G22.2262: Data Communications and Network Designs: Networks

Final Exam

A user complains that the "person query" application stopped working. It was working yesterday, but it does not work today. The user is on machine 169.125.14.55, and the service is on 169.125.14.21. The user sends the name "jamesdean" to the server, and the user expects a "n" to arrive. But, the user gets no response at all!

So, you sniff the network and ask the user to run the application again. When she does, you see the following packets. The ethernet preamble and checksum have been stripped off. For your information, the letter "n" in hexadecimal is "6e", and "jamesdean" in hexadecimal is "6a 61 6d 65 73 64 65 61 6e".

```
0800 2080 f94c 0800 201f bc72 0800 4500
0026 dbbe 4000 ff11 30c1 a97d 0e37 a97d
0e15 f0c2 140e 0012 6d25 6a61 6d65 7364
6561 6e00

0800 a13f 775e 0800 2080 f94c 0800 4500
001d eaf3 4000 ff11 2195 a97d 0e15 a97d
0e37 140e f0c2 0009 1dc4 6e00
```

***Question 1*:** Why doesn't the user get the "n" as she expects?

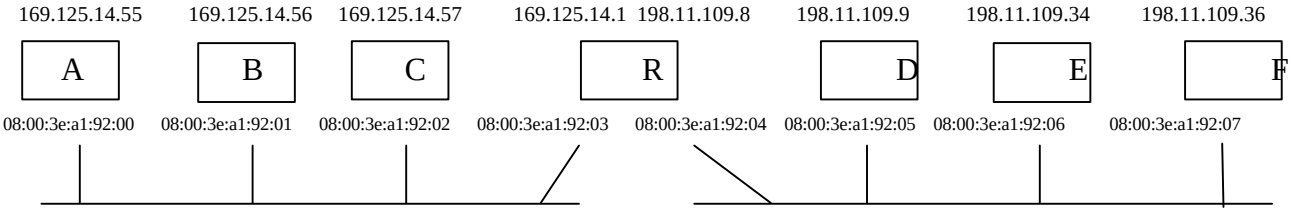
***Question 2*:** What happened to cause the problem?

***Question 3*:** What will you do to fix the problem?

***Question 4*:** Was the UDP checksum involved in the problem?

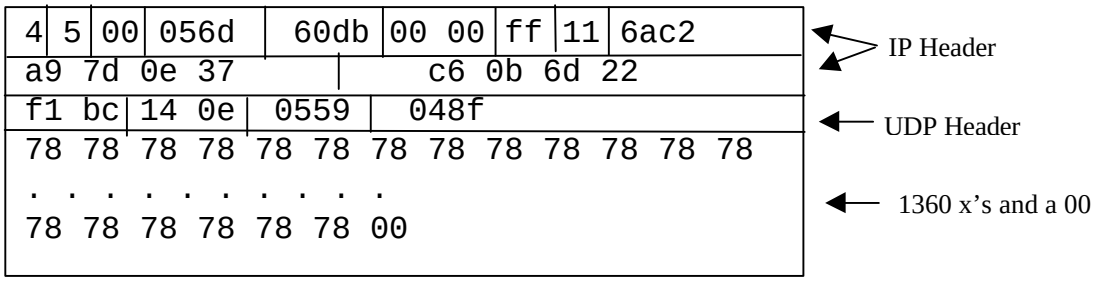
***Question 5*:** What does the 4000 in the second line of the packets mean?

Consider the following network topology:



Question 6

. Suppose the wire corresponding to 169.125.0.0 had a MTU of 500, and an application on 169.125.14.55 wanted to send data consisting of 1360 x's followed by a 00 to a service on 198.11.109.34. The packet would look like the following:



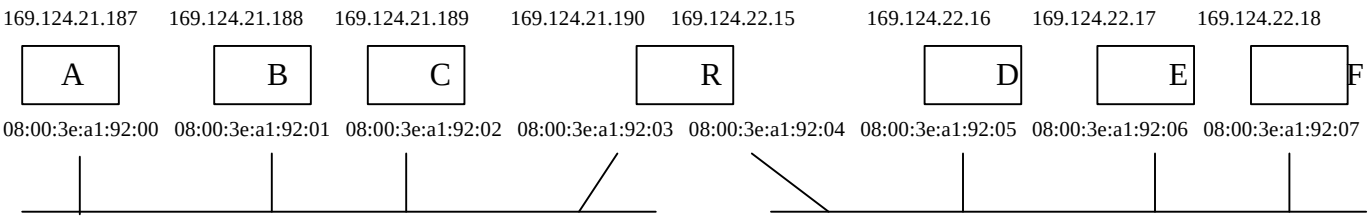
IP on 169.125.14.55 must fragment this packet. Please show the fragments that 169.125.14.55 sends, including IP and UDP checksums.

Question 7

Suppose the wire corresponding to 169.125.0.0 had an MTU of 500, but the wire corresponding to 198.11.109.0 had a MTU of 420. IP on 169.125.14.55 must fragment the packet as in the previous question, but the router R must fragment it some more! Please show the IP packets that will be placed on the 198.11.109.0 wire (don't forget that router R decrements the TTL).

Consider the following Class B configuration on old Ethernet.

For the following questions, you do not have to show padding or Ethernet checksums.



Question 8

Suppose machine R supports Proxy ARP, and machine A is *not* using subnets. Suppose machine A issues the following ARP request:

ff ff ff ff ff ff	08 00 3e a1 92 00 08 06
00 01 08 00 06 04	00 01
08 00 3e a1 92 00	a9 7c 15 bb
00 00 00 00 00 00	a9 7c 15 bc

Please show the ARP reply.

Question 9

Suppose machine R supports Proxy ARP, and machine A is *not* using subnets. Suppose machine A issues the following ARP request:

ff ff ff ff ff ff	08 00 3e a1 92 00 08 06
00 01 08 00 06 04	00 01
08 00 3e a1 92 00	a9 7c 15 bb
00 00 00 00 00 00	a9 7c 16 11

Please show the ARP reply.

Question 10

Suppose machine B supports Gratuitous ARP. Show the old Ethernet frame that B sends when it generates a Gratutious ARP request.

Question 11

If machine B was erroneously configured to have address 169.124.22.18 and machine R supports Proxy ARP, show the response that B will receive from its Gratuitous ARP request (or write "none" if no response is received).

Question 12

If machine B was erroneously configured to have address 169.124.22.18 and machine R did *not* support Proxy ARP (instead, all machines used a subnet mask of 255.255.255.0), show the response that B will receive from its gratuitous ARP request (or write "none" if no response is received).

Question 13

Suppose machine R supports Proxy ARP. Assuming E's ARP table is empty, please show the ARP table of machine E after an application on machine A issues an ARP request for E's address (or write "empty" if E's ARP table remains empty).

Miscellaneous questions

Question 14

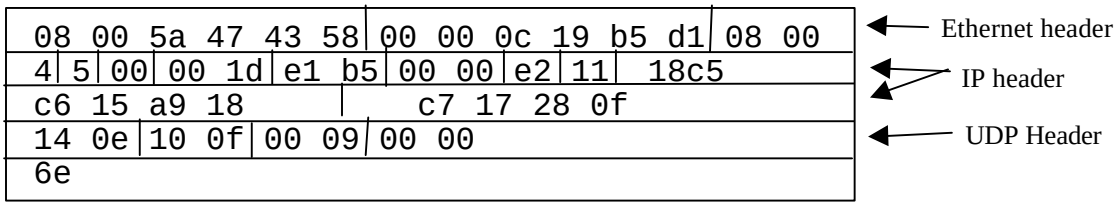
Suppose machines A and B are on a local ATM network. As we know, each ATM cell is 53 bytes in length. If IP on machine A wanted to send a 200 byte packet to machine B, would the IP software on machine A fragment the IP packet? Why or why not?

Question 15

What happens if a cell travelling in an ATM network gets corrupted in such a way that the virtual circuit identifier is modified, but it is modified in such a way that the cell still passes the checksum?

Question 16

Suppose machine with IP address 198.21.169.24 sets it Time-To-Live field to the hexadecimal value of f3 and sends a packet to 199.23.40.15. We put a sniffer on network 199.23.40.0, and we see the following packet arrive. Assuming every router only decrements the TTL by 1, how many routers handled this packet?



Question 17

If a UDP checksum results in 0, the sender sends all 1's instead. Why does it do that?