

Selective Repeat ARQ

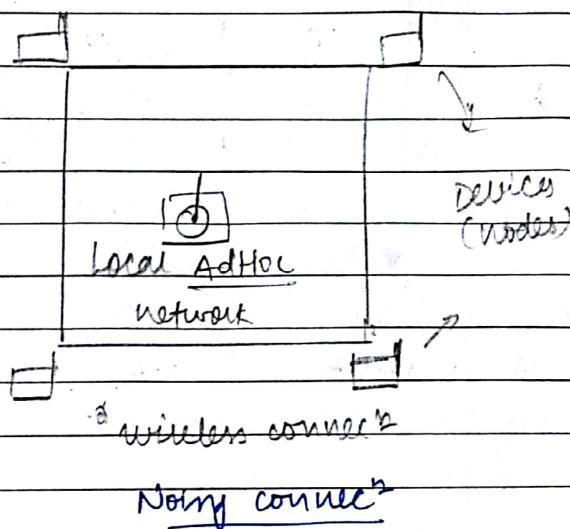
In Go Back N ARQ, window size was $2^m - 1$ frames/window
but receiver window size = 1 only

If only 1 bit didn't reach the receiver, lot more frames need to be retransmitted.

Radio waves are the shortest form of waves used for wireless connectⁿ.

AdHoc network

When we don't care about pre-planning of setting up the network. When devices come in each other's proximity, connectⁿ is established automatically. (like WiFi)



In such connectⁿ multiple devices may operate on same frequency & they can acquire same channel & start transmission. This will cause head-on collision of messages, and they all will be lost or come very unorderedly - Only 10-20% of msg will be transmitted. Resolving this by Go Back N ARQ will be very complex & problematic.

For this selective repeat ARQ is used.

Where both sender & receiver window size = $2^{(m-1)}$

A range of frames is sent & received.

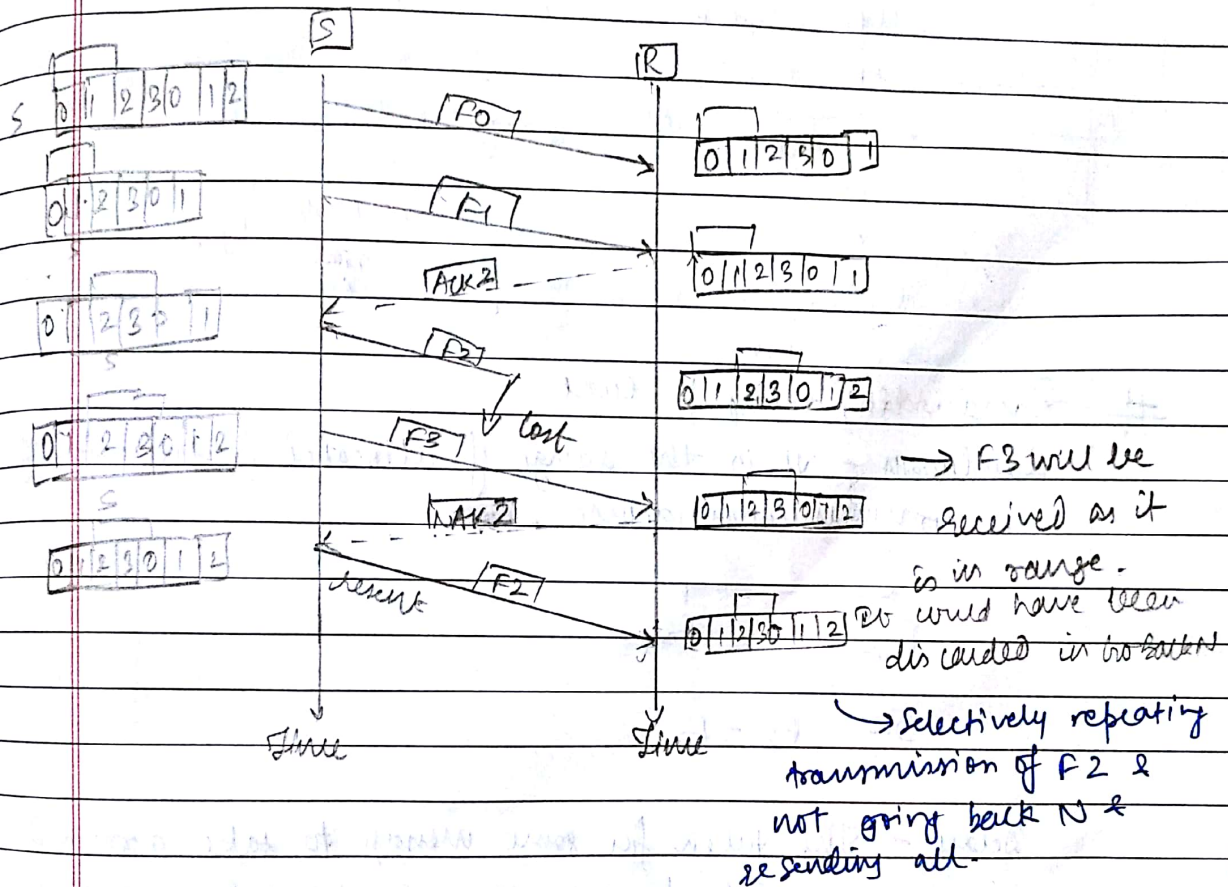
Control variables

Sender

S_F, S_L, S

Receiver

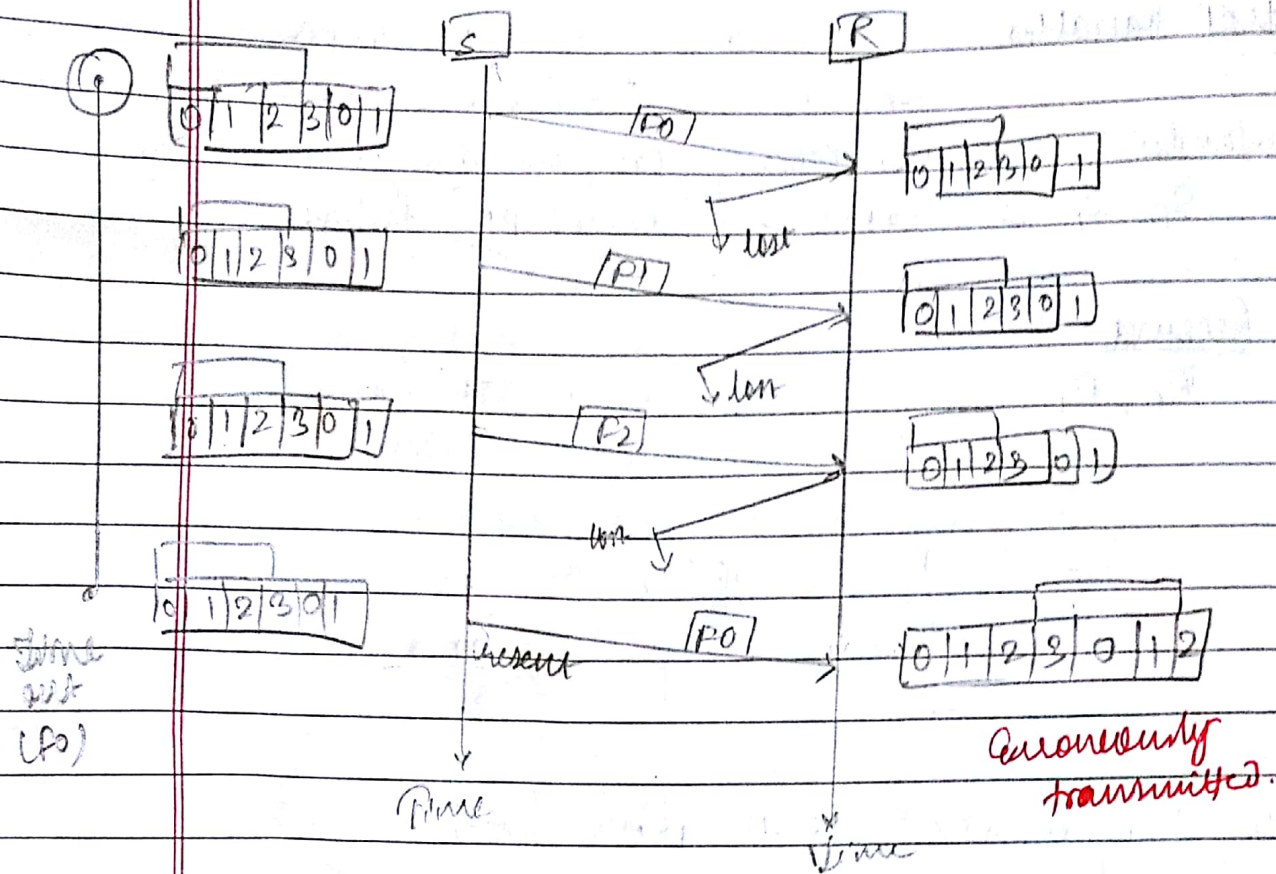
R_F, R_L



Sender window size restriction

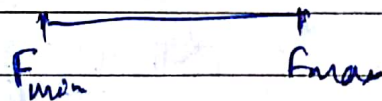
$\frac{2^m}{2} \rightarrow 2^m$
restriction \rightarrow suppose we violate that & use this size

∴ if we ~~use~~ $m=2$ $\frac{2^m}{2} = 2$
but we violate that
& take it 3.
 $\left(\frac{2^m}{2}\right) \rightarrow$



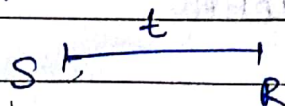
Bandwidth delay product

Bandwidth - It is the range of allocated frequencies of a communication device.



$$BW = F_2 - F_1$$

Delay - Time taken for some message to take a round trip to sender to receiver and back from receiver to sender.



$$\text{delay} = 2t$$

Bandwidth exhausted \rightarrow means properly used

Bandwidth wasted \rightarrow not properly used

Q. In a stop & wait ARQ system, the BW of the line is 1 Mbps and 1 bit takes 20 ms to make a round trip. What is the bandwidth delay product if the system data frames are 1000 bits in length. What is the utilization % age of the link?

$$\frac{10^6 \text{ bits}}{\text{sec}}$$

$$\frac{1000 \times 20}{10^6} = 0.02$$

Bandwidth delay product (BDP)

$$= 1 \times 10^6 \times 20 \times 10^{-3}$$

$$= 20000 \text{ bits}$$

$$\% \text{ utilization} = \frac{1000}{20000} \times 100 = 5\%$$