CSE 473 – Introduction to Computer Networks

Review Questions 14

Your Name:

Please print out this form (two-sided, if you can) and write your answers *legibly* in the spaces provided. If you can't write legibly, type.

1. Which of the following IP addresses are "matched" by the address prefix 123.234.99.10/20?

   123.235.31.10 123.234.95.23 123.234.102.10 123.456.140.10

   Because the mask is 20, addresses must have the same firs 20 bits for the prefix to be a match. This readily rules out 123.235.31.10 that differs in its second byte. For the other three addresses, we need to look at how their 3rd byte compares to that of the prefix.

   *The third byte of the prefix is of the form 0110 ****, i.e., only the first 4 bits matter given the mask size of 20 (16+16+4 = 20). We have: 95 = 0101 1111, 102 = 0110 0110, 140 = 1000 1100. Hence, the prefix is a match only for 123.234.102.10*

2. Suppose a host receives 10 IP packets with the same source address and the id field in these packets are: 3, 7, 8, 8, 8, 7, 9, 13, 3, 13. How many distinct packets were sent by the original host?

   Fragments with the same ID value belong to the same packet. This implies that the original host only sent 5 distinct packets.

3. Consider a router with a 10 Gbps output link that is receiving an aggregate input rate consisting of one 5 Gbps flow and ten 1 Gbps flows. What throughput does each flow get if they share a common queue? How does this change if there are 11 queues, one for each flow, that are served in round-robin fashion?

   If all flows share a common queue, they share the output bandwidth of 10 Gbps in proportion to their input rate, i.e., 5/15 = 1/3 for the 5 Gbps flow and 1/15 for the 1 Gbps flows. This translates into rates of 3.33 Gbps and 666.66 Mbps for the 5Gbps and 1 Gbps flows, respectively.

   If each flow was assigned its own queue, they would equally share transmission opportunities for a throughput of 10/11 = 909 Mbps each.