

# **Network Project**

## **Team Members:**

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**GitHub-Link:** [Cisco-Packet-Tracer File & Project-Documentation](#)

# Project Documentation

We have a Head Office (HO) , and Tow Branches , as at **figure (1)**.

## Network Setup:

HO Network: “**192.168.1.0/24**” .

Branch 1 Network: “**192.168.2.0/24**”.

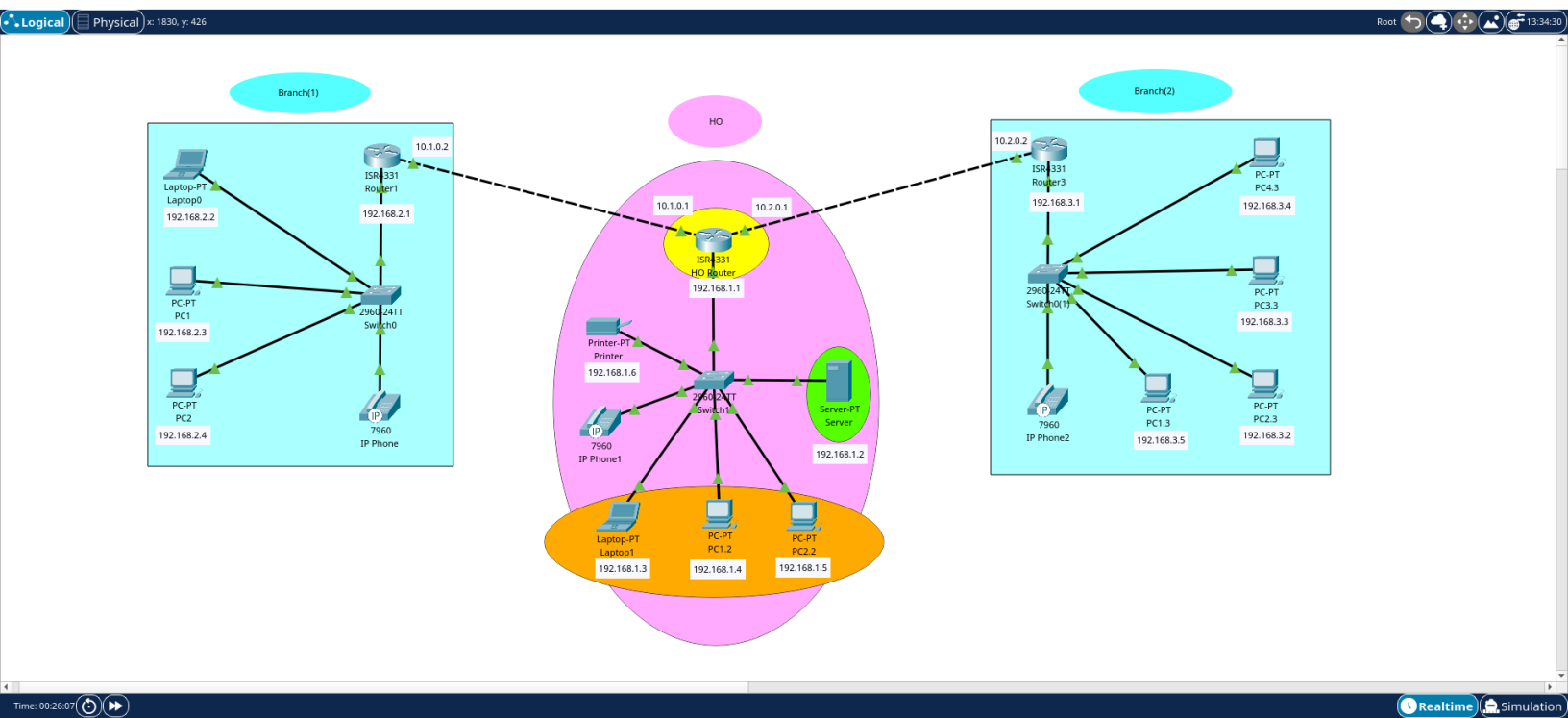
Branch 2 Network: “**192.168.3.0/24**” .

## WAN Links:

HO to Branch 1: **10.1.0.0/24**

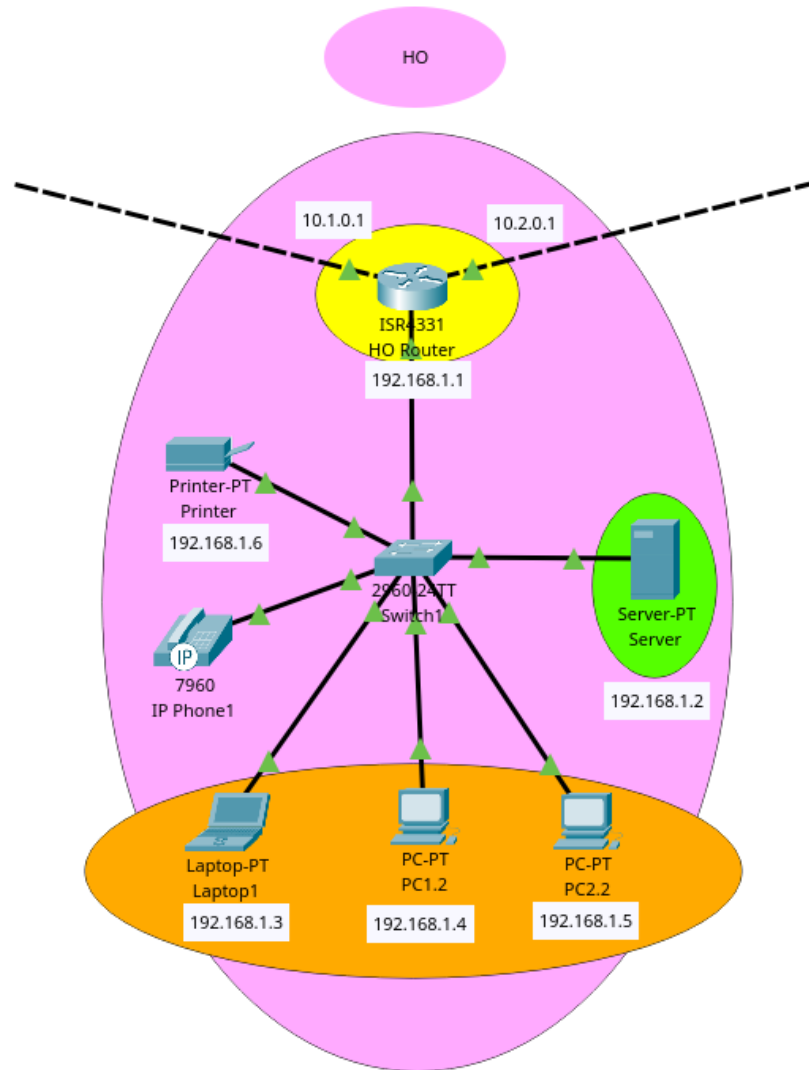
HO to Branch 2: **10.2.0.0/24**

figure(1)



## Head Office (HO)

figure(2)



### Components:

#### Router

- **HO Router:**
  - **Purpose:** Acts as the gateway for the headquarters (HO) and facilitates communication with external networks such as Branch 1 and Branch 2.
  - **Interfaces:**
    - 10.1.0.2: Connects to Branch 1, at figure (3).
    - 20.2.0.2: Connects to Branch 2, at figure (4).
    - 192.168.1.1: Serves as **the default gateway** for devices within the HO local subnet.

## Switch

- **Switch1:**
  - **Purpose:** A layer-2 switch that connects and distributes traffic between the local devices in the HO subnet.
  - **Connectivity:**
    - Connected to the router (192 . 168 . 1 . 1) for external communication.
    - Connected to all devices in the HO network.

## Devices

### 1. Server:

- **IP Address:** 192 . 168 . 1 . 2.
- **Purpose:** Likely provides centralized services such as file hosting, application hosting, or database services for the HO and possibly the entire network, and we implemented the following services (**DHCP, DNS, FTP, EMAIL**).

### 2. PCs:

- **PC1.2** (192 . 168 . 1 . 4) and **PC2.2** (192 . 168 . 1 . 5):
  - Desktop computers connected to the switch for general use.

### 3. Laptop (Laptop1):

- **IP Address:** 192 . 168 . 1 . 3.
- **Purpose:** A mobile device connected to the network.

### 4. Printer:

- **IP Address:** 192 . 168 . 1 . 6.
- **Purpose:** A network printer accessible by all devices in the HO , it's allows shared access for printing tasks..

### 5. IP Phone:

- **Purpose:** A VoIP phone connected to the network for voice communication.

## Network Subnet

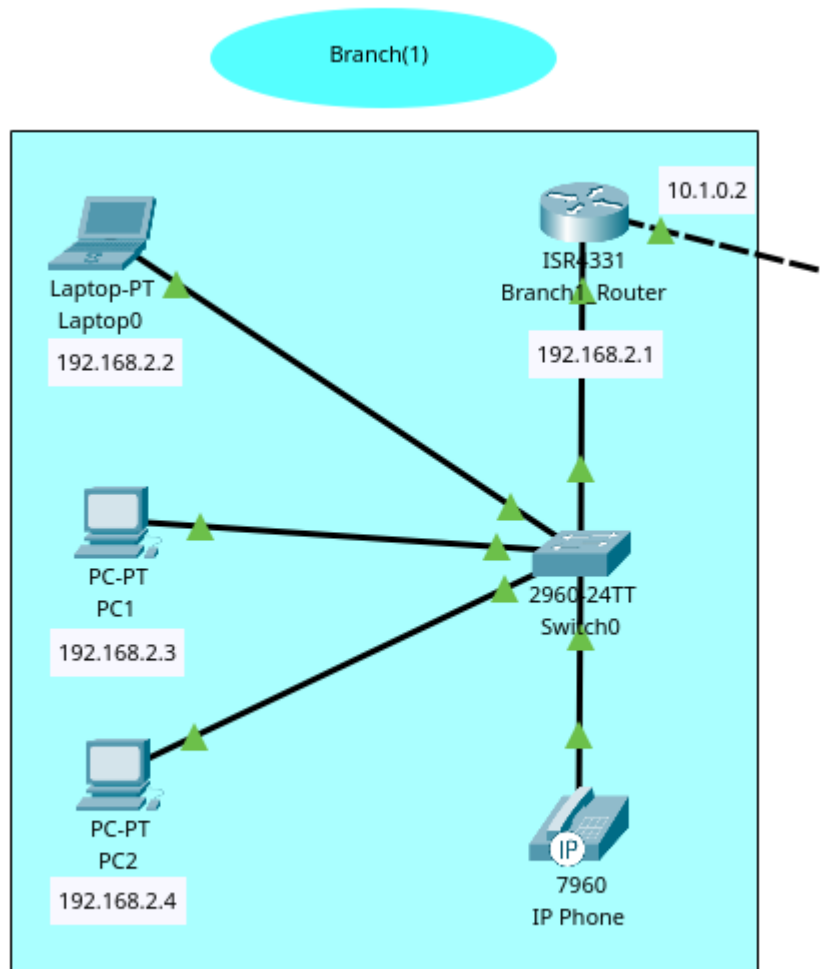
- **Subnet:** 192 . 168 . 1 . 0/24
  - Network Address: 192 . 168 . 1 . 0.
  - Default Gateway: 192 . 168 . 1 . 1 (Router interface).
  - Devices and their IP addresses fall within this subnet.

## Connectivity

- All devices within the subnet are connected through the **Switch** and communicate with the router to access external networks (Branch 1, Branch 2, or the internet).
- The **router** ensures routing between different subnets (“**192 . 168 . 1 . 0/24**”, “**10 . 1 . 0 . 0/24**”, and “**10 . 2 . 0 . 0/24**”).

## Branch (1)

figure(3)



### Components:

#### 1. Branch1\_Router:

- **IP Address (LAN):** 192.168.2.1 .
- **IP Address (WAN):** 10.1.0.2 (Connection to the head office or external network)
- **Role:**
  - Provides routing functions between the local network and external networks.
  - It Serves as the **default gateway** for all internal devices in the **192.168.2.0/24** subnet.
  - Connects to the outside world (e.g., head office) through a WAN link (represented by the dashed line).

#### 2. Switch0:

- **Role:**
  - Connects all internal devices within the branch office.
  - Distributes network connectivity to laptops, PCs, and IP phones.
  - Operates at Layer 2 (Data Link Layer) and forwards data based on MAC addresses.

### 3. End Devices:

- **Laptop0: with static IP – 192.168.2.2**
  - General-purpose computing device used by employees.
- **PC1:with static IP – 192.168.2.3**
  - Desktop computer connected to the network.
- **PC2: with static IP – 192.168.2.4**
  - Another desktop computer connected to the network.
- **IP Phone:**
  - IP address not displayed, but connected to the switch for VoIP (Voice over IP) communication.

### Communication Flow:

#### 1. Internal Communication (LAN):

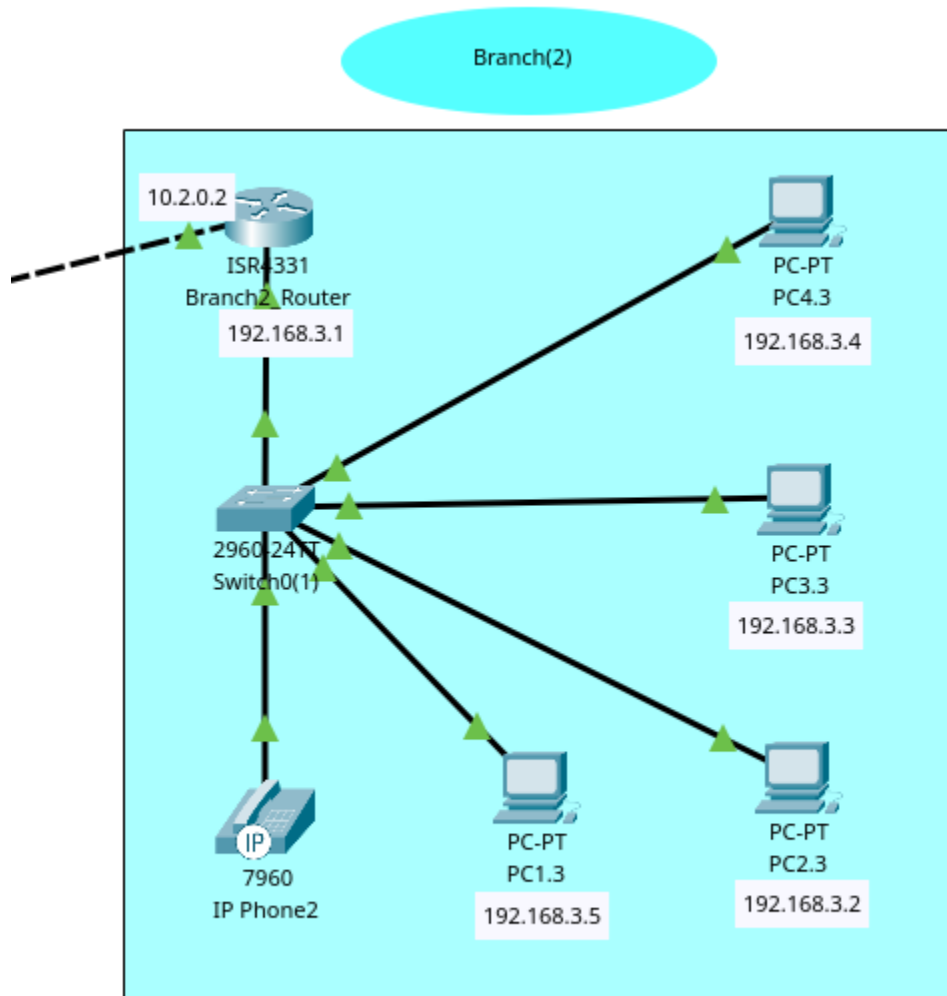
- Devices communicate directly with each other through Switch0 (Layer 2 switching).
- Example: PC1 can ping Laptop0 directly using IP 192.168.2.2.

#### 2. External Communication (WAN):

- When devices need to communicate outside the branch (e.g., internet or head office), they route traffic through **Router1** (192.168.2.1).
- The router forwards the traffic to **10.1.0.2** (WAN interface) towards the head office.

## Branch (2)

figure(4)



### Components:

#### 1. Branch2 Router:

- **IP Address (LAN):** 192.168.3.1 .
- **IP Address (WAN):** 10.2.0.2 (Connection to external network or head office).
- **Role:**
  - Routes traffic between the branch's local network and external destinations.
  - Serves as the **default gateway** for all internal devices in the **192.168.3.0/24** subnet.
  - Establishes WAN connectivity (represented by the dashed line) to the head office or other branches.

## 2. Switch0(1):

- **Role:**
  - Functions as a Layer 2 switch to connect all internal devices.
  - Provides local communication by forwarding packets between devices within the LAN.
  - Handles communication between computers, IP phones, and printers.

## 3. End Devices:

- **PC1.3** – 192.168.3.5
- **PC2.3** – 192.168.3.2
- **PC3.3** – 192.168.3.3
- **PC4.3** – 192.168.3.4
- **IP Phone** – Connected but IP not shown (likely dynamically assigned or set through VoIP VLAN).
  - Facilitates voice-over-IP (VoIP) communication.

## IP Addressing:

- **Subnet:** 192.168.3.0/24 (Class C network – 254 usable host addresses)
- **Router LAN IP:** 192.168.3.1 (Default gateway for the subnet)
- **Devices:**
  - PC1.3: 192.168.3.5
  - PC2.3: 192.168.3.2
  - PC3.3: 192.168.3.3
  - PC4.3: 192.168.3.4
- **WAN Link (Router to Head Office/External Network):** 10.2.0.2 (WAN Interface).

## Communication Flow:

### 1. Internal (LAN) Communication:

- Devices within the branch communicate through **Switch0(1)**.
- Example: PC1.3 can share files with PC3.3 using the switch, without the router's involvement.

### 2. External Communication (WAN):

- Traffic destined for external networks (like the internet or other branches) is routed through **Branch2 Router** (192.168.3.1).
- The router uses **NAT (Network Address Translation)** or other routing protocols to forward packets to the external interface (10.2.0.2).



Now we must put static routing “Manually”

In Branch1\_Router: open router , going to “config” and then in ROUTING select “static” , look at figure(5).

figure(5)

The screenshot shows the configuration interface for Branch1\_Router. The 'Config' tab is active, and the 'ROUTING' section is expanded, with 'Static' selected. The 'Static Routes' configuration area shows the following fields:

- Network: 192.168.1.0
- Mask: 255.255.255.0
- Next Hop: 10.1.0.1

An 'Add' button is located below these fields. Below the 'Add' button, a table lists the configured static routes:

Network Address
192.168.1.0/24 via 10.1.0.1
10.2.0.0/24 via 10.1.0.1
192.168.3.0/24 via 10.1.0.1

A 'Remove' button is located at the bottom right of the table. At the bottom of the window, the 'Equivalent IOS Commands' section shows the following commands:

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#%DHCPD-4-PING_CONFLICT: DHCP address conflict: server pinged 192.168.2.4.
%DHCPD-4-PING_CONFLICT: DHCP address conflict: server pinged 192.168.2.4.
%DHCPD-4-PING_CONFLICT: DHCP address conflict: server pinged 192.168.2.4.
%DHCPD-4-PING_CONFLICT: DHCP address conflict: server pinged 192.168.2.4.
%DHCPD-4-PING_CONFLICT: DHCP address conflict: server pinged 192.168.2.4.
%DHCPD-4-PING_CONFLICT: DHCP address conflict: server pinged 192.168.2.4.
%DHCPD-4-PING_CONFLICT: DHCP address conflict: server pinged 192.168.2.4.
```

**In Network label:** insert the network to be connected

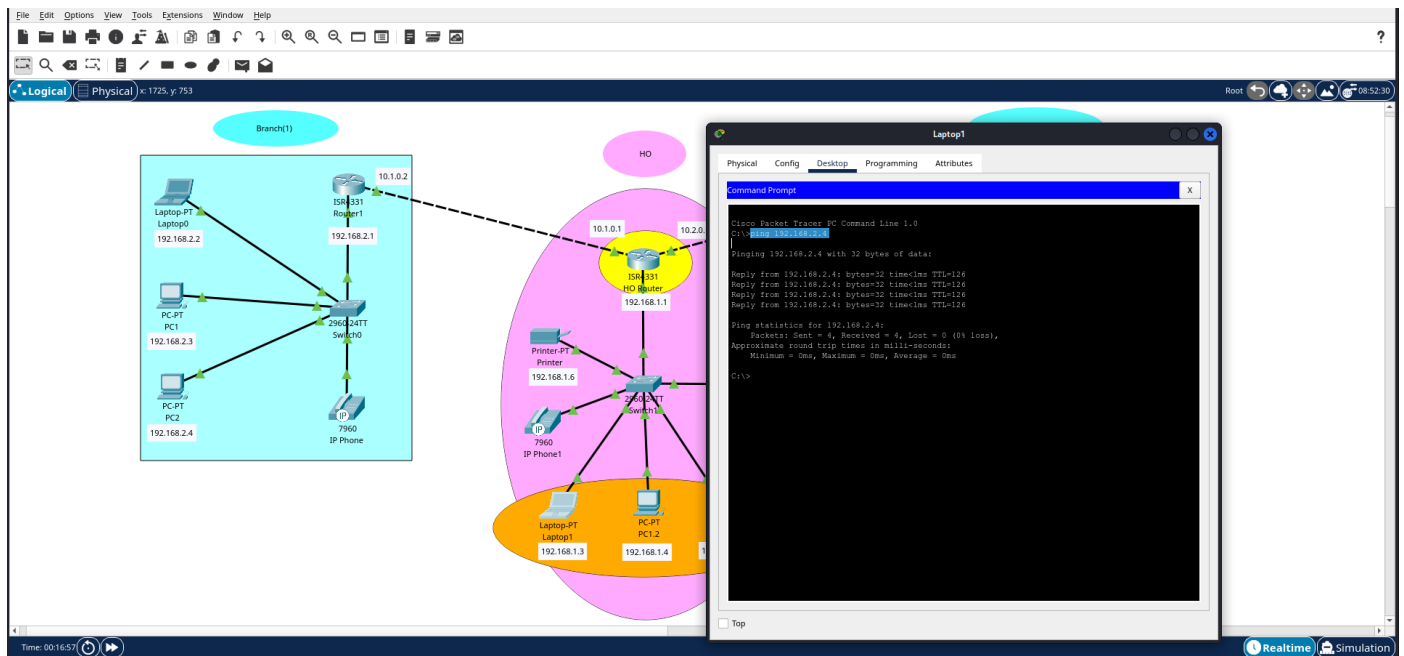
**In Mask label:** put the subnet mask of that network.

**In Next Hop:** put the last interface Branch1\_Router can see.

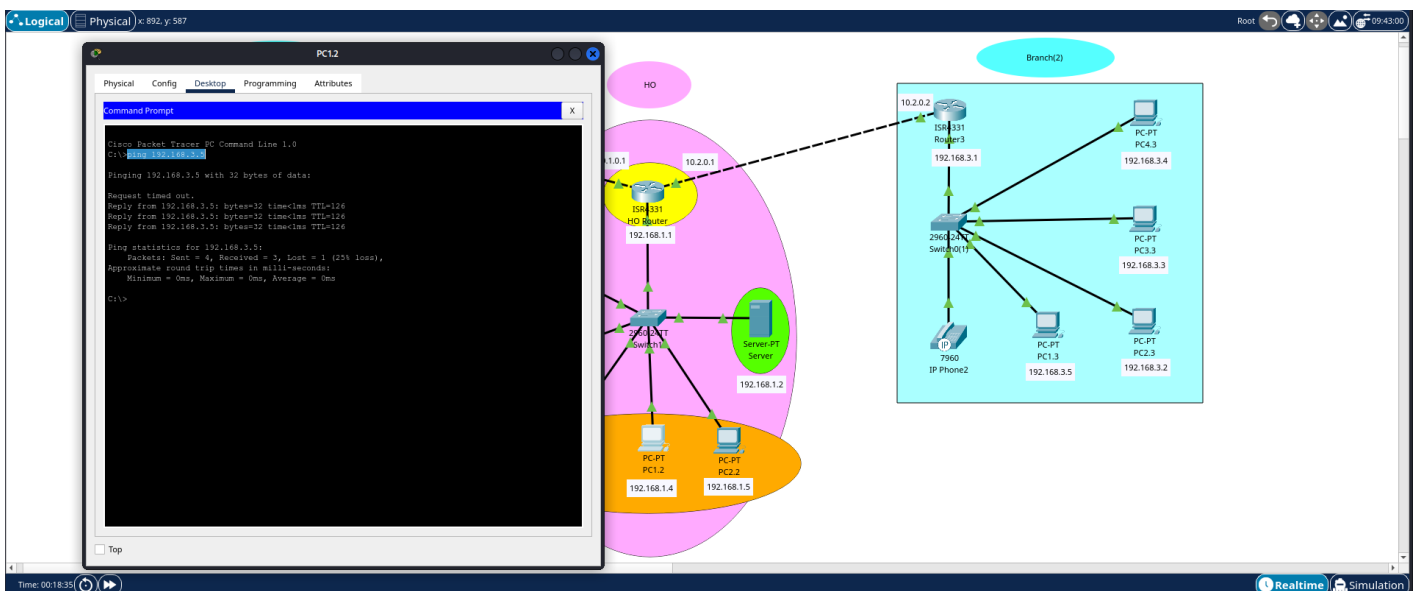
Repeat this for Networks ( 10.2.0.0/24 , 192.168.3.0/24 ) , as at figure(5)

check connectivity:

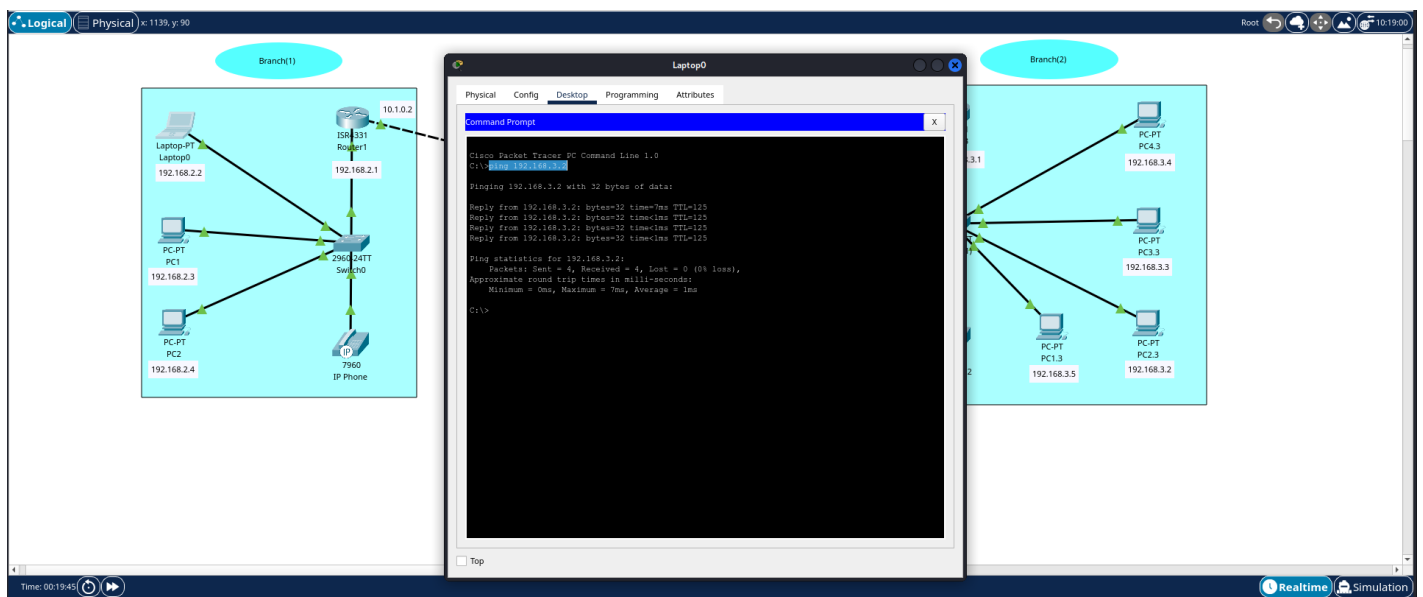
## From HO to Branch 1



## From HO to Branch 2



## From Branch 1 to Branch 2



## Using FTP service:

In the HO Server we created two users , “**admin**” & “**user1**” in FTP service.

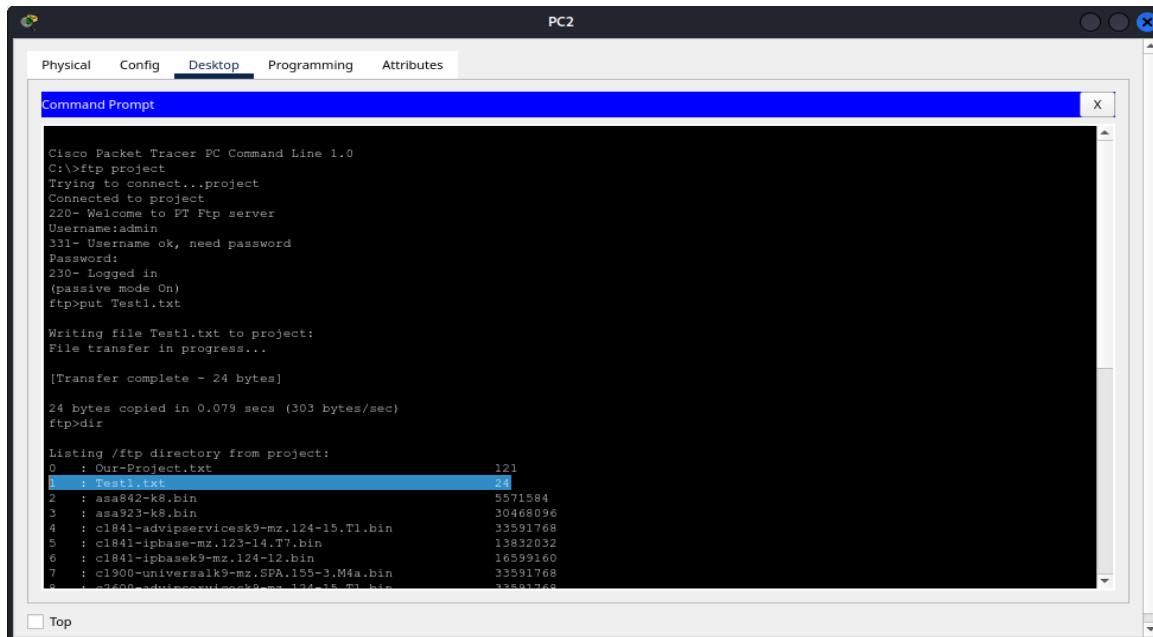
The “**admin**” user has all accesses (Write, Read, Delete, Rename, List). , but the “**user1**” just has two accesses (Read & List).

The Domain name of server is “**project**”

In Branch (1) , we created a file in PC2 , file name “ **Test1** ” .

and we uploaded the file to the server of “HO” using “**admin**” user, look at figure(6).

figure(6)



Now we can Download that file from server to any device.

Ex: Let’s go to PC2.3 in Branch (2) , open the command prompt , and then connect to FTP as in figure(7), so we can download the file using “**get**” command, #we logged in by “**user1**”, after this we can exit from FTP using “**quit**” command, and then write “**dir**” to see all files on PC3.3, as at figure(7) we can see the Test1 file downloaded on PC3.3 .

figure(7)

