Internet Protocols: Quiz 1

- This quiz consists of true/false questions for 25 pts and two quantitative problems for 25 pts.
- In the True/False questions, the following grading policy will be used:
  - **Correct answer: +1 pt**
  - **Wrong answer: -1 pt *(negative grading is used)***
  - **Blank/Unattempted: 0 pts**
- There will be ***no negative grading for the quantitative problems***. Partial credit may be awarded where appropriate.
- Open book policy
- ***Time: 45 min.*** **Strictly enforced.**
- This is the first quiz out of three quizzes. ***Best two out of three*** will be considered for final grades. Each of the two quizzes chosen will be weighted equally.

True or False? ***(25 points)***

Note: Correct Ans = +1; Wrong Answer = -1; Did not attempt = 0

T F

❑ ❑ Layering is desired because it is the most efficient way of designing and implementing network protocols

❑ ❑ If a router looks at the TCP or UDP port numbers to base any of its decisions, it is a violation of layering.

❑ ❑ A multihomed host must be configured as a router to allow communication between the networks on the two interfaces

❑ ❑ The sockets API models the network as an I/O device with the open-read-write-close paradigm, the difference being that a socket need not be “bound” to an address upon creation.

❑ ❑ Typically, ISPs assign IP addresses dynamically to its dial-up clients

❑ ❑ As a packet passes from one end to another, it will change some of its address fields depending upon the network it traverses

❑ ❑ Ethernet and IP perform a limited protocol-based demultiplexing, whereas TCP/UDP ports allow more flexible port-based demultiplexing

T F

- ❑ ❑ A telnet server demultiplexes incoming TCP segments based upon its local IP address and port number.
- ❑ ❑ A collision domain marks the boundaries of an Ethernet LAN
- ❑ ❑ The 48-bit LAN address has internal structure, but it is considered a “flat” address since the entire address is required at every stage to forward the packet
- ❑ ❑ The key difference between Ethernet and 802.3 is that the latter has a length field, which means that the former cannot support variable length packets.
- ❑ ❑ Typical IP overhead is 20 bytes while Ethernet overhead is 14 bytes
- ❑ ❑ The Initial Seq Number (ISN) is periodically incremented to avoid confusion from packets belonging to previous incarnations
- ❑ ❑ SLIP and PPP both support dynamic IP address assignment
- ❑ ❑ When a header checksum error is detected, IP quietly drops the packet and reports the error to the source
- ❑ ❑ Fragments are created at 8-octet boundaries

True or False?

T F

❑ ❑ A result of the “end-to-end” principle was that complex control functions were pushed to the edge while the forwarding path was kept as simple as possible.

❑ ❑ Subnetting allows more levels of hierarchy in the addressing structure.

❑ ❑ The IP addresses 128.40.30.20 and 128.40.30.45 belong to the same subnet

❑ ❑ Subnetting transforms classful addressing into classless addressing

❑ ❑ The reason IP addressing is hierarchical is because the router can look at a portion of the address to decide where to forward it.

❑ ❑ Though the IP max length is 65535 octets, a destination need not accept a datagram larger than 576 bytes

❑ ❑ If a UDP checksum value is zero, it means that the sender did not compute a checksum

❑ ❑ On an Ethernet, the MSS is1500 bytes

❑ ❑ The 2MSL wait allows TCP servers to be brought down and brought up immediately

- 1) a) (7 pts) The IP checksum involves 1's complement arithmetic on 16-bit quantities. Use a similar technique, but on 4-bit quantities to compute the blank checksum field:

  1111 0000 1100 ____ 0101 1000

- 2) a) (13 pts) An IP datagram of length 2000 bytes needs to cross an Ethernet (MTU = 1500B) followed by a WAN (MTU = 576B). How many fragments reach the destination ? What are the values of the Header length, More bit, Offset, and Length fields in each fragment ?

Gimme the Solutions!!!

True or False? ***(25 points)***

Note: Correct Ans = +1; Wrong Answer = -1; Did not attempt = 0

T F

❑ √ Layering is desired because it is the most efficient way of designing and implementing network protocols

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❑ √ The key difference between Ethernet and 802.3 is that the latter has a length field, which means that the former cannot support variable length packets.

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❑ √ SLIP and PPP both support dynamic IP address assignment

❑ √ When a header checksum error is detected, IP quietly drops the packet and reports the error to the source

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❑ √ The 2MSL wait allows TCP servers to be brought down and brought up immediately

- 1) a) (7 pts) The IP checksum involves 1's complement arithmetic on 16-bit quantities. Use a similar technique, but on 4-bit quantities to compute the blank checksum field:

  1111 0000 1100 ____ 0101 1000

Checksum = 1s complement sum of the 1s complement of 4-bit quantities.

1s complement of 1111, 0000, 1100, 0101, 1000

is 0000, 1111, 0011, 1010, 0111.

1s complement sum: 0000 + 1111 = ***1111****.*

1111 *+ 0011 = 0010 + 1 (carry) =* ***0011***

0011 *+ 1010 =* ***1101***

1101 *+ 0111 = 0100 + 1 (carry) =* ***0101***

Ans: Checksum = ***0101***

2) a) (13 pts) An IP datagram of length 2000 bytes needs to cross an Ethernet (MTU = 1500B) followed by a WAN (MTU = 576B). How many fragments reach the destination ? What are the values of the More bit, (fragment) offset, and Length fields in each fragment ?

IP Datagram 2000B => payload = 1980B > Enet MTU = 1500B

=> Max IP payload is nearest multiple of 8 to 1480B (1500B - 20B) = 1480B

=> 1st fragment: Length = (1480B + 20B) = 1500B; MF set; Fragoff = 0

2nd fragment: Length = (500B + 20B) = 520B; MF not set;

Fragoff (13-bit quantity) = 1480 >> 3 = 185

WAN MTU = 576B => 1st fragment needs to be refragmented. Nearest multiple of 8 to (576B - 20B = 556B) is 552B.

=> ***Fragment 1a: Length = (552B + 20B) = 572B; MF set; Fragoff = 0***

Fragment 1b: Length = (552B + 20B) = 572B; MF set; Fragoff = 69

Fragment 1c: Length = (376B + 20B) = 396B; MF set; Fragoff = 138

Fragment 2 not fragmented further.

Ans: **Four** fragments reach the destination with the fields highlighted above.