Coventry University

Coursework 1 Practical Assessment - Lab Scenario Worksheet

*This document is for CU Group students for their own use in completing their assessed work for this module and should not be passed to third parties or posted on any website. Any infringements of this rule should be reported to engagement@coventry.ac.uk

Lab Scenario Worksheet Student ID:

Task 1: Design an IP Addressing Scheme using VLSM (Total marks = 12)

For the IP addressing scheme, assign unique subnets to the departments in branches (a department in a branch will have a unique subnet). Utilise a subnetting technique which enhances IP address distribution while allowing for future scalability. Each device in the network must be assigned an IP address.

Given an IP address and mask of 210.165.10.0/24, design an IP addressing scheme which fulfils the following requirements in the table below using the VLSM approach for efficient use of IP addresses.

The 0th subnet is used. No subnet calculators should be used.

Subnet	York Headquarters	London Branch	Warsaw Branch	Number of Hosts
Marketing Department (Subnet A)	4	6	6	16
Sales Department (Subnet B)	4	4	4	12
IT Department (Subnet C)	4	2	2	8
Total	**12**	**12**	**12**	**36**

Marketing Department (Warsaw Branch)		
Specification	**Student Input**	**Marks (4 marks)**
Default Subnet Mask (binary)	11111111.11111111.11111111.00000000	
Custom subnet mask (decimal)	255.255.255.240	
Total number of subnets	16	
Total number of host addresses	16	
Number of usable addresses	14	
Number of bits borrowed	4	
First IP host address	210.165.10.1	
Last IP host address	210.165.10.14	

Sales Department (Warsaw Branch)

Specification	Student Input	
Default subnet mask (binary)	11111111.11111111.11111111.00000000	
Custom subnet mask (decimal)	255.255.255.248	
Total number of subnets	32	
Total Number of host addresses	8	
Number of usable addresses	6	
Number of bits borrowed	3	
First IP host address	210.165.10.17	
Last IP host address	210.165.10.22	

IT Department (Warsaw Branch)		
Specification	**Student Input**	
Default subnet mask (binary)	11111111.11111111.11111111.00000000	
Custom subnet mask (decimal)	255.255.255.248	
Total number of subnets	32	
Total number of host addresses	8	
Number of usable addresses	6	
Number of bits borrowed	3	
First IP host address	210.165.10.25	
Last IP host address	210.165.10.30	

Marketing Department (London Branch)		
Specification	**Student Input**	**Marks (4 marks)**
Default Subnet Mask (binary)	11111111.11111111.11111111.00000000	
Custom subnet mask (decimal)	255.255.255.240	
Total number of subnets	16	
Total number of host addresses	16	
Number of usable addresses	14	
Number of bits borrowed	4	
First IP host address	210.165.10.33	
Last IP host address	210.165.10.46	

Sales Department (London Branch)		
Specification	**Student Input**	
Default subnet mask (binary)	11111111.11111111.11111111.00000000	
Custom subnet mask (decimal)	255.255.255.248	

Total number of subnets	32	
Total Number of host addresses	8	
Number of usable addresses	6	
Number of bits borrowed	3	
First IP host address	210.165.10.49	
Last IP host address	210.165.10.54	

IT Department (London Branch)		
Specification	**Student Input**	
Default subnet mask (binary)	11111111.11111111.11111111.00000000	
Custom subnet mask (decimal)	255.255.255.248	
Total number of subnets	32	
Total number of host addresses	8	
Number of usable addresses	6	
Number of bits borrowed	3	
First IP host address	210.165.10.57	
Last IP host address	210.165.10.62	

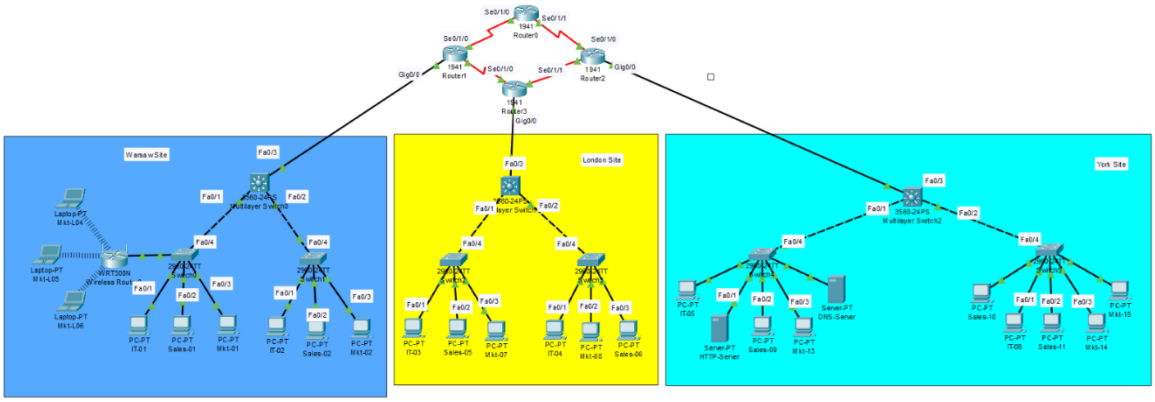
Marketing Department (York Branch)		
Specification	**Student Input**	**Marks (4 marks)**
Default Subnet Mask (binary)	11111111.11111111.11111111.00000000	
Custom subnet mask (decimal)	255.255.255.248	
Total number of subnets	32	
Total number of host addresses	8	
Number of usable addresses	6	
Number of bits borrowed	3	
First IP host address	210.165.10.65	
Last IP host address	210.165.10.70	

Sales Department (York Branch)		
Specification	**Student Input**	
Default subnet mask (binary)	11111111.11111111.11111111.00000000	
Custom subnet mask (decimal)	255.255.255.248	
Total number of subnets	32	
Total Number of host addresses	8	
Number of usable addresses	6	
Number of bits borrowed	3	
First IP host address	210.165.10.73	
Last IP host address	210.165.10.78	

IT Department (York Branch)		
Specification	**Student Input**	
Default subnet mask (binary)	11111111.11111111.11111111.00000000	
Custom subnet mask (decimal)	255.255.255.248	
Total number of subnets	32	
Total number of host addresses	8	
Number of usable addresses	6	
Number of bits borrowed	3	
First IP host address	210.165.10.81	
Last IP host address	210.165.10.86	

Task 2: Build and Configure the Network (Total marks = 15)

Build the network infrastructure as depicted in the provided diagram using Cisco Packet Tracer. Connect Warsaw and London branches to the headquarters in York using appropriate network devices such as routers and switches. Configure the devices with the designated IP addresses from Task 1. Any missing host should be included.



Step 1: Select all the devices such as PCs, servers, laptops, switches, and routers
Step 2: Cable the network as shown in the topology.
Step 3: Configure the IP addresses and default gateway for the end-user devices (PC). The network router will use the FIRST network host address. Host computers will use any address in the subnet.

After configuring each host computer, record the host network settings with the ipconfig /all command and write down the information using the table below.

Warsaw Branch

Marketing Department (Subnet A)					
Device	**IP address**	**Subnet Mask**	**Gateway**	**MAC Address**	**Marks (3 marks)**
Mkt-01	210.165.10.3	255.255.255.240	210.165.10.1	00E0.B0A6.6C56	
Mkt-02	210.165.10.5	255.255.255.240	210.165.10.1	000B.BE54.B1DA	

Mkt-03	210.165.10.7	255.255.255.240	210.165.10.1	00D0.BC10.0B2E	
Mkt-L04	210.165.10.9	255.255.255.240	210.165.10.1	000B.BE6B.8DE4	
Mkt-L05	210.165.10.11	255.255.255.240	210.165.10.1	0050.0F06.1873	
Mkt-L06	210.165.10.13	255.255.255.240	210.165.10.1	0009.7CB7.85D5	
Sales Department (Subnet B)					
Sales-01	210.165.10.22	255.255.255.248	210.165.10.17	0001.6467.91C4	
Sales-02	210.165.10.21	255.255.255.248	210.165.10.17	00E0.B073.4323	
Sales-03	210.165.10.20	255.255.255.248	210.165.10.17	00D0.97E2.C727	
Sales-04	210.165.10.19	255.255.255.248	210.165.10.17	00D0.BC06.7739	
IT Department (Subnet C)					
IT-01	210.165.10.27	255.255.255.248	210.165.10.25	0001.43C4.10DC	
IT-02	210.165.10.29	255.255.255.248	210.165.10.25	000D.BD21.8010	

London Branch

Marketing Department (Subnet A)					
Device	**IP address**	**Subnet Mask**	**Gateway**	**MAC Address**	**Marks (3 marks)**
Mkt-07	210.165.10.35	255.255.255.240	210.165.10.33	0001.63DA.6721	
Mkt-08	210.165.10.37	255.255.255.240	210.165.10.33	00E0.F9BA.EDA8	
Mkt-09	210.165.10.39	255.255.255.240	210.165.10.33	0002.1693.14AC	
Mkt-10	210.165.10.41	255.255.255.240	210.165.10.33	0090.0C69.86E6	
Mkt-11	210.165.10.43	255.255.255.240	210.165.10.33	0030.A37D.5767	
Mkt-12	210.165.10.45	255.255.255.240	210.165.10.33	0002.4ADB.E06C	
Sale Department (Subnet B)					
Sales-05	210.165.10.51	255.255.255.248	210.165.10.49	0006.2AD7.5667	
Sales-06	210.165.10.53	255.255.255.248	210.165.10.49	0001.C7B0.3106	
Sales-07	210.165.10.50	255.255.255.248	210.165.10.49	000A.F3DC.8ED9	
Sales-08	210.165.10.52	255.255.255.248	210.165.10.49	0010.1124.D7AD	
IT Department (Subnet C)					
IT-03	210.165.10.59	255.255.255.248	210.165.10.57	0090.2BC7.9905	
IT-04	210.165.10.61	255.255.255.248	210.165.10.57	0010.114C.0DA0	

York Headquarters

Marketing Department (Subnet A)					
Device	**IP address**	**Subnet Mask**	**Gateway**	**MAC Address**	**Marks (3 marks)**
Mkt-13	210.165.10.70	255.255.255.248	210.165.10.65	0060.3E14.89BA	
Mkt-14	210.165.10.69	255.255.255.248	210.165.10.65	00E0.F92B.6AA3	
Mkt-15	210.165.10.68	255.255.255.248	210.165.10.65	0009.7C07.D262	
Mkt-16	210.165.10.67	255.255.255.248	210.165.10.65	0001.434C.94D9	
Sale Department (Subnet B)					
Sales-09	210.165.10.78	255.255.255.240	210.165.10.73	00E0.B031.5E7A	
Sales-10	210.165.10.77	255.255.255.240	210.165.10.73	0040.0B31.8907	

Sales-11	210.165.10.76	255.255.255.240	210.165.10.73	0006.2A3B.48A3	
Sales-12	210.165.10.75	255.255.255.240	210.165.10.73	00D0.FF31.273E	
IT Department (Subnet C)					
IT-05	210.165.10.86	255.255.255.240	210.165.10.81	00D0.BA91.3A39	
IT-06	210.165.10.83	255.255.255.240	210.165.10.81	000A.419E.4279	
IT-07 (HTTP)	210.165.10.84	255.255.255.240	210.165.10.81	0040.0BE9.D120	
IT-08 (DNS)	210.165.10.85	255.255.255.240	210.165.10.81	0002.17AA.23AD	

Step 4: Configure VLANs for different departments as shown in the topology: (**6 marks)**

i. VLAN 10: Marketing
ii. VLAN 20: Sales
iii. VLAN 30: IT

Task 3: Implement a routing protocol for communication (Total marks = 19)

Implement a suitable dynamic routing protocol to facilitate communication between routers in the network. Ensure efficient routing of data packets between different subnets and branches.

Step 1: Configure the following routers and state the IP addresses of their interfaces using the table provided below: **(4 marks)**

Device	IP address
Router 1- Se0/0/1	10.0.0.1
Router 1- Se0/0/0	10.0.0.5
Router 2-Se0/0/1	10.0.0.13
Router 2-Se0/0/0	10.0.0.10
Router 3-Se0/0/1	10.0.0.9
Router 3-Se0/0/0	10.0.0.6
Router 0-Se0/0/1	10.0.0.2
Router 0-Se0/0/0	10.0.0.14

Step 2: Configure an IP address for the following routers and Layer 3 Switches interfaces using addressing scheme mentioned in Task 1.
Record IP Address for interface indicated in the table below. (3 marks)

Device	IP address	Subnet Mask
Router 1-Gig 0/0	192.168.10.254	255.255.255.0
Router2-Gig 0/0	192.168.30.254	255.255.255.0
Router 3-Gig 0/0	192.168.20.254	255.255.255.0
Multilayer Switch1- Fa 0/3	192.168.10.253	255.255.255.0
Multilayer Switch2- Fa 0/3	192.168.20.253	255.255.255.0
Multilayer Switch3- Fa 0/3	192.168.30.253	255.255.255.0

Step 3: Configuration tasks for each router should also include the following: **(8 marks)**

Task	Specification
Router name	Router (number)
Encrypted privileged exec password	cisco
Console access password	class (number)
Telnet access password	class (number)
Domain name	network.local
Generate RSA keys	crypto key generate rsa (1024 bits)
Configure SSH username & password	username admin password admin123
Set login banner message	banner motd # Unauthorized access is prohibited. #

Step 4: Show the Routing Table for each Router. **(4 marks – 1 mark per row)**

Device	Protocol	Networks Advertised	Configuration Commands
Router1	OSPF	10.0.0.4 10.0.0.0 192.168.10.0	router ospf 1 network 10.0.0.0 0.0.0.3 area 0 network 10.0.0.4 0.0.0.3 area 0 network 192.168.10.0 0 .255 area 0
Router2	OSPF	10.0.0.8 10.0.0.12 192.168.30.0	router ospf 1 network 10.0.0.8 0.0.0.3 area 0 network 10.0.0.12 0.0.0.3 area 0 network 192.168.30.0 0.0.0.255 a 0
Router3	OSPF	10.0.0.4 10.0.0.8 192.168.20.0	router ospf 1 network 10.0.0.4 0.0.0.3 area network 10.0.0.8 0.0.0.3 area network 192.168.20.0 .0.255 area 0

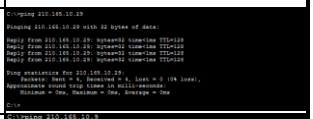
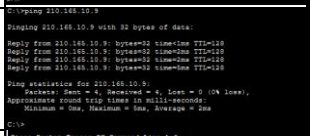
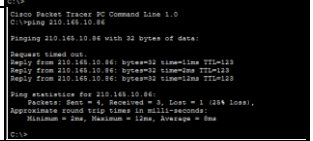
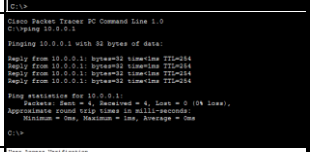
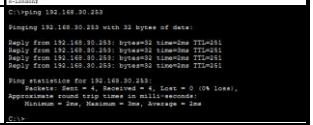
Router0	OSPF	10.0.0.0 10.0.0.12	router ospf 1 network 10.0.0.0 0.0.0.3 area network 10.0.0.12 0.0.0.3 area

Task 4: Use ping and traceroute commands for basic network testing (Total marks = 12)

Conduct network testing using the ping and traceroute commands for connectivity across devices. Troubleshoot and resolve any connectivity issues which may arise during testing.

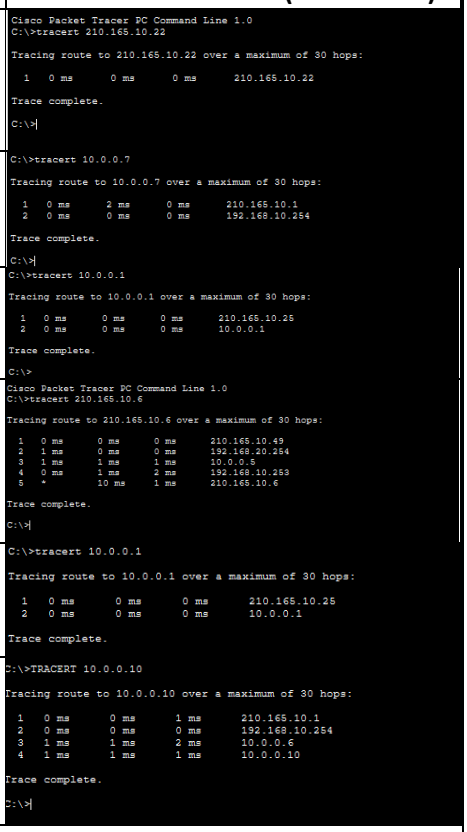
Ping and traceroute are network testing commands to check the TCP/IP network connectivity. Ping is a network administration utility used to test the reachability of a device on a network. Traceroute utility is a network diagnostic tool for displaying the route and measuring the transit delays of packets travelling on a network.

Step 1: Use the ping command to verify network connectivity.
Network connectivity can be verified with the **ping** command. Use the following table to methodically verify connectivity with each network device. Take corrective action to establish connectivity if a test fails: **(6 marks)**

From	To (Destination)	IP Address (Destination)	Ping results (Screenshot)
IT-01	IT-02	210.165.10.29	
Sales-02	Mkt-L04	210.165.10.9	
Mkt-01	IT-05	210.165.10.86	
Sales-02	Router1 se0/0/1	10.0.0.1	
Router3 se/0/0/1	Mkt-03	210.165.10.7	
IT-01	Multilayer Switch2- Fa 0/3	192.168.30.253	

Step 2: Use the **"tracert"** command to verify network connectivity.
Use the **tracert** command to trace the path to a specific destination and write down the path to the destination. **(6 marks)**

From	To (Destination)	IP Address (Destination)	Path to destination (Screenshot)
Sales-03	Sales-01	210.165.10.22	
Mkt-L05	Router0 se/0/0/1	10.0.0.7	
IT-01	Router1 se0/0/1	10.0.0.1	
Sales-05	Mkt-02	210.165.10.5	
IT-01	Multilayer Switch3-Fa 0/3	192.168.30.253	
Mkt-01	Router2 se0/0/1	10.0.0.10	



Task 5: Set Up and Configure Servers (Total marks = 12)

Configure HTTP and DNS servers on designated devices within the network. Set up necessary resources such as websites for the HTTP server and DNS records for the DNS server. Ensure proper communication and access to these servers from devices within the network.

Step 1: Configure the IP address for DNS and HTTP Server, write down the IP addresses on the table below:

Device	IP address	Default Gateway	Subnet Mask	Marks (6 marks)
DNS Server	210.165.10.84	210.165.10.81	255.255.255.248	
HTTP Server	210.165.10.85	210.165.10.81	255.255.255.248	

Step 2: Complete the DNS address field for Mkt-01 and HTTP Server with the IP address of the DNS Server

Step 3: Open the DNS Server, then add the URL: www.coventrylab.ac.uk as the domain name for the IP address of the HTTP Server

Step 4: Open the browser from Mkt-01, type in the URL: www.coventrylab.ac.uk in the address bar and open the web page. Take a snapshot of what comes up on the webpage or landing page and paste it in the text box below:

Text box	Marks (6 marks)