

Computer Networks – FALL 2020

Assignment # 07

Due Date: 29/12/2020

Time: 11:59 PM

Use Computer Networking - A Top-Down Approach 6th Edition for this assignment

Part 1

Cyclic Redundancy Check (CRC): In this problem, we will evaluate the error detection capabilities of CRC. Consider the following properties of the CRC checksum:

1. All single bit errors will always be detected.
2. If $x+1$ is a factor of generator polynomial $G(x)$, then all odd number of bit errors will always be detected.
3. All burst errors of length less than the length of generator string G will be detected. Note that the length of a burst of error means the length of string from first errored bit to the last errored bit (both inclusive) in the original data.
4. Other errors may also be detected, but there is no guarantee.

Please answer the following:

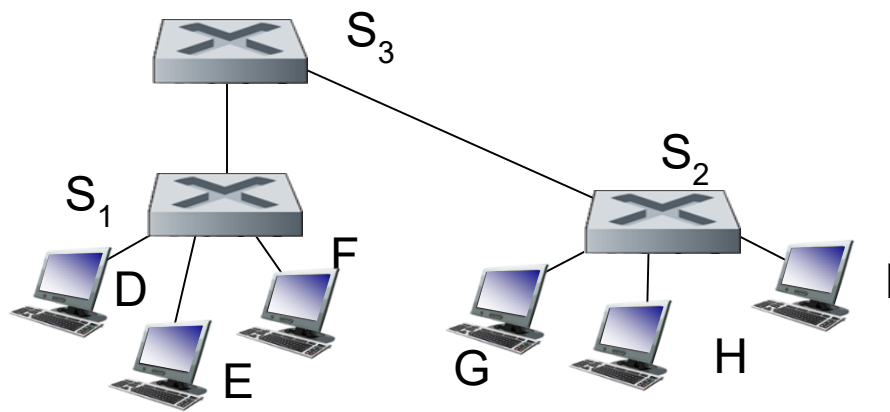
1. Station A wants to send a data string $D = 1010101101$ to station B using the CRC generator string $G = 11001$ (equivalent to generator polynomial $G(x) = x^4 + x^3 + 1$). What is the complete checksummed message that is sent?
2. Station A wants to send a data string $D = 101101010110101$ to station B using the CRC generator string $G = 11011$ (equivalent to generator polynomial $G(x) = x^4 + x^3 + x + 1$). For each of the following received messages, indicate whether or not station B will be able to detect the errors. (NOTE: The CRC field in the received messages is not shown and may be assumed to have no errors.)

- 1) 101101011110101
- 2) 101001010010111
- 3) 101101001000101

Part 2

Which MAC protocol for wired and wireless communication is widely used on the link layer as of today? What are its two flavors of wired and wireless communication? Why are there two different flavors as compared to the same being used on both wired and wireless technology?

Part 3



Consider the figure given above where mesh topology is used to interconnect different end systems on the same machine. Use the following switch table to answer the questions at the end:

Table 1 Switch 1

MAC address	Interface	TTL
D	1	20
E	2	20
F	3	20
G	4	20
H	4	20

Table 2 Switch 2

MAC address	Interface	TTL
D	4	20
E	4	20
F	1	20
G	2	20
H	3	20

Table 3 Switch 3

MAC address	Interface	TTL
D	1	Infinite
E	1	20
F	1	20
G	2	20
H	2	20

1. What will the switch 1 do when a frame is sent from node D to node F?
2. What will the switch 1 do when a frame is sent from node D to node E?
3. What will the switch 1,2, and 3 do when a frame is sent from node D to node I.

4. What will the switch 1,2, and 3 do when a frame is sent from node G to node F?
5. What will the switch 1,2, and 3 do when a frame is sent from node I to node E?
6. The above tables were set at time $t = 0$. Suppose that at time $t = 40$, node H sends data to node G. What will be the behavior of switch 2?