Homework 7 (Transport Layer)

Fill in your answers in Exercise 7 under *Tests & Quizzes* in Connex.

Concepts

- Port Multiplexing and Demultiplexing
- Sockets and Port numbers
- Checksum
- TCP Sequence and acknowledgement Numbers

Q1

Consider a `TCP` connection between host `A` and host `B`. Suppose that the `TCP` segments traveling from `A` to `B` have source port number `x` and destination port number `y`. What are the source and destination port numbers for the segments traveling from `B` to `A`?

Q2

Suppose a process on host `C` waits for `UDP` datagram continuously using a `UDP` socket with port number `6789`. Support both host `A` (with UDP port number 2345) and host `B` (with UDP port number 5432) each sends a `UDP` datagram to host `C` with destination port number `6789`. Will host `C` be able to process the datagrams from `A` and `B` eventually?

Q3

From **Q2**, how will the process at host `C` know that these two datagrams from two different hosts?

Q4

`UDP` and `TCP` use 1's complement for their checksums. Suppose you have the following three 8-bit bytes: 01010011, 01100110, 01110100. What is the checksum of these 3 bytes. (Note: although `UDP` and `TCP` use 16-bit word sum, we are only computing with 8-bit for this problem.)

Q5

The UDP/TCP 16-bit checksum computes only the sum over the payload.

Q6

Assume that the checksum inside a UDP/TCP header is x (16-bit value), a UDP/TCP packet (datagram or segment) is received, and the computed sum (in 1's complement) of the whole packet (plus padding to 16-bit) is y. What is the value of y?

Q7

Host `A` and `B` are communicating over a `TCP` connection, and host `B` has already received from `A` all bytes up through byte 126 inclusively. Suppose host `A` then sends two segments to host `B` back-to-back. The first and second segments contain 80 and 40 bytes of data respectively.

In the first segment, the sequence number is 127, the source port number is 302, and the destination port number is 80. Host `B` sends an acknowledgement whenever it receives a segment from `A`.

In the second segment sent from A to B, what are the sequence number, source port number, and destination port number?

Q8

From **Q7**, if the first segment arrives before the second segment, host `B` sends back an acknowledgement of the first arriving segment, its acknowledgement number is ____, its source port number is _____, and its destination port number is ____.

Q9

From **Q7**, if the second segment arrives before the first segment at `B`, host `B` sends back an acknowledgement after the second segment arrives, its acknowledgement number is _____.

Q10

From **Q7**, suppose the two segments sent by `A` arrive in order at `B`. But, the first acknowledgement is lost and second acknowledgement arrives after the first timeout interval at `A`.

After first timeout, the first retransmitted segment sequence number is _____; and the second acknowledge number is _____.