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PRACTICAL 3

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.

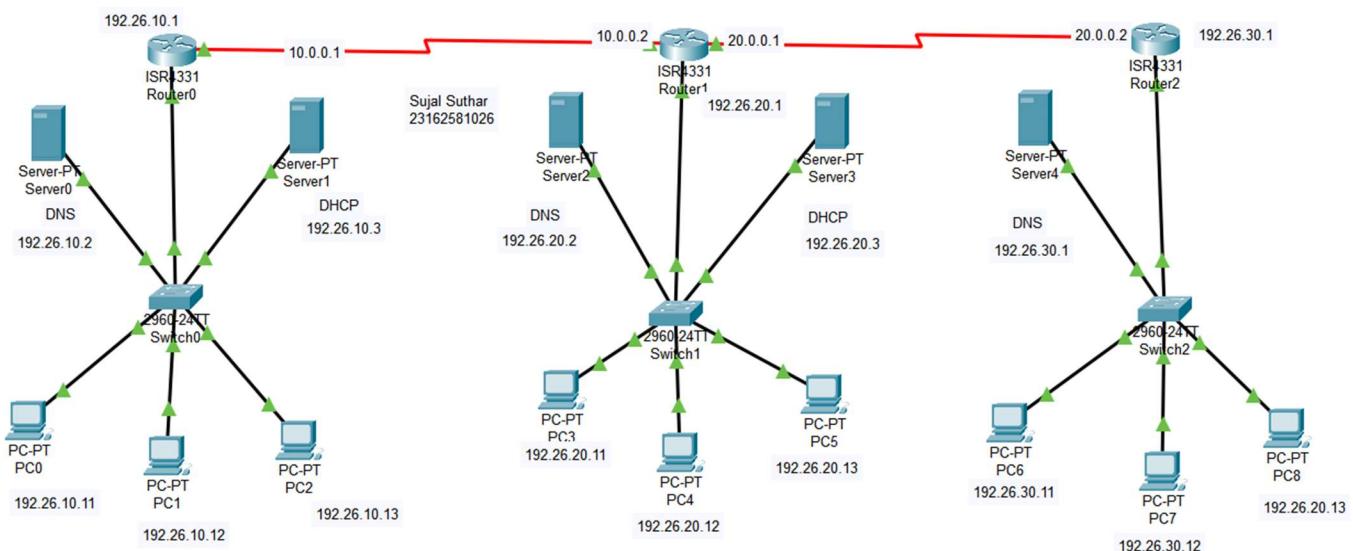
Procedure:

- 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 configuration



IP configuration of routers:

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
- Serial0/2/0
- Serial0/2/1

GigabitEthernet0/0/0

Port Status: On (checked)

Bandwidth: 1000 Mbps (radio button)

Duplex: Half Duplex (radio button)

MAC Address: 0030.F21D.5501

IP Configuration:

- IPv4 Address: 192.26.10.1
- Subnet Mask: 255.255.255.0

Tx Ring Limit: 10

Equivalent IOS Commands

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up

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
- Serial0/2/0
- Serial0/2/1

Serial0/1/0

Port Status

Duplex Full Duplex On

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(config-if)#exit
Router(config)#interface Serial0/2/0
Router(config-if)#
Router(config-if)#exit
Router(config-if)#interface Serial0/2/1
Router(config-if)#
Router(config-if)#exit
Router(config-if)#interface Serial0/1/1
Router(config-if)#
Router(config-if)#exit
Router(config-if)#interface Serial0/1/0
Router(config-if)#

```

Top

Router1

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
Serial0/2/0
Serial0/2/1

GigabitEthernet0/0/0

Port Status
Bandwidth
Duplex
MAC Address

On
1000 Mbps
100 Mbps
10 Mbps
Auto
Half Duplex
Full Duplex

0010.113D.A101

IP Configuration
IPv4 Address
Subnet Mask

192.26.20.1
255.255.255.0

Tx Ring Limit

10

Equivalent IOS Commands

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up

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

Router1

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
- Serial0/2/0
- Serial0/2/1

Serial0/1/0

Port Status

Duplex Full Duplex On

Clock Rate 2000000

IP Configuration

IPv4 Address 10.0.0.2

Subnet Mask 255.0.0.0

Tx Ring Limit 10

Router1

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**
- Serial0/2/0
- Serial0/2/1

Serial0/1/1

Port Status

Duplex Full Duplex On

Clock Rate 2000000

IP Configuration

IPv4 Address 20.0.0.1

Subnet Mask 255.0.0.0

Tx Ring Limit 10

Router2

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

Serial0/2/0

Serial0/2/1

GigabitEthernet0/0/0

Port Status On
 1000 Mbps 100 Mbps 10 Mbps Auto
 Half Duplex Full Duplex Auto

Bandwidth

Duplex

MAC Address 0002.1778.4701

IP Configuration

IPv4 Address 192.26.30.1

Subnet Mask 255.255.255.0

Tx Ring Limit 10

Router2

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

Serial0/2/0

Serial0/2/1

Serial0/1/0

Port Status On

Duplex Full Duplex

Clock Rate 2000000

IP Configuration

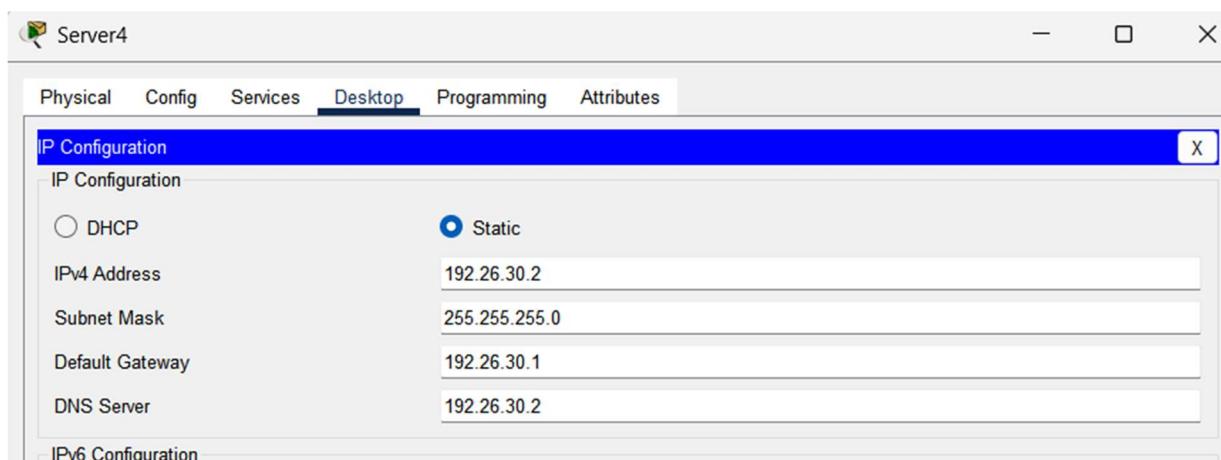
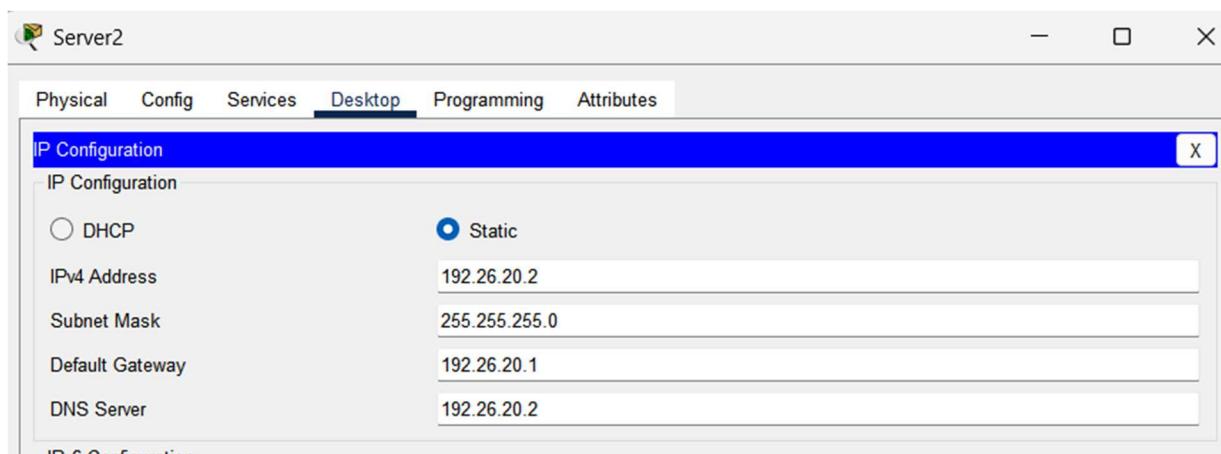
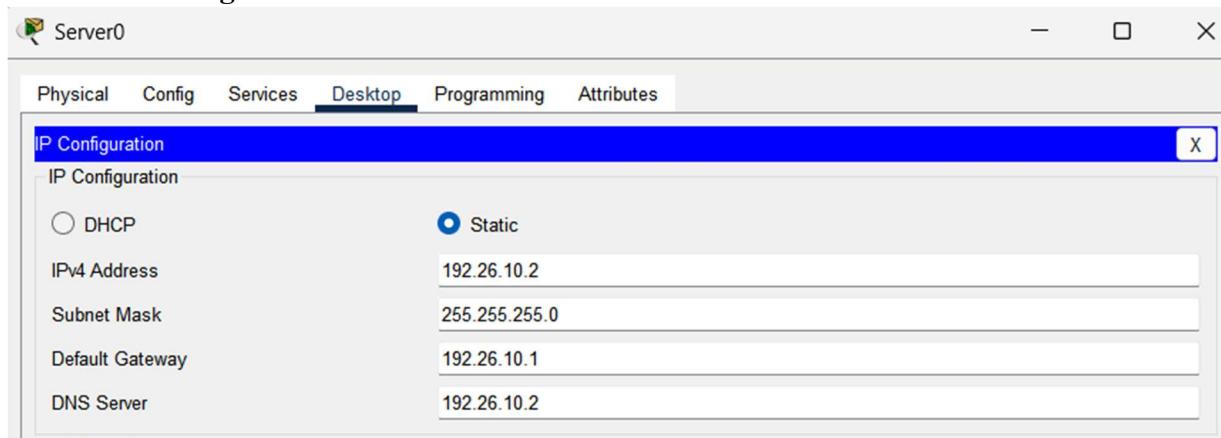
IPv4 Address 20.0.0.2

Subnet Mask 255.0.0.0

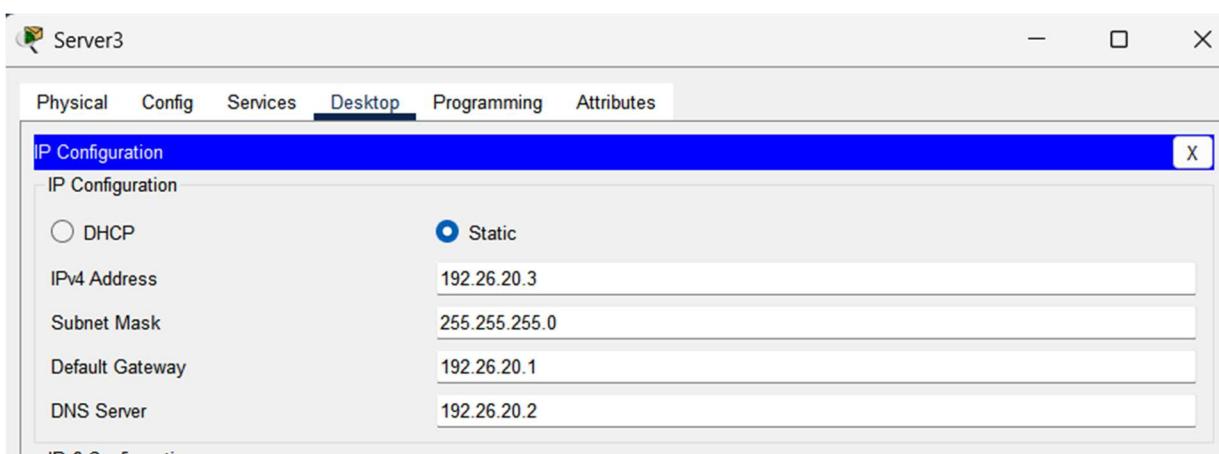
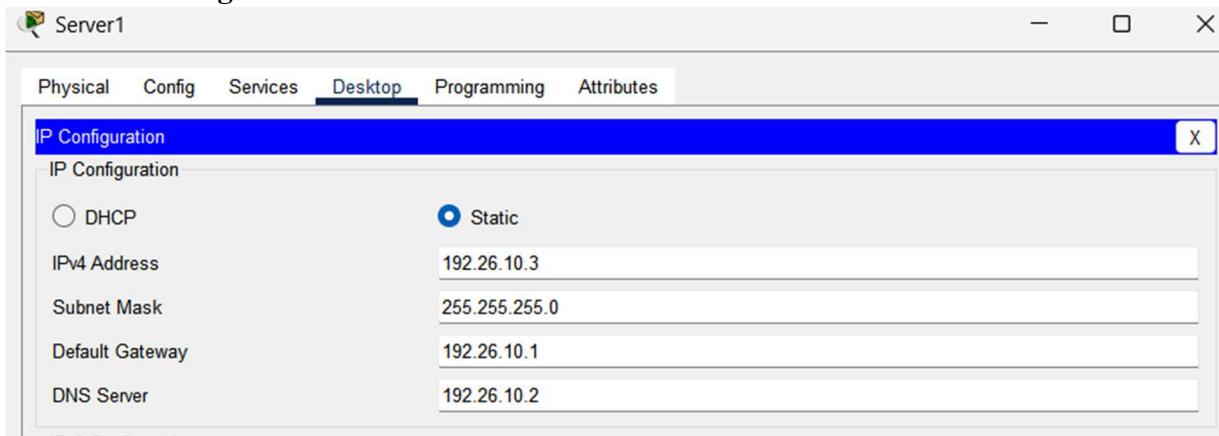
Tx Ring Limit 10

This screenshot shows a network configuration interface for a device named 'Router2'. The left sidebar contains a tree view of configuration categories: GLOBAL, ROUTING, SWITCHING, and INTERFACE. Under INTERFACE, several ports are listed: GigabitEthernet0/0/0, GigabitEthernet0/0/1, GigabitEthernet0/0/2, and Serial0/1/0, which is currently selected and highlighted with a blue border. The main panel displays the configuration for the selected port, Serial0/1/0. It includes fields for Port Status (On, checked), Duplex (Full Duplex), Clock Rate (2000000), IP Configuration (IPv4 Address 20.0.0.2, Subnet Mask 255.0.0.0), and Tx Ring Limit (10). The title bar at the top shows the window title 'Router2' and the tab 'Config' is active.

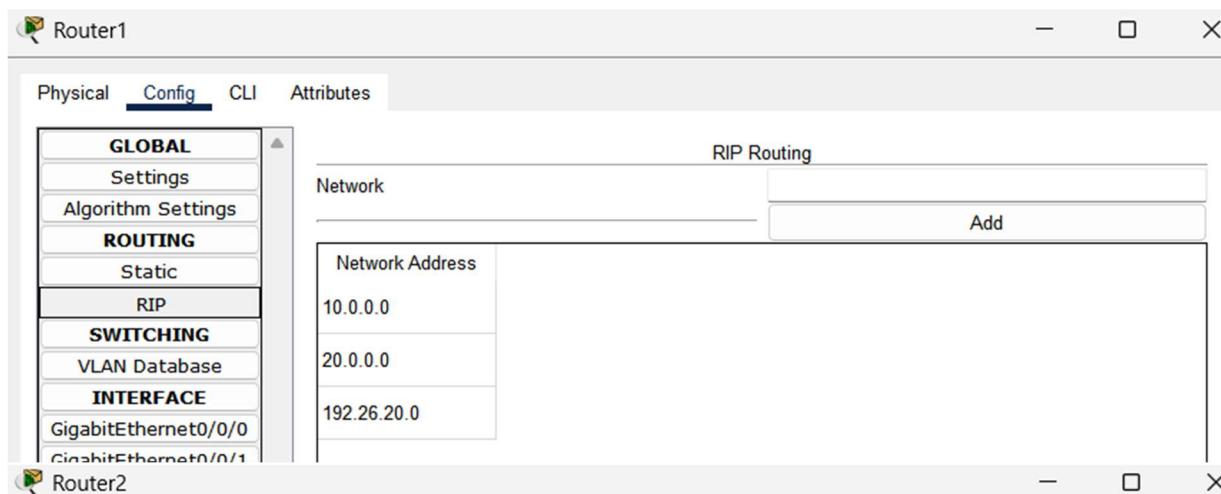
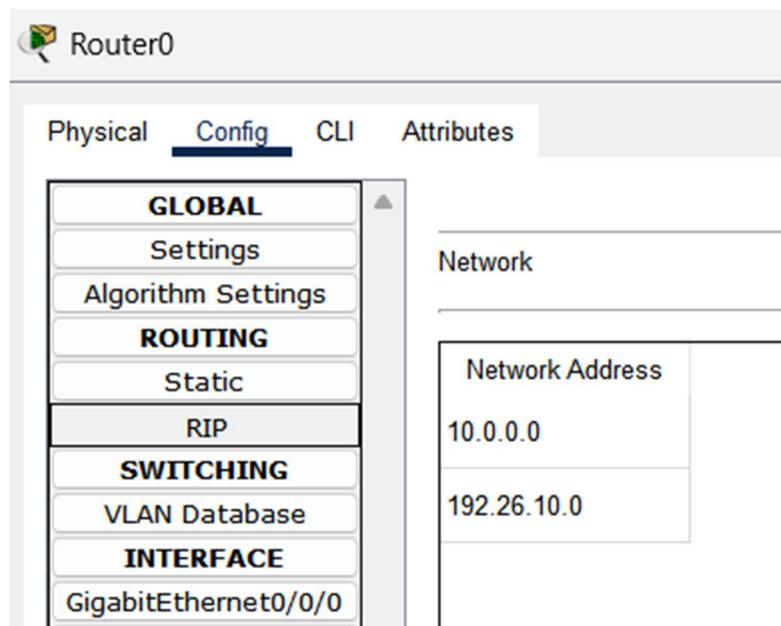
○ IP Config of DNS Servers:



○ IP Config of DHCP Servers:



○ RIP Config of Routers:



○ DNS Service config:

Server0

Physical Config Services Desktop Programming Attributes

SERVICES

- HTTP
- DHCP
- DHCIPv6
- TFTP
- DNS**
- SYSLOG
- AAA
- NTP
- EMAIL
- FTP
- IoT
- VM Management
- Radius EAP

DNS

DNS Service On Off

Resource Records

Name	Type
cisco.com	A Record
google.com	A Record
yahoo.com	A Record

Add Save Remove

No.	Name	Type	Detail
0	cisco.com	A Record	192.26.30.2
1	google.com	A Record	192.26.10.2
2	yahoo.com	A Record	192.26.20.2

Server2

Physical Config Services Desktop Programming Attributes

SERVICES

- HTTP
- DHCP
- DHCIPv6
- TFTP
- DNS**
- SYSLOG
- AAA
- NTP
- EMAIL
- FTP
- IoT
- VM Management
- Radius EAP

DNS

DNS Service On Off

Resource Records

Name	Type
cisco.com	A Record
google.com	A Record

Add Save Remove

No.	Name	Type	Detail
0	cisco.com	A Record	192.26.30.2
1	google.com	A Record	192.26.10.2

Server4

Physical Config Services Desktop Programming Attributes

SERVICES

- HTTP
- DHCP
- DHCIPv6
- 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	google.com	A Record	192.26.10.2

○ Config of web service:

Server0

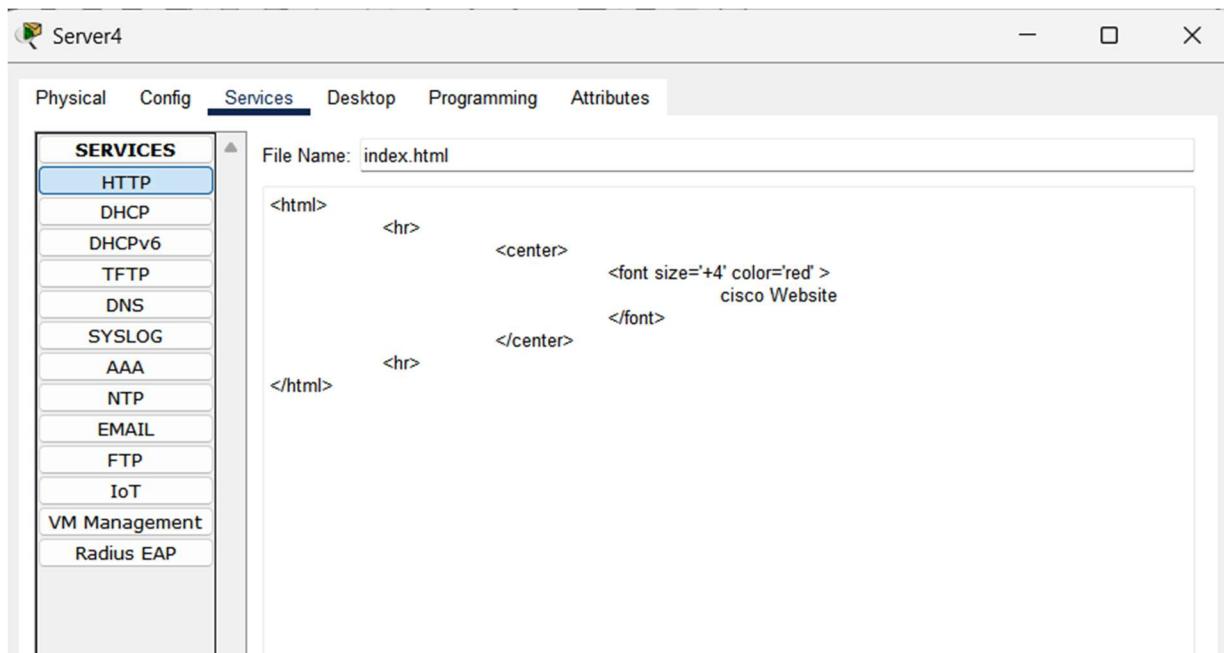
Physical Config Services Desktop Programming Attributes

SERVICES

- HTTP**
- DHCP
- DHCIPv6
- TFTP
- DNS
- SYSLOG
- AAA
- NTP
- EMAIL
- FTP
- IoT
- VM Management
- Radius EAP

File Name: index.html

```
<html>
    <hr>
        <center>
            <font size='+4' color='red'>
                google Website
            </font>
        </center>
    <hr>
</html>
```



○ Config of DHCP Server:

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	<input checked="" type="radio"/> On	<input type="radio"/> Off
Pool Name	serverPool			
Default Gateway	192.26.10.1			
DNS Server	192.26.10.2			
Start IP Address :	192	26	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
serverPool	192.26.10.1	192.26.10.2	192.26.10.11	255.255.2...	20	0.0.0.0	0.0.0.0
serverPool1	192.26.30.1	192.26.30.2	192.26.30.11	255.255.2...	20	0.0.0.0	0.0.0.0

Server3

Physical Config Services Desktop Programming Attributes

SERVICES

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

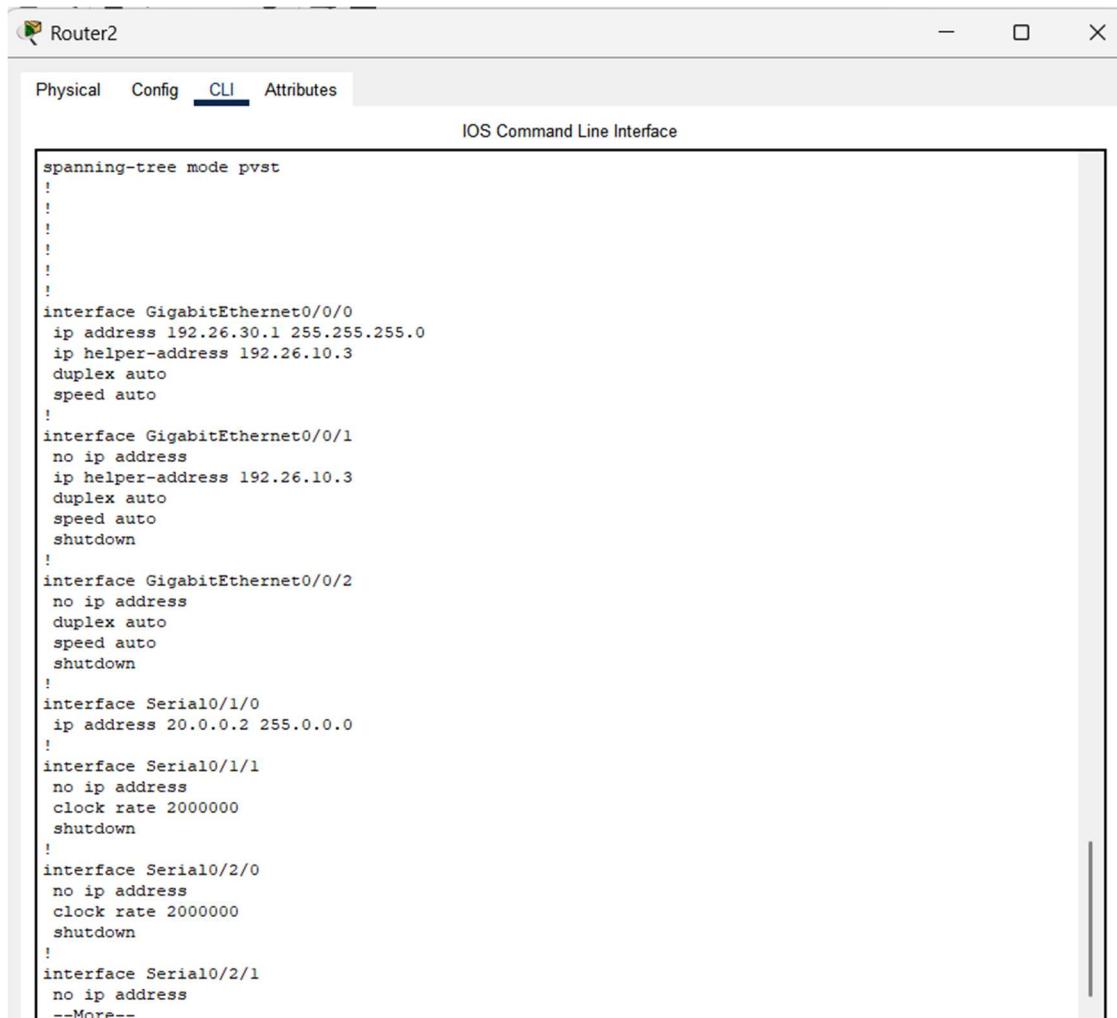
DHCP

Interface	FastEthernet0	Service	<input checked="" type="radio"/> On	<input type="radio"/> Off
Pool Name	serverPool			
Default Gateway	192.26.20.1			
DNS Server	192.26.20.2			
Start IP Address :	192	26	20	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
serverPool	192.26.20.1	192.26.20.2	192.26.20.11	255.255.2...	20	0.0.0.0	0.0.0.0

○ Configuring ip helper:

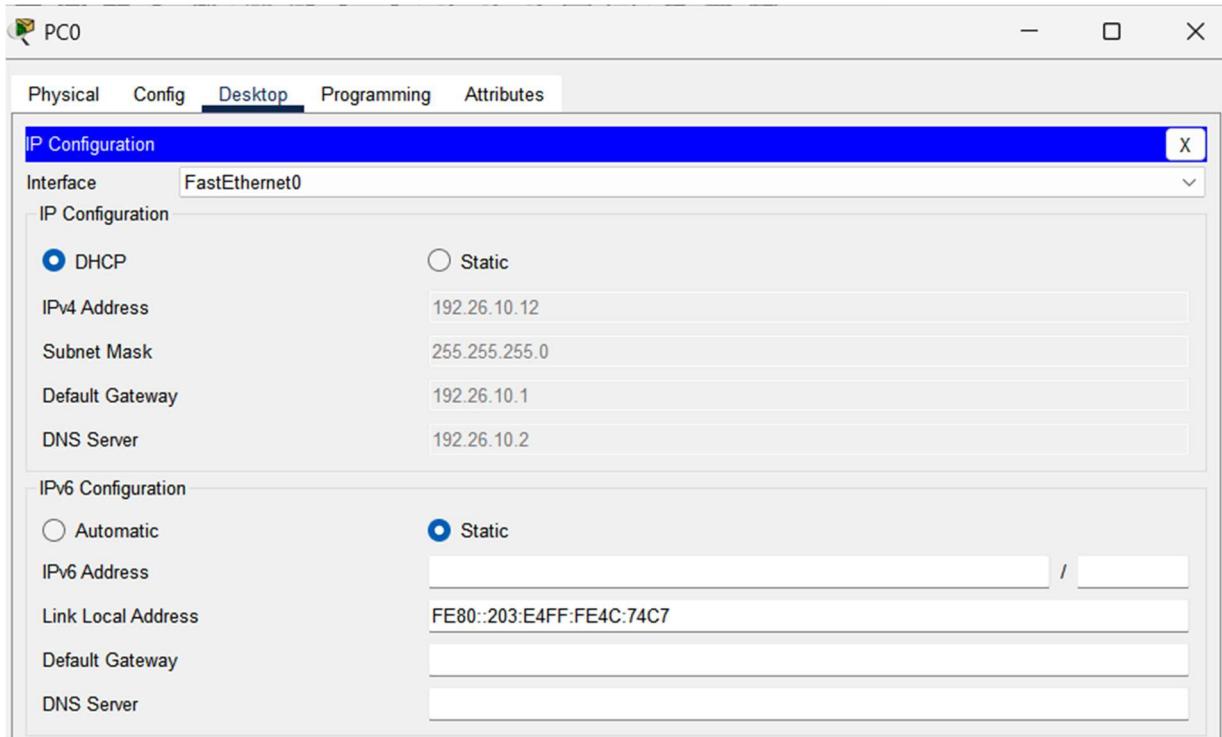


The image shows a software interface for managing a Cisco router. The title bar says "Router2". Below it is a navigation bar with tabs: "Physical", "Config", "CLI" (which is underlined), and "Attributes". A sub-header "IOS Command Line Interface" is displayed above a large text area. The text area contains the following configuration commands:

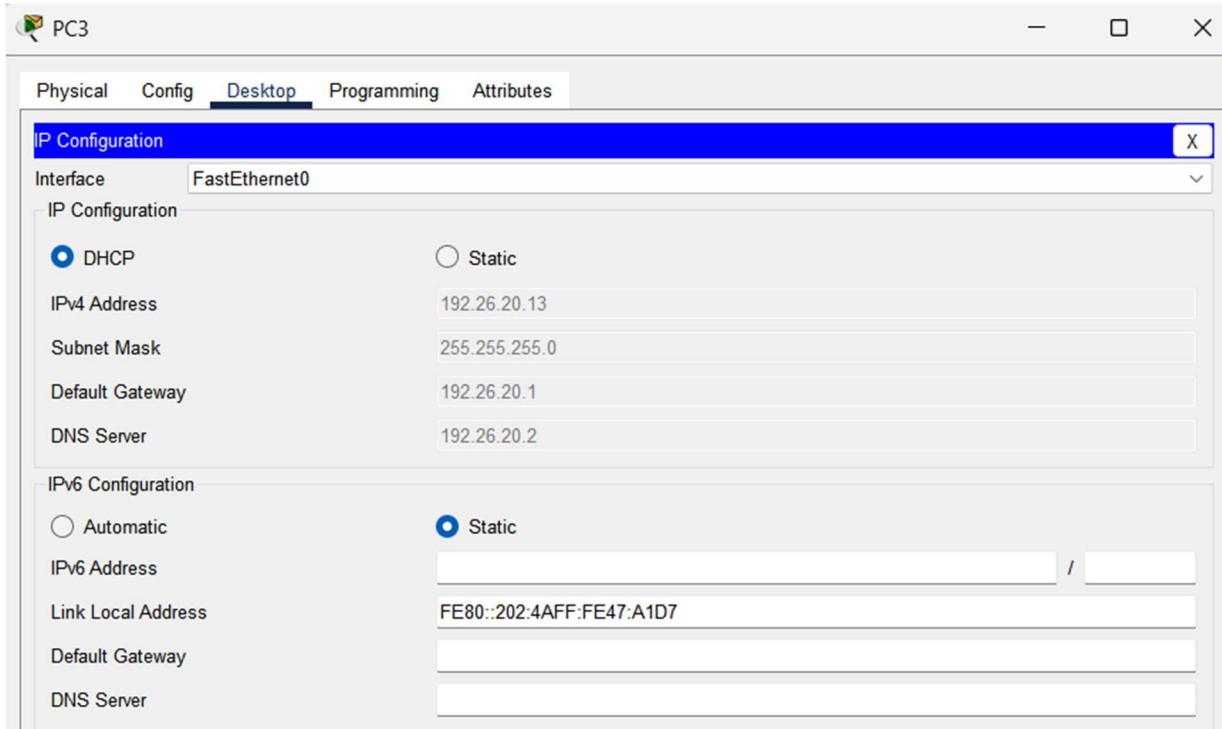
```
spanning-tree mode pvst
!
!
!
!
!
interface GigabitEthernet0/0/0
ip address 192.26.30.1 255.255.255.0
ip helper-address 192.26.10.3
duplex auto
speed auto
!
interface GigabitEthernet0/0/1
no ip address
ip helper-address 192.26.10.3
duplex auto
speed auto
shutdown
!
interface GigabitEthernet0/0/2
no ip address
duplex auto
speed auto
shutdown
!
interface Serial0/1/0
ip address 20.0.0.2 255.0.0.0
!
interface Serial0/1/1
no ip address
clock rate 2000000
shutdown
!
interface Serial0/2/0
no ip address
clock rate 2000000
shutdown
!
interface Serial0/2/1
no ip address
--More--
```

Setting all PC to configure themselves on DHCP type IP

- PC0

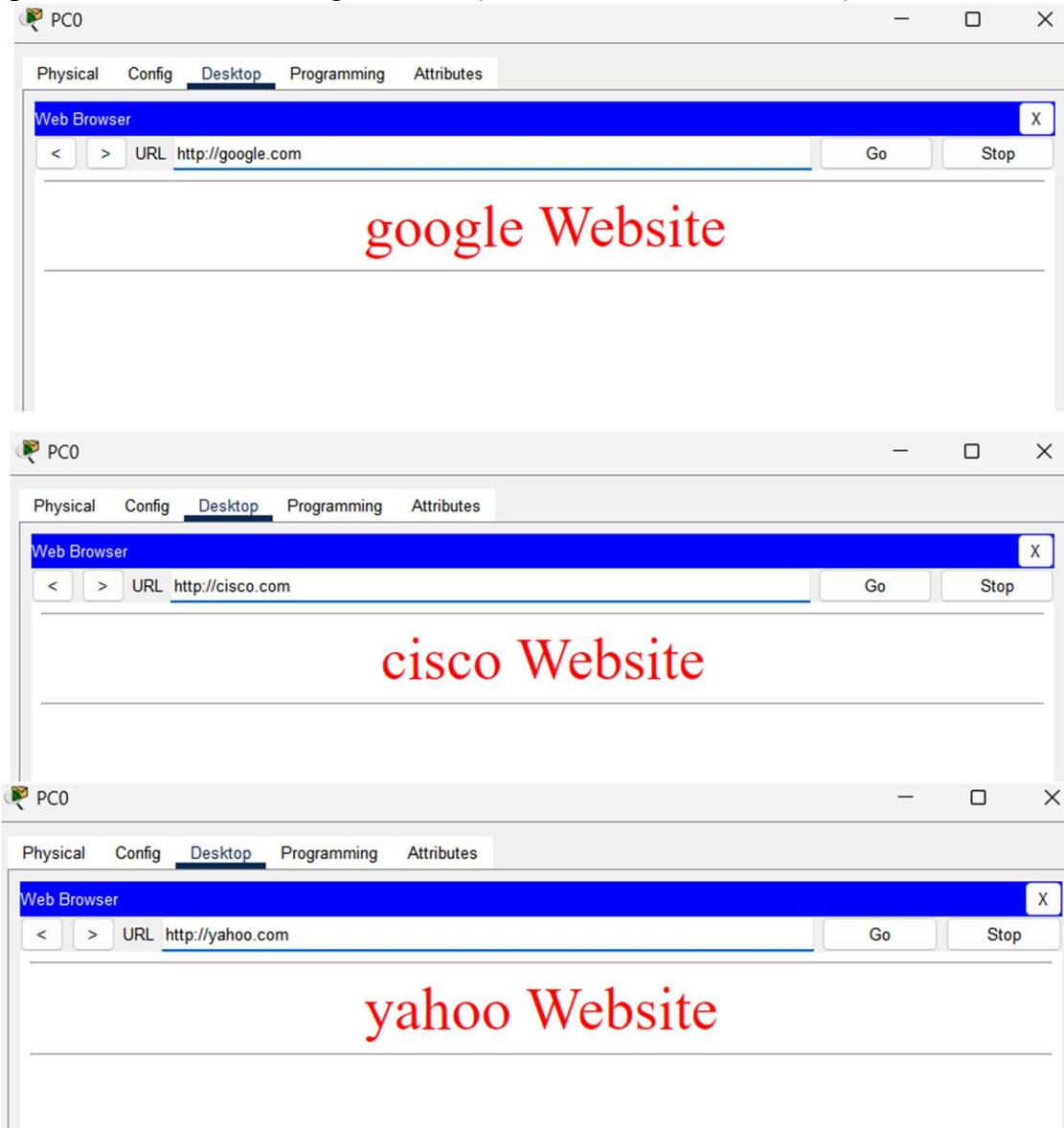


- PC3



- Now we search for a domain website from a pc in a different domain, and see if we can access the web page

Output: Here we are accessing from PC0(which can access all websites):



Conclusion:

In the previous practicals, IP addresses were manually assigned to each PC, which is a time-consuming and inefficient process. To overcome this, the DHCP (Dynamic Host Configuration Protocol) is used. A DHCP server automatically provides IP addresses to devices from a predefined range whenever they join the network. This automation ensures that devices receive valid IP configurations without the need for manual setup, making network management much simpler and more efficient.