

INSTITUTE OF COMPUTER TECHNOLOGY
B. TECH COMPUTER SCIENCE AND ENGINEERING

Subject: Computer Networks[CN]

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SEM : 5

Class : A

Batch : 52 (CS)

Practical 3

Aim: To Aim: To Design and configure a network using Dynamic Host Configuration Protocol (DHCP).

Scenario:

Mr. Jason has hired a new network admin and asked him to create a network for his company. He has given him the liberty to erase all the previous network setup and create a new one as per his understanding and expertise. Below are the details provided by Mr. Jason to the network admin.

- 1) The company has 3 departments – Admin, HR, Sales.
- 2) Each department have 10 users (add at least 3 devices in each network)
- 3) The networking device available in the organization is 3 DNS servers, 2 DHCP servers, 3 routers and 3 switches.
- 4) All the users should get the IP address dynamically.
- 5) The organization has their own inbuilt Domain Name Server (DNS) which will have the details of the website that the user can access.
- 6) The users of the company are allowed to access only mentioned websites in the office premises. The list of the website is mentioned below:

Admin – google, yahoo, cisco

HR – google, cisco

Sales – google

Help the admin to create the network and establish the connection between the devices.

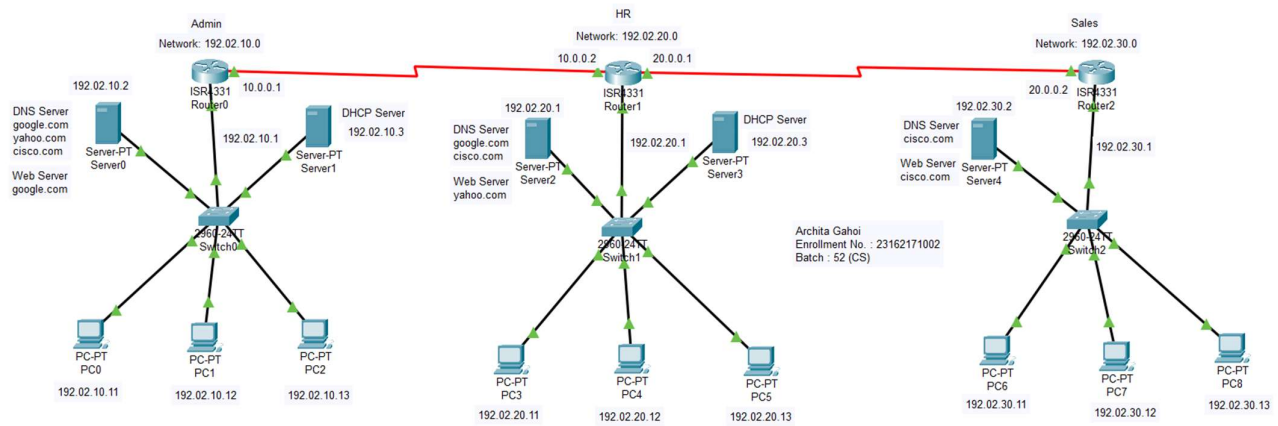
Procedure:

- 1) Create network as given below
- 2) Configure IP address (Routers, DNS servers, DHCP servers)
- 3) Configure dynamic routing table (RIP in routers)
- 4) Configure DNS service
- 5) Configure WEB service by hosting websites
- 6) Configure DHCP server
- 7) Configure IP-Helper command to appropriate interface of a router
- 8) Set PC to get IP address based on DHCP

Note:

Make sure last two digits of your enrollment numbers appears in network IP address that must be visible in snapshot of the cisco packet tracer. i.e.
192. XX .10.1 (XX indicates last two digits of your enrollment no.)

⇒ Main Circuit

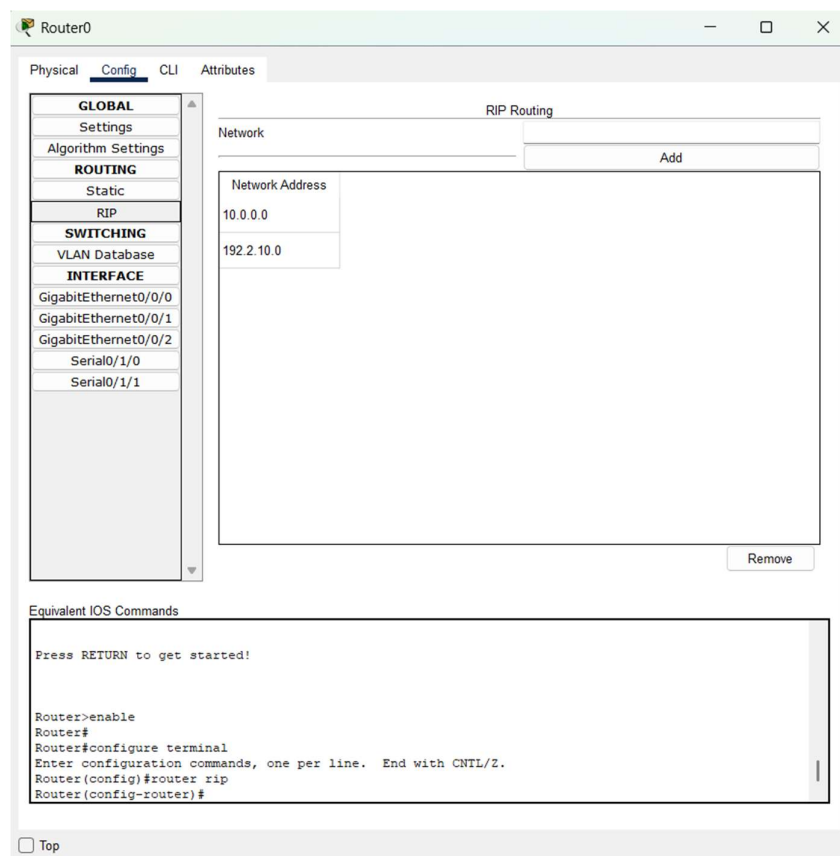


Configuration:

IP Address:

⇒ Routers

Router 0



Router0

Physical

Config

CLI

Attributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

GigabitEthernet0/0/0

GigabitEthernet0/0/1

GigabitEthernet0/0/2

Serial0/1/0

Serial0/1/1

GigabitEthernet0/0/0

Port Status

On

Bandwidth

1000 Mbps

100 Mbps

10 Mbps

Auto

Duplex

Half Duplex

Full Duplex

Auto

MAC Address

0060.5CC4.3701

IP Configuration

IPv4 Address

192.2.10.1

Subnet Mask

255.255.255.0

Tx Ring Limit

10

Equivalent IOS Commands

Press RETURN to get started!

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface GigabitEthernet0/0/0
Router(config-if)#

Top

Router0

Physical

Config

CLI

Attributes

GLOBAL

Settings

Algorithm Settings

ROUTING

Static

RIP

SWITCHING

VLAN Database

INTERFACE

GigabitEthernet0/0/0

GigabitEthernet0/0/1

GigabitEthernet0/0/2

Serial0/1/0

Serial0/1/1

Serial0/1/0

Port Status

On

Duplex

Full Duplex

Clock Rate

2000000

IP Configuration

IPv4 Address

10.0.0.1

Subnet Mask

255.0.0.0

Tx Ring Limit

10

Equivalent IOS Commands

Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface Serial0/1/0
Router(config-if)#
\$SYS-5-CONFIG_I: Configured from console by console

Router(config-if)#exit
Router(config)#interface Serial0/1/1
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/1/0
Router(config-if)#

Top

⇒ DNS Servers/Web Servers

Server 0

Server0

Physical Config **Services** Desktop Programming Attributes

IP Configuration

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 192.2.10.2

Subnet Mask 255.255.255.0

Default Gateway 192.2.10.1

DNS Server 192.2.10.2

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::230:A3FF:FE6E:5800

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

☐ Top

Server0

Physical Config **Services** Desktop Programming Attributes

SERVICES

- HTTP
- DHCP
- DHCPv6
- TFTP
- DNS**
- SYSLOG
- AAA
- NTP
- EMAIL
- FTP
- IoT
- VM Management
- Radius EAP

DNS

DNS Service ☒ On ☐ Off

Resource Records

Name Type A Record

Address

Add Save Remove

| No. | Name | Type | Detail |
|-----|------------|----------|------------|
| 0 | cisco.com | A Record | 192.2.30.2 |
| 1 | google.com | A Record | 192.2.10.2 |
| 2 | yahoo.com | A Record | 192.2.20.2 |

DNS Cache

☐ Top

⇒ DHCP Servers

Server 1

Server1

Physical

Config

Services

Desktop

Programming

Attributes

IP Configuration

X

IP Configuration

DHCP

Static

IPv4 Address

192.2.10.3

Subnet Mask

255.255.255.0

Default Gateway

192.2.10.1

DNS Server

192.2.10.2

IPv6 Configuration

Automatic

Static

IPv6 Address

Link Local Address

FE80::201:C7FF:FE17:A867

Default Gateway

DNS Server

802.1X

Use 802.1X Security

Authentication

MD5

Username

Password

Top

Server1

Physical

Config

Services

Desktop

Programming

Attributes

SERVICES

HTTP

DHCP

DHCPv6

TFTP

DNS

SYSLOG

AAA

NTP

EMAIL

FTP

IoT

VM Management

Radius EAP

DHCP

Interface

FastEthernet0

Service

On

Off

Pool Name

serverPool

Default Gateway

192.2.10.1

DNS Server

192.2.10.2

Start IP Address :

192

2

10

11

Subnet Mask:

255

255

255

0

Maximum Number of Users :

20

TFTP Server:

0.0.0.0

WLC Address:

0.0.0.0

Add

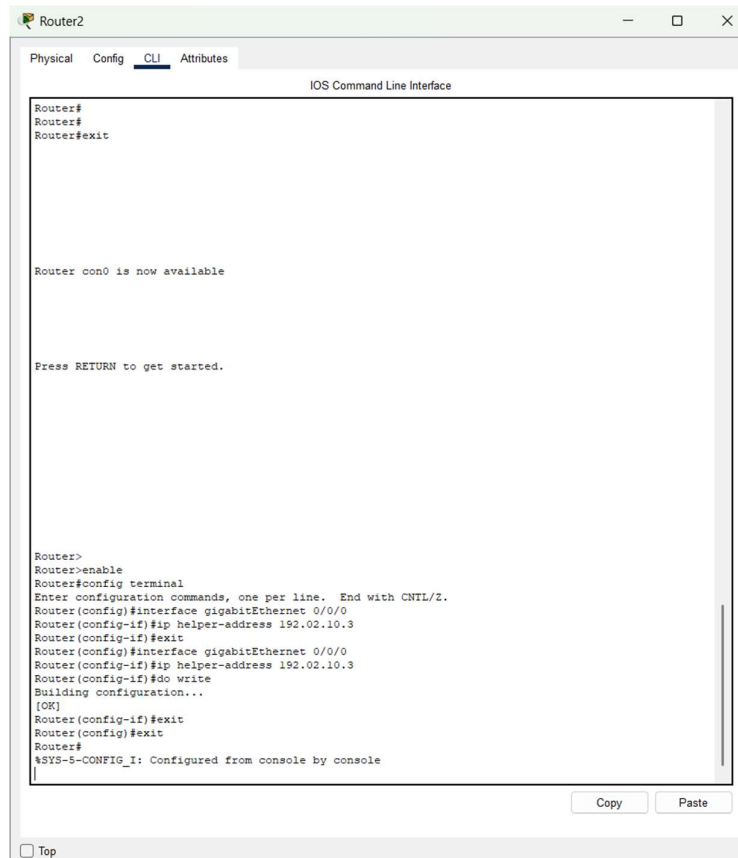
Save

Remove

| Pool Name | Default Gateway | DNS Server | Start IP Address | Subnet Mask | Max User | TFTP Server | WLC Address |
|-------------|-----------------|------------|------------------|--------------|----------|-------------|-------------|
| serverPool2 | 192.2.30.1 | 192.2.30.2 | 192.2.30.11 | 255.255.2... | 20 | 0.0.0.0 | 0.0.0.0 |
| serverPool | 192.2.10.1 | 192.2.10.2 | 192.2.10.11 | 255.255.2... | 20 | 0.0.0.0 | 0.0.0.0 |

Top

To transfer packet from PC2 to PC8 need to configure in router 2 as in network 3 it doesn't has DHCP but it uses one in network 1



```
Router2
Router#
Router#
Router#exit

Router con0 is now available

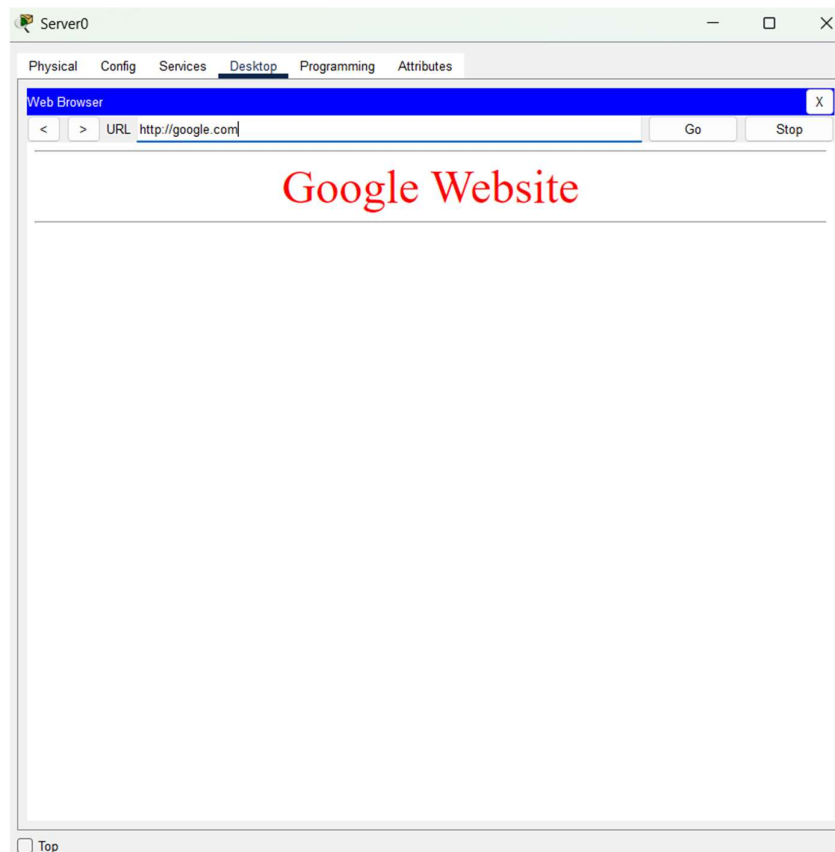
Press RETURN to get started.

Router>
Router>enable
Router>enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface gigabitEthernet 0/0/0
Router(config-if)#ip helper-address 192.02.10.3
Router(config-if)#exit
Router(config)#interface gigabitEthernet 0/0/0
Router(config-if)#ip helper-address 192.02.10.3
Router(config-if)#do write
Building configuration...
[OK]
Router(config-if)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
```

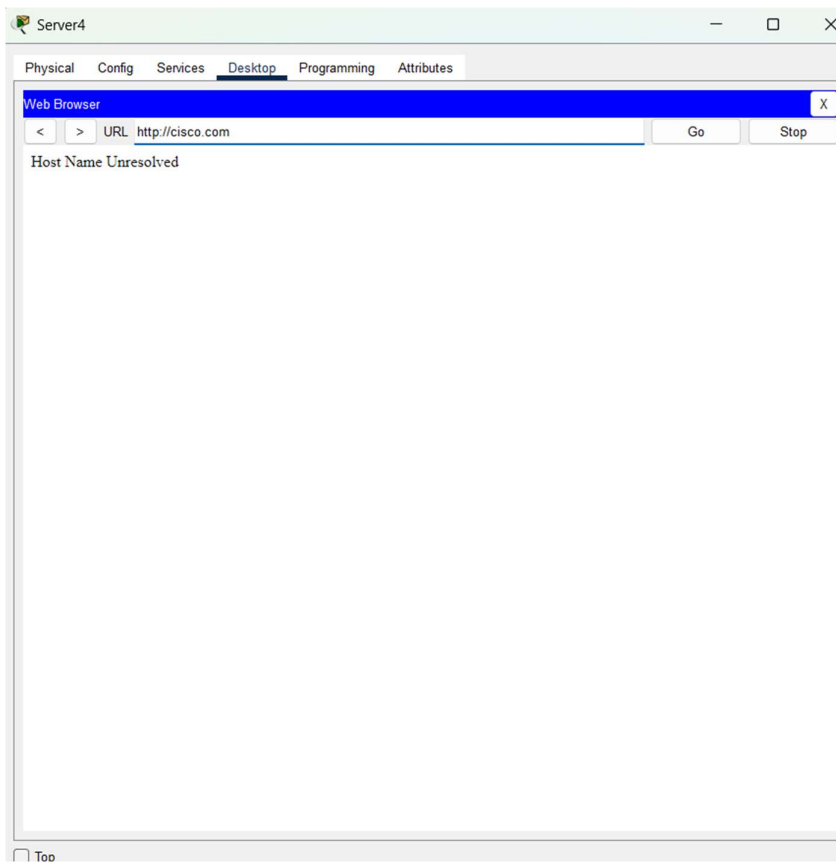
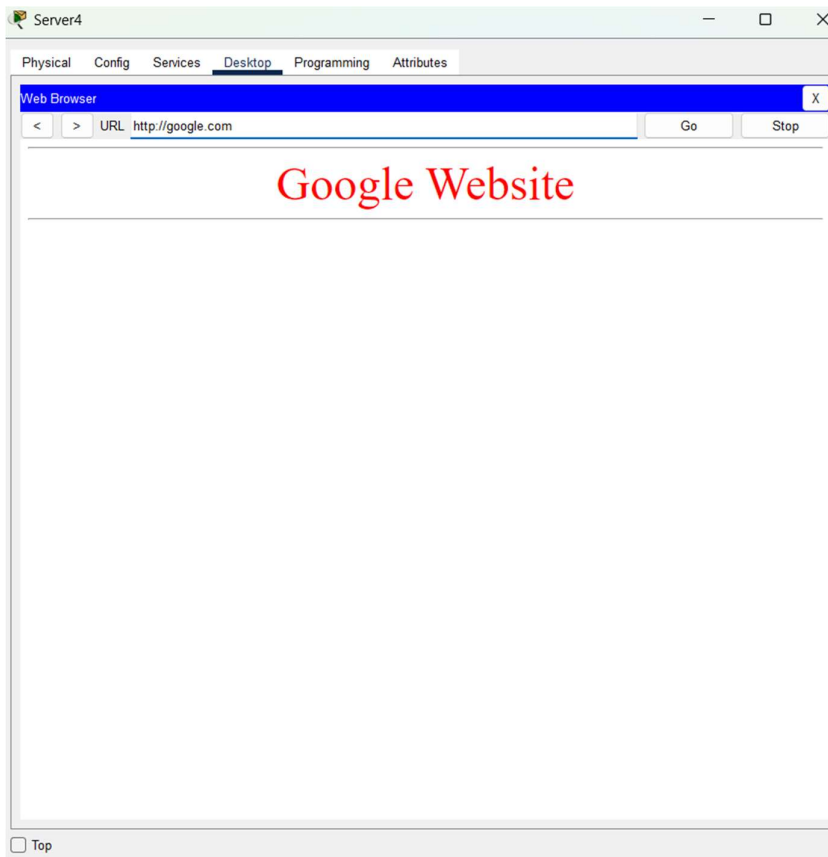
Output:

WEB service by hosting websites

Network 1:

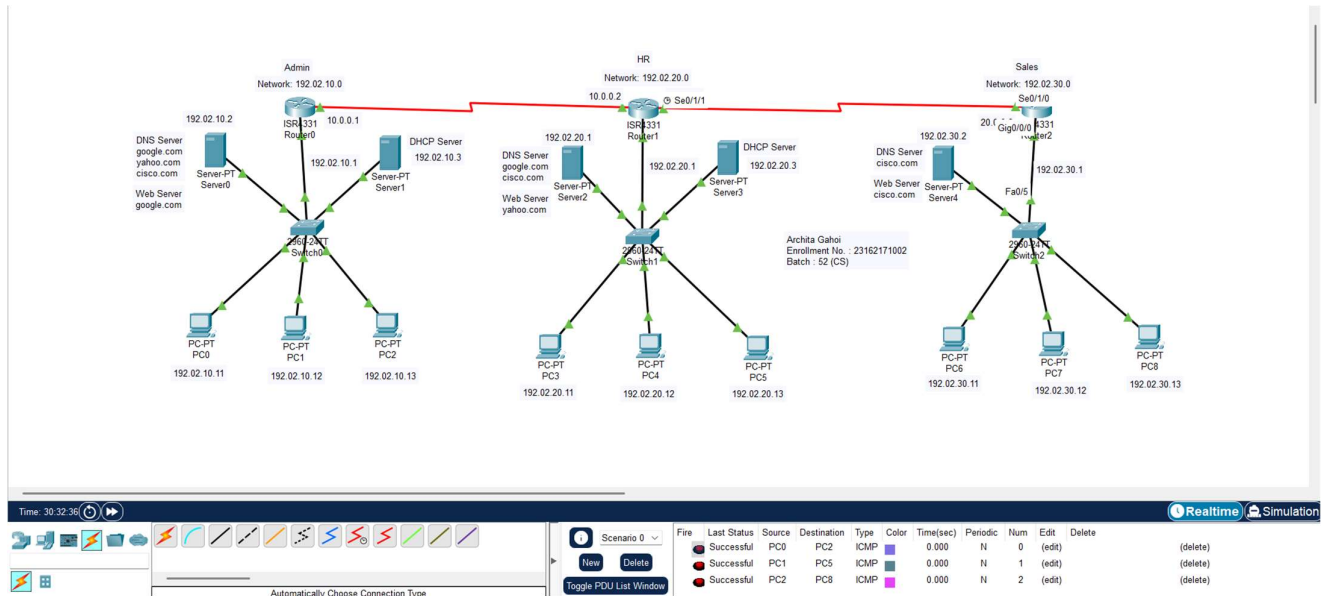


Network 3:



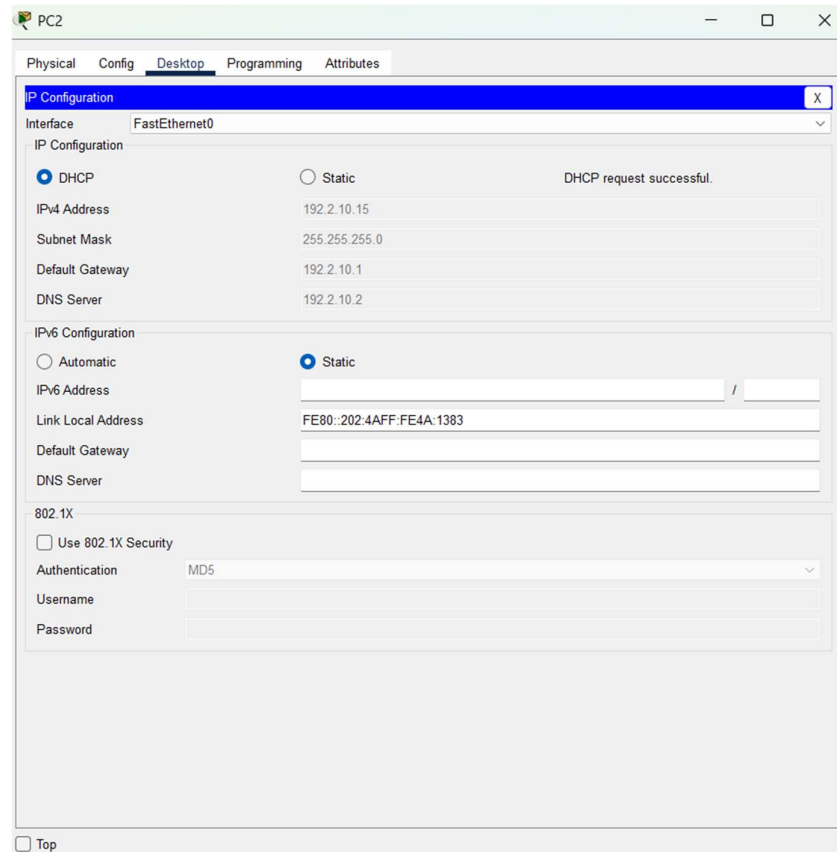
PCs packet transfer

- : within network
- : from network1 to network2
- : from network1 to network3



PCs gets successful IP address based on DHCP

PC2:



PC8:

The screenshot shows the configuration window for PC8, specifically the 'Desktop' tab. The 'IP Configuration' section is active, showing settings for the 'FastEthernet0' interface. The 'DHCP' option is selected, and a message indicates 'DHCP request successful.' The IPv4 Address is 192.2.30.13, Subnet Mask is 255.255.255.0, Default Gateway is 192.2.30.1, and DNS Server is 192.2.30.2. The IPv6 Configuration section shows 'Static' selected, with a Link Local Address of FE80::20D:B0FF:FE76:24AB. The 802.1X section shows 'Use 802.1X Security' unchecked, Authentication set to MD5, and empty fields for Username and Password. A 'Top' button is at the bottom left.

| IP Configuration | |
|--|---|
| Interface | FastEthernet0 |
| IP Configuration | |
| <input checked="" type="radio"/> DHCP | <input type="radio"/> Static |
| DHCP request successful. | |
| IPv4 Address | 192.2.30.13 |
| Subnet Mask | 255.255.255.0 |
| Default Gateway | 192.2.30.1 |
| DNS Server | 192.2.30.2 |
| IPv6 Configuration | |
| <input type="radio"/> Automatic | <input checked="" type="radio"/> Static |
| IPv6 Address | |
| Link Local Address | FE80::20D:B0FF:FE76:24AB |
| Default Gateway | |
| DNS Server | |
| 802.1X | |
| <input type="checkbox"/> Use 802.1X Security | |
| Authentication | MD5 |
| Username | |
| Password | |

Conclusion:

A three-department enterprise was built with dynamic addressing via two DHCP servers and RIP v2 routing. Departmental access control to sites was enforced using per-department DNS servers: Admin (google, yahoo, cisco), HR (google, cisco), Sales (google). DHCP relay (ip helper) enabled HR clients to obtain leases from the Admin DHCP server. Tests confirmed correct addressing, inter-LAN reachability, and policy-compliant web access.