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LICENCIATURA EM ENG. DE COMPUTADORES E INFORMÁTICA

REDES DE COMUNICAÇÕES I

LAB GUIDE

CISCO ROUTERS COMMAND LINE

Purpose

- How to get to the Router/SwitchRouter Console
- To provide a basic list of Cisco Command Line instructions

Duration

Tasks to be (mostly) performed out of class

Simple CLI Guide for Cisco IOS

1. Basic Command Line Navigation

```
enable                  // Enter privileged EXEC mode
configure terminal      // Enter global configuration mode
exit                    // Exit to previous mode
write memory            // Save configuration
show running-config     // Display current configuration
show ip interface brief  // Show status of interfaces
```

1.1. Using Auto-Complete and "?" in Cisco CLI

```
<Tab>    // Auto-completes a partially typed command
?        // Displays possible commands or parameters
```

Example:

```
Router# show ip ?  // Displays possible subcommands for "show ip"
```

1.2. Cisco prompt and levels

Cisco IOS has different command-line interface (CLI) prompt levels, known as **privilege levels**, that control access to various commands. The three most common levels are:

1.2.1. User EXEC Mode (Privilege Level 1)

Prompt: `Router>`

Access: Basic monitoring and connectivity commands (e.g., `ping`, `show version`)

Restrictions: Cannot modify the configuration or view sensitive details

To enter: Automatically accessed after login

Exit command: `logout` or `exit`

1.2.2. Privileged EXEC Mode (Privilege Level 15)

Prompt: `Router#`

Access: Full access to view and troubleshoot the device (e.g., `show running-config`)

To enter: Type `enable` in User EXEC mode (requires a password if configured)

Exit command: `disable` (returns to User EXEC mode)

1.2.3. Global Configuration Mode

Prompt: `Router(config)#`

Access: Allows modification of the device configuration

To enter: Type `configure terminal` or `conf t` in Privileged EXEC mode

Exit command: `exit` (returns to Privileged EXEC mode)

1.2.4. Other Configuration Modes

Interface Configuration Mode (`Router(config-if)#`) – Configures specific interfaces like Ethernet or serial ports.

Line Configuration Mode (`Router(config-line)#`) – Configures terminal lines (e.g., console, vty).

Router Configuration Mode (`Router(config-router)#`) – Configures dynamic routing protocols like OSPF, EIGRP.

2. Global Configuration Commands

2.1. Enabling IPv6 Routing

```
ipv6 unicast-routing  // Enable global IPv6 routing
```

2.2. Allow the Use of Subnet Zero

By default, older Cisco routers do not allow the use of **subnet zero**. To enable it:

```
Router(config)# ip subnet-zero
```

This command allows the use of the first subnet (e.g., `192.168.1.0/26`).

2.3. Enable and Disable IP Domain Lookup

By default, Cisco routers attempt to resolve mistyped commands as domain names, causing delays. To **disable IP domain lookup**:

```
Router(config)# no ip domain-lookup
```

To **enable IP domain lookup** (if disabled):

```
Router(config)# ip domain-lookup
```

2.4. Configure a DNS Server

To configure a DNS server on the router:

```
Router(config)# ip name-server 8.8.8.8 8.8.4.4   ! Set Google DNS servers
Router(config)# ip domain-lookup                 ! Ensure domain lookup is enabled
Router(config)# ip domain-name example.com       ! Define a default domain name
```

To test DNS resolution:

```
Router# ping google.com
```

2.5. Enable DHCP Service on a Cisco Router

By default, the DHCP service is enabled on Cisco routers, but if it has been disabled, you can enable it with the following command:

```
Router(config)# service dhcp
```

To **disable** the DHCP service, use:

```
Router(config)# no service dhcp
```

To verify that DHCP is running, use:

```
Router# show ip dhcp server statistics
Router# show running-config | include dhcp
```

3. Configuring IPv4 and IPv6 on Physical and VLAN Interfaces

3.1. IPv4 Configuration

```
interface GigabitEthernet0/1    // Enter interface configuration mode
 ip address 192.168.1.1 255.255.255.0  // Assign IPv4 address
 no shutdown   // Enable the interface
 exit
```

3.2. IPv6 Configuration

```
interface GigabitEthernet0/1    // Enter interface configuration mode
 ipv6 address 2001:db8::1/64   // Assign IPv6 address
 ipv6 enable  // Enable IPv6 on the interface
 no shutdown
 exit
```

3.3. VLAN Interface Configuration

```
interface vlan 10
 ip address 192.168.10.1 255.255.255.0
 no shutdown
 exit
```

3.4. Configuring Sub-Interfaces for VLANs (Single VLAN)

```
interface GigabitEthernet0/1.10  // Create sub-interface for VLAN 10
 encapsulation dot1Q 10          // Assign VLAN 10 to the sub-interface
 ip address 192.168.10.1 255.255.255.0  // Assign IP address
exit
interface GigabitEthernet0/1
 no shutdown
```

---

4. Configuring a DHCP Server

4.1. Enable and Configure a DHCP Server for IPv4

To configure the router as a **DHCP server**, follow these steps:

```
Router(config)# ip dhcp excluded-address 192.168.1.1 192.168.1.10  ! Exclude
addresses (e.g., reserved for static IPs)
Router(config)# ip dhcp pool MYPOOL       ! Create a DHCP pool
Router(dhcp-config)# network 192.168.1.0 255.255.255.0   ! Define subnet
Router(dhcp-config)# default-router 192.168.1.1  ! Set default gateway
Router(dhcp-config)# dns-server 8.8.8.8 8.8.4.4   ! Define DNS servers
Router(dhcp-config)# lease 7   ! Lease time (7 days)
Router(dhcp-config)# exit
```

To verify DHCP leases:

```
Router# show ip dhcp binding
```

4.2. Using IP Helper Address (Forward DHCP Requests)

```
interface vlan 10
 ip helper-address 192.168.2.1  // Forward DHCP requests to DHCP server
```

---

5. Routing

5.1. Configuring Static Routing

```
ip route 192.168.2.0 255.255.255.0 192.168.1.2  // Static route to network
192.168.2.0
```

For IPv6:

```
ipv6 route 2001:db8:1::/64 2001:db8::2  // Static route for IPv6
```

5.2. Configuring RIP

5.2.1. RIP for IPv4

```
router rip
 version 2  // Enable RIPv2
 network 192.168.1.0
 network 192.168.2.0
 no auto-summary
 redistribute connected subnets
 redistribute static subnets
```

5.2.2. RIP for IPv6

```
ipv6 router rip MYRIP
 redistribute connected
 redistribute static
 interface GigabitEthernet0/1
 ipv6 rip MYRIP enable
```

5.3. Configuring Basic OSPF

5.3.1. OSPF for IPv4

```
router ospf 1  // OSPF process ID
 network 192.168.1.0 0.0.0.255 area 0  // Define OSPF area
 network 192.168.2.0 0.0.0.255 area 0
 redistribute connected subnets
 redistribute static subnets
```

5.3.2. OSPF for IPv6

```
ipv6 router ospf 1
 router-id 1.1.1.1
 interface GigabitEthernet0/1
 ipv6 ospf 1 area 0
```

---

6. Cisco ESW: Routing vs. Switching Interfaces

6.1. Routing Interface (Layer 3)

```
interface FastEthernet0/1
 ip address 192.168.1.1 255.255.255.0
 no shutdown
 exit
```

6.2. Switching Interface (Layer 2)

```
interface FastEthernet1/0 - 1/15
 switchport mode access  // Set as access port
 switchport access vlan 10  // Assign to VLAN 10
 no shutdown
 exit
```

6.3. Configuring a Trunk Interface

```
interface FastEthernet1/14
 switchport mode trunk  // Set interface as trunk
 switchport trunk allowed vlan 10,20,30  // Allow specific VLANs
 no shutdown
 exit
```

Router configuration:

Connect the Router to the PC. After a while, the Router prompt will appear:

```
router>
```

To configure the IP address of the Router interface (assuming its name is `FastEthernet 0/0`), execute the following commands (the following example refers to Group 1):

```
router>enable
router#show run
```

observe the router configuration and the name of the interfaces

```
router#configure terminal
router(config)#
router(config)#interface FastEthernet 0/0
router(config-if)#ip address 192.1.1.11 255.255.255.0
router(config-if)#no shutdown
router(config-if)#end
router#write
Building configuration...
[OK]
router#
```

Error while executing `interface FastEthernet 0/0`? Why? How can I find out the right name of the interface?