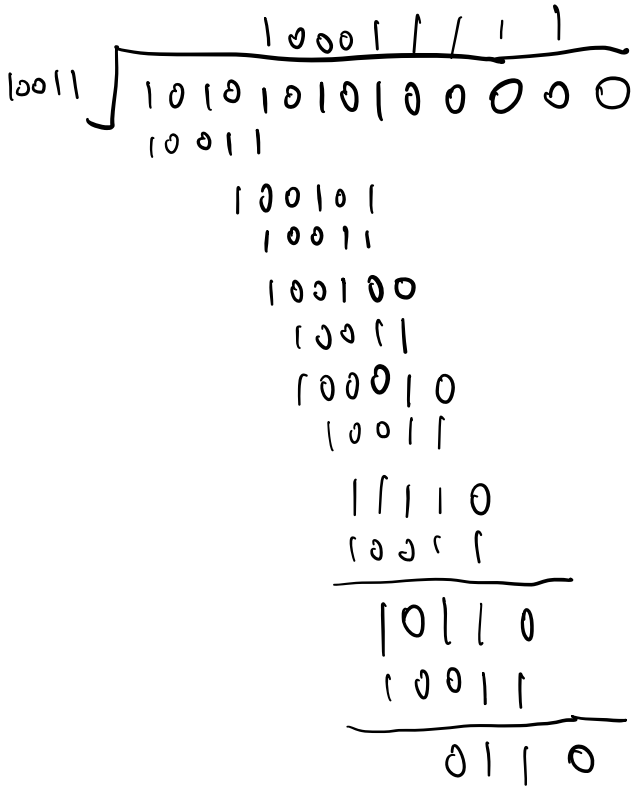
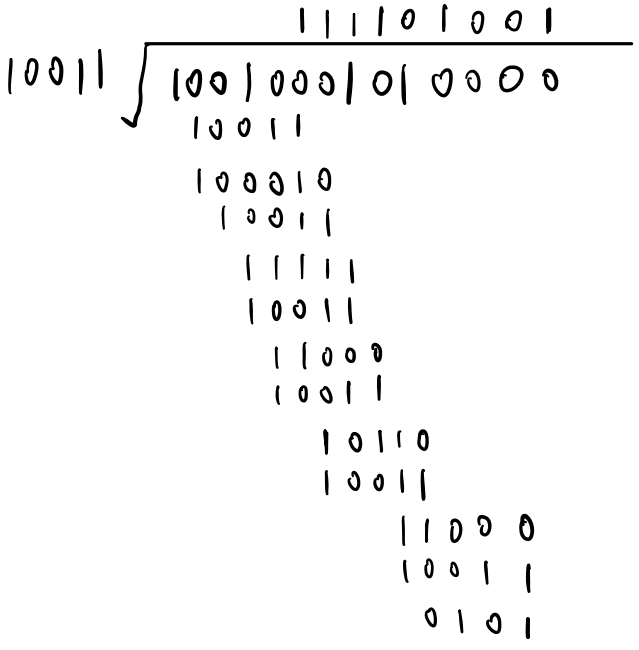
I have read and understood the course academic integrity policy.

1) $G = 10011$ $D = 1010101010000$ $D = 100100101$



$R = 0110$



$R = 0101$

2). The case cause maximum waiting time will be all (N-1) Nodes transmit Qbit

So the time will be

$$T = (N-1)\frac{Q}{R} + N \cdot d_{poll}$$

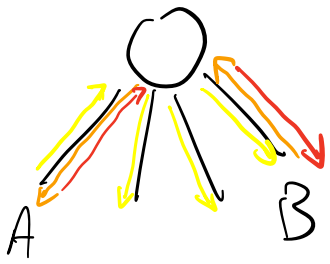
3). After 4 collistion K choose from $\{0, 1, 2, 2^4-1\}$

$$P_{K=5} = \frac{1}{16}$$

After collision, NIC wait for $K \cdot 512$ bit times

$$T = 5 \times \frac{512 \text{ bits}}{10 \text{ Mbps}} = 256 \text{ microseconds}$$

4).



1st { ① A send TCP SYN to switch, 1 frame
② switch broadcast it to (N-1) node, N-1 frames.

2st ③ B send back SYNACK to switch, Switch send back to A
2 frames.

3st. ④ A send ACK to switch, and switch send to b.
2 frames

Total will be.

$$Num = 1 + N-1 + 2 + 2 = 4 + N$$

5)

a). TDMA is the Best suitable one, it provide fixed length slot and allocated slot for different users. its good for simultaneous calls.

CSMA not suited, simultaneous calls will cause increased collisions leeds to high delay.

Slotted ALOHA, It will work but not suited. the more user try to connect IP Call, The more chance collision happend, leeds to significant delay.

Token passing: not suited. only the Node with the token can transmit data means it can not handel the multiple IP call connection cases, at each time only one Node/speaker can talk.

b. TDMA. not well suited. if not every node send data frequently. the usage rate is relative low, the bandwidth is wasted.

CSMA. well suited. in this case, the nodes are not likely to send data very often, each node can use entire frame to transmit data.

Slotted ALOHA Suited, same reason as CSMA, in the case of nodes not likely to send data often, it can allow node use whole channel transmit data.

Token passing. Suited. if each node transmit short but frequently data, it is better than CSMA and slotted ALOHA, but if nodes send large file in less frequency, it increase the waiting time by passing the token to the nodes have nothing to send.

C. by monitoring the amount of data transferred in link, we can dynamically switch the protocol between TDMA and CSMA, When using TDMA, if we see the use rate of bandwidth is low, means probably noone is doing IP call, then switch to CSMA protocol. If in CSMA protocol we see on node keep transmitting cause busy many times probably means it is doing IP call, then after finished the present transmission switch to TDMA protocol. This will guarantee when some doing IP call, the quality is given priority and when no one calls, link will still efficiently used for data transmission.