Computer Communication Networks

2021/Spring – Final Exam

1)

i) A router uses longest prefix matching to determine which link interface a packet will be forwarded to if the packet's destination address matches two or more entries in the forwarding table. That is, the packet will be forwarded to the link interface that has the longest prefix match with the packet's destination.

ii) Time-to-live.

2)

S3 Flow Table	
Match	**Action**
IP Src = 10.3.0.2; IP Dst = 10.3.0.5	Forward(2)
IP Src = 10.3.0.2; IP Dst = 10.3.0.6	Forward(1)
IP Src = 10.3.0.4; IP Dst = 10.3.0.5	Forward(2)
IP Src = 10.3.0.4; IP Dst = 10.3.0.6	Forward(1)

以上這小題送分

S3 Flow Table	
Match	**Action**
IP Src = .*.*.*.*; IP Dst = 10.3.0.5; port = UDP	Forward(2)
IP Src = .*.*.*.*; IP Dst = 10.3.0.6; port = UDP	Forward(1)

S3 Flow Table	
Match	**Action**
IP Src = .*.*.*.*; IP Dst = 10.3.0.5;	Forward(2)

S3 Flow Table	
Match	**Action**
IP Src = 10.3.0.2; IP Dst = 10.3.0.5; port = TCP	Forward(2)

3)

i) The chosen path is not necessarily the shortest AS-path. Recall that there are many issues to be considered in the route selection process. It is very likely that a longer loop-free path is preferred over a shorter loop-free path due to economic reason. For example, an AS might prefer to send traffic to one neighbor instead of another neighbor with shorter AS distance.

ii) A's adapter will process the frames, but the adapter will not pass the datagrams up the protocol stack.

4)

a) $[(1-P_A*(1-P_B)*(1-P_C)*(1-P_D))^3]*[P_A*(1-P_B)*(1-P_C)*(1-P_D)]$

probability that A succeeds in a slot: $P_A*(1-P_B)*(1-P_C)*(1-P_D)$

probability that A does not succeed in a slot: $1-P_A*(1-P_B)*(1-P_C)*(1-P_D)$

b)$P_A*(1-P_B)*(1-P_C)*(1-P_D)+P_B*(1-P_A)*(1-P_C)*(1-P_D)+P_C*(1-P_B)*(1-P_A)*(1-P_D)+ P_D*(1-P_B)*(1-P_C)*(1-P_A)$

c) Let $X=P_A*(1-P_B)*(1-P_C)*(1-P_D)+P_B*(1-P_A)*(1-P_C)*(1-P_D)+P_C*(1-P_B)*(1-P_A)*(1-P_D)+ P_D*(1-P_B)*(1-P_C)*(1-P_A)$

The answer is $(1-X)^2*X$

d) efficiency = $P_A*(1-P_B)*(1-P_C)*(1-P_D)+P_B*(1-P_A)*(1-P_C)*(1-P_D)+P_C*(1-P_B)*(1-P_A)*(1-P_D)+ P_D*(1-P_B)*(1-P_C)*(1-P_A)$

5)

i) When the bits transmitted by a node A have yet to reach another node B, the latter senses the channel idle and in accordance with the CSMA protocol begins transmitting its frame. A short time later, B's transmission begins to interfere with A's transmission.

ii) Yes, because the code vectors are orthogonal (dot product is zero).

6)

Suppose a new station associates with AP1. When the new station sends a frame, it will be addressed to AP1. Although AP2 will also receive the frame, it will not process the frame because the frame is not addressed to it. Thus, the two APs can work in parallel over the same channel. However, the two APs will be sharing the same wireless bandwidth. If wireless stations in these two APs transmit at the same time, there will be a collision.

7)

i) No, there wouldn't be any advantage. Suppose there are two stations that want to transmit at the same time, and they both use RTS/CTS. If the RTS frame is as long as a DATA frames, the channel would be wasted for as long as it would have been wasted for two colliding DATA frames. Thus, the RTS/CTS exchange is only useful when the RTS/CTS frames are significantly smaller than the DATA frames.

ii) No, it cannot.

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i)The host will typically send a DHCP discovery message into the subnet via the AP in order to obtain an IP address on the subnet. Once the address is obtained, the rest of theworld then views that host simply as another host with an IP address in that subnet.
ii) The use of HTTP over TCP allows the video to traverse firewalls and NATs more easily, which are often configured to block most UDP traffic but to allow most HTTP traffic. Streaming over HTTP also obviates the need for a media control server, such as an RTSP server, reducing the cost of a large-scale deployment over the Internet.(THE ANSWER CAN BE VERY FLEXIBLE.)

9)

i) Except the first video frame, all of the other cannot be playout in time.

ii) Except the seventh video frame, all of the others can be playout.

iii) 1.

iv) T1+3*d.

10)

Time slot	Packets in the queue	Number of tokens in bucket
0	1,2,3,4	2
1	3,4	1
2	4,5	1
3	5,6	1
4	6	1
5	7	1
6	8	1
7	9,10	1
8	10	1

Time slot	Packet in output buffer
0	1,2
1	3
2	4
3	5
4	6
5	7
6	8
7	9
8	10

*此題答案可以多樣化, depending on the definition of students' processing time! But, it needs to adjust the corresponding values based on the definition of students' processing time! For example, Packets on the queue can be 0個 on time t_0.