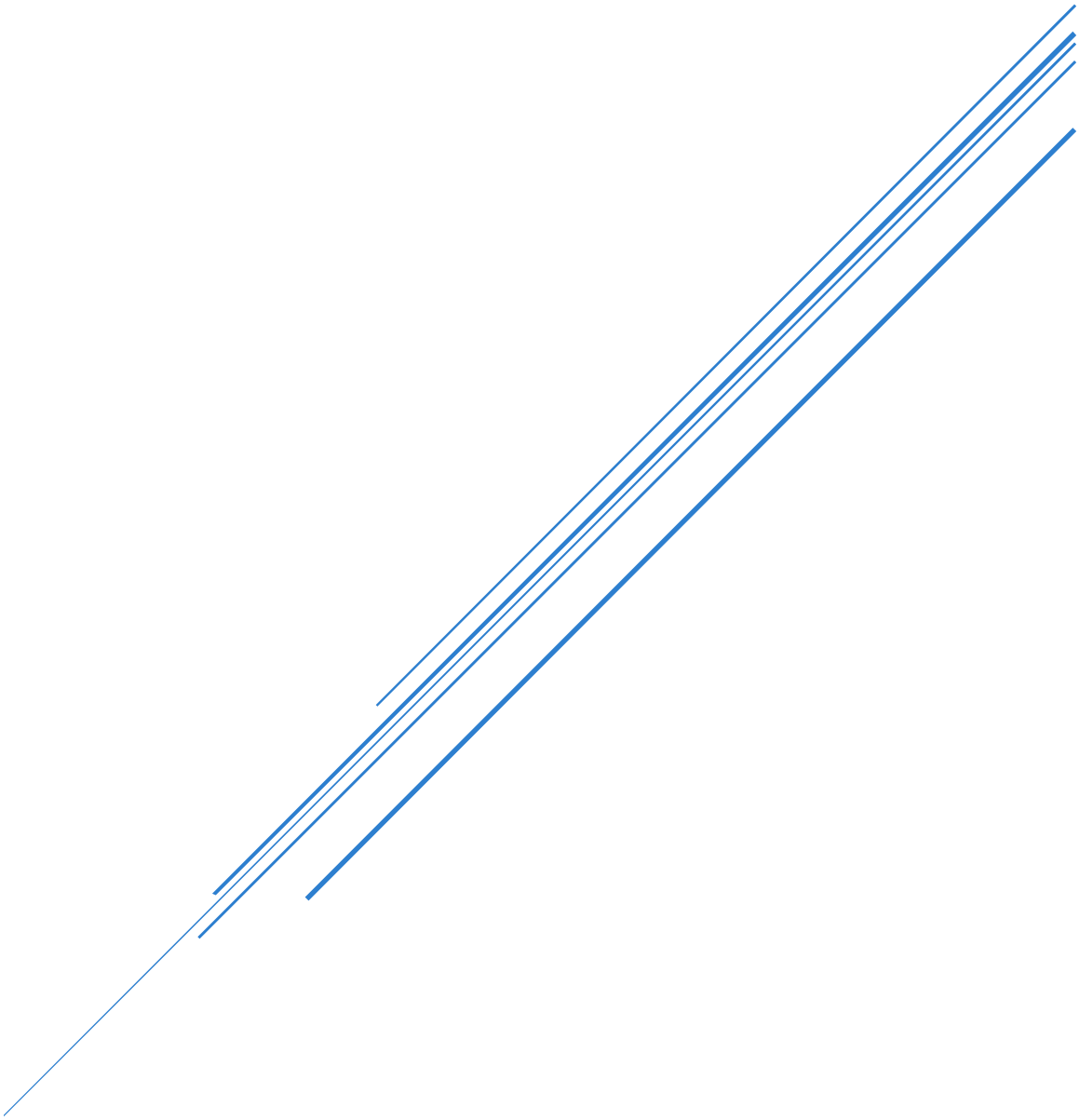
DESIGN AND IMPLEMENTATION OF A COMPANY/BUSINESS SYSTEM NETWORK DESIGN (PROJECT #6)

CCNA NETWORK PROJECT



SUBASH SUBEDI

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

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.

Table of Contents

Technologies Implemented

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

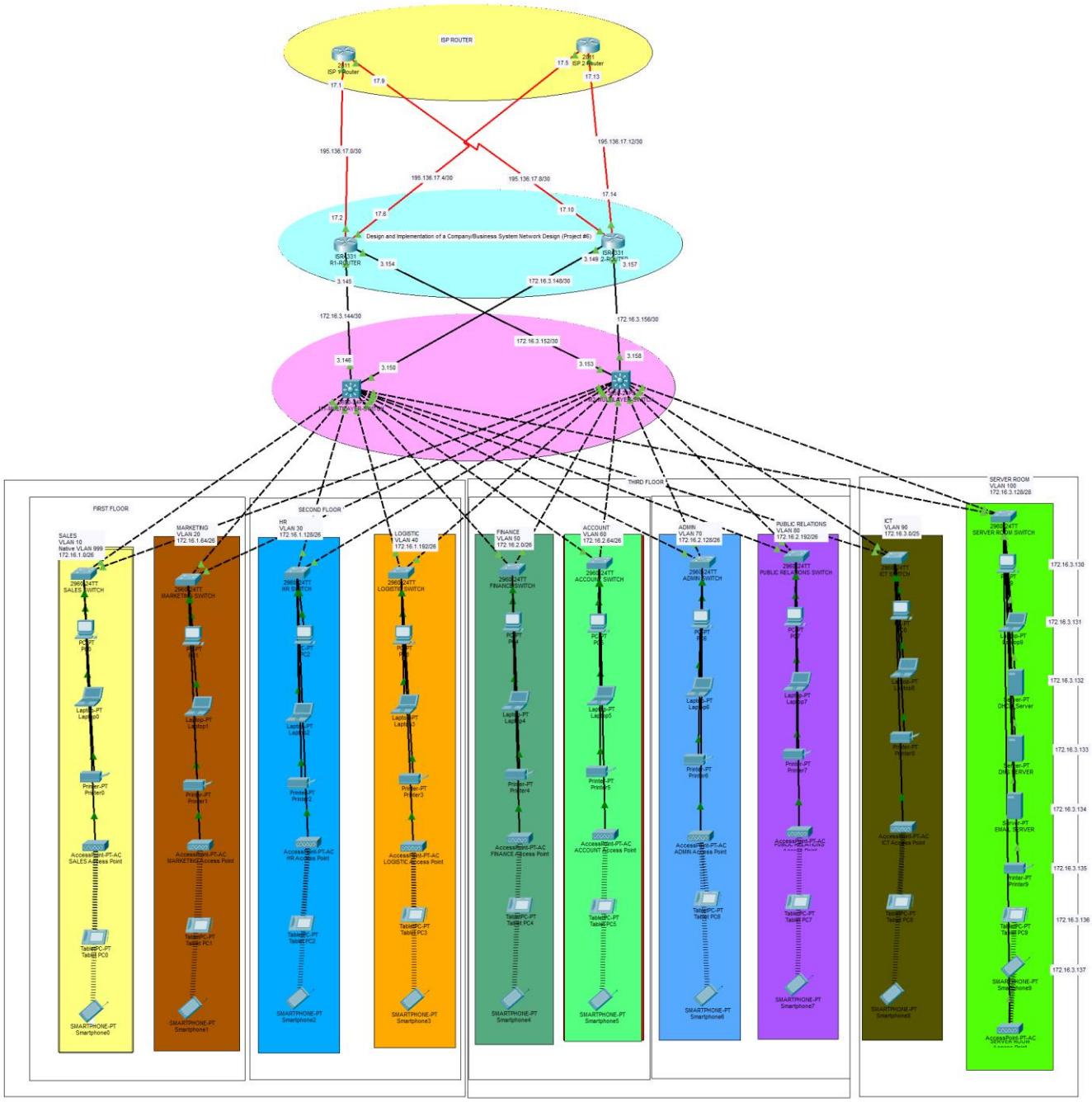


Figure 1

2. 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

3. Configuring Basic device settings.

R1 ROUTER	**R2 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	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	do wr

FIRST MULTILAYER SWITCH	**SECOND 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	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	**ACCOUNT SWITCH**
enable configure terminal hostname SALES-SWITCH do clock set 00:00:00 1 JANUARY 2025 banner motd $ ONLY AUTHORIZED ACCESS $	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	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	**PUBLIC RELATIONS 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	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	**SERVER ROOM 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	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

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

FIRST MULTILAYER SWITCH	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	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	interface GigabitEthernet 1/0/5
description **THIS IS TRUNK INTERFACES OF HR **	description **THIS IS TRUNK INTERFACES OF HR **
switchport mode trunk	switchport mode trunk
switchport trunk native vlan 999	switchport trunk native vlan 999
switchport trunk allowed vlan 30	switchport trunk allowed vlan 30
switchport nonegotiate	switchport nonegotiate
exit	exit
vlan 40	vlan 40
name LOGISTIC-DEPARTMENT	name LOGISTIC-DEPARTMENT
exit	exit
interface GigabitEthernet 1/0/6	interface GigabitEthernet 1/0/6
description **THIS IS TRUNK INTERFACES OF LOGISTIC **	description **THIS IS TRUNK INTERFACES OF LOGISTIC **
switchport mode trunk	switchport mode trunk
switchport trunk native vlan 999	switchport trunk native vlan 999
switchport trunk allowed vlan 40	switchport trunk allowed vlan 40
switchport nonegotiate	switchport nonegotiate
exit	exit
vlan 50	vlan 50
name FINANCE-DEPARTMENT	name FINANCE-DEPARTMENT
exit	exit
interface GigabitEthernet 1/0/7	interface GigabitEthernet 1/0/7
description **THIS IS TRUNK INTERFACES OF FINANCE **	description **THIS IS TRUNK INTERFACES OF FINANCE **
switchport mode trunk	switchport mode trunk
switchport trunk native vlan 999	switchport trunk native vlan 999
switchport trunk allowed vlan 50	switchport trunk allowed vlan 50
switchport nonegotiate	switchport nonegotiate
exit	exit
vlan 60	vlan 60
name ACCOUNT-DEPARTMENT	name ACCOUNT-DEPARTMENT
exit	exit
interface GigabitEthernet 1/0/8	interface GigabitEthernet 1/0/8
description **THIS IS TRUNK INTERFACES OF ACCOUNT **	description **THIS IS TRUNK INTERFACES OF ACCOUNT **
switchport mode trunk	switchport mode trunk

switchport trunk native vlan 999	switchport trunk native vlan 999
switchport trunk allowed vlan 60	switchport trunk allowed vlan 60
switchport nonegotiate	switchport nonegotiate
exit	exit
vlan 70	vlan 70
name ADMIN-DEPARTMENT	name ADMIN-DEPARTMENT
exit	exit
interface GigabitEthernet 1/0/9	interface GigabitEthernet 1/0/9
description **THIS IS TRUNK INTERFACES OF ADMIN **	description **THIS IS TRUNK INTERFACES OF ADMIN **
switchport mode trunk	switchport mode trunk
switchport trunk native vlan 999	switchport trunk native vlan 999
switchport trunk allowed vlan 70	switchport trunk allowed vlan 70
switchport nonegotiate	switchport nonegotiate
exit	exit
vlan 80	vlan 80
name PUBLIC-RELATIONS-DEPARTMENT	name PUBLIC-RELATIONS-DEPARTMENT
exit	exit
interface GigabitEthernet 1/0/10	interface GigabitEthernet 1/0/10
description **THIS IS TRUNK INTERFACES OF PUBLIC-RELATIONS **	description **THIS IS TRUNK INTERFACES OF PUBLIC-RELATIONS **
switchport mode trunk	switchport mode trunk
switchport trunk native vlan 999	switchport trunk native vlan 999
switchport trunk allowed vlan 80	switchport trunk allowed vlan 80
switchport nonegotiate	switchport nonegotiate
exit	exit
vlan 90	vlan 90
name ICT-DEPARTMENT	name ICT-DEPARTMENT
exit	exit
interface GigabitEthernet 1/0/11	interface GigabitEthernet 1/0/11
description **THIS IS TRUNK INTERFACES OF ICT **	description **THIS IS TRUNK INTERFACES OF ICT **
switchport mode trunk	switchport mode trunk
switchport trunk native vlan 999	switchport trunk native vlan 999
switchport trunk allowed vlan 90	switchport trunk allowed vlan 90
switchport nonegotiate	switchport nonegotiate
exit	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	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

SALES SWITCH	**ACCOUNT 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	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 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	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	**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 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	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	**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

exit ip default-gateway 172.16.1.128	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	**SERVER ROOM 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
```

```
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
```

5. 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

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

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

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

FIRST MULTILAYER SWITCH	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 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 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 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 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 **	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	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	no shutdown exit

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

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
ITC_Pool	172.16.3.1	172.16.3.133	172.16.3.3	255.255.255.128	120	0.0.0.0	0.0.0.0
PUBLIC_RELATIONS_Pool	172.16.2.193	172.16.3.133	172.16.2.196	255.255.255.192	60	0.0.0.0	0.0.0.0
Admin_Pool	172.16.2.129	172.16.3.133	172.16.2.132	255.255.255.192	60	0.0.0.0	0.0.0.0
HR_Pool	172.16.1.129	172.16.3.133	172.16.1.132	255.255.255.192	60	0.0.0.0	0.0.0.0
Account_Pool	172.16.2.65	172.16.3.133	172.16.2.68	255.255.255.192	60	0.0.0.0	0.0.0.0
Finance_Pool	172.16.2.1	172.16.3.133	172.16.2.3	255.255.255.192	60	0.0.0.0	0.0.0.0
Logistic_Pool	172.16.1.193	172.16.3.133	172.16.1.196	255.255.255.192	60	0.0.0.0	0.0.0.0
Marketing_Pool	172.16.1.65	172.16.3.133	172.16.1.68	255.255.255.192	60	0.0.0.0	0.0.0.0
Sales_Pool	172.16.1.1	172.16.3.133	172.16.1.3	255.255.255.192	60	0.0.0.0	0.0.0.0

Figure 2: DHCP CONFIGURATION

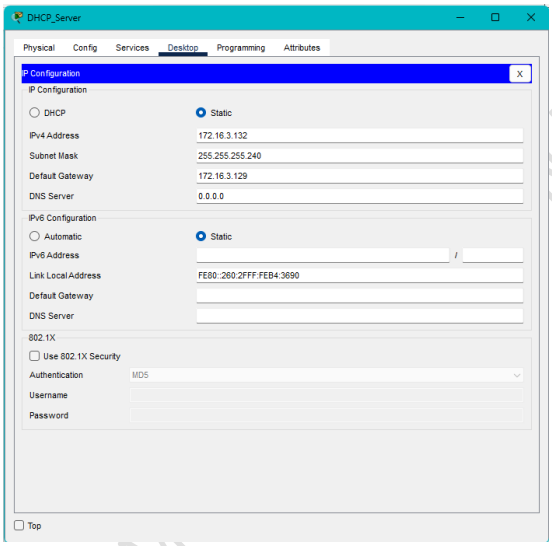


Figure 3: DHCP SERVER IP

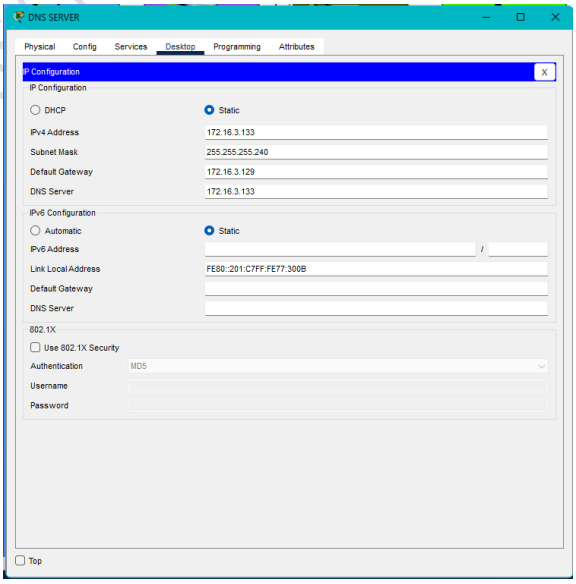


Figure 4: DNS SERVER IP

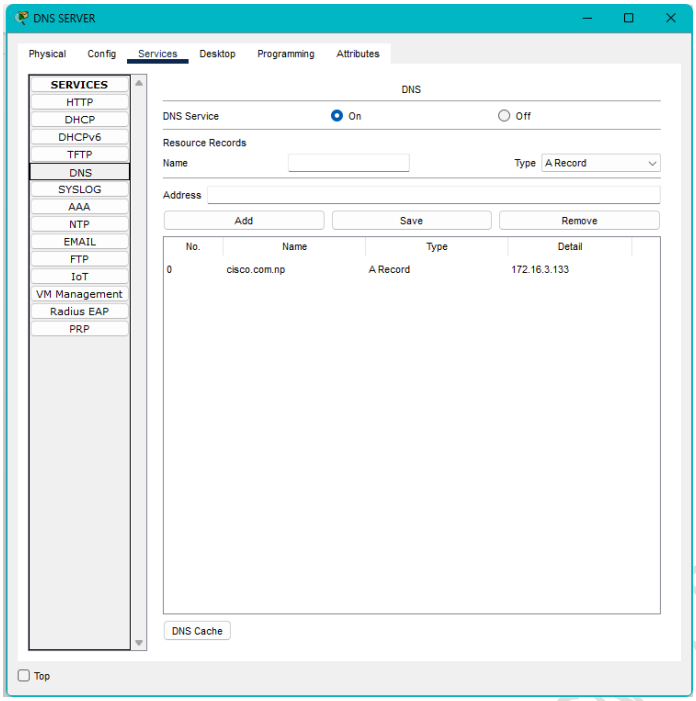


Figure 5: DNS CONFIGURATION

8. Configuring SSH for secure Remote access.

R1 ROUTER	R2 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	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	SECOND 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	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	line vty 0 15 login local transport input ssh exit ip ssh time-out 60 ip ssh authentication-retries 3

SALES SWITCH	**ACCOUNT 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	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	**ADMIN SWITCH**
enable configure terminal ip domain-name marketing.com crypto key generate rsa	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	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	**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	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

9. Configuring OSPF as the routing protocol.

R1 ROUTER	**R2 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	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	**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 172.16.3.152 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	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

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

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

11. 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
```

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

FIRST MULTILAYER SWITCH	**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	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	**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	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	**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	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	**PUBLIC RELATIONS SWITCH**
enable	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	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

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

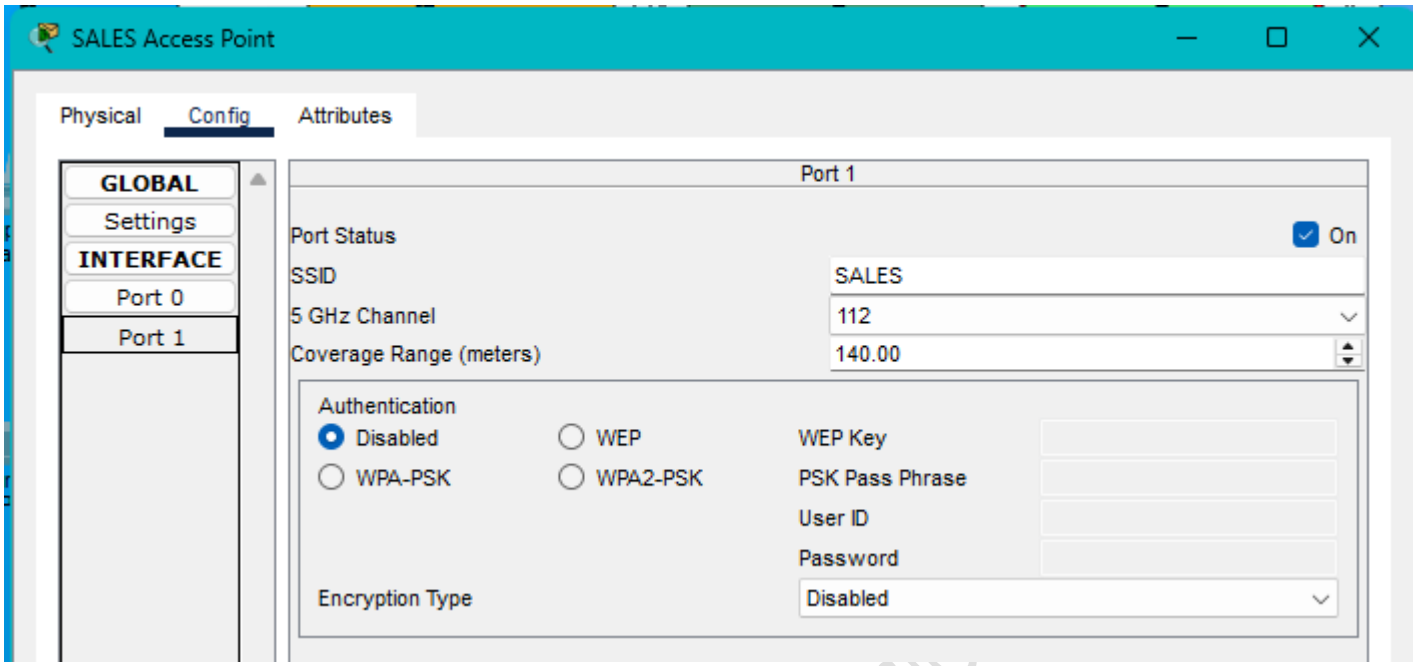


Figure 6: AP CONFIGURATION

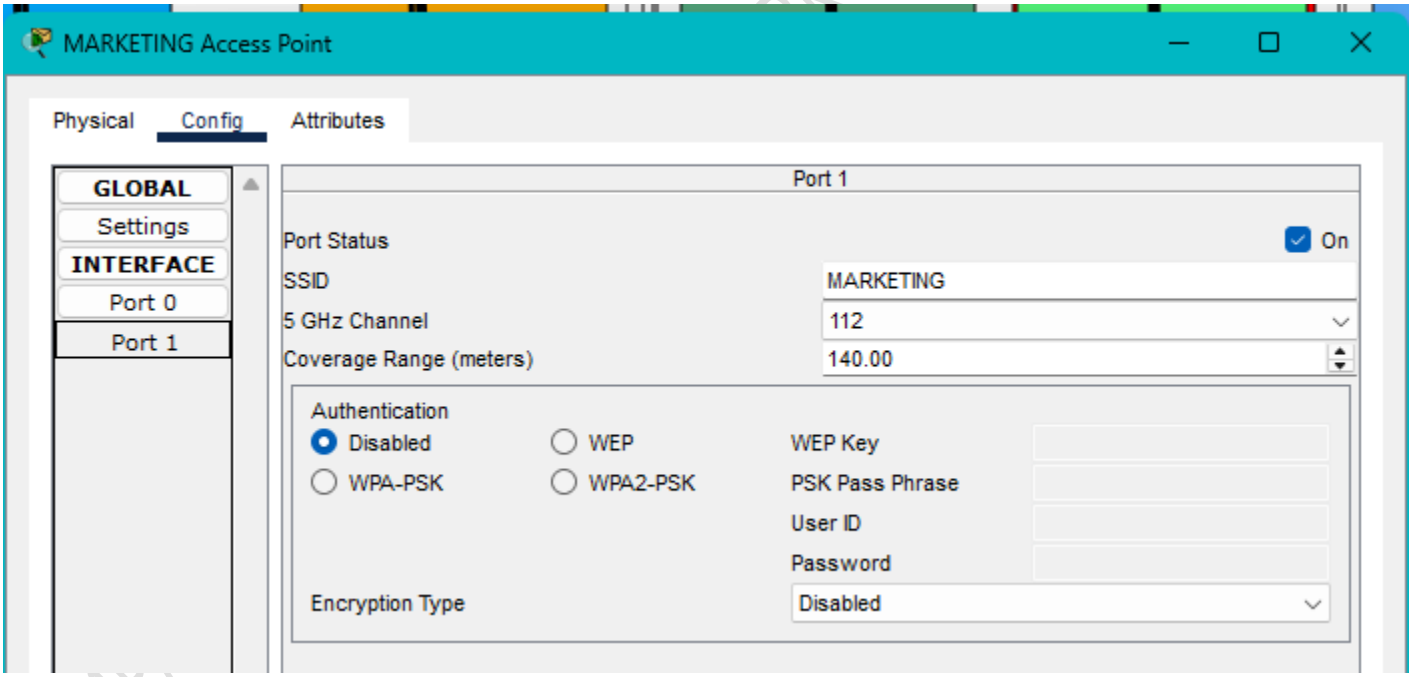


Figure 7: AP CONFIGURATION

14.Host Device Configurations.

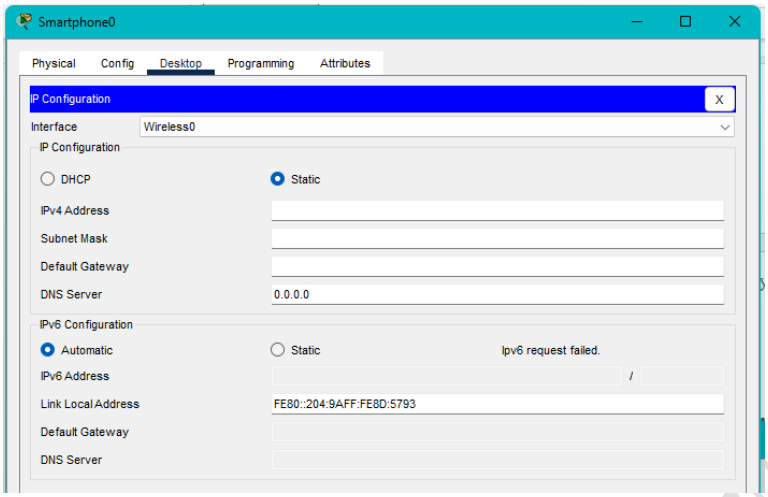


Figure 8

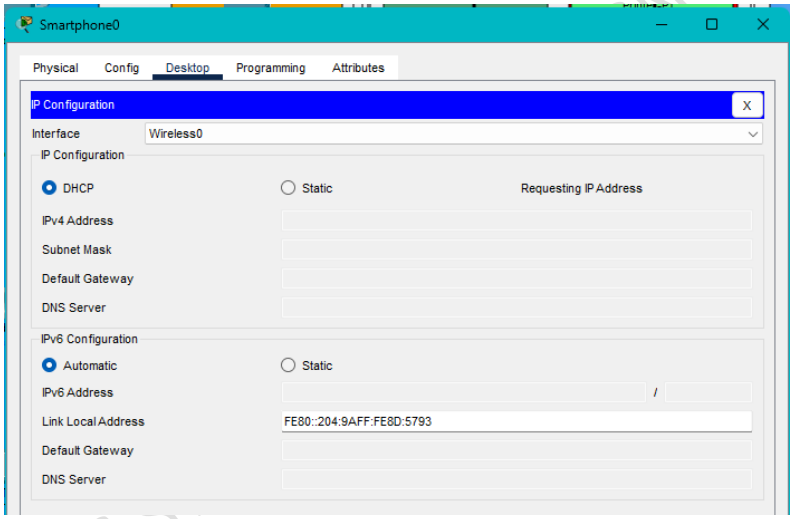


Figure 9

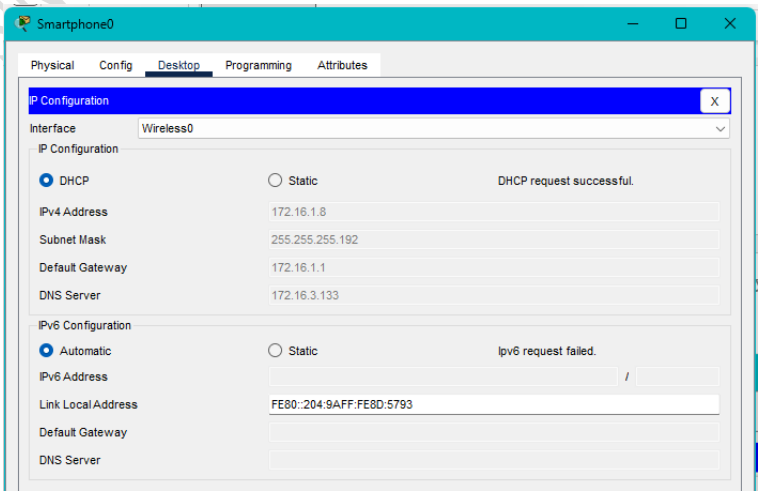


Figure 10

15.Test and Verifying Network Communication.

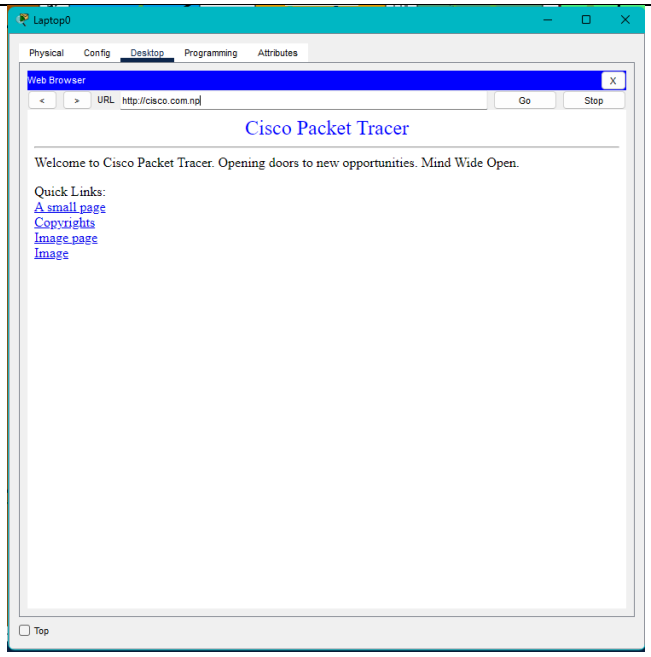


Figure 11

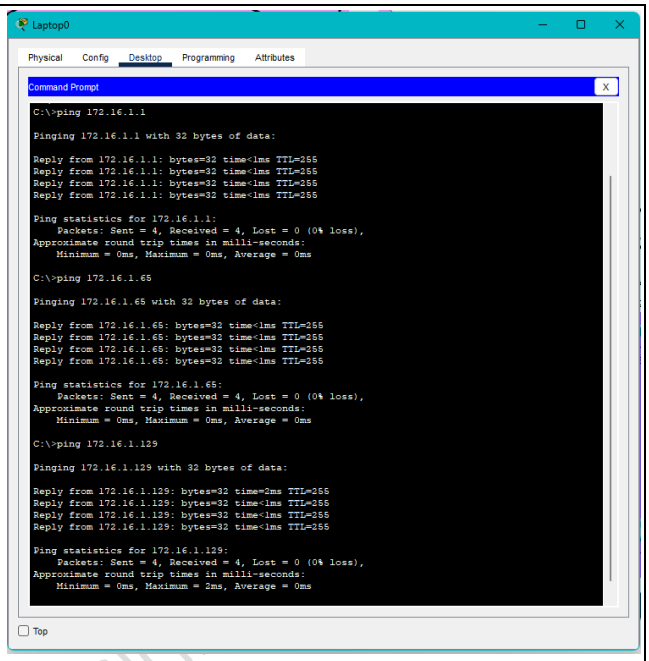


Figure 12

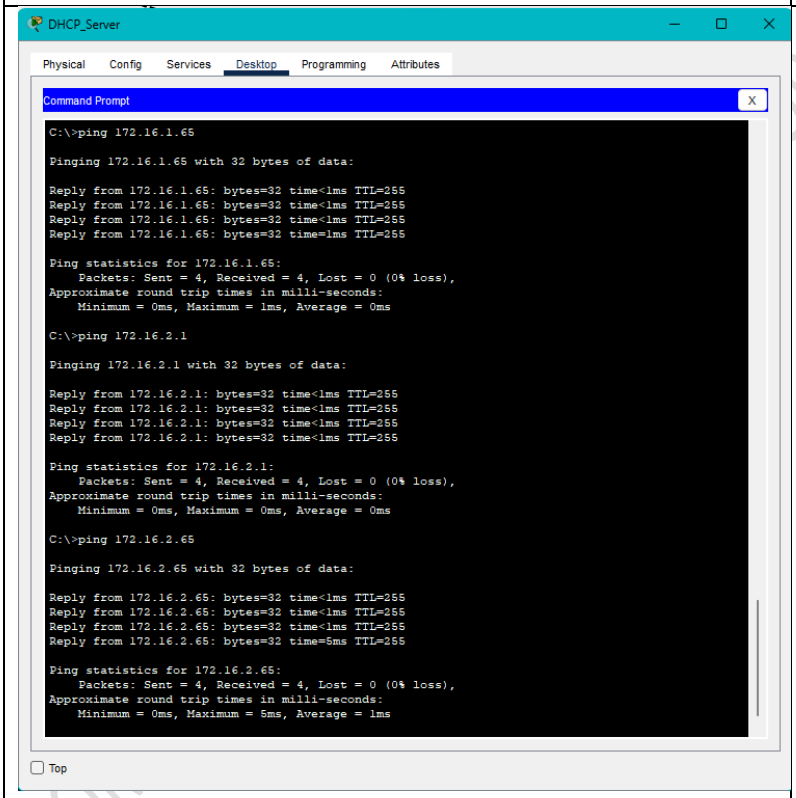


Figure 13

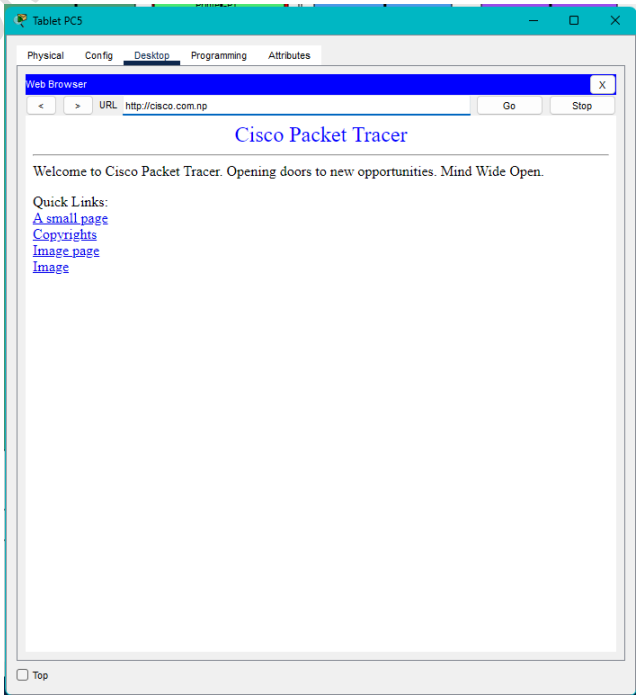


Figure 14