CS224 (m): Computer Networks (minor)
Tutorial 07, 14/16 Sep 2016

Concepts tested: IP service model, IP packet format

1. From the time a packet is received to the time it leaves a router, how many layers of the OSI protocol stack does it pass through?

2. Suppose 1MByte of application data (including application layer header) has to be sent out of a host attached to Ethernet. How many datagrams are sent as a result? Assume the application uses TCP protocol and that the IP as well as TCP header is 20 bytes each. Recall that Ethernet MTU is 1500 bytes (i.e. Ethernet's payload). What is the IP packet size (in bytes, including IP header) of the last datagram?

3. Suppose IP datagrams of original size 5000 bytes are being sent over a link with MTU size of 1500 and 1% frame loss rate. What is the probability that the original datagram cannot be reconstructed? Express probability in percentage.

4. Suppose the maximum time an IP datagram can stay in the network before being delivered to the receiver is 60 sec (MSL: Maximum segment lifetime is 60 sec). Under what rate should a host send 1000 Byte datagrams so as to avoid confusion during reassembly of fragments at the receiver?

5. From your computer, use wget or ping to generate some traffic. Observe the various fields of IP headers.

6. You can force fragmentation by using "ping" packets of large size. You can specify the size using the -s option in linux or the -l option in windows cygwin. You can ping your friend's machine and observe IP fragmentation in action via wireshark. (Note that some of CC's routers are configured to drop ping packets, so you may not be able to ping any arbitrary machine).