



National University of Computer & Emerging Sciences, Karachi
FAST School of Computing
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Course Code: CL-3001	Course: Computer Networks Lab
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1. Introduction to Telnet

A terminal emulation program for TCP/IP networks such as the Internet. The Telnet program runs on your computer and connects your PC to a server on the network. You can then enter commands through the Telnet program and they will be executed as if you were entering them directly on the server console. This enables you to control the server and communicate with other servers on the network. To start a Telnet session, you must log in to a server by entering a valid username and password. Telnet is a common way to remotely control Web servers. To telnet means to establish a connection with the Telnet protocol, either with command line client or with a programmatic interface.

2. Configuration of Telnet

Below are the steps for Telnet Protocol. Follow the figure 1 till figure 8 for the configuration of Telnet Protocol.

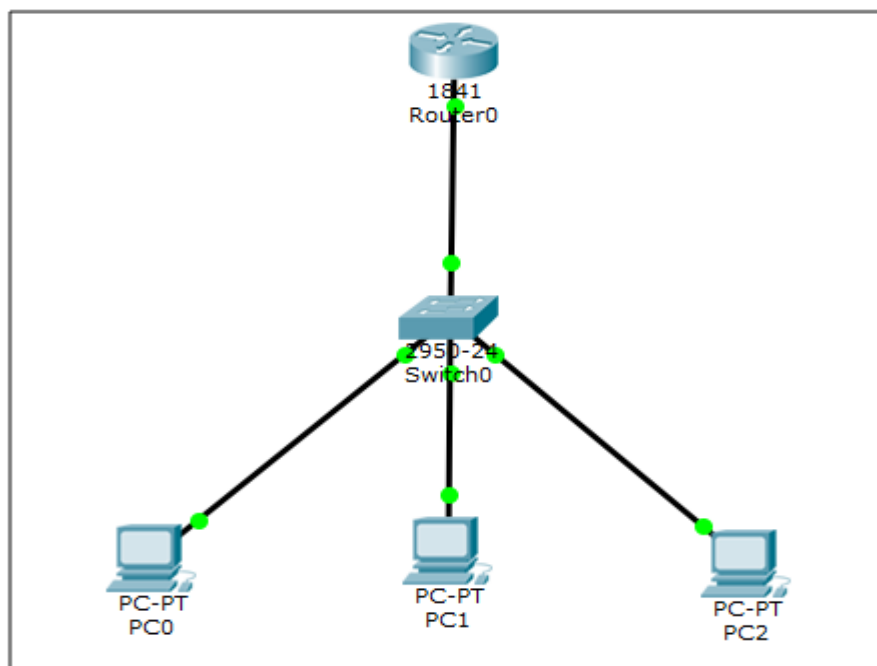
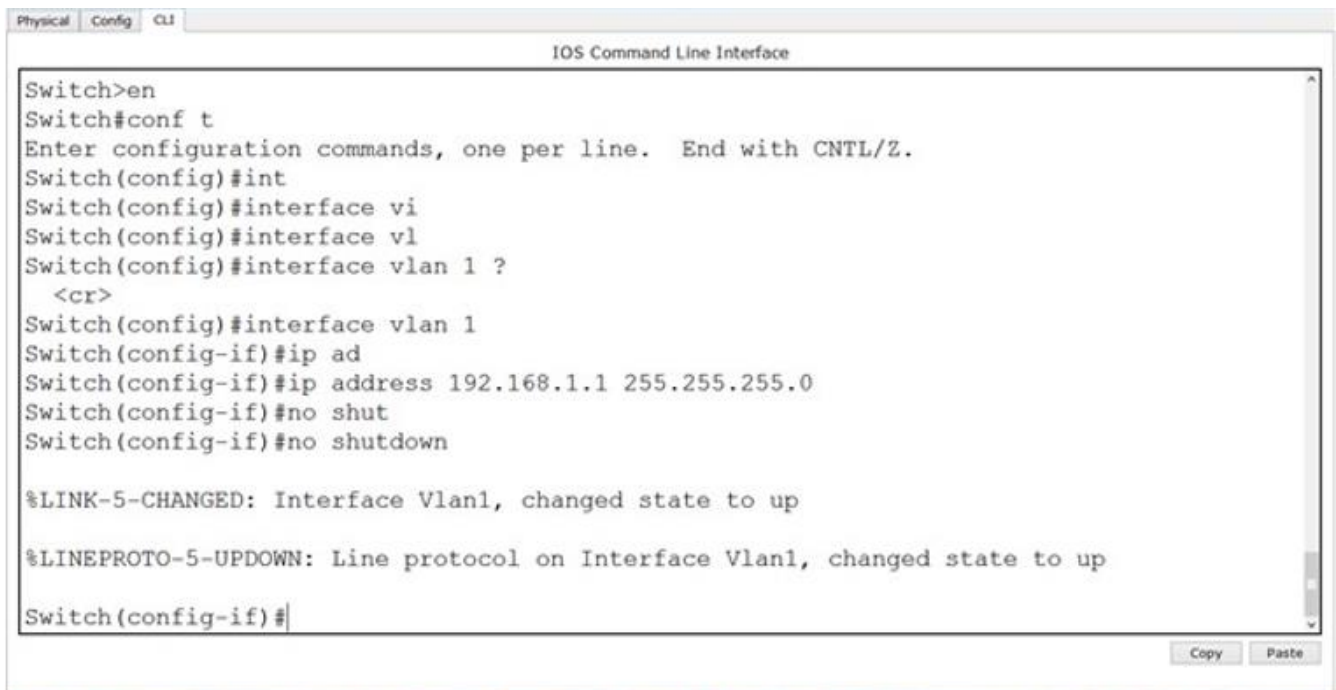


Figure # 1(Network Topology)

Take the topology as in the above diagram. Set IPs on the PCs. As, by default, all PCs are in vlan. We will create a virtual interface on switch with vlan 1 as follows.



```
Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#int
Switch(config)#interface vi
Switch(config)#interface vl
Switch(config)#interface vlan 1 ?
<cr>
Switch(config)#interface vlan 1
Switch(config-if)#ip ad
Switch(config-if)#ip address 192.168.1.1 255.255.255.0
Switch(config-if)#no shut
Switch(config-if)#no shutdown

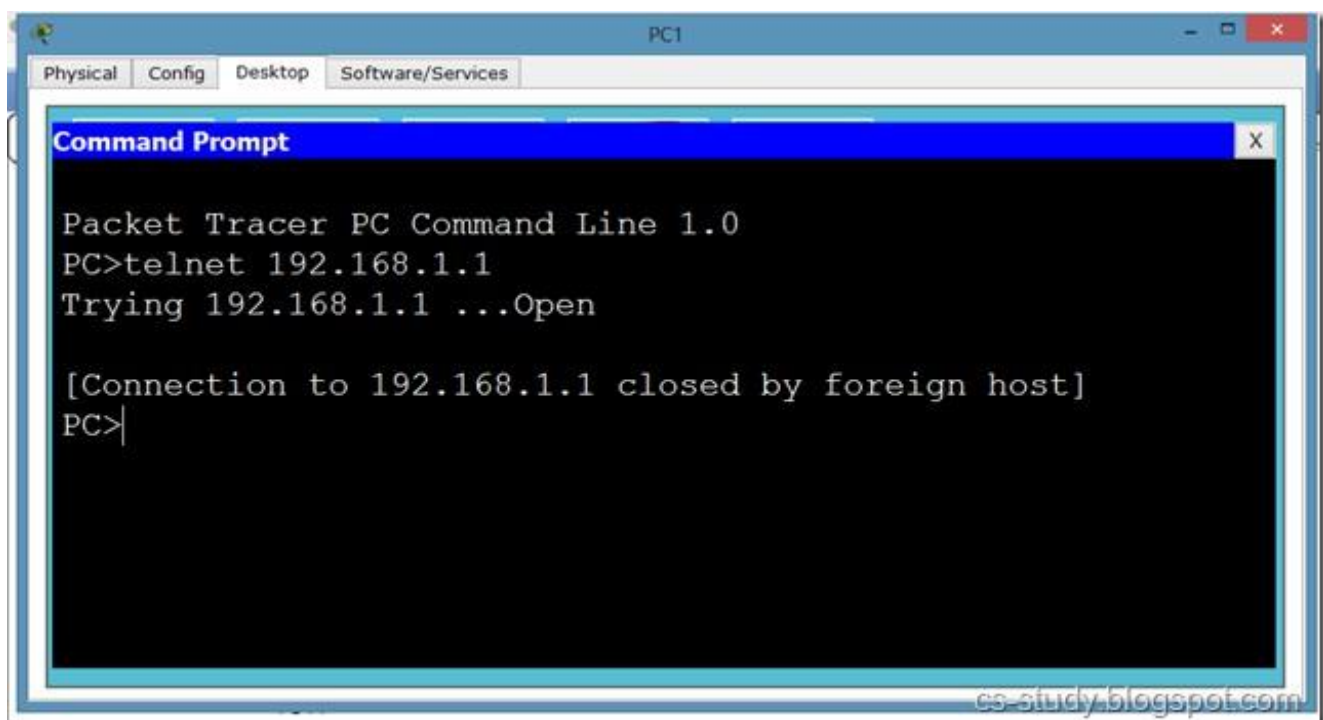
%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

Switch(config-if)#
```

Figure # 2(Configuring vlan connection)

Now, try to telnet the switch from our PC, it refuses because we have not applied authentication on the switch yet.

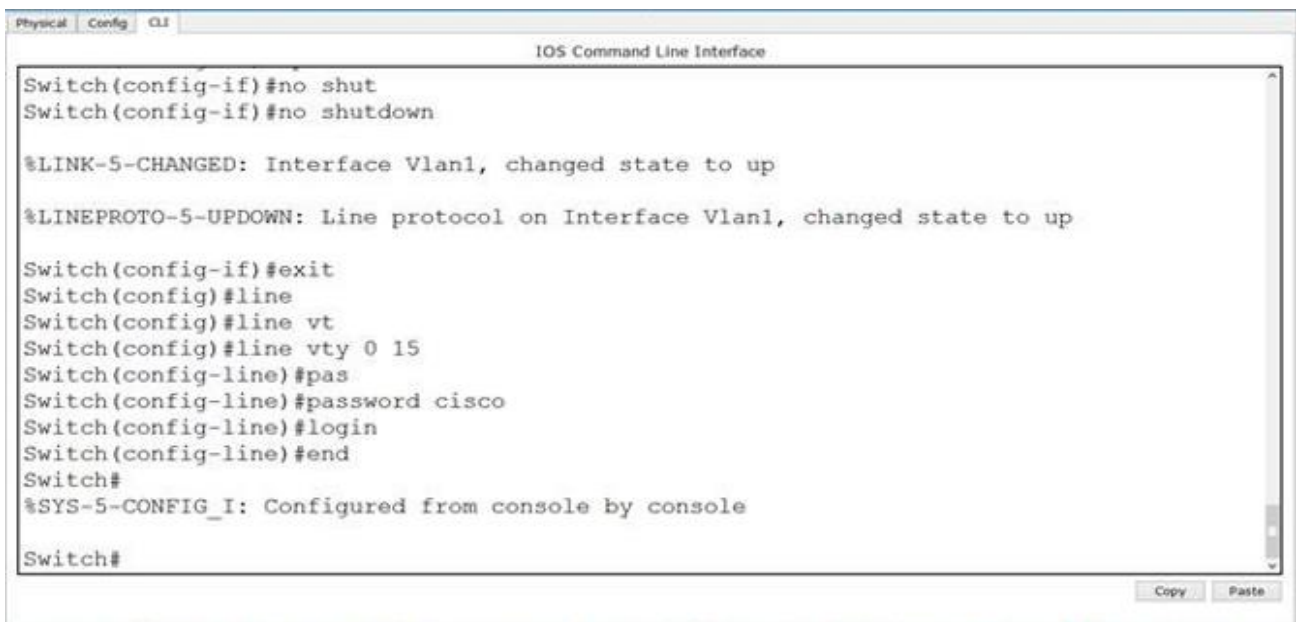


```
Packet Tracer PC Command Line 1.0
PC>telnet 192.168.1.1
Trying 192.168.1.1 ...Open

[Connection to 192.168.1.1 closed by foreign host]
PC>
```

Figure # 3(Initial checking of Vlan)

Secure Shell Server (SSH) and FTP services. Each Telnet, SSH, or FTP session requires one vty line. You can add security to your system by configuring the software to validate login requests.



```
Switch(config-if)#no shut
Switch(config-if)#no shutdown

%LINK-5-CHANGED: Interface Vlan1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up

Switch(config-if)#exit
Switch(config)#line
Switch(config)#line vt
Switch(config)#line vty 0 15
Switch(config-line)#pas
Switch(config-line)#password cisco
Switch(config-line)#login
Switch(config-line)#end
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#
```

Figure # 4(Creating vty line connection for telnet)

Now, we can easily telnet. But it does not let us go in the switch enabled mode because we have not set the password on the switch yet.



```
Command Prompt

Packet Tracer PC Command Line 1.0
PC>telnet 192.168.1.1
Trying 192.168.1.1 ...Open

[Connection to 192.168.1.1 closed by foreign host]
PC>telnet 192.168.1.1
Trying 192.168.1.1 ...Open

User Access Verification

Password:
Switch>en
% No password set.
Switch>
```

Figure # 5(Checking Vty line connection for telnet)

Let's apply password on the switch enabled mode.

```

Switch(config)#line
Switch(config)#line vt
Switch(config)#line vty 0 15
Switch(config-line)#pas
Switch(config-line)#password cisco
Switch(config-line)#login
Switch(config-line)#end
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#enable pas
Switch(config)#enable password cs
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#

```

Figure # 6(Adding password to enable mode)

Now, we can go inside Switch configuration mode from our pc.

```

Packet Tracer PC Command Line 1.0
PC>telnet 192.168.1.1
Trying 192.168.1.1 ...Open

[Connection to 192.168.1.1 closed by foreign host]
PC>telnet 192.168.1.1
Trying 192.168.1.1 ...Open

User Access Verification

Password:
Switch>en
% No password set.
Switch>en
Password:
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#

```

Figure # 7(Checking it by using command)

Introduction to SSH

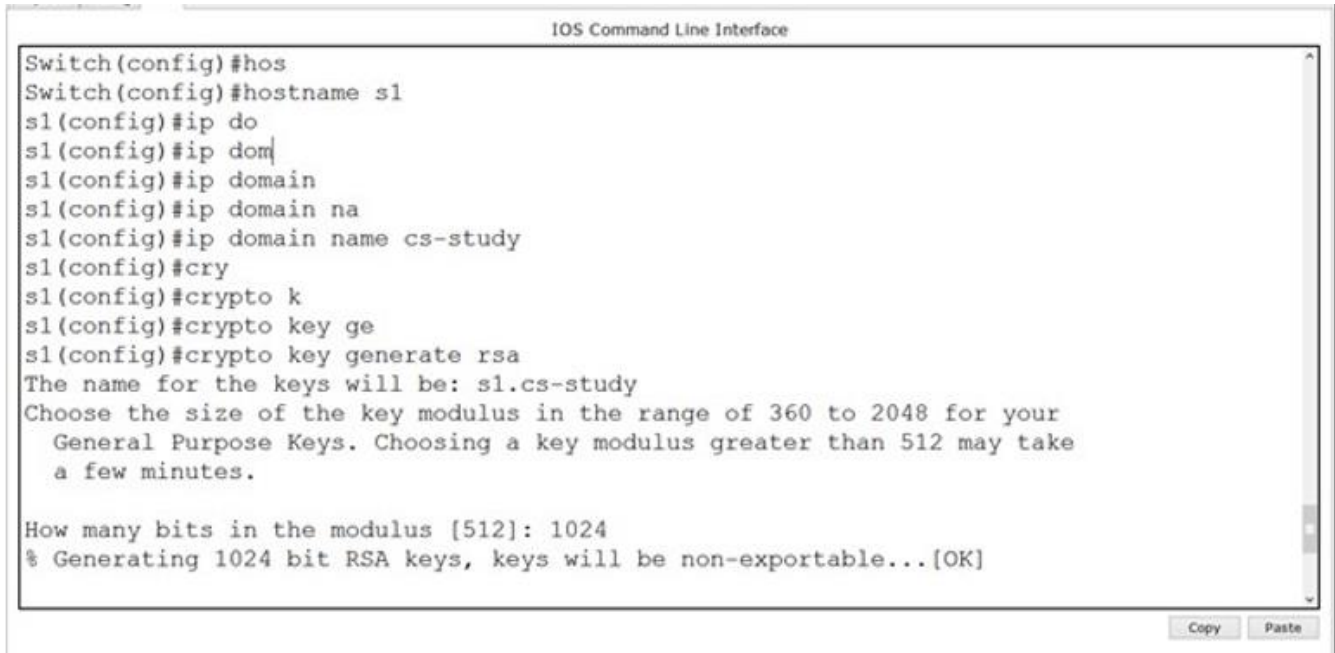
Secure Shell or Secure Socket Shell is a network protocol. It is an application layer protocol that is in the 7th layer of the Open Systems Interconnection (OSI) network model. It also refers to the suite of utilities that implements the SSH protocol.

Secure Shell also supports both password and key-based authentication. Password-based authentication let users provide username and password to authenticate to the remote server. A key-based authentication allows users to authenticate through a key-pair. The key pairs are two cryptographically secure keys for authenticating a client to a Secure Shell server.

Furthermore, the Secure Shell protocol also encrypts data communication between two computers. It is extensively used to communicate with a remote computer over the Internet.

Configuration of SSH

Taking the same topology as mentioned in figure 1. Below are the steps for SSH Protocol. Follow the figure 9 till figure 14 for the configuration of SSH Protocol.



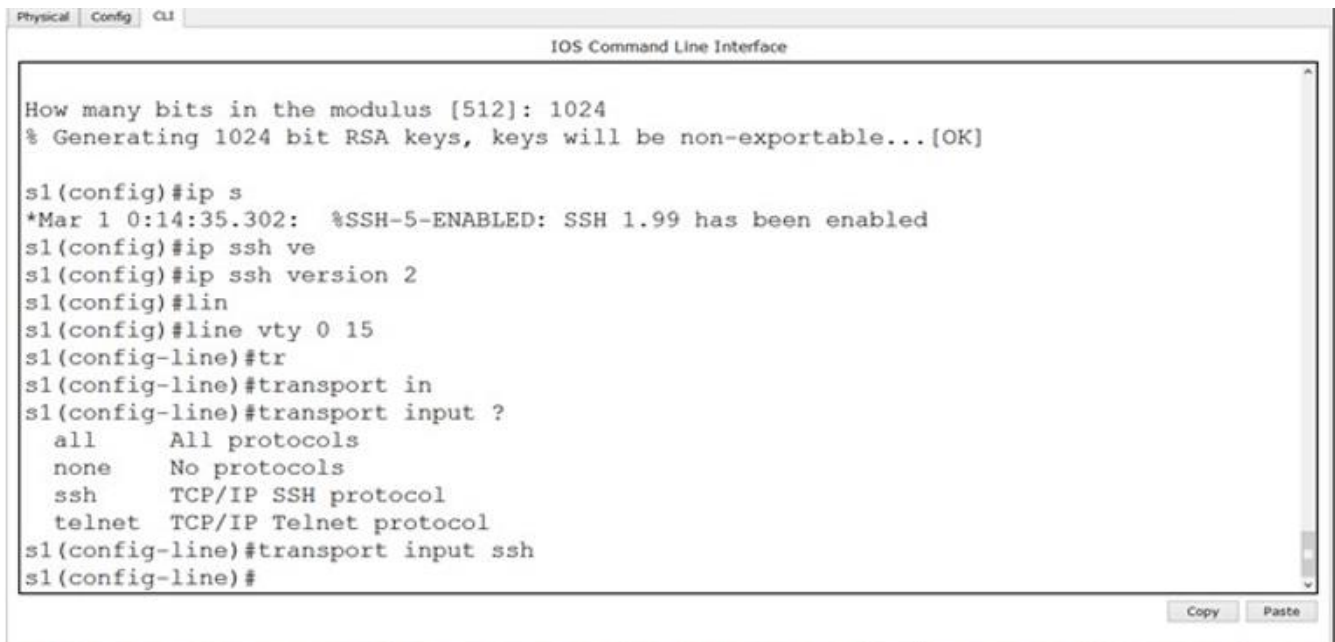
```
IOS Command Line Interface

Switch(config)#hostname s1
s1(config)#ip domain
s1(config)#ip domain na
s1(config)#ip domain name cs-study
s1(config)#crypto k
s1(config)#crypto key ge
s1(config)#crypto key generate rsa
The name for the keys will be: s1.cs-study
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]
```

Figure # 8(Creating domain and RSA Key)

Commands continued.



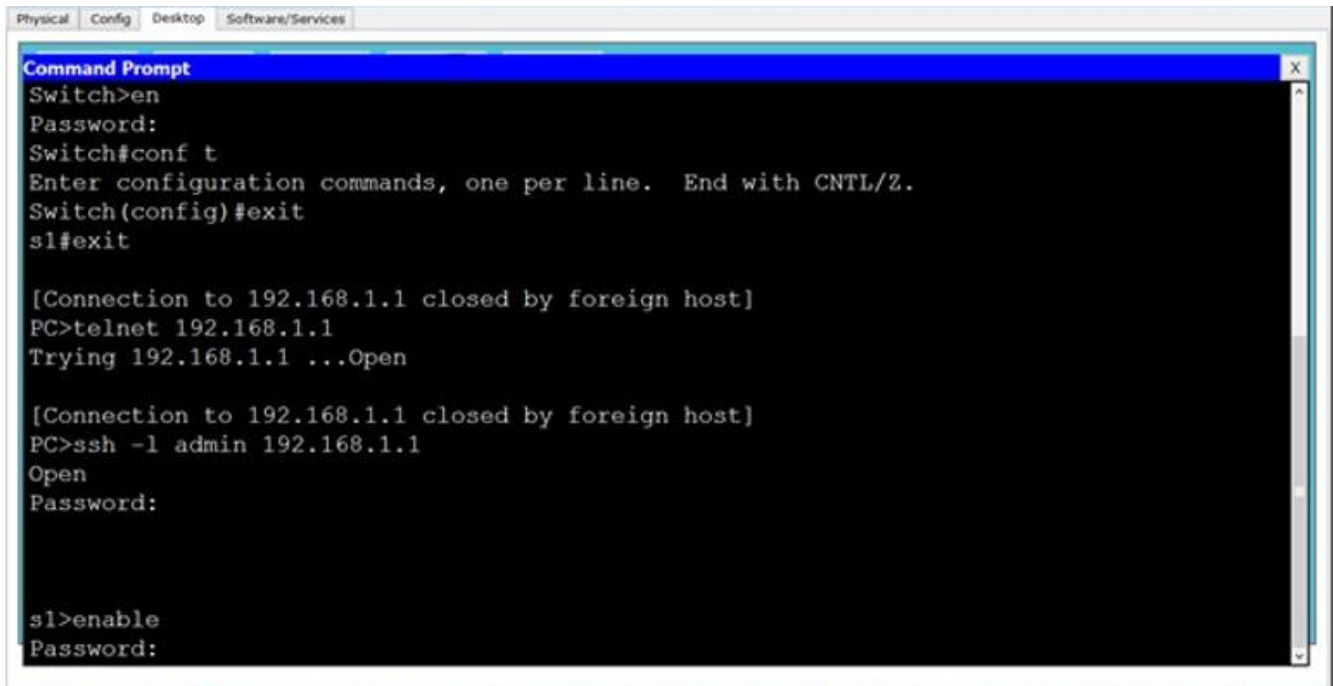
```
Physical Config CLI
IOS Command Line Interface

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

s1(config)#ip s
*Mar 1 0:14:35.302: %SSH-5-ENABLED: SSH 1.99 has been enabled
s1(config)#ip ssh ve
s1(config)#ip ssh version 2
s1(config)#lin
s1(config)#line vty 0 15
s1(config-line)#tr
s1(config-line)#transport in
s1(config-line)#transport input ?
all      All protocols
none     No protocols
ssh      TCP/IP SSH protocol
telnet   TCP/IP Telnet protocol
s1(config-line)#transport input ssh
s1(config-line)#
```

Figure # 9(Creating SSH Connection)

Protocol working on it. By default username is admin.



```
Physical Config Desktop Software/Services
Command Prompt
Switch>en
Password:
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#exit
sl#exit

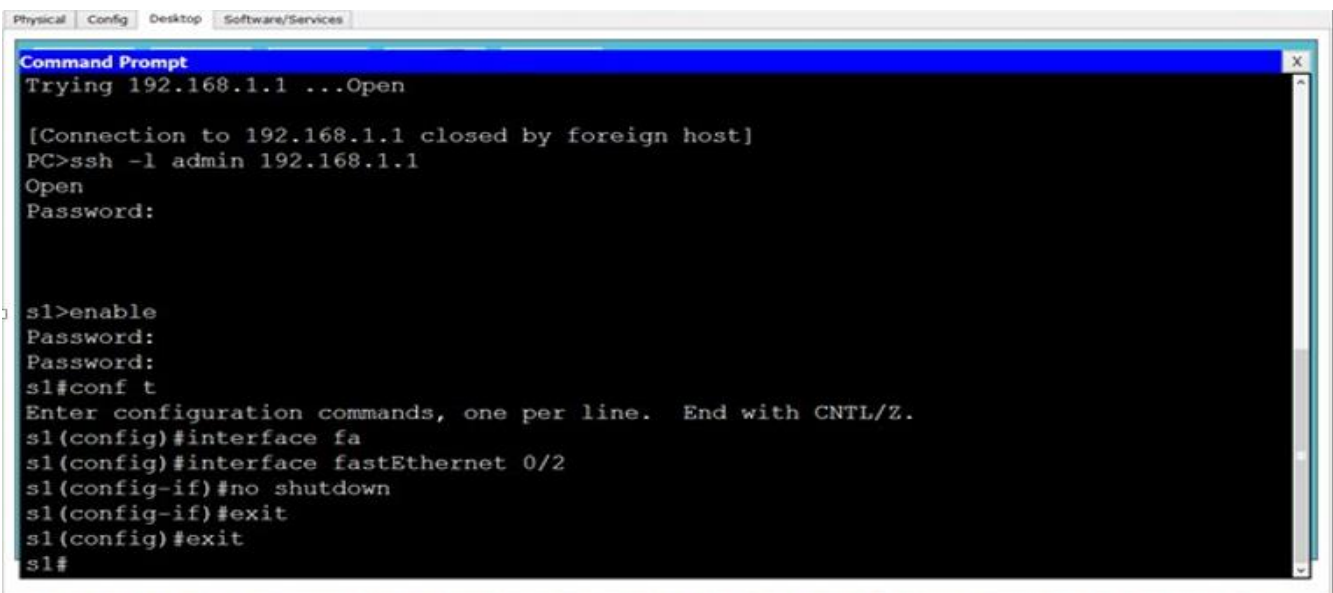
[Connection to 192.168.1.1 closed by foreign host]
PC>telnet 192.168.1.1
Trying 192.168.1.1 ...Open

[Connection to 192.168.1.1 closed by foreign host]
PC>ssh -l admin 192.168.1.1
Open
Password:

sl>enable
Password:
```

Figure # 10(Checking SSH Connection on admin user)

And we can apply any sort of configuration on our switch from our pc.



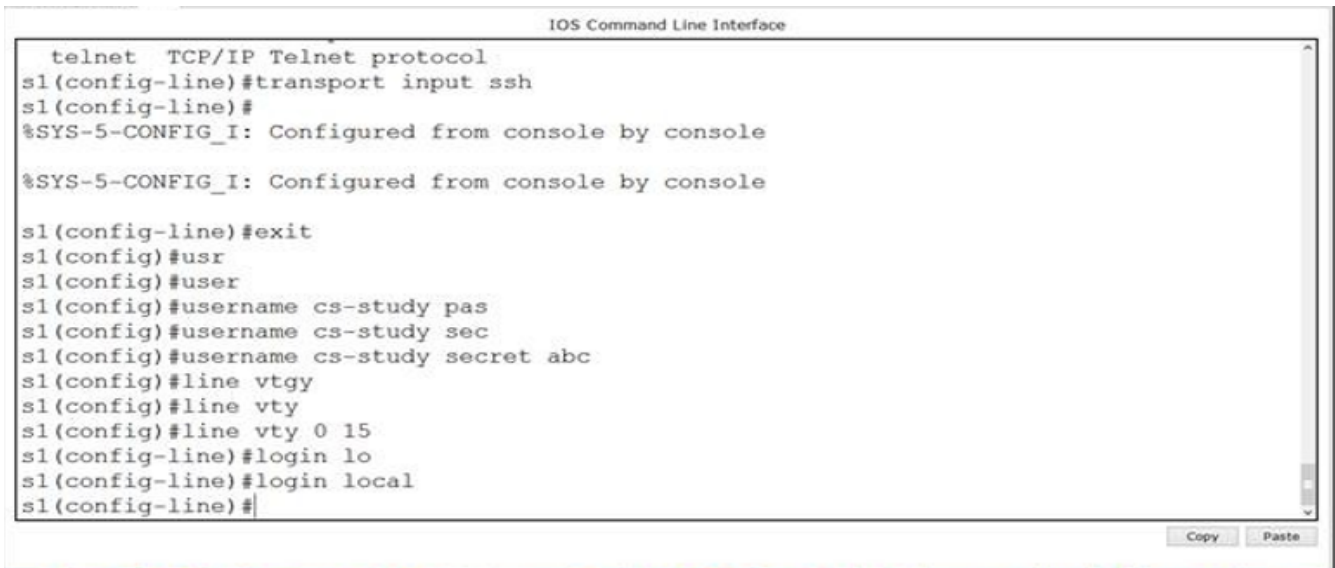
```
Physical Config Desktop Software/Services
Command Prompt
Trying 192.168.1.1 ...Open

[Connection to 192.168.1.1 closed by foreign host]
PC>ssh -l admin 192.168.1.1
Open
Password:

sl>enable
Password:
Password:
sl#conf t
Enter configuration commands, one per line. End with CNTL/Z.
sl(config)#interface fa
sl(config)#interface fastEthernet 0/2
sl(config-if)#no shutdown
sl(config-if)#exit
sl(config)#exit
sl#
```

Figure # 11(Moving to enable mode using specific computer)

Now, if we want to change the username from admin to something else, we will do it as follows.



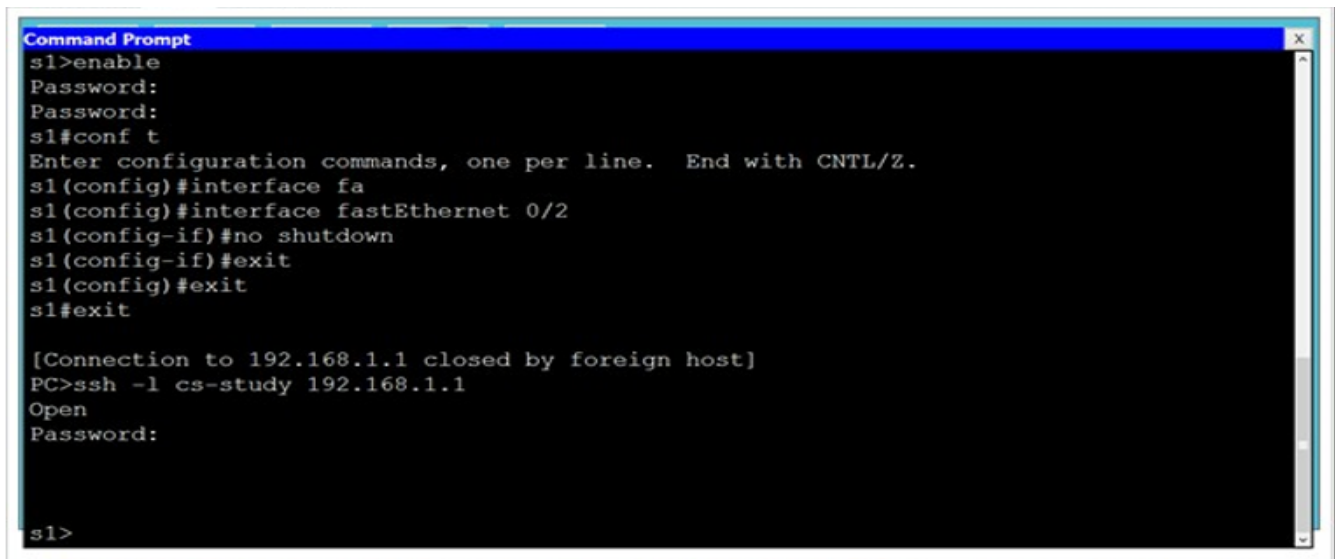
```
telnet TCP/IP Telnet protocol
s1(config-line)#transport input ssh
s1(config-line)#
%SYS-5-CONFIG_I: Configured from console by console

%SYS-5-CONFIG_I: Configured from console by console

s1(config-line)#exit
s1(config)#usr
s1(config)#user
s1(config)#username cs-study pas
s1(config)#username cs-study sec
s1(config)#username cs-study secret abc
s1(config)#line vty
s1(config)#line vty
s1(config)#line vty 0 15
s1(config-line)#login lo
s1(config-line)#login local
s1(config-line)#
```

Figure # 12(Creating vty connection on specific domain)

and from our pc as follows.



```
Command Prompt
s1>enable
Password:
Password:
s1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
s1(config)#interface fa
s1(config)#interface fastEthernet 0/2
s1(config-if)#no shutdown
s1(config-if)#exit
s1(config)#exit
s1#exit

[Connection to 192.168.1.1 closed by foreign host]
PC>ssh -l cs-study 192.168.1.1
Open
Password:

s1>
```

Figure # 13(Checking the connection)

Lab Exercises

Question # 1

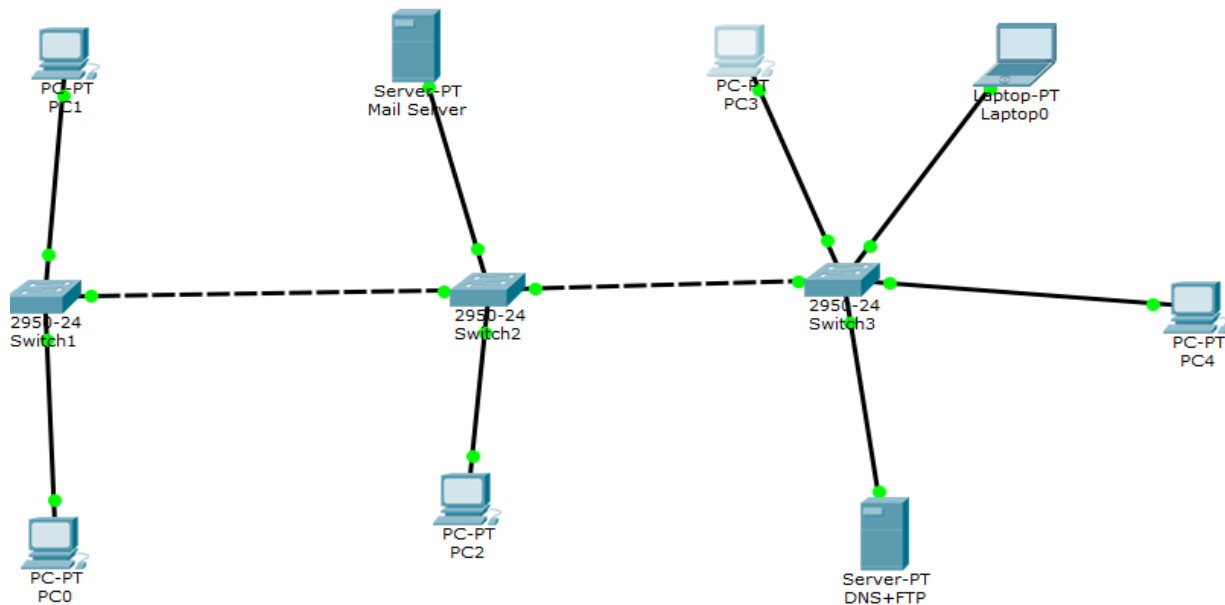


Figure A: Network Topology

1. Implement the topology given in figure A on cisco packet tracer.
2. The IP should assign to the computer using DHCP Pool. The Network should like this XX.XX.0.0 i.e. your roll number like 3879(38.79.0.0)
3. Computer can be able to hit the website using its nick name.
4. Verify the telnet connection from all switches nearest to the computer.
5. Do change the IP of Switch2 from PC2 using its command prompt.

Question # 2

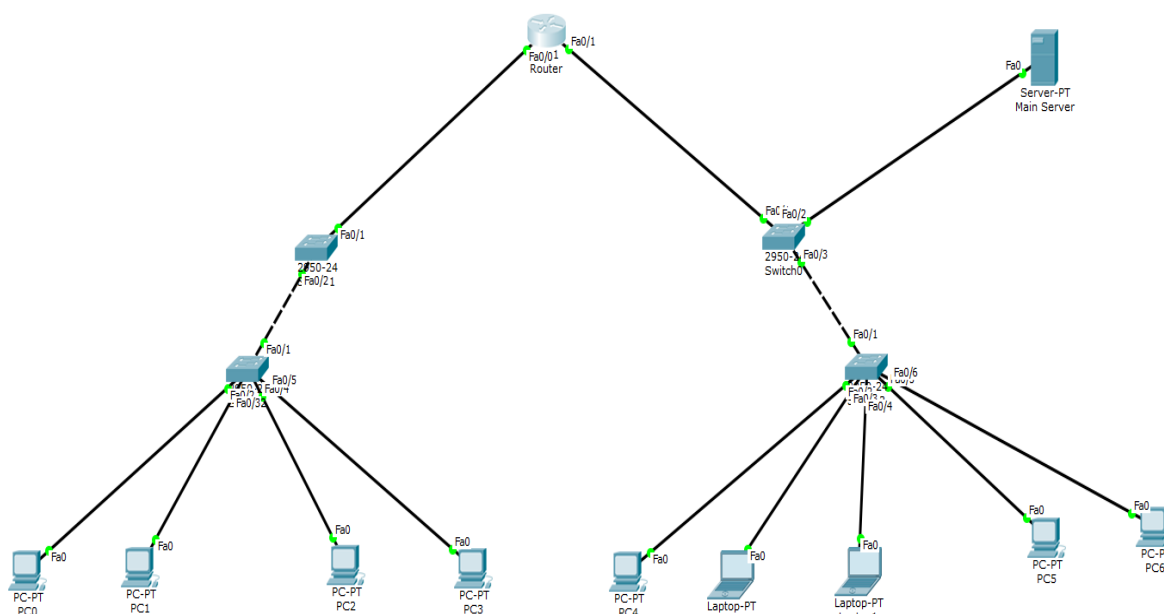


Figure B: Network Topology

1. Implement the figure B topology on cisco packet tracer.
2. The IP should assign to the computer using DHCP Pool but it should be created on router. The Network on one side of FastEthernet should like this XX.XX.0.0 i.e. your roll number like 3879(38.79.0.0) and on another side it should be 3880(38.80.0.0).
3. Run command of show run on Switch0 and Switch0 and take screenshot of it.
4. Verify SSH and do assign IP to another interface of Router. It should be done through laptop0. Take screenshot of it.
Run command of show ip route on router using PC0. It should be done in secure method. Take screenshot of it.