Project #6 Case Study and Requirements

A trading floor Support centre 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).

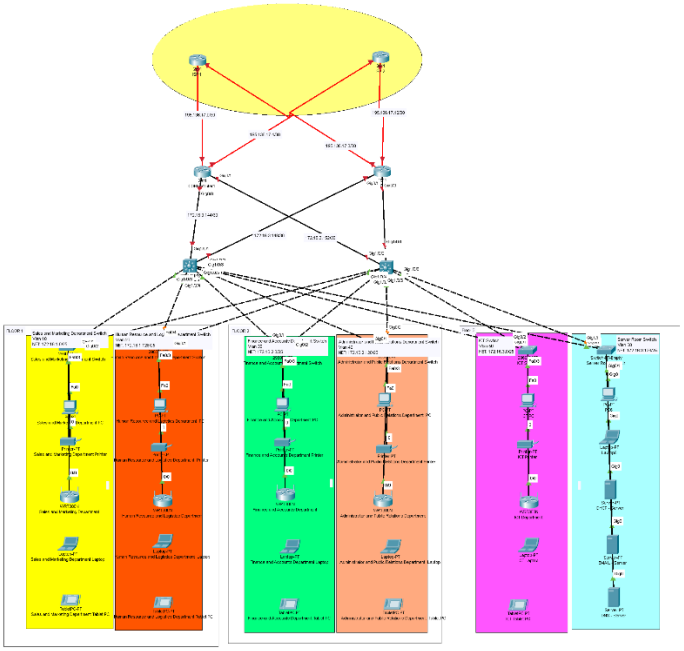
Therefore, as a key member of the Networks Team, you have been tasked to design a network for the new building. At this stage, logical design is required, which shows the measures that you would put in place to ensure that the new network meets the current business need and is future-proofed:

- Use Cisco Packet Tracer to design and implement the network solution.
- Use 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 to 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.

Technologies Implemented

1. Creating a network topology using Cisco Packet Tracer.

2. Hierarchical Network Design.



3. Connecting Networking devices with Correct cabling.

4. Configuring Basic device settings & Configuring SSH for secure Remote access.

ISP 1 Router

```
Router(config)#interface Serial0/0/0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface Serial0/0/1
Router(config-if)#exit
```

ISP 2 Router

```
Router(config)#interface Serial0/0/0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface Serial0/0/1
Router(config-if)#no shutdown
```

Core 1 Router

```
Router(config)#interface Serial0/0/0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface Serial0/0/1
Router(config-if)#no shutdown
Router(config-if)#exit

Router(config)#interface GigabitEthernet0/0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/1
Router(config-if)#no shutdown
Router(config-if)#exit

Router(config)#hostname CORE-Router1
CORE-Router1(config)#banner motd $No Authorized Access$
CORE-Router1(config)#no ip domain lookup

CORE-Router1(config)#line console 0
CORE-Router1(config-line)#password cisco
CORE-Router1(config-line)#login
CORE-Router1(config-line)#exit

CORE-Router1(config)#enable password cisco
CORE-Router1(config)#service password-encryption
CORE-Router1(config)#exit

CORE-Router1#wr

CORE-Router1(config)#ip domain name cisco.net
CORE-Router1(config)#username admin password cisco
CORE-Router1(config)#crypto key generate rsa

CORE-Router1(config)#line vty 0 15
CORE-Router1(config-line)#login local
CORE-Router1(config-line)#transport input ssh
CORE-Router1(config-line)#exit
CORE-Router1(config)#ip ssh version 2

CORE-Router1(config)#do wr
```

Core 2 Router

```
Router(config)#interface Serial0/0/0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface Serial0/0/1
Router(config-if)#no shutdown
Router(config-if)#exit

Router(config)#interface GigabitEthernet0/0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/1
Router(config-if)#no shutdown
Router(config-if)#exit

Router(config)#hostname CORE-Router2
CORE-Router2(config)#banner motd $No Authorized Access$
CORE-Router2(config)#no ip domain lookup

CORE-Router2(config)#line console 0
CORE-Router2(config-line)#password cisco
CORE-Router2(config-line)#login
CORE-Router2(config-line)#exit

CORE-Router2(config)#enable password cisco
CORE-Router2(config)#service password-encryption
CORE-Router2(config)#exit

CORE-Router2#wr

CORE-Router2(config)#ip domain name cisco.net
CORE-Router2(config)#username admin password cisco
CORE-Router2(config)#crypto key generate rsa

CORE-Router2(config)#line vty 0 15
CORE-Router2(config-line)#login local
CORE-Router2(config-line)#transport input ssh
CORE-Router2(config-line)#exit
CORE-Router2(config)#ip ssh version 2

CORE-Router2(config)#do wr
```

Multilayer Switch1

```
Switch(config)#hostname Multilayer_1-Switch
Multilayer_1-Switch(config)#banner motd $No Authorized Access$
Multilayer_1-Switch(config)#no ip domain lookup

Multilayer_1-Switch(config)#line console 0
Multilayer_1-Switch(config-line)#password cisco
Multilayer_1-Switch(config-line)#login
Multilayer_1-Switch(config-line)#exit
```

Multilayer Switch2

```
Switch(config)#hostname Multilayer_2-Switch
Multilayer_2-Switch(config)#banner motd $No Authorized Access$
Multilayer_2-Switch(config)#no ip domain lookup

Multilayer_2-Switch(config)#line console 0
Multilayer_2-Switch(config-line)#password cisco
Multilayer_2-Switch(config-line)#login
Multilayer_2-Switch(config-line)#exit
```

```
Multilayer_1-Switch(config)#enable password cisco
Multilayer_1-Switch(config)#service password-encryption
Multilayer_1-Switch(config)#exit

Multilayer_1-Switch#wr

Multilayer_1-Switch(config)#ip domain name cisco.net
Multilayer_1-Switch(config)#username admin password cisco
Multilayer_1-Switch(config)#crypto key generate rsa

Multilayer_1-Switch(config)#line vty 0 15
Multilayer_1-Switch(config-line)#login local
Multilayer_1-Switch(config-line)#transport input ssh
Multilayer_1-Switch(config-line)#exit
Multilayer_1-Switch(config)#ip ssh version 2

Multilayer_1-Switch(config)#do wr
```

```
Multilayer_2-Switch(config)#enable password cisco
Multilayer_2-Switch(config)#service password-encryption
Multilayer_2-Switch(config)#exit

Multilayer_2-Switch#wr

Multilayer_2-Switch(config)#ip domain name cisco.net
Multilayer_2-Switch(config)#username admin password cisco
Multilayer_2-Switch(config)#crypto key generate rsa

Multilayer_2-Switch(config)#line vty 0 15
Multilayer_2-Switch(config-line)#login local
Multilayer_2-Switch(config-line)#transport input ssh
Multilayer_2-Switch(config-line)#exit
Multilayer_2-Switch(config)#ip ssh version 2

Multilayer_2-Switch(config)#do wr
```

Sales and Marketing Department Switch (Floor 1)

```
Switch(config)#hostname Sales_and_Marketing_Department_Switch
Sales_and_Marketing_Department_Switch(config)#banner motd #No Authorized Access#
Sales_and_Marketing_Department_Switch(config)#no ip domain lookup

Sales_and_Marketing_Department_Switch(config)#line console 0
Sales_and_Marketing_Department_Swi(config-line)#password cisco
Sales_and_Marketing_Department_Swi(config-line)#login
Sales_and_Marketing_Department_Swi(config-line)#exit

Sales_and_Marketing_Department_Swi(config-line)#enable password cisco
Sales_and_Marketing_Department_Switch(config)#service password-encryption
Sales_and_Marketing_Department_Switch(config)#exit

Sales_and_Marketing_Department_Switch#wr
```

Human Resource and Logistics Department Switch (Floor 1)

```
Switch(config)#hostname Human_Resource_and_Logistics_Department_Switch
Human_Resource_and_Logistics_Department(config)#banner motd $No Authorized Access$
Human_Resource_and_Logistics_Department(config)#no ip domain lookup

Human_Resource_and_Logistics_Department(config)#line console 0
Human_Resource_and_Logistics_Depar(config-line)#password cisco
Human_Resource_and_Logistics_Depar(config-line)#login
Human_Resource_and_Logistics_Depar(config-line)#exit

Human_Resource_and_Logistics_Depar(config-line)#enable password cisco
Human_Resource_and_Logistics_Department(config)#service password-encryption
Human_Resource_and_Logistics_Department(config)#exit

Human_Resource_and_Logistics_Department_Switch#wr
```

Finance and Accounts Department Switch (Floor 2)

```
Switch(config)#hostname Finance_and_Account_Department_Switch
Finance_and_Account_Department_Switch(config)#banner motd $No Authorized Access$
Finance_and_Account_Department_Switch(config)#no ip domain lookup

Finance_and_Account_Department_Switch(config)#line console 0
Finance_and_Account_Department_Swi(config-line)#password cisco
Finance_and_Account_Department_Swi(config-line)#login
Finance_and_Account_Department_Swi(config-line)#exit

Finance_and_Account_Department_Switch(config)#enable password cisco
Finance_and_Account_Department_Switch(config)#service password-encryption
Finance_and_Account_Department_Switch(config)#exit

Finance_and_Account_Department_Switch#wr
```

Administrator and Public Relations Department Switch (Floor 2)

```
Switch(config)#hostname Administrator_and_Public_Relations_Department_Switch
Administrator_and_Public_Relations_Depa(config)#banner motd $No Authorized Access$
Administrator_and_Public_Relations_Depa(config)#no ip domain lookup

Administrator_and_Public_Relations_Depa(config)#line console 0
Administrator_and_Public_Relations(config-line)#password cisco
Administrator_and_Public_Relations(config-line)#login
Administrator_and_Public_Relations(config-line)#exit

Administrator_and_Public_Relations_Depa(config)#enable password cisco
Administrator_and_Public_Relations_Depa(config)#service password-encryption
Administrator_and_Public_Relations_Depa(config)#exit

Administrator_and_Public_Relations_Department_S#wr
```

ICT Switch (Floor 3)

```
Switch(config)#hostname ICT_Switch
ICT_Switch(config)#banner motd $No Authorized Access$
ICT_Switch(config)#no ip domain lookup

ICT_Switch(config)#line console 0
ICT_Switch(config-line)#password cisco
ICT_Switch(config-line)#login
ICT_Switch(config-line)#exit

ICT_Switch(config)#enable password cisco
ICT_Switch(config)#service password-encryption
ICT_Switch(config)#exit

ICT_Switch#wr
```

Server Room Switch (Floor 3)

```
Switch(config)#hostname Server_Room_Switch
Server_Room_Switch(config)#banner motd $No Authorized Access$
Server_Room_Switch(config)#no ip domain lookup

Server_Room_Switch(config)#line console 0
Server_Room_Switch(config-line)#password cisco
Server_Room_Switch(config-line)#login
Server_Room_Switch(config-line)#exit

Server_Room_Switch(config)#enable password cisco
Server_Room_Switch(config)#service password-encryption
Server_Room_Switch(config)#exit

Server_Room_Switch#wr
```

5. Creating VLANs and assigning ports VLAN numbers.

Multilayer Switch 1

```
Multilayer_1-Switch(config)#interface range gigabitEthernet1/0/3-8
Multilayer_1-Switch(config-if-range)#switchport mode trunk
Multilayer_1-Switch(config-if-range)#exit
Multilayer_1-Switch(config)#do wr

Multilayer_1-Switch(config)#interface range gigabitEthernet 1/0/3-8
Multilayer_1-Switch(config-if-range)#switchport mode trunk

Multilayer_1-Switch(config-if-range)#vlan 10
Multilayer_1-Switch(config-vlan)#name Sales&Marketing

Multilayer_1-Switch(config-vlan)#vlan 20
Multilayer_1-Switch(config-vlan)#name HR&Logistic

Multilayer_1-Switch(config-vlan)#vlan 30
Multilayer_1-Switch(config-vlan)#name Finance&Account

Multilayer_1-Switch(config-vlan)#vlan 40
Multilayer_1-Switch(config-vlan)#name Administrator&Public

Multilayer_1-Switch(config-vlan)#vlan 50
Multilayer_1-Switch(config-vlan)#name ICT

Multilayer_1-Switch(config-vlan)#vlan 60
Multilayer_1-Switch(config-vlan)#name SERVER
Multilayer_1-Switch(config-vlan)#exit
```

Multilayer Switch 2

```
Multilayer_2-Switch(config)#interface range gigabitEthernet1/0/3-8
Multilayer_2-Switch(config-if-range)#switchport mode trunk
Multilayer_2-Switch(config-if-range)#exit
Multilayer_2-Switch(config)#do wr

Multilayer_2-Switch(config)#interface range gigabitEthernet 1/0/3-8
Multilayer_2-Switch(config-if-range)#switchport mode trunk

Multilayer_2-Switch(config-if-range)#vlan 10
Multilayer_2-Switch(config-vlan)#name Sales&Marketing

Multilayer_2-Switch(config-vlan)#vlan 20
Multilayer_2-Switch(config-vlan)#name HR&Logistic

Multilayer_2-Switch(config-vlan)#vlan 30
Multilayer_2-Switch(config-vlan)#name Finance&Account

Multilayer_2-Switch(config-vlan)#vlan 40
Multilayer_2-Switch(config-vlan)#name Administrator&Public

Multilayer_2-Switch(config-vlan)#vlan 50
Multilayer_2-Switch(config-vlan)#name ICT

Multilayer_2-Switch(config-vlan)#vlan 60
Multilayer_2-Switch(config-vlan)#name SERVER
Multilayer_2-Switch(config-vlan)#exit
```

Multilayer_1-Switch(config)#do wr	Multilayer_2-Switch(config)#do wr

Sales and Marketing Department Switch (Floor 1)

```
Sales_and_Marketing_Department_Switch(config)#interface range gigabitEthernet 0/1-2
Sales_and_Marketing_Department(config-if-range)#switchport mode trunk
Sales_and_Marketing_Department(config-if-range)#exit

Sales_and_Marketing_Department_Switch(config)#vlan 10
Sales_and_Marketing_Department_Swi(config-vlan)#name Sales&Marketing
Sales_and_Marketing_Department_Swi(config-vlan)#exit

Sales_and_Marketing_Department_Switch(config)#interface range fastEthernet 0/1-24
Sales_and_Marketing_Department(config-if-range)#switchport mode access
Sales_and_Marketing_Department(config-if-range)#switchport access vlan 10
Sales_and_Marketing_Department(config-if-range)#exit

Sales_and_Marketing_Department_Switch(config)#do wr
```

Human Resource and Logistics Department Switch (Floor 1)

```
Human_Resource_and_Logistics_Department(config)#interface range gigabitEthernet 0/1-2
Human_Resource_and_Logistics_D(config-if-range)#switchport mode trunk
Human_Resource_and_Logistics_D(config-if-range)#exit

Human_Resource_and_Logistics_Department(config)#vlan 20
Human_Resource_and_Logistics_Depar(config-vlan)#name HR&Logistic
Human_Resource_and_Logistics_Depar(config-vlan)#exit

Human_Resource_and_Logistics_Department(config)#interface range fastEthernet 0/1-24
Human_Resource_and_Logistics_D(config-if-range)#switchport mode access
Human_Resource_and_Logistics_D(config-if-range)#switchport access vlan 20
Human_Resource_and_Logistics_D(config-if-range)#exit

Human_Resource_and_Logistics_Department(config)#do wr
```

Finance and Accounts Department Switch (Floor 2)

```
Finance_and_Account_Department_Switch(config)#interface range gigabitEthernet 0/1-2
Finance_and_Account_Department(config-if-range)#switchport mode trunk
Finance_and_Account_Department(config-if-range)#exit

Finance_and_Account_Department_Switch(config)#vlan 30
Finance_and_Account_Department_Swi(config-vlan)#name Finance&Account
Finance_and_Account_Department_Swi(config-vlan)#exit

Finance_and_Account_Department_Switch(config)#interface range fastEthernet 0/1-24
Finance_and_Account_Department(config-if-range)#switchport mode access
Finance_and_Account_Department(config-if-range)#switchport access vlan 30
Finance_and_Account_Department(config-if-range)#exit

Finance_and_Account_Department_Switch(config)#do wr
```

Administrator and Public Relations Department Switch (Floor 2)

```
Administrator_and_Public_Relations_Depa(config)#interface range gigabitEthernet 0/1-2
Administrator_and_Public_Relat(config-if-range)#switchport mode trunk
Administrator_and_Public_Relat(config-if-range)#exit

Administrator_and_Public_Relations_Depa(config)#vlan 40
Administrator_and_Public_Relations(config-vlan)#name Administrator&Public
Administrator_and_Public_Relations(config-vlan)#exit

Administrator_and_Public_Relations_Depa(config)#interface range fastEthernet 0/1-24
Administrator_and_Public_Relat(config-if-range)#switchport mode access
Administrator_and_Public_Relat(config-if-range)#switchport access vlan 40
Administrator_and_Public_Relat(config-if-range)#exit

Administrator_and_Public_Relations_Depa(config)#do wr
```

ICT Switch (Floor 3)

```
ICT_Switch(config)#interface range gigabitEthernet 0/1-2
ICT_Switch(config-if-range)#switchport mode trunk
ICT_Switch(config-if-range)#exit

ICT_Switch(config)#vlan 50
ICT_Switch(config-vlan)#name ICT
ICT_Switch(config-vlan)#exit

ICT_Switch(config)#interface range fastEthernet 0/1-24
ICT_Switch(config-if-range)#switchport mode access
ICT_Switch(config-if-range)#switchport access vlan 50
ICT_Switch(config-if-range)#exit

ICT_Switch(config)#do wr
```

Server Room Switch (Floor 3)

```
Server_Room_Switch(config)#interface gigabitEthernet 0/1
Server_Room_Switch(config-if)#switchport mode trunk
Server_Room_Switch(config-if)#exit

Server_Room_Switch(config)#interface gigabitEthernet 1/1
Server_Room_Switch(config-if)#switchport mode trunk
Server_Room_Switch(config-if)#exit

Server_Room_Switch(config)#vlan 60
Server_Room_Switch(config-vlan)#name SERVER
Server_Room_Switch(config-vlan)#exit

Server_Room_Switch(config)#interface gigabitEthernet 2/1
Server_Room_Switch(config-if)#switchport mode access
Server_Room_Switch(config-if)#switchport access vlan 60
Server_Room_Switch(config-if)#exit
Server_Room_Switch(config)#interface gigabitEthernet 3/1
Server_Room_Switch(config-if)#switchport mode access
Server_Room_Switch(config-if)#switchport access vlan 60
Server_Room_Switch(config-if)#exit
Server_Room_Switch(config)#interface gigabitEthernet 4/1
Server_Room_Switch(config-if)#switchport mode access
Server_Room_Switch(config-if)#switchport access vlan 60
Server_Room_Switch(config-if)#exit
Server_Room_Switch(config)#interface gigabitEthernet 5/1
Server_Room_Switch(config-if)#switchport mode access
Server_Room_Switch(config-if)#switchport access vlan 60
Server_Room_Switch(config-if)#exit
Server_Room_Switch(config)#interface gigabitEthernet 6/1
Server_Room_Switch(config-if)#switchport mode access
Server_Room_Switch(config-if)#switchport access vlan 60
Server_Room_Switch(config-if)#exit
Server_Room_Switch(config)#interface gigabitEthernet 7/1
Server_Room_Switch(config-if)#switchport mode access
Server_Room_Switch(config-if)#switchport access vlan 60
Server_Room_Switch(config-if)#exit
Server_Room_Switch(config)#interface gigabitEthernet 8/1
Server_Room_Switch(config-if)#switchport mode access
Server_Room_Switch(config-if)#switchport access vlan 60
Server_Room_Switch(config-if)#exit
Server_Room_Switch(config)#interface gigabitEthernet 9/1
Server_Room_Switch(config-if)#switchport mode access
Server_Room_Switch(config-if)#switchport access vlan 60
Server_Room_Switch(config-if)#exit

Server_Room_Switch(config)#do wr
```

6. Subnetting and IP Addressing.

First Floor

Department	Network Address	Subnet Mask	Host Address Range	Broadcast Address
Sales & Marketing	172.16.1.0	255.255.255.128/25	172.16.1.1-126	172.16.1.127
HR & Logistic	172.16.1.128	255.255.255.128/25	172.16.1.129-254	172.16.1.255

Second Floor

Department	Network Address	Subnet Mask	Host Address Range	Broadcast Address
Finance & Accounts	172.16.2.0	255.255.255.128/25	172.16.2.1-126	172.16.2.127

Admin & Public	172.16.2.128	255.255.255.128/25	172.16.2.129-254	172.16.2.255

Third Floor

Department	Network Address	Subnet Mask	Host Address Range	Broadcast Address
ICT	172.16.3.0	255.255.255.128/25	172.16.3.1-126	172.16.3.127
Server Room	172.16.3.128	255.255.255.128/25	172.16.3.129-254	172.16.3.255

Between the Routers and Layer-3 Switches

No.	Network Address	Subnet Mask	Host Address Range	Broadcast Address
R1 – MLSW - 1	172.16.3.144	255.255.255.252	172.16.3.145-146	172.16.3.147
R1 – MLSW - 2	172.16.3.148	255.255.255.252	172.16.3.149-150	172.16.3.151
R2 – MLSW – 1	172.16.3.152	255.255.255.252	172.16.3.153-154	172.16.3.155
R2 – MLSW – 2	172.16.3.156	255.255.255.252	172.16.3.157-158	172.16.3.159

Between the Routers and ISP

Public IP address 195.136.17.0/30, 195.136.17.4/30, 195.136.17.8/30, 195.136.17.12/30

Core 1 Router

```
CORE-Router1(config)#interface GigabitEthernet0/0
CORE-Router1(config-if)#ip address 172.16.3.146 255.255.255.252
CORE-Router1(config-if)#no shutdown
CORE-Router1(config-if)#exit
CORE-Router1(config)#do wr

CORE-Router1(config)#interface GigabitEthernet0/1
CORE-Router1(config-if)#ip address 172.16.3.154 255.255.255.252
CORE-Router1(config-if)#no shutdown
CORE-Router1(config-if)#exit
CORE-Router1(config)#do wr

CORE-Router1(config)#interface serial 0/0/0
CORE-Router1(config-if)#ip address 195.136.17.1 255.255.255.252
CORE-Router1(config-if)#no shutdown
CORE-Router1(config-if)#exit
CORE-Router1(config)#do wr

CORE-Router1(config)#interface serial 0/0/1
CORE-Router1(config-if)#ip address 195.136.17.5 255.255.255.252
CORE-Router1(config-if)#no shutdown
CORE-Router1(config-if)#exit
CORE-Router1(config)#do wr
```

Core 1 Router

```
CORE-Router2(config)#interface GigabitEthernet0/0
CORE-Router2(config-if)#ip address 172.16.3.158 255.255.255.252
CORE-Router2(config-if)#no shutdown
CORE-Router2(config-if)#exit
CORE-Router2(config)#do wr

CORE-Router2(config)#interface GigabitEthernet0/1
CORE-Router2(config-if)#ip address 172.16.3.150 255.255.255.252
CORE-Router2(config-if)#no shutdown
CORE-Router2(config-if)#exit
CORE-Router2(config)#do wr

CORE-Router2(config)#interface serial 0/0/0
CORE-Router2(config-if)#ip address 195.136.17.13 255.255.255.252
CORE-Router2(config-if)#no shutdown
CORE-Router2(config-if)#exit
CORE-Router2(config)#do wr

CORE-Router2(config)#interface serial 0/0/1
CORE-Router2(config-if)#ip address 195.136.17.9 255.255.255.252
CORE-Router2(config-if)#no shutdown
CORE-Router2(config-if)#exit
CORE-Router2(config)#do wr
```

Multilayer Switch 1

```
Multilayer_1-Switch(config)#interface range gigabitEthernet 1/0/1-2
Multilayer_1-Switch(config-if-range)#no switchport
Multilayer_1-Switch(config-if-range)#exit
Multilayer_1-Switch(config)#do wr

Multilayer_1-Switch(config)#interface gigabitEthernet 1/0/1
Multilayer_1-Switch(config-if)#ip address 172.16.3.145 255.255.255.252
Multilayer_1-Switch(config-if)#no shutdown
Multilayer_1-Switch(config-if)#exit
Multilayer_1-Switch(config)#do wr
Multilayer_1-Switch(config)#interface GigabitEthernet1/0/2
Multilayer_1-Switch(config-if)#ip address 172.16.3.149 255.255.255.252
Multilayer_1-Switch(config-if)#no shutdown
Multilayer_1-Switch(config-if)#exit
Multilayer_1-Switch(config)#do wr
```

Multilayer Switch 2

```
Multilayer_2-Switch(config)#interface range gigabitEthernet 1/0/1-2
Multilayer_2-Switch(config-if-range)#no switchport
Multilayer_2-Switch(config-if-range)#exit
Multilayer_2-Switch(config)#do wr

Multilayer_2-Switch(config)#interface GigabitEthernet1/0/1
Multilayer_2-Switch(config-if)#ip address 172.16.3.157 255.255.255.252
Multilayer_1-Switch(config-if)#no shutdown
Multilayer_2-Switch(config-if)#exit
Multilayer_2-Switch(config)#do wr
Multilayer_2-Switch(config)#interface GigabitEthernet1/0/2
Multilayer_2-Switch(config-if)#ip address 172.16.3.153 255.255.255.252
Multilayer_2-Switch(config-if)#no shutdown
Multilayer_2-Switch(config-if)#exit
Multilayer_2-Switch(config)#do wr
```

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

Multilayer Switch 1

```
Multilayer_1-Switch(config)#interface vlan 10
Multilayer_1-Switch(config-if)#no shutdown
Multilayer_1-Switch(config-if)#ip address 172.16.1.1 255.255.255.128
Multilayer_1-Switch(config-if)#ip helper-address 172.16.3.130
Multilayer_1-Switch(config-if)#exit

Multilayer_1-Switch(config)#interface vlan 20
Multilayer_1-Switch(config-if)#no shutdown
Multilayer_1-Switch(config-if)#ip address 172.16.1.129 255.255.255.128
Multilayer_1-Switch(config-if)#ip helper-address 172.16.3.130
Multilayer_1-Switch(config-if)#exit

Multilayer_1-Switch(config)#interface vlan 30
Multilayer_1-Switch(config-if)#no shutdown
Multilayer_1-Switch(config-if)#ip address 172.16.2.1 255.255.255.128
Multilayer_1-Switch(config-if)#ip helper-address 172.16.3.130
Multilayer_1-Switch(config-if)#exit

Multilayer_1-Switch(config)#interface vlan 40
Multilayer_1-Switch(config-if)#no shutdown
```

Multilayer Switch 2

```
Multilayer_2-Switch(config)#interface vlan 10
Multilayer_2-Switch(config-if)#no shutdown
Multilayer_2-Switch(config-if)#ip address 172.16.1.1 255.255.255.128
Multilayer_2-Switch(config-if)#ip helper-address 172.16.3.130
Multilayer_2-Switch(config-if)#exit

Multilayer_2-Switch(config)#interface vlan 20
Multilayer_2-Switch(config-if)#no shutdown
Multilayer_2-Switch(config-if)#ip address 172.16.1.129 255.255.255.128
Multilayer_2-Switch(config-if)#ip helper-address 172.16.3.130
Multilayer_2-Switch(config-if)#exit

Multilayer_2-Switch(config)#interface vlan 30
Multilayer_2-Switch(config-if)#no shutdown
Multilayer_2-Switch(config-if)#ip address 172.16.2.1 255.255.255.128
Multilayer_2-Switch(config-if)#ip helper-address 172.16.3.130
Multilayer_2-Switch(config-if)#exit

Multilayer_2-Switch(config)#interface vlan 40
Multilayer_2-Switch(config-if)#no shutdown
```

```
Multilayer_1-Switch(config-if)#ip address 172.16.2.129 255.255.255.128
Multilayer_1-Switch(config-if)#ip helper-address 172.16.3.130
Multilayer_1-Switch(config-if)#exit

Multilayer_1-Switch(config)#interface vlan 50
Multilayer_1-Switch(config-if)#no shutdown
Multilayer_1-Switch(config-if)#ip address 172.16.3.1 255.255.255.128
Multilayer_1-Switch(config-if)#ip helper-address 172.16.3.130
Multilayer_1-Switch(config-if)#exit

Multilayer_1-Switch(config)#interface vlan 60
Multilayer_1-Switch(config-if)#no shutdown
Multilayer_1-Switch(config-if)#ip address 172.16.3.129 255.255.255.240
Multilayer_1-Switch(config-if)#ip helper-address 172.16.3.130
Multilayer_1-Switch(config-if)#exit

Multilayer_1-Switch(config)#do wr
```

```
Multilayer_2-Switch(config-if)#ip address 172.16.2.129 255.255.255.128
Multilayer_2-Switch(config-if)#ip helper-address 172.16.3.130
Multilayer_2-Switch(config-if)#exit

Multilayer_2-Switch(config)#interface vlan 50
Multilayer_2-Switch(config-if)#no shutdown
Multilayer_2-Switch(config-if)#ip address 172.16.3.1 255.255.255.128
Multilayer_2-Switch(config-if)#ip helper-address 172.16.3.130
Multilayer_2-Switch(config-if)#exit

Multilayer_2-Switch(config)#interface vlan 60
Multilayer_2-Switch(config-if)#no shutdown
Multilayer_2-Switch(config-if)#ip address 172.16.3.129 255.255.255.240
Multilayer_2-Switch(config-if)#ip helper-address 172.16.3.130
Multilayer_2-Switch(config-if)#exit

Multilayer_2-Switch(config)#do wr
```

8. Configuring Dedicated DHCP Server device to provide dynamic IP allocation.

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
FinancePool	172.16.2.1	172.16.3.131	172.16.2.6	255.255.255...	120	0.0.0.0	0.0.0.0
ICTPool	172.16.3.1	172.16.3.131	172.16.3.6	255.255.255...	120	0.0.0.0	0.0.0.0
AdminPool	172.16.2.129	172.16.3.131	172.16.2.134	255.255.255...	120	0.0.0.0	0.0.0.0
HRPool	172.16.1.129	172.16.3.131	172.16.128....	255.255.255...	120	0.0.0.0	0.0.0.0
SalesPool	172.16.1.1	172.16.3.131	172.16.1.6	255.255.255...	120	0.0.0.0	0.0.0.0

9. Configuring OSPF as the routing protocol.

Core 1 Router

```
CORE-Router1(config)#router ospf 10
CORE-Router1(config-router)#router-id 3.3.3.3

CORE-Router1(config-router)#network 195.136.17.4 0.0.0.3 area 0
CORE-Router1(config-router)#network 195.136.17.0 0.0.0.3 area 0
CORE-Router1(config-router)#network 172.13.3.144 0.0.0.3 area 0
CORE-Router1(config-router)#network 172.13.3.152 0.0.0.3 area 0
CORE-Router1(config-router)#exit

CORE-Router1(config)#do wr
```

Core 2 Router

```
CORE-Router2(config)#router ospf 10
CORE-Router2(config-router)#router-id 4.4.4.4

CORE-Router2(config-router)#network 195.136.17.8 0.0.0.3 area 0
CORE-Router2(config-router)#network 195.136.17.12 0.0.0.3 area 0
CORE-Router2(config-router)#network 172.13.3.148 0.0.0.3 area 0
CORE-Router2(config-router)#network 172.13.3.156 0.0.0.3 area 0
CORE-Router2(config-router)#exit

CORE-Router2(config)#do wr
```

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

No.	Name	Type	Detail
0	www.wlink.com	A Record	172.16.3.131

11. Configuring standard and extended Access Control Lists ACL.

Core 1 Router

```
CORE-Router1(config)#ip nat inside source list 1 interface serial 0/0/0 overload
CORE-Router1(config)#ip nat inside source list 1 interface serial 0/0/1 overload

CORE-Router1(config)#access-list 1 permit 172.16.1.0 0.0.0.127
CORE-Router1(config)#access-list 1 permit 172.16.1.128 0.0.0.127
CORE-Router1(config)#access-list 1 permit 172.16.2.0 0.0.0.127
CORE-Router1(config)#access-list 1 permit 172.16.2.128 0.0.0.127
CORE-Router1(config)#access-list 1 permit 172.16.3.0 0.0.0.127
CORE-Router1(config)#access-list 1 permit 172.16.3.128 0.0.0.15

CORE-Router1(config)#interface range gigabitEthernet 0/0-1
CORE-Router1(config-if-range)#ip nat inside
CORE-Router1(config-if-range)#exit

CORE-Router1(config)#interface Serial0/0/0
```

Core 2 Router

```
CORE-Router2(config)#ip nat inside source list 1 interface serial 0/0/0 overload
CORE-Router2(config)#ip nat inside source list 1 interface serial 0/0/1 overload

CORE-Router2(config)#access-list 1 permit 172.16.1.0 0.0.0.127
CORE-Router2(config)#access-list 1 permit 172.16.1.128 0.0.0.127
CORE-Router2(config)#access-list 1 permit 172.16.2.0 0.0.0.127
CORE-Router2(config)#access-list 1 permit 172.16.2.128 0.0.0.127
CORE-Router2(config)#access-list 1 permit 172.16.3.0 0.0.0.127
CORE-Router2(config)#access-list 1 permit 172.16.3.128 0.0.0.15

CORE-Router2(config)#interface range gigabitEthernet 0/0-1
CORE-Router2(config-if-range)#ip nat inside
CORE-Router2(config-if-range)#exit

ORE-Router2(config)#interface Serial0/0/0
```

CORE-Router1(config-if)#ip nat outside CORE-Router1(config-if)#exit CORE-Router1(config)#interface Serial0/0/1 CORE-Router1(config-if)#ip nat outside CORE-Router1(config-if)#exit CORE-Router1(config)#do wr	CORE-Router2(config-if)#ip nat outside CORE-Router2(config-if)#exit CORE-Router2(config)#interface Serial0/0/1 CORE-Router2(config-if)#ip nat outside CORE-Router2(config-if)#exit CORE-Router2(config)#do wr

12. Test and Verifying Network Communication.