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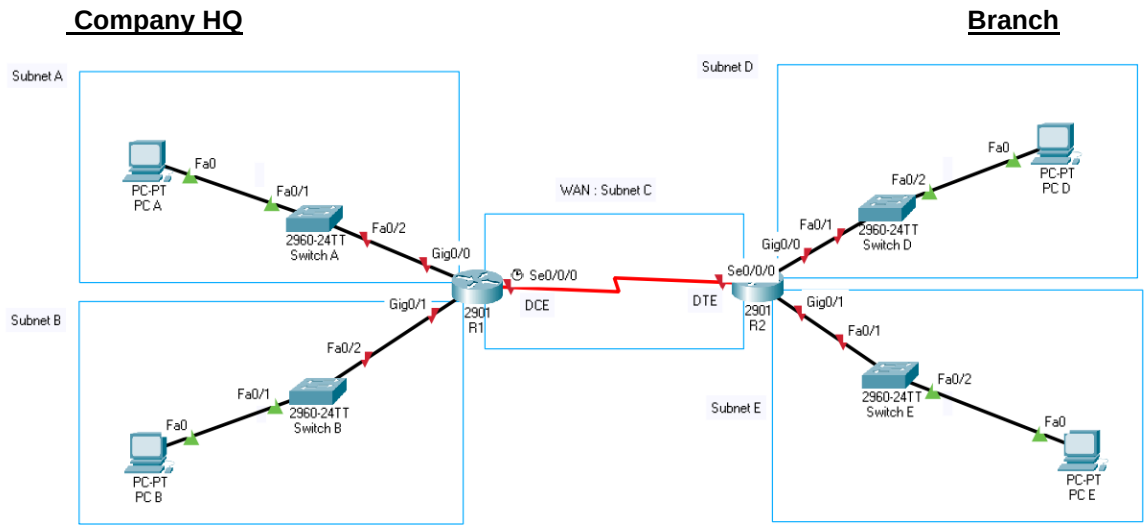
Group : 3

44NETF Mini Project

Requirement: IP Addressing Scheme Design , Packet Tracer Configuration, Demo & Written Report (MS Word)
Type: Individual Project
Weightage: 30%

Scenario

You are a Network Engineer in a small-medium sized enterprise company. Your company is implementing a wired network that can support growth over the next five years. Setup and configure the network using packet tracer to verify its connectivity. Your manager has given you the following topology and requirements for the company network.



Network address of company ABC obtained from Singnet is
Y.Z.100.0 /24 (i.e. 255.255.255.0) 154.3.100.0/24

Group	Y value	Z value
PMx	14x i.e. 141 for PM1, 142 for PM2 ,etc	Student index number
PA14	154	3
PBx	16x i.e. 161 for PB21, 162 for PB2, etc	Student index number

The company has the following requirements:

Subnet A (LAN)	11 IP addresses (usable)
Subnet B (LAN)	8 IP addresses (usable)
Subnet C (WAN connection)	2 IP addresses (usable)
Subnet D (LAN)	24 IP addresses (usable)

Subnet E (LAN)	5 IP addresses (usable)

You are required to:

1. Design and assign IP addresses (with fixed length subnet mask - FLSM) in table 1 and 2. Show your calculations steps clearly.
   Hint: Design and determine subnet mask based on the largest number of hosts.

2. Download the PT template for this project and change the user profile name. Complete and configure the network topology.

3. Perform connectivity tests and check that they are all successful. Provide a screenshot of the following test results in this report.

   - **"Ping"** from PC_A to all PCs
   - "**tracert**" from PC_A to PC_D
   - ***"*ipconfig /all"** in all PCs to verify ip address settings
   - "**show ip interface brief**", "**show ip route**" in R1 and R2

4. Name the PT and report files with your group and name, "**Proj_*class_name*.pkt"** & "**Proj_*class_name*.docx"** . eg Proj_2M1_AngCC before submitting them in BS.

5. Demonstrate test results to your lecturer.

6. Write a brief report with proper content page, page number, font size of 12 points, proper format, and captions.

Note:

- Upload PT file and report in politemall before each presentation.
- Each student will be given approx. 5-10 min to demonstrate and explain your mini-project in each part 1 and 2.

Report Format:

1. Title Page:
    - Project Title
    - Student Name
    - Course Title
    - Date
2. Table of Contents
3. Introduction:
    - Brief description of the project
    - Objectives and expected outcomes
4. Network Design:
    - Detailed network topology diagram
    - Explanation of the FLSM subnetting approach
    - IP addressing table
5. Configuration:
    - Configuration commands used for each device
    - Screenshots of device configurations
6. Testing and Analysis:
    - Description of tests performed
    - Analysis of test results
    - Troubleshooting steps, if any
7. Enhancements:
    - Description of the additional feature or service researched.
    - Justification for the selection and its relevance to the project.
    - Detailed steps for implementation.
8. Conclusion:

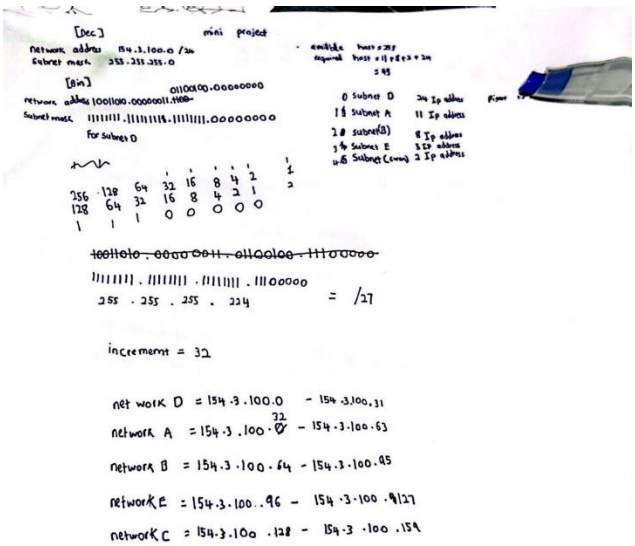
Note that this worksheet is not to be submitted as a final report.

1: Show your steps in determining IP subnet addresses

Your IP Network: 154.3.100.0 /24 (255.255.255.0)

1. Show the steps in determining: subnet mask(255.255.255.224)
   a. Number of host bits
   b. Number of subnet bits
   c. Subnet mask after subnetting

2. List all the subnets (subnet address) in a table.



1a) 32-2=30
Host bits=30 bits

1b) Class B= /16
27-16=11
Subnet bits=11 bits

1c) /27 (255.255.255.224)

2)

net work D = 154.3.100.0 - 154.3.100.31
network A = 154.3.100.32 - 154.3.100.63
network B = 154.3.100.64 - 154.3.100.95
networkE = 154.3.100..96 - 154.3.100.9127
networkC = 154.3.100.128 - 154.3.100.159

2. Complete Table 1 and 2

Table 1: Determining IP address ranges

Subnet	Subnet Number	Subnet Address	Subnet Mask	First Usable Host Address	Last Usable Host Address	Broadcast Address
Eg.	0	201.1.120.0/26	255.255.255.192	201.1.120.1	201.1.120.126	201.1.120.127
A	1	154.3.100.32/27	255.255.255.224	154.3.100.33	154.3.100.62	154.3.100.63
B	2	154.3.100.64/27	255.255.255.224	154.3.100.65	154.3.100.94	154.3.100.95
C	4	154.3.100.128/27	255.255.255.224	154.3.100.129	154.3.100.158	154.3.100.159
D	0	154.3.100.0/27	255.255.255.224	154.3.100.1	154.3.100.30	154.3.100.31
E	3	154.3.100.96/27	255.255.255.224	154.3.100.97	154.3.100.126	154.3.100.127

Table 2: Assign IP addresses.

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	**LAN: G0/0** (Subnet A)	154.3.100.33	255.255.255.224	N/A
	LAN: G0/1 (Subnet B)	154.3.100.65	255.255.255.224	N/A
	WAN: S0/0/0 (Subnet C)	154.3.100.129	255.255.255.224	N/A
R2	**LAN: G0/0** (Subnet D)	154.3.100.1	255.255.255.224	N/A
	LAN: G0/1	154.3.100.97	255.255.255.224	N/A

	(Subnet E)			
	WAN: S0/0/0 (Subnet C)	**154.3.100.158**	**255.255.255.224**	**N/A**
PC A	**NIC**	**154.3.100.62**	**255.255.255.224**	**154.3.100.33**
PC B	**NIC**	**154.3.100.94**	**255.255.255.224**	**154.3.100.65**
PC D	**NIC**	**154.3.100.30**	**255.255.255.224**	**154.3.100.1**
PC E	**NIC**	**154.3.100.126**	**255.255.255.224**	**154.3.100.97**

2. Router 1 and 2 working configurations

(Record commands used, refer to sample shown in appendix)

R1:	**R2:**
Router>enable	Router>enable
Router(config)#**hostname R1**	Router(config)#**hostname R2**
R1(config)#**no ip domain-lookup**	R2(config)#**no ip domain-lookup**
R1(config)#int g0/0	R2(config)#int g0/0
R1(config-if)#**ip address 154.3.100.33** 255.255.255.224	R2(config-if)#**ip address 154.3.100.1** 255.255.255.224
R1(config-if)#no shutdown	R2(config-if)#no shutdown
R1(config-if)#exit	R2(config-if)#exit
R1(config)#int g0/1	R2(config)#int g0/1
R1(config-if)#**ip address 154.3.100.65** 255.255.255.224	R2(config-if)#**ip address 154.3.100.97** 255.255.255.224
R1(config-if)#no shut	R2(config-if)#no shut
R1(config-if)#exit	R2(config-if)#exit
R1(config)#**int s0/0/0**	R2(config)#**int s0/0/0**
R1(config-if)#**ip address 154.3.100.129** 255.255.255.224	R2(config-if)#**ip address 154.3.100.158** 255.255.255.224
R1(config-if)#**clock rate 128000**	R2(config-if)#no shut
R1(config-if)#no shut	R2(config-if)#exit
R1(config-if)#exit	R2(config)# **ip route 154.3.100.32** 255.255.255.224 **154.3.100.129** R2(config)# **ip route 154.3.100.64** 255.255.255.224 **154.3.100.129**
R1(config)# **ip route 154.3.100.0** 255.255.255.224 **154.3.100.158** R1(config)# **ip route 154.3.100.96** 255.255.255.224 **154.3.100.158**	R2(config)#exit
R1(config)#exit	R2# copy running-config startup-config

R1# copy running-config startup-config

3. Test Results

3.1 **Show the following commands in R1 and R2:**

R1# Show IP interface brief

What does it show?

It displays a summary of the IP configuration and status of all the network interfaces on a Cisco device

R1# Show IP route

How many static routes shown in R1 routing table? What are they for?

2

Static routing is used to manually configure the path that data packets take through a network. Network administrators set up these routes to specify the exact paths between different network nodes, ensuring a high level of control over traffic flow that will minimize packet loss or network congestion. This method is useful in smaller networks or where network paths do not change frequently, as it provides stability, predictability, and simplicity. Static routes are defined and maintained manually, making them reliable in environments where network changes are minimal.

3.2 Connectivity Tests:

- Ping from **PC_A to PC_B :** *Ping* **154.3.100.94 successful? Yes / No**
- Ping from **PC_A to PC_D:** *Ping* **154.3.100.30 successful? Yes / No**
- Ping from **PC_A to PC_E:** *Ping* **154.3.100.126 successful? Yes / No**

To paste screenshots of Ping test results

```
C:\>ping 154.3.100.62

Pinging 154.3.100.62 with 32 bytes of data:

Reply from 154.3.100.62: bytes=32 time=2ms TTL=128
Reply from 154.3.100.62: bytes=32 time=4ms TTL=128
Reply from 154.3.100.62: bytes=32 time=4ms TTL=128
Reply from 154.3.100.62: bytes=32 time=4ms TTL=128

Ping statistics for 154.3.100.62:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 4ms, Average = 3ms

C:\>ping 154.3.100.126

Pinging 154.3.100.126 with 32 bytes of data:

Reply from 154.3.100.126: bytes=32 time=44ms TTL=126
Reply from 154.3.100.126: bytes=32 time=46ms TTL=126
Reply from 154.3.100.126: bytes=32 time=45ms TTL=126
Reply from 154.3.100.126: bytes=32 time=37ms TTL=126

Ping statistics for 154.3.100.126:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 37ms, Maximum = 46ms, Average = 43ms

C:\>ping 154.3.100.30

Pinging 154.3.100.30 with 32 bytes of data:

Reply from 154.3.100.30: bytes=32 time=36ms TTL=126
Reply from 154.3.100.30: bytes=32 time=52ms TTL=126
Reply from 154.3.100.30: bytes=32 time=37ms TTL=126
Reply from 154.3.100.30: bytes=32 time=31ms TTL=126

Ping statistics for 154.3.100.30:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 31ms, Maximum = 52ms, Average = 39ms

C:\>ping 154.3.100.94

Pinging 154.3.100.94 with 32 bytes of data:

Reply from 154.3.100.94: bytes=32 time<1ms TTL=127
Reply from 154.3.100.94: bytes=32 time<1ms TTL=127
Reply from 154.3.100.94: bytes=32 time<1ms TTL=127
Reply from 154.3.100.94: bytes=32 time<1ms TTL=127

Ping statistics for 154.3.100.94:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

To paste screenshots of " show IP interface brief" and "Show IP route"

```
R1#show ip int br
R1#show ip int brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0     154.3.100.33    YES manual up                    up
GigabitEthernet0/1     154.3.100.65    YES manual up                    up
GigabitEthernet0/2     unassigned      YES unset  administratively down down
Serial0/0/0            154.3.100.129   YES manual up                    up
Serial0/0/1            unassigned      YES unset  administratively down down
Vlan1                  unassigned      YES unset  administratively down down
R1#
```

```
R2#show ip int br
R2#show ip int brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0     154.3.100.1     YES manual up                    up
GigabitEthernet0/1     154.3.100.97    YES manual up                    up
GigabitEthernet0/2     unassigned      YES unset  administratively down down
Serial0/0/0            154.3.100.158   YES manual up                    up
Serial0/0/1            unassigned      YES unset  administratively down down
Vlan1                  unassigned      YES unset  administratively down down
R2#
```

```
R1#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     154.3.0.0/16 is variably subnetted, 8 subnets, 2 masks
S       154.3.100.0/27 [1/0] via 154.3.100.158
C       154.3.100.32/27 is directly connected, GigabitEthernet0/0
L       154.3.100.33/32 is directly connected, GigabitEthernet0/0
C       154.3.100.64/27 is directly connected, GigabitEthernet0/1
L       154.3.100.65/32 is directly connected, GigabitEthernet0/1
S       154.3.100.96/27 [1/0] via 154.3.100.158
C       154.3.100.128/27 is directly connected, Serial0/0/0
L       154.3.100.129/32 is directly connected, Serial0/0/0

R1#
```

```
R2#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     154.3.0.0/16 is variably subnetted, 8 subnets, 2 masks
C       154.3.100.0/27 is directly connected, GigabitEthernet0/0
L       154.3.100.1/32 is directly connected, GigabitEthernet0/0
S       154.3.100.32/27 [1/0] via 154.3.100.129
S       154.3.100.64/27 [1/0] via 154.3.100.129
C       154.3.100.96/27 is directly connected, GigabitEthernet0/1
L       154.3.100.97/32 is directly connected, GigabitEthernet0/1
C       154.3.100.128/27 is directly connected, Serial0/0/0
L       154.3.100.158/32 is directly connected, Serial0/0/0

R2#
```

4. Extra Features

Research and add 2 extra features to be implemented in this network. You may refer to chap 16 for the features or research elsewhere.

Port security and standard ACL

Update and submit report before demonstration.

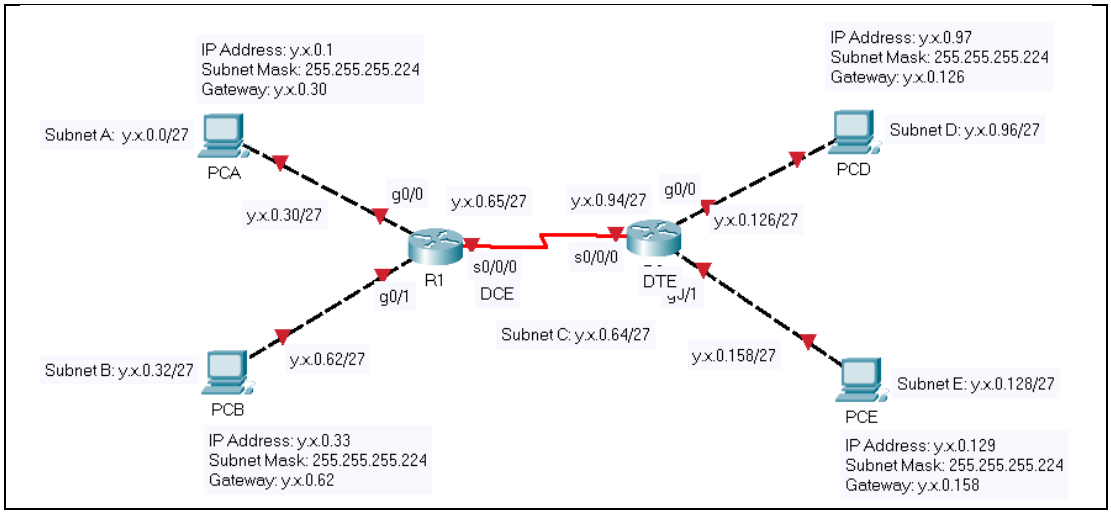
End

Marking Rubrics

Items	Max. marks
Assessment Part 1	
Working steps of determining IP addresses	10 marks
Table 1 / Table 2	10 marks
PT Diagram	5 marks
Assessment Part 2	
Test Results	15 marks
Quality of Demonstration (understanding)	20 marks
2 Extra Features	20 marks
Documentation and Answers	10 marks
Timeliness / Independence	10 marks
Total	**100 marks**

Appendix A – Sample router commands

Addresses in diagram are meant for illustration only.



R1 Configuration

Router>enable
Router#config terminal
Router(config)#**hostname R1**
R1(config)#**no ip domain-lookup**

R1(config)#int g0/0 ; **Subnet A**

R1(config-if)#**ip address** _____ _____
R1(config-if)#no shutdown
R1(config-if)#exit

R1(config)#int g0/1 ; **Subnet B**
R1(config-if)#**ip address** _____ _____
R1(config-if)#no shut
R1(config-if)#exit

R1(config)#**int s0/0/0** ; **Subnet C (DCE)**

R1(config-if)#**ip address** _____ _____
R1(config-if)#**clock rate 128000** ; (DCE side only)
R1(config-if)#no shut
R1(config-if)#exit

R1(config)# **ip route** _____

R1(config)#exit

R1# copy running-config startup-config ; Save the configuration

R2 Configuration

Router>enable
Router#config terminal
Router(config)#**hostname R2**
R2(config)#**no ip domain-lookup**

R2(config)#int g0/0 ; **Subnet D**

R2(config-if)#p address _____ _____
R2(config-if)#no shutdown
R2(config-if)#exit

R2(config)#int g0/1 ; **Subnet E**
R2(config-if)#ip address _____ _____
R2(config-if)#no shut
R2(config-if)#exit

R2(config)#int **s0/0/0** ; **Subnet C (DTE)**

R2(config-if)#ip address _____ _____
R2(config-if)#no shut
R2(config-if)#exit

R2(config)# R1(config)# **ip route**
_____

R2(config)#exit

R2# copy running-config startup-config

Appendix C: Rubrics

Criteria		Exemplary (A)	Accomplished (B)	Developing (C)	Beginning (D)	Not putting effort / Poor (E)
		8-10	7-7.5	6-6.5	5-5.5	0-5
Working steps	Content and working steps are corect & shown clearly	No errors and presented logically	Only 1 or 2 errors , Generally easy to follow	More than 2 errors , some information missing and hard to follow	Incomplete and not able to justify answers at all	No proper steps or copy from others
Table 1 & 2	Accurate in IP addressing & subnet assignments	No errors	Only 1 or 2 errors	More than 2 errors	More than 3 errors	Numerous errors
PT Diagram	Properly Drawn and labelled	Excellent Layout with no errors	Good Layout with 1 or 2 errors only	More than 2 errors	More than 3 errors	Poor Layout/incomplete
Test Results	All Test results successfully carried out independently	No errors	Only 1 or 2 errors	More than 2 errors	More than 3 errors	Numerous errors
Quality of Demonstration	Student is confident, presentation is smooth and questions from staff are answered correctly	**Confident** and smooth, all answers are correct	**Quite confident** but 1 or 2 answers given wrongly, need **guidance** from staff	**Not confident** and more than 2 questions are answered wrongly	Uncertain of steps and answers to most questions are wrong	Unable to present/ answer properly
2 Extra Features (20%)	Additional Feature implemented by student' own effort	Features are advance, **excellent** demonstration and explanation	Basic feature, **good** demonstration and explanation	Feature implemented but demonstration or explanation is **not complete**	Feature configured and demonstrated but student is **unable to explain** it well	Not successfully implemented or unable to explain at all
Report, documentation and Answers	Proper format, screenshots and Answers to questions	Document, diagrams properly formatted , screenshots all included and **no error** in the answers/information	Some **Screenshots not included** or **1 error** in the answers/information	Document and diagrams not properly formatted or **more than 1 error** in the answers/information provided	Document and diagram poorly formatted or most answers are wrong	Answers not given / untidy documentation
Timeliness / Independence	Complete before due date and independent	Complete and submit early **without any consultation** from staff or help from classmates	Complete on time with **some consultation**	Complete on time with a lot of consultation	Submit after **due date**	Submit after due date with **reminder**