Lab 01: The IOS operating System

Contents

Cisco IOS

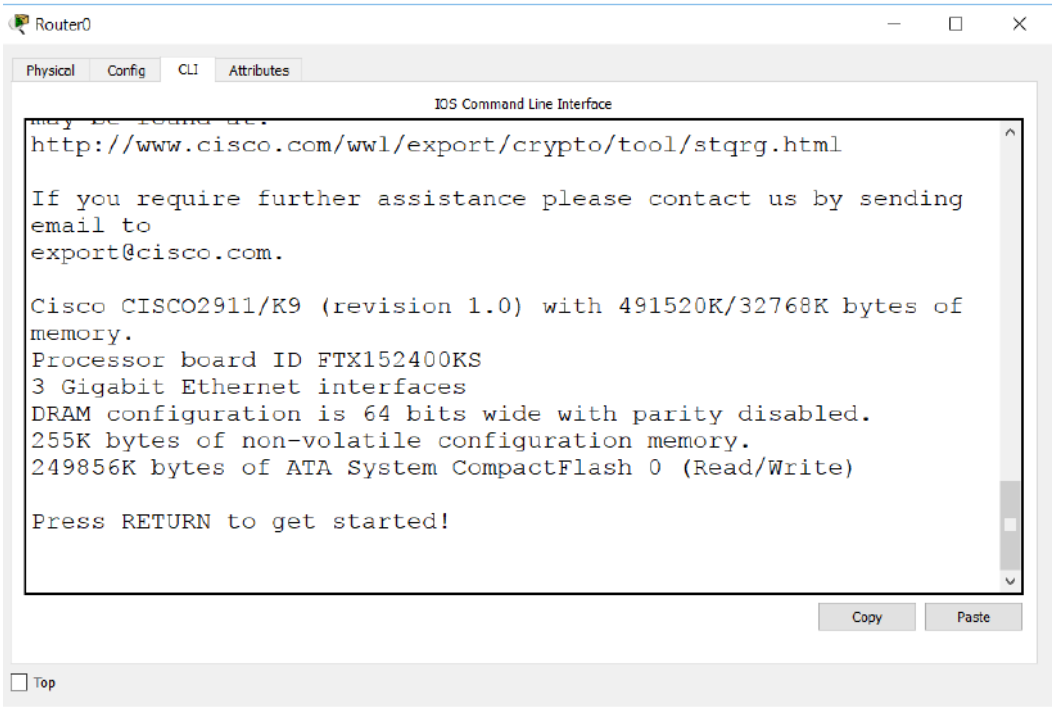
- Cisco IOS (Internetwork Operating System) is a proprietary operating system that runs on Cisco Systems routers and switches.
- The core function of Cisco IOS is to enable data communications between network nodes.
- It provides functionalities that an administrator can use to control the networking traffic.

Load the project

- Extract the “04 The IOS Operating System.zip” file.
- Open Packet tracer.
- Open the extracted .pkt file.

Connect to your device

- Click on Router0 and open the CLI tab.



- Press Return, then enter the privileged Exec mode.
  Router> enable
  Router#
- Reboot the device.
  Router#reload
  Proceed with reload? [confirm]
- If prompted to enter the initial configuration dialog, enter no.
  Would you like to enter the initial configuration dialog? [yes/no]: no

Explore user Exec mode and CLI command tab

- If the prompt is Router>, then you are in user Exec mode.
- Enter a question mark to explore the commands that are available in User Exec mode.

```
Router>?
Exec commands:
  <1-99>      Session number to resume
  connect     Open a terminal connection
  disable     Turn off privileged commands
  disconnect  Disconnect an existing network connection
  enable      Turn on privileged commands
  exit        Exit from the EXEC
  logout      Exit from the EXEC
  ping        Send echo messages
  resume      Resume an active network connection
  show        Show running system information
  ssh         Open a secure shell client connection
  telnet      Open a telnet connection
  terminal    Set terminal line parameters
  traceroute  Trace route to destination
```

- If you type an invalid command not available in the current Exec mode, the CLI prints an error message.

```
Router>show run
          ^
% Invalid input detected at '^' marker.
```

Exploring Privileged Exec (Enable) Mode and Context Sensitive Help

- Enter Privileged Exec mode. This mode is often commonly known as Enable mode. Notice that the prompt changes to 'Router#'

```
Router>enable
Router#
```

- Drop back to User Exec mode.

```
Router#disable
Router>
```

- Check to see all commands that begin with 'sh'

```
Router#sh?
Show
```

- Enter 'show ?' to see all available show commands.
  - Notice that we have now included a space before the question mark.
  - This enters context sensitive help for the 'show' command.
  - Unfortunately, its use may be disabled in the simulator questions on the CCNA exam, so you'll need to actually know the commands.

```
Router>show ?
  arp             Arp table
  cdp             CDP information
  class-map       Show QoS Class Map
  clock           Display the system clock
  controllers     Interface controllers status
  crypto          Encryption module
  dot11           IEEE 802.11 show information
  flash:          display information about flash: file system
  frame-relay     Frame-Relay information
  history         Display the session command history
  hosts           IP domain-name, lookup style, nameservers, and host
table
```

Explore Global Configuration Mode

- Global Configuration mode is where we can enter configuration which affects the device as a whole
- Enter Global Configuration mode. (The command can be abbreviated to 'conf t'.)

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

- Change the hostname of the device to R1.

```
Router(config)#hostname R1
R1(config)#
```

- Check which interfaces are available in the router.

```
R1(config)#show ip interface brief
          ^
% Invalid input detected at '^' marker.
```

  - We get an error message because the "show" command runs in privileged Exec mode.
  - We can override this for 'show' commands by entering 'do' at the start of the command. This works from any level in the command hierarchy.

```
R1(config)#do show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0     unassigned      YES NVRAM  administratively down down
GigabitEthernet0/1     unassigned      YES NVRAM  administratively down down
GigabitEthernet0/2     unassigned      YES NVRAM  administratively down down
Vlan1                  unassigned      YES NVRAM  administratively down down
```

- Enter Interface Configuration mode for one of your interfaces.

```
R1(config)#interface gigabitEthernet 0/0
R1(config-if)#
```

- Drop back down to Global Configuration mode.

```
R1(config-if)#exit
R1(config)#
```

  - The ‘exit’ command drops back down one level.
- Drop all the way back down to Privilege Exec mode with a single command.

```
R1(config-if)#end
R1#
```

  - The ‘end’ command drops back down to Privilege Exec mode from any level. You can also achieve this by entering ‘Ctrl-C’
- View the entire device configuration.

```
R1#show running-config
```

```
R1#show running-config
Building configuration...

Current configuration : 697 bytes
!
version 15.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R1
!
!
!
!
!
!
!
!
ip cef
no ipv6 cef
!
!
 --More--
```

- View configuration lines which include the word ‘interface’.

  R1#show run | include interface

```
R1#show run | include interface
interface GigabitEthernet0/0
interface GigabitEthernet0/1
interface GigabitEthernet0/2
interface Vlan1
```

- View all configuration lines which do not include the word ‘interface’.

  R1#show run | exclude interface

IOS Configuration Management

- A startup configuration is stored in the nonvolatile memory of a device, which means that all configuration changes are saved even if the device loses power.
- Copy the running configuration to the startup configuration.

  R1#copy run start
  Destination filename [startup-config]?
  Building configuration...
  [OK]

- Change the hostname of the router to RouterX.

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

  - Notice that when you enter a command in IOS it takes effect immediately.

- Check what hostname will be used when the system reboots.

```
RouterX(config)#do show startup-config
Using 697 bytes
!
version 15.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R1
!
!
!
!
!
!
!
!
ip cef
no ipv6 cef
!
```

    - Commands take effect immediately but are not persistent across a reboot until we save them.
- Save the current running configuration so it will be applied next time the router is reloaded.

```
RouterX#copy run startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

- Verify the new hostname will be applied following a reboot.

```
RouterX#show startup-config
Using 702 bytes
!
version 15.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname RouterX
!
!
!
!
!
!
!
!
ip cef
no ipv6 cef
```

- Backup the current running configuration to flash memory in the router.

```
RouterX#copy run flash:
Destination filename [running-config]? config-backup
Building configuration...
[OK]
```

- It's not a good idea to back up a device to the device itself, so enter the command to back the running configuration up to an external TFTP server.

```
RouterX#copy run tftp
Address or name of remote host []? 10.10.10.10
Destination filename [RouterX-confg]?
Writing running-config.....
%Error opening tftp://10.10.10.10/RouterX-confg (Timed out)
```

- Reload the device and check it comes back up with the expected configuration with hostname RouterX.

```
RouterX#reload
Proceed with reload? [confirm]
```

- To reset the router to factory settings:
  - Step 1: enter enable mode

```
RouterX>en
```

  - Step 2: enter “write erase“ command

```
RouterX#write er
RouterX#write erase
Erasing the nvram filesystem will remove all configuration files! Continue?
[confirm]
[OK]
Erase of nvram: complete
%SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
```

  - Step 3: reload the router

```
RouterX#reload
Proceed with reload? [confirm]
```

Exercise

1. Rename the router to “Basic0”.
2. Apply the new configuration.
3. Save a backup to the internal memory of the router. Save the file with name “myBackup”.
4. Check if the configurations are applied successfully.
5. Reload the router.
6. Reset the router to factory defaults.

Solutions

1. Router#conf t
   Enter configuration commands, one per line. End with CNTL/Z.
   Router(config)#hostname Basic0

2. Basic0(config)#do copy run start
   Destination filename [startup-config]?
   Building configuration...
   [OK]

3. Basic0(config)#do copy run flash:
   Destination filename [running-config]? myBackup
   Building configuration...
   [OK]

4. Basic0(config)#do show startup-config

5. Basic0(config)#exit
   Basic0#
   %SYS-5-CONFIG_I: Configured from console by console

   Basic0#reload
   Proceed with reload? [confirm]

6. RouterX>en
   RouterX#write erase
   Erasing the nvram filesystem will remove all configuration files!
   Continue? [confirm]
   [OK]
   Erase of nvram: complete
   %SYS-7-NV_BLOCK_INIT: Initialized the geometry of nvram
   RouterX#reload
   Proceed with reload? [confirm]

Creating a network topology