

Module 1 Lab Guide

Command Line Interface and Basic Commands Lab

Prerequisite

This lab exercise has no prerequisites.

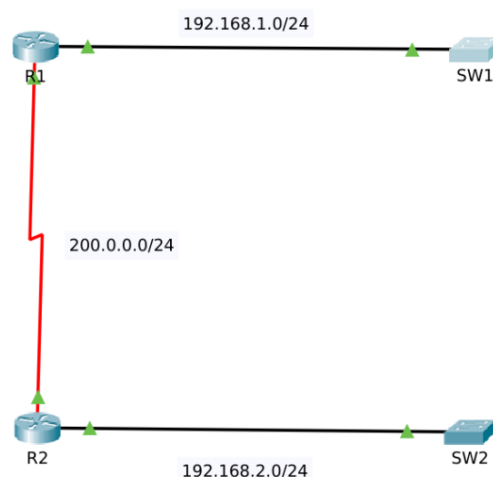
Lab Objective:

The main objective of this lab is to provide participants with hands-on experience in using the Command Line Interface (CLI) and basic commands. By the end of this lab, participants should be able to:

1. Access and navigate the CLI of networking devices.
2. View critical device information, including hardware and software details.
3. Display the current active configuration of a networking device.
4. Filter and display specific information from the device's configuration.
5. Examine and interpret interface details and statistics.
6. Test connectivity using the "ping" command to check reachability to specific destinations.
7. Trace the path of packets using the "traceroute" command.
8. Understand and interpret routing table information on a router.

Topology:

The lab is prepared with the devices that are represented in the topology diagram, with the IPv4 addresses depicted in the table.



Device Information:

The lab devices have been fully configured; you'll use Cisco IOS commands to verify device configurations.

Device	Characteristic	Value
SW1	VLAN 1 IPv4 address	192.168.1.100/24
SW1	Default gateway	192.168.1.1
SW2	VLAN 1 IPv4 address	192.168.2.100/24
SW2	Default gateway	192.168.2.1
R1	GigabitEthernet0/0/0 IPv4 address	192.168.1.1/24
R1	Serial0/1/0 IPv4 address	200.0.0.1/24
R2	GigabitEthernet0/0/0 IPv4 address	192.168.2.1/24
R2	Serial0/1/0 IPv4 address	200.0.0.2/24

Step 1: Launch Cisco packet tracer

To launch Cisco Packet Tracer on the desktop, follow the following steps:

- a) Click "OK" on the dialog box that pops and on any other dialog boxes appear during the startup process until Cisco Packet Tracer has fully loaded.
- b) Once Cisco Packet Tracer is running, proceed to open "Module 1 Lab.pkt," by following these steps:
 - a. Click on the "File" menu in the Packet Tracer application.
 - b. Select the "Open" option from the menu.
- c) In the file selection dialog box, navigate to coursera directory by following this path:
"/home/coder/coursera"
- d) Locate and select the "Module 1 Lab.pkt" file, and then click the "Open" button to load the lab file into Cisco Packet Tracer.

Step 2. Access Privileged EXEC Mode on SW1

Click SW1 and navigate to the CLI tab then press Enter key. Use **enable** command to access the privileged EXEC mode.

```
SW1>enable
SW1#
```

There is no password configured on the switch. The change of the last character in the prompt from > to # is an indication you have successfully accessed the privileged mode.

Step 3. Display SW1 Hardware and Software Info

To examine key information about the SW1's hardware and software configuration, use the “**show version**” command. This command gives details such as the switch's model, installed memory, software version, uptime, and configuration register. Use the **space bar** key on the keyboard to reveal the subsequent page of output. Continue pressing it until you reach the conclusion of the command output.

```
SW1#show version
```

From the command output, observe the following details;

1. **Cisco IOS Software Information:**
 - Cisco IOS Software version: 12.2(25)FX
 - Feature Set: LANBASE
 - Release Type: RELEASE SOFTWARE (fc1)
 - Copyright: Cisco Systems, Inc. (1986-2005)
 - Compilation Date: Wed 12-Oct-05 22:05 by pt_team
2. **ROM Information:**
 - Boot Loader Version: 12.2(25r)FX
 - Release Type: RELEASE SOFTWARE (fc4)
3. **System Status:**
 - System returned to ROM by power-on
4. **Hardware Details:**
 - Device Model: Cisco WS-C2960-24TT
 - Processor: RC32300, revision C0
 - Memory: 21039K bytes
5. **Interfaces:**
 - 24 FastEthernet/IEEE 802.3 interfaces
 - 2 Gigabit Ethernet/IEEE 802.3 interfaces
6. **Configuration Memory:**
 - 63488K bytes of flash-simulated non-volatile configuration memory
7. **MAC Addresses and Serial Numbers:**
 - Base Ethernet MAC Address: 0007.EC14.B906
 - Motherboard assembly number: 73-9832-06
 - Power supply part number: 341-0097-02
 - Motherboard serial number: FOC103248MJ
 - Power supply serial number: DCA102133JA
 - Model revision number: B0
 - Motherboard revision number: C0
 - Model number: WS-C2960-24TT
 - System serial number: FOC1033Z1EY
 - Top Assembly Part Number: 800-26671-02
 - Top Assembly Revision Number: B0
 - Version ID: V02
 - CLEI Code Number: COM3K00BRA
 - Hardware Board Revision Number: 0x01
8. **Switch Information:**
 - Switch Number: 1

- Total Ports: 26
- Model: WS-C2960-24TT
- Software Version: 12.2
- Software Image: C2960-LANBASE-M

9. Configuration Register:

- Configuration register value: 0xF

Step 4. Display Current Active Configuration of SW1

To display the current active configuration of SW1, use "**show running-config**" command. Use the **space bar** keyboard key to load the next page.

```
SW1#show running-config
```

Below are the key highlights from the command output

- **Version:** The switch is running version 12.2 of the operating system.
- **Service Settings:** Various service timestamps and password-encryption features are disabled.
- **Hostname:** The switch's hostname is "SW1".
- **Spanning-Tree:** Spanning Tree Protocol is enabled, using the Per-VLAN Spanning Tree (PVST) mode.
- **Interfaces:** FastEthernet interface 0/1 is configured with **full duplex** and **100 Mbps** speed. Interfaces 0/2 to 0/24 and GigabitEthernet interfaces 0/1 to 0/2 have no specific configurations (default settings).
- **VLAN:** VLAN 1 has an IP address of 192.168.1.100 with a subnet mask of 255.255.255.0 assigned to it.
- **Default Gateway:** The default gateway is set to 192.168.1.1.
- **Line Settings:** Console and virtual terminal (VTY) lines have login enabled.

Step 5. Display Hostname Using Output Modifier

To display only a section of the command output, use "|" and an Output Modifier after the show command.

Use the "**show running-config**" command to display the hostname.

```
SW1#show running-config | include hostname
hostname SW1
SW1#
```

This command combines two commands using the pipe (|) symbol. The first command (**show running-config**) displays the current running configuration of the device. The second command (**include hostname**) filters the output to only show lines that contain the word "hostname."

The output indicates that the device's hostname is set to "SW1." This is the configured name of the device as identified in the running configuration.

Step 6. Display Detailed Interface Information

Run the command "**show interfaces**" and use **space bar** keyboard key to display next page output until you get to the end of the command output.

```
SW1#show interfaces
```

This provides detailed information about the status and configuration of all interfaces on the switch and offers an overview of the various physical and logical interfaces, such as Ethernet interfaces (FastEthernet and GigabitEthernet), VLAN interfaces, and port-channel interfaces.

The command output typically includes data about interface status, statistics, errors, and other relevant parameters.

Step 7. Examine Interface FastEthernet 0/1

A more meaningful way to use the "show interfaces" command is to specify an interface with the command. Examine interface FastEthernet 0/1 by running the command "show interfaces FastEthernet 0/1"

```
SW1#show interfaces FastEthernet 0/1
```

A summary of this command will look like this;

Interface Status: FastEthernet0/1 is up and the line protocol is up (connected).

Hardware: The interface is using Lance hardware with the MAC address 0060.3e21.7c01 (bia 0060.3e21.7c01)

Description: The interface is described as "This link connects to R1."

Bandwidth and Delay: The bandwidth is set to 100000 Kbit, and the delay is 1000 microseconds.

Reliability and Load: The interface reliability is 255/255, and the transmission load is 1/255 while the reception load is 1/255.

Duplex and Speed: The interface is running in full-duplex mode at a speed of 100 Mb/s.

Flow Control: Flow control is turned off for both input and output.

ARP: ARP type is ARPA, and the ARP timeout is set to 04:00:00 (4 hours).

Last Input/Output: The time since the last input and output on the interface is 00:00:08 and 00:00:05, respectively.

Input/Output Queue: The input queue has 0/75/0/0 (size/max/drops/flushes) packets, and there have been 0 output drops.

Queueing Strategy: The interface uses FIFO (First-In-First-Out) queueing strategy.

Output Queue: The output queue has 0/40 (size/max) packets.

Traffic Rates: The 5-minute input and output rates are both 0 bits/sec and 0 packets/sec.

Traffic Counters: The interface has received 956 packets, totaling 193351 bytes, with 956 broadcasts. No errors, CRC, frame, overrun, ignored, or abort conditions are reported for input. The interface has sent 2357 packets, totaling 263570 bytes, with no underruns.

Errors and Collisions: No input or output errors or collisions have been detected.

Resets: The interface has experienced 10 resets.

Other Statistics: There are no multicast packets, pause input, input packets with dribble condition detected, babbles, late collisions, deferred packets, lost carrier, or no carrier. No output buffer failures or output buffers swapped out have occurred.

Step 8. Test Connectivity with Ping

To test connectivity between the switch and a specified destination IP address, use the “ping” command.

Check reachability to the following destinations from the switch;

192.168.1.1,

192.168.2.1,

192.168.2.100,

200.0.0.1 and

200.0.0.2

```
SW1#ping 192.168.2.100
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.2.100, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/5 ms
```

Key Information related to the “ping” command include;

Destination IP: The command specifies the destination IP address to ping (e.g., "ping 192.168.2.100").

Sent Packets: "Sending 5, 100-byte ICMP Echos" indicates that the switch sent 5 ICMP echo requests, each containing 100 bytes of data.

Timeout: "timeout is 2 seconds" shows the time the switch waits for each echo reply before considering the request as timed out.

Response: "!!!!!" represents the ICMP echo replies received from the destination. Each exclamation mark (!) indicates a successful reply for one sent packet.

Success Rate: "Success rate is 100 percent (5/5)" shows that all 5 ICMP echo requests were successful, meaning all of them received a reply.

Round-Trip Time: "round-trip min/avg/max = 1/2/5 ms" provides statistics on the round-trip time for the ICMP echo requests. In this example, the minimum round-trip time was 1 ms, the average was 2 ms, and the maximum was 5 ms.

Step 9. Trace the Path with Traceroute

Use "**traceroute**" command to trace the path taken by packets from the switch to destination IP 192.168.2.100 (SW2). Determine if packets successfully reached the destination IP address and how many hops (intermediate network devices) were identified between the source and destination.

```
SW1#traceroute 192.168.2.100
Type escape sequence to abort.
Tracing the route to 192.168.2.100

 1  192.168.1.1      0 msec    0 msec    0 msec
 2  200.0.0.2       1 msec    1 msec    0 msec
 3  192.168.2.100   11 msec   4 msec    1 msec
SW1#
```

This is the summary of the traceroute command output:

Source: The traceroute was initiated from the Cisco switch "SW1".

Destination: The destination IP address is "192.168.2.100".

Intermediate Hops: The output shows two intermediate network devices (routers) through which the packets passed before reaching the destination:

Hop 1: The first hop is "192.168.1.1". The packets took 0 milliseconds (msec) to reach this hop from the source switch.

Hop 2: The second hop is "200.0.0.2". The packets took 0 msec to reach this hop from the first hop.

Hop 3: The third hop is "192.168.2.100", which is the destination IP address itself. The packets took 1 msec to reach the destination from the second hop.

Note: The "msec" values represent the time taken in milliseconds for each hop.

This output indicates that the packets successfully reached the destination IP address "192.168.2.10" via two intermediate hops.

Step 10. Access R1 and Display Routing Table

Switch back to packet tracer main page and click on R1, then click CLI tab and press Enter key to access the prompt.

Use **enable** command to get to the privileged EXEC mode. Then type “**show ip route**” command and hit Enter key to display the routing table.

```
R1#sh ip route
Codes: L - local, C - connected, S - static, 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

    192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, GigabitEthernet0/0/0
L       192.168.1.1/32 is directly connected, GigabitEthernet0/0/0
S       192.168.2.0/24 [1/0] via 200.0.0.2
    200.0.0.0/24 is variably subnetted, 2 subnets, 2 masks
C       200.0.0.0/24 is directly connected, Serial0/1/0
L       200.0.0.1/32 is directly connected, Serial0/1/0
```

A router uses the routing table information to make decisions about how to forward incoming packets to their intended destinations.

Here are the key details from the command output:

1. **Gateway of last resort:** Not set. This means there is no default gateway configured.
2. **Connected Routes:**
 - 192.168.1.0/24 is directly connected to GigabitEthernet0/0/0 interface.
 - 192.168.1.1/32 is the local address for GigabitEthernet0/0/0.
3. **Static Route:**
 - 192.168.2.0/24 is reachable via next hop 200.0.0.2.
4. **Connected Routes:**
 - 200.0.0.0/24 is directly connected to Serial0/1/0 interface.
 - 200.0.0.1/32 is the local address for Serial0/1/0.

Lab Conclusion:

In conclusion, this lab provided valuable hands-on experience with the Command Line Interface (CLI) and fundamental commands used in networking. Participants successfully accomplished the following:

- Accessed and navigated the CLI of networking devices.
- Gained insights into device information, including hardware, software, and configuration details.
- Explored interface statistics and configuration settings.
- Conducted connectivity tests using the "ping" command to confirm reachability.
- Traced the path of packets to identify intermediate hops using the "traceroute" command.
- Analyzed and interpreted routing table information on a router.

These skills are essential for network administrators and engineers to troubleshoot, configure, and manage network devices effectively.