**Question: Whether the timeout event is an indication of a more serious congestion in the network?**

Timeout, because the receiver is not receiving the segments or packets because the network is too much congested. The sended packets might face a long queing delay in routers or they might get lost in the network due to buffer overflow in routers. In addition the ACK messages from receiver could also get lost due to congestion in the network. In these cases, the sender does not receive sufficient number of duplicate acknowledgement messages that will trigger the fast retransmission mechanism. If the network, would not be congested, fast retransmission could happen, because duplicate ACK messages could be received by the courtesy uncongested network. Also, TCP mechanism adjusts itself also to the mentioned rule. In case of timeout, congestion window will be reduced to 1 MSS, whereas in Fast Transmission, congestion window will be halved.

**Question: FRM is triggered by 3 duplicate ACK messages. Assume that it is triggered by the first ACK message. What is the disadvantage?**

Packets might be delivered out of order because the packets might use different routers. In this case, the sender will receive duplicate ACK messages. Hence, unnecessary fast retransmission might occur, congestion window will be halved, connection efficiency and speed will slow down.

**Question: Immature Timeout occurs when the timeout is not sufficiently long because the packet experiences a longer delay. Due to timeout, the sender will resend the packets. Mention 2 disadvantages of immature timeout?**

- Unnecessarily retransmission of messages.

- Transmission time decreases due to congestion window will be decreased to 1 MSS.

**GO\_BACK\_N**

N --> window size

Send\_base <= next\_seq\_num <= send\_base + N

**Selective Repeat**

Send\_base <= next\_seq\_num <= send\_base + N

**Rcv\_base - N <= sendbase <= rcv\_base**









