Problems #5

Chapter 5

Sam Quinn

CS372

03/08/2016

1)

If the passenger is analogous to the datagram then the link layer would be analogous to the transportation method for the passanger be it a train, bus, airplane, or boat.

2)

TCP would still be necessary for transmission. There are ways for packets in a completely reliable network to still get misplaced or out of order in transmission. TCP would still be desired in order to keep the packets that are received in the same order as they were sent. TCP's duplicate packet error detections would be redundant since the packets in this network would be guaranteed to arrive.

3)

Framing Both IP and TCP will use a frame for holding all the required information.
Link access Both protocols need to have medium access control (MAC) protocol for the ability to send the frame to the link.
Reliable delivery IP and TCP are both guaranteed delivery systems
Error detection TCP and IP need to have some way to determine when an error occurs during transmission.

4)

Because A token ring network avoids collisions by each node taking a turn in order going around the ring, if the ring is very large then each node would have a very long delay until they were able to talk. If the network was arranged with an Ethernet deployment in a s star configuration the network would function much better since each node will be isolated meaning that they can initiate a conversation without the need for taking turns. Their link would also go directly to the HUB or Switch rather than the other nodes, so if one node goes down it will not bring the whole network down with it.

5)

A)

IPv6 addresses are 128 bits in length which is around 2^128 address which is a lot!

B)

MAC addresses are 48 bits in length which is around 2^48 MAC addresses.

C)

IPv4 is 32 bits in length which is 2^32 addresses.

6)

An ARP request is a packet asking “who owns this address?”. The reason that it is a broadcast is because if nobody has the address the requester doesn’t expect a response. The reason that an ARP response is sent directly back to the requester is that the responder, who owns the address that was in question, knows who the requester was and it is important for the responding message to make it back, so the address is not given to someone else.

7)

A)

Data 1111 0
0000 0
1001 0

No errors

1	1	1	1	0
0	0	0	0	0
1	0	0	1	0
0	1	1	0	0

Has errors

1	1	1	1	0
0	1	0	0	1
1	0	0	1	0
0	0	1	0	1

B)

Data 1111 0
0000 0
1001 0

No errors

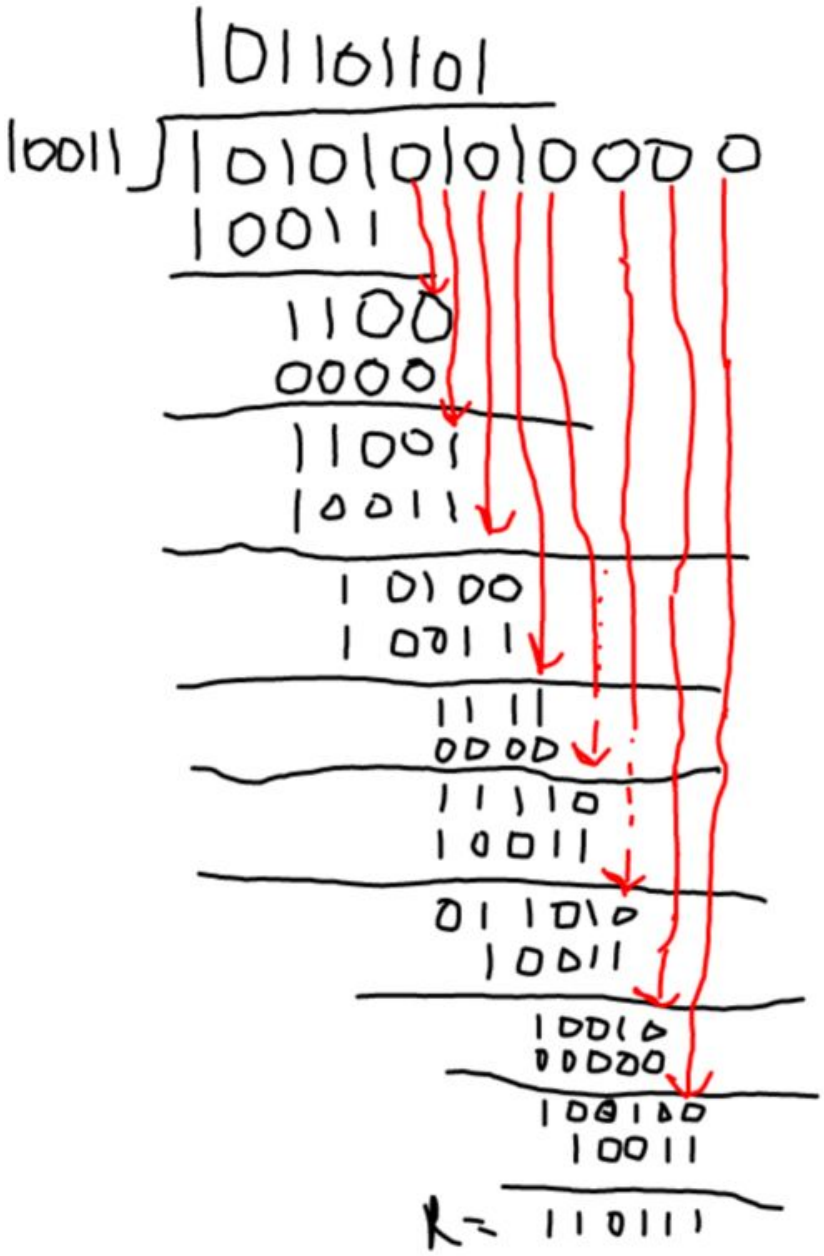
1	1	1	1	0
0	0	0	0	0
1	0	0	1	0
0	1	1	0	0

Has errors

1	1	1	1	0
0	1	0	0	1
1	1	0	1	1
0	1	1	0	0

As you can see the bottom checksum is normal but the checksum on the right is wrong. Because the two errors cancel each other out in the bottom checksum no correction can be made.

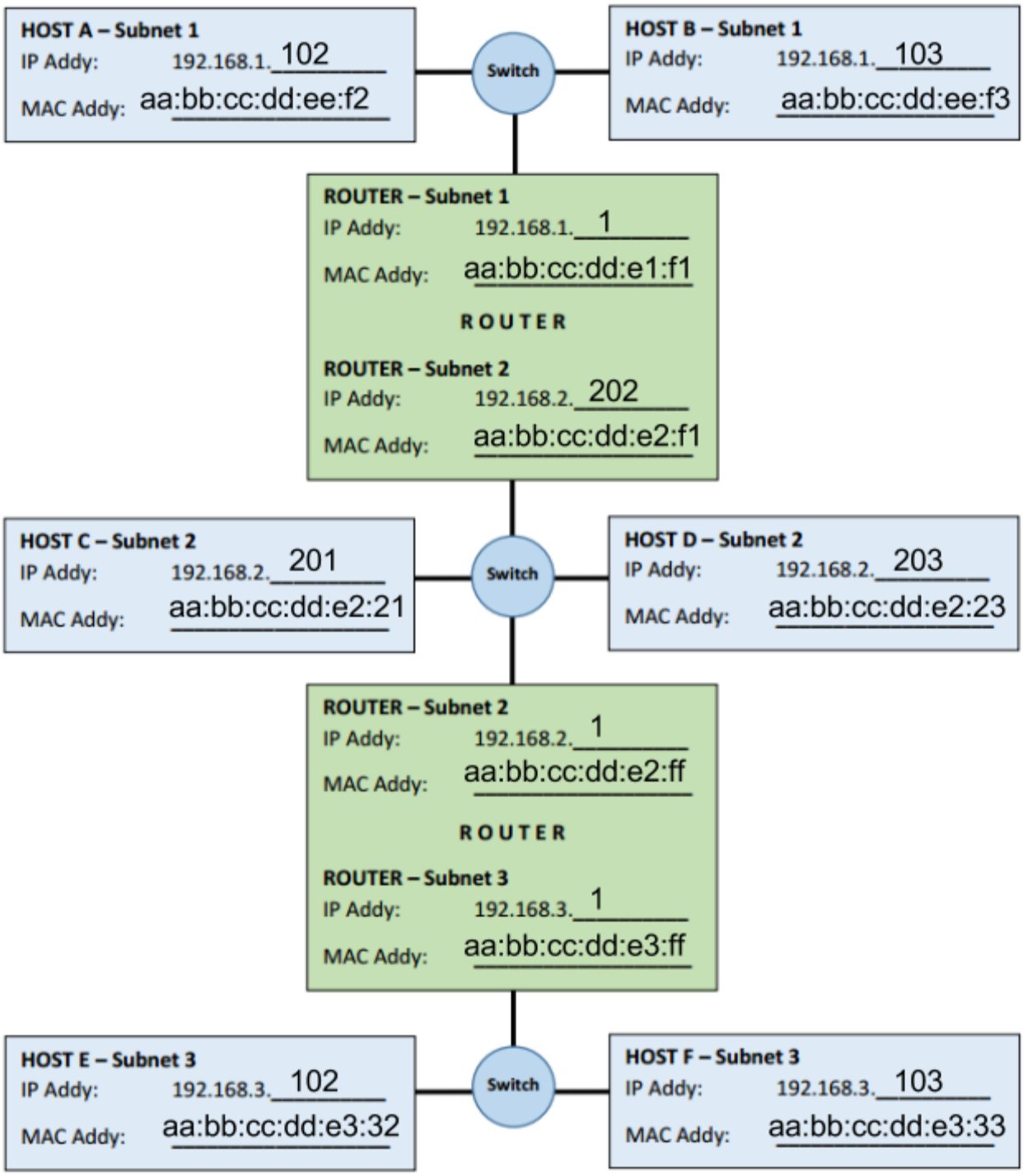
8)



However I do not think this is right..

9)

A)



B)

Host E[192.168.3.102, aa:bb:cc:dd:e3:32] sends the datagram to Router-Subnet 3[192.168.3.1, aa:bb:cc:dd:e3:ff] which has a datagram addressed to Router-Subnet 2[192.168.2.202, aa:bb:cc:dd:e2:f1] which has another datagram addressed to Host B[192.168.1.103, aa:bb:cc:dd:ee:f3]

C)

Host E will make an ARP broadcast to every host in its subnet which the Router-Subnet 3 would reply with an up to date ARP table.

10)

A)

Source IP: 192.168.1.102
Source MAC: aa:bb:cc:dd:ee:f2
Destination IP: 192.168.1.1
Destination MAC: aa:bb:cc:e1:f1

B)

Source IP: 192.168.2.202
Source MAC: aa:bb:cc:dd:e2:f1
Destination IP: 192.168.2.1
Destination MAC: aa:bb:cc:e2:ff

C)

Source IP: 192.168.3.1
Source MAC: aa:bb:cc:dd:e3:ff
Destination IP: 192.168.3.103
Destination MAC: aa:bb:cc:e3:33

11)

A)

You could allocate these addresses with a netmask of 255.255.255.240

Router: 192.168.1.1

Port 1	192.168.1.2-14 // Trunk to port 16
Port 2	192.168.1.17-30
Port 3	192.168.1.30-46
Port 4	192.168.1.19-62
Port 5	192.168.1.65-78
Port 6	192.168.1.81-94
Port 7	192.168.1.97-110
Port 8	192.168.1.113-126
Port 9	192.168.1.129-142
Port 10	192.168.1.145-158
Port 11	192.168.1.161-174
Port 12	192.168.1.177-190

Port 13	192.168.1.193-206
Port 14	192.168.1.209-222
Port 15	192.168.1.225-238
Port 16	192.168.1.241-254 // Trunk to port 1

B)

For the CS vlan to be able to communicate with the EE vlan there would have to be some path between the two. One method of doing this is called VLAN Trunking, where a specific port on each of the VLANs connect to each other. In the chart above I have chosen port 1 and 16.

12)

1) The computer will connect to the network with no IP address. It will obtain an IP via DHCP by broadcasting a UDP packet reqesting for a IP address on 255.255.255.255
2) The DHCP server will broadcast an IP address offer back.
3) The computer will send an ACK directly back to the DHCP server accepting the IP.
4) The computer now needs to find the MAC of the router interface to send packets out of the network. This is done with an ARP query which will also broadcast to all network nodes like in DHCP. The router will reply with its address directly to the computer.
5) Now that the computer has an IP address and the MAC of the router it will need to find the IP of the website where the download is. A DNS query is encapsulated in a UDP packet and delivered to the router.
6) The DNS query is bounced around between servers until an authoritative server sends a reply back to the router.
7) The router will then NAT translate the DNS reply back to the computer.
8) Now that the computer has the address of the website it will begin to make the request for the file within a TCP packet.
9) The TCP packet contain the HTTP request will be sent to the web server via its IP retrieved from DNS.
10) The web server will respond with a SYN ACK packet saying that it is ready to serve the file.
11) The computer will reply with an ACK completing the 3-way handshake.
12) The server will send an HTTP reply with the file that is to be downloaded back.
13) Each of the segments that the computer receives it will send an ACK packet back to ensure that all the data is arriving correctly.
14) After the file transfer is complete the computer will send a terminating packet to the server and end the interaction.