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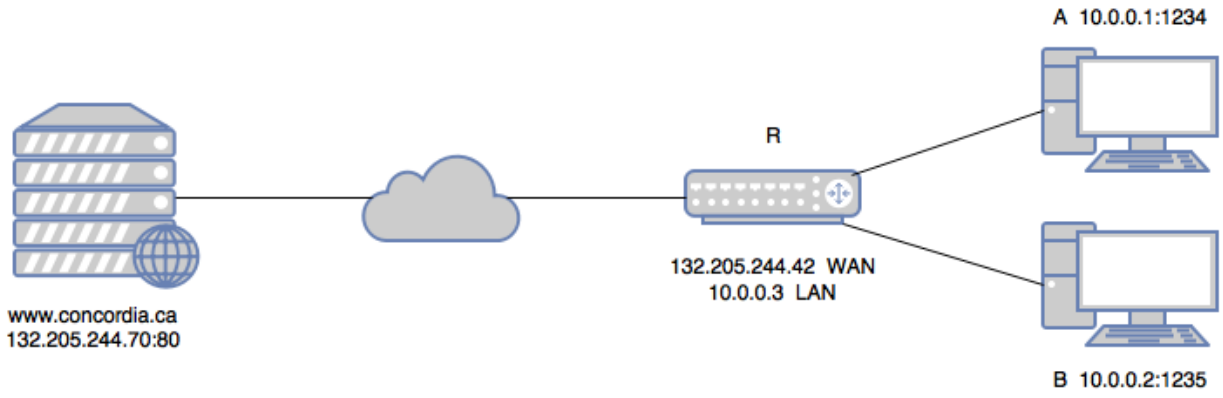
TA3: 1 Network Layer

Q1: Every host on the network has a piece of the network layer in them unlike the transport layers and other layers above. The two main functions of the network layer are forwarding and routing. Forwarding involves the transfer of a packet from an incoming link and an outgoing link within a router. Routing involves all of the network's routers. Working together using the routing protocols, routing determines the path a a packet will take from sure to destination.

Q2: The identification field is used for datagram fragmentation. This is when a datagram is broken into fragments to better accommodate the MTU of the link running different link layer protocols. The identification flag in the IPv4 datagram format allows the end host to reassemble and group diagram fragments that have the same identification flag. Datagrams have flag buts to determine the last of the fragments, 0 if it is the last datagram fragment, 1 if not.

Q3:

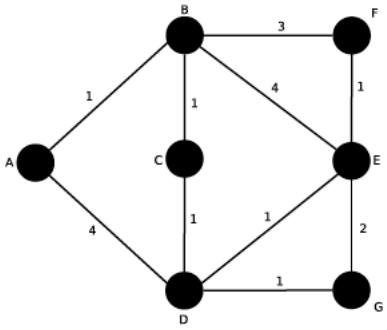
NAT table in R		
WAN Side	LAN Side	
132.205.244.42:5001	10.0.0.1:1234	A
132.205.244.42:5002	10.0.0.2:1235	B



The NAT table is held by the NAT router R. A packet request will be created from each host (A, B) containing LAN source IP, LAN source port, destination IP and destination port. The router will then take the packet and modify the LAN source IP and port with that of the routers WAN IP and an arbitrary port. This pair is recorded in the NAT table and will be used to forward the packet to the appropriate host when a response is received.

Q4: This content belongs to ICMP which belongs to the Network Layer in the Internet Model. The Type 8 code message is an ICMP message that is sent to a specified host by the ping program. The host will receive the type 8 ping request and reply with a type 0 ICMP echo message.

Q5: The table below outlines the path taken to get from node A to all other nodes using the Dijkstra algorithm. Bold entries mark the end for that node.



Steps	N'	D(B)	D(C)	D(D)	D(E)	D(F)	D(G)
	A	1,A	inf	4,A	inf	inf	inf
	AB	**1,A**	2,B	4,A	5,B	4,B	inf
	ABC		**2,B**	3,C	5,B	4,B	inf
	ABCD			**3,C**	4,D	4,B	4,D
	ABCDE				**4,D**	4,B	4,D
	ABCDEF					**4,B**	4,D
	ABCDEFG						**4,D**

Q6: Yes the RIP table of router C will change by updating its fps to subnet w because it learned there is a shorter path from the RIP table of A. The table will look like this…

Destination Subnet	Next Router	Hops to Dest.
u	-	1
v	D	3
w	A	2
x	A	3

Q7:
Starting with two-dimensional party matrix A.1, with an a bit error in row 2, column3 of matrix A. 2, the parity is now wrong and can be detected. Now with matrix A.3 there is a bit error in row 2, column 2 and 3. The parity of row 2 is correct but not correct in those columns and the row in which the error occurred can not be detected.

A.1	A.2	A.3
0 0 0 0 1 1 1 1 0 1 0 1 1 0 1 0	0 0 0 0 1 1 0 1 0 1 0 1 1 0 1 0	0 0 0 0 1 0 0 1 0 1 0 1 1 0 1 0

Q8: After the fifth collision, the adapter will choose from {0, 1, … , 31}. The probability that it chooses 4 is 1/32, approximately 3%, and will wait 204.8 microseconds.

Q9: A special MAC broadcast address is used when a sending adapter wants all other adapters on the local area network to receive and process the frame it is about to send. This address is a string of 48 consecutive 1s which is FF-FF-FF-FF-FF-FF in hexadecimal.

Q10: The purpose of the ALOHA protocol is to determine which competing station gets the next chance of accessing the multi access channel at the MAC layer. The main difference between Pure Alohas and Slotted Aloha is that in Pure, time is continuous whereas in Slotted, time is discrete. Slotted Aloha is better than Pure Aloha because the probability of collisions is less. The station waits for the next time slot to begin which allows the frame in a previous slot to pass and avoid collisions.