



ICT259

Computer Networking

Tutor-Marked Assignment

July Semester 2022 Presentation

TUTOR-MARKED ASSIGNMENT (TMA)

This assignment is worth **18 %** of the final mark for **ICT259 Computer Networking**.

The cut-off date for this assignment is **Sunday, 30 October 2022, 2355hrs.**

Note to Students:

You are to include the following particulars in your submission: Course Code, Title of the TMA, SUSS PI No., Your Name, and Submission Date.

Question 1 (25 marks)

- (a) For the network in Figure Q1(a), discuss how network protocols and standards facilitate the transfer of data in this network by answering the following question.

If Host A sends a frame to Host B, identify the source Internet Protocol (IP), destination IP, source Media Access Control (MAC), and destination MAC addresses in the frame Host A sends to Host B.

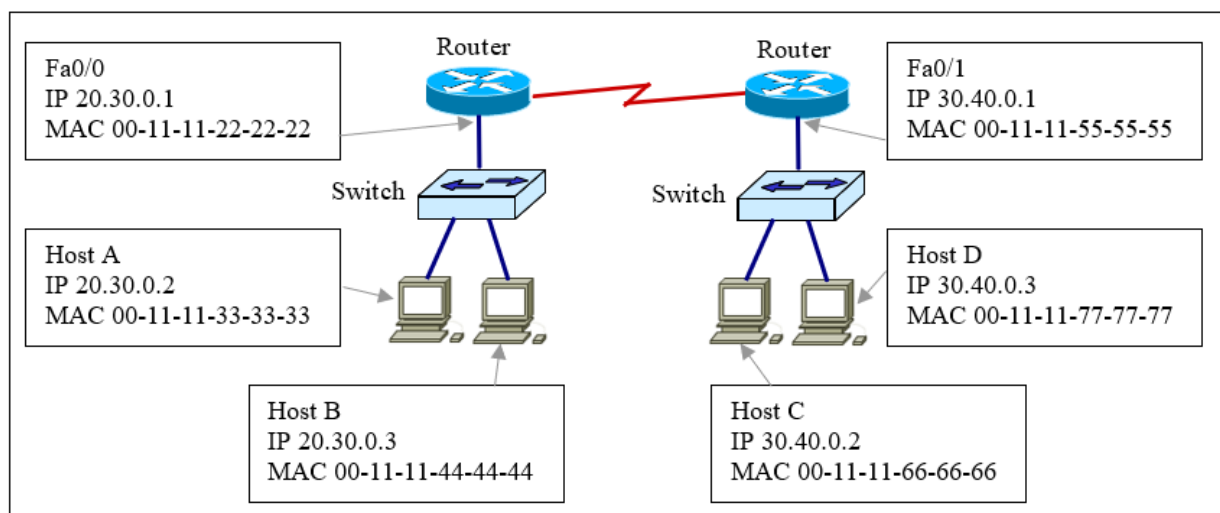


Figure Q1(a)

(4 marks)

- (b) Initially, the MAC address table of the switch given in Figure Q1(b) is empty.

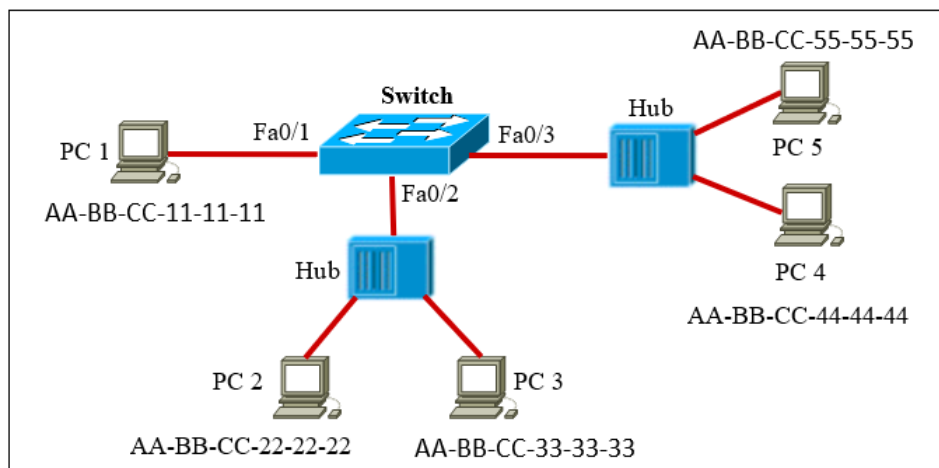


Figure Q1(b)

Explain, in sequence, how the switch responds to each of the incoming frames based on the following series of events. For each transmission, include any entry made to the switch's MAC address table. Complete and include Table Q1(b) as part of your answer.

Assume all entries in the MAC address table will not expire during the duration of the series of events. Also, assume that there is sufficient memory space in the MAC address table for additional entries.

- (i) PC 2 sends a frame to PC 4 (4 marks)
- (ii) PC 4 replies to PC 2 (3 marks)
- (iii) PC 3 sends a frame to PC 2 (3 marks)
- (iv) PC 1 sends a multicast frame (3 marks)

Switch	
MAC Address	Port
...	...

Table Q1(b)

(8 marks)

Question 2 (27 marks)

The network topology in Figure Q2 has network address 50.0.0.0. PC1 is a member of the IT-VLAN, and PC2 is a member of the ENG-VLAN.

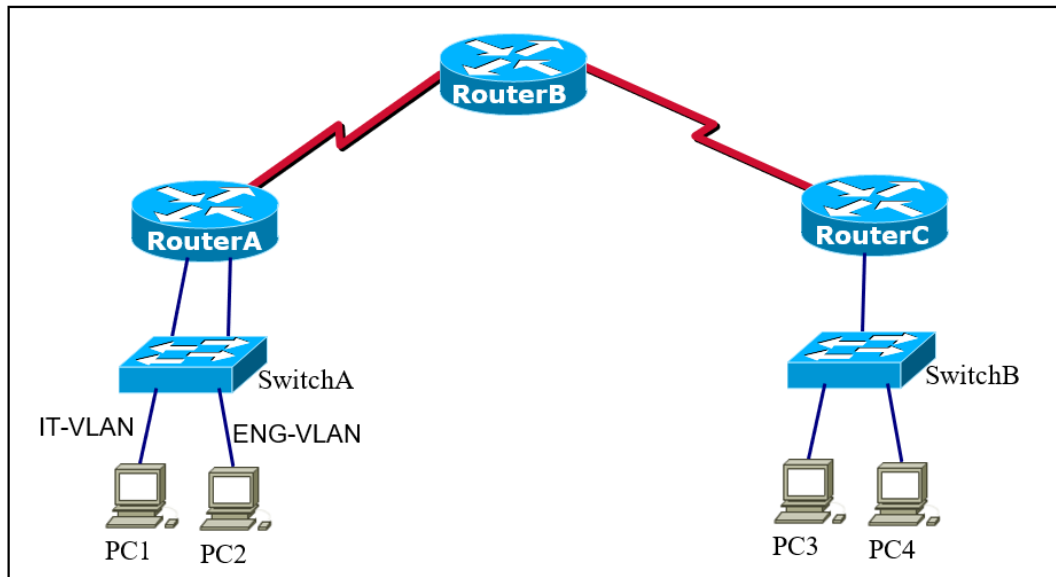


Figure Q2

Apply an IPv4 addressing scheme using a fixed-length subnet mask to the network. Illustrate your scheme by completing the following tasks.

- (a) Copy Figure Q2 to your answer script. Use the shape of a rectangle to represent the PC and switch, and an oval for the router. Label all the devices with names either inside or beside the shaped objects. Indicate the following on the diagram you have drawn.
 - (i) All the networks by enclosing each with a circle
 - (ii) The location of the default gateway(s) by a pointing arrow with labels

(4 marks)
- (b) If the network administrator uses seven subnet bits, give the subnet mask in the following representations. Explain your answer.
 - (i) Dotted decimal notation
 - (ii) Prefix length

(2 marks)
- (c) Starting from the left of Figure Q2, assign Subnet 10, Subnet 20, Subnet 30, Subnet 40, Subnet 50, Subnet 60, Subnet 70, ... to all the networks you have circled in Q2(a).

Based on seven subnet bits, obtain the IP address of the first six subnets based on the subnet list given above. That is from Subnet 10 to Subnet 60. Show your binary working bits.

(6 marks)

- (d) Based on seven subnet bits, obtain the entire usable host range for Subnet 10 and Subnet 20. Show your working. (4 marks)
- (e) Copy Figure Q2 to your answer script. On the diagram you have drawn, indicate the following:
- The interfaces of all the routers and SwitchA that you will use to set up the network. (2 marks)
 - Based on your Q2(c) answers, assign an appropriate IP address to all the PCs, the two switches, and the routers' interfaces. Assign starting from the first usable host IP address of each subnet to as many host IP addresses as you need. Indicate the IP addresses on the diagram drawn. Explain your answers to the IP addresses of the two switches. (9 marks)

Question 3 (40 marks)

This question is based on your answers to Q2. If you cannot complete Q2 or have no confidence in your answers, you may use the IP addresses given in Figure Q3 to answer Question 3. However, **5 marks** will be deducted from your total marks for this question.

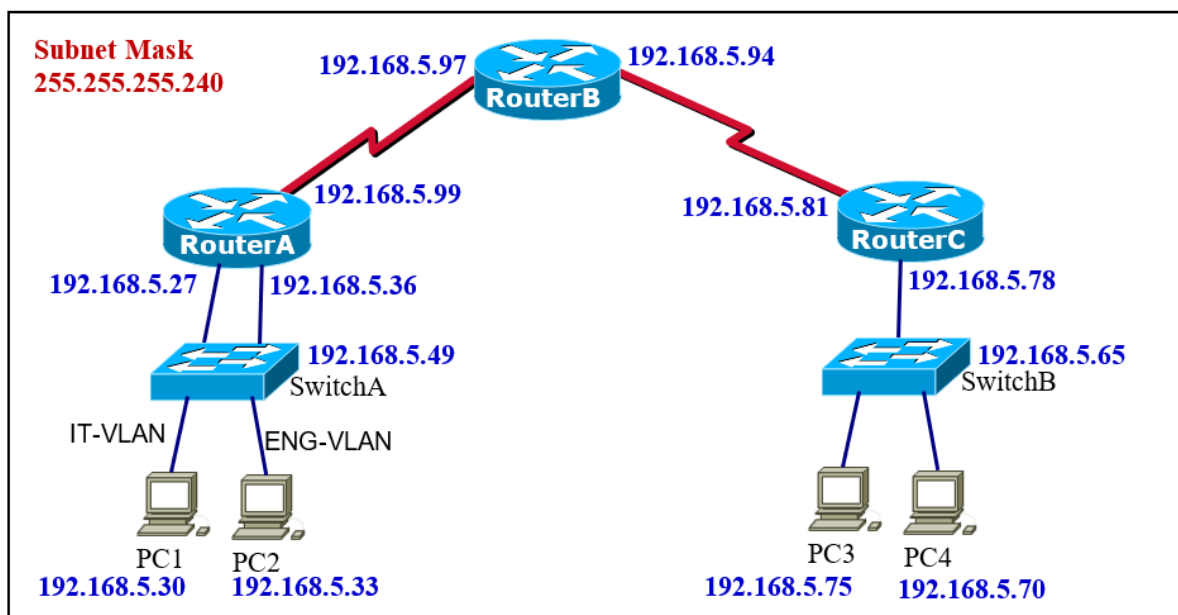


Figure Q3

Discuss how network protocols and standards facilitate the transfer of data in this network by answering the following based on your answers to Q2:

- (a) Assume that all the routers in the network shown in Figure Q2 are enabled with only Routing Information Protocol version 2 (RIPv2) routing protocol. Write down the

router configuration commands to be entered on all the routers to achieve reachability in the entire network.

(6 marks)

- (b) Assume all the routers are configured with RIPv2 routing protocol. It is desired to have backup static routes for PC1 to reach PC3 and vice versa via Routers A, B, and C. Give the configuration command(s) to set up the static routes and indicate the router(s) where the commands are implemented.

(8 marks)

- (c) Use Packet Tracer to set up the network topology given in Figure Q2. Use router model 1841 for all the routers, and add interface module WIC-2T to slot 0 to all the routers. Use model 2960 for the two switches.

Use the interfaces indicated in your answers to Q2(e)(i). The Ethernet interfaces available on the routers are Fa0/0 and Fa0/1. For serial interfaces, they are S0/0/0 and S0/0/1.

Name the routers (Display Name and Hostname) using the initials of the router name followed by your PI Number. E.g., If your PI number is *S1234567*, name RouterA as RA-*S1234567*, RouterB as RB-*S1234567*, etc. Likewise, name SwitchA and PC1 as SA-*S1234567* and PC1- *S1234567*, respectively. Name the VLANs according to Figure Q2. Complete the configurations for the 4 PCs.

Save the Packet Tracer (pkz or pkt) file to the Vocareum Lab Workspace using the following file name convention:

ICT259-T0<*Tut Group*>-<*PI Number*>-<*Your Name*>

E.g., ICT259-T01-S1234567-John Tan

Take a screenshot of the created network topology and paste it to your MS WORD answer script. Be sure the name of the devices has your PI number.

Note: For Windows users, you can snap a screenshot by pressing the *Shift*, *Windows*, and *S* keys simultaneously. You will see a grey screen. Use your mouse to enclose the area you want to capture. The captured image is saved to the clipboard. Then press *Ctrl-V* to paste it to your answer script.

(4 marks)

- (d) Setup the VLANs for SwitchA and configure the IP addresses for the 2 switches. Save your work to the same file name created in Q3(c).

- (i) Check your VLAN configurations by issuing the *show vlan* command as shown below.

```
SwitchA> enable  
SwitchA#show vlan
```

Take a screenshot of SwitchA's VLAN database and paste it to your MS WORD answer script. Figure Q3(d)(i) shows a sample with details intentionally cropped. The screenshot must have your PI number.

**Figure Q3(d)(i)**

(2 marks)

- (ii) You can also check the VLAN membership by issuing the *show run* command as shown below.

SwitchA#**show run**

If there is a *more* at the bottom of the page, press the space bar on your keyboard to advance to the next page.

Take a screenshot of the VLAN membership of your created VLANs and paste it to your MS WORD answer script.

(2 marks)

- (iii) From the *show run* listing, scroll down to look for the assigned IP address of SwitchA. Take another screenshot that shows the IP address of SwitchA and paste it to your MS WORD answer script.

(1 mark)

- (iv) Take a screenshot of SwitchB's VLAN database (use *show vlan*) and another screenshot showing the assigned IP address of the SwitchB (use *show run*). Paste both screenshots to your MS WORD answer script.

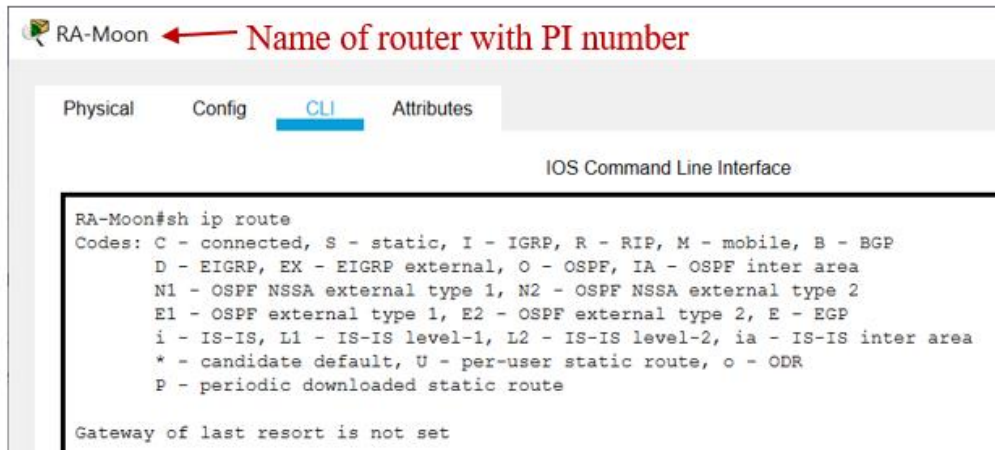
(2 marks)

- (e) Implement the RIPv2 configuration commands you have written in Q3(a) on all the routers on the Packet Tracer topology. Save your work to the same file name created in Q3(c).

- (i) Check the routing table by issuing the *show ip route* command as shown below.

Router> **enable**
Router#**show ip route**

Take a screenshot of the routing table for each router and paste it to your MS WORD answer script. Figure Q3(e)(i) shows a sample with details intentionally cropped.

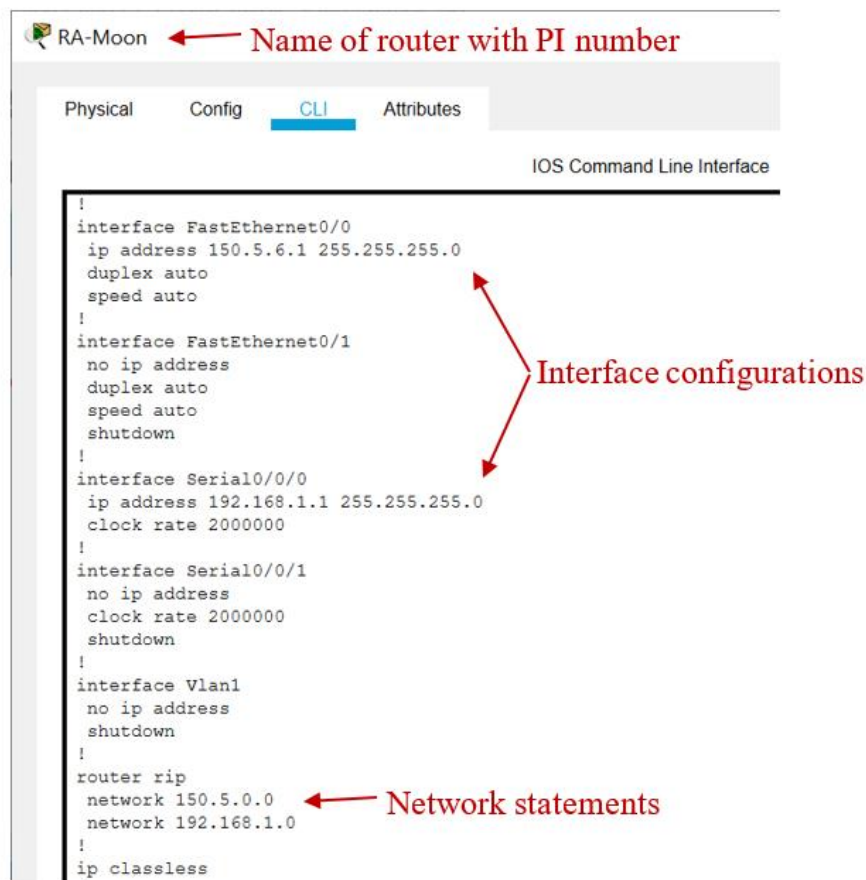
**Figure Q3(e)(i)**

(3 marks)

- (ii) Check your router configurations by issuing the *show run* command as shown below.

Router#**show run**

Scroll through the listing so that the interface configurations and network statements are displayed on one page, as shown in the sample given in Figure Q3(e)(ii).

**Figure Q3(e)(ii)**

Take a screenshot of each router's *show run* listing with the router's name, interface configurations, and network statements on one page, and paste it to your MS WORD answer script. There should be three screenshots, one for each router. Be sure the name of the router has your PI number.

(6 marks)

- (f) Implement the backup static routes configuration commands you have written in Q3(b) on the appropriate routers of the Packet Tracer topology. Save your work to the same file name created in Q3(c).

Take a screenshot of each router's *show run* listing with the router's name, interface configurations, network statements, and static route(s) displayed on one page, and paste it to your MS WORD answer script. There should be three screenshots, one for each router. Be sure the name of the router has your PI number.

(4 marks)

- (g) Verify your configurations by performing the following:

- PC1 pings PC2
- PC2 pings PC3

Take a screenshot of each ping, and paste it to your MS WORD answer script. Be sure the name of the PC has your PI number.

(2 marks)

Submit your Packet Tracer (pkz or pkt) file to Vocareum Lab for grading. If you save your file and do not submit it, your work will not show up and can result in not being graded. Submission instructions are given in the *Student Guide for Virtual Lab Workspace*. Capture a screenshot of your submission and paste it to your MS WORD answer script. Figure Q3(g) shows a sample.

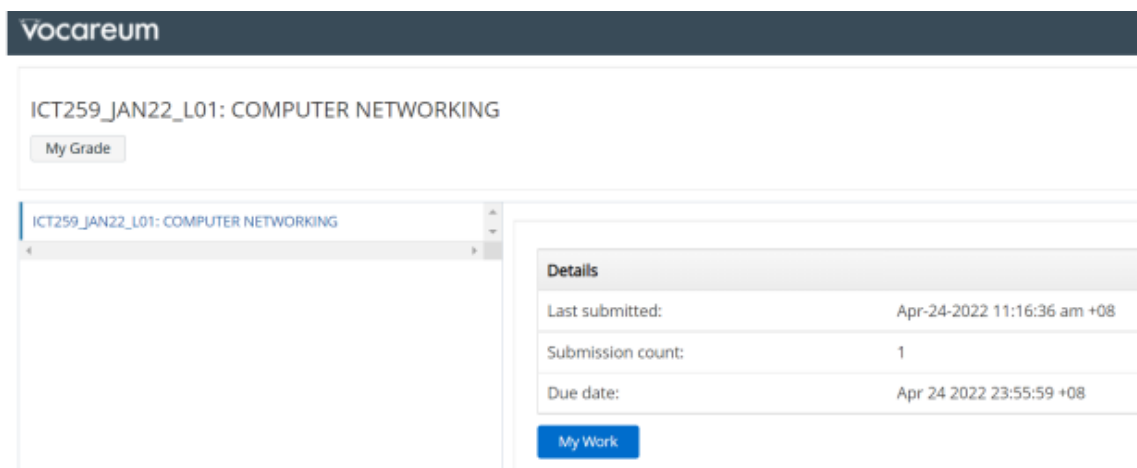


Figure Q3(g)

Question 4 (8 marks)

Figure Q4 shows a network of switches with the implemented Spanning Tree Protocol (STP).

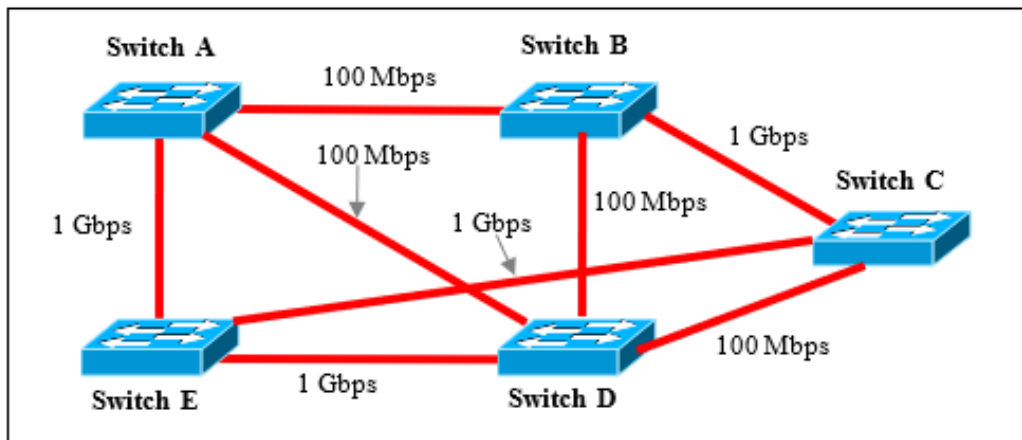


Figure Q4

The following information is found on the network devices:

- Switch A: MAC address is 02-03-19-BA-A7-16
- Switch B: MAC address is 02-05-88-33-55-22
- Switch C: MAC address is 02-03-F6-B3-85-33
- Switch D: MAC address is 02-03-B8-FF-AA-BB
- Switch E: MAC address is 02-04-77-05-AB-44

(Revised IEEE Specifications: 1 Gbps => Cost = 4, 100 Mbps => Cost = 19)

Analyse the behaviour of switch protocols and answer the following question.

Copy Figure Q4 to your answer script. Assume **Switch A** is elected as the root bridge, determine and indicate on your diagram the following information.

- All root ports (R)
- All designated ports (D)
- All non-designated ports (ND)

(8 marks)

---- END OF ASSIGNMENT ----