Data Communications, Lab 3

Theoretical Assignment

Axel Alvin, Lukas Axelborn

1. Sub 2: 223.1.17.0 → 223.1.17.127 (128 addresses)
   Sub 1: 223.1.17.128 → 223.1.17.191 (64 addresses)
   Sub 3: 223.1.17.192 → 223.1.17.207 (16 addresses)

2. The datagram is 3500 bytes, the IP header is 20 bytes which leaves 3500 – 20 = 3480 bytes to be transmitted. With an MTU of 1024 bytes, 1024 – 20 = 1004 bytes may be transmitted in each packet which leaves us with 3480/1004 = 4 packets to transport the datagram.
   Packet 1: ID = x (assumed ID), lenght = 1024, MF = 1, frag_offset = 0
   Packet 2: ID = x, lenght = 1024, MF = 1, frag_offset = 60
   Packet 3: ID = x, lenght = 1024, MF = 1, frag_offset = 120
   Packet 4: ID = x, lenght = 468, MF = 0, frag_offset = 180

3. Five collisions tells us that the k-value 4 is one out of 32 possible values ($2^5 = 32$), therefor there is a 1/32 chance that k=4 (1/32 = 0.03125 = 3.125 %)
   Given a 100 Mbps network, each bit transmitts in 10^{-8} seconds, then K * 512 bit-times → 4 x 512 x 10^{-8} = 0.00002048 = 0.02048 ms

4. If A already has a complete ARP-table then it simply has to check the table to find the desired destination. The ARP-table tells A that the destination host is not present in A’s network, therefor A sends the packet to the router. By using it’s routing table, the router finds that the destination host is not present in either one of it’s connected networks, therefor it sends the packet to the second router. The second router has the destination host in one of it’s networks and so it sends it there.

   If A does not have a complete ARP-table then it first has to send out an ARP-request to fill it, before the previously described event can occur. The way this works is, basically, that A ”screams out” to all hosts in all connected networks asking for a host with the desired IP-address. The host then sends an ARP-response back to the source containing its MAC-address that the source puts into its table.