NAME : RADHIKA PATWARI
ROLL NO. : 18CS10062

DATE : 10/4/2021
Computer Networks[CS31006] Class test 5
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1.
Roll no : 18CS10062
ASCII code : 18CS62

Values :
1 = 0x31
8 = 0x38
C = 0x43
S = 0x53
6 = 0x36
2 = 0x32

Sender side (checksum is 0 here) (taking 16-bits)

3 1 3 8 (18)
4 3 5 3 (CS)
3 6 3 2 (62)
0 0 0 0 (checksum)(initial)

In bits form, we have

111 111 111 1 (carries)
0011 0001 0011 1000 (18)
0100 0011 0101 0011 (CS)
0011 0110 0011 0010 (62)
0000 0000 0000 0000 (initial checksum - all 0)
= 1010 1010 1011 1101 (partial sum)

As no carry left : sum = partial sum = 1010 1010 1011 1101
Taking 1's complement of sum = 0101 0101 0100 0010 = 5542
Thus, checksum to be send = 5542 = 0101 0101 0100 0010

Receiver side

3 1 3 8 (18)
4 3 5 3 (CS)
3 6 3 2 (62)
5 5 4 2 (checksum)(received from sender)

In bits form, we have

111 111 11 1 (carries)
0011 0001 0011 1000 (18)
0100 0011 0101 0011 (CS)
0011 0110 0011 0010 (62)
0101 0101 0100 0010 (checksum received)
= 1111 1111 1111 1111 (partial sum)

As no carry left : sum = partial sum = 1111 1111 1111 1111
Taking 1's complement of sum = 0000 0000 0000 0000

Thus, new checksum at receiver end = all 16 bit zeros = indicating no transmission error

2.
a.
Source ip : 10.0.0.1
Destination ip : 10.0.1.1
Source MAC : 00:0a:95:9d:68:16
Destination MAC : 00:b7:91:8d:12:0a

b.
Source ip : 10.0.0.1
Destination ip : 10.0.1.1
Source MAC : 00:A0:C9:14:C8:29
Destination MAC : 00:1B:44:11:3A:B7

c.
After the routing procedure running at R1 decides the next hop of the packet, R1 decides about the destination MAC address for the packet using Address Resolution Protocol (ARP)

The data link service at R1-eth2, creates a ARP header with the following data:

Source protocol address=10.0.1.2
Source hardware address=00:A0:C9:14:C8:29
Target protocol address= 10.0.1.1
Target hardware address= ?
and ethernet frame with
Source ip=10.0.1.2
Destination ip=255.255.255.255 (broadcast ip address)
Source address=00:A0:C9:14:C8:29
Destination address= FF:FF:FF:FF:FF:FF (broadcast mac address)

This frame is then broadcasted to all switches (L2) in the subnet connecting at R1-eth2 using Spanning Tree Protocol.All machines receive this packet and extract the target protocol address from the frame. They then match it with their own ip address.If it does not match, they drop the frame.This address matches the ip address at H2, so it fills the target hardware address of the ARP reply as 00:1B:44:11:3A:B7. So finally it returns the following to the route R1-eth2 and hence the mac address of the next hop H2 is obtained.

Source protocol address=10.0.1.2
Source hardware address=00:A0:C9:14:C8:29
Target protocol address= 10.0.1.1
Target hardware address=00:1B:44:11:3A:B7
and ethernet frame with
Source ip=10.0.1.1
Destination ip=10.0.1.2
Source address=00:1B:44:11:3A:B7
Destination address= 00:A0:C9:14:C8:29

3.
N = 62
Cable = (N%4)+1 = 2+1 = 3 Gbps = 3x10^9 bits per sec
Length of cable = 1 km
Signal speed of the cable = 200000 km/sec
Minimum frame size for the cable = ?

Transmission rate in the cable in one direction = length of cable/signal speed = 1km/200000km/sec = 5 x 10^-6 sec = 5 usec

Round trip time for the cable = 2*5 usec = 10 usec
Frame should take 5usec to reach the receiver,then it has 5usec extra to pass a collision signal in case a collision occurs.

We consider round trip time as for CSMA/CD , contention/collision is detected with the same contention slot.So frame transmission time = 2*propagation delay = 10 usec

Thus, a 3Gbps cable can transmit = (3x10^9) * (10x10^-6) / 2 bits = 15000 bits = 1875 bytes

Minimum frame size = 1875 bytes