THADOMAL SHAHANI TSEC ENGINEERING COLLEGE

CN Assignment-1

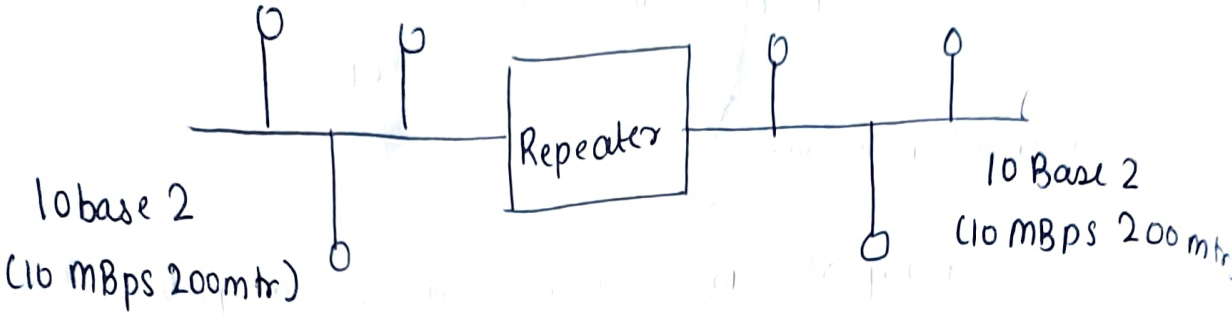
CN-C32-2103164

Write a short note on:-

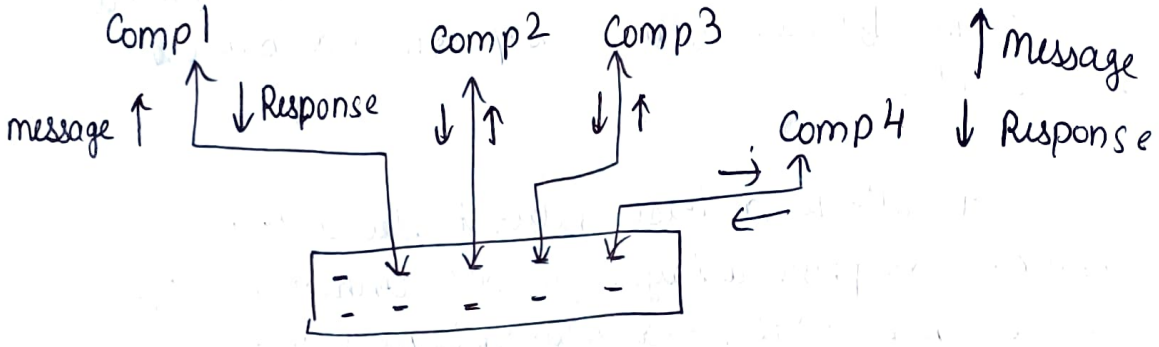
1) Repeater:- A repeater is a device used in computer networks to amplify and retransmit signals, extending the network's reach. It operates the physical layer, transparently regenerating signals without examining data content. However, advancement in networking technology have led to the decreased use of traditional repeaters in favour of more sophisticated devices like switches.

2) Hub:- A hub is a basic network device that operates at physical layer, used to connect multiple devices in a local area network (LAN). It receives incoming data from one device and broadcast it all connected devices. Hubs create single collision domain, leading to data collisions and reduced network efficiency. Due to their limitation and lack of intelligence, hubs have become outdated in modern networks and have been replaced by switches, which provide better performance and segmentation of collision domains for more efficient data transmission.

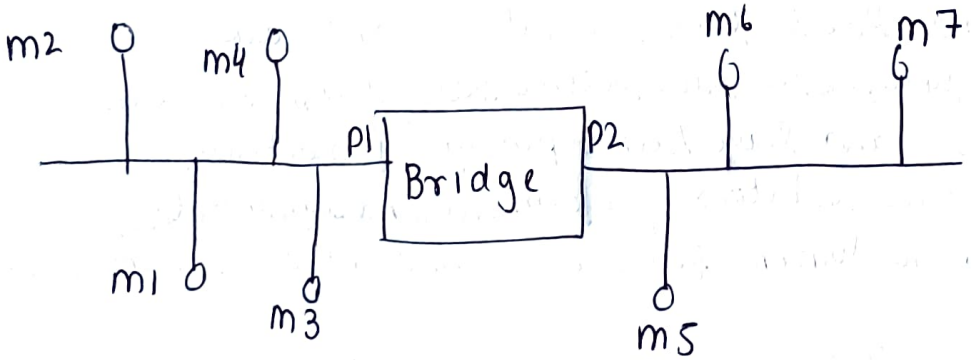
3) Bridges:- Bridges are network devices that operate at data link layer (Layer 2) of the OSI model, used to interconnect two or more LAN segments. They examine the MAC addresses of incoming data frames and maintain a table of MAC addresses and their associated segments. When a frame destination



1.) Repeater



2.) Hub



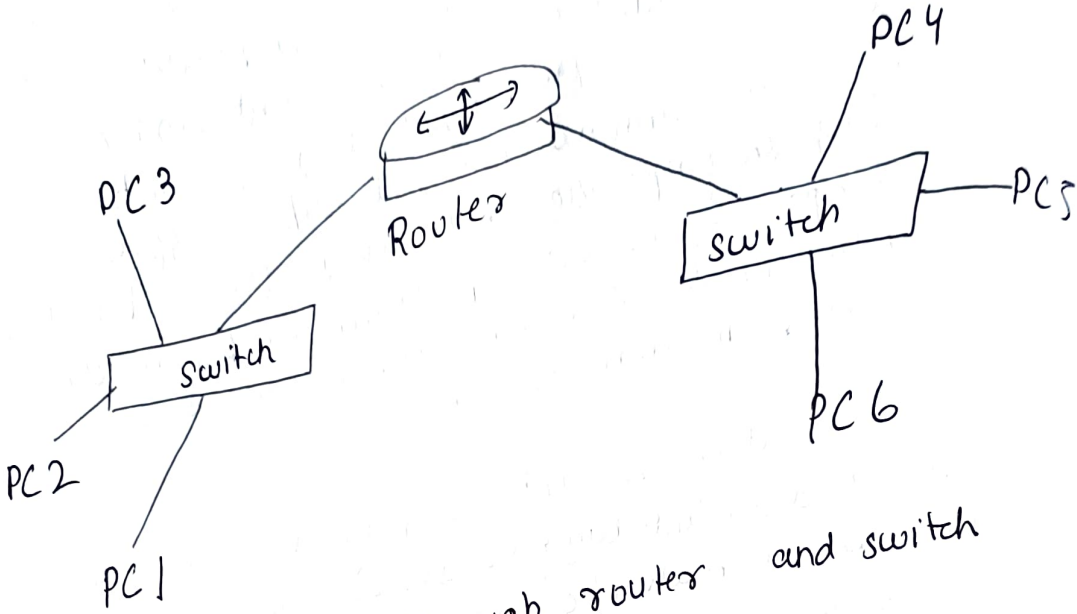
3.) Bridge

is on same segment as the source, the bridge filters the frame. If the destination is on different segment the bridge forwards the frame only to the relvant segment, reducing unnecessary network traffic. Bridges help in improving network traffic. Bridges help in improving network performance by dividing LANs into smaller collosion domains and are predecessors to modern switches.

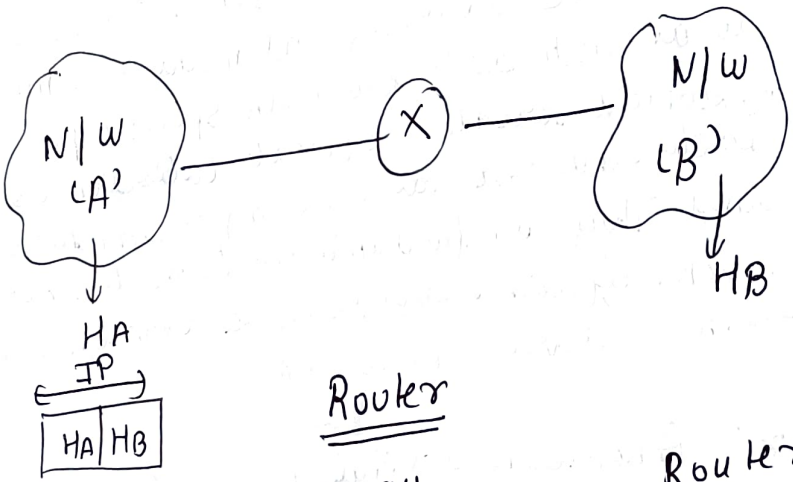
4) Switches :- Switches are integral network devices that operate at data link layer (layer 2) of the OSI model, used to connect multiple devices within a local area network (LAN). They examine incoming data frames, make forwarding decisions based on the destination MAC address, and maintain a MAC address table to associate addresses with specific port. Unlike hubs, switches create separate collosion domain for each connected device, improving network efficiency. They are fundamental to modern networking providing efficient and reliable communication between devices in a LAN.

5) Router :- A Router is a vital network device that operates at network layer (layer 3) of the OSI model. It connects multiple networks and make intelligent data forwarding decisions based on destination IP addresses. They maintain routing table to determine best path for data transmission. By doing so, router enable efficient data exchange, ensure proper network segmentation, provide security by acting

CN-C32-2103164



Connection through router and switch



Router

gateways

Router

Hub

Switch

Bridge

Repeater

as a gateway between networks. Router plays a crucial role in directing data traffic and enabling communication across complex & interconnected networks.

6.) Gateway :- A gateway is network device that act as a interface between different networks, protocols, or communication technologies. They play a vital role in connecting LANs to the internet, enabling access to external networks. Gateways can be hardware or software based and are essential for establishing communication between networks with distinct characteristics. In essence, gateway serve as bridges, allowing data to bormily between different network and ensuring interoperability in complex networking environments.

7.) Modem :- A modem, short for modulator-demodulator, is a network device used to convert digital data from computer or digital devices into analog signal suitable for transmission over analog communication channels. It also perform reverse process i.e converting incoming analog signal back to digital for receiving device. Modems are commonly used to provide internet access via dial-up connections and are essential for connecting to the internet over telephone lines. With the rise of broadband and digital communication technologies, traditional dial up modems have become less common, but their role in early networking history was crucial for establishing internet connectivity.

Sharish
C32

THADOMAL SHAHANI TSEC ENGINEERING COLLEGE

2103164
Sharish
C32

CN Assignment No-2

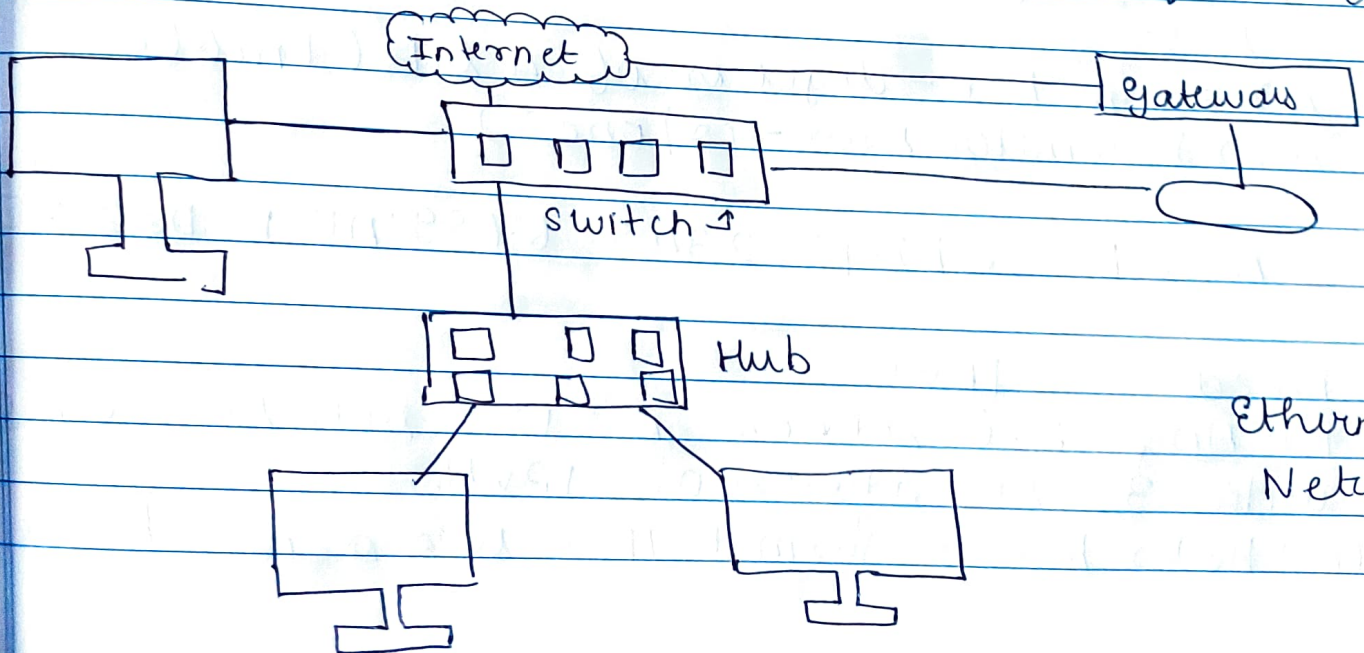
CN - C32 - 2103164

Write short note on

1) Ethernet

Ethernet is a type of communication protocol that connects computers on a network over a wired connection. It is all widely used LAN protocol, which is also known as Ayto Along Network. It connects computer within the local area network and wide area network. Numerous devices like printers & lap network. Can be connected by LAN & WAN within buildings, homes & even small neighbours.

The wireless networks replaced ethernet in many areas, however Ethernet is still more common on for wired networking. Wi-Fi reduces the need for cabling as it allows users to connect smartphones or laptops to a network without the required cable.



Ethernet Network.

Advantages of Ethernet:-
i) It is costly, but still inexpensive than other options
ii) Provides high security.
iii) Quality of data is maintained.

Disadvantages of ethernet:-
i) Distance covered is less
ii) No acknowledgement from receivers side
iii) Can't determine which node is faulty.

② IPV6:-
IPV6 was developed by Internet Engineering Task Force (IETF) to deal with the problem IPV4 exchaustion. IPV6 is a 128 bit address having an address space of 2^{128} which is way bigger than IPV4 IPV6 use Hexadecimal format separated by colone :)
Components of IPV6 address.
i) 8-groups, each group represent 2 byte (16 bits.
ii) Each Hex-digit is of 4 bits (1 nibble)
iii) Delimeter used - colone :)

ABCD:EFD1:2345:6789:ABCD:D201:54

Need of IPV6
i) An IPV6 address is 128 bits long compared with 32 bit address of IPV4.
ii) Better header format, IPV6 uses a new header

CN-632-2103154

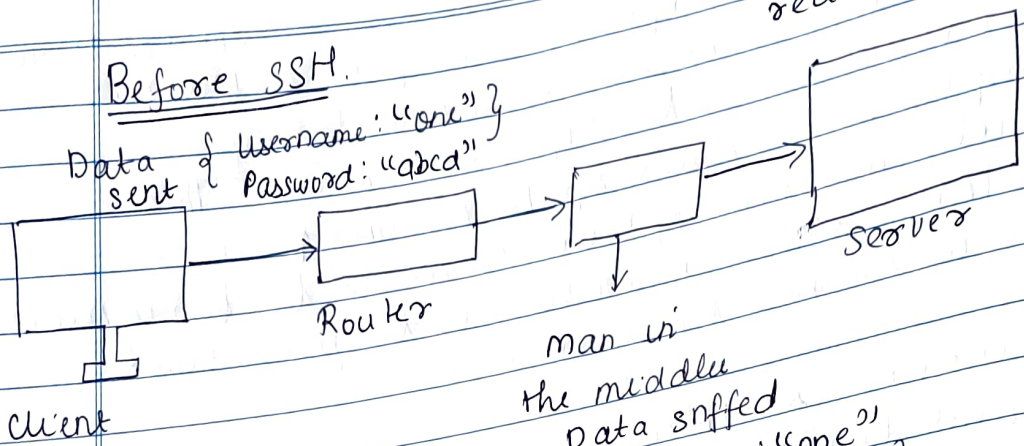
format in which options are separated from the base header & inserted when needed between the base header & the upper layer data. This simplifies i.e speed up the routing process.
(iii) IPV6 has new options to allow for functionalities
(iv) IPV6 allows extension of the protocol if required by new technologies.

Advantages of IPV6.
i) Real time data transmission
ii) Supports authentication
iii) Performs encryption.
iv) Faster processing at router side.

SSH.
SSH stand for secure shell or secure socket shell. It is cryptographic network protocol that allow two computers to communicate & share the data over an insecure network such as the internet. It is used to login to a internet. It is used to login to a remote server to execute commands & data transfer from one machine to another machine.

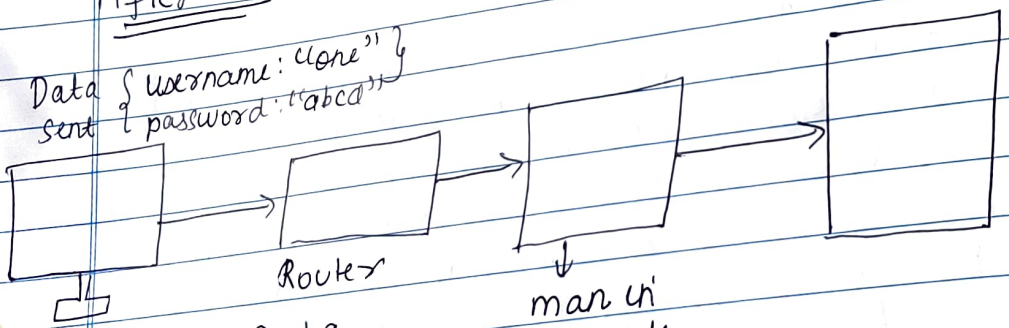
It provides a strong password encryption & password authentication communication with public key over insecure channel. It is used to replace unprotected remote login protocols such as telnet, rlogin, rsh, etc.

Before SSH



Data snffed
{ username: "one"
password: "abcd" }

After SSH



Data sent

Data snipped

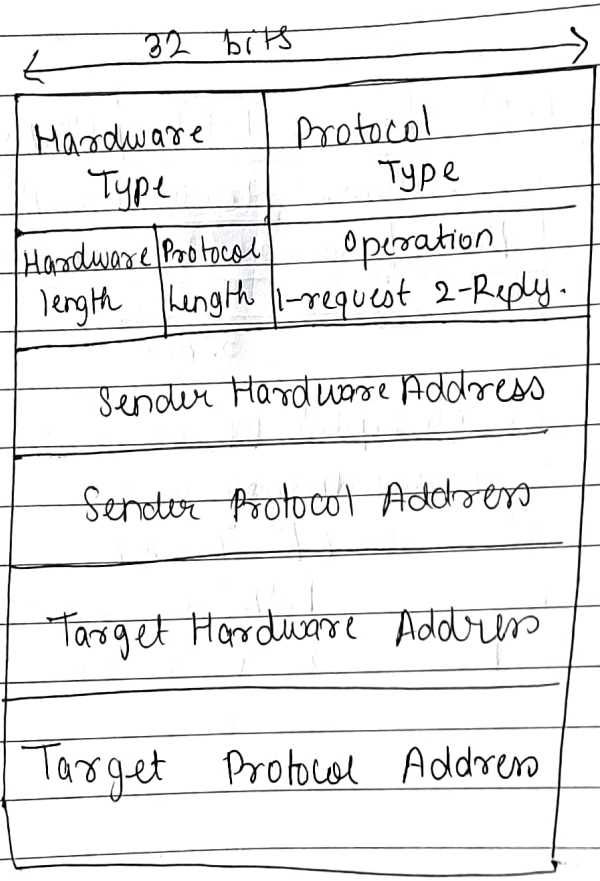
Advantages of SSH:
It prevent malicious activities like DNS spoofing, Data manipulation, eavesdropping or sniffing of transmitted data, IP address routing.

CN - C3 - 2103164

(iii) SSH enables port forwarding

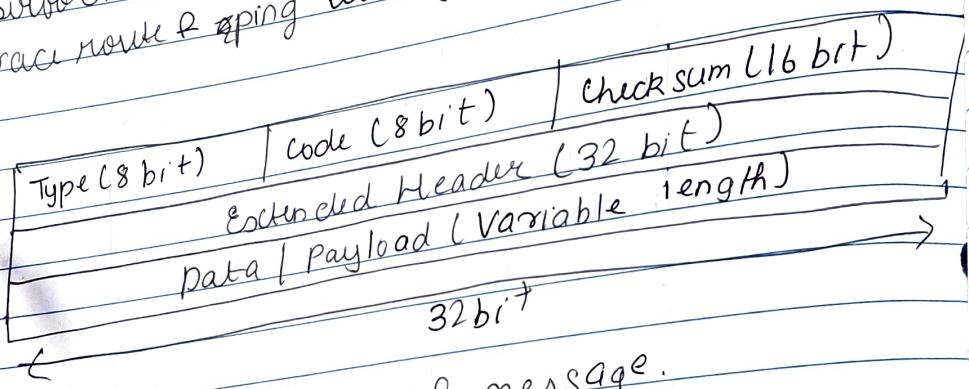
.) Explain purpose of following protocols with header format.
i) ARP ii) ICMP iii) DNS

) -i) ARP: The Address Resolution Protocol (ARP) is a fundamental networking protocol that plays a pivotal role in local network communication by mapping known IP address to their corresponding physical. Mac addresses. It enables devices on a network to discover & associate. Mac addresses with IP addresses.



ii) ICMP: ICMP is used for error reporting. It two devices connect over the internet & some error and occurs. So, the router send an ICMP error message to the source informing about the error. For example, whenver a device a device sends any message which is large enough for the reciever in that the reciever will drop the message & reply back ICMP message to the source.

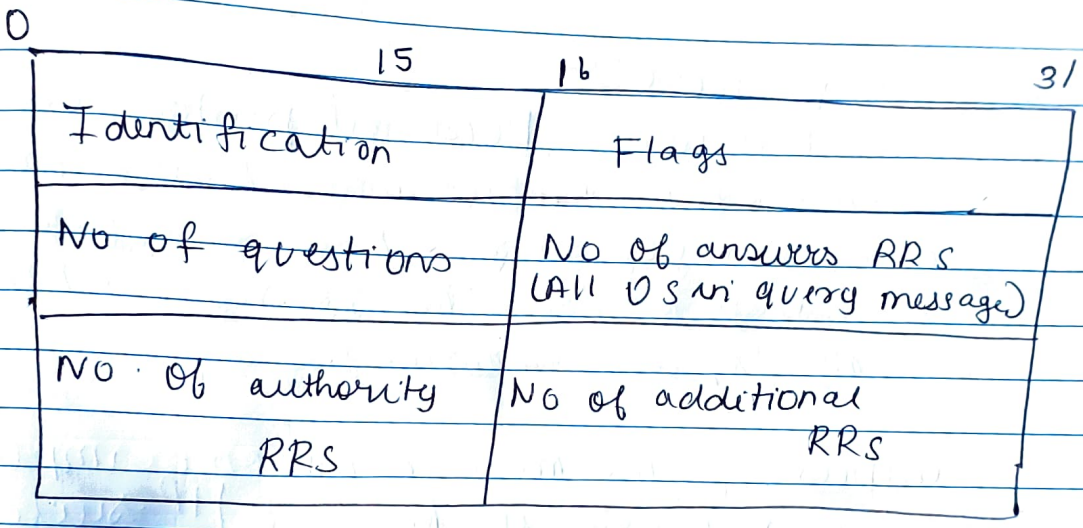
Another important use of ICMP protocol is used to perform network diagonous. by making use of trace route & ping utiling. We will discuss one by one.



Type : Basic description of message.
Code : Additional information
Checksum : Checksum of ICMP
Extended header :- Point out problem in IP messa
Data or Payload of variable length.

CN - CS2 - 2103164

ii) DNS: The Domain Name System (DNS) serves vital role of translating user friendly domain names into numerical IP addresses, enabling seamless internet communication. It ensures user can access website & services using easily memorable names, simplifying web browsing & resources location. It also provides data packet addressing & routing.



Indentification: Used to match the response with the request

Flags: 16 bit flags for indication of values.

No of Quations, number of authority RRs, number of answer RRs. & number of additional RRs are all explanatory.

THADOMAL SHAHANI TSEC ENGINEERING COLLEGE

CN-C32-2103164

Q.3) Dicuss the persistent & non persistent protocols used in transport & application layer of TCP/IP protocol su

Ans → Persistent & non persistent protocols II D are two different approches to handling connections in the Transport & Application layer of the TCP/ protocol suite. These protocols govern how data is exchanged between two devices over a network.

Persistent protocol :-

i) Connection oriented :- Persistent protocols are connection-oriented which means they establish a connection between sender & reciever before data exchange begins. This connection remains open for multiple transactions.

(ii) Examples :- The most common example of persistent protocol in the TCP/IP suite is the Transmission Control Protocol (TCP). TCP ensur reliable, ordered, error check delivery of data. It maintains a continous until explicitly closed by either the sender or reci

(iii) Use Cases : Persistent protocols are suitab for applications that requires reliable & ord data transfer such as web browsing, e file transfer & most client interactions. The are ideal for situations where data integrity correctness are crucial.

(iv) Overhead: They typically have more overhead due to the need for connection setup & maintaince which involves three-way hand hakes, acknowledgement message & error recovery mechanism

Non-persistent protocol :-

i) Connectionless :- Non persistent protocols are connectionless, meaning they donot establish a continous connection between sender & receiver. Instead a new connection is established for each data exchange & it is closed after that exchange is complete.

(ii) Examples: A common example is User Datagram Protocol (UDP)

(iii) Use cases :- Non persistent protocols are suitable for applications that prioritize speed & efficiency over reliability.

Commonly used in real time data sharing.

(iv) Overhead :- Lesser overhead as compared to persistent protocols because they skip connection setup.

Persistent protocols :-
Application : HTTP, FTP, SMTP
Transport : TCP

Non persistent protocols :-
Application Layer :- DNS, SNMP, DHCP
Transport :- UDP, SCTP