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Quiz 3 solution
CSE232 Computer Networks
Duration-30min, Full marks-9

November 15, 2023

Q.1. The routing table of a router is shown below: **[1+1+1]**

Destination	Subnet mask	Interface
125.12.41.0	255.255.128.0	1
125.12.32.0	255.255.224.0	2
180.128.112.0	255.255.240.0	3
180.128.112.0	255.255.248.0	4
180.128.112.0	255.255.255.0	5
Default		0

On which interface will the router forward packets addressed to the following destinations? Explain how you obtain the answer. **Note that you will NOT be awarded partial points for correct answers without explanation.**

(a) 125.12.41.10
(b) 180.128.119.31
(c) 10.129.116.10

Ans:

(a) 2

125.12.41.10 ^ 255.255.128.0=125.12.0.0 => does not match the dest network “125.12.41.0” ;
125.12.41.10 ^255.255.224.0=125.12.32.0 => matches the dest network “125.12.32.0”

(b) 4

180.128.119.31 ^ 255.255.240.0=180.128.112.0 => matches the dest network “180.128.112.0”
180.128.119.31 ^ 255.255.248.0=180.128.112.0 => matches the dest network “180.128.112.0”
180.128.119.31 ^ 255.255.255.0=180.128.119.0 => doesn't match dest network “180.128.112.0”
Longest prefix that matches is “255.255.248.0”; the packet should be forwarded to interface 4

(c) 0

The destination IP address will not match with any routing table entry. Therefore, the packet is forwarded via the default interface, “0”.

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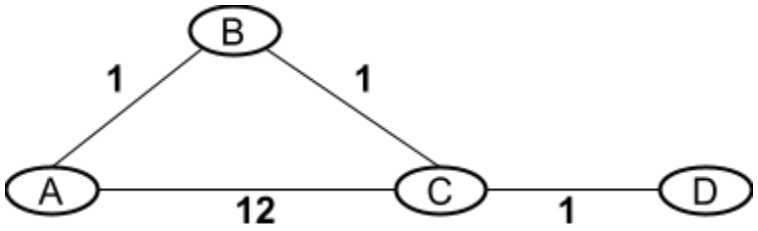
Q.2. Suppose you receive an IP packet. **[1+1+1+1]**

a. The value at the "HLEN" field (Header length) in the IP packet header is **5 (in decimal),** and the "Total length" field has a value **1500 (in decimal)**. What is the **payload/data size (in bytes)** carried by the IP packet?
b. What can you comment about IP options size if you were told that the "HLEN" field value was **10 (in decimal)?**
c. The "fragment offset" field is **100**, the "MF" flag is **0,** and the "total length" is **500.**
    i. Is this packet fragmented? Justify your answer
    ii. What is the offset of the first and last payload bytes?

Ans.

(a) Data len = Total length - HLEN*4 = 1500 - 5*4 = 1480 bytes.
(b) HLEN = 10 => IP header length = 10*4 = 40 bytes.
IP header's fixed size is 20 bytes. This implies that the IP options are present and have a size of 20 bytes.
(c)
(i) Yes
Even if "MF" is 0 indicates this is the last fragment, "fragment offset" is non-zero. This indicates that there was a fragment prior to this.
(ii) First payload byte =100*8=800;
Payload length = total length - header length = 500 - 20 = 480
Last byte=800+480-1=1299 — minus 1 since the count is inclusive of the first byte "800"
{For TAs:
Alternative solution allowed (though incorrect): Last byte=800+500-1=1299 since I did not explicitly mention header size}

Q.3. Suppose you have a topology with routers A, B, C, and D that implement **DVR (distance vector routing)** based protocol for routing. The link weights represent the cost between the corresponding routers.



Suppose all the routers are just switched ON. Assume **none of the routers have shared their distance vectors with their neighbors**; they have just finished the **routing table initialization phase**. Given the above assumptions, complete the routing table at each router. Write your answers within the space provided in the table. **[2]**

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Ans:

Routing table: A		
Dest	Cost	Next hop
A	0	-
B	1	B
C	12	C
D	inf	-

Routing table: B		
Dest	Cost	Next hop
A	1	A
B	0	-
C	1	C
D	inf	-

Routing table: C		
Dest	Cost	Next hop
A	12	A
B	1	B
C	0	-
D	1	D

Routing table: D		
Dest	Cost	Next hop
A	inf	-
B	inf	-
C	1	C
D	0	-

----------*THE END*----------