

CNE – Tutorial Guide

Week 6

Part I. General Router Configuration

This tutorial introduces the first basic step to configure a Cisco Router. You will practice router configuration with Packet Tracer, a software which has powerful simulation, visualization, authoring, assessment, and collaboration capabilities.



1. Use a **console cable** to connect a **router (Console port)** with a **PC (RS 232 port)** like the description above.

For routers, Cisco provides a minimal configuration that requires you to give input before the devices can perform their functions. The router has a console port that is used to access the device from a directly attached terminal or PC with a terminal emulator.

2. Click on the PC, go to Desktop tab, choose Terminal. When you are asked to continue with configuration dialog, type **N** or **no** then press Enter.

```
--- System Configuration Dialog ---  
Continue with configuration dialog? [yes/no]: N
```

Press RETURN to get started!

Router>

3. Go to to privilege mode: **enable**

```
Router>enable  
Router#
```

4. Use these privileged mode commands that work with configuration files:

- Go to the global configuration mode to modify the running configuration manually from the terminal:

configure terminal

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

- Change Router's name: **hostname** <router's name>

```
Router(config)#hostname FIT-HANU  
FIT-HANU(config)#
```

- Set password to access via console line:

```
FIT-HANU(config)#line console 0  
FIT-HANU(config-line)#password yourpassword  
FIT-HANU(config-line)#exit  
FIT-HANU(config)#
```

- Set password to access via VTY line:

```
FIT-HANU(config)#line vty 0 4  
FIT-HANU(config-line)#password yourpassword  
FIT-HANU(config-line)#exit  
FIT-HANU(config)#
```

- Set password to access privilege mode:

```
FIT-HANU(config)#enable password yourpassword
FIT-HANU(config)#
```

* You have to remember all passwords you've already set.

- Configure IP address for FastEthernet0/0 and FastEthernet0/1 ports:

```
FIT-HANU(config)#interface fa0/0
FIT-HANU(config-if)#ip address 192.168.100.254 255.255.255.0
FIT-HANU(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
FIT-HANU(config-if)#exit
FIT-HANU(config)#
FIT-HANU(config)#interface fa0/1
FIT-HANU(config-if)#ip address 192.168.200.254 255.255.255.0
FIT-HANU(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
FIT-HANU(config-if)#exit
FIT-HANU(config)#exit
%SYS-5-CONFIG_I: Configured from console by console
FIT-HANU#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
```

5. Privileged mode commands to work with configuration files.

- **configure terminal** - modify the running configuration manually from the terminal.
- **show running-config** - display the running configuration.
- **show startup-config** - display the startup configuration.
- **copy running-config startup-config** - copy the running configuration to the startup configuration.
- **copy startup-config running-config** - copy the startup configuration to the running configuration.
- **erase startup-config** - erase the startup-configuration in NVRAM.
- **copy tftp running-config** - load a configuration file stored on a Trivial File Transfer Protocol (TFTP) server into the running configuration.
- **copy running-config tftp** - store the running configuration on a TFTP server.

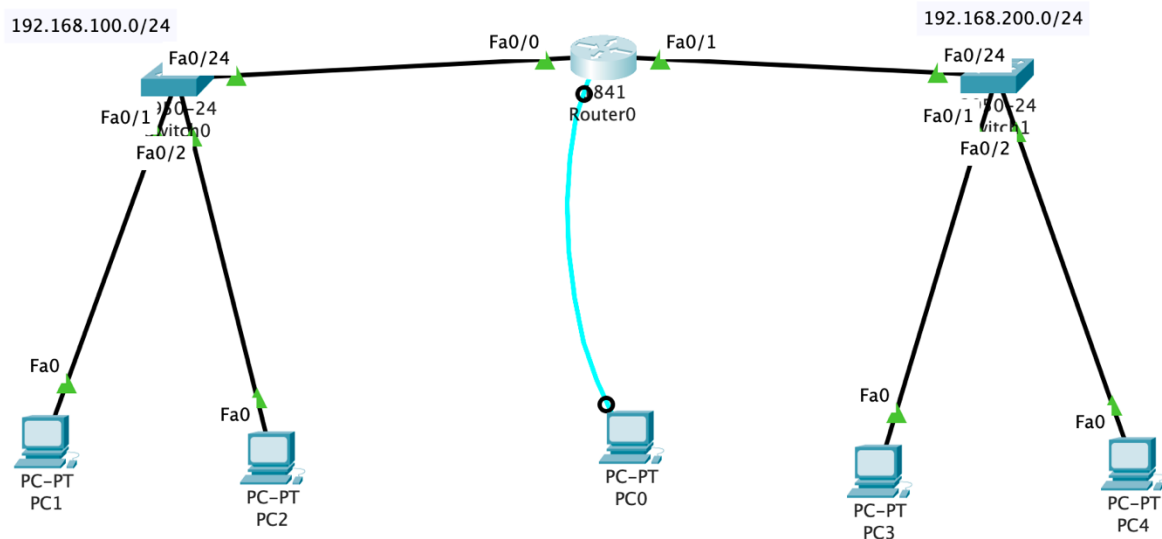
6. Remember to write you configuration to memory before reboot the Router.

There are actually two important configuration files on any router. There is the configuration file that describes the current running state of the router, which is called the *running-config*. Then, there is the configuration file that the router uses to boot, which is called the *startup-config*. Only the *startup-config*

is stored in NVRAM so any time you make changes to the router configuration, you must save the changes to memory because if you do not they will be lost if there is a system reload or power outage by simply copying the *running-config* onto the *startup-config* file.

7. Examine the Router configuration

- Draw a network like this example: Connect router with two switches, then each switch can be connected with one or more PCs. Remember to use straight-through cable.



If the light is green, so we might be change the interface state up successfully.

Fa0/0 of router: 192.168.100.254/24

Fa0/1 of router: 192.168.200.254/24

Configure PC1:

IP Address: 192.168.100.1
Subnet Mask: 255.255.255.0
GW: 192.168.100.254

Configure PC2:

IP Address: 192.168.100.2
Subnet Mask: 255.255.255.0
GW: 192.168.100.254

Configure PC3:

IP Address: 192.168.200.1
Subnet Mask: 255.255.255.0
GW: 192.168.200.254

Configure PC4:

IP Address: 192.168.200.2
Subnet Mask: 255.255.255.0
GW: 192.168.200.254

- From the terminal, try pinging PC1, PC2, PC3, PC4.

```
FIT-HANU#ping 192.168.100.1

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 9/11/13 ms

FIT-HANU#ping 192.168.100.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.3, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 10/10/12 ms
...
```

Don't worry if the success rate at the first time you ping is only 80 percent. When you try pinging the second time, the success rate will be 100 percent.

- From the command line of one PC you can also try pinging the Router and the other PCs.

Part II. Static Routing Configuration

Scenario:

We have 2 networks A and B:

- Network A: 192.168.100.0/24
- Network B: 192.168.200.0/24

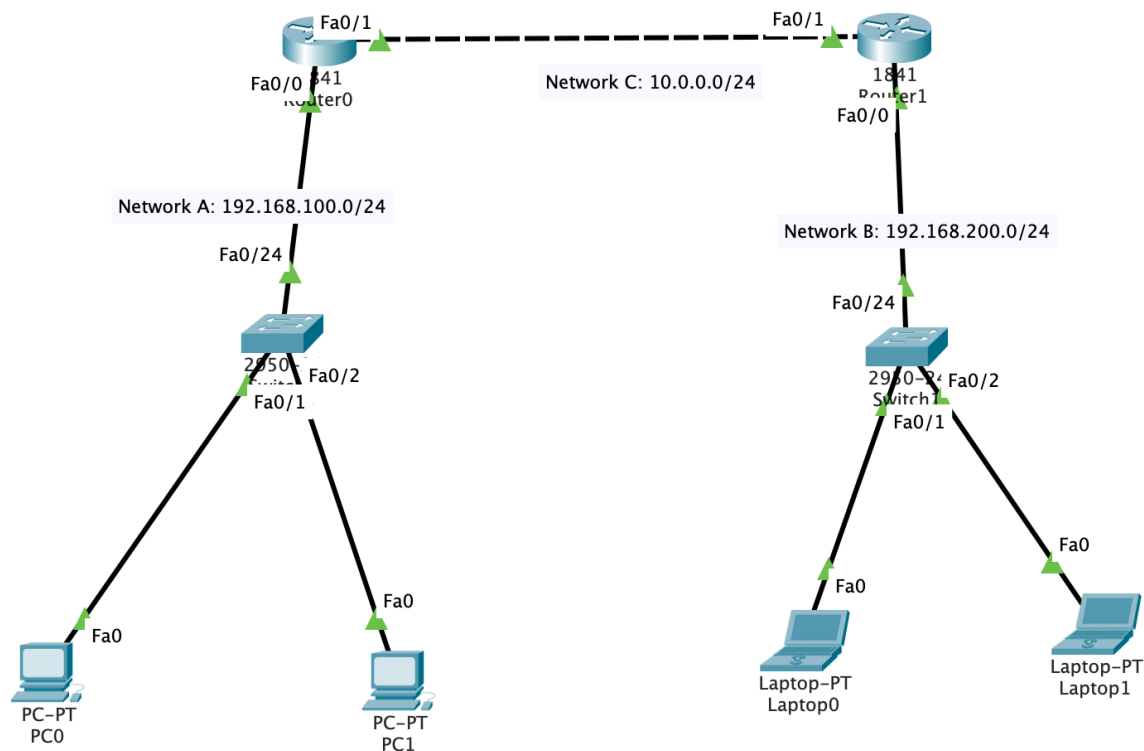
Recall: PCs, routers, Laptops connected to a switch (or hub) form a network. In the picture, Switch0 (together with connected devices) forms Network A; Switch1 (together with connected devices) forms Network B.

Connection between PCs/Laptops and Switch: Copper Straight-through

Connection between Routers and Routers: Copper Cross-over

In addition, the connection between Router0 and Router1 forms a network, called Network C.

What we are going to do is to successfully find the route from PC0 to Laptop0.



Now we have to configure each device so that there are 3 different networks (192.168.100.0/24, 192.168.200.0/24 and 10.0.0.0/24):

Router 0: interface FastEthernet0/0: 192.168.100.254, subnet 255.255.255.0
 Router 0: interface FastEthernet0/1: 10.0.0.1, subnet 255.255.255.0

Router 1: interface FastEthernet0/0: 192.168.200.254, subnet 255.255.255.0
 Router 1: interface FastEthernet0/1: 10.0.0.2, subnet 255.255.255.0]

PC 0: ip 192.168.100.2, subnet 255.255.255.0, gateway 192.168.100.254
 Laptop0: ip 192.168.200.2, subnet 255.255.255.0, gateway 192.168.200.254

Note: *If you don't know how to configure the devices, please do the tutorial in week 10 again.*

After being successfully configured, all the red lights will turn to green. At this situation, PC0 and Router0 are successfully connected to Switch0. They can ping each other. Laptop0 and Router1 are successfully connected to Switch1. They can ping each other too. However we cannot ping from PC0 to Laptop0 as network B is still invisible to Router0 and network A is still invisible to Router1. To make it possible, we have to 'teach' the two routers, using the syntax:

ip route <ip address of the routed network> <its subnet> <ip of the next hope>

Remember to exit to global configuration mode before routing.

For example, we want the **Router0** to learn the route to PC1, so the network B will be the routed network (which connect Router1 and Laptop0), and the hope next to Router0 will be the port Fa0/1 of the Router1, which is 10.0.0.2. We will type the command like this:

```
ip route 192.168.200.0 255.255.255.0 10.0.0.2
```

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

Router(config)#interface fa0/1
Router(config-if)#ip address 10.0.0.1 255.255.255.0
Router(config-if)#exit
Router(config)#ip route 192.168.200.0 255.255.255.0 10.0.0.2
```

Similarly we have to teach the **Router1** the route of network A which connects PC0 and Router0:

```
ip route 192.168.100.0 255.255.255.0 10.0.0.1
```

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

Router(config)#interface fa0/1
Router(config-if)#ip address 10.0.0.2 255.255.255.0
Router(config-if)#exit
Router(config)#ip route 192.168.100.0 255.255.255.0 10.0.0.1
```

To check how router remembers the routed network, we exit to privilege mode and type **show ip route**

```
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

    10.0.0.0/24 is subnetted, 1 subnets
C       10.0.0.0 is directly connected, FastEthernet0/1
C    192.168.100.0/24 is directly connected, FastEthernet0/0
S    192.168.200.0/24 [1/0] via 10.0.0.2

Router#
```

Now that the two routers have known how to reach devices of the routed networks, we can ping from PC0 to Laptop0 and vice versa. Click on the PC icon, choose Desktop tab and choose Command Prompt tool.