Course ISE 327, EEE 051: Introduction to Computer Networks
Recitation 7

Michael J. May

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Note: The fragmentation problem as solved on the board in class is shown below as *IP Packet Fragmentation 1*. This version does not take the link layer headers into consideration. The second version *IP Packet Fragmentation 2* is shown below to illustrate how taking the link layer headers into consideration would affect the packet fragmentation sizes.

1 IP Packet Fragmentation 1

Suppose a TCP message that contains 2048 bytes of data and 20 bytes of TCP header is passed to IP for delivery across two networks of the Internet (i.e., from the source host to a router to the destination host). The first network uses 14-byte headers and has an MTU of 1024 bytes; the second uses 8-byte headers with an MTU of 512 bytes. Each networks MTU gives the size of the largest IP datagram that can be carried in a link-layer frame **including the link layer header**. Give the sizes and offsets of the sequence of fragments delivered to the network layer at the destination host. Assume all IP headers are 20 bytes.

2 IP Packet Fragmentation 2

Suppose a TCP message that contains 2048 bytes of data and 20 bytes of TCP header is passed to IP for delivery across two networks of the Internet (i.e., from the source host to a router to the destination host). The first network uses 14-byte headers and has an MTU of 1024 bytes; the second uses 8-byte headers with an MTU of 512 bytes. Each network's MTU gives the size of the largest IP datagram that can be carried in a link-layer frame **(not including the link layer header)**. Give the sizes and offsets of the sequence of fragments delivered to the network layer at the destination host. Assume all IP headers are 20 bytes.

3 Subnetting

SubnetNumber	SubnetMask	NextHop
128.96.170.0	255.255.254.0	Interface 0
128.96.168.0	255.255.254.0	Interface 1
128.96.166.0	255.255.254.0	R2
128.96.164.0	255.255.252.0	R3
<Default>		R4

Suppose a router has built up the routing table shown in the table above. The router can deliver packets directly over interfaces 0 and 1, or it can forward packets to routers R2, R3, or R4. Assume the router does the longest prefix match. Describe what the router does with a packet addressed to each of the following destinations:

(a) 128.96.171.92

(b) 128.96.167.151

(c) 128.96.163.151

(d) 128.96.169.192

(e) 128.96.165.121