IT 307- Exploring the Networks
Lab 3- Basics of Cisco Packet Tracer and Router and Gateway Configurations

Part A: Modes of Routers

Cisco routers operate in several different modes, each with specific functions and permissions. Below is a description of the different modes and some basic commands that are executed within each mode.

1. User EXEC Mode
Description: This is the first mode you access after logging into a Cisco device. It has limited capabilities, mainly for viewing basic information. You can identify this mode by the `>` symbol in the prompt (e.g., `Router>`).
Basic Commands:
- `ping [IP Address]`: Test connectivity to another network device.
- `show version`: Display information about the router's software and hardware.
- `show ip interface brief`: Display a summary of the router's interfaces and their IP addresses.

2. Privileged EXEC Mode
Description: This mode allows access to all router commands, including configuration commands. It is accessed from User EXEC mode and is identified by the `#` symbol (e.g., `Router#`). This mode is also called "enable mode."
Basic Commands:
- `enable`: Enter Privileged EXEC mode from User EXEC mode.
- `disable`: Return to User EXEC mode.
- `show running-config`: Display the current configuration stored in RAM.
- `show startup-config`: Display the configuration stored in NVRAM that will be used upon reboot.
- `reload`: Reboot the router.
- `copy running-config startup-config`: Save the current configuration to NVRAM.

3. Global Configuration Mode
Description: This mode is used to configure the router. It allows changes that affect the entire router. You enter this mode from Privileged EXEC mode, and it is identified by `(config)#` in the prompt (e.g., `Router(config)#`).
Basic Commands:
- `configure terminal`: Enter Global Configuration mode from Privileged EXEC mode.
- `hostname [name]`: Set the router's hostname.
- `enable secret [password]`: Set the password for Privileged EXEC mode.
- `interface [type and number]`: Enter interface configuration mode (e.g., `interface gigabitEthernet 0/0`).
- `exit`: Return to the previous mode (Privileged EXEC mode).
- `ip route [network] [mask] [next-hop]`: Configure a static route.

4. Interface Configuration Mode
Description: This mode is used to configure individual router interfaces. It is entered from Global Configuration mode and is identified by `(config-if)#` in the prompt (e.g., `Router(config-if)#`).
Basic Commands:
- `ip address [IP Address] [Subnet Mask]`: Assign an IP address to the interface.
- `ipv6 address [IPv6 Address]`: Assign an IPv6 address to the interface.
- `no shutdown`: Enable the interface (turn it on).
- `description [text]`: Add a description to the interface for documentation purposes.
- `exit`: Return to Global Configuration mode.

5. Line Configuration Mode

Description: This mode is used to configure settings on console, auxiliary, or VTY (Virtual Terminal) lines. It is entered from Global Configuration mode and is identified by `(config-line)#` in the prompt (e.g., `Router(config-line)#`).

Basic Commands:

- `line console 0`: Enter Console line configuration mode.
- `line vty 0 4`: Enter VTY line configuration mode for remote access.
- `password [password]`: Set a password for the line.
- `login`: Require login to access the line.
- `exit`: Return to Global Configuration mode.

6. Router Configuration Mode

Description: This mode is used to configure routing protocols. It is entered from Global Configuration mode and is identified by `(config-router)#` in the prompt (e.g., `Router(config-router)#`).

Basic Commands:

- `router rip`: Enter RIP routing protocol configuration mode.
- `network [network]`: Advertise a network in the routing protocol.
- `version 2`: Set the RIP version to 2.
- `exit`: Return to Global Configuration mode.

7. ROMMON Mode (ROM Monitor)

Description: This is a low-level mode used for disaster recovery, such as password recovery or restoring the router to a factory default state. It is accessed during the router's boot process and is identified by the `rommon>` prompt.

Basic Commands:

- `confreg [value]`: Change the configuration register value.
- `boot`: Boot the router using a specified image or configuration.
- `tftpdnld`: Download a new IOS image using TFTP.

PART B: Basic Router Commands

1. Accessing the Router:

Router> enable - This command moves you from User EXEC mode to Privileged EXEC mode.

2. Entering Global Configuration Mode:

Router# configure terminal- This command allows you to enter the global configuration mode where you can make changes to the router’s configuration.

3. Setting the Router Hostname:

Router(config)# hostname R1 - This command changes the router's hostname to "R1."

4. Configuring a Password for Privileged EXEC Mode:

Router(config)# enable secret mypassword- This command sets a password for accessing Privileged EXEC mode. Replace "mypassword" with your desired password.

5. Setting a Console Password:

Router(config)# line console 0
Router(config-line)# password cisco
Router(config-line)# login
- This command sets a password for console access to the router.

6. Configuring an Interface with an IPv4 Address:

Router(config)# interface gigabitEthernet 0/0
Router(config-if)# ip address 192.168.10.1 255.255.255.0

Router(config-if)# no shutdown

- This command configures the IP address and subnet mask for the GigabitEthernet 0/0 interface and enables the interface.

7. Configuring an Interface with an IPv6 Address:

Router(config)# interface gigabitEthernet 0/0

Router(config-if)# ipv6 address 2001:DB8:ACAD:1::1/64

Router(config-if)# no shutdown

- This command configures the IPv6 address and prefix for the GigabitEthernet 0/0 interface and enables the interface.

8. Saving the Configuration:

Router# copy running-config startup-config

- This command saves the current configuration to the startup configuration, ensuring that it will be loaded on the next reboot.

9. Viewing the Running Configuration:

Router# show running-config- This command displays the current configuration stored in the router's RAM.

10. Viewing the Status of Interfaces:

Router# show ip interface brief

- This command shows a brief summary of the status of all interfaces, including IP addresses and whether the interface is up or down.

11. Assigning a Default Gateway (for a router as a host):

Router(config)# ip default-gateway 192.168.10.254

- This command sets the default gateway for the router itself (useful if the router is acting as a host or needs to access another network).

12. Configuring a Router Interface Description:

Router(config)# interface gigabitEthernet 0/0

Router(config-if)# description Link to Switch0

- This command adds a description to the interface, which helps identify the purpose of the interface.

13. Configuring a Router to Use SSH:

Router(config)# ip domain-name mydomain.com

Router(config)# crypto key generate rsa

Router(config)# ip ssh version 2

Router(config)# line vty 0 4

Router(config-line)# transport input ssh

Router(config-line)# login local

- These commands configure the router to use SSH for remote management.

PART C: Configuring the Default Gateway

IPv4 address

Step 1: Setting Up the Basic Network Topology

Adding Devices: Drag and drop one Cisco 1841 Router, two Cisco 2960 Switches, and four PCs onto the workspace in Cisco Packet Tracer.

Connecting Devices:

Connect PCs to Switches:

PC0 and PC1 to Switch0 using Copper Straight-Through cables.

PC2 and PC3 to Switch1 using Copper Straight-Through cables.

Connect Switches to Router:

Connect Switch0 to the Router's GigabitEthernet0/0 interface using a Copper Cross-Over cable.

Connect Switch1 to the Router's GigabitEthernet0/1 interface using a Copper Cross-Over cable.

Step 2: Configuring IPv4 Addresses

1. **Assigning IPv4 Addresses to PCs:**
    - Click on PC0, go to the "Desktop" tab, and select "IP Configuration."
        - **IP Address:** 192.168.10.2
        - **Subnet Mask:** 255.255.255.0
        - **Default Gateway:** 192.168.10.1
    - Repeat the process for PC1 with:
        - **IP Address:** 192.168.10.3
    - Repeat the process for PC2 and PC3, connected to Switch1:
        - **IP Address (PC2):** 192.168.20.2
        - **IP Address (PC3):** 192.168.20.3
        - **Subnet Mask:** 255.255.255.0
        - **Default Gateway:** 192.168.20.1
2. **Configuring Router Interfaces with IPv4:**
    - Click on the Router and go to the "CLI" tab.
    - Enter the following commands to configure the router's interfaces

```
Router> enable
Router# configure terminal

! Configuring GigabitEthernet 0/0 for Switch0
Router(config)# interface gig0/0
Router(config-if)# ip address 192.168.10.1 255.255.255.0
Router(config-if)# no shutdown
! Configuring GigabitEthernet 0/1 for Switch1
Router(config)# interface gig0/1
Router(config-if)# ip address 192.168.20.1 255.255.255.0
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)# end
Configuring IPv6 addresses
```

Step 3: Configuring IPv6 Addresses

1. **Assigning IPv6 Addresses to PCs:**
    - Click on PC0, go to the "Desktop" tab, and select "IP Configuration."
        - **IPv6 Address:** 2001:DB8:ACAD:1::2/64
        - **Default Gateway:** 2001:DB8:ACAD:1::1
    - Repeat the process for PC1 with:
        - **IPv6 Address:** 2001:DB8:ACAD:1::3/64
    - Repeat the process for PC2 and PC3, connected to Switch1:
        - **IPv6 Address (PC2):** 2001:DB8:ACAD:2::2/64
        - **IPv6 Address (PC3):** 2001:DB8:ACAD:2::3/64
        - **Default Gateway:** 2001:DB8:ACAD:2::1
2. **Configuring Router Interfaces with IPv6:**
    - On the Router CLI, enter the following commands

```
Router> enable
Router# configure terminal
! Configuring IPv6 for GigabitEthernet 0/0
Router(config)# interface gig0/0
Router(config-if)# ipv6 address 2001:DB8:ACAD:1::1/64
Router(config-if)# no shutdown
```

```
! Configuring IPv6 for GigabitEthernet 0/1
Router(config)# interface gig0/1
Router(config-if)# ipv6 address 2001:DB8:ACAD:2::1/64
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)# end
```