**Misr International University Faculty of Computer Science**

**Computer Networks**

**Project S24**

**Group (2)**

# Objectives

**Part 1: Design and Implement a VLSM Addressing Scheme and fill in the required tables Part 2: Build the Network and Configure Basic Device Settings and Interface Addressing**

**Part 3: Configure the Layer 2 Network and Host Support.**

**Part 4: Configure a Router as a DHCP Server.**

**Part 5: Configure Rou ng Protocols.**

**Part 6: Configure Dynamic NAT with PAT and Sta c NAT.**

**Part 7: Configure Network Management Features**

**Part 8: Verify Connectivity**

**Part 9: Documentation on and Hab**

# Background / Scenario

In this project, you are responsible for completing ng the configuration of the network so there is full end-to-end reachability, so the hosts have reliable default gateway support, and so that management protocols are opera operational within the “Company Network” part of the topology. Be careful to verify that your configurations meet the provided specifications and that the devices perform as required.

# Instructions

**Part 1: Design and Implement a VLSM Addressing Scheme**

Step 1: Design a VLSM addressing scheme given a network address and host requirements. You will configure addressing on routers, switches, and network hosts.

|  |
| --- |
| 172.16.0.0/16 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Subnet  Description | VLAN  ID | Required  Number of hosts | Subnet  mask | CIDR  Prefix | IP Range  a.a.a.a - b.b.b.b | Broadcast  Address |
| Main | VLAN 11 | 15 | 255.255.255.224 | /27 | 172.16.1.33 🡪 172.16.1.63 | 172.16.1.63/27 |
| VLAN 22 | 20 | 255.255.255.224 | /27 | 172.16.0.225 🡪 172.16.0.254 | 172.16.0.255/27 |
| S | VLAN 33 | 75 | 255.255.255.128 | /25 | 172.16.0.1 🡪 172.16.0.126 | 172.16.0.127/25 |
| VLAN 44 | 13 | 255.255.255.240 | /28 | 172.16.1.81 🡪 172.16.1.94 | 172.16.1.95/28 |
| N | VLAN 55 | 40 | 255.255.255.192 | /26 | 172.16.0.129 🡪 172.16.0.190 | 172.16.0.191/26 |
| VLAN 66 | 18 | 255.255.255.224 | /27 | 172.16.1.1 🡪 172.16.1.30 | 172.16.1.31/27 |
| R | VLAN 77 | 14 | 255.255.255.240 | /28 | 172.16.1.65 🡪 172.16.1.78 | 172.16.1.79/28 |
| VLAN 88 | 23 | 255.255.255.224 | /27 | 172.16.0.193 🡪 172.16.0.222 | 172.16.0.223/27 |
| Server Room |  | 10 | 255.255.255.240 | /28 | 172.16.1.97 🡪 172.16.1.110 | 172.16.1.111/28 |
|  |  |  |  |  |  |  |
| Main-MLS <--> GW |  |  |  |  |  |  |
| N-MLS <--> GW |  |  |  |  |  |  |
| S-MLS <--> GW |  |  |  |  |  |  |
| R-MLS <--> GW |  |  |  |  |  |  |
| GW <--> ISP |  |  |  |  |  |  |
| ISP <--> Branch-GW |  |  |  |  |  |  |
| ISP <--> Home |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| PC-Number | VLAN  ID | IP Address/CIDR | Default Gateway |
| PC-0 |  |  |  |
| PC-1 |  |  |  |
| PC-2 |  |  |  |
| PC-3 |  |  |  |
| PC-4 |  |  |  |
| PC-5 |  |  |  |
| PC-6 |  |  |  |
| PC-7 |  |  |  |
| PC-8 |  |  |  |
| PC-9 |  |  |  |
| PC-10 |  |  |  |
| PC-11 |  |  |  |
|  |  |  |  |
| Laptop |  |  |  |
| Tablet |  |  |  |
| Smartphone |  |  |  |
|  |  |  |  |
| DHCP Server |  |  |  |
| Email Server |  |  |  |
| Web Server |  |  |  |
| DNS Server |  |  |  |
| NTP Syslog Server |  |  |  |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| Networking Device | Port-Number | VLAN ID | IP Address/CIDR |
| Main-MLS | Fa 0/1 |  |  |
| Fa 0/2 |  |  |
| Fa 0/3 |  |  |
| Fa 0/4 |  |  |
| Fa 0/5 |  |  |
| Gig 0/1 |  |  |
|  |  |  |  |
|  | Fa 0/1 |  |  |
| S-MLS | Fa 0/2 |  |  |
| Fa 0/3 |  |  |
| Fa 0/4 |  |  |
| Fa 0/5 |  |  |
| Gig 0/1 |  |  |
|  |  |  |  |
| N-MLS | Fa 0/1 |  |  |
| Fa 0/2 |  |  |
| Fa 0/3 |  |  |
| Fa 0/4 |  |  |
| Fa 0/5 |  |  |
| Gig 0/1 |  |  |
|  |  |  |  |
| R-MLS | Fa 0/1 |  |  |
| Fa 0/2 |  |  |
| Fa 0/3 |  |  |
| Fa 0/4 |  |  |
| Fa 0/5 |  |  |
| Gig 0/1 |  |  |
|  |  |  |  |
| GW | Gig 1/0/1 |  |  |
| Gig 1/0/2 |  |  |
| Gig 1/0/3 |  |  |
| Gig 1/0/4 |  |  |
| Gig 1/0/5 |  |  |
| Gig 1/0/6 |  |  |
|  |  |  |  |
| ISP | Gig 0/0 |  |  |
| Gig 0/1 |  |  |
| Gig 0/2 |  |  |
|  |  |  |  |
| Branch-GW | Gig 0/0/0 |  |  |
| Gig 0/0/1 |  |  |
|  |  |  |  |
| Wireless Home  Router | Wireless 1 |  |  |
| Wireless 2 |  |  |
| Wireless 3 |  |  |

**Part 2: Build the Network and Configure Basic Device Settings and Interface Addressing**

In Part 2, you will set up the network topology and configure basic settings and interface addressing.

Step 1: **Configure PCs with IPv4 addresses**

Use the addressing table to manually configure the PCs with full IP addressing.

Step 2: **Configure basic Settings for each device.**

1. Configure allDevices with the following:
   1. Prevent the router from a emp ng to resolve incorrectly entered commands as domain names.
   2. Host name for all devices.
   3. Encrypted privileged EXEC secret password4) Console access password.
   4. Set the minimum password length to **10** characters.
   5. Encrypt the clear text passwords.
   6. Configure an appropriate MOTD Banner.
2. Configure the Interface Addressing of routers and switches.
3. Configure SSH for all routers.

**Part 3: Configure Network Infrastructure Settings (VLANs, Trunking, Inter-VLAN Rou ng EtherChannel)**

In this part of the Skills Assessment, you will complete the Layer 2 network configuration and set up basic host support. At the end of this part, all the switches should be able to communicate.

Step 1: Create VLANs and Assign Switch Ports

Step 2: Configure an 802.1Q Trunk between the Switches

Step 3: On all switches, configure host access ports connecting to PCs

Step 4: Configure Inter-VLAN Rou ng on the Router

Step 5: Verify Inter-VLAN Rou ng is working

Step 6: On all switches, create LACP EtherChannels as shown in the topology diagram.

Step 7: Verify EtherChannels are working.

**Part 4: Configure a Router as a DHCP Server.**

Step 1: Configure the excluded IPv4 addresses.

Step 2: Create a DHCP pool on B\_R1 LAN.

1. Create a DHCP pool named **B\_R1 LAN**.
2. Configure the DHCP pool to include the network address, the default gateway, and the IP address of the DNS server.

Step 3: Verify DHCP and Connectivity.

**Part 5: Configure Rou ng Protocols**

In this part, you will configure IPv4 routing protocols. At the end of this part, the network should be fully converged. Step 1: Configure and Verify Single Area OSPF for IPv4 on **Core\_R1, Multilayer\_Main\_SW1, and Multilayer\_S\_SW2.**

Step 2: Configure and Verify Single Area EIGRP for IPv4 on **Core\_R1, Multilayer \_N\_SW3, and Multilayer \_R\_SW4.**

Step 3: Configure redistribution from OSPF into EIGRP for IPv4, and redistribution of EIGRP into OSPF for IPv4

Step 4: Verify OSPF, EIGRP, and redistribution settings.

**Part 6: Configure Dynamic NAT with PAT and Sta c NAT.**

Step 1: Configure Dynamic NAT with PAT on **Core\_R1**

Step 2: Configure Sta c NAT on **Core\_R1 for web server.**

Step 3: Verify Dynamic NAT with PAT and static NAT Implementation.

**Part 7: Configure Network Management Features**

In this part, you will configure various network management features.

Step 1: Configure NTP on all devices.

Step 2: Configure Syslog on all devices

Step 3: Configure SNMPv2c on all devices

**Part 8: Verify Connectivity**

Verify that all PCs can ping each other.

**Documentation and Handover**

* **Prepare a final document whether .docx or PPT with detailed configurations for each part of the implementation**
* **If you face any issues, provide the troubleshooting guide that you follow to detect and resolve that issue in any step. “Optional”**
* **Include testing screenshots for ping command and traceroute command on different PCs**
* **Include the IP routing table for each device after testing is done and the routing is built dynamically**