



Strathmore
UNIVERSITY

FACULTY OF INFORMATION TECHNOLOGY
BACHELOR OF SCIENCE IN INFORMATICS AND COMPUTER SCIENCE
CONTINUOUS ASSESSMENT TEST 1-**MARKING GUIDE**
ICS 2203-Advanced Networking

DATE: 19th September 2019

Time: 1 hr.

Instructions: Attempt ALL questions

Question One [24 marks]

- a) You are the network administrator at Smart Solution's Company (SSC). The organization has THREE branches in four regions of Africa: East, West, South and Central. SCC has been growing rapidly over the past few years and requires an upgrade of some of its devices and an overhaul of the IP addressing to take care of the anticipated growth. The table below shows SCC's current position and anticipated growth.

Region	Current No. of Hosts	Anticipated Growth
East	1000	30%
West	3000	20%
Central	500	10%
South	100	50%

Table Q.1a

Assume that your Regional Internet Registry (RIR) has allocated you the public address 172.40.0.0/24 for communication over the internet but you will need to select your own private IP address for internal addressing.

- i. Explain the role of a Regional Internet Registry (RIR) and give ONE example of an RIR. [2 marks]

Award 1 mark for the role and 1 mark for the example

- **RIR - an organization that manages the allocation and registration of Internet number resources (i.e. public IP addresses and autonomous system numbers) within a region of the world**
- **Examples:**
 - The African Network Information Center (AFRINIC)
 - The American Registry for Internet Numbers (ARIN)
 - The Asia-Pacific Network Information Centre (APNIC)
 - The Latin America and Caribbean Network Information Centre (LACNIC)

- The Réseaux IP Européens Network Coordination Centre (RIPE NCC)

ii. Differentiate between public IP addresses and private IP addresses. [2 marks]

Award 2 marks for a good differentiation

- A public IP address is the address that is assigned to a computing device to allow direct access over a public network such as the Internet. The IP is assigned by an authority
- A private IP address is the address space allocated for use within a private enterprise network, or home. The number is chosen by a network administrator and cannot be used route traffic over a public network

iii. Suggest a private IP address that you would use for SCC's internal addressing. (Note that your answer should include the private IP address and an associated prefix or decimal mask) [1 mark]

Award 1 mark for a good choice with an appropriate accompanying prefix

- Any IP in these ranges can be chosen
 - 10.0.0.0 – 10.255.255.255
 - 172.16.0.0 -172.31.255.255
 - 192.168.0.0-192.168.255.255

iv. Applying variable length subnet masks (VLSM), subnet the suggested address in (iii) above and represent your addressing scheme in a subnet chart. *Ensure that you consider the anticipated growth and show all the working. Do not subnet beyond the fourth subnet.*

Hint: Your subnet chart should capture the following information:

Region | Subnet Address | Usable Host Addresses | Broadcast Address | Prefix

[12 marks]

Award 4 marks for the working and 8 marks for the final chart

Working 1

Region	Current Hosts	% growth	Anticipated Hosts
West	3000	20%	3600
East	1000	30%	1300
Central	500	10%	550
South	100	50%	150

Working 2: Option 1-If chosen IP is using a /16 prefix (N.N.H.H)

Region	Hosts	H	N	New Binary Mask	Incremental	New Prefix
West	3600	12	4	N.N.11110000.00000000	16	16+4=/20
East	1300	11	5	N.N.11111000.00000000	8	16+5=/21
Central	550	10	6	N.N.11111100.00000000	4	16+6=/22
South	150	8	8	N.N.11111111.00000000	1	16+6=/24

Working: Option 2-1f chosen IP is using a /8 prefix (N.H.H.H)

Region	Hosts	H	N	New Binary Mask	Incremental	New Prefix
West	3600	12	12	N.11111111.11110000.00000000	16	8+12=/20
East	1300	11	13	N.11111111.11111000.00000000	8	8+13=/21
Central	550	10	14	N.11111111.11111100.00000000	4	8+14=/22
South	150	8	16	N.11111111.11111111.00000000	1	16+6=/24

Final chart (assuming the chosen IP is 10.0.0.0/8 or 10.0.0.0/16)

Region	Subnet Address	Usable Host Addresses		Broadcast Address	Prefix
		First IP	Last IP		
West	10.0.0.0	10.0.0.1	10.0.15.254	10.0.15.255	/20
East	10.0.16.0	10.0.16.1	10.0.23.254	10.0.23.255	/21
Central	10.0.24.0	10.0.24.1	10.0.27.254	10.0.27.255	/22
South	10.0.28.0	10.0.28.1	10.0.28.254	10.0.28.255	/24
	10.0.29.0				

Final chart (assuming the chosen IP is 172.16.0.0/16)

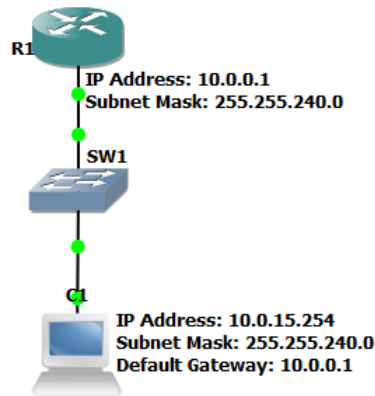
Region	Subnet Address	Usable Host Addresses		Broadcast Address	Prefix
		First IP	Last IP		
West	172.16.0.0	172.16.0.1	172.16.15.254	172.16.15.255	/20
East	172.16.16.0	172.16.16.1	172.16.23.254	172.16.23.255	/21
Central	172.16.24.0	172.16.24.1	172.16.27.254	172.16.27.255	/22
South	172.16.28.0	172.16.28.1	172.16.28.254	172.16.28.255	/24
	172.16.29.0				

Final chart (assuming the chosen IP is 192.168.0.0/16)

Region	Subnet Address	Usable Host Addresses		Broadcast Address	Prefix
		First IP	Last IP		
West	192.168.0.0	192.168.0.1	192.168.15.254	192.168.15.255	/20
East	192.168.16.0	192.168.16.1	192.168.23.254	192.168.23.255	/21
Central	192.168.24.0	192.168.24.1	192.168.27.254	192.168.27.255	/22
South	192.168.28.0	192.168.28.1	192.168.28.254	192.168.28.255	/24
	192.168.29.0				

- v. Sketch a simple diagram showing how you would connect the devices in the West Region. Assume that you will need only one router, one switch and a single end device to represent the devices in the West local area network. On the sketch indicate the IP settings that you would configure on the appropriate interfaces. That is; IP Address, Subnet Mask (*in decimal format*) and Default Gateway (*where applicable*) [5 marks]

Award ½ a mark for each correct IP and ½ a mark for the subnet masks. Award 1 ½ marks for the devices and connections. The diagram is an illustration using 10.0.0.0/8 or 10.0.0.0/16 chart



Chosen IP address for the PC and router should be anything between the usable IP address ranges. Indicate only ONE IP address on the diagram not the entire range. Note that the IP of the router is the gateway of the PC

- b) A user is attempting to configure the following IP settings on a laptop

IP address: 10.10.10.127

Subnet Mask: 255.255.255.224

Default Gateway: 10.10.10.99

Can the IP address be configured? Provide a justification for your answer. [3 marks]

Award 1 mark for Anding and 2 marks for justifying the answer

Solution

And IP and Mask to see if the IP is a usable IP or not

10.10.10.127 = 00001010.00001010.00001010.01111111

255.255.255.224 = 11111111.11111111.11111111.11100000

00001010.00001010.00001010.01100000

10 . 10 . 10 . 96

The IP 10.10.10.127 is not a subnet address but belongs to the subnet 10.10.10.96

H = 5 (the 5 zeros in the binary mask). Hence;

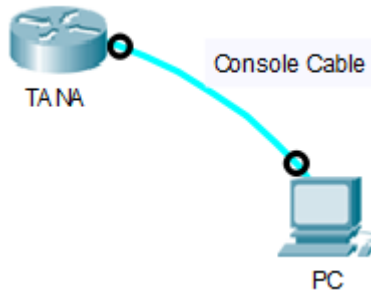
Mini subnet chart to proof where the IP is located:

Subnet Address	First IP	Last IP	Broadcast
10.10.10.96	10.10.10.97	10.10.10.126	10.10.10.127
10.10.10.128			

- 10.10.10.127 cannot be configured. According to the subnet chart above, the address is a broadcast address

Question Two [6 marks]

A network administrator connects a new Cisco router to a PC using the console cable for initial configuration as shown in the topology in **Figure Q.2** below.



Required Router Configurations:

- ❖ Router Name: (as indicated)
- ❖ Privilege Mode secret: **test_2**
- ❖ Banner (indicate your own appropriate banner)
- ❖ Gigabit0/0 interface: IP address: **192.168.30.1** and subnet mask: **255.255.255.0**
- ❖ Switch on the Gigabit0/0 interface

Figure Q.2

- a) Write down the sequence of commands that the administrator will use to configure the required router configurations indicated in **Figure Q.2** above

Hint: Start your commands from the prompts indicated below:

```
Router >
Router #
Router (config) #
TANA (config) #
TANA (config) #
TANA (config) #
TANA (config-if) #
TANA (config-if) #
```

[4 marks]

Award ½ a mark for each correct command

(Note that the commands below can have variants. The solution is simply a guide)

```
Router > enable
Router # configure terminal
Router (config) # hostname TANA
TANA (config) # enable secret test_2
TANA (config) # banner motd # Authorised Access ONLY #
TANA (config) # int g0/0
TANA (config-if) # ip address 192.168.30.1 255.255.255.0
TANA (config-if) # no shutdown
```

- b) Explain what each of the following router commands will lead to when executed on a Cisco router. **[2 marks]**

Award 1 mark for each correct answer

- i. Router (config)# service password-encryption
 - **Encrypts ALL configured passwords**
- ii. Router # copy running-config tftp
 - **Saves the configuration in RAM (i.e. running-config) onto a tftp server**

Total: 30 Marks