Started on	Tuesday, 25 May 2021, 11:09 AM
State	Finished
Completed on	Tuesday, 25 May 2021, 11:59 AM
Time taken	50 mins 1 sec
Grade	**43.51** out of 100.00

Question 1

Correct Mark 10.00 out of 10.00

Suppose the information content of a packet is the bit pattern 0100 1100 1001 1110 and an ODD parity scheme is being used. What would the value of the field containing the parity bits for the case of two-dimensional parity scheme?

Please fill in your answer in the following matrix!

bits	parity
0100	0 ✓
1100	1 ✓
1001	1 ✓
1110	0 ✓
parity 0000 ✓	1 ✓

Question 2

Incorrect Mark 0.00 out of 15.00

A data **D** that consists of bit-stream **1101111101** is sent out using **CRC** error detection with generator **G = 1010**. Determine the value of **R** that is sent out together with the data **D**!

Answer: 011 ✗

The correct answer is: 110

Question 3

Not answered Marked out of 25.00

Suppose eigth nodes -- A, B, C, D, E, F, G, and H -- are competing for a channel using Slotted ALOHA. Assume each node has an infinite number of packets to send. Each node attempts to transmit in each slot with probability ***p***. The first slot is numbered slot 1, the second slot is numbered slot 2, and so on.

- What is the probability of node C succeeds for the first time in slot 6? (**NOTE:** do not use space and use dot (".") sign to express multiplication) ✗
- What is the probability of the first success in slot 7? (**NOTE:** do not use space and use dot (".") sign to express multiplication) ✗
- Find value ***p**** that maximizes the efficiency? (**HINT:** use first derivative from the equation) ✗

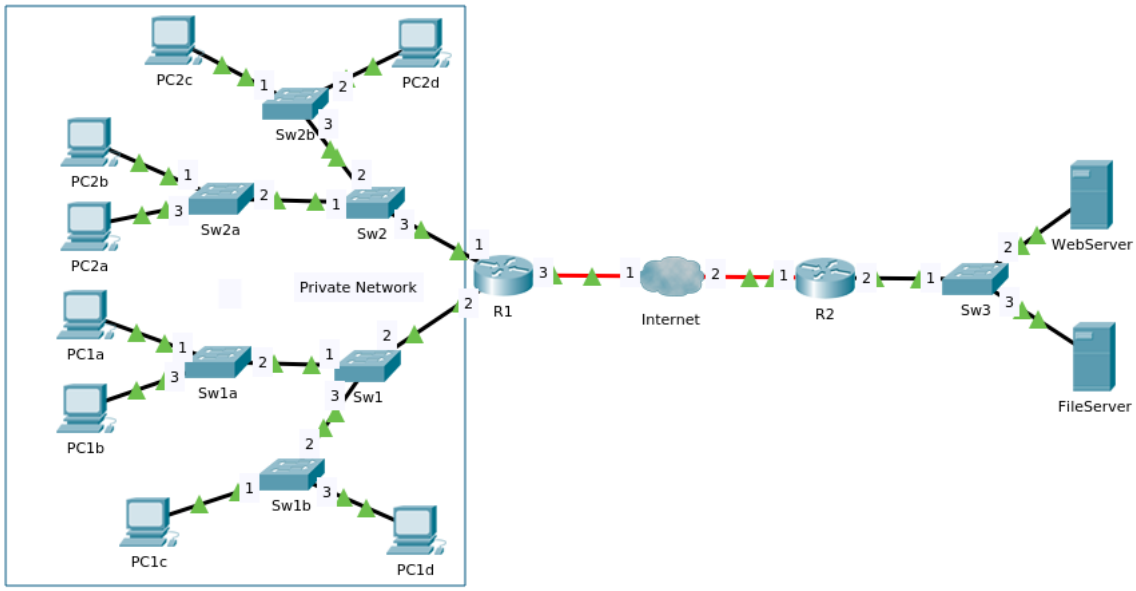
The probability of node C succeeds for the first time in slot 6: probability of C fails in the first 5 slots and succeeds in the 6^{th} slot. The probability of C succeed in a slot (p_C): $p(1-p)^7$, thus the probability of C fails to transmit in a slot: $1-p_C = 1 - p(1-p)^7$. Now, the probability of C succeeds for the first time in slot 6: $p_C(1-p_C)^5 = \mathbf{p(1-p)^7(1-p(1-p)^7)^5}$

The probability of the first success in slot 7: the probability of any node fails in the first 6 slots and succeeds in the 7^{th} slot. The probability of any node succeed in a slot (p_{any}): $8p(1-p)^7$, thus the probability of any node fails to transmit in a slot: $1-p_{any} = 1-8p(1-p)^7$. Now, the probability of any node succeeds for the first time in slot 7: $p_{any}(1-p_{any})^6 = \mathbf{8p(1-p)^7(1-8p(1-p)^7)^6}$

Efficiency of 8 nodes system: $8p(1-p)^7$

The first derivative: $8(1-p)^7 - 8p(7)(1-p)^6 = 8(1-p)^6(1-p-7p)$ --> to get optimum solution it should be equals to 0 --> $1-8p = 0$ --> **p = 1/8 = 0.125**

Question 4 Partially correct Mark 33.51 out of 50.00



Consider the network above. Please **NOTE** that the network inside blue rectangle is a **private network** (i.e. private IP addresses are used by its hosts) and **R1** is a **NAT enabled** router. Suppose that, initially the **ARP table** in all hosts and routers are **empty**, and all **Switch tables** are **empty** too. Then, the following transmissions happen in chronological order:

1. PC1b sends a ping command to PC1d
2. PC1c sends a ping command to PC2d
3. PC2b accesses a file from FileServer

After the last packet transmission, please fill in the **ARP** tables in each host and router, as well as the **Switch** tables, by completing the tables below:

NOTE:

- Router is written with the interface number separated by '-'. E.g. R1-1, R1-2, R2-2, Internet-2, etc
- Fill in the IP and MAC with the host name or router's interface number, e.g. PC1a, PC2d, R1-3, Internet-1, WebServer, etc
- Write the device name exactly as it is written in the figure.
- If there are more than one record in an **ARP** or a **Switch** table, fill the table based on the chronological order.
- In case of no record in table, simply fill the table with '-' (a dash sign).

ARP Tables

PC1a		PC1b		PC1c		PC1d		PC2a		PC2b		PC2c		PC2d	
IP	MAC	IP	MAC	IP	MAC	IP	MAC	IP	MAC	IP	MAC	IP	MAC	IP	MAC
- ✓	- ✓	PC1d ✓	PC1d ✓	PC2d ✗	R1-2 ✓	PC1b ✓	PC1b ✓	- ✓	- ✓	FileServer ✗	R1-2 ✗	- ✓	- ✓	PC1c ✗	R1-1 ✓

WebServer		FileServer		R1-1		R1-2		R1-3		R2-1		R2-2	
IP	MAC	IP	MAC	IP	MAC	IP	MAC	IP	MAC	IP	MAC	IP	MAC
- ✓	- ✓	R1-3 ✗	R2-2 ✓	PC1c ✗	PC1c ✗	PC2d ✗	PC2d ✗	FileServer ✗	Internet-1 ✓	Internet-2 ✓	Internet-2 ✓	FileServer ✓	FileServe ✓
				PC2d ✗	PC2d ✗								

Switch tables

Sw1		Sw1a		Sw1b		Sw2		Sw2a		Sw2b		Sw3	
MAC	Port	MAC	Port	MAC	Port	MAC	Port	MAC	Port	MAC	Port	MAC	Port
PC1b ✓	Sw1-1 ✓	PC1b ✓	Sw1a-3 ✓	PC1c ✗	Sw1b-1 ✗	R1-1 ✓	Sw2-3 ✓	PC2b ✗	Sw2a-1 ✗	R1-1 ✓	Sw2b-3 ✓	R2-2 ✓	Sw3-1 ✓
R1-2 ✗	Sw1-2 ✗	R1-2 ✗	Sw1a-2 ✓	R1-2 ✗	Sw1b-2 ✗	PC2d ✓	Sw2-2 ✓	R1-1 ✗	Sw2a-2 ✗	PC2d ✓	Sw2b-2 ✓	FileServer ✓	Sw3-3 ✓
PC1c ✓	Sw1-3 ✓			- ✗	- ✗	PC2b ✓	Sw2-1 ✓						
- ✗	- ✗			- ✗	- ✗								

When PC2b accesses a file from FileServer, an FTP request message is sent from PC2b to FileServer, and an FTP response in the opposite direction.

Please complete the information about **source** and **destination** of **IP Address** and **MAC Address**, during this communication process at various locations:

Location	Source MAC	Destination MAC	Source IP	Destination IP

PC2b --> R1	PC2b ✓	R1-1 ✓	PC2b ✓	FileServer ✓
R1 --> Internet	R1-3 ✓	Internet-1 ✓	R1-3 ✓	FileServer ✓
R2 --> FileServer	R2-2 ✓	FileServer ✓	R1-3 ✓	FileServer ✓
FileServer --> R2	FileServer ✓	R2-3 ✗	FileServer ✓	R1-3 ✓
Internet --> R1	Internet-1 ✓	R1-3 ✓	FileServer ✓	R1-3 ✓
R1 --> PC2b	R1-2 ✗	PC2b ✓	FileServer ✓	PC2b ✓