CN | End Sem

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Q1. is to drop the packet from the flow with the largest number of packets. Source: https://www.cse.iitk.ac.in/users/braman/courses/cs625-fall2003/lec-notes/lec-notes07-2.html

Q2. Suppose the network is as such
A -----> B -----> C where B is the bottleneck router.
Initial CWND = 1
A sends packet 1 first, gets the ACK back. CWND after = 2
A sends packet 2,3 and gets the ACKs back. CWND after = 4
A sends packet 4,5,6,7 and gets the ACKs back. CWND after = 8
A sends packet 8,9,10,11,12,13,14,15. B stores packets 8,9,10,11 but packets 12,13,14,15 are dropped. Therefore, the first dropped packet is **12.**

Q3. Decrease cost:
Suppose the network was a such:

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    B
   / \
  /   \
A      C
```

A and B have a customer-provider relationship. C and B also have a customer-provider relationship. A pays B so that C can reach it. Similarly, C pays B so that A can reach it. If A and C have a peering relationship, then A can reach C, and vice-versa for free.

Increase cost:
Suppose network is such
A ------- B
A and B have a peering relationship. Customers of A will go via A to reach B. If one such customer uses a lot of bandwidth, then A will have to invest in more resources to buffer and forward packets, increasing cost. If A and B would not have had a peering relationship, the customers of A would have reached B via some other path.

Q4. C

Q5. Computational overhead:
Link state routing is more computationally expensive as each node needs to know the statutes of all nodes in the network. Distance vector protocols, on the other hand, only need the local information to make a decision. Since distance vector protocols work on a subset of data, they are less computational expensive.

Avoiding persistent loops:

Link state routing is better at preventing persistent loops as the nodes in the network have the complete picture of the whole network. Therefore, loops can be easily identified by each node. Distance vector routing only has the local information, which leads to issues such as count to infinity problems, thereby creating persistent loops. The issue with distance vector routing is the lack of complete picture of the network.

Convergence time:

Link state routing protocols converge faster as any change in the network is propagated to all the nodes simultaneously. On the other hand, distance vector routing protocols transmit information hop by hop, increasing the convergence time.

Q6.

a. A has an entry for B: **t = 0** as initially A and B are connected
b. A has an entry for C: **t = 5** as at t = 5, A receives an advertisement from B indicating a path to C.
c. D has an entry for E: **t = 0** as initially D and E are connected
d. F has an entry for D: **t = 0** as initially F and D are connected

Q7.

a. From t=0 to t=4, from t=27 to t=31, from t=33 to t=37, and from t=39 to t = 40
b. From t=4 to t=8, from t=31 to t=32, and from t=37 to t=38
c. 3 Dup-acks as TCP goes into fast recovery (cwnd increased by 1 MSS at every dup ack)
d. Timeout as TCP goes into slow start (CWND = 1)
e. 8 at t=4, CWND=8 and TCP goes into congestion avoidance.
f. 8 as Congestion avoidance doesn't alter ssthresh
g. 6 as at t=9 ssthresh went to 12/2 = 6
h. t=21
i. Before t=26, TCP was in fast recovery. Therefore after another dup-ack, cwnd increments by 1 becoming 27. ssthresh remains the same, ssthresh = 6

Q8.

a. 1a to 2a BGP (BGP uses port 179)
    i. Transport layer: Src Port: 179, Dst Port: 179
    ii. Network Layer: Src Addr: 1a, Dst Addr: 2a
    iii. Link Layer: Src Addr: A1, Dst Addr: A2
b. S to D FTP (FTP uses port 20 to transfer data and suppose D asked S to send data on port x)
    i. Transport layer: Src Port: 20, Dst Port: x
    ii. Network Layer: Src Addr: 1c, Dst Addr: 2c
    iii. Link Layer: Src Addr: A1, Dst Addr: A2