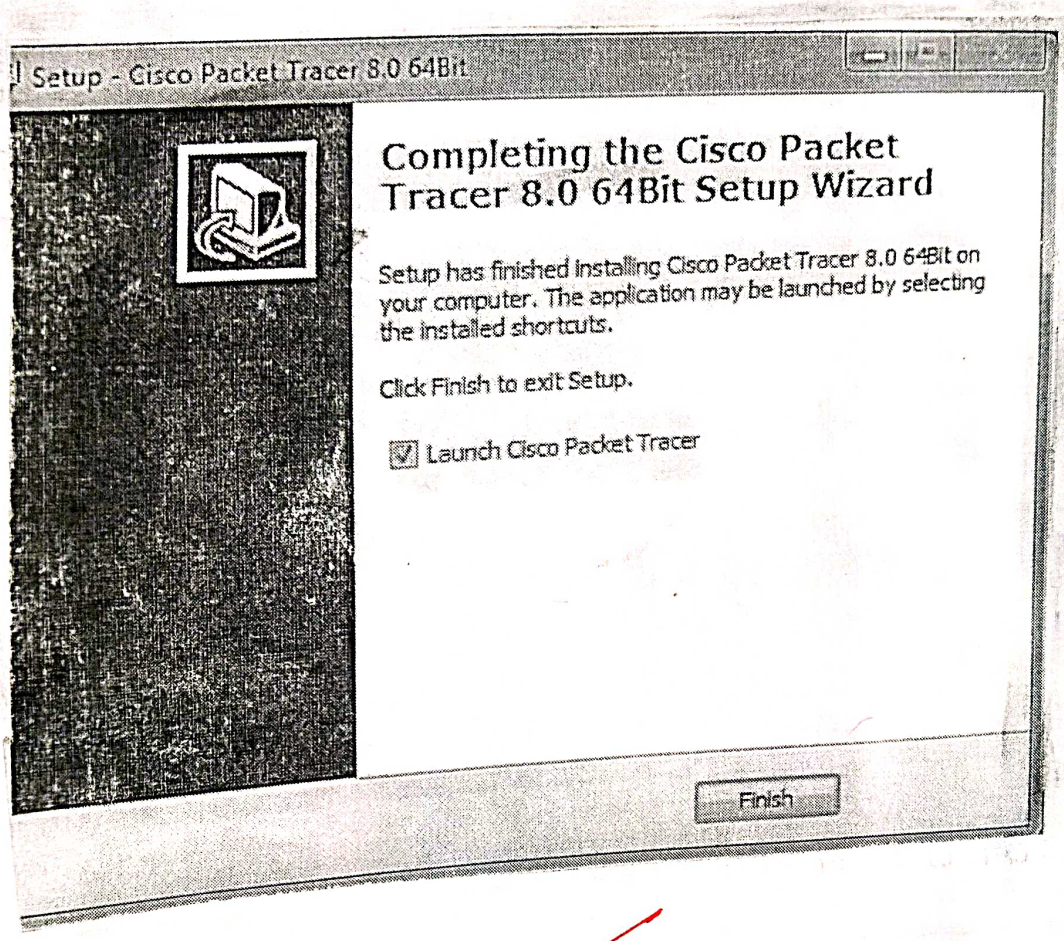
3. Prototyping and Testing: Network administrators and engineers can use packet tracer to prototype and test network designs, ensuring they work correctly before implementing them in real-world environments. It helps to prevent costly mistakes and downtime.

4. Scenario Replication: Packet Tracer allows users to replicate specific network scenarios, including complex setups to understand how different configurations and protocols interact. This is valuable for trouble shooting and optimization.

5. Visual Representation: The tool provides a graphical representation of network concepts to others

6. Packet Analysis: User can capture and analysis network trafic within packet Tracer, helping to diagnose issues and gain insights into networks behaviour.

7. Cost-Efficiency: Packet Tracer is a costeffective to purchasing and maintaining physical networking equipment especially for educational purpose.


Setup - Cisco Packet Tracer 8.0 64Bit
Completing the Cisco Packet Tracer 8.0 64Bit Setup Wizard
Setup has finished installing Cisco Packet Tracer 8.0 64Bit on your computer. The application may be launched by selecting the installed shortcuts.
Click Finish to exit Setup.
Launch Cisco Packet Tracer
Finish

Date
Page No.

* How to install our packet tracer in our system.?

ans → Packet Tracer is computer software that is designed with the purpose of making network simulations to understand the networking and cyber security concepts in an easy way. It is built by cisco corporation and is available for free for different operating system like macOS, windows, Linux, etc. It is easy to ~~easy~~ easy with a simple interface.

Installing packet Tracer on windows.

follow the below steps to install packet Tracer on windows.

1 → Visit the official website of Netacad using any web browser.

2: Press the login button and select log in option.

3: Next screen will appear, click on the sign-up option.

4: Next screen will appear and will ask for email and password and other simple details, fill them and click on Register.

5: Now the login screen appears again so fill in the email id

6: On the next screen enter the password and press the login button

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ep7: Dashboad will initialize, now click on Resources and choose Download packet Tracer option.

tep8: On the next web page choose the operating system to download the packet tracer. Downloading will start automatically.

9: check for the executable file in your system and run it.

ep 10: Next screen is of License Agreement so click on I accept the license.

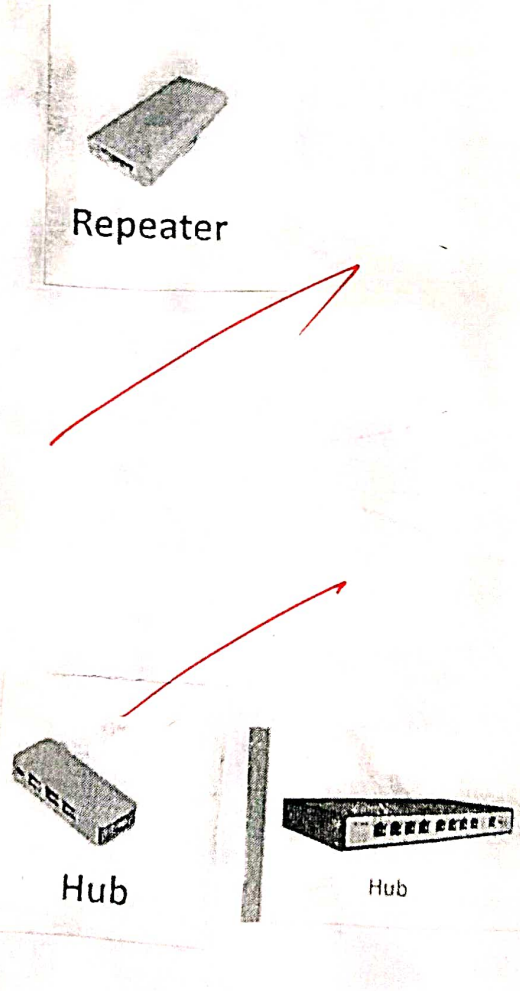
ep 11: Choose the installing location which has sufficient space.

12: Select the start menu folder and click the Next button.

p 13: Check the box for creating a desktop icon and click on the Next button.

ep 14: Now packet tracer is ready to install so click on the install button.

ep 15: The installation process will start and will hardly take a minute.


Repeater
Hub
Hub

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6: click on the finish button to complete the installation

7: An icon is created on the desktop so run it.

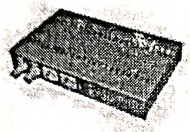
8: Interface is initialized and the software is ready to use.

* study of different network devices in detail any 10:

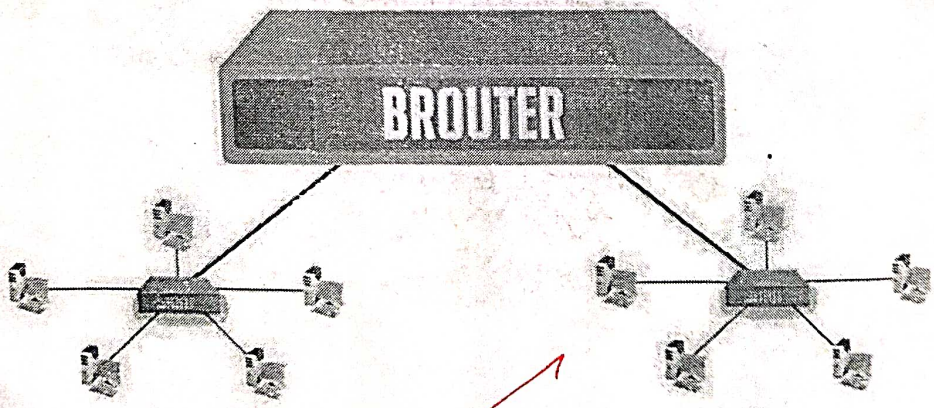
① Repeater - A repeater operates at the physical layer. Its job is to regenerate the signal over the same network before the signal ~~over the same network before~~ the becomes too weak or corrupted to extend the length to which the signal can be transmitted over the same network. An important point to be noted about repeaters is that they not only amplify the signal but also regenerate it. When the signal becomes weak, they copy it bit by and regenerate it at its star topology connectors connecting to following the original strength. It is a 2-port device.

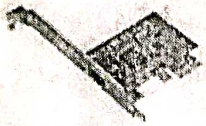
② Hub: A hub is a basically multi-port repeater. A hub connects multiple wires coming from different branches, for example, the connector in star topology which connects different stations.

Bridge



Repeater





NIC

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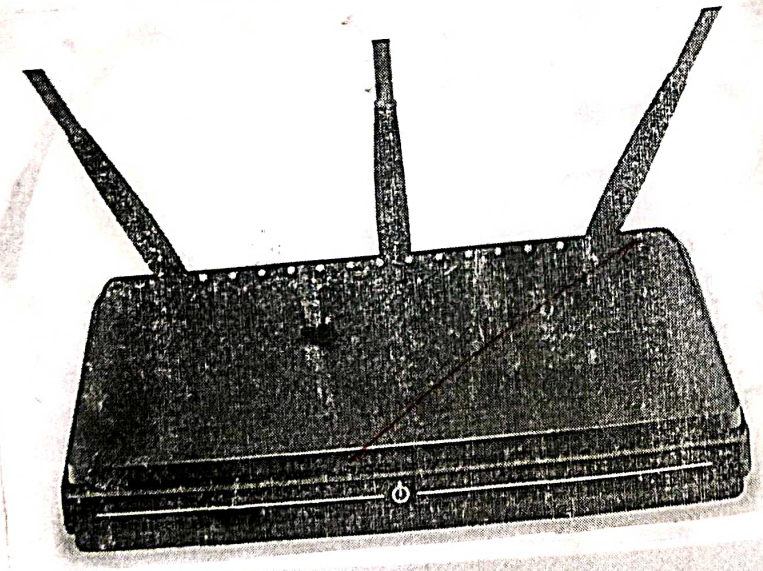
Hubs cannot filter data. so data packets are sent to all connected connected devices. In other words, the collision domain of all hosts connected through Hub remains one. Also, they do not have the intelligence to find out the best path for data packets which leads to inefficiencies and wastage.

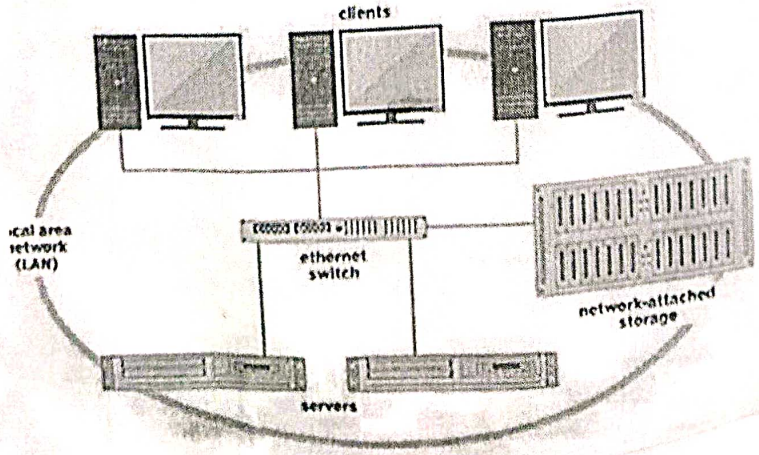
3. Bridge: A bridge operates at the data link layer. A bridge is a repeater with add on the functionality of filtering content by reading the MAC addresses of the source and destination. It is also used for interconnecting two LANs working on the same protocol. It has a single input and single output port, thus making it a 2 port device.

4. Brouter: It is also known as the bridging router. is a device that combines features of both bridge and router. It can work either at the data link layer or a network layer. working as a router, it is capable of routing packets across networks and working as a router, it is capable of routing packets across networks and working as the bridge. It is capable of filtering local area network traffic.

5. NIC: NIC or network interface card is a network



Network-attached storage



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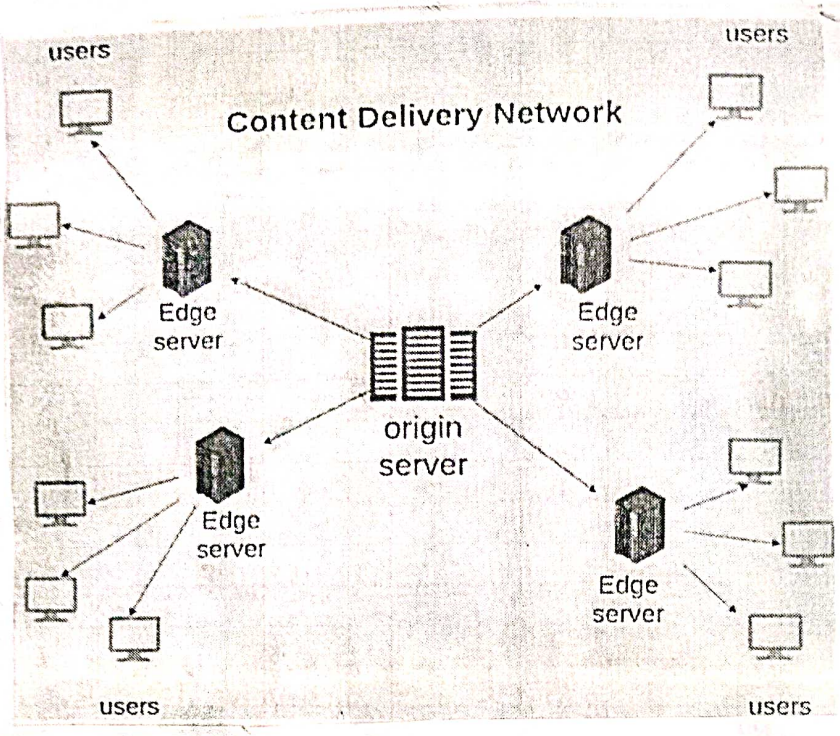
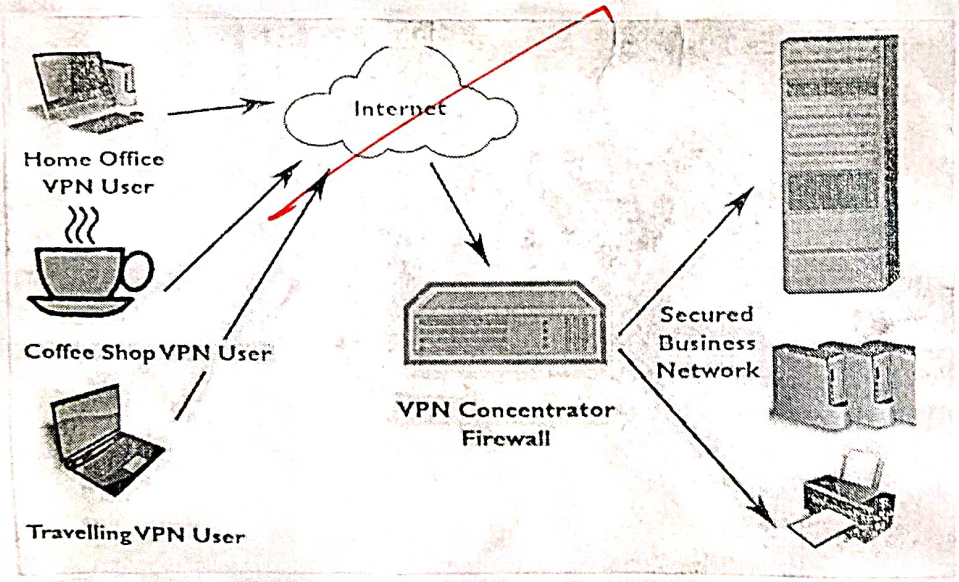
adapter that is used to connect the computer to the network. It is installed in the computer to establish a LAN. It has a unique id that is written on the chip, and it has a connector to connect the cable to it. The cable acts as an interface between the computer and the router or modem. NIC card is a layer 2 devic which means that it works on both the physical and data link layers of the network model.

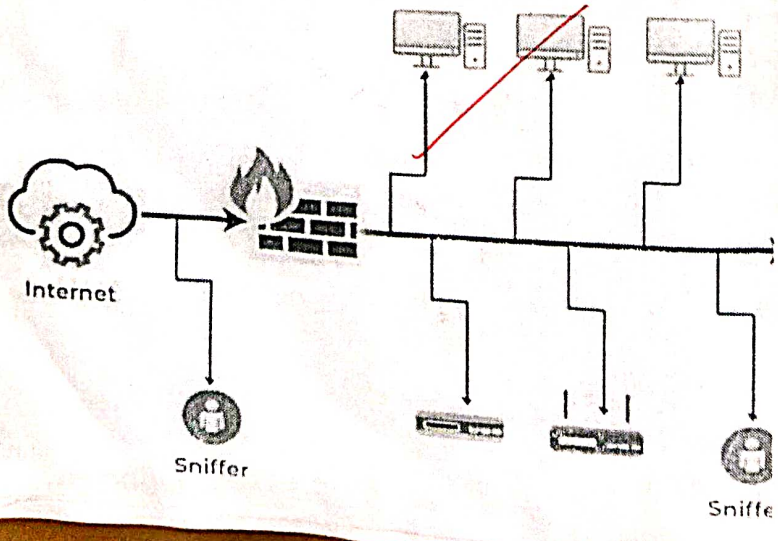
(6) Wireless access point: A wireless access point is a network device that transmits and receives data over a wireless local area network, serving as the interconnection point between the WLAN and a fixed wire network. Conceptually, an AP is like an Ethernet hub, but instead of relaying LAN frames only to other 802.3 stations, an AP relays 802.11 frames to all other 802.11 or 802.3 stations in the same subnet.

(7) Network Attached Storage: NAS is a dedicated storage device or server that is connected to a network and provides centralized to a network and provides centralized file storage and sharing services to multiple users and devices within that network. NAS systems are designed to store and manage digital data, including documents, media files and backup, making it accessible to authorized users over a local area network.





HOW PACKET SNIFFING ATTACK WORKS



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2) CDN: A content delivery network is a geographically distributed group of servers that caches content close to end users. A CDN allows for the quick transfer of assets needed for loading internet content, including HTML pages, javascript files, stylesheets, images, and videos. Although the benefits of using a CDN vary depending on the size and needs for an internet property, the primary benefits for most users can be broken down into four different components.

3) VPN Concentrator: VPN concentrators are used to connects many remote networks and clients to a central corporate network. They are used to Protect the Communication between remote branches or remote clients - such as workstations, tablets, phones, and IoT devices - to corporate network.

18/9/23

4) Packet sniffer: A packet sniffer also known as a packet analyser or network analyzer - is a piece of hardware or software used to monitor network traffic. Sniffers work by examining streams of data packets that flow between computers on a network as well as between networked computers and the larger internet. These packets are intended for and addressed to specific machines, but using a packet sniffer in "Promiscuous mode",

Experiment: 5 Study of Network IP

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(A) To find ip address of given PC, write steps and draw free hand diagrams of steps:

Ans → Step 1: Go to control Panel. Press windows key + X at the same time and select control panel.

Step 2: click on Network and Internet -> Network and sharing center, click on change adapter setting on the left side.

Step 3: Highlight and right-click on Ethernet, go to status -> Details. The IP address will display.

diagram - 1.1

Program and Features
Power options
Event viewer
System
Device Manager
Network Connections
Disk Management
Computer Management
Command Prompt
Command Prompt (Admin)

Task Manager
Control Panel
File Explorer
Search
Run

Shut down or sign out >
Desktop

diagram - 1.2

Network Connection Details

Property	
Connection-specific DN...	
Description	Realtek PCIe GBE Family Controller
Physical Address	94-DE-80-57-98-A4
DHCP Enabled	Yes
IPv4 Address	172.30.30.151
IPv4 Subnet Mask	255.255.255.0
Lease Expires	wednesday, october 9, 2023, 10:00:26
Lease obtained	wednesday, october 9, 2023, 12:20:26
IPv4 Default Gateway	172.30.30.1
IPv4 DHCP Server	172.30.30.1
IPv4 DNS Server	172.30.30.1
IPv4 WINS Server	
NetBIOS over Tcpip En...	Yes

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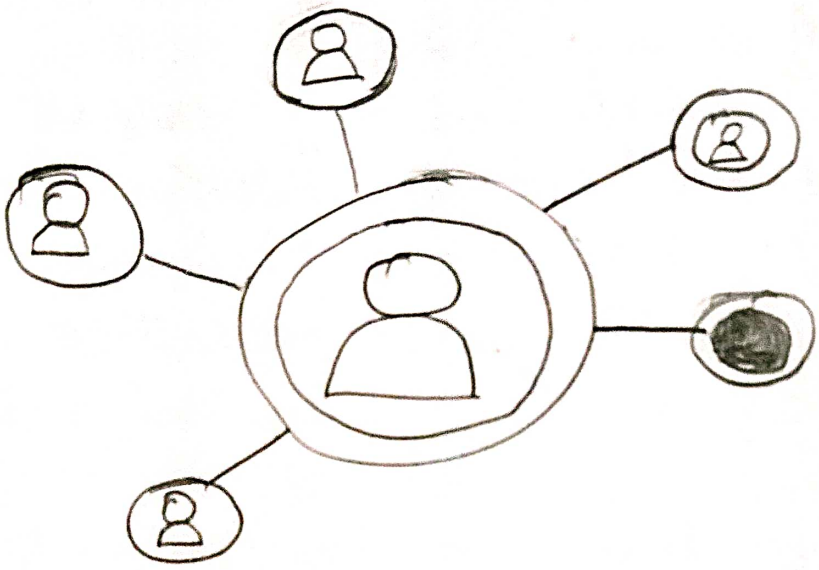
(B) Subnetting and supernetting:

Introduction: Subnetting and supernetting are core concepts of Computer Networks. These two concepts allow for the efficient and proper utilization of a computer network by prioritizing optimal usage of given IP addresses.

Subnetting: Subnetting is the process of dividing a large single network into smaller subnetworks or Subnets.

Subnetting is very important because of the many advantages it offers, like reduced latency, enhanced network security, and better allocation of IP address.

- Subnetting offers lower latency because as the network gets divided into smaller sub-networks, subnetting helps to reduce the amount of network traffic by dividing an extensive network into smaller subnets which reduces the time to handle each request.
- By dividing a network into subnets, network administrators can isolate different departments or groups of users from each other. which can help to improve network security.
- By dividing the network into different sub-networks for different purpose, we can efficiently allocate the IP addresses that are at our disposal.



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Disadvantages of subnetting

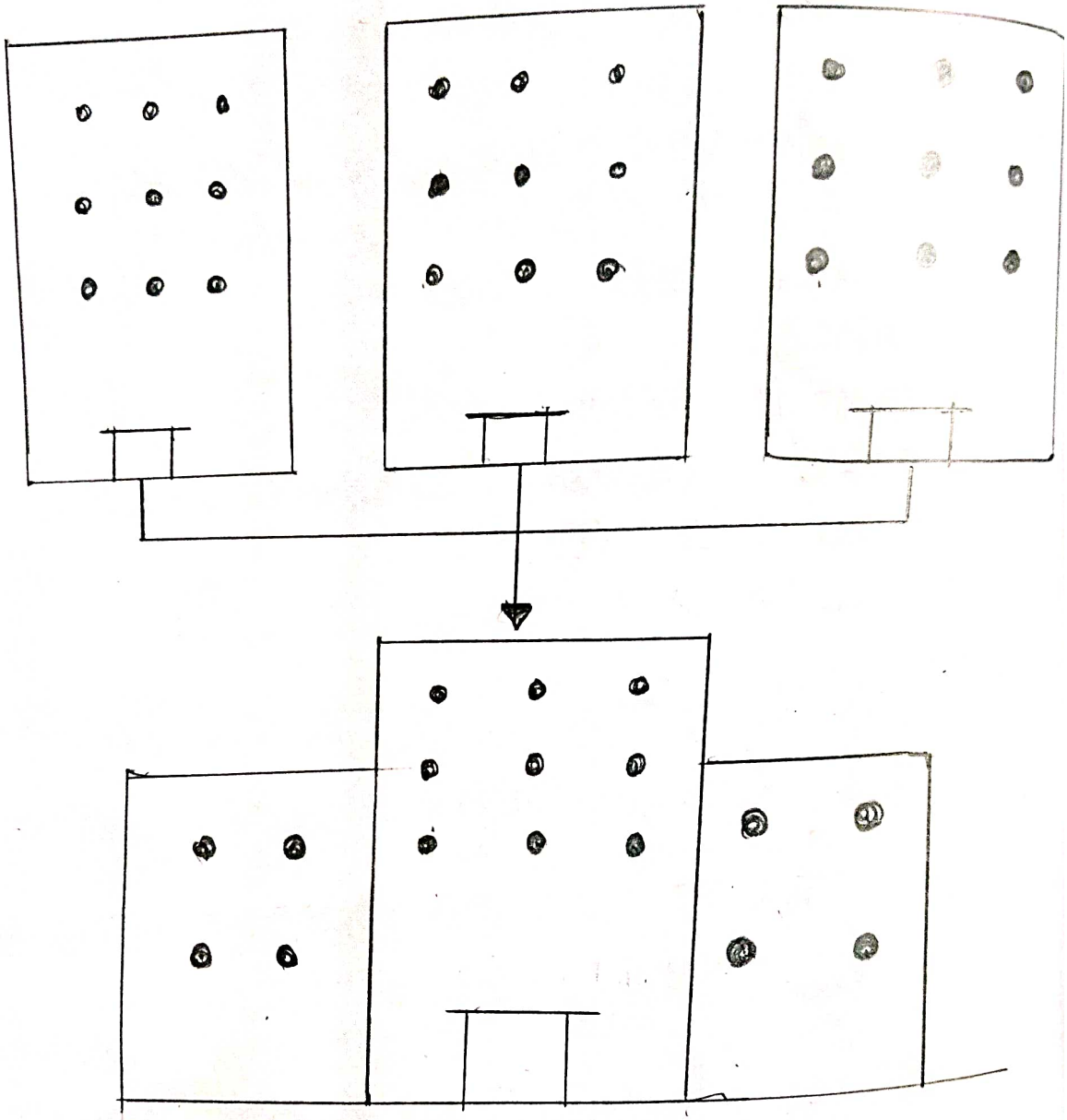
- Complexity
- Increased Administrative overhead.
- potential for Misconfiguration.
- overhead.

Advantages of subnetting.

- Efficient IP Address Utilization.
- Improved Network Performance.
- Enhanced Security.
- scalability.

* Supernetting: This is the exact opposite of what subnetting does. supernetting also known as route aggregation or route summarization, is the process of combining multiple smaller IP address ranges into a large, contiguous range.

- supernetting is done to reduce the complexity of the routing tables and reduce the congestion of the network and improve the efficiency of the network.
- Instead of listing multiple individual entries in the routing table. supernetting allows the merging of contiguous entries into one single entry.
- It is essential to know that the networks that are being combined should be contiguous and should have the same prefix.



Supernetting : Combining small networks into a large

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Advantage of Supernetting

- Reduced Routing Table size:
- IP Address Conservation.
- Simplified Routing.
- Improved Network Efficiency.

Disadvantage of Supernetting.

- Complex Design and Management.
- Potential for Misconfiguration.
- Reduced Granularity.
- Addressing Conflicts.
- Suboptimal Routing.

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Ex:6 Implementing different types of commands to observe networking protocols.

1. IPCONFIG: The IPCONFIG network command provides a comprehensive view of information regarding the IP address configuration of the device we are currently working on. It is used to see the ip address.

The IPconfig command also provides a us with some variation in the primary command that targets specific settings or data which are

- IPCONFIG/all : provides primary output with additional information about network adapters.
- IPCONFIG/renew : Used to renew the system's IP address.
- IPCONFIG/release : Removes the system's current IP address.

2. NSLOOKUP : The NSLOOKUP command is used to troubleshoot network connectivity issues in the system. Using the nslookup command, we can access the information related to our system's

Command prompt

Simplilearn >ipconfig

Windows IP configuration

Wireless LAN adapter Local Area Connection* 3

Media State . . . . . : Media disconnected

Connection-specific DNS Suffix . :

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DNS server i.e., domain name and IP address.
Command to enter name and IP address.
Command to enter in prompt - nslookup.

3. HOSTNAME: The HOSTNAME command displays the hostname of the system. The hostname command is much easier to use than going into the system settings to search for it.
Command to enter in prompt - hostname

4. PING: The Ping command is one of the most widely used commands in the prompt tool, as it allows the user to check the connectivity of our system to another host.
This command sends four experimental packets to the destination host to check whether it receives them successfully.

Command to enter in prompt - Ping www.destination_host_name.com

5. TRACERT: The TRACERT command is used to trace the route during the transmission of the data packet over to the destination host and also provides us with the "hop" count during transmission.

2

simplilearn > nslookup

Default Server : local.airtelfiber.com

Address:

> www.amazon.com

3. simplilearn > hostname

LATOP_

simplilearn >

4 simplilearn > ping www.google.com

pinging www.google.com [142.250.194.4] with 32 bytes of

Reply from 142.250.194.4: bytes=32 time=26ms TTL=11

Reply from 142.250.194.4: bytes=32 time=27ms TTL=11

Reply from 142.250.194.4: bytes=32 time=26ms TTL=118

Reply from 142.250.194.4: bytes=32 time=27ms TTL=118

5. simplilearn > tracert www.facebook.com

Tracing route to star-mini.c10r.facebook.com [157.240

over a maximum of 30 hops:

1	1ms	1ms	1ms	local.airtelfiber.com [192.168.1.1]
2	15ms	12ms	22ms	abts-mh-dynamic-001.33.169.122.airtelbroadband.in [122.169.33.1]
3	6ms	7ms	7ms	msg-corporate-45.78.186.122.airtel.in [122.186.78.45]
4	48ms	48ms	48ms	116.119.104.148
5	55ms	55ms	55ms	ae18.pr03.bom1.tfbnw.net [157.240.67.48]
6	46ms	47ms	47ms	po103.psw02.bom1.tfbnw.net [157.240.53.2]
7	54ms	54ms	54ms	173.252.67.85
8	42ms	41ms	42ms	edge-star-mini-shv-01-bom1.facebook.com [157.240.16.35]

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Using the number of hops and the hop IP addresses, we can troubleshoot network issues and identify the point of the problem during the transmission of the data

Command to enter in prompt -
tracert www.destination_host_name.com

6. ARP Command (Address Resolution protocol): The ARP Command is used to access the mapping structure of IP addresses to the MAC address. This provides us with a better understanding of the transmission of packets in the network channel.

Command to enter in prompt - arp

7. route: The route command in networking is used to display and manipulate the IP routing table on a computer. It's a command-line tool that allows you to add, delete or manipulate routing entries. Here's a basic overview of how to use it.

8. Netstat: The Netstat command as the name suggest displays an overview of all the network connections in the device. The table shows detail about the connection protocol, address, and the

6 simplilearn > arp

Display and modifies the IP-to-physical address translation tables used by address resolution protocol

Address ~~resolution~~ protocol (ARP)

ARP -s inet_addr eth_addr [If_addr]

ARP -d inet_addr [if_addr]

ARP -a [inet_addr] [-N if_addr] [-v]

7 route print

route add 192.168.1.0 mask 255.255.255.0 192.168.

route delete 192.168.1.0

8 simplilearn > netstat

Proto	Local address	Foreign address	State
TCP			ESTABLISHED
TCP			ESTABLISHED
TCP			SYN-SENT
TCP			ESTABLISHED
TCP			ESTABLISHED
TCP			ESTABLISHED
TCP			ESTABLISHED

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current state of the network

Command to enter in prompt - netstat

(9) Nbstat Command : nbstat Command is used to display NetBIOS over TCP/IP (NBT) protocal information on windows systems. It's not used to absorb networking but rather to provide information about NetBIOS names and their association with IP addresses.

(10) Getmac/v : Getmac/v Command can be used to absorb networking information about a Computer, including mac addresses of all network adapters, the IP address of all the ~~names~~ network connections, and the names of all network interfaces. This information can be useful for troubleshooting network problems.

9 nbstat -n
nbtstat -A remote_computer_name
nbstat -R
~~nbst~~
nbtstat -RR

10 getmac /v

getmac /v > network_info.txt

Adapter Name	Mac address
Ethernet 1	00-11-22-33-44-55
wifi	00-66-77-88-99-00

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Experiment No: 7

Connect the Computers in Local Area Network.

To connect two computers in local area Network, we have to ensure these following steps:

- We have to ensure that each system in LAN has a unique IP address.
- We have to setup a consistent subnet mask to the segment network logically.
- We have to define a default gateway for each system to enable external network access
- Specify the DNS servers for each system to make external network access for domain name resolution.
- We have to configure share folders of resources on the systems for data exchange. Adjust the firewall rules to allow network traffic as needed.
- Ping test in it we will verify connectivity by using ping command.
- Send and Receive Packets of data b/w system.

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systems using applications like file sharing web browsing etc.

- we have to implement security practices like strong passwords and regular updata to protect the network.

Troubleshooting is done to address any connectivity issue and maintain the network for smooth operation.

steps to make the two systems connected by their IP Address and show sending and receiving of packets from one system to other.

1. Go to control panel.
2. click on network and sharing.
3. Go to Adapter setting.
4. Them click on the network on which have connectivity.
5. Add the IP address of the another system
6. Go to advance system settings.
7. Click on ok after adding IP address of the another computer.
8. Open command prompt, type Ping Ipaddress run it - NO. of packets received and send will be shown.