

Spring 2025, CS 3611: Computer Networks

Homework 5

Solution to problem 1

1 1 1 0 1

0 1 1 0 0

1 0 1 1 1

1 1 0 0 0

1 1 1 1 0

Solution to problem 2

If we divide 10011 into 1010101011 0000, we get 1011011101, with a remainder of R=0111. Note that, G=10011 is CRC-4-ITU standard.

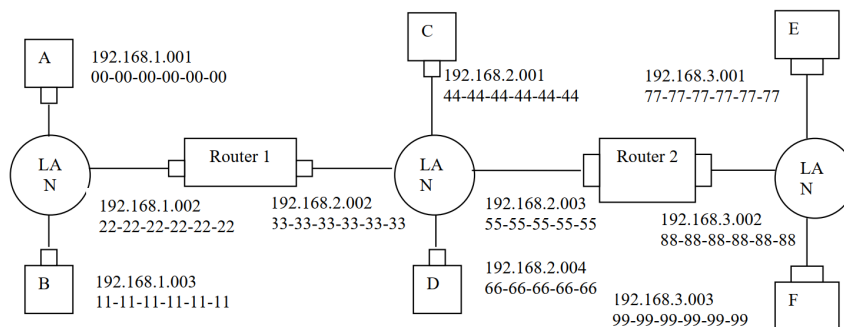
Solution to problem 3

1. we get 0101010101, with a remainder of R=1111.
2. we get 1011010101, with a remainder of R=1111.
3. we get 1000110000, with a remainder of R=0000.

Solution to problem 4

part 1,2

See figure below.



part 3

a) Forwarding table in B determines that the datagram should be routed to interface 192.168.1.002.

b) The adapter in B creates an Ethernet packet with Ethernet destination address 22-22-22-22-22-22.

c) Router 1 receives the packet and extracts the datagram. The forwarding table in this router indicates that the datagram is to be routed to 198.162.2.003.

d) Router 1 then sends the Ethernet packet with the destination address of 55-55-55-55-55-55 and source address of 33-33-33-33-33-33 via its interface with IP address of 198.162.2.002.

e) The process continues until the packet has reached Host B.

part 4

ARP in B must now determine the MAC address of 198.162.1.002. Host B sends out an ARP query packet within a broadcast Ethernet frame. Router 1 receives the query packet and sends to Host B an ARP response packet. This ARP response packet is carried by an Ethernet frame with Ethernet destination address 11-11-11-11-11-11.

Solution to problem 5

At $t = 0$ A transmits. At $t = 576$, A would finish transmitting. In the worst case, B begins transmitting at time $t = 349$, which is the time right before the first bit of A 's frame arrives at B . At time $t = 349 + 350 = 699$ B 's first bit arrives at A . Because $699 > 576$, A finishes transmitting before it detects that B has transmitted. So A incorrectly thinks that its frame was successfully transmitted without a collision.

Solution to problem 6

Action	Switch Table State	Link(s) packet is forwarded to	Explanation
B sends a frame to E	Switch learns interface corresponding to MAC address of B	A, C, D, E, and F	Since switch table is empty, so switch does not know the interface corresponding to MAC address of E
E replies with a frame to B	Switch learns interface corresponding to MAC address of E	B	Since switch already knows interface corresponding to MAC address of B
A sends a frame to B	Switch learns the interface corresponding to MAC address of A	B	Since switch already knows the interface corresponding to MAC address of B
B replies with a frame to A	Switch table state remains the same as before	A	Since switch already knows the interface corresponding to MAC address of A