

# **Web Hosting with Port Forwarding**

## **A COURSE PROJECT REPORT**

**BY**

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of

**18CSC302J - COMPUTER NETWORKS**

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**Department of Networking & Communications**



**FACULTY OF ENGINEERING & TECHNOLOGY**

**SRM INSTITUTE OF SCIENCE AND TECHNOLOGY**

**Kattankulathur, Chengalpattu District**

**NOVEMBER 2021**

# **SRM INSTITUTE OF SCIENCE AND TECHNOLOGY**

(Under Section 3 of UGC Act, 1956)

## **BONAFIDE CERTIFICATE**

Certified that this project report **“Web Hosting with Port Forwarding”** is the bonafide work of Tejas Ashok (RA1911030010090) who carried out the project work under my supervision.

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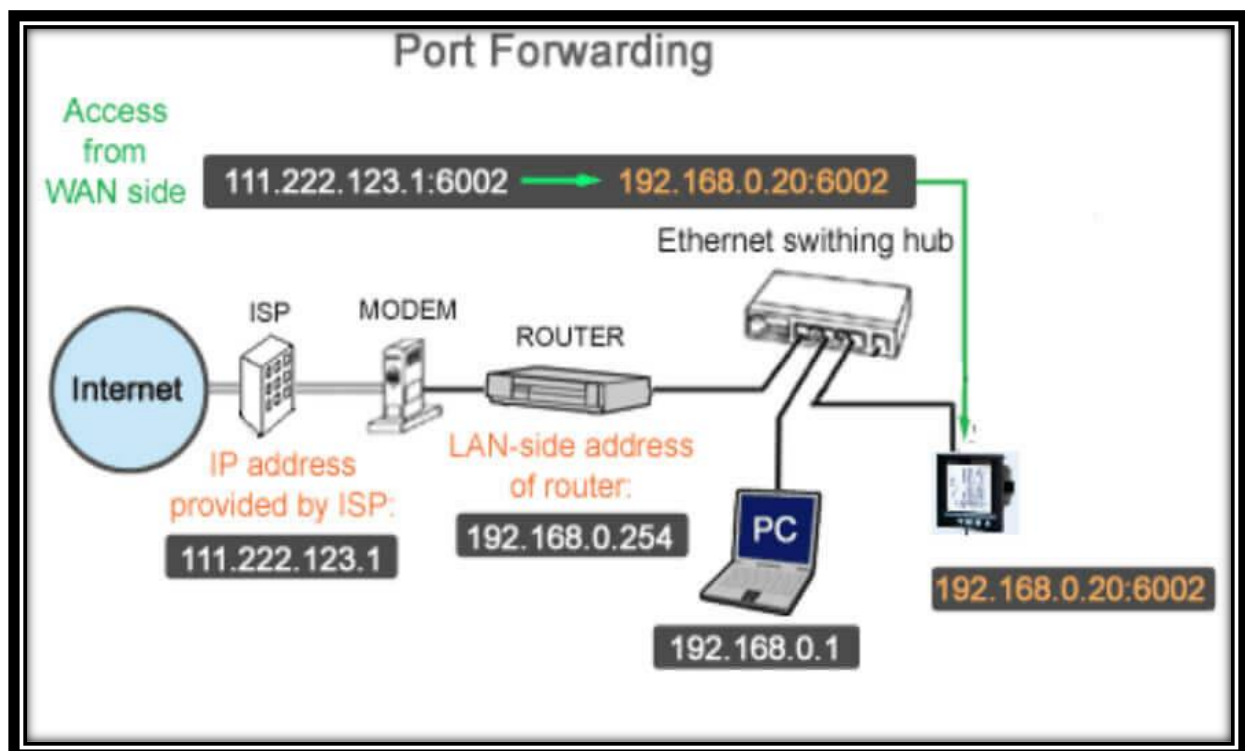
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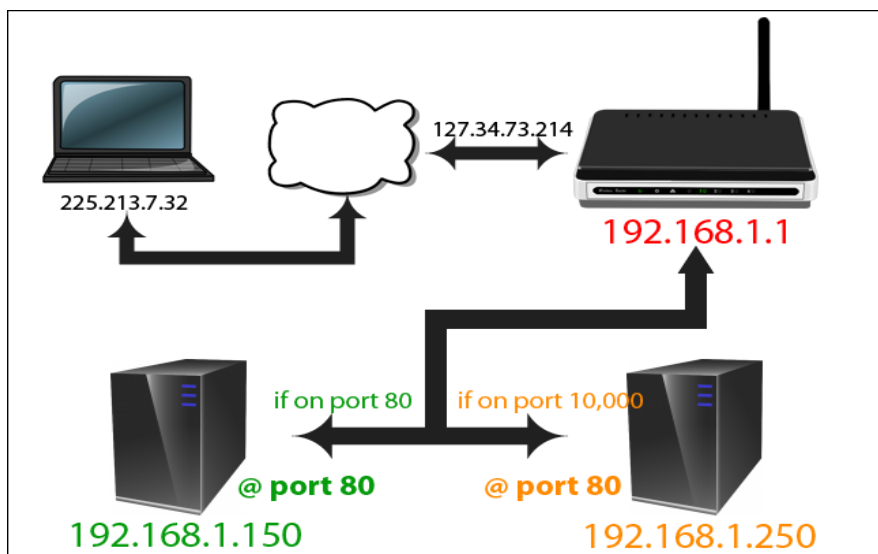
## ABSTRACT

This project aims to implement the concept of port forwarding. Port forwarding allows remote computers to connect to a specific computer or service within a private LAN. Port forwarding is an application of NAT that redirects a communication request from one address and port number combination to another while the packets are traversing a network gateway. With port forwarding we can host a web app or a game lobby to the internet that usually runs on LAN. So, when a PC from the internet sends an HTTP request to the public IP of the server which runs the game or the web app, the request is forwarded to the private address of the server via the router and thus the PC's will be able to communicate back and forth via WAN.



## INTRODUCTION

Port forwarding is an application of network address translation (NAT) that redirects a communication request from one address and port number combination to another while the packets are traversing a network gateway, such as a router or firewall.



This project sets up port forwarding for a company. The company has a single public IP address assigned to it, for e.g., 210.1.1.1. The company has two websites in two servers. The two servers are connected to a single router with single IP address. One of the two servers is for admin and that is not accessible by the public. So, to make both the servers accessible via the single public IP, we implement *Port Forwarding*.

By implementing port forwarding, we can connect to admin server (website) by adding a port number at the end of the public IP address, for e.g., 210.1.1.1:5029. Using NAT, the router will forward this request to the private IP address of the

server containing the admin files. If the IP address is entered without the port number, we will be redirected to the default main page because 210.1.1.1 is equal to 210.1.1.1:80.

This helps the employees to modify and work on files that are stored on the server directly from their home.

# **REQUIREMENT ANALYSIS**

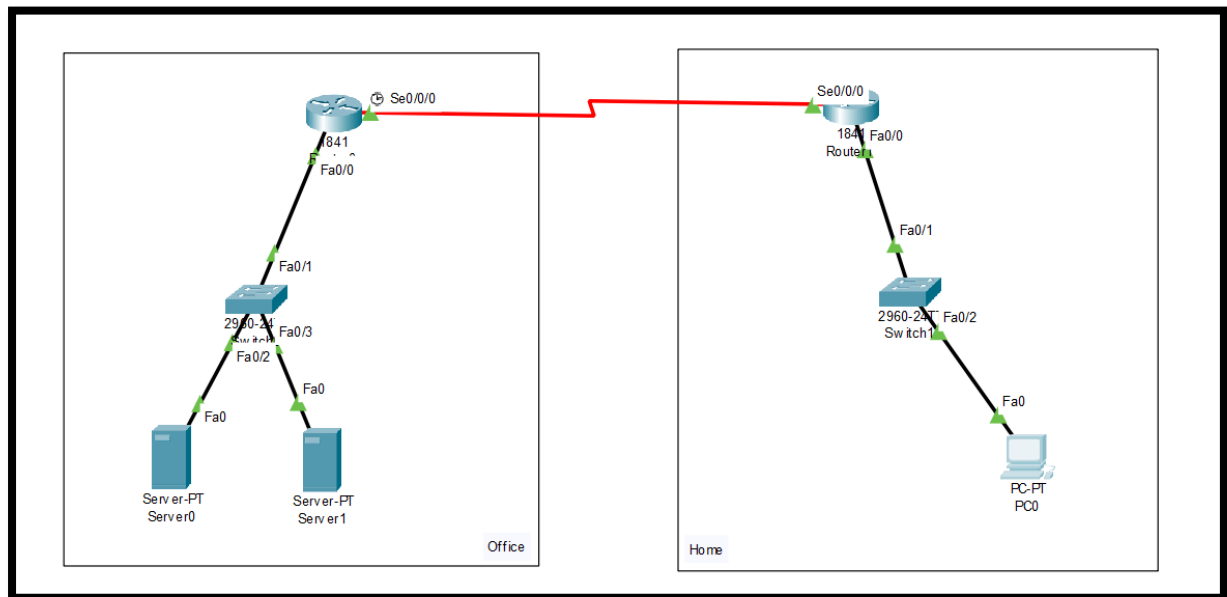
## **Hardware Requirements**

- Cisco PT Servers – 2
- Home PC – 1
- 2960 Switch – 2
- 1841 Routers – 2
- Ethernet and Serial Cables

## **Software Requirements**

- Platform – Cisco Packet Tracer
- Operating System – Any (Preferred – Windows 10)
- Basic Web Browser
- Router CLI

## ARCHITECTURE & DESIGN



### The Office

The left part of the above figure is the representation of an office.

### **Components**

Server0 – Contains the main website which is available to the public which can be access by everyone.

Server1 – Contains the Admin files that can only be accessed by authorized employees of the company.

Switch – Splits connection to both the servers.

Router – Connects the servers to the internet.

### Home

The right part of the above figure is the representation of an employee's home.



## **Components**

PC0 – The employee's work PC.

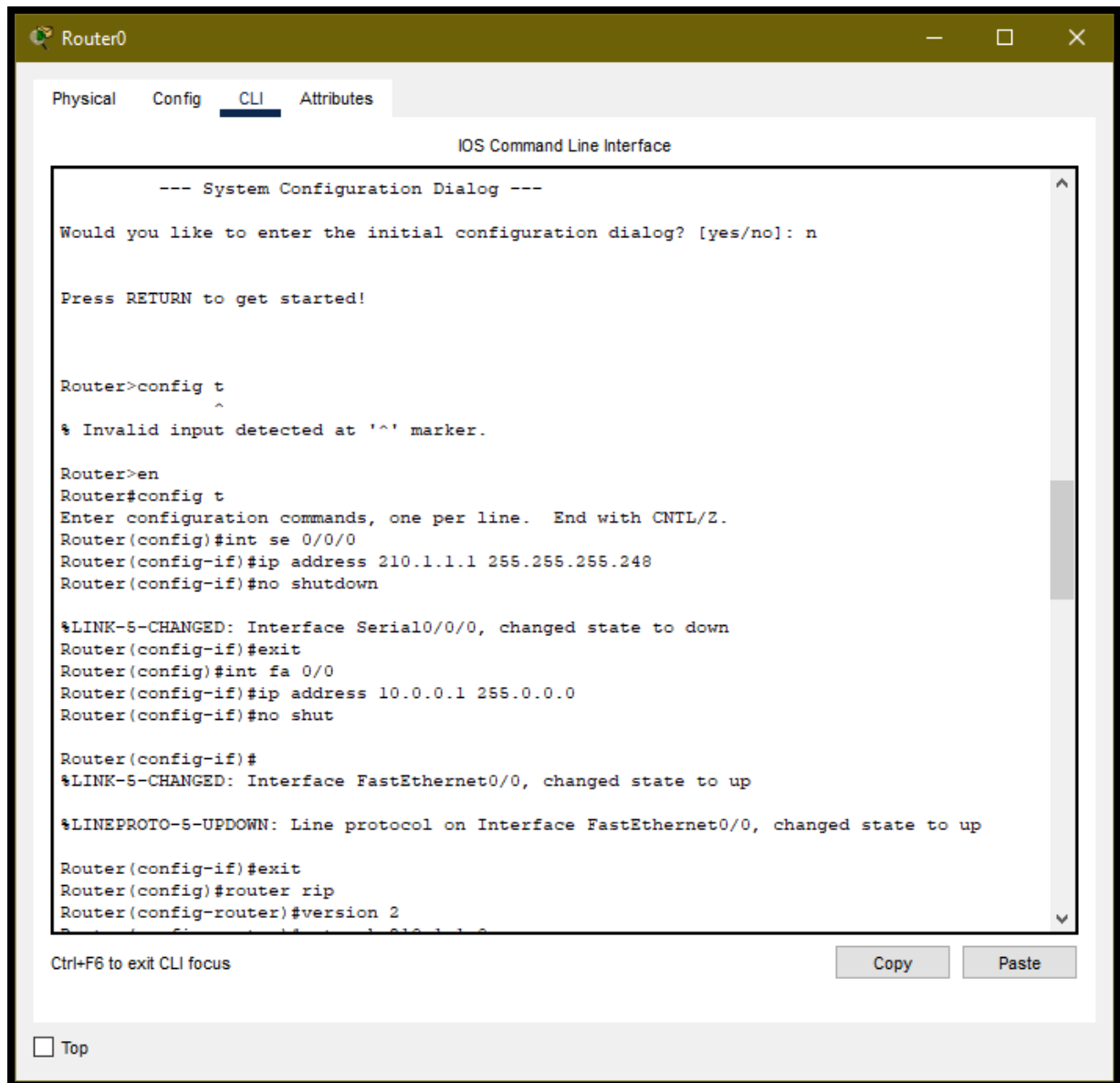
Switch – Forwards connection to the PC.

Router – Connects the PC to the internet.

# IMPLEMENTATION

## The Office

### Router Configuration



The screenshot shows a window titled "Router0" with tabs for "Physical", "Config", "CLI", and "Attributes". The "CLI" tab is active, displaying the "IOS Command Line Interface". The interface shows a "System Configuration Dialog" where the user has entered 'n' to skip the initial configuration. The user then enters 'config t' to enter configuration mode. An error message appears: "% Invalid input detected at '^' marker." because of an unintended caret character. The user then enters 'en' to return to privileged mode. In configuration mode, the user enters 'config t' again. The user then configures the Serial interface: 'int se 0/0/0', 'ip address 210.1.1.1 255.255.255.248', and 'no shutdown'. A status message indicates the interface state has changed to down. The user exits the interface configuration and configures the Fast Ethernet interface: 'int fa 0/0', 'ip address 10.0.0.1 255.0.0.0', and 'no shut'. A status message indicates the interface state has changed to up. The user then enters 'router rip' and 'version 2'. The window includes a "Copy" button, a "Paste" button, and a "Top" button at the bottom.

```
Router0
Physical Config CLI Attributes
IOS Command Line Interface

--- System Configuration Dialog ---
Would you like to enter the initial configuration dialog? [yes/no]: n

Press RETURN to get started!

Router>config t
      ^
% Invalid input detected at '^' marker.

Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int se 0/0/0
Router(config-if)#ip address 210.1.1.1 255.255.255.248
Router(config-if)#no shutdown

%LINK-S-CHANGED: Interface Serial0/0/0, changed state to down
Router(config-if)#exit
Router(config)#int fa 0/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#no shut

Router(config-if)#
%LINK-S-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-S-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
Router(config-if)#exit
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#
Router(config-router)#
```

Ctrl+F6 to exit CLI focus

Copy Paste

☐ Top

### Assigning IP address to Serial and Fast Ethernet Connections

```
Router0
Physical Config CLI Attributes
IOS Command Line Interface
Router(config-if)#exit
Router(config)#int fa 0/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#network 210.1.1.0
Router(config-router)#network 10.0.0.0
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

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

Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ip nat inside source static tcp 10.0.0.10 80 210.1.1.1 80
Router(config)#int se 0/0/0
Router(config-if)#ip nat outside
Router(config-if)#int fa 0/0
Router(config-if)#ip nat inside
Router(config-if)#ip nat inside source static tcp 10.0.0.20 80 210.1.1.1 5029
Router(config)#

Ctrl+F6 to exit CLI focus
Copy Paste
Top
```

## Routing using RIP V2 and Configuring Port Forwarding

## Server Configuration

The screenshot shows a configuration window for 'Server0' with tabs for Physical, Config, Services, Desktop, Programming, and Attributes. The 'Desktop' tab is active, displaying the 'IP Configuration' section. This section includes fields for IPv4 and IPv6 addresses, subnet masks, default gateways, and DNS servers. The IPv4 configuration is set to static with the address 10.0.0.10, subnet mask 255.0.0.0, default gateway 10.0.0.1, and DNS server 0.0.0.0. The IPv6 configuration is also set to static, with a link local address of FE80::201:64FF:FE9C:75BD. Below these, there is a section for 802.1X security, which is currently disabled. A 'Top' button is located at the bottom left of the configuration area.

Server0

Physical Config Services Desktop Programming Attributes

IP Configuration

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 10.0.0.10

Subnet Mask 255.0.0.0

Default Gateway 10.0.0.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::201:64FF:FE9C:75BD

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

☐ Top

Server with Main Website (Port 80)

Server1

Physical Config Services **Desktop** Programming Attributes

IP Configuration

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 10.0.0.20

Subnet Mask 255.0.0.0

Default Gateway 10.0.0.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::260:3EFF:FE91:2CA1

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

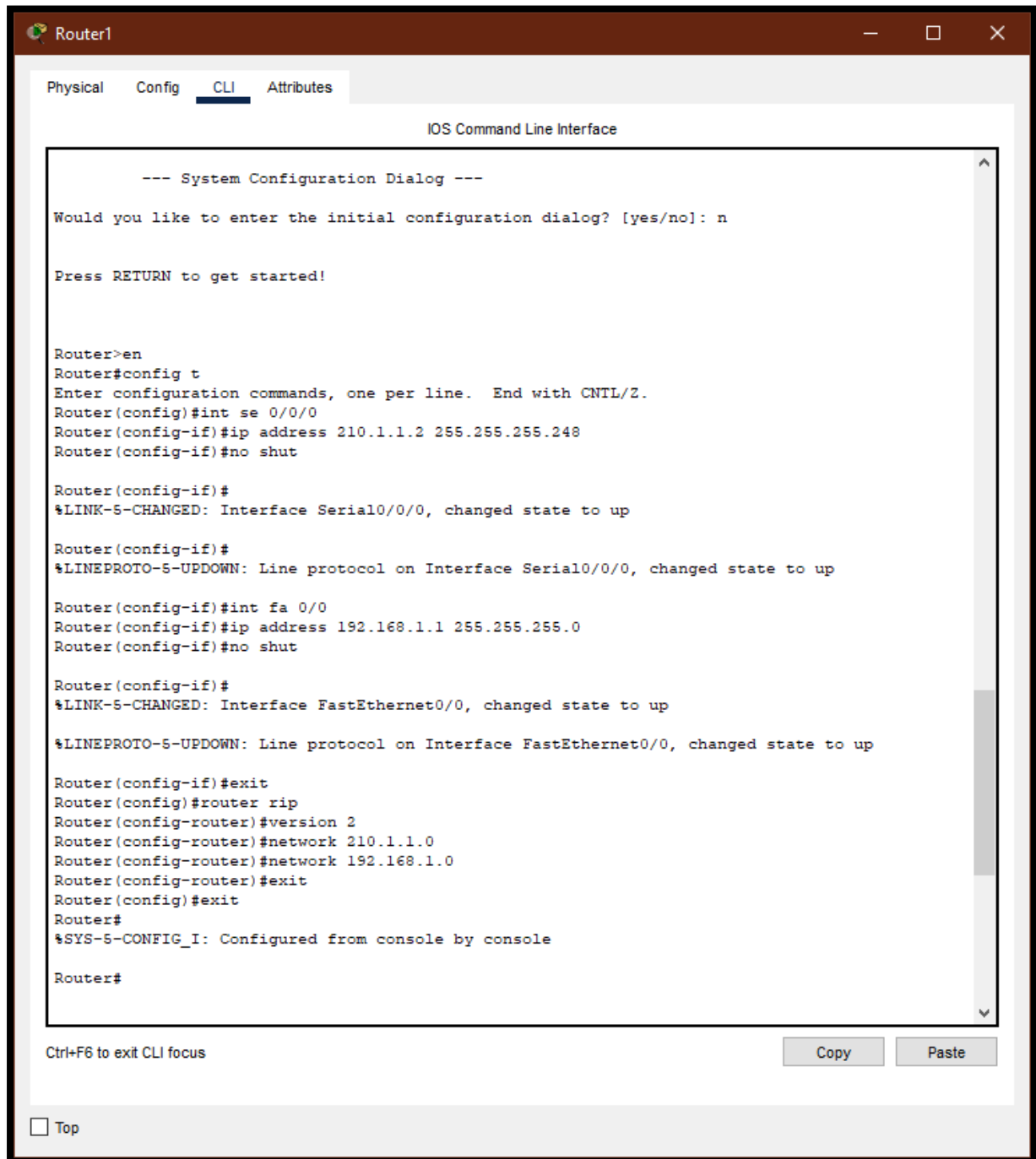
Password

☐ Top

Server with Admin files (Port 5029)

## Home

### Router Configuration



```
Router1
Physical Config CLI Attributes
IOS Command Line Interface

--- System Configuration Dialog ---
Would you like to enter the initial configuration dialog? [yes/no]: n

Press RETURN to get started!

Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int se 0/0/0
Router(config-if)#ip address 210.1.1.2 255.255.255.248
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

Router(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state to up

Router(config-if)#int fa 0/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

Router(config-if)#exit
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#network 210.1.1.0
Router(config-router)#network 192.168.1.0
Router(config-router)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#
```

Ctrl+F6 to exit CLI focus

Copy Paste

☐ Top

### Routing using RIP V2

## PC Configuration

The screenshot shows the configuration window for PC0, specifically the Desktop tab. The 'IP Configuration' section is active, showing settings for the 'FastEthernet0' interface. The 'Static' radio button is selected for both IPv4 and IPv6 configurations. The IPv4 configuration includes a static IP address of 192.168.1.10, a subnet mask of 255.255.255.0, a default gateway of 192.168.1.1, and a DNS server of 0.0.0.0. The IPv6 configuration shows a static mode with a link local address of FE80::20D:BDFE:FEE0:5E74. The 802.1X section is also visible, with 'Use 802.1X Security' unchecked and 'Authentication' set to MD5.

PC0

Physical Config Desktop Programming Attributes

IP Configuration X

Interface FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 192.168.1.10

Subnet Mask 255.255.255.0

Default Gateway 192.168.1.1

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::20D:BDFE:FEE0:5E74

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

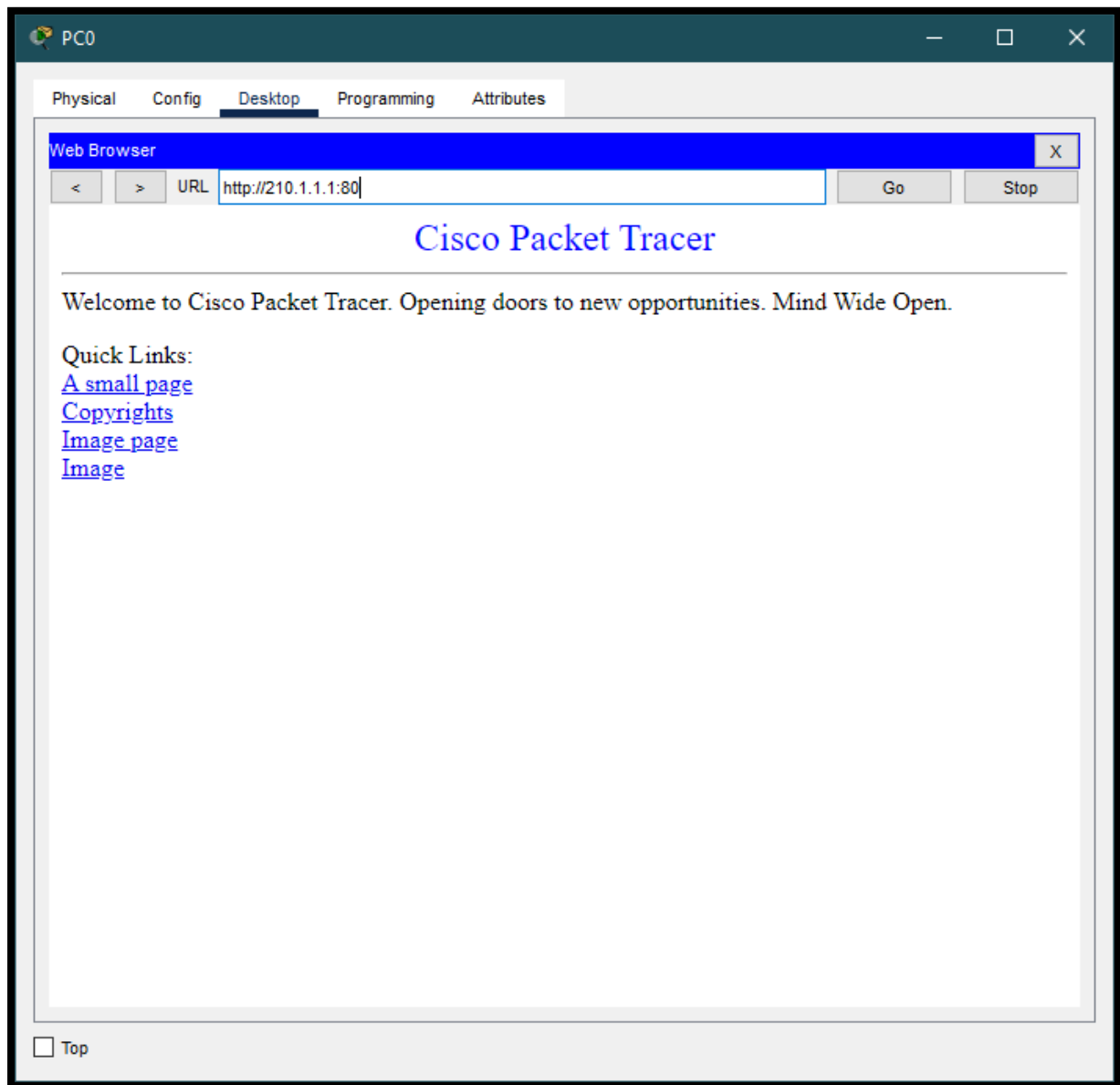
Password

☐ Top

**Configured PC with Private IP**

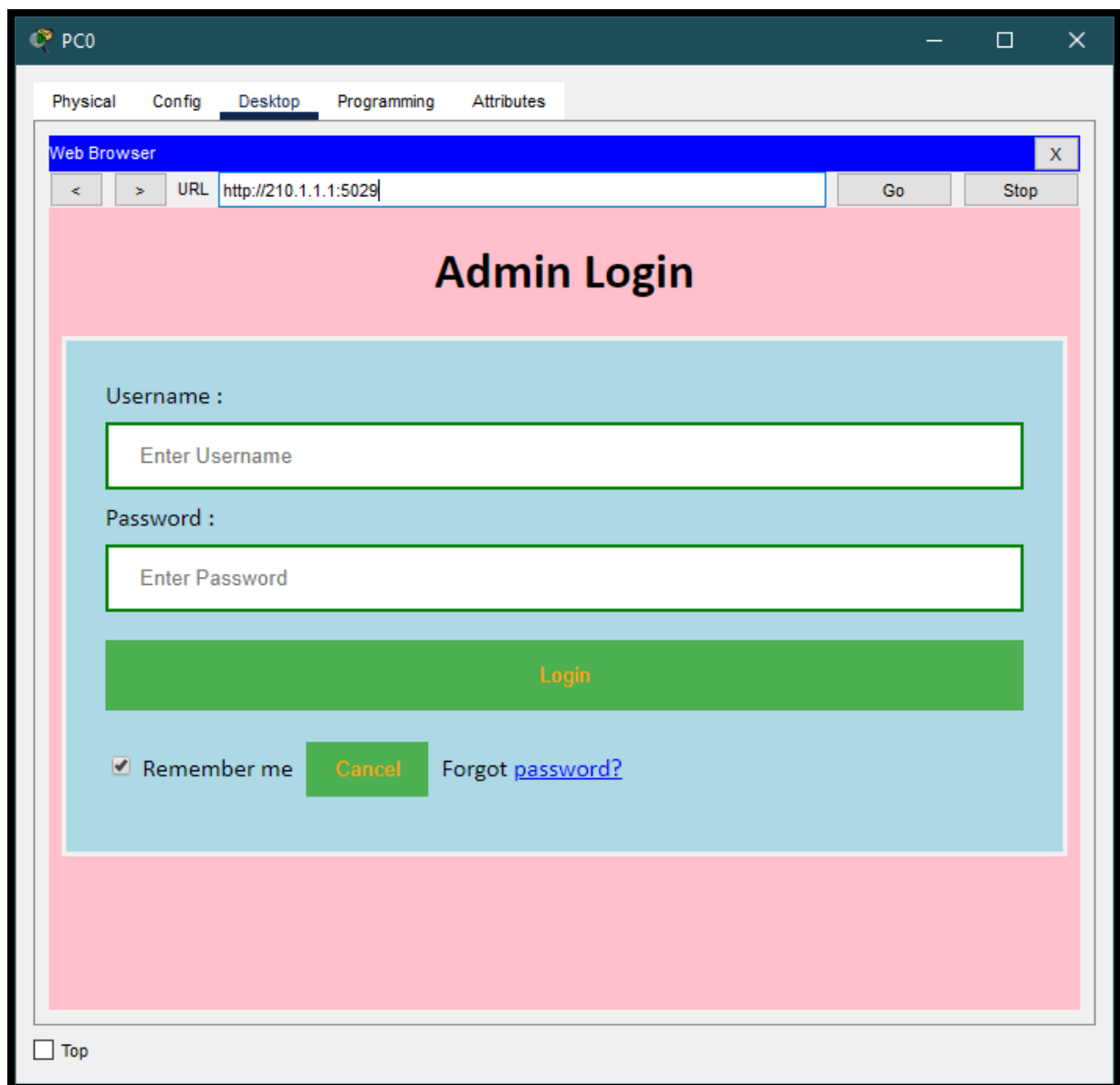
# EXPERIMENT RESULTS & ANALYSIS

## Results



Main Webpage is displayed when the public IP is entered without any port specified. (Or Port 80).





When the public IP with port 5029 is entered into the browser, the request is forwarded to Server0 containing the admin files by the router. Thus, the login page is displayed.

## Result Analysis

### Router0 Configuration

The screenshot displays the configuration interface for Router0. The 'Config' tab is active, showing a tree view on the left with categories: GLOBAL, ROUTING, SWITCHING, and INTERFACE. Under the INTERFACE category, 'Serial0/0/0' is selected. The main panel shows the configuration for 'Serial0/0/0' with the following settings:

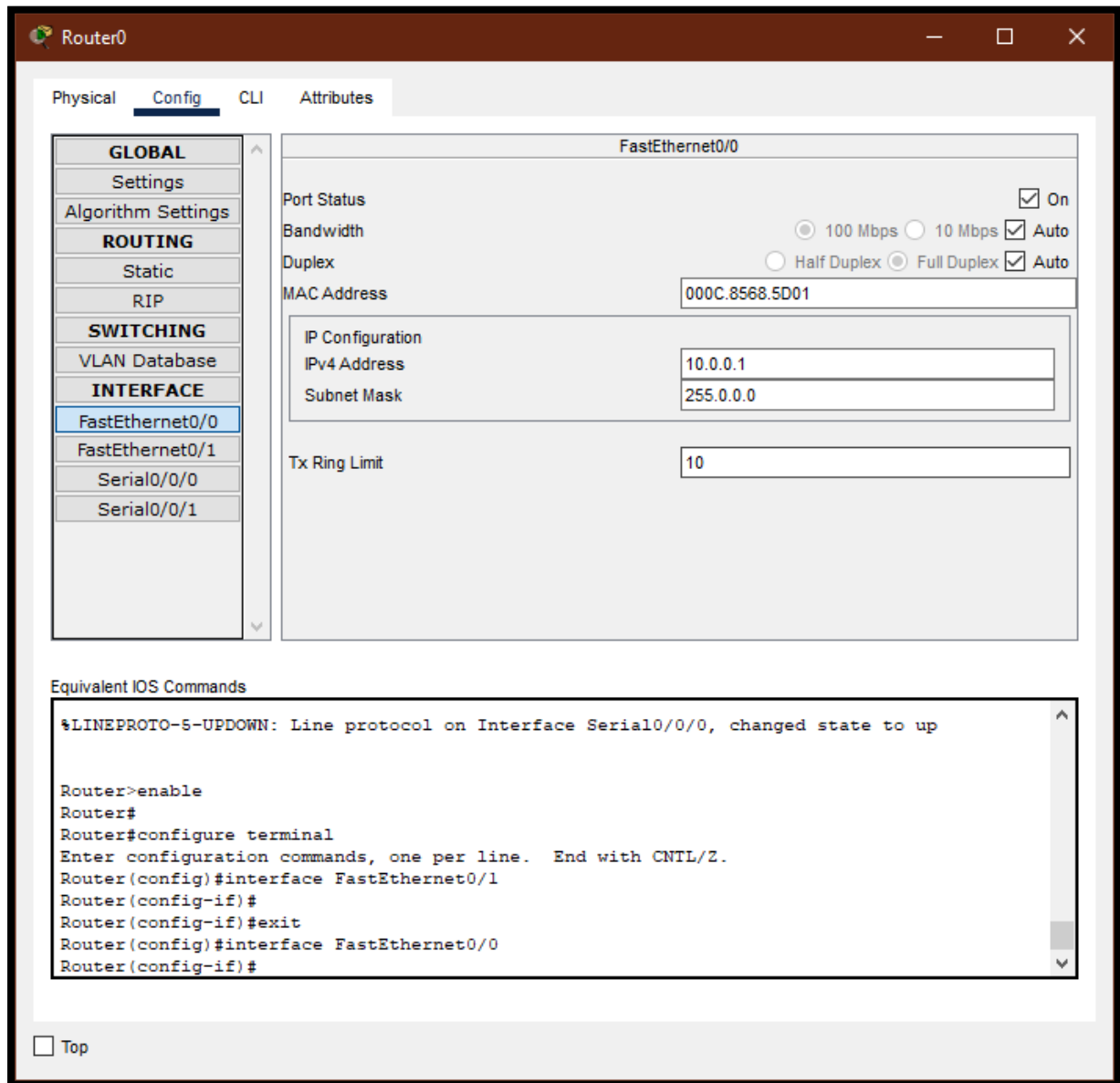
- Port Status: ☒ On
- Duplex: ☐ Full Duplex
- Clock Rate: 2000000
- IP Configuration:
  - IPv4 Address: 210.1.1.1
  - Subnet Mask: 255.255.255.248
- Tx Ring Limit: 10

Below the configuration panel, 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 FastEthernet0/1
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#
```

At the bottom left, there is a checkbox labeled 'Top'.

Set serial connection using CLI commands



Configured Fast Ethernet using CLI Commands

## Router1 Configuration

The screenshot shows the Router1 configuration window with the 'Config' tab selected. The left sidebar contains a tree view with categories: GLOBAL, ROUTING, SWITCHING, and INTERFACE. Under the INTERFACE category, 'Serial0/0/0' is selected. The main configuration area for 'Serial0/0/0' includes: Port Status (checked 'On'), Duplex (radio button for 'Full Duplex'), Clock Rate (dropdown set to '1200'), IP Configuration (IPv4 Address: '210.1.1.2', Subnet Mask: '255.255.255.248'), and Tx Ring Limit (input field with '10'). Below the configuration area, a section titled 'Equivalent IOS Commands' displays a terminal window with the following commands:

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

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/0
Router(config-if)#
Router(config-if)#exit
Router(config)#interface Serial0/0/0
Router(config-if)#
```

At the bottom left of the window, there is a checkbox labeled 'Top'.

Set serial connection using CLI commands

The screenshot displays the configuration window for Router0, specifically the 'Config' tab for the 'FastEthernet0/0' interface. The left sidebar shows a tree view with categories: GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, SWITCHING, VLAN Database, and INTERFACE. Under the INTERFACE category, 'FastEthernet0/0' is selected. The main configuration area for 'FastEthernet0/0' includes: Port Status (checked 'On'), Bandwidth (radio buttons for 100 Mbps and 10 Mbps, with 'Auto' checked), Duplex (radio buttons for Half Duplex and Full Duplex, with 'Auto' checked), MAC Address (000C.8568.5D01), IP Configuration (IPv4 Address: 10.0.0.1, Subnet Mask: 255.0.0.0), and Tx Ring Limit (10). Below the configuration area, a section titled 'Equivalent IOS Commands' shows a terminal window with the following commands: 

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

Router>enable
Router#
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface FastEthernet0/1
Router(config-if)#
Router(config-if)#exit
Router(config)#interface FastEthernet0/0
Router(config-if)#
```

 At the bottom left of the window is a 'Top' button.

Configured Fast Ethernet using CLI Commands

## CONCLUSION:

The simulation of connection between the workspace and home, and the implementation of port forwarding is completed.

## REFERENCES:

1. <https://stevessmarthomeguide.com/understanding-port-forwarding/>
2. <https://www.howtogeek.com/66214/how-to-forward-ports-on-your-router/>
3. <http://tutorials.ptnetacad.net/tutorials70.htm>
4. <https://www.geeksforgeeks.org/network-address-translation-nat/>
5. [https://www.sciencedirect.com/topics/computer-science/routing-information-protocol#:~:text=RIP%20version%20%20is%20very,has%20a%20few%20major%20differences%3A&text=RIP%20version%20%20messages%20carry,2%20is%20a%20classless%20protocol\).&text=RIP%20version%20%20uses%20multicast%20address%20224.0.](https://www.sciencedirect.com/topics/computer-science/routing-information-protocol#:~:text=RIP%20version%20%20is%20very,has%20a%20few%20major%20differences%3A&text=RIP%20version%20%20messages%20carry,2%20is%20a%20classless%20protocol).&text=RIP%20version%20%20uses%20multicast%20address%20224.0.)