



University of Asia Pacific

Department of Computer Science and Engineering

Course Title: Computer Networks Lab

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Network Components:

- End Device: PC = 5, Server = 5
- Network Device: Router = 5, Switch = 5
- Wire: Copper Straight Through, Fiber

Network Design:

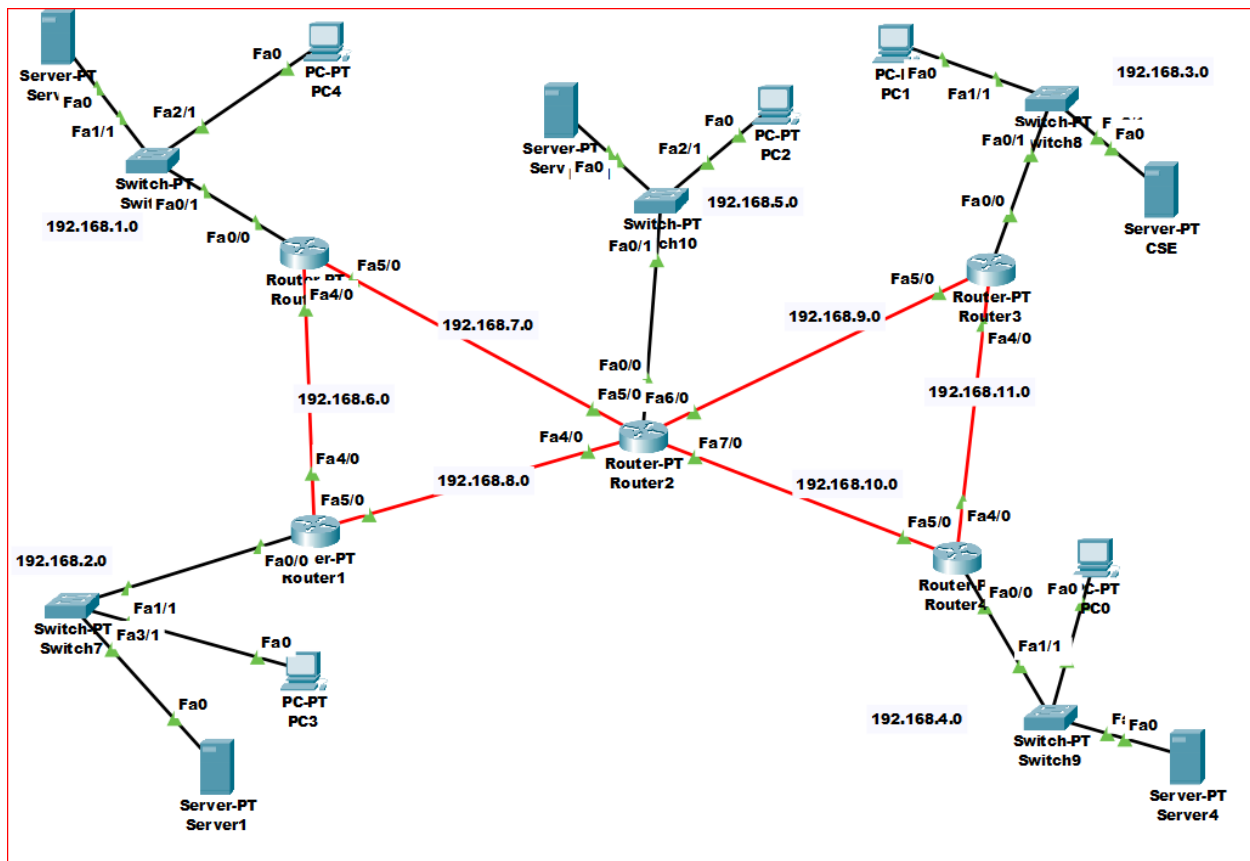


Figure: 01

Connecting all the Routers with **Fiber cables** and End devices will be connected with **Copper Straight Through cables**.

Network Addressing Table

S.N.#	Network Name	Host Requirements	Network Address	Subnet Mask	First Host	Last Host	Broadcast Address
1	Zone - 1	254	192.168.1.0	255.255.255.0	192.168.1.1	192.168.1.254	192.168.1.255
2	Zone -2	254	192.168.2.0	255.255.255.0	192.168.2.1	192.168.2.254	192.168.2.255
3	Zone - 3	254	192.168.3.0	255.255.255.0	192.168.3.1	192.168.3.254	192.168.3.255
4	Zone -4	254	192.168.4.0	255.255.255.0	192.168.4.1	192.168.4.254	192.168.4.255
5	M Zone	254	192.168.5.0	255.255.255.0	192.168.5.1	192.168.5.254	192.168.5.255
6	R0-R1	2	192.168.6.0	255.255.255.0	192.168.6.1	192.168.6.254	192.168.6.255
7	R0-R2	2	192.168.7.0	255.255.255.0	192.168.7.1	192.168.7.254	192.168.7.255
8	R1-R2	2	192.168.8.0	255.255.255.0	192.168.8.1	192.168.8.254	192.168.8.255
9	R2-R3	2	192.168.9.0	255.255.255.0	192.168.9.1	192.168.9.254	192.168.9.255
10	R2-R4	2	192.168.10.0	255.255.255.0	192.168.10.1	192.168.10.254	192.168.10.255
11	R3-R4	2	192.168.11.0	255.255.255.0	192.168.11.1	192.168.11.254	192.168.11.255

Table: 01

Router Configuration:

The screenshot shows the configuration window for Router0. The 'Config' tab is selected. On the left, a tree view shows the configuration hierarchy: GLOBAL (Settings, Algorithm Settings), ROUTING (Static, RIP), and INTERFACE (FastEthernet0/0, FastEthernet1/0, Serial2/0, Serial3/0, FastEthernet4/0, FastEthernet5/0). The 'FastEthernet0/0' interface is selected. The main area shows the configuration for this interface. The 'Port Status' is set to 'On'. The 'Bandwidth' is set to '100 Mbps'. The 'Duplex' is set to 'Full Duplex'. The 'MAC Address' is '000C.CF49.CE72'. The 'IP Configuration' section shows the 'IPv4 Address' as '192.168.1.1' and the 'Subnet Mask' as '255.255.255.0'. The 'Tx Ring Limit' is set to '10'. At the bottom, 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)#interface FastEthernet0/0, Router(config-if)#. A 'Top' button is located at the bottom left.

Router0

Physical **Config** CLI Attributes

FastEthernet0/0

Port Status ☒ On

Bandwidth ☒ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 000C.CF49.CE72

IP Configuration

IPv4 Address 192.168.1.1

Subnet Mask 255.255.255.0

Tx Ring Limit 10

Equivalent IOS Commands

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
```

☐ Top

Figure: 02

Here, press the router and go to the **config** mode then for each FastEthernet port **Turn ON** the port status and set the IP address for IPv4, also set the Subnet Mask for each port and each router. The IP address for each port will be the **First Host ID** or **Second Host ID** depends on need of each network connected to the dedicated port.

Adding Extra Port in Router 02:

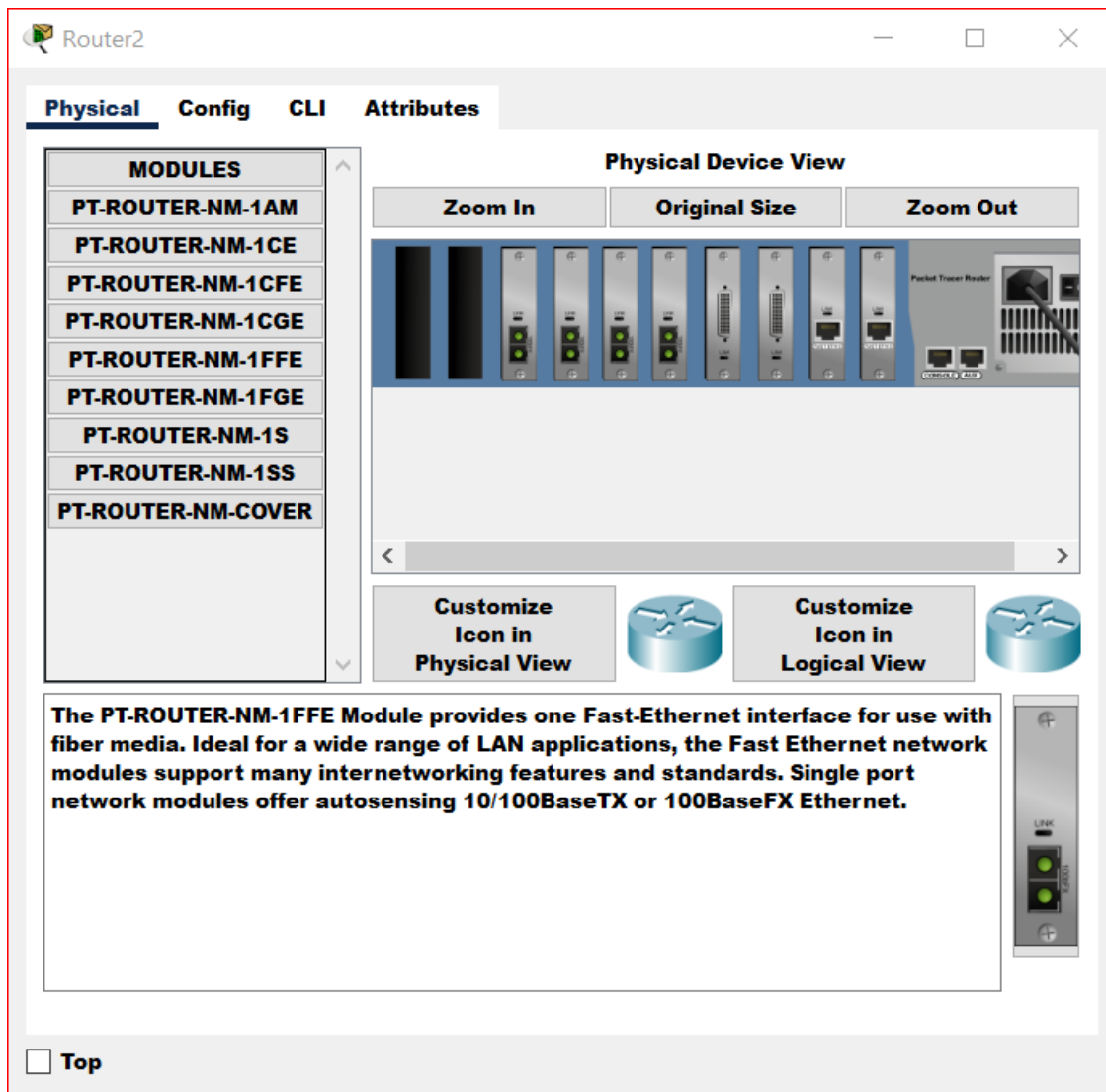


Figure: 03

In router 02 for giving more connection we have to add two extra **NM-1FFE** port to it. So first we should **Turn OFF** the switch and then select the NM-1FFE port and add it to the router. After adding those ports, we must turn the switch of the router **ON**.

Connection Router to another networks:

The screenshot shows the configuration interface for a router named 'Router1'. The 'Config' tab is selected, and the 'Static' option under the 'ROUTING' section is highlighted in the left sidebar. The 'Static Routes' section contains three input fields for 'Network', 'Mask', and 'Next Hop', followed by an 'Add' button. Below these fields is a list of configured static routes, each showing the network address and the next hop IP address. At the bottom, there is a 'Remove' button and a section for 'Equivalent IOS Commands' which displays the commands to enter the configuration mode.

Router1

Physical **Config** CLI Attributes

GLOBAL

- Settings
- Algorithm Settings

ROUTING

- Static**
- RIP

INTERFACE

- FastEthernet0/0
- FastEthernet1/0
- Serial2/0
- Serial3/0
- FastEthernet4/0
- FastEthernet5/0

Static Routes

Network

Mask

Next Hop

Add

Network Address

- 192.168.1.0/24 via 192.168.6.1
- 192.168.3.0/24 via 192.168.8.2
- 192.168.4.0/24 via 192.168.8.2

Remove

Equivalent IOS Commands

```
Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#
```

☐ **Top**

Figure: 04

Select the router and go to the config tab, then select the **Static** section. Here we have to provide the IP address of other possible networks, add their subnet mask and also give the IP address of the next hope towards the network from the router.

Configuring the DHCP & DNS Servers:

The screenshot shows the 'Server0' configuration window with the 'Desktop' tab selected. The 'IP Configuration' section is expanded, showing the following settings:

IP Configuration	
<input type="radio"/> DHCP	<input checked="" type="radio"/> Static
IPv4 Address	192.168.1.254
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1
DNS Server	192.168.1.254

Below the IP Configuration section is the 'IPv6 Configuration' section:

IPv6 Configuration	
<input type="radio"/> Automatic	<input checked="" type="radio"/> Static
IPv6 Address	
Link Local Address	FE80::290:21FF:FE4A:1D78
Default Gateway	
DNS Server	

At the bottom is the '802.1X' section:

802.1X	
<input type="checkbox"/> Use 802.1X Security	
Authentication	MD5
Username	
Password	

A 'Top' button is located at the bottom left of the configuration window.

Figure: 05

In server 0 select the Desktop and open IP configuration. Here we have to select the **static** mode. Then give IPv4 address which will be the **Last Host ID** of that network. Provide subnet mask default gateway and give its own IP address as **DNS Server** to convert this server to DNS server alongside DHCP server.

Server0

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

192.168.1.1

DNS Server

0.0.0.0

Start IP Address :

192

168

1

2

Subnet Mask:

255

255

255

0

Maximum Number of Users :

254

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 Use	TFTP Server	WLC Address
serverPool	192....	0.0.0.0	192....	255....	254	0.0.0.0	0.0.0.0

<

>

Top

Figure: 06

Then in the Services tab select the **DHCP** section **Turn ON** the service. After that give the default gateway of the network. Reserve the first two IP address and start the host Ip address from **192.168.1.2**
Then press the save button.

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	www.cse.com	A Record	192.168.3.254

DNS Cache

☐ Top

Figure: 07

In the DNS section Turn ON the DNS Service, give the **URL name** and the **IP address** for the specific network and press the save button for saving the information in the DNS server.

Here URL: www.cse.com
IP address: 192.168.3.254

Configure the PC:

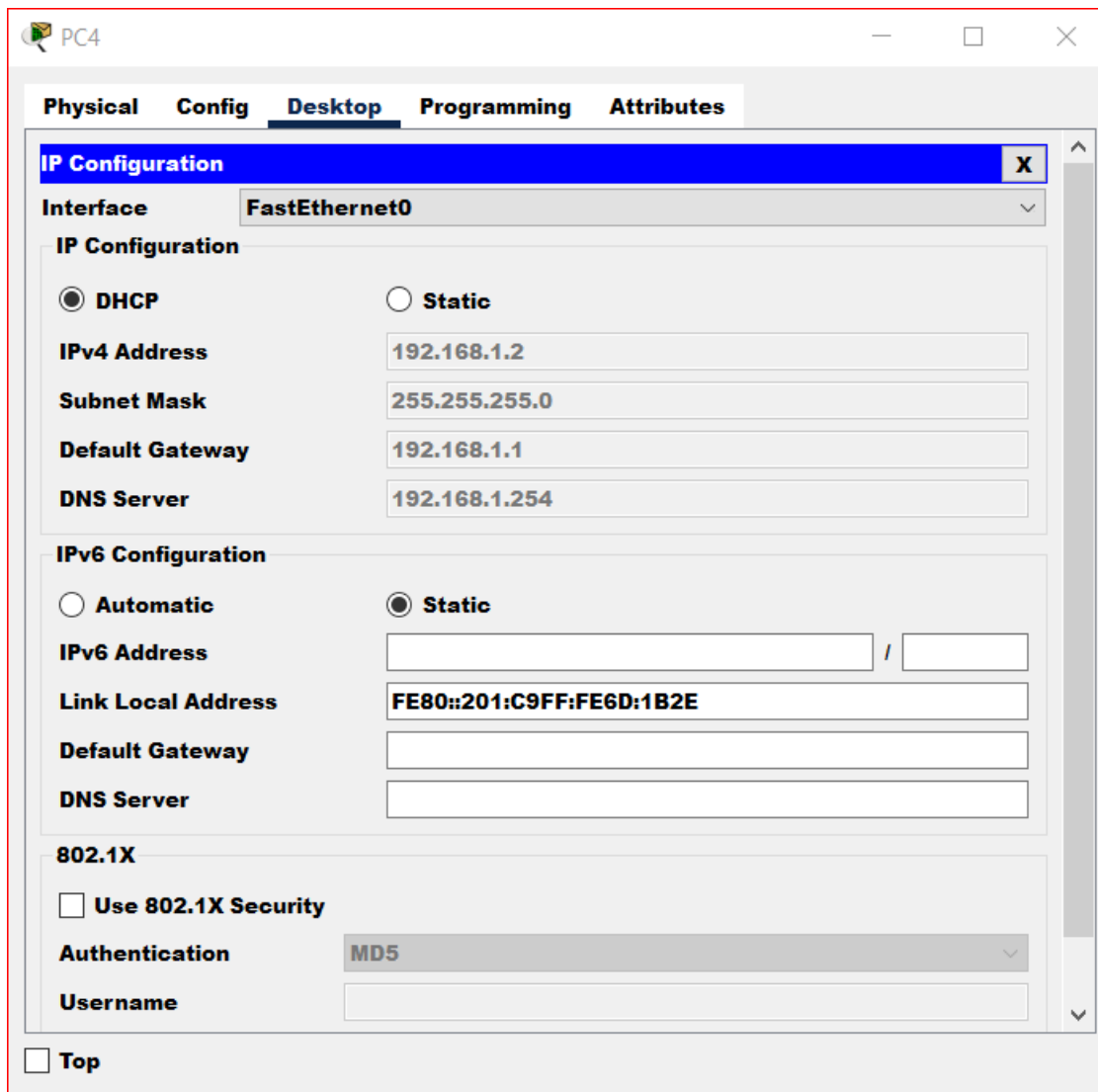


Figure: 08

Select the PC and go to the Desktop tab, then select the IP Configuration. Here, we have to select the DHCP mode. So that the device will get all its information needed from the DHCP server which is connected with it.

Testing of Networks:

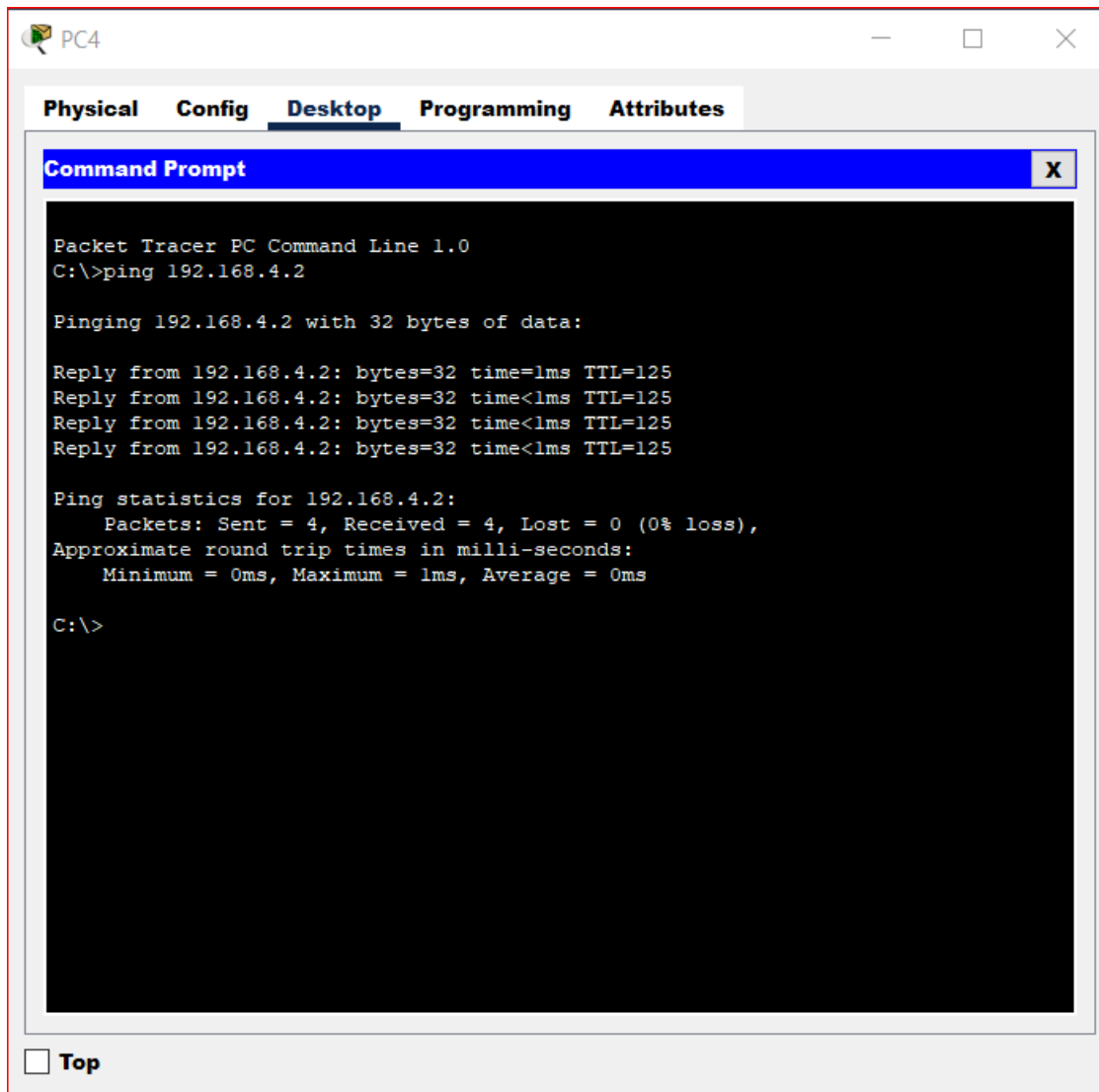


Figure: 09

For testing the network, first we have to select a PC and open the Command Prompt from the desktop tab. Then **ping** to a particular **IP address** here, 192.168.4.2
We can see that-

Sent = 4 packets

Received = 4 packets

Lost = 0 packets

Browsing from the PC:

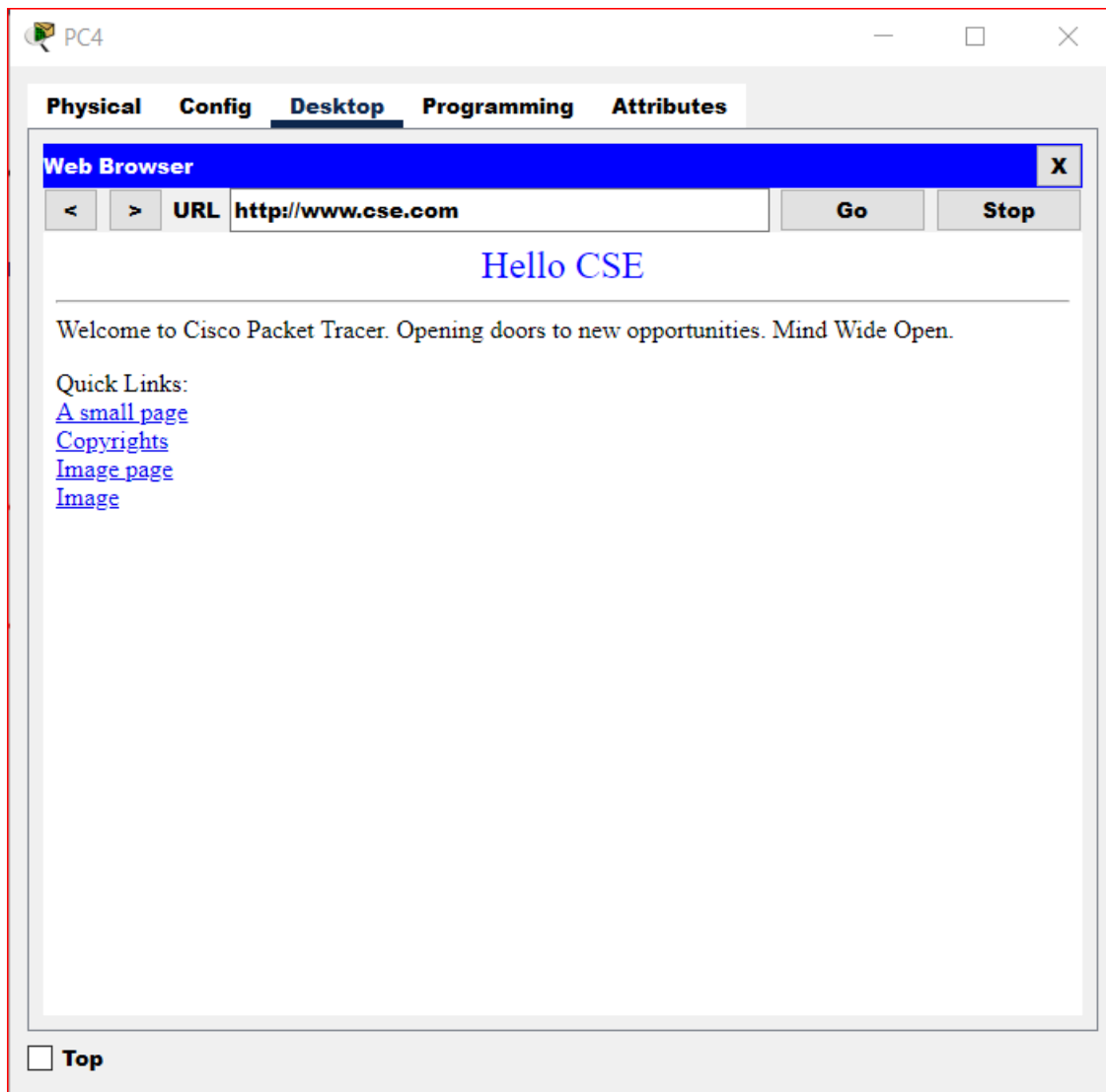


Figure: 10

From a particular we can also browse. First select desktop then open Web Browser press the **URL** which was set in the **DNS server**. Then we can see the interface of that website.

Here,

Web URL: <http://www.cse.com>