

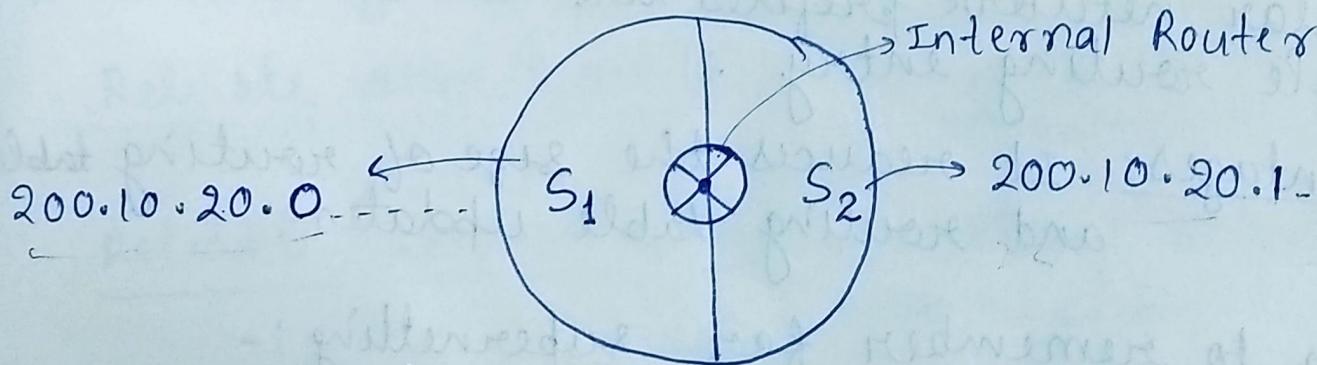
Ques What is the length of string in DNS tree?

Ans-1 What is subnetting?

Ans: Subnetting is a process of dividing a big network into many small networks.

It is done within an organization for easy maintenance of network and to provide network security.

Ex: Let us we have network ID 200.10.20.0, we need to create 2 sub networks.



IP addresses in Subnet 1 range from 200.10.20.0 to 200.10.20.127.

IP addresses in Subnet 2 range from 200.10.20.128 to 200.10.20.255.

Here, 25th bit of IP address decides sub-network of a host.

Network ID of subnet 1 = 200.10.20.0

" " " subnet 2 = 200.10.20.128

Number of usable hosts in each subnet = $128 - 2$
= 126

Subnet mask = 255.255.255.10000000 bits
= 255.255.255.128

Ques-2 What is Supernetting?

Ans - In supernetting, multiple networks are combined into a bigger network termed as a Supernet or supernet.

It is mainly used in route summarization where routes to multiple networks with similar network prefixes are combined into a single routing entry.

Advantages: It reduces the size of routing tables and routing table updates.

Points to remember for supernetting:-

- ① All the networks should be contiguous.
- ② The block size of every network should be equal and must be in form of 2^n .
- ③ First network Id should be exactly divisible by whole size of supernet.

- ① Limited-broadcast Address (255.255.255.255/32)
- ② Loopback address (127.0.0.0/8) → It is used to test a piece of software in the machine.
- ③ Multicast Address (224.0.0.0/4)

Ques-3 What is reliable communication?

Ans In this, data is delivered reliably through a combination of sequence numbers and acknowledgement numbers (messages).

- Upon detecting an error or loss of packet, the source can recover by transmitting the packet without involvement from the user application.
- It guarantees the delivery of a message packet exactly once.

Reliable connection (RC) → direct dedicated connection

Reliable datagram (RD) → without dedicated connection

→ It is achieved by using TCP and UDP features.

Ques - 4 What is unicast, multicast, Broadcast, anycast ?
(one-to-one)

Ans - Unicast: When data is transferred from a sender to a single receiver over a communication channel.

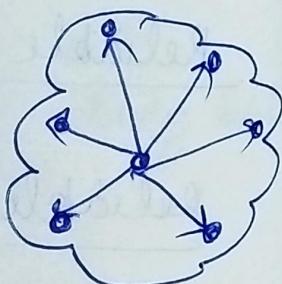
Broadcast: (one-to-all)

When data is transferred from a sender to all devices in a network.
(hosts)

(i') Limited Broadcasting:

transfer of data from sender to all devices in ^{the same} network where sender resides.

LBA : 255.255.255.255/32

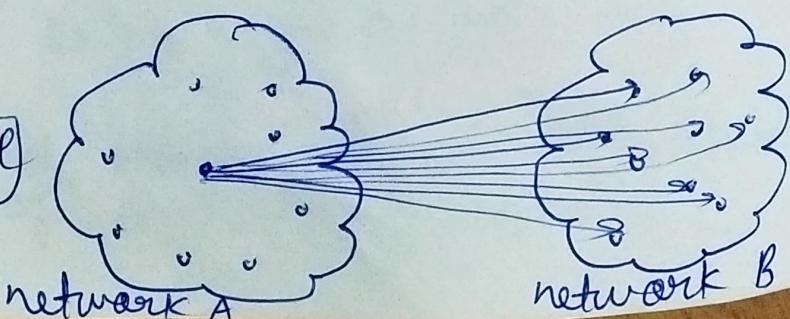


(ii') Direct Broadcasting:

transfer of data from a device in a network to all the devices over other network.

→ requires ARP protocol

(In DBA, all host bits
are 1)



Multicast: (many-to many)

- Transfer of data takes place b/w one or more senders and one or more recipients.
- requires support of protocols like IGMP, Multicast Routing.
 - Class D in classful addressing is reserved for multicast.

Anycast: An anycast address is an address allocated to a set of interfaces that typically belong to different router.

- When a packet is destined to an anycast address, it is delivered to the closest interface that has this anycast address, where the term closest is determined by the routing protocol.

Ques- Which layer uses CRC protocol?

Ans Data link layer

Ques-6 What are the security protocols running in different layers?

Ans Application layer :- Encryption / Decryption using public - private key

Transport Layer :-

- ① SSL protocol (Secure socket layer) provides security to the data that is transferred b/w web browser and server. SSL encrypts the link b/w a web server and a browser which ensures that all data passed b/w them remain private and free from attack.
- ② port number.

Network Layer :-

IP security protocol : The protocols needed for secure key exchange and key management are defined in it.

Data Link Layer :-

No well known security protocol is defined in this layer

Ques-7 How many root servers are there?

Ans: There are many hundreds of root servers at over 130 physical location in many different countries.

- There are 12 organizations responsible for the overall coordination of the management of these servers.
- Managing root servers is ICANN's responsibility.

Ex: There are 13 main DNS root servers each of which is named with the letters 'A' to 'M'.

(DNS is a client server application.)

Ques-8 What are the name-address resolution techniques used by DNS?

Ans:

name-address resolution: Mapping a name to an address is called name-address resolution,

→ A host that needs to map a name to an address or an address to a name calls a DNS client called a resolver.

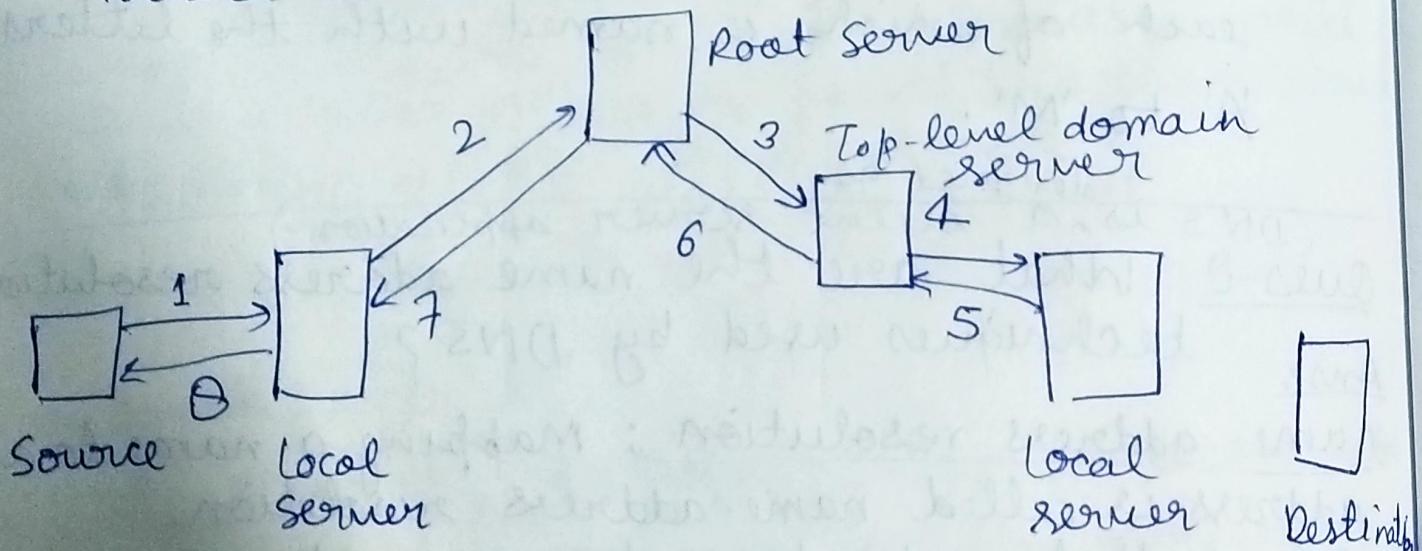
→ The resolver sends mapping request to the closest DNS server.

→ If the server has the information, it satisfies the server, otherwise it asks other servers to provide the information.

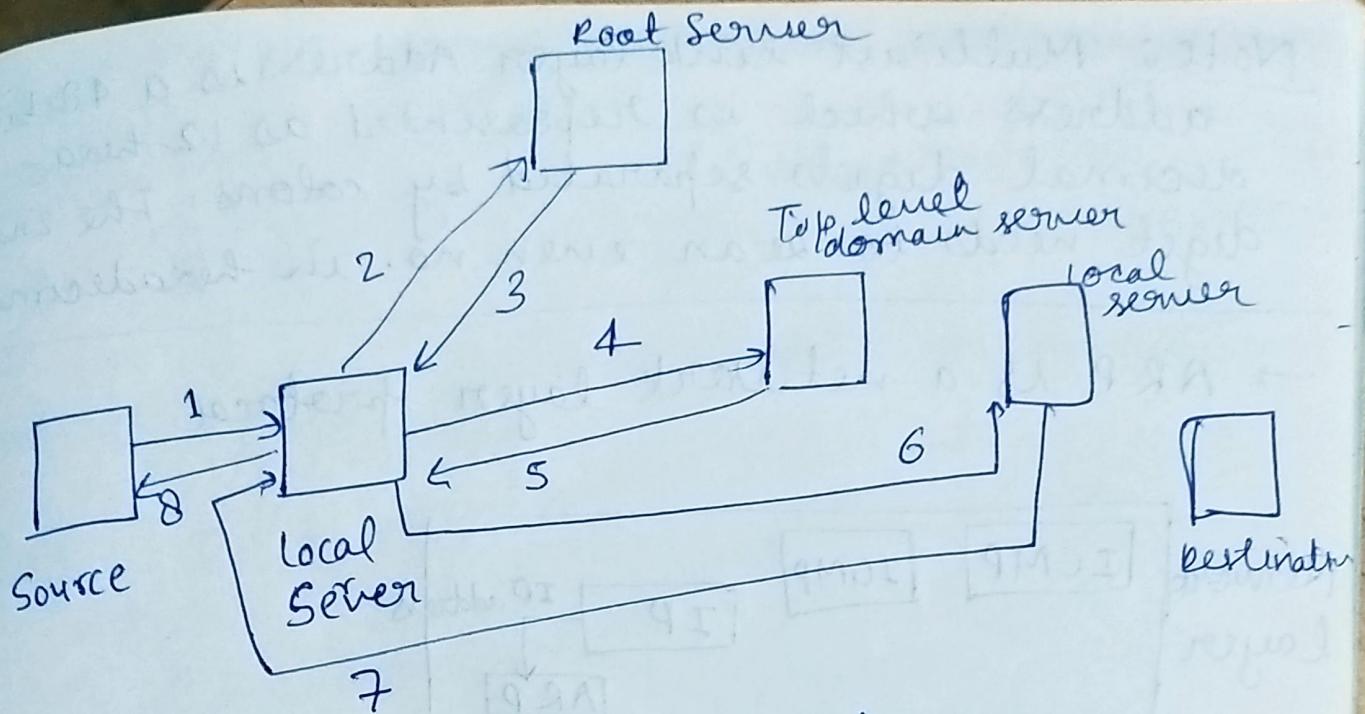
→ After the resolver receives the mapping, it delivers the result to the process that requested it.

★ A resolution can be either recursive or iterative.

① Recursive resolution: In this mapping request travels from local server of source host to local server of destination host and then response backtracks from destination local server to source local server.



② Iterative resolution: In this, each server that does not know the mapping sends the IP address of the next server back to the one that requested it.



2, 4, 6 → mapping request

3 → IP address of Top-level domain server

5 → IP address of local server of destination

7 → IP address of the destination.

Ques - 9 What is ARP and RARP?

Ans → ARP stands for Address Resolution Protocol.

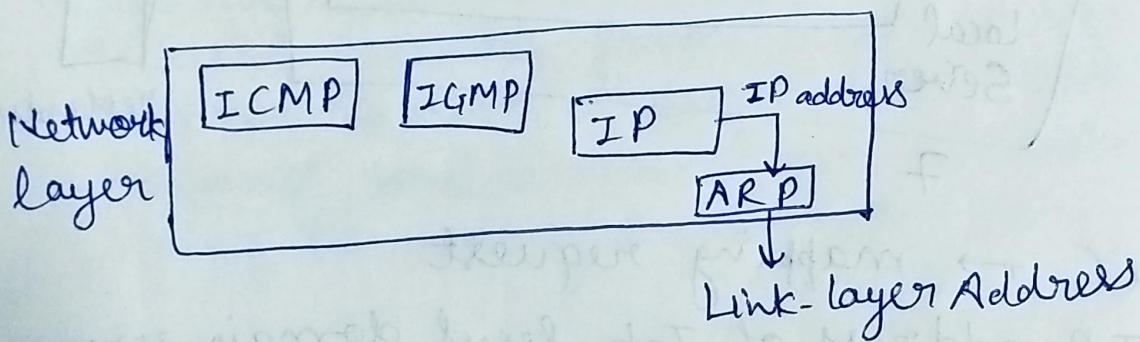
→ It is used to find corresponding physical address (MAC) to a given logical address (IP address).

→ ARP request made by host to know physical address is a broadcast request.

→ RARP stands for Reverse Address Resolution Protocol. Converts Physical address to logical.

Note: Multicast link-layer Address is a 48-bit address which is represented as 12 hex decimal digits separated by colons. The 2nd digit needs to be an even no. in hexadecimal.

→ ARP is a network layer protocol



→ ARP request is Broadcast and ARP-reply is unicast.

→ Host sends ARP request packet when it wants the link-layer address of other host or router in its network.

ARP Packet

8	16	31
Hardware Type		Protocol Type
Hardware length	Protocol length	Operation Request: 1, Response: 2
		Source Hardware Address (MAC)
		Source protocol Address (IP)
		Destination Hardware Address (Empty in Request)
		Destination protocol Address

Ques-10 How many layers in DNS-tree?

Ans: DNS-tree can have maximum of 128 levels level 0 (root) to level 127.

Ques-11 What is the length of a table in DNS-tree?

Ans: Each node in the tree has a label, which is a string with a maximum of 63 characters.

Ques-12 Types of Interprocess communication?

Ans: IPC is the mechanism provided by the operating system that allows processes to communicate with each other.

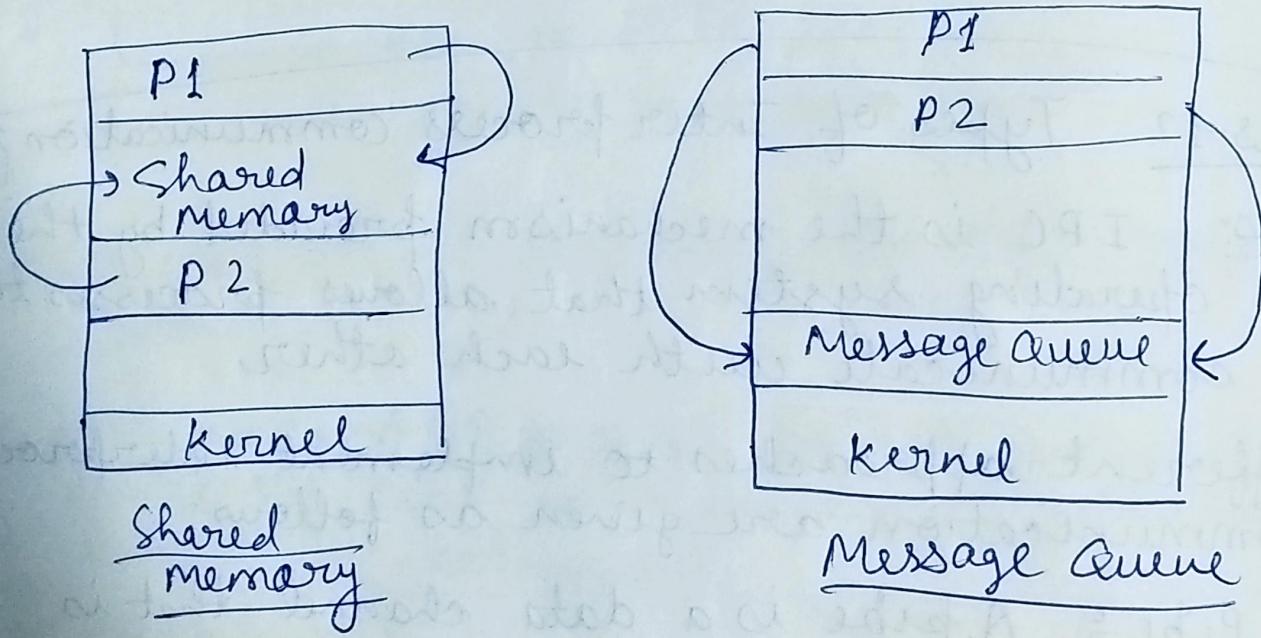
Different approaches to implement interprocess communication are given as follows:

① Pipe: A pipe is a data channel that is unidirectional

→ Two pipes can be used to create a two-way data channel b/w two process.

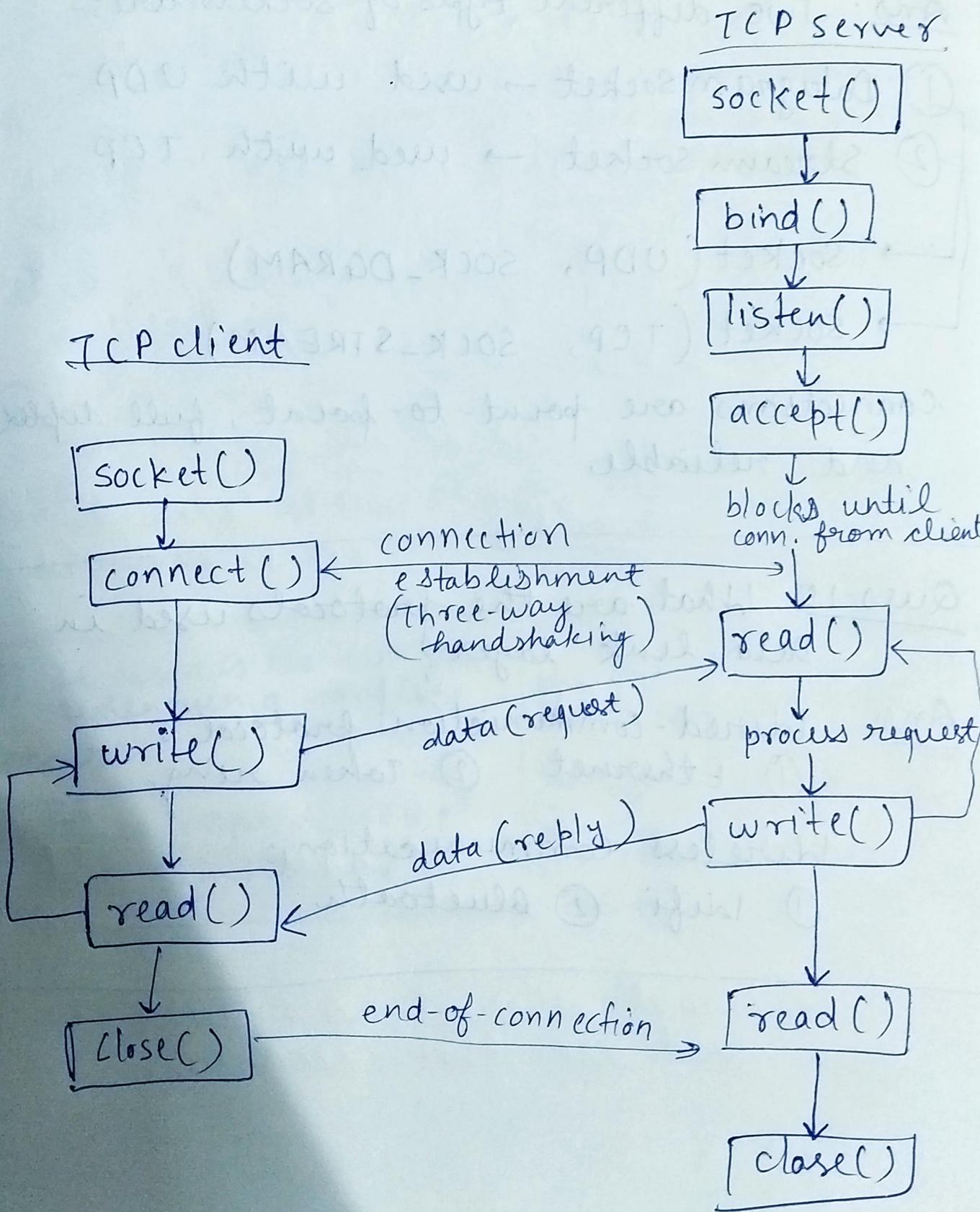
→ Pipes are used in all POSIX systems as well as Window OS.

- ② Socket: A socket is an endpoint for sending or receiving data in a network.
→ Most of the OS use sockets for IPC.
- ③ Shared Memory: It is a memory that can be simultaneously accessed by multiple processes. This is done so that processes can communicate with each other.



- ④ Message Passing:
- Multiple processes can read and write data to the message queue without being connected to each other.
- Messages are stored in the queue until their recipient receives them.

Ques-13 Draw Diagram for socket connection b/w client and server.



Ques-14 What are different types of sockets?

Ans: Two different types of sockets are:-

① Datagram Socket → used with UDP

② Stream socket → used with TCP

→ Socket (UDP, SOCK_DGRAM)

→ Socket (TCP, SOCK_STREAM)

connections are point-to-point, full-duplex and reliable

Ques-15 What are the protocols used in Data-link layer?

Ans: Wired-communication protocol :

① Ethernet ② Token ring

Wireless communication :

① WiFi ② Bluetooth

Ques-16 Difference b/w CSMA/CD and CSMA/CA? (Operated in Medium Access Control layer)

CSMA/CD

CSMA/CA

- | | |
|---|---|
| ① Carrier Sense Multiple access / Collision Detection | ① Carrier Sense Multiple access / collision avoidance |
| ② It is effective after a collision | ② It is effective before a collision |
| ③ It is used in wired networks | ③ It is commonly used in wireless networks. |
| ④ It only reduces the recovery time. | ④ Whereas, it minimizes the possibility of collision |
| ⑤ It retransmits the data frame whenever a conflict occurs. | ⑤ It will first transmit the intent to send for data transmission |
| ⑥ It is more efficient than simple CSMA | ⑥ It is similar to simple CSMA. |

CSMA/CD

- It does not use an acknowledgement system
- During transmission, if a collision signal is received by the node, transmission is stopped and the station then transmits a jam signal onto the link and waits for random amount of time before it resends the frame.

$$\boxed{TT > PD}$$

For avoiding collision in worst case,

$$\boxed{TT \geq 2 PD}$$

TT = Transmission Time
PD = Propagation Delay

$$\Rightarrow \frac{L}{BW} \geq 2 PD$$

$$\boxed{L \geq 2 * PD * BW}$$

$$\text{Efficiency} = \eta = \frac{1}{1 + 6.44a}, \quad a = \frac{PD}{TT}$$

- Traditional ethernet LAN with 10 mbps data speed use this CSMA/CD.

Ques-17 Distance Vector Routing ? (DVR)

Ans. DVR protocol requires that a router inform its neighbors of topology changes periodically. Also known as Old ARPANET routing algorithm or Bellman-Ford Algo.

- Each router maintains a Distance Vector table containing the distance b/w itself and all other nodes.
 - Distance vector routing uses UDP for transportation Distance vector Algo:
- ① A router transmits its distance vector to each of its neighbors in a routing packet.
 - ② Each router receives and saves the most recently received distance vector from each of its neighbors
 - ③ A router recalculates its distance vector when (i) It receives a DV from a neighbor containing different info from before
(ii) It discovers that a link to a neighbor has gone down

Advantages: It is simpler to configure and maintain than link state routing.

Disadvantages:
① Risk of count-to-infinity problem.
② Slower to converge than link-state.
③ Creates more traffic than link state.