An Ad Hoc network using IEEE802.11 has 4 nodes: N1 , N2 , N3 , N4 . Assume that SIFS is 1 unit of time, PIFS 2 units of time, DIFS 3 units of time, and slot time is 2 (these value are not the real values but are taken to simplify the packets scheduling).

Assume that at the beginning the channel is idle (no transmission), and that at instant 1, N2  has a packet to be sent to N4 . At instant 2, both N1  and N3  have a packet to be sent to N4 . Assume that the random number generator (for backoff) will give the following values for N1 : 2, 5, ... and for N2 : 4, 3, … and for N3 : 1, 4, ... Assume that we don’t use RTS/CTS nor fragmentation, and that all data packets have the same length: 6 units of time and that the Ack packet has length 3 units of time. Furthermore the channel Bit Error Rate is assumed to be 0. Show the execution of the DCF mode of IEEE802.11.

Instant 1: N2 sense the medium is free and wait for DIFS time

Instant 2: N1 and N3 sense the medium is free and wait for DIFS time

Instant 4: N2 starts transmit the packet; N1 and N3 sense the medium is busy, they get the back-off time, which is 4 for N1(2\*2) and 2 for N3(2\*1).

Instant

Instant 10: N2 finishes packet transmission to N4, N4 waits for SIFS time and then send the ACK

Instant 11: N4 sends the ACK

Instant 14: N2 receives N4’s ACK, N1 and N3 sense the free channel then start to wait for DIFS time

Instant 17: N1 and N3 start to wait for back-off time

Instant 19: N3’s back-off time finishes first, so N3 starts transmit packet to N4. N1 stop counting back-off time and have 2 residual backoff time

Instant 25: N3 finishes packet transmission, N4 waits for SIFS time and then send the ACK

Instant 26: N4 sends the ACK

Instant 29: N3 receives ACK, N1 starts its residual backoff time

Instant 31: N1 starts transmit packet to N4

Instant 37: N1 finishes transmission

Instant 38: N4 sends the ACK

Instant 41: N1 receives the ACK