# VALLURUPALLI NAGESWARA RAO VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

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## Department of Computer Science Engineering


**Subject : Computer Networks** **III Year I Sem** **Common to CSE & IT**

## FLIPPED CLASSROOM ACTIVITY- Think Pair Share

Learning Objective(s) of In - Class Activity
1. What Student will do?
A. Thinks about the answer and discuss with other peers and share the information
2. What Teacher will do?
A. After interaction with all the peers teacher finally provides the answers

Q: Justify why the above is an active learning strategy
A: Using Think – pair – share Learner can actively engaged & participated in the discussion

**Peer Instruction Strategy – What Student Does**
For the questions raised by the teacher, learner first think individually.
Then they will share with peers of same group.
Then each group member will discuss with other groups.

**TPS Strategy – What Instructor does**
First provide a premise
First Teacher will Instruct the learners to go through all the Computing Techniques .
After peer interactions finally teacher provides the answer to all the peers

Steps to be followed in TPS:
**Step:1 TPS Strategy – What Instructor does**
Think (~2 minutes)
Instruction: Instruct all the peers to analyse all the computing techniques.

**TPS Strategy – What Instructor does**
Step 2: Pair (~5 minutes)
Instruction: Now pair up and compare your answers. Agree on one final answer.
While students are pairing and discussing, instructor goes to 2~3 sections to see what they are doing.

Step 3: **TPS Strategy – What Instructor does**
Share (~8 minutes)
Instructor asks a group to share their answer with class and check whether all the features are noted down for the evolution of Cloud Computing .
After sharing is done, instructor finalize the answer by providing
**Justify why the above is an active learning strategy**
By using the above strategy ,

1. Learners not only learn the concept but also provides the scope to analyse the concept.
2. Moulds the student share their ideas with other learners which inturn also increases the communication skills .
3. When i implement this techniques in my class Learners showing much interest to participate and share their knowledge, which helps to analyse the level of understand the concepts by the learners.

**Activity 1: Comparing of Network Topologies**

Q 1: Can you provide best topology for interconnecting systems in a Network ?

Answer: Star

- Teacher instructs all the learners to go through all the Network Topologies

**Think (~2 minutes)**

- Instruction: Analyse all the Topologies for best topology

**Pair (~5 minutes)**

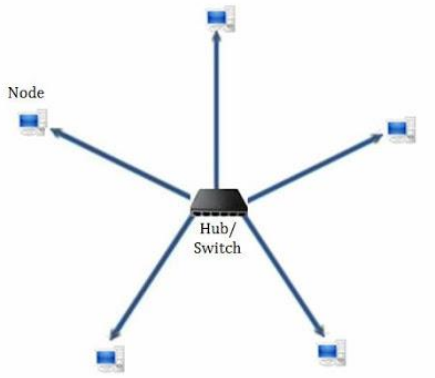
- Now analyse all the Topologies compare their features that can give the correct answer

**Share (~8 minutes)**

- Teacher insists all the group members to share their ideas to all the peers.
- Then finally the teacher finalizes the answer and clear all the doubts of learners

**Advantages of Star Topology**

- **1)** As compared to Bus topology it gives far much better performance, signals don't necessarily get transmitted to all the workstations. A sent signal reaches the intended destination after passing through no more than 3-4 devices and 2-3 links. Performance of the network is dependent on the capacity of central hub.
  **2)** Easy to connect new nodes or devices. In star topology new nodes can be added easily without affecting rest of the network. Similarly components can also be removed easily.
  **3)** Centralized management. It helps in monitoring the network.
  **4)** Failure of one node or link doesn't affect the rest of network. At the same time its easy to detect the failure and troubleshoot it.



**Activity 2:Out of multiple protocols which will provide the best multiple access without collisions?**

**Ans: CSMA/CD**

- Teacher instructs all the learners to go through all the multiple access protocols

**Think (~2 minutes)**

- Instruction: Analyse all the multiple access protocols

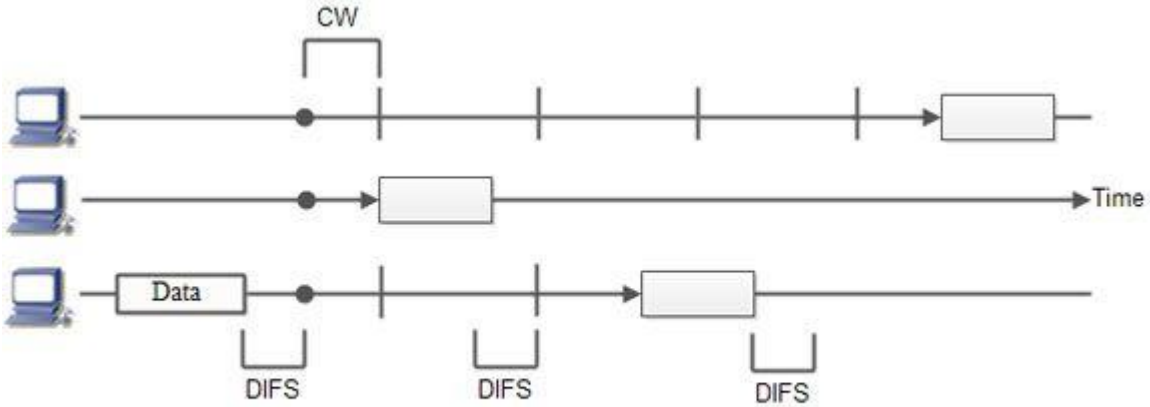
**Pair (~5 minutes)**

- Now analyse all the multiple access protocols compare their features that can give the correct answer

**Share (~8 minutes)**

- Teacher insists all the group members to share their ideas to all the peers.
- Then finally the teacher finalizes the answer and clear all the doubts of learners

CSMA is a network access method used on shared network topologies such as Ethernet to control access to the network. Devices attached to the network cable listen (carrier sense) before transmitting. If the channel is in use, devices wait before transmitting. MA (Multiple Access) indicates that many devices can connect to and share the same network. All devices have equal access to use the network when it is clear. In other words, a station that wants to communicate "listen" first on the media communication and awaits a "silence" of a preset time (called the Distributed Inter Frame Space or DIFS). After this compulsory period, the station starts a countdown for a random period considered. The maximum duration of this countdown is called the collision window (Window Collision, CW). If no equipment speaks before the end of the countdown, the station simply deliver its package. However, if it is overtaken by another station, it stops immediately its countdown and waits for the next silence. She then continued his account countdown where it left off. This is summarized in Figure. The waiting time random has the advantage of allowing a statistically equitable distribution of speaking time between the various network equipment, while making little unlikely (but not impossible) that both devices speak exactly the same time. The countdown system prevents a station waiting too long before issuing its package. It's a bit what place in a meeting room when no master session (and all the World's polite) expected a silence, then a few moments before speaking, to allow time for someone else to speak. The time is and randomly assigned, that is to say, more or less equally.



Sharing time with CSMA method.

Again, this is what we do naturally in a meeting room if many people speak exactly the same time, they are realizing account immediately (as they listen at the same time they speak), and they interrupt without completing their sentence. After a while, one of them speaks again. If a new collision occurs, the two are interrupted again and tend to wait a little longer before speaking again.

CSMA protocol was developed to overcome the problem found in ALOHA i.e. to minimize the chances of collision, so as to improve the performance. CSMA protocol is based on the principle of 'carrier sense'. The station senses the carrier or channel before transmitting a frame. It means the station checks the state of channel, whether it is idle or busy.

Even though devices attempt to sense whether the network is in use, there is a good chance that two stations will attempt to access it at the same time. On large networks, the transmission time between one end of the cable and another is enough that one station may access the cable even though another has already just accessed it.

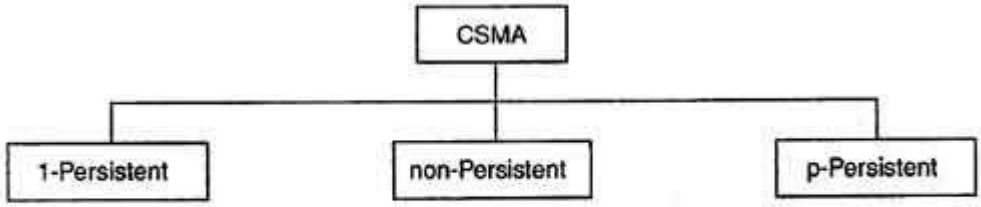
The chances of collision still exist because of propagation delay. The frame transmitted by one station takes some time to reach other stations. In the meantime, other stations may sense the channel to be idle and transmit their frames. This results in the collision.

**There Are Three Different Type of CSMA Protocols**

(I) I-persistent CSMA

(ii) Non- Persistent CSMA

(iii) p-persistent CSMA




Types of CSMA

**(i) I-persistent CSMA**

• In this method, station that wants to transmit data continuously senses the channel to check whether the channel is idle or busy.

• If the channel is busy, the station waits until it becomes idle.

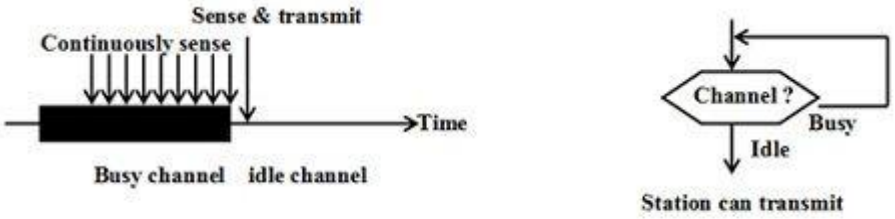
• When the station detects an idle-channel, it immediately transmits the frame with probability 1. Hence it is called I-persistent CSMA.

• This method has the highest chance of collision because two or more stations may find channel to be idle at the same time and transmit their frames.

• When the collision occurs, the stations wait a random amount of time and start allover again.

**Drawback of I-persistent**

• The propagation delay time greatly affects this protocol. Let us suppose, just after the station I begins its transmission, station 2 also became ready to send its data and senses the channel. If the station I signal has not yet reached station 2, station 2 will sense the channel to be idle and will begin its transmission. This will result in collision.




1-persistent CSMA

Even if propagation delay time is zero, collision will still occur. If two stations became .ready in the middle of third station's transmission, both stations will wait until the transmission of first station ends and then both will begin their transmission exactly simultaneously. This will also result in collision.

**(ii) Non-persistent CSMA**

• In this scheme, if a station wants to transmit a frame and it finds that the channel is busy (some other station is transmitting) then it will wait for fixed interval oftime.
• After this time, it again checks the status of the channel and if the channel is.free it will transmit.

• A station that has a frame to send senses the channel.

• If the channel is idle, it sends immediately.

• If the channel is busy, it waits a random amount of time and then senses the channel again.

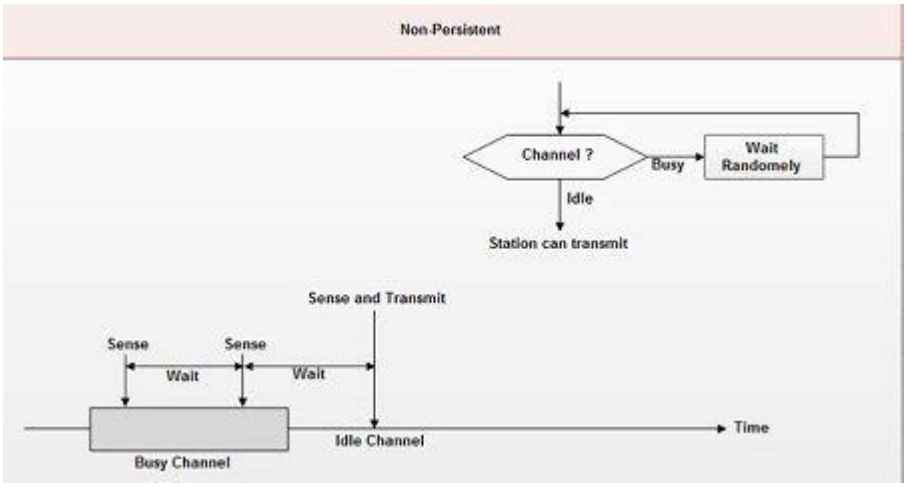
• In non-persistent CSMA the station does not continuously sense the channel for the purpose of capturing it when it detects the end of previous transmission.

**Advantage of non-persistent**

• It reduces the chance of collision because the stations wait a random amount of time. It is unlikely that two or more stations will wait for same amount of time and will retransmit at the same time.

**Disadvantage of non-persistent**

• It reduces the efficiency of network because the channel remains idle when there may be stations with frames to send. This is due to the fact that the stations wait a random amount of time after the collision.




**(iii) p-persistent CSMA**

• This method is used when channel has time slots such that the time slot duration is equal to or greater than the maximum propagation delay time.

• Whenever a station becomes ready to send, it senses the channel.

• If channel is busy, station waits until next slot.

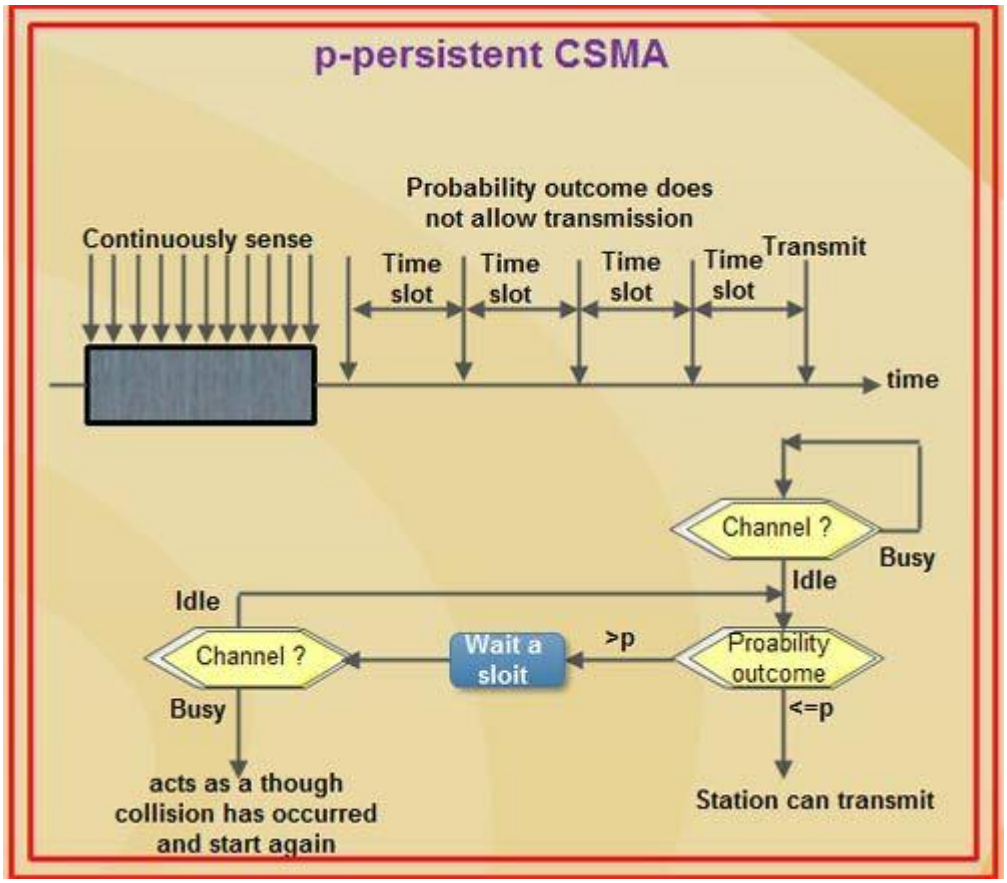
• If channel is idle, it transmits with a probability p.

• With the probability q=l-p, the station then waits for the beginning of the next time slot.

• If the next slot is also idle, it either transmits or waits again with probabilities p and q.

• This process is repeated till either frame has been transmitted or another station has begun transmitting.

• In case of the transmission by another station, the station acts as though a collision has occurred and it waits a random amount of time and starts again.




**Advantage of p-persistent**

• It reduces the chance of collision and improves the efficiency of the network.

**Activity 3: How does tunnelling provides the better network Services ?**

**Ans: CSMA/CD**

- Teacher instructs all the learners to go through the concept of tunnelling

**Think (~2 minutes)**

- Instruction: Analyse importance and features of tunnelling

**Pair (~5 minutes)**

- Now analyse the advantages and features of tunnelling that can give the correct answer

**Share (~8 minutes)**

- Teacher insists all the group members to share their ideas to all the peers.
- Then finally the teacher finalizes the answer and clear all the doubts of learners

Tunneling is an internetworking strategy that is used when source and destination networks of same type are connected through a network of different type. In such a case, the packet from one network reaches the other network via different kind pf network that interconnects them. To understand tunneling, let an Ethernet is to be connected to another Ethernet via a WAN.

• The IP packets are to be sent from host 1 of Ethernet 1 to host 2 of Ethernet 2 via a WAN.

• To send an IP packet to host 2, host 1 constructs the packet containing the IP address of host 2.

• It then inserts this packet into an Ethernet frame. This frame is addressed to the multi-protocol router $M_1$ and is placed on Ethernet.

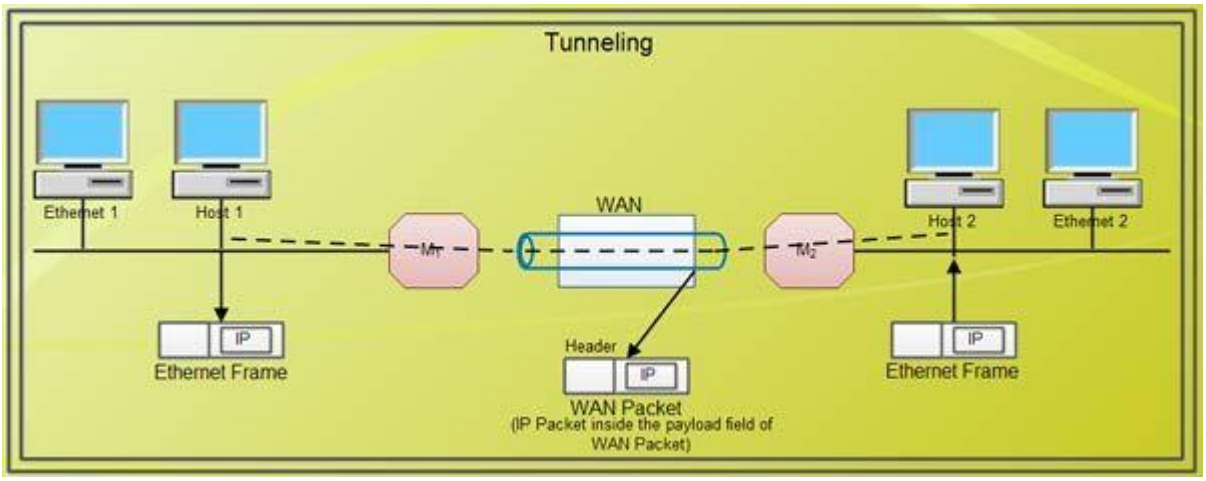
• When this packet reaches, multiprotocol router MI, it removes the IP packet and insert it in the payload field of the WAN network layer packet.

This WAN network layer packet is then addressed to multi-protocol router $M_2$.

• When this packet reaches M2, it removes the IP packet and inserts it into the Ethernet frame and sends it to host 2.

• In the above process, IP packets do not have to deal with WAN, they just travel from one end 0f the tunnel to the other end. The host 1 and host 2 on two Ethernet also do not have to deal with WAN.

• The multi-protocol routers $M_1$ & $M_2$ understand about IP and WAN packets.



**Activity 4: Identify the technique to establish the connection in a network and explain the process ?**

Ans: Threeway Handshaking policy

- Teacher instructs all the learners to identify the technique

**Think (~2 minutes)**

- Instruction: understand the concepts of Threeway Handshaking policy

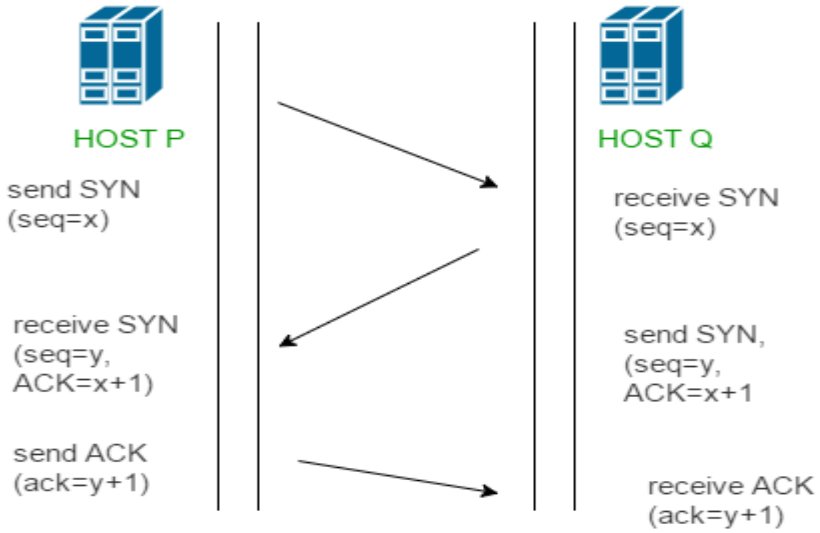
**Pair (~5 minutes)**

- Now discuss among pairs, analyse and understand the Threeway Handshaking policy

**Share (~8 minutes)**

- Teacher insists all the group members to share their ideas to all the peers.
- Then finally the teacher finalizes the answer and clear all the doubts of learners

CP provides reliable communication with something called **Positive Acknowledgement with Re-transmission(PAR)**. The Protocol Data Unit(PDU) of the transport layer is called segment. Now a device using PAR resend the data unit until it receives an acknowledgement. If the data unit received at the receiver's end is damaged(It checks the data with checksum functionality of the transport layer that is used for Error Detection), then receiver discards the segment. So the sender has to resend the data unit for which positive acknowledgement is not received. You can realize from above mechanism that three segments are exchanged between sender(client) and receiver(server) for a reliable TCP connection to get established. Let us delve how this mechanism works :

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**Step 1 (SYN) :** In the first step, client wants to establish a connection with server, so it sends a segment with SYN(Synchronize Sequence Number) which informs server that client is likely to start communication and with what sequence number it starts segments with
**Step 2 (SYN + ACK):** Server responds to the client request with SYN-ACK signal bits set. Acknowledgement(ACK) signifies the response of segment it received and SYN signifies with what sequence number it is likely to start the segments with
**Step 3 (ACK) :** In the final part client acknowledges the response of server and they both establish a reliable connection with which they will start eh actual data transfer
The steps 1, 2 establish the connection parameter (sequence number) for one direction and it is acknowledged. The steps 2, 3 establish the connection parameter (sequence number) for the other direction and it is acknowledged. With these, a full-duplex communication is established.

**Activity 5: Identify the protocol used for the transmission of Electronic mails?**

Ans: SMTP ( Simple Mail Transfer Protocol)

- Teacher instructs all the learners to identify protocol which supports transfer of electronic mails

**Think (~2 minutes)**

- Instruction:  understand the concepts of all application protocols

**Pair (~5 minutes)**

- Now discuss among pairs, about the concepts of all application protocols

**Share (~8 minutes)**

- Teacher insists all the group members to share their ideas to all the peers.
- Then finally the teacher finalizes the answer and clear all the doubts of learners

SMTP (Simple Mail Transfer Protocol) is a TCP/IP protocol used in sending and receiving e-mail. However, since it is limited in its ability to queue messages at the receiving end, it is usually used with one of two other protocols, POP3 or IMAP, that let the user save messages in a server mailbox and download them periodically from the server. In other words, users typically use a program that uses SMTP for sending e-mail and either POP3 or IMAP for receiving e-mail. On Unix-based systems, sendmail is the most widely-used SMTP server for e-mail. A commercial package, Sendmail, includes a POP3 server. Microsoft Exchange includes an SMTP server and can also be set up to include POP3 support.