Design and Implementation of a Company/Business System Network Design (Project #6)

CCNA NETWORK PROJECT

SUBASH SUBEDI

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A trading floor Support center employs 600 staff. They have recently expanded and as a result, need to move to a new building. A building has been identified but has no network. This means that before they can make to move out, new network service needs to be designed and implemented in the new building. Existing Network comprises of the following elements: The new building is expected to have three floors with two departments in each for example.

1. **First floor-** (Sales and Marketing Department-120 users expected, Human Resource and Logistics Department-120 users expected).
2. **Second floor-** (Finance and Accounts Department-120 users expected, Administrator and Public Relations Department-120 users expected).
3. **Third floor-** (ICT-120 users expected, Server Room-12 devices expected).

Therefore, as a key member of the Networks Team, you have been tasked to design a network for the new building. At this stage, logical design is required, which shows the measures that you would put in place to ensure that the new network meets the current business need and is future-proofed:

* Use Cisco Packet Tracer to design and implement the network solution.
* Using hieratical model providing redundancy at every layer i.e. two routers and two multilayer switches are expected to be used to provide redundancy.
* The network is also expected to connect at least two ISPs to provide redundancy and each router to the connected to the two ISPs.
* Each department is required to have a wireless network for the users.
* Each department should be in a different VLAN and in different subnetwork.
* Provided a base network of 172.16.1.0, carry out subnetting to allocate the correct number of IP addresses to each department.
* The company network is connected to the static, public IP addresses (Internet Protocol) 195.136.17.0/30, 195.136.17.4/30, 195.136.17.8/30 and 195.136.17.12/30 connected to the two Internet providers.
* Configure basic device settings such as hostnames, console password, enable password, banner messages, disable IP domain lookup.
* Devices in all the departments are required to communicate with each other with the respective multilayer switch configured for inter-VLAN routing.
* The Multilayer switches are expected to carry out both routing and switching functionalities thus will be assigned IP addresses.
* All devices in the network are expected to obtain an IP address dynamically from the dedicated DHCP servers located at the server room.
* Devices in the server room are to be allocated IP address statically.
* Use OSPF as the routing protocol to advertise routes both on the routers and multilayer switches.
* Configure SSH in all the routers and layer three switches for remote login.
* Configure port-security for the Finance and Accounts department to allow only one device to connect to a switchport, use sticky method to obtain mac-address and violation mode shutdown.
* Configure PAT to use the respective outbound router interface IPv4 address, implement the necessary ACL rule.
* Test Communication, ensure everything configured is working as expected.

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# Technologies Implemented

## Creating a network topology using Cisco Packet Tracer. Hierarchical Network Design.

A diagram of a diagram of a diagram

AI-generated content may be incorrect.

Figure 1

## Connecting Networking devices with Correct cabling.

Copper Straight-Through

Copper Cross-Over

ISP Router Model: 2811

Core Router Model: ISR 4311

Multi-Layer Switch Model: 3650-24P

L2-Switch Model: 2960-24TT

Laptop-PT

Printer-PT

Access Point PT-AC

Tablet PC-PT

SmartPhone-PT

Server-PT

## Configuring Basic device settings.

|  |  |
| --- | --- |
| **R1 ROUTER**  enable  configure terminal  hostname R1-ROUTER  do clock set 00:00:00 1 JANUARY 2025  banner motd $ ONLY AUTHORIZED ACCESS $  service password-encryption  enable secret cisco  username cisco secret cisco  no ip domain lookup  line console 0  motd-banner  password cisco  exec-timeout 5  login  exit  do wr | **R2 ROUTER**  enable  configure terminal  hostname R2-ROUTER  do clock set 00:00:00 1 JANUARY 2025  banner motd $ ONLY AUTHORIZED ACCESS $  service password-encryption  enable secret cisco  username cisco secret cisco  no ip domain lookup  line console 0  motd-banner  password cisco  exec-timeout 5  login  exit  do wr |

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| --- | --- |
| **FIRST MULTILAYER SWITCH**  enable  configure terminal  hostname M1-MULTILAYER-SWITCH  do clock set 00:00:00 1 JANUARY 2025  banner motd $ ONLY AUTHORIZED ACCESS $  service password-encryption  enable secret cisco  username cisco secret cisco  no ip domain lookup  line console 0  motd-banner  password cisco  exec-timeout 5  login  exit  do wr | **SECOND MULTILAYER SWITCH**  enable  configure terminal  hostname M2-MULTILAYER-SWITCH  do clock set 00:00:00 1 JANUARY 2025  banner motd $ ONLY AUTHORIZED ACCESS $  service password-encryption  enable secret cisco  username cisco secret cisco  no ip domain lookup  line console 0  motd-banner  password cisco  exec-timeout 5  login  exit  do wr |

|  |  |
| --- | --- |
| **SALES SWITCH**  enable  configure terminal  hostname SALES-SWITCH  do clock set 00:00:00 1 JANUARY 2025  banner motd $ ONLY AUTHORIZED ACCESS $  service password-encryption  enable secret cisco  username cisco secret cisco  no ip domain lookup  line console 0  motd-banner  password cisco  exec-timeout 5  login  exit  do wr | **ACCOUNT SWITCH**  enable  configure terminal  hostname ACCOUNT-SWITCH  do clock set 00:00:00 1 JANUARY 2025  banner motd $ ONLY AUTHORIZED ACCESS $  service password-encryption  enable secret cisco  username cisco secret cisco  no ip domain lookup  line console 0  motd-banner  password cisco  exec-timeout 5  login  exit  do wr |
| **MARKETING SWITCH**  enable  configure terminal  hostname MARKETING-SWITCH  do clock set 00:00:00 1 JANUARY 2025  banner motd $ ONLY AUTHORIZED ACCESS $  service password-encryption  enable secret cisco  username cisco secret cisco  no ip domain lookup  line console 0  motd-banner  password cisco  exec-timeout 5  login  exit  do wr | **ADMIN SWITCH**  enable  configure terminal  hostname ADMIN-SWITCH  do clock set 00:00:00 1 JANUARY 2025  banner motd $ ONLY AUTHORIZED ACCESS $  service password-encryption  enable secret cisco  username cisco secret cisco  no ip domain lookup  line console 0  motd-banner  password cisco  exec-timeout 5  login  exit  do wr |
| **HR SWITCH**  enable  configure terminal  hostname HR-SWITCH  do clock set 00:00:00 1 JANUARY 2025  banner motd $ ONLY AUTHORIZED ACCESS $  service password-encryption  enable secret cisco  username cisco secret cisco  no ip domain lookup  line console 0  motd-banner  password cisco  exec-timeout 5  login  exit  do wr | **PUBLIC RELATIONS SWITCH**  enable  configure terminal  hostname PUBLIC-RELATIONS-SWITCH  do clock set 00:00:00 1 JANUARY 2025  banner motd $ ONLY AUTHORIZED ACCESS $  service password-encryption  enable secret cisco  username cisco secret cisco  no ip domain lookup  line console 0  motd-banner  password cisco  exec-timeout 5  login  exit  do wr |
| **LOGISTIC SWITCH**  enable  configure terminal  hostname LOGISTIC-SWITCH  do clock set 00:00:00 1 JANUARY 2025  banner motd $ ONLY AUTHORIZED ACCESS $  service password-encryption  enable secret cisco  username cisco secret cisco  no ip domain lookup  line console 0  motd-banner  password cisco  exec-timeout 5  login  exit  do wr | **ICT SWITCH**  enable  configure terminal  hostname ICT-SWITCH  do clock set 00:00:00 1 JANUARY 2025  banner motd $ ONLY AUTHORIZED ACCESS $  service password-encryption  enable secret cisco  username cisco secret cisco  no ip domain lookup  line console 0  motd-banner  password cisco  exec-timeout 5  login  exit  do wr |
| **FINANCE SWITCH**  enable  configure terminal  hostname FINANCE-SWITCH  do clock set 00:00:00 1 JANUARY 2025  banner motd $ ONLY AUTHORIZED ACCESS $  service password-encryption  enable secret cisco  username cisco secret cisco  no ip domain lookup  line console 0  motd-banner  password cisco  exec-timeout 5  login  exit  do wr | **SERVER ROOM SWITCH**  enable  configure terminal  hostname SERVER-ROOM-SWITCH  do clock set 00:00:00 1 JANUARY 2025  banner motd $ ONLY AUTHORIZED ACCESS $  service password-encryption  enable secret cisco  username cisco secret cisco  no ip domain lookup  line console 0  motd-banner  password cisco  exec-timeout 5  login  exit  do wr |

## Creating VLANs and assigning ports VLAN numbers and Trunk.

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| --- | --- |
| **FIRST MULTILAYER SWITCH**  enable  configure terminal  interface range gigabitEthernet 1/0/1-2  no switchport  exit  vlan 10  name SALES-DEPARTMENT  exit  interface GigabitEthernet 1/0/3  description \*\*THIS IS TRUNK INTERFACES OF SALES \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 10  switchport nonegotiate  exit  vlan 20  name MARKETING-DEPARTMENT  exit  interface GigabitEthernet 1/0/4  description \*\*THIS IS TRUNK INTERFACES OF MARKETING \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 20  switchport nonegotiate  exit  vlan 30  name HR-DEPARTMENT  exit  interface GigabitEthernet 1/0/5  description \*\*THIS IS TRUNK INTERFACES OF HR \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 30  switchport nonegotiate  exit  vlan 40  name LOGISTIC-DEPARTMENT  exit  interface GigabitEthernet 1/0/6  description \*\*THIS IS TRUNK INTERFACES OF LOGISTIC \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 40  switchport nonegotiate  exit  vlan 50  name FINANCE-DEPARTMENT  exit  interface GigabitEthernet 1/0/7  description \*\*THIS IS TRUNK INTERFACES OF FINANCE \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 50  switchport nonegotiate  exit  vlan 60  name ACCOUNT-DEPARTMENT  exit  interface GigabitEthernet 1/0/8  description \*\*THIS IS TRUNK INTERFACES OF ACCOUNT \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 60  switchport nonegotiate  exit  vlan 70  name ADMIN-DEPARTMENT  exit  interface GigabitEthernet 1/0/9  description \*\*THIS IS TRUNK INTERFACES OF ADMIN \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 70  switchport nonegotiate  exit  vlan 80  name PUBLIC-RELATIONS-DEPARTMENT  exit  interface GigabitEthernet 1/0/10  description \*\*THIS IS TRUNK INTERFACES OF PUBLIC-RELATIONS \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 80  switchport nonegotiate  exit  vlan 90  name ICT-DEPARTMENT  exit  interface GigabitEthernet 1/0/11  description \*\*THIS IS TRUNK INTERFACES OF ICT \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 90  switchport nonegotiate  exit  vlan 100  name SERVER-ROOM-DEPARTMENT  exit  interface GigabitEthernet 1/0/12  description \*\*THIS IS TRUNK INTERFACES OF SERVER ROOM \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 100  switchport nonegotiate  exit  vlan 999  name NATIVE-VLAN  exit | **SECOND MULTILAYER SWITCH**  enable  configure terminal  interface range gigabitEthernet 1/0/1-2  no switchport  exit  vlan 10  name SALES-DEPARTMENT  exit  interface GigabitEthernet 1/0/3  description \*\*THIS IS TRUNK INTERFACES OF SALES \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 10  switchport nonegotiate  exit  vlan 20  name MARKETING-DEPARTMENT  exit  interface GigabitEthernet 1/0/4  description \*\*THIS IS TRUNK INTERFACES OF MARKETING \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 20  switchport nonegotiate  exit  vlan 30  name HR-DEPARTMENT  exit  interface GigabitEthernet 1/0/5  description \*\*THIS IS TRUNK INTERFACES OF HR \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 30  switchport nonegotiate  exit  vlan 40  name LOGISTIC-DEPARTMENT  exit  interface GigabitEthernet 1/0/6  description \*\*THIS IS TRUNK INTERFACES OF LOGISTIC \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 40  switchport nonegotiate  exit  vlan 50  name FINANCE-DEPARTMENT  exit  interface GigabitEthernet 1/0/7  description \*\*THIS IS TRUNK INTERFACES OF FINANCE \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 50  switchport nonegotiate  exit  vlan 60  name ACCOUNT-DEPARTMENT  exit  interface GigabitEthernet 1/0/8  description \*\*THIS IS TRUNK INTERFACES OF ACCOUNT \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 60  switchport nonegotiate  exit  vlan 70  name ADMIN-DEPARTMENT  exit  interface GigabitEthernet 1/0/9  description \*\*THIS IS TRUNK INTERFACES OF ADMIN \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 70  switchport nonegotiate  exit  vlan 80  name PUBLIC-RELATIONS-DEPARTMENT  exit  interface GigabitEthernet 1/0/10  description \*\*THIS IS TRUNK INTERFACES OF PUBLIC-RELATIONS \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 80  switchport nonegotiate  exit  vlan 90  name ICT-DEPARTMENT  exit  interface GigabitEthernet 1/0/11  description \*\*THIS IS TRUNK INTERFACES OF ICT \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 90  switchport nonegotiate  exit  vlan 100  name SERVER-ROOM-DEPARTMENT  exit  interface GigabitEthernet 1/0/12  description \*\*THIS IS TRUNK INTERFACES OF SERVER ROOM \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 100  switchport nonegotiate  exit  vlan 999  name NATIVE-VLAN  exit |

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| --- | --- |
| **SALES SWITCH**  enable  configure terminal  vlan 10  name SALES-DEPARTMENT  exit  vlan 999  name NATIVE-VLAN  exit  interface range FastEthernet 0/1-24  switchport mode access  switch access vlan 10  no shutdown  exit  interface range GigabitEthernet 0/1-2  description \*\*THIS IS TRUNK INTERFACES OF SALES \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 10  switchport nonegotiate  exit  interface vlan 10  description \*\*THIS VLAN IS DEFINE FOR SALES DEPARTMENT \*\*  ip address 172.16.1.62 255.255.255.192  no shutdown  exit  ip default-gateway 172.16.1.1 | **ACCOUNT SWITCH**  enable  configure terminal  vlan 60  name ACCOUNT-DEPARTMENT  exit  vlan 999  name NATIVE-VLAN  exit  interface range FastEthernet 0/1-24  switchport mode access  switch access vlan 60  no shutdown  exit  interface range GigabitEthernet 0/1-2  description \*\*THIS IS TRUNK INTERFACES OF ACCOUNT \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 60  switchport nonegotiate  exit  interface vlan 60  description \*\*THIS VLAN IS DEFINE FOR ACCOUNT DEPARTMENT \*\*  ip address 172.16.2.126 255.255.255.192  no shutdown  exit  ip default-gateway 172.16.2.126 |
| **MARKETING SWITCH**  enable  configure terminal  vlan 20  name MARKETING-DEPARTMENT  exit  vlan 999  name NATIVE-VLAN  exit  interface range FastEthernet 0/1-24  switchport mode access  switch access vlan 20  no shutdown  exit  interface range GigabitEthernet 0/1-2  description \*\*THIS IS TRUNK INTERFACES OF MARKETING \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 20  switchport nonegotiate  exit  interface vlan 20  description \*\*THIS VLAN IS DEFINE FOR MARKETING DEPARTMENT \*\*  ip address 172.16.1.126 255.255.255.192  no shutdown  exit  ip default-gateway 172.16.1.65 | **ADMIN SWITCH**  enable  configure terminal  vlan 70  name ADMIN-DEPARTMENT  exit  vlan 999  name NATIVE-VLAN  exit  interface range FastEthernet 0/1-24  switchport mode access  switch access vlan 70  no shutdown  exit  interface range GigabitEthernet 0/1-2  description \*\*THIS IS TRUNK INTERFACES OF ADMIN \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 70  switchport nonegotiate  exit  interface vlan 70  description \*\*THIS VLAN IS DEFINE FOR ADMIN DEPARTMENT \*\*  ip address 172.16.2.191 255.255.255.192  no shutdown  exit  ip default-gateway 172.16.2.129 |
| **HR SWITCH**  enable  configure terminal  vlan 30  name HR-DEPARTMENT  exit  vlan 999  name NATIVE-VLAN  exit  interface range FastEthernet 0/1-24  switchport mode access  switch access vlan 30  no shutdown  exit  interface range GigabitEthernet 0/1-2  description \*\*THIS IS TRUNK INTERFACES OF HR \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 30  switchport nonegotiate  exit  interface vlan 30  description \*\*THIS VLAN IS DEFINE FOR HR DEPARTMENT \*\*  ip address 172.16.1.190 255.255.255.192  no shutdown  exit  ip default-gateway 172.16.1.128 | **PUBLIC RELATIONS SWITCH**  enable  configure terminal  vlan 80  name PUBLIC-RELATIONS-DEPARTMENT  exit  vlan 999  name NATIVE-VLAN  exit  interface range FastEthernet 0/1-24  switchport mode access  switch access vlan 80  no shutdown  exit  interface range GigabitEthernet 0/1-2  description \*\*THIS IS TRUNK INTERFACES OF PUBLIC-RELATIONS \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 80  switchport nonegotiate  exit  interface vlan 80  description \*\*THIS VLAN IS DEFINE FOR PUBLIC-RELATIONS DEPARTMENT \*\*  ip address 172.16.2.254 255.255.255.192  no shutdown  exit  ip default-gateway 172.16.2.193 |
| **LOGISTIC SWITCH**  enable  configure terminal  vlan 40  name LOGISTIC-DEPARTMENT  exit  vlan 999  name NATIVE-VLAN  exit  interface range FastEthernet 0/1-24  switchport mode access  switch access vlan 40  no shutdown  exit  interface range GigabitEthernet 0/1-2  description \*\*THIS IS TRUNK INTERFACES OF LOGISTIC \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 40  switchport nonegotiate  exit  interface vlan 40  description \*\*THIS VLAN IS DEFINE FOR LOGISTIC DEPARTMENT \*\*  ip address 172.16.1.254 255.255.255.192  no shutdown  exit  ip default-gateway 172.16.1.193 | **ICT SWITCH**  enable  configure terminal  vlan 90  name ICT-DEPARTMENT  exit  vlan 999  name NATIVE-VLAN  exit  interface range FastEthernet 0/1-24  switchport mode access  switch access vlan 90  no shutdown  exit  interface range GigabitEthernet 0/1-2  description \*\*THIS IS TRUNK INTERFACES OF ICT\*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 90  switchport nonegotiate  exit  interface vlan 90  description \*\*THIS VLAN IS DEFINE FOR ICT DEPARTMENT \*\*  ip address 172.16.3.126 255.255.255.192  no shutdown  exit  ip default-gateway 172.16.3.1 |
| **FINANCE SWITCH**  enable  configure terminal  vlan 50  name FINANCE-DEPARTMENT  exit  vlan 999  name NATIVE-VLAN  exit  interface range FastEthernet 0/1-24  switchport mode access  switch access vlan 50  no shutdown  exit  interface range GigabitEthernet 0/1-2  description \*\*THIS IS TRUNK INTERFACES OF FINANCE \*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 50  switchport nonegotiate  exit  interface vlan 50  description \*\*THIS VLAN IS DEFINE FOR FINANCE DEPARTMENT \*\*  ip address 172.16.2.62 255.255.255.192  no shutdown  exit  ip default-gateway 172.16.2.1 | **SERVER ROOM SWITCH**  enable  configure terminal  vlan 100  name SERVER-ROOM-DEPARTMENT  exit  vlan 999  name NATIVE-VLAN  exit  interface range FastEthernet 0/1-24  switchport mode access  switch access vlan 100  no shutdown  exit  interface range GigabitEthernet 0/1-2  description \*\*THIS IS TRUNK INTERFACES OF SERVER-ROOM\*\*  switchport mode trunk  switchport trunk native vlan 999  switchport trunk allowed vlan 100  switchport nonegotiate  exit  interface vlan 100  description \*\*THIS VLAN IS DEFINE FOR SERVER-ROOM DEPARTMENT \*\*  ip address 172.16.3.142 255.255.255.192  no shutdown  exit  ip default-gateway 172.16.3.129 |

## Subnetting and IP Addressing.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Floor** | **DEPARTMENT** | **NETWORK ID** | **GATEWAYS / STARTING IP** | **LAST IP / VLAN IP** | **BROADCAST ID** | **SUBNET MASK** |
| **1st Floor** | **SALES DEPARTMENT** | 172.16.1.0/26 | 172.16.1.1 | 172.16.1.62 | 172.16.1.63 | 255.255.255.192 |
| **MARKETING DEPARTMENT** | 172.16.1.64/26 | 172.16.1.65 | 172.16.1.126 | 172.16.1.127 | 255.255.255.192 |
| **2nd Floor** | **HR DEPARTMENT** | 172.16.1.128/26 | 172.16.1.129 | 172.16.1.190 | 172.16.1.191 | 255.255.255.192 |
| **LOGISTICS & STORE DEPARTMENT** | 172.16.1.192/26 | 172.16.1.193 | 172.16.1.254 | 172.16.1.255 | 255.255.255.192 |
| **3rd Floor** | **FINANCE DEPARTMENT** | 172.16.2.0/26 | 172.16.2.1 | 172.16.2.62 | 172.16.2.63 | 255.255.255.192 |
| **ACCOUNT DEPARTMENT** | 172.16.2.64/26 | 172.16.2.65 | 172.16.2.126 | 172.16.2.127 | 255.255.255.192 |
| **ADMIN DEPARTMENT** | 172.16.2.128/26 | 172.16.2.129 | 172.16.2.190 | 172.16.2.191 | 255.255.255.192 |
| **PUBLIC RELATIONS**  **DEPARTMENT** | 172.16.2.192/26 | 172.16.2.193 | 172.16.2.254 | 172.16.2.255 | 255.255.255.192 |
| **4th Floor** | **ICT DEPARTMENT** | 172.16.3.0/25 | 172.16.3.1 | 172.16.3.126 | 172.16.3.127 | 255.255.255.128 |
| **SERVER DEPARTMENT** | 172.16.3.128/28 | 172.16.3.129 | 172.16.3.142 | 172.16.3.143 | 255.255.255.240 |

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| --- | --- | --- | --- | --- |
| **R1-ROUTER** | Gig 0/0/0 | 172.16.3.145 | 255.255.255.252 | M1-MULTILAYER-SWITCH  Gig 1/0/1 |
| Gig 0/0/1 | 172.16.3.154 | 255.255.255.252 | M2-MULTILAYER-SWITCH  Gig 1/0/1 |
| **R2-ROUTER** | Gig 0/0/0 | 172.16.3.149 | 255.255.255.252 | M1-MULTILAYER-SWITCH  Gig 1/0/2 |
| Gig 0/0/1 | 172.16.3.157 | 255.255.255.252 | M2-MULTILAYER-SWITCH  Gig 1/0/2 |

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| --- | --- | --- | --- | --- |
| **M1-MULTILAYER-SWITCH** | Gig 1/0/1 | 172.16.3.146 | 255.255.255.252 | R1-ROUTER  Gig 0/0/0 |
| Gig 1/0/2 | 172.16.3.150 | 255.255.255.252 | R2-ROUTER  Gig 0/0/0 |
| **M2-MULTILAYER-SWITCH** | Gig 1/0/1 | 172.16.3.153 | 255.255.255.252 | R1-ROUTER  Gig 0/0/1 |
| Gig 1/0/2 | 172.16.3.158 | 255.255.255.252 | R1-ROUTER  Gig 0/0/2 |

## Configuring Inter-VLAN Routing on the Multilayer switches (Switch Virtual Interface).

|  |  |
| --- | --- |
| **FIRST MULTILAYER SWITCH**  interface vlan 10  description \*\*THIS VLAN IS DEFINE FOR SALES DEPARTMENT \*\*  ip address 172.16.1.1 255.255.255.192  ip helper-address 172.16.3.132  no shutdown  exit  interface vlan 20  description \*\*THIS VLAN IS DEFINE FOR MARKETING DEPARTMENT \*\*  ip address 172.16.1.65 255.255.255.192  ip helper-address 172.16.3.132  no shutdown  exit  interface vlan 30  description \*\*THIS VLAN IS DEFINE FOR HR DEPARTMENT \*\*  ip address 172.16.1.129 255.255.255.192  ip helper-address 172.16.3.132  no shutdown  exit  interface vlan 40  description \*\*THIS VLAN IS DEFINE FOR LOGISTIC DEPARTMENT \*\*  ip address 172.16.1.193 255.255.255.192  ip helper-address 172.16.3.132  no shutdown  exit  interface vlan 50  description \*\*THIS VLAN IS DEFINE FOR FINANCE DEPARTMENT \*\*  ip address 172.16.2.1 255.255.255.192  ip helper-address 172.16.3.132  no shutdown  exit  interface vlan 60  description \*\*THIS VLAN IS DEFINE FOR ACCOUNT DEPARTMENT \*\*  ip address 172.16.2.65 255.255.255.192  ip helper-address 172.16.3.132  no shutdown  exit  interface vlan 70  description \*\*THIS VLAN IS DEFINE FOR ADMIN DEPARTMENT \*\*  ip address 172.16.2.129 255.255.255.192  ip helper-address 172.16.3.132  no shutdown  exit  interface vlan 80  description \*\*THIS VLAN IS DEFINE FOR PUBLIC-RELATIONS DEPARTMENT \*\*  ip address 172.16.2.193 255.255.255.192  ip helper-address 172.16.3.132  no shutdown  exit  interface vlan 90  description \*\*THIS VLAN IS DEFINE FOR ICT DEPARTMENT \*\*  ip address 172.16.3.1 255.255.255.128  ip helper-address 172.16.3.132  no shutdown  exit  interface vlan 100  description \*\*THIS VLAN IS DEFINE FOR SERVER DEPARTMENT \*\*  ip address 172.16.3.129 255.255.255.240  no shutdown  exit | **SECOND MULTILAYER SWITCH**  interface vlan 10  description \*\*THIS VLAN IS DEFINE FOR SALES DEPARTMENT \*\*  ip address 172.16.1.1 255.255.255.192  ip helper-address 172.16.3.132  no shutdown  exit  interface vlan 20  description \*\*THIS VLAN IS DEFINE FOR MARKETING DEPARTMENT \*\*  ip address 172.16.1.65 255.255.255.192  ip helper-address 172.16.3.132  no shutdown  exit  interface vlan 30  description \*\*THIS VLAN IS DEFINE FOR HR DEPARTMENT \*\*  ip address 172.16.1.129 255.255.255.192  ip helper-address 172.16.3.132  no shutdown  exit  interface vlan 40  description \*\*THIS VLAN IS DEFINE FOR LOGISTIC DEPARTMENT \*\*  ip address 172.16.1.193 255.255.255.192  ip helper-address 172.16.3.132  no shutdown  exit  interface vlan 50  description \*\*THIS VLAN IS DEFINE FOR FINANCE DEPARTMENT \*\*  ip address 172.16.2.1 255.255.255.192  ip helper-address 172.16.3.132  no shutdown  exit  interface vlan 60  description \*\*THIS VLAN IS DEFINE FOR ACCOUNT DEPARTMENT \*\*  ip address 172.16.2.65 255.255.255.192  ip helper-address 172.16.3.132  no shutdown  exit  interface vlan 70  description \*\*THIS VLAN IS DEFINE FOR ADMIN DEPARTMENT \*\*  ip address 172.16.2.129 255.255.255.192  ip helper-address 172.16.3.132  no shutdown  exit  interface vlan 80  description \*\*THIS VLAN IS DEFINE FOR PUBLIC-RELATIONS DEPARTMENT \*\*  ip address 172.16.2.193 255.255.255.192  ip helper-address 172.16.3.132  no shutdown  exit  interface vlan 90  description \*\*THIS VLAN IS DEFINE FOR ICT DEPARTMENT \*\*  ip address 172.16.3.1 255.255.255.128  ip helper-address 172.16.3.132  no shutdown  exit  interface vlan 100  description \*\*THIS VLAN IS DEFINE FOR SERVER DEPARTMENT \*\*  ip address 172.16.3.129 255.255.255.240  no shutdown  exit |

## Configuring Dedicated DHCP Server device to provide dynamic IP allocation & DNS .

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AI-generated content may be incorrect.

Figure 2: DHCP CONFIGURATION

A screenshot of a computer

AI-generated content may be incorrect.

Figure 3: DHCP SERVER IP

A screenshot of a computer

AI-generated content may be incorrect.

Figure 4: DNS SERVER IP

A screenshot of a computer

AI-generated content may be incorrect.

Figure 5: DNS CONFIGURATION

## Configuring SSH for secure Remote access.

|  |  |
| --- | --- |
| **R1 ROUTER**  enable  configure terminal  ip domain-name r1.com  crypto key generate rsa  1024  ip ssh version 2  username cisco secret cisco  username admin secret admin  line vty 0 15  login local  transport input ssh  exit  ip ssh time-out 60  ip ssh authentication-retries 3 | **R2 ROUTER**  enable  configure terminal  ip domain-name r2.com  crypto key generate rsa  1024  ip ssh version 2  username cisco secret cisco  username admin secret admin  line vty 0 15  login local  transport input ssh  exit  ip ssh time-out 60  ip ssh authentication-retries 3 |

|  |  |
| --- | --- |
| **FIRST MULTILAYER SWITCH**  enable  configure terminal  ip domain-name mls1.com  crypto key generate rsa  1024  ip ssh version 2  username cisco secret cisco  username admin secret admin  line vty 0 15  login local  transport input ssh  exit  ip ssh time-out 60  ip ssh authentication-retries 3 | **SECOND MULTILAYER SWITCH**  enable  configure terminal  ip domain-name mls2.com  crypto key generate rsa  1024  ip ssh version 2  username cisco secret cisco  username admin secret admin  line vty 0 15  login local  transport input ssh  exit  ip ssh time-out 60  ip ssh authentication-retries 3 |

|  |  |
| --- | --- |
| **SALES SWITCH**  enable  configure terminal  ip domain-name sales.com  crypto key generate rsa  1024  ip ssh version 2  username cisco secret cisco  username admin secret admin  line vty 0 15  login local  transport input ssh  exit  ip ssh time-out 60  ip ssh authentication-retries 3 | **ACCOUNT SWITCH**  enable  configure terminal  ip domain-name account.com  crypto key generate rsa  1024  ip ssh version 2  username cisco secret cisco  username admin secret admin  line vty 0 15  login local  transport input ssh  exit  ip ssh time-out 60  ip ssh authentication-retries 3 |
| **MARKETING SWITCH**  enable  configure terminal  ip domain-name marketing.com  crypto key generate rsa  1024  ip ssh version 2  username cisco secret cisco  username admin secret admin  line vty 0 15  login local  transport input ssh  exit  ip ssh time-out 60  ip ssh authentication-retries 3 | **ADMIN SWITCH**  enable  configure terminal  ip domain-name admin.com  crypto key generate rsa  1024  ip ssh version 2  username cisco secret cisco  username admin secret admin  line vty 0 15  login local  transport input ssh  exit  ip ssh time-out 60  ip ssh authentication-retries 3 |
| **HR SWITCH**  enable  configure terminal  ip domain-name hr.com  crypto key generate rsa  1024  ip ssh version 2  username cisco secret cisco  username admin secret admin  line vty 0 15  login local  transport input ssh  exit  ip ssh time-out 60  ip ssh authentication-retries 3 | **PUBLIC RELATIONS SWITCH**  enable  configure terminal  ip domain-name pr.com  crypto key generate rsa  1024  ip ssh version 2  username cisco secret cisco  username admin secret admin  line vty 0 15  login local  transport input ssh  exit  ip ssh time-out 60  ip ssh authentication-retries 3 |
| **LOGISTIC SWITCH**  enable  configure terminal  ip domain-name logistic.com  crypto key generate rsa  1024  ip ssh version 2  username cisco secret cisco  username admin secret admin  line vty 0 15  login local  transport input ssh  exit  ip ssh time-out 60  ip ssh authentication-retries 3 | **ICT SWITCH**  enable  configure terminal  ip domain-name ict.com  crypto key generate rsa  1024  ip ssh version 2  username cisco secret cisco  username admin secret admin  line vty 0 15  login local  transport input ssh  exit  ip ssh time-out 60  ip ssh authentication-retries 3 |
| **FINANCE SWITCH**  enable  configure terminal  ip domain-name finance.com  crypto key generate rsa  1024  ip ssh version 2  username cisco secret cisco  username admin secret admin  line vty 0 15  login local  transport input ssh  exit  ip ssh time-out 60  ip ssh authentication-retries 3 | **SERVER ROOM SWITCH**  enable  configure terminal  ip domain-name server.com  crypto key generate rsa  1024  ip ssh version 2  username cisco secret cisco  username admin secret admin  line vty 0 15  login local  transport input ssh  exit  ip ssh time-out 60  ip ssh authentication-retries 3 |

## Configuring OSPF as the routing protocol.

|  |  |
| --- | --- |
| **R1 ROUTER**  enable  configure terminal  router ospf 50  router-id 2.2.2.2  network 172.16.3.144 0.0.0.3 area 0  network 172.16.3.152 0.0.0.3 area 0  network 195.136.17.0 0.0.0.3 area 0  network 195.136.17.4 0.0.0.3 area 0 | **R2 ROUTER**  enable  configure terminal    router ospf 50  router-id 2.2.2.2  network 172.16.3.148 0.0.0.3 area 0  network 172.16.3.156 0.0.0.3 area 0  network 195.136.17.12 0.0.0.3 area 0  network 195.136.17.8 0.0.0.3 area 0 |

|  |  |
| --- | --- |
| **FIRST MULTILAYER SWITCH**  enable  configure terminal  ip routing    router ospf 50  network 172.16.1.0 0.0.0.63 area 0  network 172.16.1.64 0.0.0.63 area 0  network 172.16.1.128 0.0.0.63 area 0  network 172.16.1.192 0.0.0.63 area 0  network 172.16.2.0 0.0.0.63 area 0  network 172.16.2.64 0.0.0.63 area 0  network 172.16.2.128 0.0.0.63 area 0  network 172.16.2.192 0.0.0.63 area 0  network 172.16.3.0 0.0.0.127 area 0  network 172.16.3.128 0.0.0.15 area 0  network 172.16.3.152 0.0.0.3 area 0  network 172.16.3.156 0.0.0.3 area 0  network 172.16.3.144 0.0.0.3 area 0  network 172.16.3.148 0.0.0.3 area 0 | **SECOND MULTILAYER SWITCH**  enable  configure terminal  ip routing    router ospf 50  network 172.16.1.0 0.0.0.63 area 0  network 172.16.1.64 0.0.0.63 area 0  network 172.16.1.128 0.0.0.63 area 0  network 172.16.1.192 0.0.0.63 area 0  network 172.16.2.0 0.0.0.63 area 0  network 172.16.2.64 0.0.0.63 area 0  network 172.16.2.128 0.0.0.63 area 0  network 172.16.2.192 0.0.0.63 area 0  network 172.16.3.0 0.0.0.127 area 0  network 172.16.3.128 0.0.0.15 area 0  network 172.16.3.144 0.0.0.3 area 0  network 172.16.3.148 0.0.0.3 area 0  network 172.16.3.156 0.0.0.3 area 0  network 172.16.3.152 0.0.0.3 area 0 |

## Configuring NAT Overload(Port Address Translation PAT).

|  |  |
| --- | --- |
| **R1 ROUTER**  enable  configure terminal  ip nat inside source list 1 interface serial 0/1/0 overload  ip nat inside source list 1 interface serial 0/1/1 overload  access-list 1 permit 172.16.1.0 0.0.0.63  access-list 1 permit 172.16.1.64 0.0.0.63  access-list 1 permit 172.16.1.128 0.0.0.63  access-list 1 permit 172.16.1.192 0.0.0.63  access-list 1 permit 172.16.2.0 0.0.0.63  access-list 1 permit 172.16.2.64 0.0.0.63  access-list 1 permit 172.16.2.128 0.0.0.63  access-list 1 permit 172.16.2.192 0.0.0.63  access-list 1 permit 172.16.3.0 0.0.0.127  access-list 1 permit 172.16.3.128 0.0.0.15  interface range gigabitEthernet 0/0/0-1  ip nat inside  exit  interface Serial0/1/0  ip nat outside  exit  interface Serial0/1/1  ip nat outside  exit | **R2 ROUTER**  enable  configure terminal  ip nat inside source list 1 interface serial 0/1/0 overload  ip nat inside source list 1 interface serial 0/1/1 overload  access-list 1 permit 172.16.1.0 0.0.0.63  access-list 1 permit 172.16.1.64 0.0.0.63  access-list 1 permit 172.16.1.128 0.0.0.63  access-list 1 permit 172.16.1.192 0.0.0.63  access-list 1 permit 172.16.2.0 0.0.0.63  access-list 1 permit 172.16.2.64 0.0.0.63  access-list 1 permit 172.16.2.128 0.0.0.63  access-list 1 permit 172.16.2.192 0.0.0.63  access-list 1 permit 172.16.3.0 0.0.0.127  access-list 1 permit 172.16.3.128 0.0.0.15  interface range gigabitEthernet 0/0/0-1  ip nat inside  exit  interface Serial0/1/0  ip nat outside  exit  interface Serial0/1/1  ip nat outside  exit |

* 1. **Configure PAT to use the respective outbound router interface IPv4 address, implement the necessary ACL rule.**

|  |
| --- |
| ip nat inside source list 1 interface serial 0/1/0 overload  ip nat inside source list 1 interface serial 0/1/1 overload  access-list 1 permit 172.16.1.0 0.0.0.63  access-list 1 permit 172.16.1.64 0.0.0.63  access-list 1 permit 172.16.1.128 0.0.0.63  access-list 1 permit 172.16.1.192 0.0.0.63  access-list 1 permit 172.16.2.0 0.0.0.63  access-list 1 permit 172.16.2.64 0.0.0.63  access-list 1 permit 172.16.2.128 0.0.0.63  access-list 1 permit 172.16.2.192 0.0.0.63  access-list 1 permit 172.16.3.0 0.0.0.127  access-list 1 permit 172.16.3.128 0.0.0.15  interface range gigabitEthernet 0/0/0-1  ip nat inside  exit  interface Serial0/1/0  ip nat outside  exit  interface Serial0/1/1  ip nat outside  exit |

## Configuring switchport security or Port-Security on the switches.

|  |  |
| --- | --- |
| **FIRST MULTILAYER SWITCH**  enable  configure terminal  interface range gigabitEthernet 1/0/1-23  switchport port-security  switchport port-security maximum 1  switchport port-security violation shutdown  switchport port-security mac-address sticky  exit | **SECOND MULTILAYER SWITCH**  enable  configure terminal  interface range gigabitEthernet 1/0/1-23  switchport port-security  switchport port-security maximum 1  switchport port-security violation shutdown  switchport port-security mac-address sticky  exit |

|  |  |
| --- | --- |
| **SALES SWITCH**  enable  configure terminal  interface range fastEthernet 0/1-23, gigabitEthernet 0/1-2 switchport port-security  switchport port-security maximum 1  switchport port-security violation shutdown  switchport port-security mac-address sticky  exit | **ACCOUNT SWITCH**  enable  configure terminal  interface range fastEthernet 0/1-23, gigabitEthernet 0/1-2 switchport port-security  switchport port-security maximum 1  switchport port-security violation shutdown  switchport port-security mac-address sticky  exit |
| **MARKETING SWITCH**  enable  configure terminal  interface range fastEthernet 0/1-23, gigabitEthernet 0/1-2 switchport port-security  switchport port-security maximum 1  switchport port-security violation shutdown  switchport port-security mac-address sticky  exit | **ADMIN SWITCH**  enable  configure terminal  interface range fastEthernet 0/1-23, gigabitEthernet 0/1-2 switchport port-security  switchport port-security maximum 1  switchport port-security violation shutdown  switchport port-security mac-address sticky  exit |
| **HR SWITCH**  enable  configure terminal  interface range fastEthernet 0/1-23, gigabitEthernet 0/1-2 switchport port-security  switchport port-security maximum 1  switchport port-security violation shutdown  switchport port-security mac-address sticky  exit | **PUBLIC RELATIONS SWITCH**  enable  configure terminal  interface range fastEthernet 0/1-23, gigabitEthernet 0/1-2 switchport port-security  switchport port-security maximum 1  switchport port-security violation shutdown  switchport port-security mac-address sticky  exit |
| **LOGISTIC SWITCH**  enable  configure terminal  interface range fastEthernet 0/1-23, gigabitEthernet 0/1-2 switchport port-security  switchport port-security maximum 1  switchport port-security violation shutdown  switchport port-security mac-address sticky  exit | **ICT SWITCH**  enable  configure terminal  interface range fastEthernet 0/1-23, gigabitEthernet 0/1-2 switchport port-security  switchport port-security maximum 1  switchport port-security violation shutdown  switchport port-security mac-address sticky  exit |
| **FINANCE SWITCH**  enable  configure terminal  interface range fastEthernet 0/1-23, gigabitEthernet 0/1-2 switchport port-security  switchport port-security maximum 1  switchport port-security violation shutdown  switchport port-security mac-address sticky  exit | **SERVER ROOM SWITCH**  enable  configure terminal  interface range fastEthernet 0/1-23, gigabitEthernet 0/1-2 switchport port-security  switchport port-security maximum 1  switchport port-security violation shutdown  switchport port-security mac-address sticky  exit |

## Configuring WLAN or wireless network (Cisco Access Point).

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Figure 6: AP CONFIGURATION

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Figure 7: AP CONFIGURATION

## Host Device Configurations.

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Figure 8

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Figure 9

A screenshot of a computer

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Figure 10

## Test and Verifying Network Communication.

|  |  |
| --- | --- |
| A screenshot of a computer  AI-generated content may be incorrect.  Figure 11 | A computer screen shot of a computer program  AI-generated content may be incorrect.  Figure 12 |
| A computer screen shot of a black screen  AI-generated content may be incorrect.  Figure 13 | Figure 14 |