Started on	Thursday, 10 December 2020, 12:57 PM
State	Finished
Completed on	Thursday, 10 December 2020, 1:53 PM
Time taken	56 mins 6 secs
Grade	**24.15** out of 100.00

Question 1

Correct Mark 5.00 out of 5.00

Suppose the information content of a packet is the bit pattern 0001 0110 0111 0101 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
	0001	0 ✓
	0110	1 ✓
	0111	0 ✓
	0101	1 ✓
parity	1010 ✓	1 ✓

Question 2

Incorrect Mark 0.00 out of 15.00

A data **D** that consists of bit-stream **1100010100** 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: 100 ✗

https://asecuritysite.com/comms/crc_div
ambil remainder

The correct answer is: 110

Question 3

Incorrect Mark 0.00 out of 30.00

N = 4 (number of nodes)
N-1 = 3

Suppose four nodes -- A, B, C, D -- 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 3? (**NOTE:** do not use space and use dot (".") sign to express multiplication)
  p+2.p.p+p.p.p ✗
- What is the probability of the first success in slot 4? (**NOTE:** do not use space and use dot (".") sign to express multiplication)
  −4.p.p.p.p+12.p.p.p−12.p.p+4.p ✗
- Find value ***p**** that maximizes the efficiency? (**HINT:** use first derivative from the equation) 0.125 ✗ p = 1/N

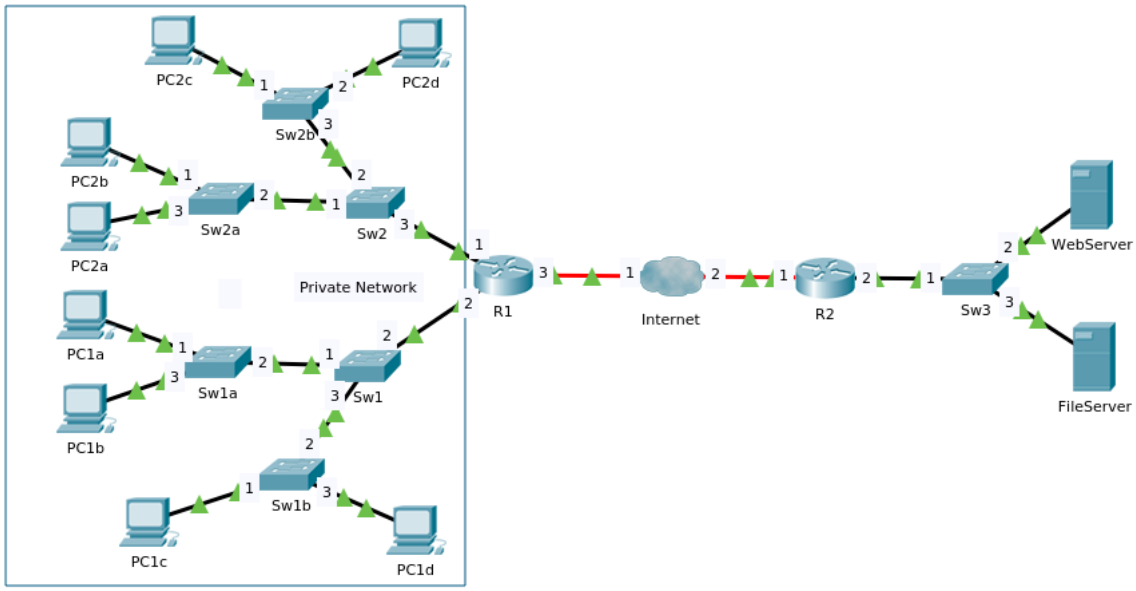
The probability of node C succeeds for the first time in slot 3: probability of C fails in the first 2 slots and succeeds in the 3rd slot. The probability of C succeed in a slot (p_C): $p(1-p)^3$, thus the probability of C fails to transmit in a slot: $1-p_C = 1 - p(1-p)^3$. Now, the probability of C succeeds for the first time in slot 3: $p_C(1-p_C)^2 = p(1-p)^3(1-p(1-p)^3)^2$

The probability of the first success in slot 4: the probability of any node fails in the first 3 slots and succeeds in the 4th slot. The probability of any node succeed in a slot (p_{any}): $4p(1-p)^3$, thus the probability of any node fails to transmit in a slot: $1-p_{any} = 1-4p(1-p)^3$. Now, the probability of any node succeeds for the first time in slot 4: $p_{any}(1-p_{any})^3 = 4p(1-p)^3(1-4p(1-p)^3)^3$ N = 4 (dikali N)

Efficiency of 4 nodes system: $4p(1-p)^3$

The first derivative: $4(1-p)^3-4p(3)(1-p)^2=4(1-p)^3(1-p - 3p)$ --> to get optimum solution it should be equals to 0 --> 1-4p = 0 --> **p = 1/4 = 0.25**

Question 4 Partially correct Mark 19.15 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. PC2c sends a ping command to PC2a
2. PC2b sends a ping command to PC1b
3. PC1c 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
- ✓	- ✓	R1-2 ✗	R1-2 ✗	R1-2 ✗	R1-2 ✗	- ✓	- ✓	Pc2c ✗	Pc2c ✗	R1-1 ✗	R1-1 ✗	Pc2a ✗	Pc2a ✗	- ✓	- ✓

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
- ✓	- ✓	R2-2 ✗	R2-2 ✗	PC2b ✗	PC2b ✗	- ✗	- ✗	Fileserver ✗	Fileserver ✗	Fileserver ✗	Fileserver ✗	Fileserver ✓	Fileserver ✓
						✗	✗	Internet-1	Internet-1	Internet-2	Internet-2		

PC1b PC1b
PC1c PC1c

Switch tables

Sw1		Sw1a		Sw1b		Sw2		Sw2a		Sw2b		Sw3	
MAC	Port	MAC	Port	MAC	Port	MAC	Port	MAC	Port	MAC	Port	MAC	Port
R1-2 PC2b ✗	2 ✓	R1-2 ✗	- 2 ✗	R1-2 ✗	- 2 ✗	PC2c ✗	- 2 ✗	PC2c ✗	- 2 ✗	PC2c ✓	1 ✓	R2-2 ✗	- 1 ✗
PC1b R1-2 ✗	2 1 ✗	PC1b ✗	- 3 ✗	PC1c ✗	- 1 ✗	PC2a ✗	- 1 ✗	PC2a ✗	- 3 ✗	PC2a ✓	3 ✓	Fileserver ✓	3 ✓
PC1c PC1b ✗	3 ✓					PC2b ✗	- 1 ✗	PC2b ✗	1 ✗				
						R1-1 ✗	-3 ✗	-R1-1 ✗	2 ✗				

When PC1c accesses a file from FileServer, an FTP request message is sent from PC1c 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

PC1c --> R1	PC1c ✓	R1-2 ✓	PC1c ✓	Internet-1 ✗
R1 --> Internet	R1-3 ✓	Internet-1 ✓	R1-3 ✓	Internet-1 ✗
R2 --> FileServer	R2-2 ✓	Fileserver ✓	R2-2 ✗ R1-3	Fileserver ✓
FileServer --> R2	Fileserver ✓	R2-2 ✓	Fileserver ✓	R2-2 ✗ R1-3
Internet --> R1	Internet-1 ✓	R1-3 ✓	Internet-1 ✗	R1-3 ✓
R1 --> PC1c	R1-2 ✓	PC1c ✓	Internet-1 ✗	PC1c ✓

FileServer
FileServer

FileServer
FileServer

#MAC address harusnya sama kayak locationnya paling ditambahin lewat port mana biar lebih spesifik

08395349

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Started on	Thursday, 10 December 2020, 12:50 PM
State	Finished
Completed on	Thursday, 10 December 2020, 1:51 PM
Time taken	1 hour
Grade	**21.49** out of 100.00

Question 1

Correct Mark 5.00 out of 5.00

Suppose the information content of a packet is the bit pattern 0001 0110 0111 0101 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
	0001	0 ✓
	0110	1 ✓
	0111	0 ✓
	0101	1 ✓
parity	1010 ✓	1 ✓

Question 2

Incorrect Mark 0.00 out of 15.00

A data **D** that consists of bit-stream **1110010101** 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: 0110 ✗

The correct answer is: 000

Question 3

Incorrect Mark 0.00 out of 30.00

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)
  p.(1-p)^5 ✗
- What is the probability of the first success in slot 7? (**NOTE:** do not use space and use dot (".") sign to express multiplication)
  8.p.(1-p)^7 ✗
- Find value ***p**** that maximizes the efficiency? (**HINT:** use first derivative from the equation) 8.x.(x + 1)^7 ✗

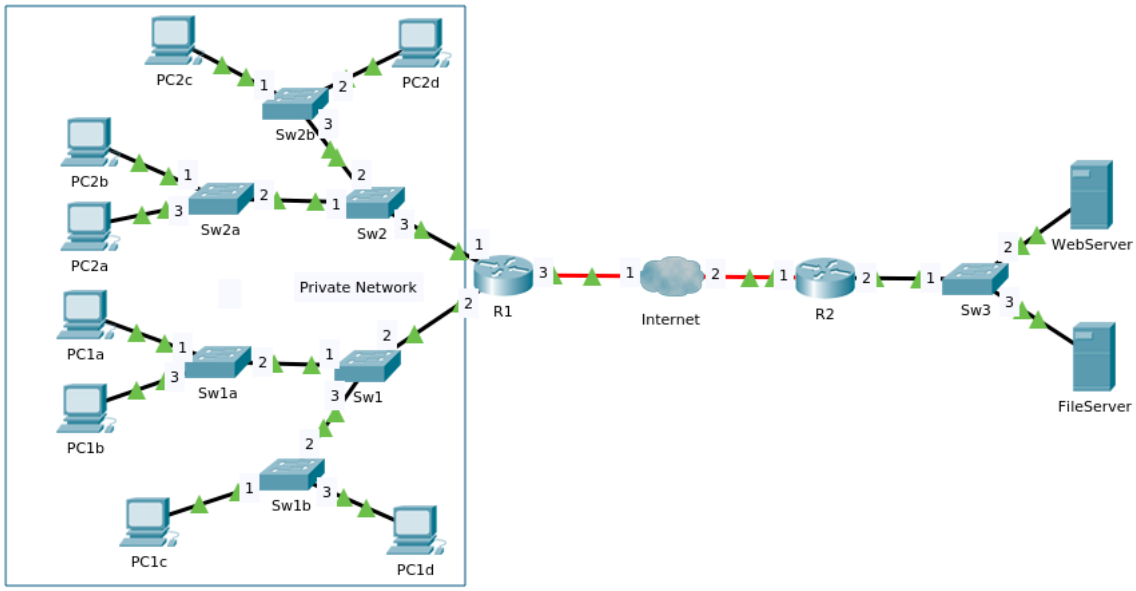
The probability of node C succeeds for the first time in slot 6: probability of C fails in the first 5 slots and succeeds in the 6^{th} slot. The probability of C succeed in a slot (p_C): $p(1-p)^7$, thus the probability of C fails to transmit in a slot: $1-p_C = 1 - p(1-p)^7$. Now, the probability of 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 16.49 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. PC2b sends a ping command to PC2d
2. PC2a sends a ping command to PC1b
3. PC1d accesses a web page from WebServer

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 R1-2 R1-2 R1-2 R1-2 R1-1 R1-1 - -

PC1a		PC1b		PC1c		PC1d		PC2a		PC2b		PC2c		PC2d	
IP	MAC	IP	MAC	IP	MAC	IP	MAC	IP	MAC	IP	MAC	IP	MAC	IP	MAC
- ✓	- ✓	- ✗	- ✗	- ✓	- ✓	- ✗	- ✗	Pc2b ✗	Pc2b ✗	Pc2d ✗	Pc2d ✗	Pc2b ✗	Pc2b ✗	Pc2b ✓	Pc2b ✓

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
✗	✗	✗	✗	Pc2b ✗	✗	pc1b ✗	pc1b ✗	✗	✗	✗	✗	✗	✗
R2-2	R2-2	-	-	pc2a	pc2a	pc1d ✗	pc1d ✗	Internet-1	Internet-1	Internet-2	Internet-2	Webserver	Webserver

Switch tables

Sw1		Sw1a		Sw1b		Sw2		Sw2a		Sw2b		Sw3	
MAC	Port	MAC	Port	MAC	Port	MAC	Port	MAC	Port	MAC	Port	MAC	Port
Pc2a ✗	2 ✓	Pc2a ✗	2 ✓	Pc2a ✗	2 ✗	Pc2b ✓	1 ✓	Pc2b ✓	1 ✓	Pc2b ✓	3 ✓	Pc1d ✗	3 ✗
Pc1b ✓	1 ✓	Pc1b ✓	3 ✓	Pc1d ✗	3 ✗	Pc2d ✓	2 ✓	Pc2d ✓	2 ✓	Pc2d ✓	2 ✓	Webserver ✓	2 ✓
Pc1d ✓	3 ✓					Webserver ✗	2 ✗	Pc1b ✗	3 ✓				
						Sebserver ✗	2 ✗	- ✓	- ✓				

When PC1d accesses a web page from WebServer, an HTTP request message is sent from PC1d to WebServer, and an HTTP 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
PC1d --> R1	pc1d ✕	R1-2 ✕	Pc1d ✕	Webserver ✕
R1 --> Internet	R1-3 ✕	Internet-1 ✕	R1-3 ✕	Webserver ✕
R2 --> WebServer	R2-2 ✕	Webserver ✕	R1-3 ✕	Webserver ✕
WebServer --> R2	Webserver ✕	R2-2 ✕	Webserver ✕	R1-3 ✕
Internet --> R1	Internet-1 ✕	R1-3 ✕	Webserver ✕	R1-3 ✕
R1 --> PC1d	R1-2 ✕	pc1d ✕	Webserber ✕	Pc1d ✕

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Started on	Thursday, 10 December 2020, 1:00 PM
State	Finished
Completed on	Thursday, 10 December 2020, 1:59 PM
Time taken	58 mins 26 secs
Grade	**66.70** out of 100.00

Question 1

Correct Mark 5.00 out of 5.00

Suppose the information content of a packet is the bit pattern 0001 0110 0111 0101 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
0001	0 ✓
0110	1 ✓
0111	0 ✓
0101	1 ✓
parity 1010 ✓	1 ✓

Question 2

Correct Mark 15.00 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: 110 ✓

The correct answer is: 110

Question 3 Partially correct Mark 10.00 out of 30.00

Suppose four nodes -- A, B, C, D -- 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 3? (**NOTE:** do not use space and use dot (".") sign to express multiplication)
  p.(p-1)*2 ✗
- What is the probability of the first success in slot 4? (**NOTE:** do not use space and use dot (".") sign to express multiplication)
  p.(p-1)*3 ✗
- Find value ***p**** that maximizes the efficiency? (**HINT:** use first derivative from the equation) 0.25 ✓

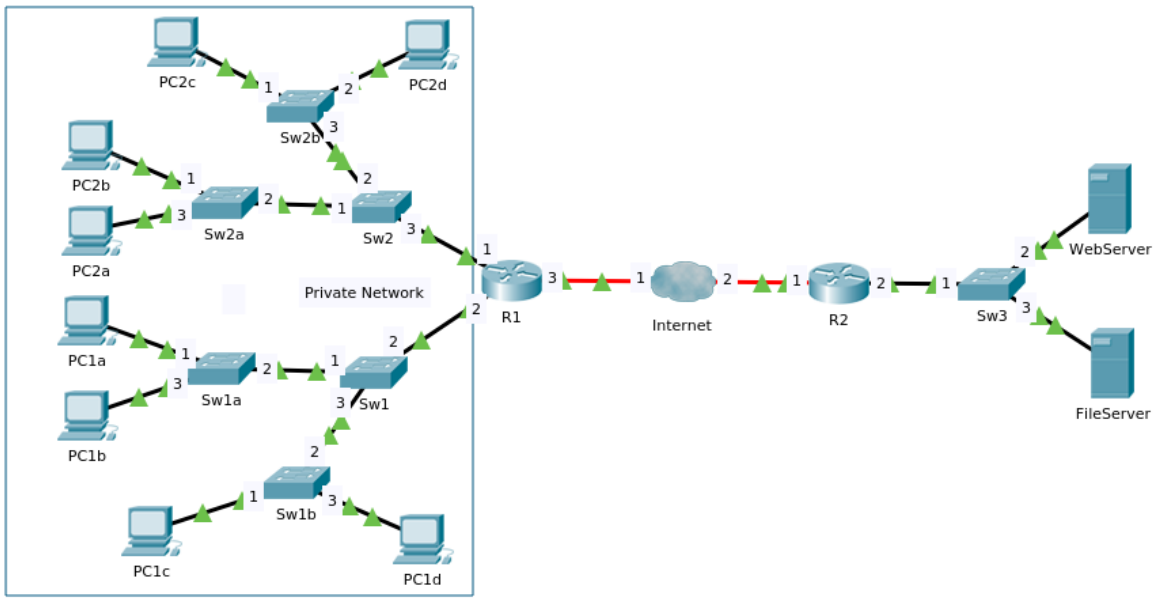
The probability of node C succeeds for the first time in slot 3: probability of C fails in the first 2 slots and succeeds in the 3rd slot. The probability of C succeed in a slot (p_C): $p(1-p)^3$, thus the probability of C fails to transmit in a slot: $1-p_C = 1 - p(1-p)^3$. Now, the probability of C succeeds for the first time in slot 3: $p_C(1-p_C)^2 = \mathbf{p(1-p)^3(1-p(1-p)^3)^2}$

The probability of the first success in slot 4: the probability of any node fails in the first 3 slots and succeeds in the 4th slot. The probability of any node succeed in a slot (p_{any}): $4p(1-p)^3$, thus the probability of any node fails to transmit in a slot: $1-p_{any} = 1-4p(1-p)^3$. Now, the probability of any node succeeds for the first time in slot 4: $p_{any}(1-p_{any})^3 = 4\mathbf{p(1-p)^3(1-4p(1-p)^3)^3}$

Efficiency of 4 nodes system: $4p(1-p)^3$

The first derivative: $4(1-p)^3-4p(3)(1-p)^2=4(1-p)^3(1-p-3p)$ --> to get optimum solution it should be equals to 0 --> $1-4p = 0$ --> **p = 1/4 = 0.25**

Question 4 Partially correct Mark 36.70 out of 50.00 SAMA #1



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. PC2c sends a ping command to PC2a
2. PC2b sends a ping command to PC1b
3. PC1c 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
- ✓	- ✓	Sw1a ✗	Sw1a ✗	Sw1b ✗	Sw1b ✗	- ✓	- ✓	PC2c ✓	PC2c ✓	Sw2a ✗	Sw2a ✗	PC2a ✓	PC2a ✓	- ✓	- ✓

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
- ✓	- ✓	Sw3 ✗	Sw3 ✗	PC2c ✗	PC2c ✗	PC1b ✓	PC1b ✓	Internet-1 ✓	Internet-1 ✓	Internet-2 ✓	Internet-2 ✓	FileServer ✓	FileServer ✓
						PC1c ✓	PC1c ✓						

Switch tables

Sw1		Sw1a		Sw1b		Sw2		Sw2a		Sw2b		Sw3	
MAC	Port	MAC	Port	MAC	Port	MAC	Port	MAC	Port	MAC	Port	MAC	Port
PC2b ✗	2 ✓	PC2b ✗	2 ✓	PC1c ✗	1 ✗	PC2c ✓	2 ✓	PC2c ✓	2 ✓	PC2c ✓	1 ✓	R2-2 ✓	1 ✓
PC1b ✓	1 ✓	PC1b ✓	3 ✓	R1 ✗	2 ✗	PC2a ✓	1 ✓	PC2a ✓	3 ✓	PC2a ✓	3 ✓	FileServer ✓	3 ✓
PC1c ✓	3 ✓					PC2b ✓	1 ✓	PC2b ✓	1 ✓				
						PC1b ✗	3 ✓	PC1b ✗	2 ✓				

When PC1c accesses a file from FileServer, an FTP request message is sent from PC1c 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
PC1c --> R1	PC1c ✓	R1-1 ✗	PC1c ✓	FileServer ✓
R1 --> Internet	R1-3 ✓	Internet ✗	R1-3 ✓	FileServer ✓
R2 --> FileServer	R2-2 ✓	FileServer ✓	R2-2 ✗	FileServer ✓
FileServer --> R2	FileServer ✓	R2-2 ✓	FileServer ✓	R2-2 ✗
Internet --> R1	Internet ✗	R1-3 ✓	Internet ✗	R1-3 ✓
R1 --> PC1c	R1-2 ✓	PC1c ✓	R1-2 ✗	PC1c ✓

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Started on	Thursday, 10 December 2020, 1:10 PM
State	Finished
Completed on	Thursday, 10 December 2020, 2:09 PM
Time taken	59 mins 12 secs
Grade	**37.04** out of 100.00

Question 1

Partially correct Mark 4.17 out of 5.00

Suppose the information content of a packet is the bit pattern 0001 0110 0111 0101 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
0001	0 ✓
0110	1 ✓
0111	0 ✓
0101	1 ✓
parity 0011 ✗	1 ✓

Question 2

Incorrect Mark 0.00 out of 15.00

A data **D** that consists of bit-stream **1100010100** 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: 100 ✗

The correct answer is: 110

Question 3 Partially correct Mark 10.00 out of 30.00

Suppose five nodes -- A, B, C, D and E -- 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 4? (**NOTE:** do not use space and use dot (".") sign to express multiplication)
  (1-(p.(1-p).(1-p).(1-p).(1-p)))^3.p.(1-p).(1-p).(1-p).(1-p) ✓
- What is the probability of the first success in slot 5? (**NOTE:** do not use space and use dot (".") sign to express multiplication)
  (1-(5.p.(1-p).(1-p).(1-p).(1-p)))^4.5p.(1-p).(1-p).(1-p).(1-p) ✗
- Find value ***p**** that maximizes the efficiency? (**HINT:** use first derivative from the equation) 0,128 ✗

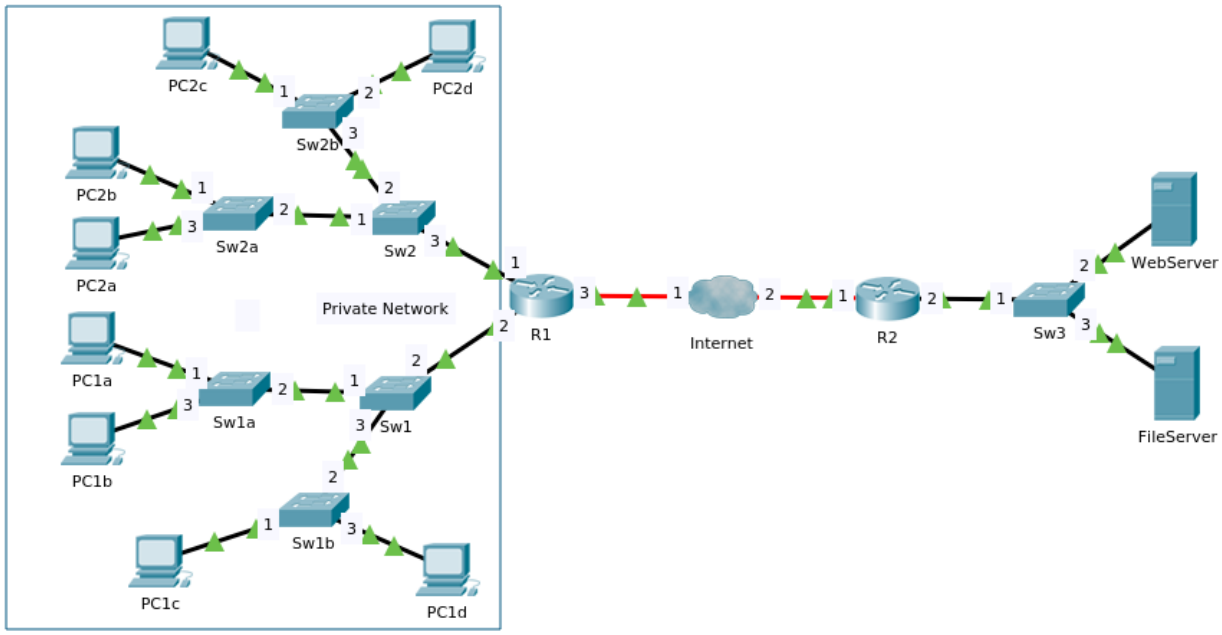
The probability of node C succeeds for the first time in slot 4: probability of C fails in the first 3 slots and succeeds in the 4^{th} slot. The probability of C succeed in a slot (p_C): $p(1-p)^4$, thus the probability of C fails to transmit in a slot: $1-p_C = 1 - p(1-p)^4$. Now, the probability of C succeeds for the first time in slot 4: $p_C(1-p_C)^3 = \mathbf{p(1-p)^4(1-p(1-p)^4)^3}$

The probability of the first success in slot 5: the probability of any node fails in the first 4 slots and succeeds in the 5^{th} slot. The probability of any node succeed in a slot (p_{any}): $5p(1-p)^4$, thus the probability of any node fails to transmit in a slot: $1-p_{any} = 1-5p(1-p)^4$. Now, the probability of any node succeeds for the first time in slot 5: $p_{any}(1-p_{any})^4 = \mathbf{5p(1-p)^4(1-5p(1-p)^4)^4}$

Efficiency of 5 nodes system: $5p(1-p)^4$

The first derivative: $5(1-p)^4 - 5p(4)(1-p)^3 = 5(1-p)^3(1-p-4p)$ --> to get optimum solution it should be equals to 0 --> $1-5p = 0$ --> $\mathbf{p = 1/5 = 0.2}$

Question 4 Partially correct Mark 22.87 out of 50.00 #Sama Adil



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 ✓	Sw1b ✗	Sw1b ✗	PC1b ✓	PC1b ✓	- ✓	- ✓	R2 ✗	R2 ✗	- ✓	- ✓	Sw2a ✗	Sw2a ✗

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 ✗	R1 ✗	Sw2 ✗	Sw2 ✗	Sw1 ✗	Sw1 ✗	R2 ✗	R2 ✗	R1 ✗	R1 ✗	FileServer ✓	FileServer ✓
				PC2b ✓	PC2b ✓								

Switch tables

Sw1		Sw1a		Sw1b		Sw2		Sw2a		Sw2b		Sw3	
MAC	Port	MAC	Port	MAC	Port	MAC	Port	MAC	Port	MAC	Port	MAC	Port
R1 ✗	2 ✗	Sw1 ✗	2 ✗	Sw1 ✗	2 ✓	R1 ✗	3 ✓	Sw2 ✗	2 ✓	Sw2 ✗	3 ✓	R2 ✗	1 ✓
Sw1a ✗	1 ✗	PC1b ✗	3 ✗	PC1d ✓	3 ✓	Sw2a ✗	1 ✗	PC2b ✓	1 ✓	PC2d ✓	2 ✓	FileServer ✓	3 ✓

Sw1b ✗	3 ✓			PC1c ✓	1 ✓	Sw2b ✗	2 ✗						
- ✗	- ✗			- ✗	- ✗								

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 ✓	Sw2 ✗	PC2b ✓	FileServer ✓
R1 --> Internet	Sw2 ✗	Internet ✗	PC2b ✗	FileServer ✓
R2 --> FileServer	Sw3 ✗	FileServer ✓	PC2b ✗	FileServer ✓
FileServer --> R2	FileServer ✓	Sw2 ✗	FileServer ✓	PC2b ✗
Internet --> R1	Internet ✗	Sw1 ✗	FileServer ✓	PC2b ✗
R1 --> PC2b	Sw2 ✗	Sw2a ✗	FileServer ✓	PC2b ✓

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Started on	Thursday, 10 December 2020, 12:51 PM
State	Finished
Completed on	Thursday, 10 December 2020, 1:51 PM
Time taken	1 hour
Grade	40.53 out of 100.00

Question 1 Correct Mark 5.00 out of 5.00

Suppose the information content of a packet is the bit pattern 0100 1100 1001 1110 and an EVEN 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	1 ✓
1100	0 ✓
1001	0 ✓
1110	1 ✓
parity 1111 ✓	0 ✓

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: 100 ✗

The correct answer is: 110

Question 3 Partially correct Mark 10.00 out of 30.00

Suppose four nodes -- A, B, C, D -- 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 3? (NOTE: do not use space and use dot (".") sign to express multiplication)
  p(1-p)^2 ✗
- What is the probability of the first success in slot 4? (NOTE: do not use space and use dot (".") sign to express multiplication)
  4.p(1-p)^3 ✗
- Find value *p** that maximizes the efficiency? (HINT: use first derivative from the equation) 0,25 ✓

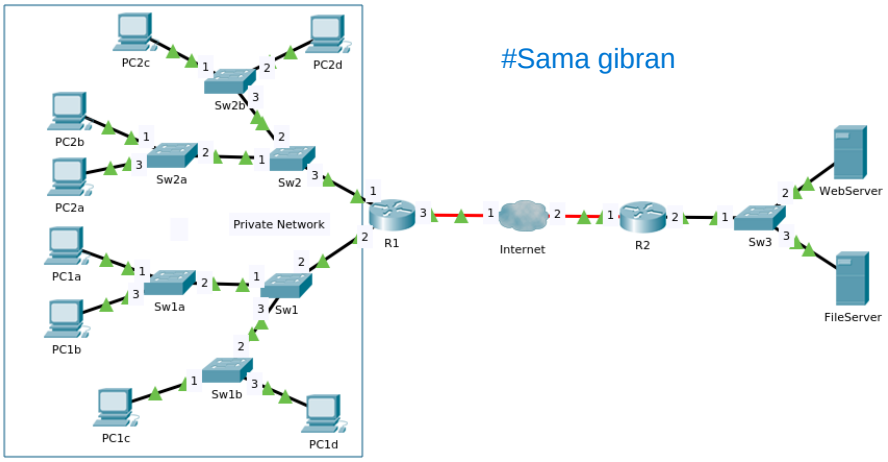
The probability of node C succeeds for the first time in slot 3: probability of C fails in the first 2 slots and succeeds in the 3rd slot. The probability of C succeed in a slot (p_C): $p(1-p)^3$, thus the probability of C fails to transmit in a slot: $1-p_C = 1 - p(1-p)^3$. Now, the probability of C succeeds for the first time in slot 3: $p_C(1-p_C)^2 = p(1-p)^3(1-p(1-p)^3)^2$

The probability of the first success in slot 4: the probability of any node fails in the first 3 slots and succeeds in the 4th slot. The probability of any node succeed in a slot (p_{any}): $4p(1-p)^3$, thus the probability of any node fails to transmit in a slot: $1-p_{any} = 1-4p(1-p)^3$. Now, the probability of any node succeeds for the first time in slot 4: $p_{any}(1-p_{any})^3 = 4p(1-p)^3(1-4p(1-p)^3)^3$

Efficiency of 4 nodes system: $4p(1-p)^3$

The first derivative: $4(1-p)^3-4p(3)(1-p)^2=4(1-p)^3(1-p - 3p)$ --> to get optimum solution it should be equals to 0 --> 1-4p = 0 --> p = 1/4 = 0.25

Question 4 Partially correct Mark 25.53 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. PC2c sends a ping command to PC2a
2. PC2b sends a ping command to PC1b
3. PC1c 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
- ✓	- ✓	PC2b ✗	PC2b ✗	✗	✗	- ✓	- ✓	PC2c ✓	PC2c ✓	PC1b ✗	PC1b ✗	PC2a ✓	PC2a ✓	- ✓	- ✓

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
- ✓	- ✓	PC1c ✗	PC1c ✗	Sw2 ✗	Sw2 ✗	Sw1 ✗	Sw1 ✗	Internet-1 ✓	Internet-1 ✓	Internet-2 ✓	Internet-2 ✓	FileServer ✓	FileServer ✓
						✗	✗						

Switch tables

Sw1		Sw1a		Sw1b		Sw2		Sw2a		Sw2b		Sw3	
MAC	Port	MAC	Port	MAC	Port	MAC	Port	MAC	Port	MAC	Port	MAC	Port
R1-2 ✓	2 ✓	Sw1 ✗	2 ✓	PC1c ✗	1 ✗	Sw2b ✗	2 ✓	Sw2 ✗	2 ✓	PC2c ✓	1 ✓	R2-2 ✓	1 ✓
Sw1b ✗	3 ✗	- ✗	- ✗	- ✗	- ✗	Sw2a ✗	1 ✓	Sw2a ✗	1 ✗	PC2b ✗	2 ✗	- ✗	- ✗
- ✗	- ✗					- ✗	- ✗	- ✗	- ✗				
						- ✗	- ✗	- ✗	- ✗				

When PC1c accesses a file from FileServer, an FTP request message is sent from PC1c 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
PC1c --> R1	PC1c ✓	R1-2 ✓	PC1c ✓	FileServer ✓
R1 --> Internet	R1-3 ✓	Internet-1 ✓	PC1c ✗	FileServer ✓
R2 --> FileServer	R2-2 ✓	FileServer ✓	PC1c ✗	FileServer ✓
FileServer --> R2	FileServer ✓	R2-2 ✓	FileServer ✓	PC1c ✗
Internet --> R1	Internet-1 ✓	R1-3 ✓	FileServer ✓	PC1c ✗
R1 --> PC1c	R1-2 ✓	PC1c ✓	FileServer ✓	PC1c ✓

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