

COE 344 – Quiz # 3

Name: Key Solution

ID#:

1. (4 points) Briefly explain how TCP demultiplexing takes place? Does it differ from UDP? Why?

The demultiplexing function takes place at the receiver side at the transport layer. In particular for a TCP connection, the demultiplexing needs to check 4-tuple that constitutes a unique logical TCP connection between the client and the server. These 4-tuples are source IP address, source port number, destination IP address and destination port number.

For UDP, it differs from TCP in that it is a connectionless protocol and therefore the demultiplexing needs to check only 2-tuple; destination IP address and destination port number.

2. (8 points) Discuss the out of order packet reception problem and what you will do to overcome this problem.

The out-of-order packet problem is very expected in the internet as the network layer is providing only a datagram packet switching service. Therefore, packets are expected to traverse different routs which will cause this problem.

To overcome this problem, the reliable data protocol needs to be equipped with the following:

- ✓ **Robust sequence numbering** for the packets → to help in reordering and discovering gaps. Also, the robustness will help in avoiding any possible ambiguity in duplicate packets for example.
 - ✓ **Automatic repeat request mechanisms** → to automate the request for resending the missing packets
 - ✓ **Buffers in both sides**; sender and receiver
3. (3 points) Consider stop-and wait flow control mechanism, define the system utilization under such mechanism.

Utilization is the ratio of the time the server is busy to the total time for successful delivery. For example, for a L packet size, R channel rate, and RTT is the round trip time, the utilization is

$$U = \frac{L/R}{RTT + L/R}$$