DOCUMENTATION

Network Topology Configuration using Putty

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Day 2: Network Topology Configuration using Putty

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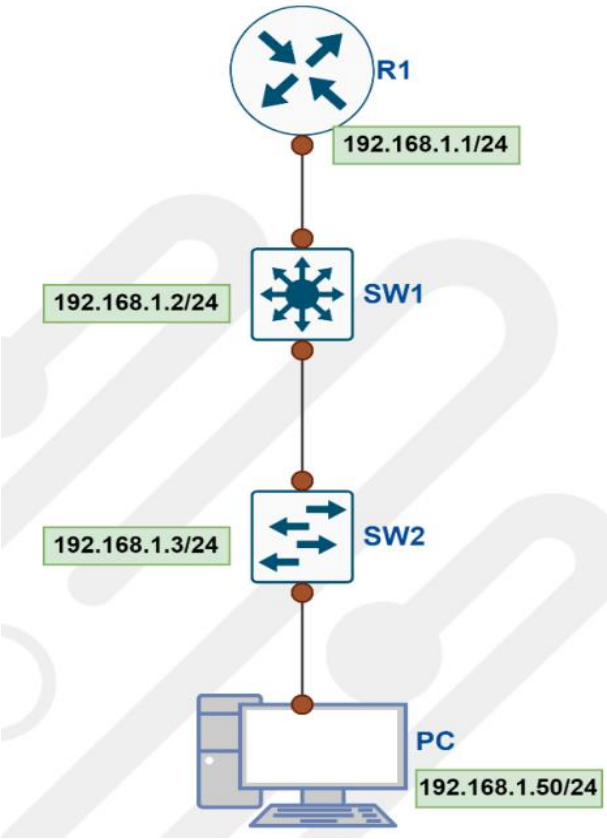
1. Introduction

This documentation provides essential configurations for configuring a simple network topology in which a PC can successfully communicate with a router (R1) and two switches (SW1 and SW2).
It covers configuration such as device naming, establishing connections between devices, setting up passwords for security, configuring interface settings on the router and switches, and configuring the PC with the IP. By following this step-by-step guide, you should be able to create a simple network topology.

2. Understanding the topology for implementation

Here in the following topology as shown in the figure, we will need to connect a router with a multilayer switch to be connected with the other switch and the second switch will be connected to the computer.



3. Devices used to build the network

- **A network router: Cisco 1900 Series**
- **A multilayer switch (Layer 3 switch)**
- **A network switch: Catalyst 3650**
- **A computer**

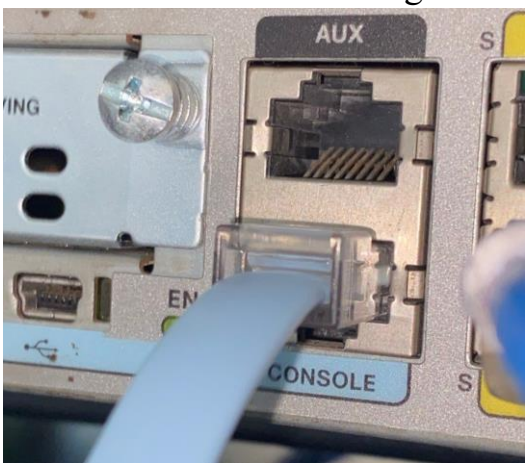
4. Connecting the devices together using an Ethernet cable

As we known from the previous documentation that to configure any network device you will obviously need to connect it with a console cable to the computer where you are monitoring from using application Putty.

In this documentation, when configuring R1, SW1, and SW2, we will connect the network device to the PC using the console cable. The ethernet port will be connected to the network device we want to configure and the serial interface will be on the backside of the computer.

5. Configuration of R1

At the beginning of the configuration, we will need to connect the router to the PC using a console cable. As shown in the figure:



5.1 Naming the router to R1

Of course, in any network it is important to differentiate between all the devices in the network, that's why its important to set a hostname for the device. As shown in the configuration, here is how to set a hostname for the router:

Router> enable
Router# configure terminal
Router (config)# hostname R1

```
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R1
```

5.2 Setting a password for the console port

It is very important to set a password for the console port to allow the access for authorized people only. In the next example, the password of the console will be "we123". Here is how to set a password for the console port:

R1 (config)# line console 0
R1 (config-line)# password we123
R1 (config-line)# login

```
R1(config)#line console 0
R1(config-line)#password we123
R1(config-line)#login
```

5.3 Setting an encrypted password for the privilege EXEC mode

To secure the router and switches, it's important to set an encrypted password for privileged EXEC mode. In the next example, the password for the privilege mode is "comm", here is how:

R1 (config)# enable secret comm

```
R1(config)#enable secret comm
```

5.4 Setting an appropriate message for the banner

A Message of the Day (MOTD) banner is an important parameter for warning unauthorized users and providing important information when people try to access the devices. To set a MOTD, use the following command:

R1 (config)# banner motd "Authorized Access Only!"

```
Router(config)#banner motd "Authorized Access Only!"
```

Attention!! Don't forget the quotation marks between the text you want to appear when anyone try to access the configuration.

5.5 Configuring and addressing the interface settings

In this topology, R1 is connected with SW1 using interface GigabitEthernet 0/0. So that, here is how to address the interface settings:

R1 (config)# interface GigabitEthernet 0/0
R1 (config-if)# ip address 192.168.1.1 255.255.255.0
R1 (config-if)# no shutdown

```
R1(config)#interface gigabitEthernet 0/0
R1(config-if)#ip address 192.168.1.1 255.255.255.0
R1(config-if)#no shutdown
```

5.6 Saving the configuration

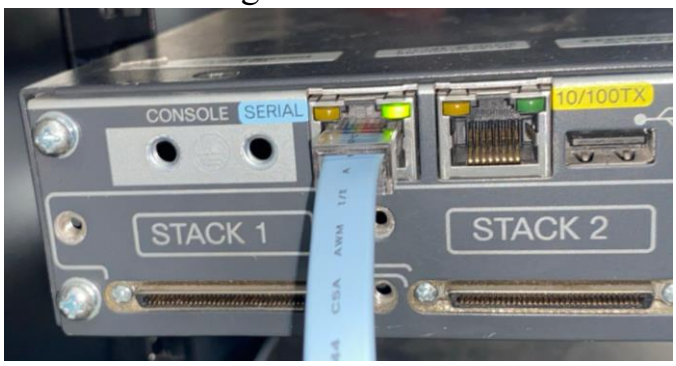
To save and ensure that all the configuration is saved, we will use this command in the privileged mode: copy running-config startup-config
And it automatically will be saved in the Non-Volatile Random-Access Memory (NVRAM). And instead, you can write "wr" for short, it has the same purpose.

```
R1(config)#do copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

Reminder: It's very important to save your work after finishing the configuration to prevent losing your settings if the switch is turned off.

6. Configuration of SW1

At the beginning of the configuration, you will need to connect the multilayer switch to the PC using a console cable. As shown in the picture:



Additionally, SW1 (Multilayer Switch) will be connected to SW2 (Network Switch) using an Ethernet cable. As shown in the picture:

6.1 Protection for the console port

Protection for the console port is important to ensure that only authorized users can access the device's console. Here is how protect it:

Core_1 (config)# line console 0
Core_1 (config-line)# password we123
Core_1 (config-line)# login

```
Core_1(config)#line console 0
Core_1(config-line)#password we123
Core_1(config-line)#login
Core_1(config-line)#exit
```

6.2 Setting an encrypted password for the privilege EXEC mode

To secure the privilege EXEC mode, set an encrypted password by writing:

Core_1 (config)# enable secret comm

```
Core_1(config)#enable secret comm
```

6.3 Making sure that all plain text passwords are encrypted

To prevent plain text passwords from being displayed in configuration files, we use the command "Service password-encryption" in the global configuration mode

```
Core_1(config)#service password-encryption
```

6.4 Configuring the default management interface so that it will accept connections over the network from local hosts

Configuring the management interface allows the switch to be managed over the network. The switch has a lot of VLANs (Virtual Local Area Networks) but the default management interface is vlan 1. Here is how to configure the default management interface:

Core_1 (config)# interface vlan 1
Core_1 (config-if)# ip address 192.168.1.2 255.255.255.0
Core_1 (config-if)# no shutdown

```
Core_1(config)#interface vlan 1
Core_1(config-if)#ip address 192.168.1.2 255.255.255.0
Core_1(config-if)#no shutdown
```

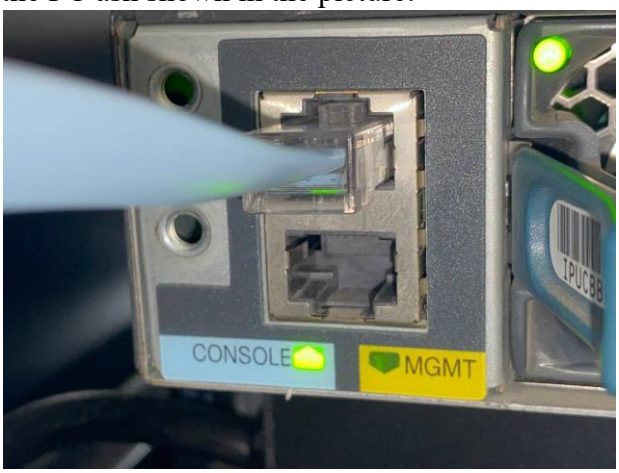
6.5 Saving the configuration

Don't forget to save the work after finishing the configuration by writing: wr

```
Core_1#wr
Building configuration...
[OK]
```

7. Configuration of SW2

As we did for the router and SW1, the same for SW2. Connect the console cable to the network switch with the PC ash shown in the picture:



7.1 Naming the network switch to SW2

Setting the hostname of the switch by typing:

Switch> enable
Switch# configure terminal
Switch (config)# hostname SW2

```
Switch>enable
Switch#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname SW2
```

7.2 Setting a password for both the console port and the privilege EXEC mode

Setting the password for the console and the privilege mode as we did before by writing:

SW2 (config)# line console 0
SW2 (config-line)# password we123
SW2 (config-line)# login
SW2 (config-line)# exit
SW2 (config)# enable secret comm

```
SW2(config)#line console 0
SW2(config-line)#password we123
SW2(config-line)#login
SW2(config-line)#exit
SW2(config)#
SW2(config)#
SW2(config)#enable secret comm
```

7.3 Setting an appropriate message for the banner

Here is how to set a MOTD banner:

SW2 (config)# banner motd "Authorized Access Only!"

```
SW2(config)#banner motd "Authorized Access Only!"
```

7.4 Configuring the default management interface so that it will accept connections over the network from local hosts

To configure the default management interface, write:

SW2 (config)# interface vlan 1
SW2 (config-if)# ip address 192.168.1.3 255.255.255.0
SW2 (config-if)# no shutdown

```
SW2(config)#interface vlan 1
SW2(config-if)#ip address 192.168.1.3 255.255.255.0
SW2(config-if)#
SW2(config-if)#
SW2(config-if)#no shutdown
SW2(config-if)#exit
```

7.5 Saving the configuration

Again, don't forget to save your work.

```
SW2#wr
Building configuration...
Compressed configuration from 2374 bytes to 1233 bytes[OK]
```

8. Configuration of PC

The first thing to do for a computer is to set an IP address for it whether by static or dynamically. In this example, we will set the IP address for the PC statically, follow the following steps:

1. Open the cmd of your computer but choose "RUN AS ADMINISTRATOR".
2. Write ipconfig to know what is the name of the Ethernet.

```
C:\Windows\system32>ipconfig

Windows IP Configuration


Ethernet adapter Ethernet 2:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::1d93:57b7:8b00:cbad%8
   IPv4 Address. . . . . . . . . . . : 192.168.1.4
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 192.168.1.1
```

And here all the details of the IP address are shown. At this step, we knew that the Ethernet Adapter name is "Ethernet 2".

3. Write the following command:

Netsh interface ip set address name="Ethernet 2" static 192.168.1.4 255.255.255.0 192.168.1.1

```
C:\Windows\system32>netsh interface ip set address name="Ethernet 2" static 192.168.1.4 255.255.255.0 192.168.1.1
```

9. Troubleshooting

To ensure that the work we did is successful, we should troubleshoot it by pinging the PC by its ip address to all other devices and it should ping successfully.

Here is pinging the PC to the network router:

```
C:\Users\vip>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:
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
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
```

Pinging the PC to the multilayer switch SW1:

```
C:\Users\vip>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=255
Reply from 192.168.1.2: bytes=32 time<1ms TTL=255
Reply from 192.168.1.2: bytes=32 time<1ms TTL=255
Reply from 192.168.1.2: bytes=32 time<1ms TTL=255

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 = 0ms, Average = 0ms
```

Pinging the PC to the network switch SW2:

```
C:\Users\vip>ping 192.168.1.3

Pinging 192.168.1.3 with 32 bytes of data:
Reply from 192.168.1.3: bytes=32 time=2ms TTL=255
Reply from 192.168.1.3: bytes=32 time=2ms TTL=255
Reply from 192.168.1.3: bytes=32 time=2ms TTL=255
Reply from 192.168.1.3: bytes=32 time=6ms TTL=255

Ping statistics for 192.168.1.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 6ms, Average = 3ms
```

All of the above pings are 0% loss which means that our network is configured successfully and now the PC can send any packet to the two switches and the router.

10. Question and Answer (Q&A) Section

Based on the previous configuration, the following questions clarify the configuration we did:

- What command did you use to save the configuration to NVRAM?
  - #Copy running-config startup-config
- What is the shortest version of this command that still works?
  - #wr
- Why should every router have a Message of the Day (MOTD) banner?
  - It provides a warning or important information to anyone trying to access the network device. It can serve as a warning to unauthorized access by displaying a message that access is restricted and unauthorized use is prohibited.
- What command do you use to view the configuration?
  - #show running-config
- Why do you need to enter the no shutdown command on the interface?
  - To bring an interface out of the down state. By default, interfaces on routers and switches are disabled, so without the no shutdown command, the traffic will have a big problem and no traffic will be passed.
- What is the command to save the configuration from RAM to NVRAM?
  - #copy running-config startup-config