

Name : Arka Haldi  
Date : 9/9/2020  
UID : 2018130014

## CEL 51, DCCN, Monsoon 2020

### Lab 4: Prototyping a Network

#### Objective:

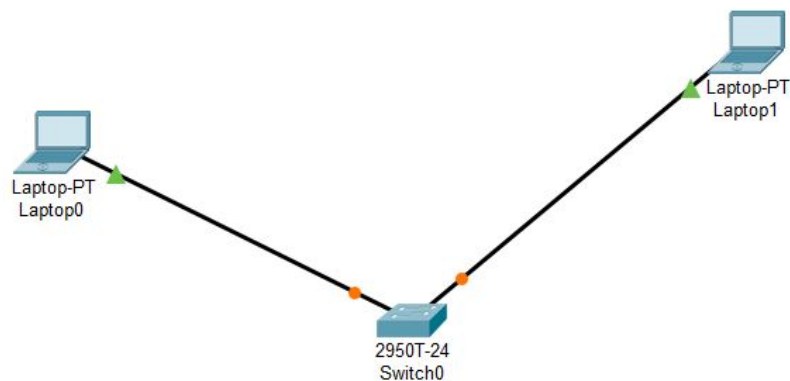
Prototype a network using Packet Tracer

#### Background

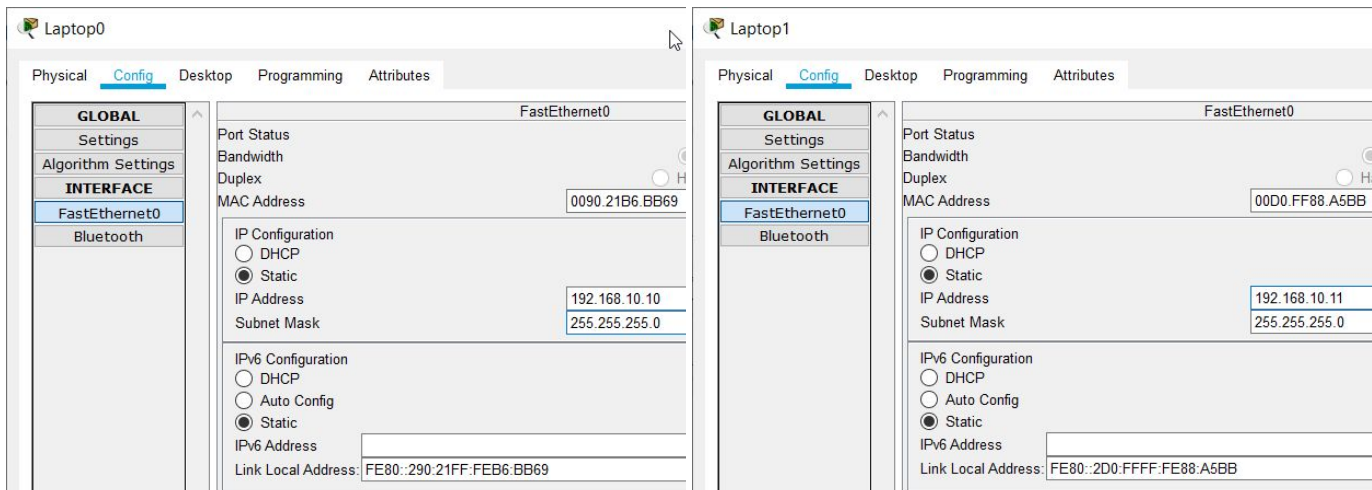
A client has requested that you set up a simple network with two PCs connected to a switch. Verify that the hardware, along with the given configurations, meet the requirements of the client.

#### Step 1: Set up the network topology

- a) Add two PCs and a Cisco 2950T switch
- b) Using straight-through cables, connect **PC0** to interface **Fa0/1** on **Switch0** and **PC1** to interface **Fa0/2** on **Switch0**.

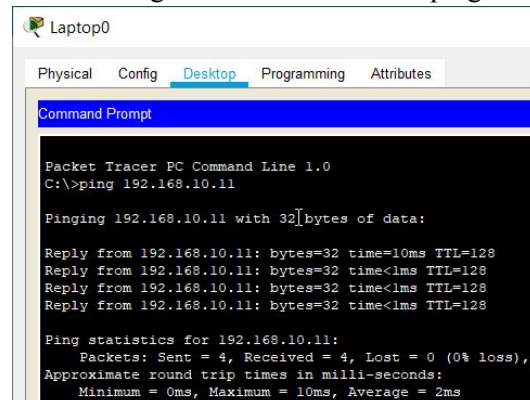


- c) Configure PC0 using the **Config** tab in the PC0 configuration window:
  - a. IP address: 192.168.10.10
  - b. Subnet Mask 255.255.255.0
- d) Configure PC1 using the **Config** tab in the PC1 configuration window
  - a. IP address: 192.168.10.11
  - b. Subnet Mask 255.255.255.0

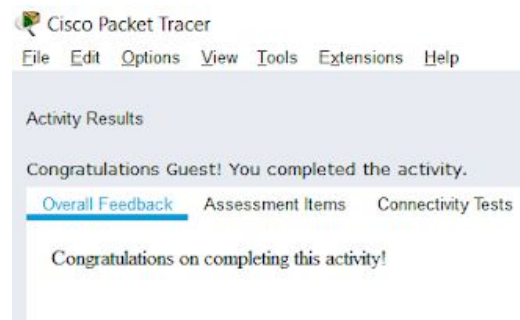


## Step 2: Test connectivity from PC0 to PC1

- Use the **ping** command to test connectivity.
  - Click PC0.
  - Choose the **Desktop** tab.
  - Choose **Command Prompt**.
  - Type: **ping 192.168.10.11** and press *enter*.
- A successful **ping** indicates the network was configured correctly and the prototype validates the hardware and software configurations. A successful ping should resemble the below output:



- Close the configuration window.
- Click the **Check Results** button at the bottom of the instruction window to check your work..



## **Theory:**

### **1. Network Switch**



A network switch (also called switching hub, bridging hub, and by the IEEE MAC bridge)<sup>[1]</sup> is networking hardware that connects devices on a computer network by using packet switching to receive and forward data to the destination device.

A network switch is a multiport network bridge that uses MAC addresses to forward data at the data link layer (layer 2) of the OSI model. Some switches can also forward data at the network layer (layer 3) by additionally incorporating routing functionality. Such switches are commonly known as layer-3 switches or multilayer switches.<sup>[2]</sup>

[\[Source\]](#)

### **2. Router**



A router<sup>[a]</sup> is a networking device that forwards data packets between computer networks. Routers perform the traffic directing functions on the Internet. Data sent through the internet, such as a web page or email, is in the form of data packets. A packet is typically forwarded from one router to another router through the networks that constitute an internetwork (e.g. the Internet) until it reaches its destination node.<sup>[2]</sup>

A router is connected to two or more data lines from different IP networks.<sup>[b]</sup> When a data packet comes in on one of the lines, the router reads the network address information in the packet header to determine the ultimate destination. Then, using information in its routing table or routing policy, it directs the packet to the next network on its journey.

[\[Source\]](#)

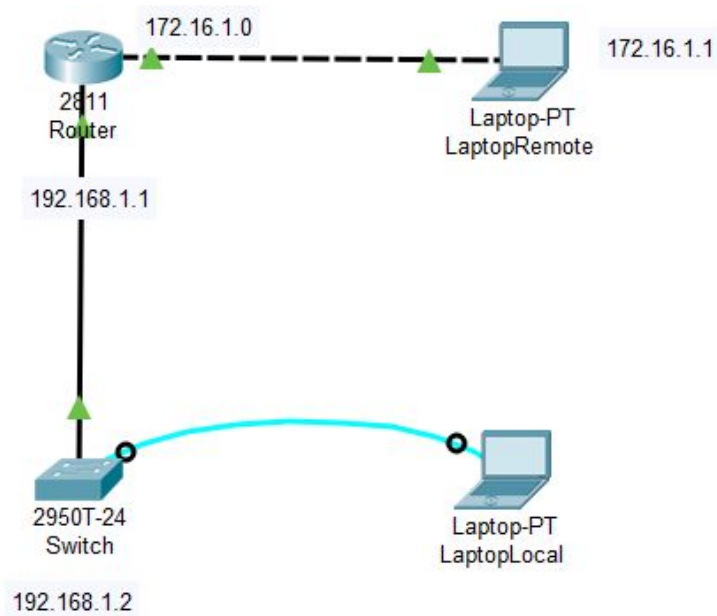
## CEL51, DCCN, Monsoon 2020

### Lab 4.1: Basic configuration - hostname, motd banner, passwd etc

---

#### Objective:

This lab will test your ability to configure basic settings such as hostname, motd banner, encrypted passwords, and terminal options on a Packet Tracer 6.2 simulated Cisco Catalyst switch.



\* Above is the configuration used in this experiment

## Initial Setup

The screenshot shows the 'LaptopRemote' application window with the 'Config' tab selected. The left sidebar shows a tree view with 'GLOBAL' (Settings, Algorithm Settings) and 'INTERFACE' (FastEthernet0, Bluetooth). The 'FastEthernet0' interface is selected, and its configuration is displayed on the right. The 'Port Status' is 'On'. 'Bandwidth' is set to '100 Mbps' and 'Duplex' is set to 'Full Duplex', both with 'Auto' checkboxes. The 'MAC Address' is '00D0.D3BA.AE97'. Under 'IP Configuration', 'Static' is selected, with 'IP Address' set to '172.16.1.1' and 'Subnet Mask' set to '255.255.255.0'. Under 'IPv6 Configuration', 'Static' is selected, with 'IPv6 Address' and 'Link Local Address' fields. The 'Link Local Address' is 'FE80::2D0:D3FF:FEBA:AE97'.

Physical **Config** Desktop Programming Attributes

**GLOBAL**  
Settings  
Algorithm Settings  
**INTERFACE**  
FastEthernet0  
Bluetooth

FastEthernet0

Port Status ☒ On  
Bandwidth ☒ 100 Mbps ☐ 10 Mbps ☒ Auto  
Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto  
MAC Address 00D0.D3BA.AE97

IP Configuration  
☐ DHCP  
☒ Static  
IP Address 172.16.1.1  
Subnet Mask 255.255.255.0

IPv6 Configuration  
☐ DHCP  
☐ Auto Config  
☒ Static  
IPv6 Address  
Link Local Address FE80::2D0:D3FF:FEBA:AE97

☐ Top

- Set IP address of Remote Laptop as 172.16.1.1, belonging to the same subnet as the Router Gateway IP that it's connected to.

The screenshot shows the 'LaptopRemote' application window with the 'Config' tab selected. The left sidebar shows a tree view with 'GLOBAL' (Settings, Algorithm Settings) and 'INTERFACE' (FastEthernet0, Bluetooth). The 'FastEthernet0' interface is selected, and its configuration is displayed on the right. The 'Global Settings' section is visible, showing 'Display Name' as 'LaptopRemote' and 'Interfaces' as 'FastEthernet0'. Under 'Gateway/DNS IPv4', 'Static' is selected, with 'Gateway' set to '172.16.1.0' and 'DNS Server' set to an empty field. Under 'Gateway/DNS IPv6', 'Static' is selected, with 'IPv6 Gateway' and 'IPv6 DNS Server' set to empty fields.

Physical **Config** Desktop Programming Attributes

**GLOBAL**  
Settings  
Algorithm Settings  
**INTERFACE**  
FastEthernet0  
Bluetooth

Global Settings

Display Name LaptopRemote  
Interfaces FastEthernet0

Gateway/DNS IPv4  
☐ DHCP  
☒ Static  
Gateway 172.16.1.0  
DNS Server

Gateway/DNS IPv6  
☐ DHCP  
☐ Auto Config  
☒ Static  
IPv6 Gateway  
IPv6 DNS Server

☐ Top

- Set the default IP address as 172.16.1.0, same as that of the IP at the Router port.

The screenshot shows the 'Router' configuration window with the 'Config' tab selected. The left sidebar shows a tree view with 'INTERFACE' expanded and 'FastEthernet0/0' selected. The main panel displays the configuration for 'FastEthernet0/0'. The 'Port Status' is 'On'. 'Bandwidth' is set to '100 Mbps' and 'Duplex' is set to 'Full Duplex'. The 'MAC Address' is '0001.9753.2C01'. The 'IP Configuration' section shows 'IP Address' as '172.16.1.0' and 'Subnet Mask' as '255.255.0.0'. The 'Tx Ring Limit' is set to '10'. Below the configuration fields, the 'Equivalent IOS Commands' section shows the following commands:

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

At the bottom left, there is a 'Top' button.

- Enter the IP Gateway entered in the Remote Laptop as the FastEthernet IP address, with the same Subnet Mask as that of the Remote Laptop

The screenshot shows the 'Router' configuration window with the 'Config' tab selected. The left sidebar shows a tree view with 'INTERFACE' expanded and 'FastEthernet0/1' selected. The main panel displays the configuration for 'FastEthernet0/1'. The 'Port Status' is 'On'. 'Bandwidth' is set to '100 Mbps' and 'Duplex' is set to 'Full Duplex'. The 'MAC Address' is '0001.9753.2C02'. The 'IP Configuration' section shows 'IP Address' as '192.168.1.1' and 'Subnet Mask' as '255.255.255.0'. The 'Tx Ring Limit' is set to '10'. Below the configuration fields, the 'Equivalent IOS Commands' section shows the following commands:

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

At the bottom left, there is a 'Top' button.

- Enter the IP Gateway to be entered into the Router, as part of the below instructions, as the IP Address of the FastEthernet1 port of the Router

1. Use the local laptop connect to the switch console.

```

Switch1
Physical Config CLI Attributes
IOS Command Line Interface
$ Invalid input detected at '^' marker.
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname LOCAL-SWITCH
LOCAL-SWITCH(config)#banner motd #
Enter TEXT message. End with the character '#'.
Unauthorized access is forbidden#
LOCAL-SWITCH(config)#enable secret cisco
LOCAL-SWITCH(config)#service password-encryption
LOCAL-SWITCH(config)#line con 0
LOCAL-SWITCH(config-line)#password password-line
LOCAL-SWITCH(config-line)#logging synchronous
LOCAL-SWITCH(config-line)#login
LOCAL-SWITCH(config-line)#history size 15
LOCAL-SWITCH(config-line)#exec-timeout 6 45
LOCAL-SWITCH(config-line)#line vty 0 15
LOCAL-SWITCH(config-line)#exec-timeout 8 20
LOCAL-SWITCH(config-line)#password password-telnet
LOCAL-SWITCH(config-line)#logging synchronous
LOCAL-SWITCH(config-line)#login
LOCAL-SWITCH(config-line)#history size 15
LOCAL-SWITCH(config-line)#
Ctrl+F6 to exit CLI focus
Copy Paste
Top

```

- All of the configuration to the Switch to set encryption, make logging in synchronous, adding MOTD, and switching encryption on, etc are all done in the above lines

2. Configure Switch hostname as LOCAL-SWITCH

3. Configure the message of the day as "Unauthorized access is forbidden"

```

Switch>enable
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname LOCAL-SWITCH
LOCAL-SWITCH(config)#banner motd #
Enter TEXT message. End with the character '#'.
Unauthorized access is forbidden#

```

- Here as we observe, we enter the configuration mode of the Router CLI, and configure the hostname as the new name, and Attach a MOTD to the Switch.

4. Configure the password for privileged mode access as "cisco". The password must be md5 encrypted

5. Configure password encryption on the switch using the global configuration command

6. Configure CONSOLE access with the following settings :

- Login enabled
- Password : password-line
- History size : 15 commands



- Timeout : 6'45"
- Synchronous logging

6. Configure TELNET access with the following settings :

- Login enabled
- Password : password-telnet
- History size : 15 commands
- Timeout : 8'20"
- Synchronous logging

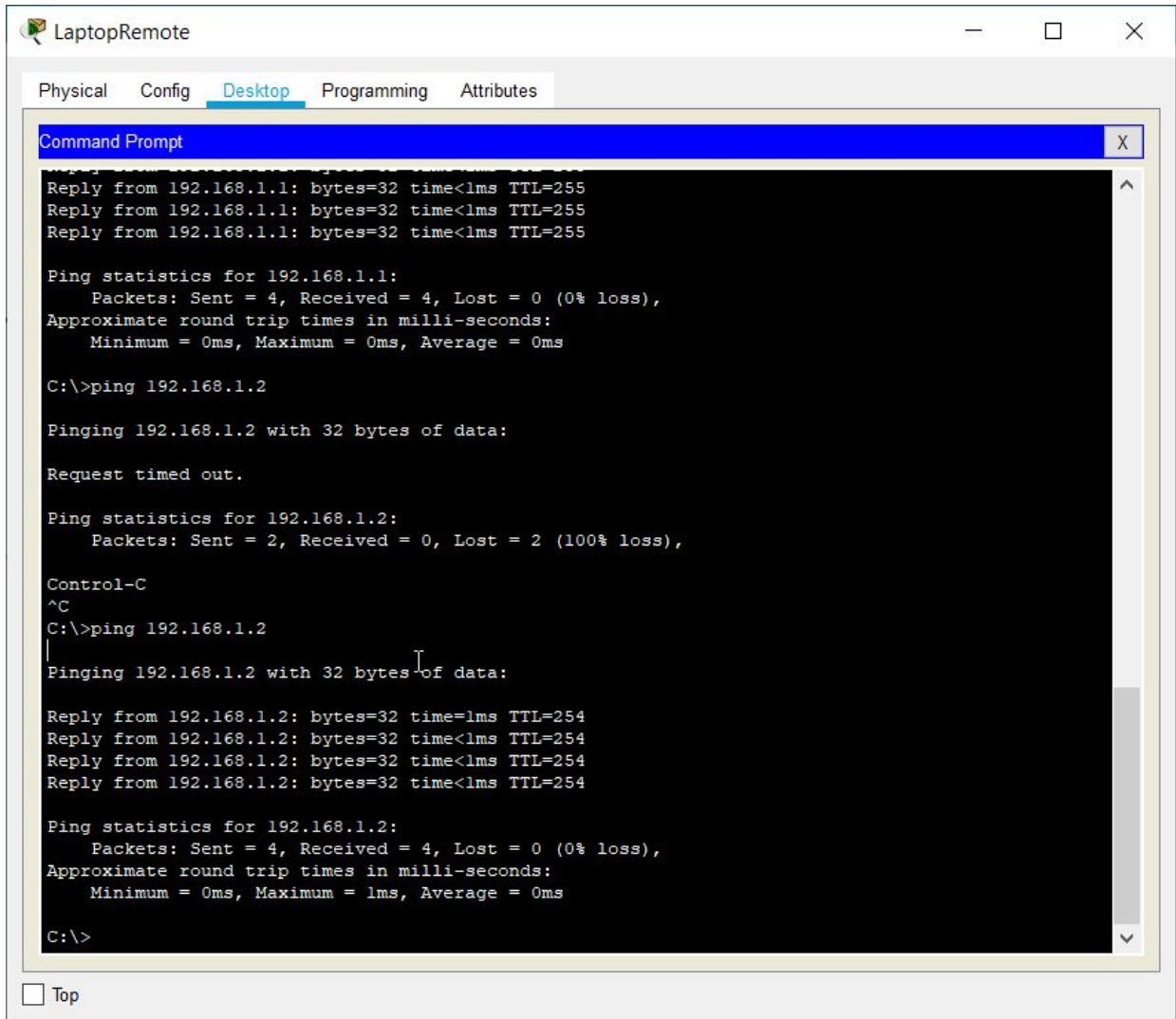
```
LOCAL-SWITCH(config)#enable secret cisco
LOCAL-SWITCH(config)#service password-encryption
LOCAL-SWITCH(config)#line con 0
LOCAL-SWITCH(config-line)#password password-line
LOCAL-SWITCH(config-line)#logging synchronous
LOCAL-SWITCH(config-line)#login
LOCAL-SWITCH(config-line)#history size 15
LOCAL-SWITCH(config-line)#exec-timeout 6 45
LOCAL-SWITCH(config-line)#line vty 0 15
LOCAL-SWITCH(config-line)#exec-timeout 8 20
LOCAL-SWITCH(config-line)#password password-telnet
LOCAL-SWITCH(config-line)#logging synchronous
LOCAL-SWITCH(config-line)#login
LOCAL-SWITCH(config-line)#history size 15
```

7. Configure the IP address of the switch as 192.168.1.2/24 and it's default gateway IP (192.168.1.1).

```
LOCAL-SWITCH(config-line)#interface Vlan1
LOCAL-SWITCH(config-if)#ip address 192.168.1.2 255.255.255.0
LOCAL-SWITCH(config-if)#ip default-gateway 192.168.1.1
LOCAL-SWITCH(config)#
```



8. Test telnet connectivity from the Remote Laptop using the telnet client.



```
LaptopRemote
Physical Config Desktop Programming Attributes
Command Prompt
Reply from 192.168.1.1: bytes=32 time<1ms TTL=255
Reply from 192.168.1.1: bytes=32 time<1ms TTL=255
Reply from 192.168.1.1: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.1.2

Pinging 192.168.1.2 with 32 bytes of data:

Request timed out.

Ping statistics for 192.168.1.2:
    Packets: Sent = 2, Received = 0, Lost = 2 (100% loss),

Control-C
^C
C:\>ping 192.168.1.2
|
Pinging 192.168.1.2 with 32 bytes of data:

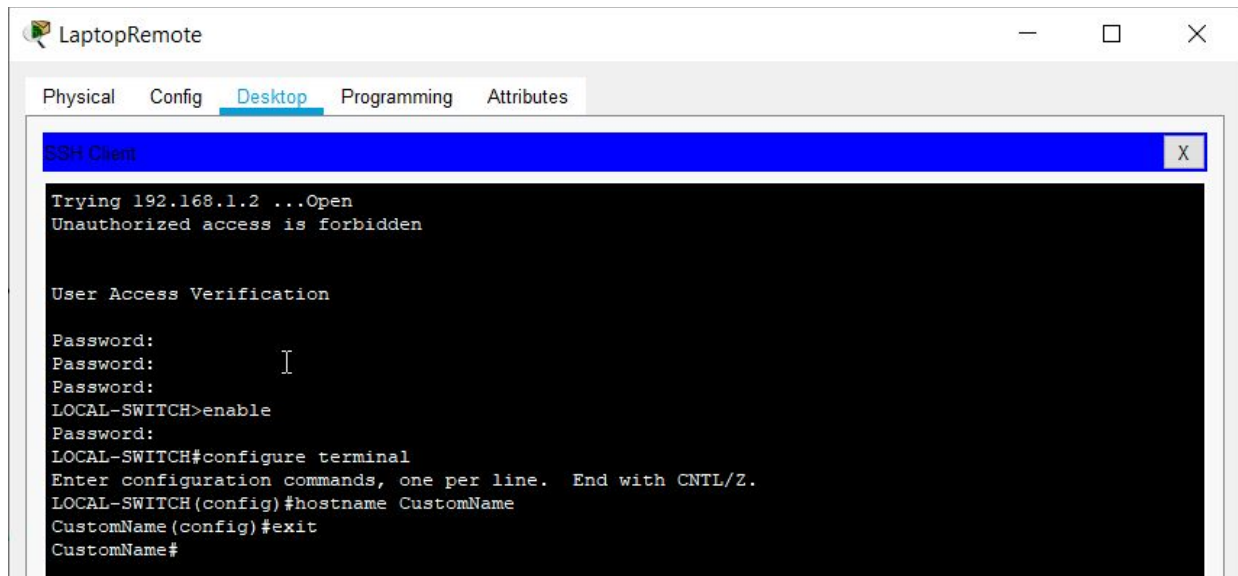
Reply from 192.168.1.2: bytes=32 time=1ms TTL=254
Reply from 192.168.1.2: bytes=32 time<1ms TTL=254
Reply from 192.168.1.2: bytes=32 time<1ms TTL=254
Reply from 192.168.1.2: bytes=32 time<1ms TTL=254

Ping statistics for 192.168.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

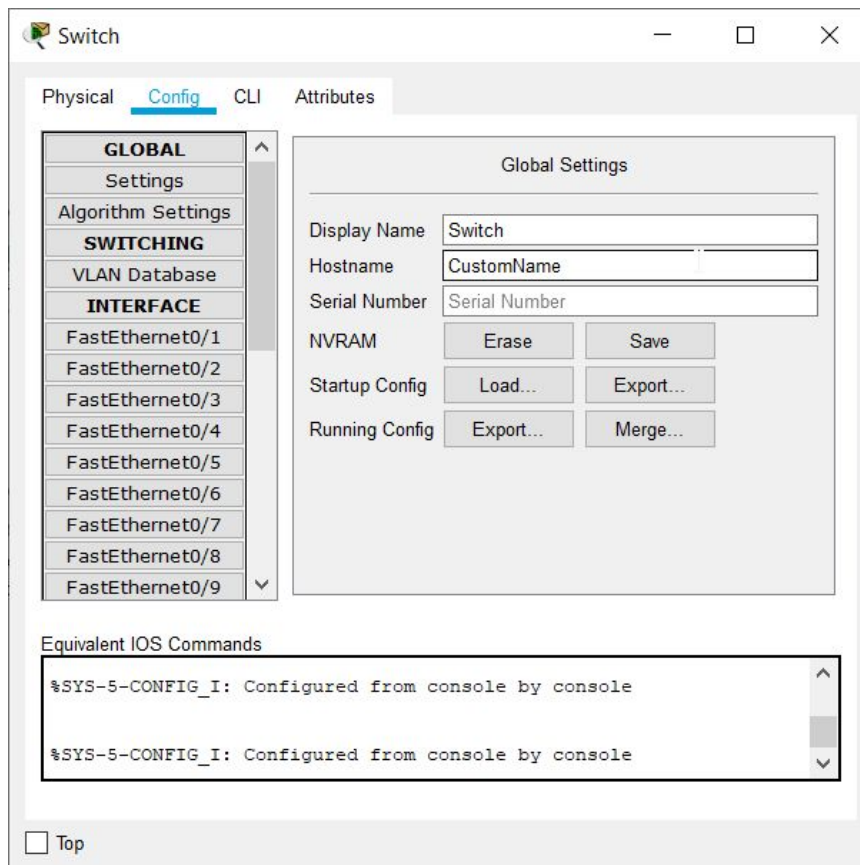
C:\>
```

☐ Top

- Successfully pinged 192.168.1.2, i.e the Switch. Next we check the telnet client



- Used Telnet to rename the switch from Remote Laptop, using the CLI of Switch.



- Hostname changed

**Conclusion:**

- Hence, we have successfully demonstrated telnet utility using a simple Router, Switch topology.
- We learnt how to make the IP connections, how to assigned IP addresses to ports, about IP Gateways, how to debug a network topology, about subnet masks, and Network ID's , and also about the reality of Networking as a whole.