

# CCNA Project: Small Office Network Design and Simulation

## Network Topology:

- 3 departments: HR, Sales, and IT
- 2 Cisco routers
- 2 Layer 2 switches
- 3 VLANs (one for each department)
- 1 DHCP server

## Devices:

- PCs for each department
- Cisco routers
- Cisco switches

## Tasks & Configuration Steps:

- Subnetting:
- Divide the given IP block (e.g., 192.168.0.0/24) into subnets for HR, Sales, and IT departments using VLSM.

## 2. VLAN Configuration:

- Create separate VLANs for:
  - VLAN 10: HR
  - VLAN 20: Sales
  - VLAN 30: IT
- Assign switch ports to respective VLANs.

## 3. Inter-VLAN Routing:

- Use Router-on-a-Stick configuration:
- Configure sub-interfaces on the router for each VLAN.
- Assign gateway IPs for each VLAN.

## 4. Routing Protocols:

- Configure Static Routing between routers.
- Alternatively, use a dynamic routing protocol such as RIP or OSPF for scalability.

#### 5. DHCP Setup:

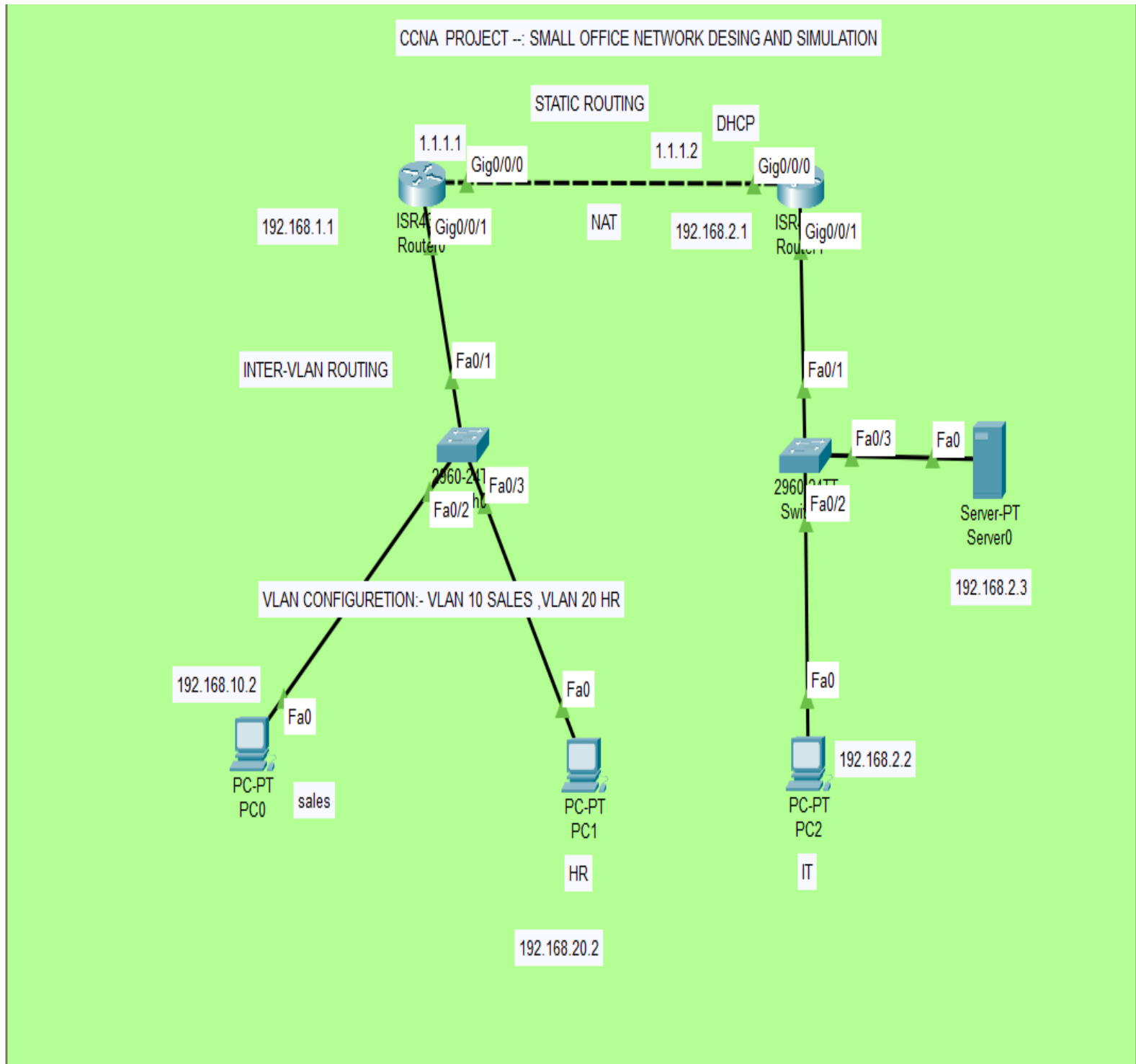
- Configure a DHCP server to dynamically assign IP addresses to clients in each
- VLAN/subnet.

#### 6. NAT Configuration:

- Configure Static NAT

# PROJECT START

## ➤ PROJECT COMPLETED BY STEP BY STEP



# **STEP 1**

## **❖ VLAN Configuration & Inter-VLAN Routing**

### **Network Setup Overview:**

- Switch with multiple VLANs
- Router with a single physical interface connected to the switch
- Multiple PCs assigned to different VLANs
- VLANs (e.g. VLAN 10 and VLAN 20)

#### Step-by-Step Configuration

##### 1. Configure VLANs on the Switch

- Switch> enable
- Switch# configure terminal
- Switch(config)# vlan 10
- Switch(config-vlan)# name Sales
- Switch(config-vlan)# exit
- Switch(config)# vlan 20
- Switch(config-vlan)# name HR
- Switch(config-vlan)# exit

##### 2. Assign Switch Ports to VLANs

- Switch(config)# interface fa0/2
- Switch(config-if)# switchport mode access
- Switch(config-if)# switchport access vlan 10
- Switch(config-if)# exit
- Switch(config)# interface fa0/3
- Switch(config-if)# switchport mode access
- Switch(config-if)# switchport access vlan 20
- Switch(config-if)# exit

##### 3. Configure Trunk Port to the Router

- Switch(config)# interface fa0/1

- Switch(config-if)# switchport mode trunk
- Switch(config-if)# exit

#### 4. Configure Router Subinterfaces (Router-on-a-Stick)

- Router> enable
- Router# configure terminal
- Router(config)# interface g0/0/1.10
- Router(config-subif)# encapsulation dot1Q 10
- Router(config-subif)# ip address 192.168.10.1 255.255.255.0
- Router(config-subif)# exit
- Router(config)# interface g0/0/1.20
- Router(config-subif)# encapsulation dot1Q 20
- Router(config-subif)# ip address 192.168.20.1 255.255.255.0
- Router(config-subif)# exit
- Router(config)# interface g0/0/1
- Router(config-if)# no shutdown
- Router(config-if)# exit

## STEP 2

### ❖ . Routing Protocols

#### Static Routing Configuration IN BOTH ROUTER 1 AND ROUTER 2.

- ROUTER 1 --: IP ROUTE 192.168.2.0 255.255.255.0 1.1.1.2
- ROUTER 2 --: IP ROUTE 192.168.1.0 255.255.255.0 1.1.1.1

## STEP 3

### ❖ DHCP Setup

#### Configuring DHCP server on Router 2.

- Router(config)#ip dhcp pool MYPOOL
- Router(dhcp-config)#network 192.168.2.0 255.255.255.0
- Router(dhcp-config)#default-router 192.168.2.1
- Router(dhcp-config)#dns-server 192.168.2.3

## STEP 4

### ❖ NAT Configuration

Step-by-Step NAT Configuration

#### ROUTER 1

- Router> enable
- Router# configure terminal
- Router(config)# interface Gig0/0/1
- Router(config-if)# ip address 192.168.1.1 255.255.255.0
- Router(config-if)# ip nat inside
- Router(config-if)# no shutdown
- Router(config-if)# exit
- Router(config)# interface Gig0/0/0
- Router(config-if)# ip address 1.1.1.1 255.0.0.0

- Router(config-if)# ip nat outside
- **Router(config-if)# no shutdown**
- Router(config-if)# exit

### Dynamic NAT

- Router(config)# ip nat pool MYPOOL 1.1.1.10 1.1.1.15 netmask 255.0.0.0
- Router(config)# access-list 1 permit 192.168.1.0 0.0.0.255
- Router(config)# ip nat inside source list 1 pool MYPOOL

## ROUTER 2

### ❖ Static NAT ON ROUTER 2

- Router> enable
- Router# configure terminal
- Router(config)# interface Gig0/0/1
- Router(config-if)# ip address 192.168.2.1 255.255.255.0
- Router(config-if)# ip nat inside
- Router(config-if)# no shutdown
- Router(config-if)# exit
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- Router(config)# interface Gig0/0/0
- Router(config-if)# ip address 1.1.1.2 255.0.0.0
- Router(config-if)# ip nat outside
- **Router(config-if)# no shutdown**
- Router(config-if)# exit

### Static NAT

- Router(config)# ip nat inside source static 192.168.2.1 1.1.1.10