CMR INSTITUTE OF TECHNOLOGY

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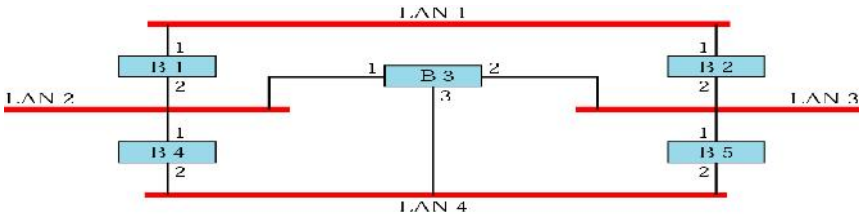
Internal Assesment Test - II

Sub:	DATA COMMUNICATION NETWORK							Code:	10EE843
Date:	8 / 5 / 2017	Duration:	90 mins	Max Marks:	50	Sem:	VIII	Branch:	EEE

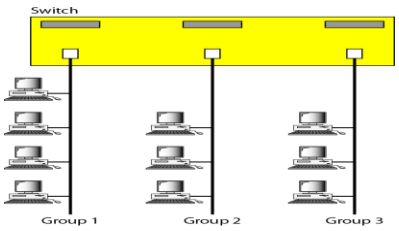
Answer Any FIVE FULL Questions

		Marks	OBE CO	OBE RBT
1 (a)	Explain virtual LANs in brief and give some advantages.	[5]	CO1	L4
(b)	List the goals of fast Ethernet and enumerate fast Ethernet implementation.	[5]	CO1	L1
2 (a)	A pure ALOHA network transmits 200-bit frames on a shared channel of 200 kbps. What is the throughput if the system produces a. 1000 frames per second b. 500 frames per second c. 250 frames per second	[6]	CO1	L3
(b)	Define the transition phases of Point to Point protocol.	[4]	CO2	L1
3 (a)	What is HDLC? Explain Different frame formats with control field used in HDLC.	[10]	CO2	L1
4 (a)	What is loop problem inside bridge? A system with four LANs and five bridges is shown in above figure. Choose B1 as the root bridge. Show the forwarding and blocking ports, after applying the spanning tree procedure.	[10]	CO2	L4
5 (a)	Explain why the size of the send window of Go-back-N protocol is less than 2^m?	[6]	CO2	L4
(b)	List and draw different connecting devices on the basis of layer they operate.	[4]	CO2	L1,
6 (a)	What is channelization in the context of multiple access of the channel? What are the various channelization techniques? [10]		CO2	L1
7 (a)	Explain CSMA with three persistence method. [6]		CO2	L1
(b)	Explain bit stuffing in detail. [4]		CO2	L4
8 (a)	What is sliding window protocol? Explain the Selective-repeat-protocol with all relevant diagrams. [10]		CO2	L4



1 (a) VLAN:

We can roughly define a virtual local area network (VLAN) as a local area network configured by software, not by physical wiring

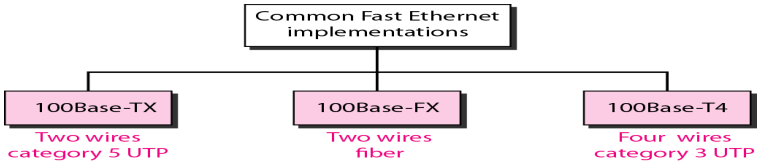


- VLANs enable logical grouping of end-stations that are physically dispersed on a network.
- VLANs reduce the need to have routers.
- Reduce the cost, safe and secure.

1 (b) Goals of Fast Ethernet:

- Upgrade the data rate up to 100 Mbps
- Make it compatible with Standard Ethernet
- Keep the same 48-bit address
- Keep the same frame format
- Keep the same minimum and maximum frame lengths

Fast Ethernet Implementation:



Q 2 (a) Pure Aloha

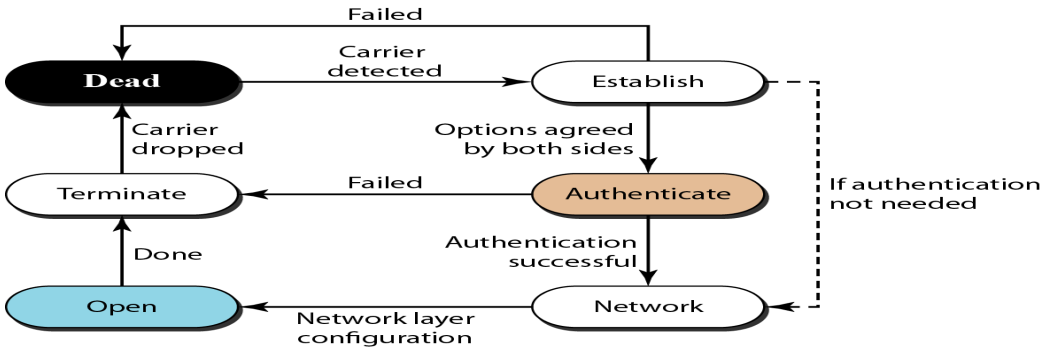
The frame transmission time is *2001200* kbps or 1 ms.

a. If the system creates 1000 frames per second, this is 1 frame per millisecond. The load is 1. In this case $S = G \times e^{-2G}$ or $S = 0.135$ (13.5 percent). This means that the throughput is $1000 \times 0.135 = 135$ frames. Only 135 frames out of 1000 will probably survive.

b. If the system creates 500 frames per second, this is (1/2) frame per millisecond. The load is *(1/2)*. In this case $S = G \times e^{-2G}$ or $S = 0.184$ (18.4 percent). This means that the throughput is $500 \times 0.184 = 92$ and that only 92 frames out of 500 will probably survive. Note that this is the maximum throughput case, percentagewise.

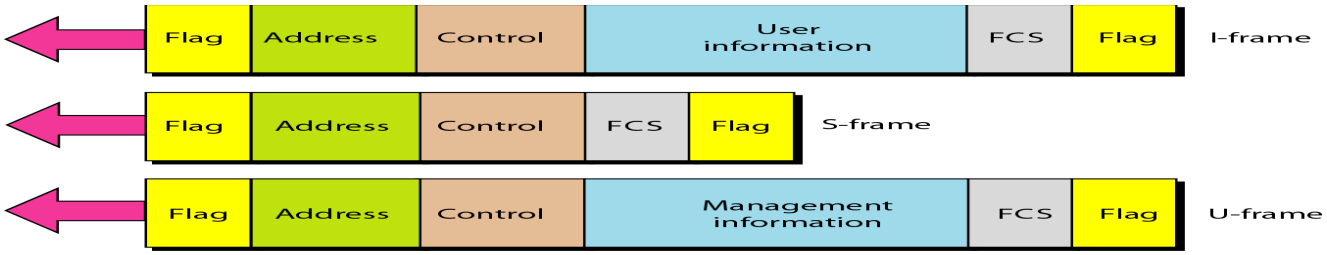
c. If the system creates 250 frames per second, this is (1/4) frame per millisecond. The load is (1/4). In this case $S = G \times e^{-2G}$ or $S = 0.152$ (15.2 percent). This means that the throughput is $250 \times 0.152 = 38$. Only 38 frames out of 250 will probably survive.

Q2(b) Transition phases of Point to Point Protocol



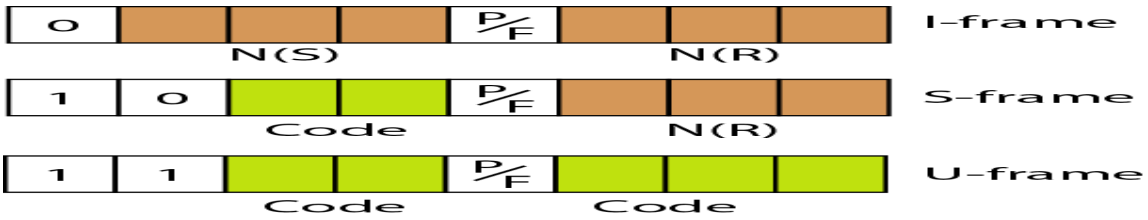
3 (a) HDLC: *High-level Data Link Control (HDLC) is a bit-oriented protocol for communication over point-to-point and multipoint links. It implements the ARQ mechanisms we discussed in this chapter.*

HDLC defines three types of frames: information frames (I-frames), supervisory frames (S-frames), and unnumbered frames (V-frames). Each frame in HDLC may contain up to six fields. I frames are used to transport user data and control information relating to user data, S frames used only to transport control information, U frames are reserved for management

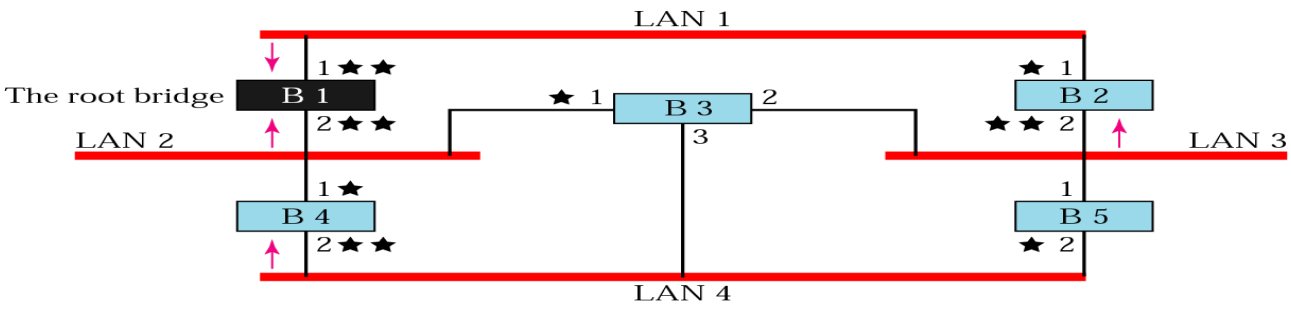


Control field format for the different frame types

- *N(S),*define the sequence number of the frame.
- *N(R), correspond to the* acknowledgment number when piggybacking is used.
- The single bit between *N(S) and N(R) is called the P/F bit. The P/F field is a Polling and Final bit* when bit is set (bit = 1), It means *poll when the frame then data* is sent by a primary station to a secondary, when reset, It means *final when the frame is sent by a secondary to a primary(address of the sender)*



4 (a) Loop Problem arises when two or more bridges are used inside a LAN, leads to forming a loop hence leads to flooding of frames. To remove loop problem spanning tree is used.

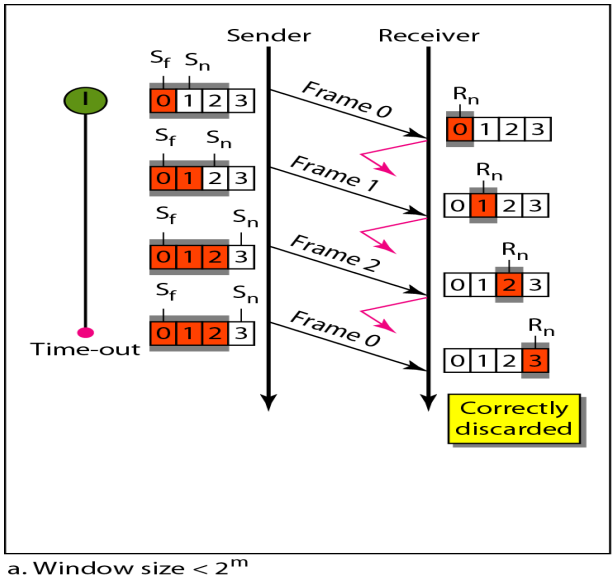


Step 1: Every bridge has an ID. Select the bridge as root bridge with smallest ID.
Step 2: Assign and mark the weights from root bridge to each bridge (except root bridge) and to LAN.

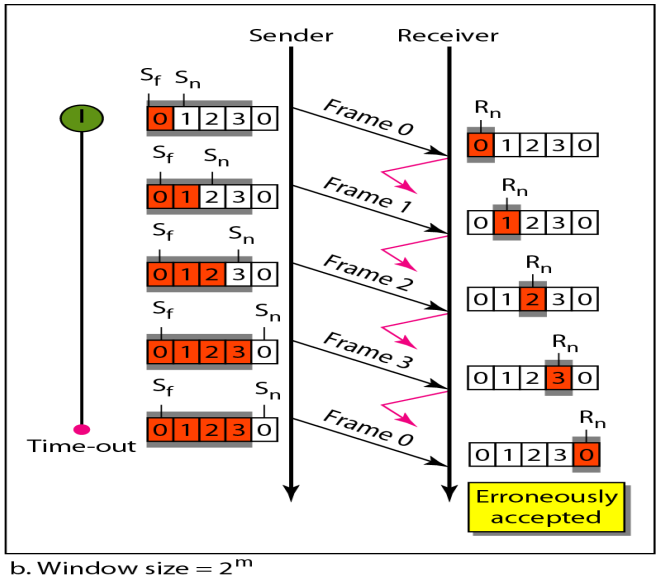
From Bridge to bridge weight =1
From Bridge to LAN weight =1
From LAN to Bridge weight =1

Step 3: Find and form a shortest least-cost path weights from root bridge connecting each bridge and to all LAN without forming a loop.

5 (a) In Go-Back-N ARQ, the size of the send window must be less than 2^m

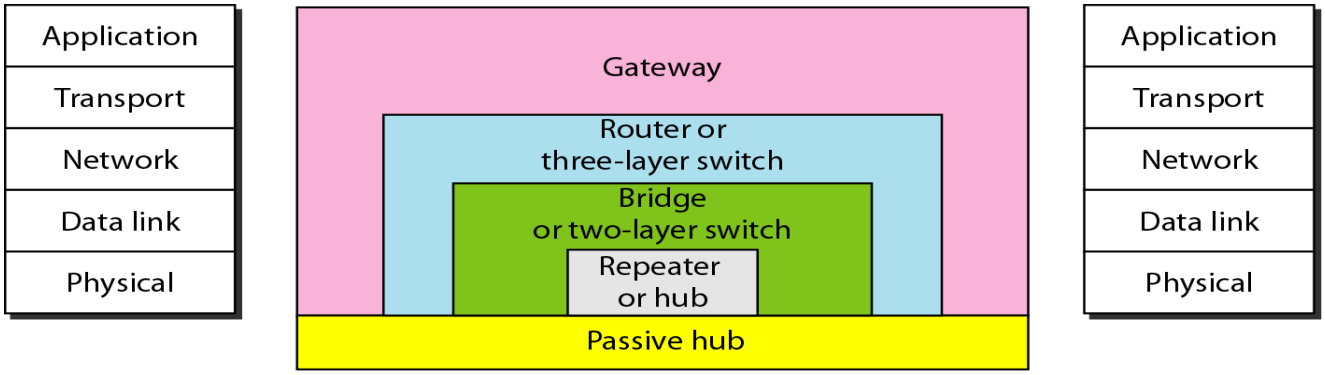


a. Window size $< 2^m$



b. Window size $= 2^m$

5(b) **Different connecting devices on the basis of layers:**



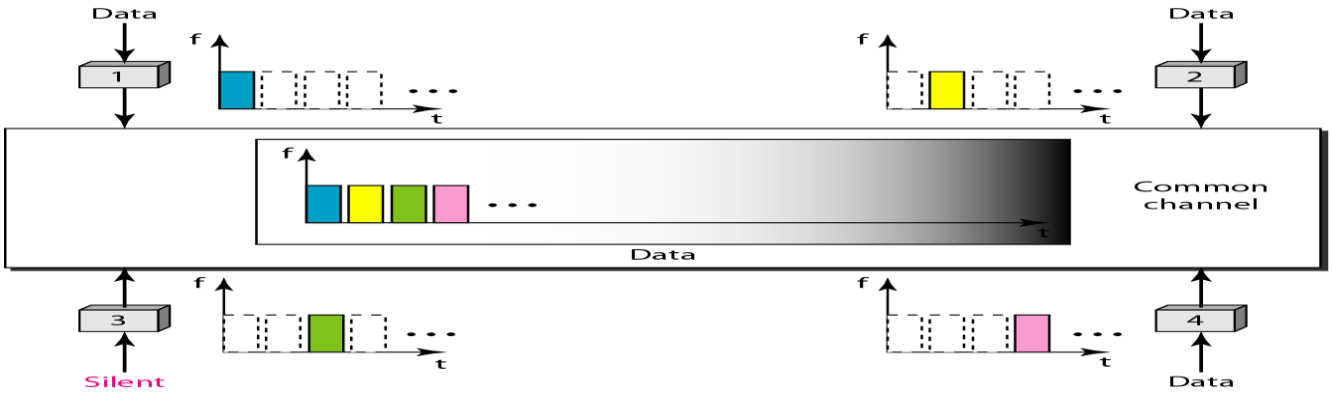
- Passive hub operates below the physical layer.
- Active hub or repeater operates at the physical layer.
- Bridge or two layer switch operates at the physical layer and data link layer
- Router operates at the physical layer, data link layer and at the network layer
- Gateways operates at all the five layers.

6(a) **Channelization** is a multiple-access method in which the available bandwidth of a link is shared in time, frequency, or through code, between different stations. three channelization protocols.

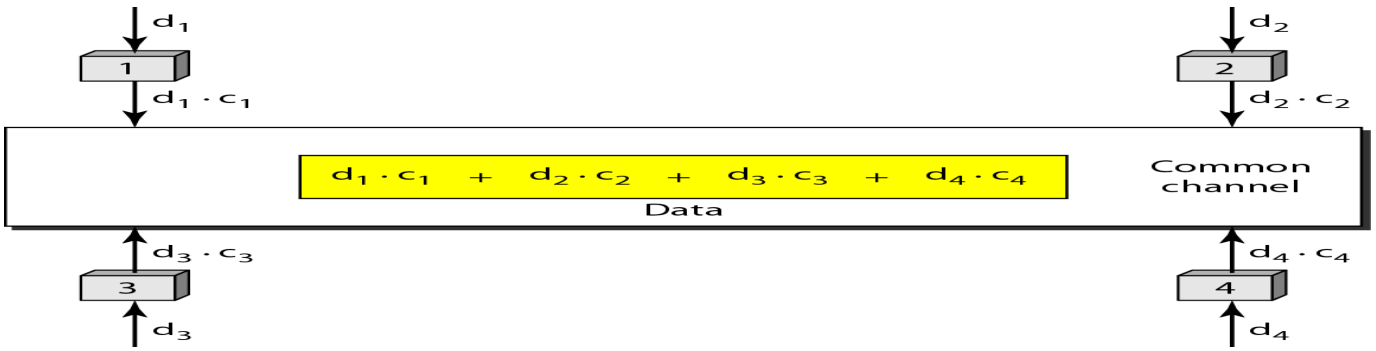
- Frequency-Division Multiple Access (FDMA)
- Time-Division Multiple Access (TDMA),
- Code-Division Multiple Access (CDMA)

FDMA: The available bandwidth of the common channel is divided into bands that are separated by guard bands.

TDMA: The bandwidth is just one channel that is timeshared between different stations.

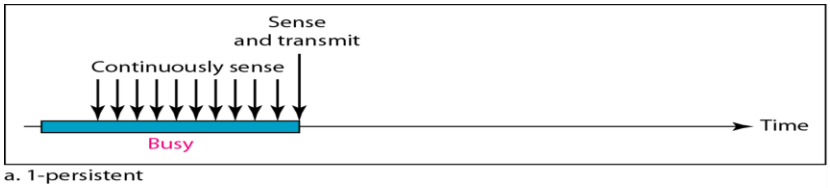


CDMA : Here one channel carries all transmissions simultaneously.

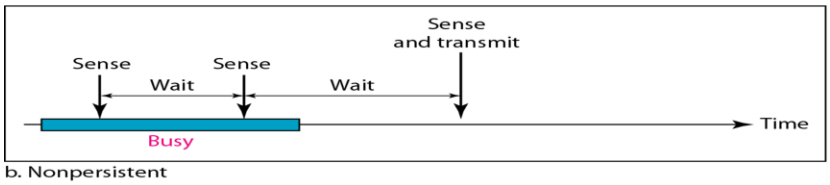


Q 7 (a) CSMA:

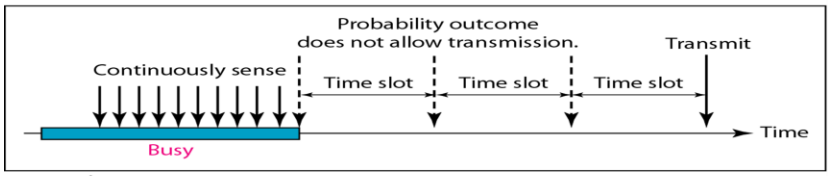
- Each station "sense before transmit" or "listen before talk.“
- CSMA can reduce the possibility of collision, but it cannot eliminate it.
- The possibility of collision still exists because of propagation delay(first bit)



a. 1-persistent



b. Nonpersistent



c. p-persistent

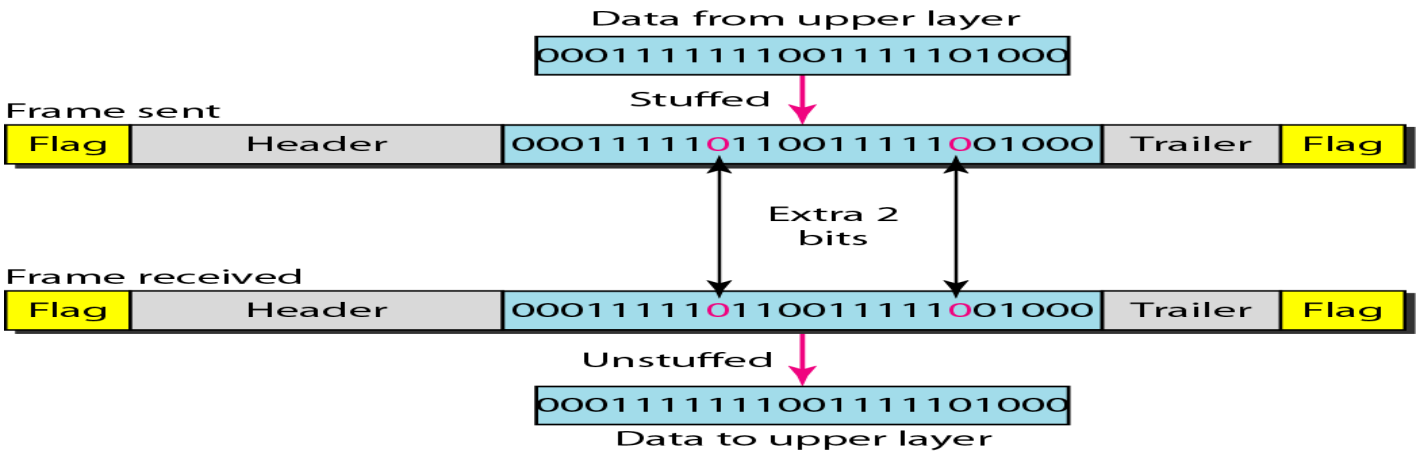
1-Persistent-after station finds the line idle, send its frame

Non-persistent-senses the line; idle: sends immediately; not idle: waits random amount of time and senses again

p-Persistent-the channel has time slots with duration equal to or greater than max propagation time

Q 7 (b) Bit Stuffing:

Bit stuffing is the process of adding one extra 0 whenever five consecutive 1s follow a 0 in the data, so that the receiver does not mistake the pattern 0111110 for a flag.

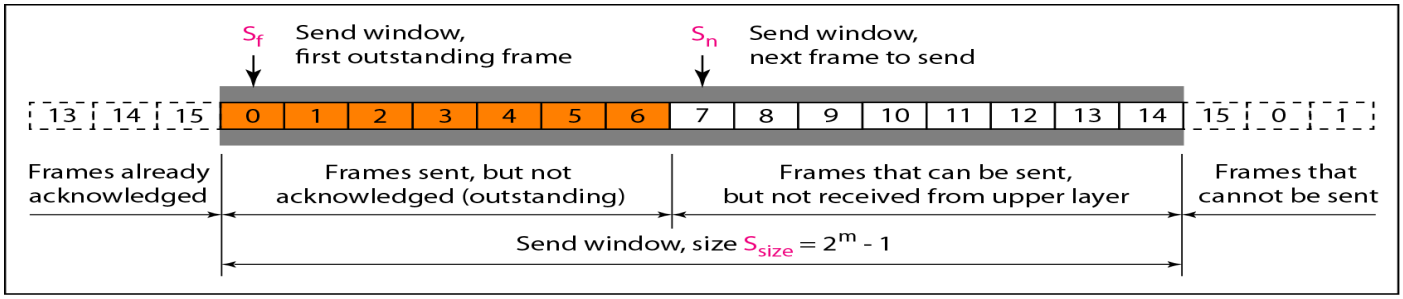


Q 8 (a) Sliding Window Protocol:

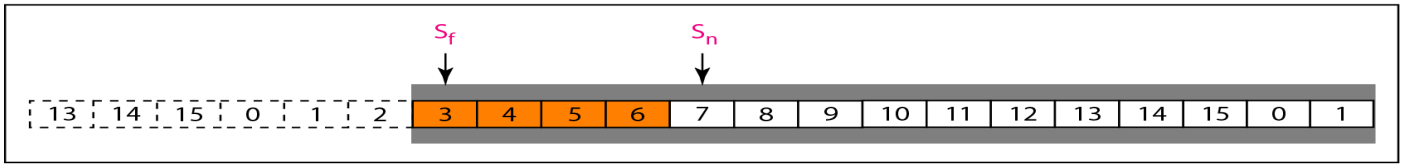
The window is an abstract concept defining an imaginary box having some size $2^m - 1$ with three variables: Sf, Sn, and S_{size} and the window slides one or more slots when a valid acknowledgment arrives.

For Example consider *Go-Back-N ARQ* Protocol

Send window for Go-Back-N ARQ

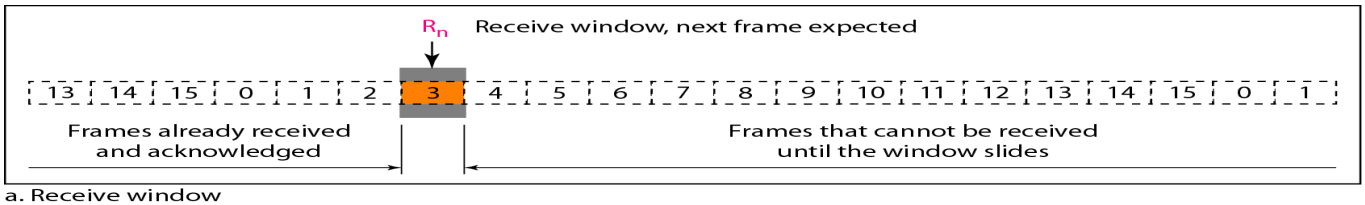


a. Send window before sliding

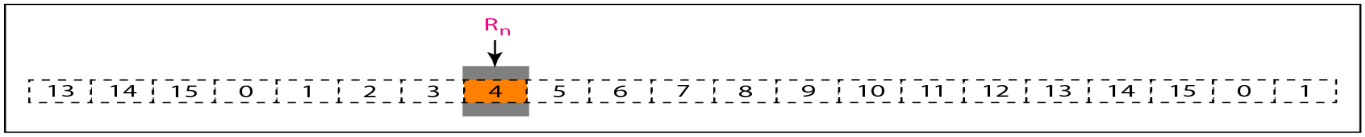


b. Send window after sliding

Receive window for Go-Back-N ARQ



a. Receive window



b. Window after sliding