

Lab 2: Practice on Cisco network devices

Student Name:

Student No:



I. Objectives:

- Using Cisco IOS command-line interface (CLI) for configuring Switches 2960 Series and Routers 1800 Series.
- http://www.cisco.com/en/US/docs/switches/lan/catalyst2960/software/release/12.2_55_se/configuration/guide/scg_2960.html
- <http://www.cisco.com/en/US/docs/routers/access/1800/1841/software/configuration/guide/sw.html>
- Cisco devices will be given on Lab time

II. Cisco device management options

- **An embedded device manager**—The device manager is a GUI that is integrated in the software image. You use it to configure and to monitor a single device.
- **Network Assistant**—Network Assistant is a network management application that can be downloaded from Cisco.com. You use it to manage a single device, a cluster of devices, or a community of devices.
- **CLI**—The Cisco IOS software supports desktop- and multilayer-switching features. You can access the CLI by connecting your management station directly to the device console port, by connecting your PC directly to the Ethernet management port, or by using Telnet from a remote management station or PC.
- **SNMP**—SNMP management applications such as CiscoWorks2000 LAN Management Suite (LMS) and HP OpenView. You can manage from an SNMP-compatible management station that is running platforms such as HP OpenView or SunNet Manager. The Cisco device supports a comprehensive set of MIB extensions and four remote monitoring (RMON) groups.
- **Cisco IOS Configuration Engine** (previously known to as the Cisco IOS CNS agent)—Configuration service automates the deployment and management of network devices and services. You can automate initial configurations and configuration updates by generating

device-specific configuration changes, sending them to the device, executing the configuration change, and logging the results.

III. Cisco IOS command-line interface (CLI)

1. Command Modes

The Cisco IOS user interface is divided into many different modes. The commands available to you depend on which mode you are currently in. Enter a question mark (?) at the system prompt to obtain a list of commands available for each command mode.

Mode	Access Method	Prompt	Exit Method	About This Mode
User EXEC	Begin a session with your device.	device>	Enter logout or quit .	Use this mode to <ul style="list-style-type: none"> •Change terminal settings. •Perform basic tests. •Display system information.
Privileged EXEC	While in user EXEC mode, enter the enable command.	device#	Enter disable to exit.	Use this mode to verify commands that you have entered. Use a password to protect access to this mode.
Global configuration	While in privileged EXEC mode, enter the configure command.	device (config) #	To exit to privileged EXEC mode, enter exit or end , or press Ctrl-Z .	Use this mode to configure parameters that apply to the entire device.
VLAN configuration	While in global configuration mode, enter the vlan <i>vlan-id</i> command.	device (config-vlan) #	To exit to global configuration mode, enter the exit command. To return to privileged EXEC mode, press Ctrl-Z or enter end .	Use this mode to configure VLAN parameters. When VTP mode is transparent, you can create extended-range VLANs (VLAN IDs greater than 1005) and save configurations in the device startup configuration file.
Interface configuration	While in global configuration mode, enter the interface command (with a specific interface).	device (config-if) #	To exit to global configuration mode, enter exit . To return to privileged EXEC mode, press Ctrl-Z or enter end .	Use this mode to configure parameters for the Ethernet ports.
Line configuration	While in global configuration mode, specify a line with the line <i>vtty</i> or line <i>console</i> command.	device (config-line) #	To exit to global configuration mode, enter exit . To return to privileged EXEC mode, press Ctrl-Z or enter end .	Use this mode to configure parameters for the terminal line.

2. Help System

Command	Purpose
---------	---------

help	Obtain a brief description of the help system in any command mode.
<i>abbreviated-command-entry?</i>	Obtain a list of commands that begin with a particular character string. For example: device# di? dir disable disconnect
<i>abbreviated-command-entry<Tab></i>	Complete a partial command name. For example: device# sh conf <tab> device# show configuration
?	List all commands available for a particular command mode. For example: device> ?
<i>command?</i>	List the associated keywords for a command. For example: device> show ?
<i>command keyword?</i>	List the associated arguments for a keyword. For example: device (config)# cdp holdtime ? <10-255> Length of time (in sec) that receiver must keep this packet

3. Abbreviated Commands

You need to enter only enough characters for the device to recognize the command as unique.

This example shows how to enter the show configuration privileged EXEC command in an abbreviated form:

```
device# show conf
```

4. “no” and “default” Forms of Commands

Almost every configuration command also has a “**no**” form. In general, use the “**no**” form to disable a feature or function or reverse the action of a command.

Configuration commands can also have a “**default**” form. The “**default**” form of a command returns the command setting to its default. Most commands are disabled by default, so the “**default**” form is the same as the “**no**” form. However, some commands are enabled by default and have variables set to certain default values. In these cases, the “**default**” command enables the command and sets variables to their default values.

5. Searching and Filtering Output of “*show*” and “*more*” Commands

You can search and filter the output for *show* and *more* commands. This is useful when you need to sort through large amounts of output or if you want to exclude output that you do not need to see. Using these commands is optional.

```
command | {begin | include | exclude} regular-expression
```

Expressions are case sensitive.

```
device# show interfaces | include protocol
```

```
Vlan1 is up, line protocol is up
```

```
Vlan10 is up, line protocol is down
```

6. Accessing the CLI

You can access the CLI through a console connection, through Telnet, or by using the browser.

a. Accessing the CLI through a Console Connection or through Telnet

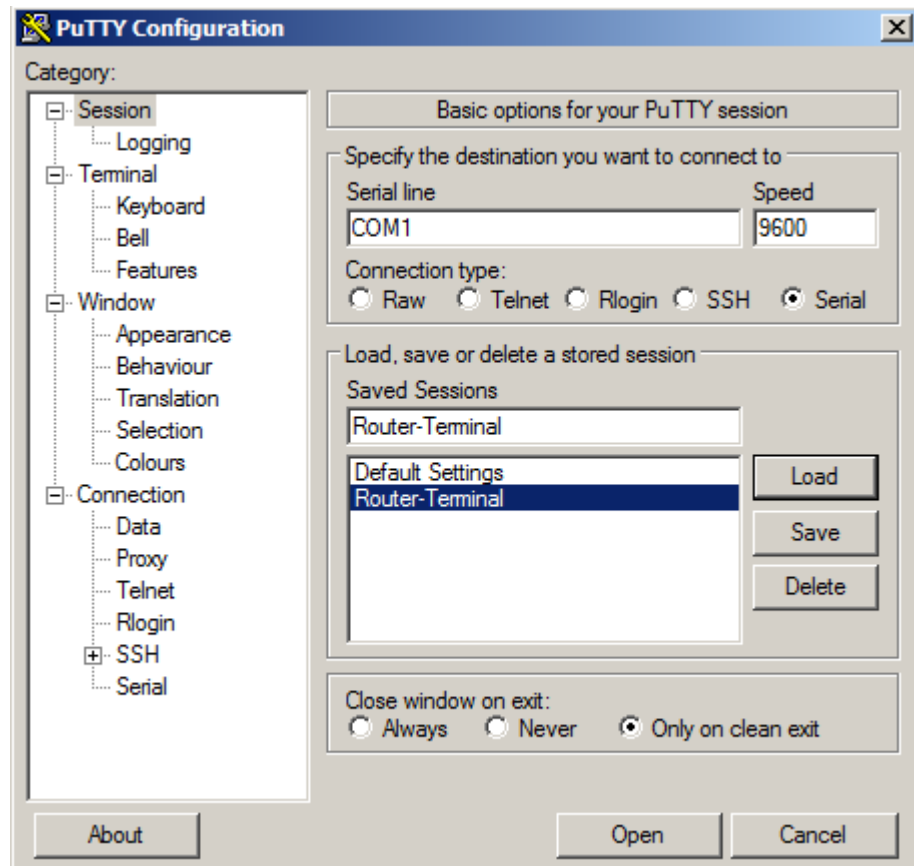
You can use one of these methods to establish a connection with the device:

- Connect the device console port to a management station or dial-up modem. For information about connecting to the console port, see the device getting started guide or hardware installation guide.
- Use any Telnet TCP/IP or encrypted Secure Shell (SSH) package from a remote management station. The device must have network connectivity with the Telnet or SSH client, and the device must have an enable secret password configured.

b. Using Putty on Windows System

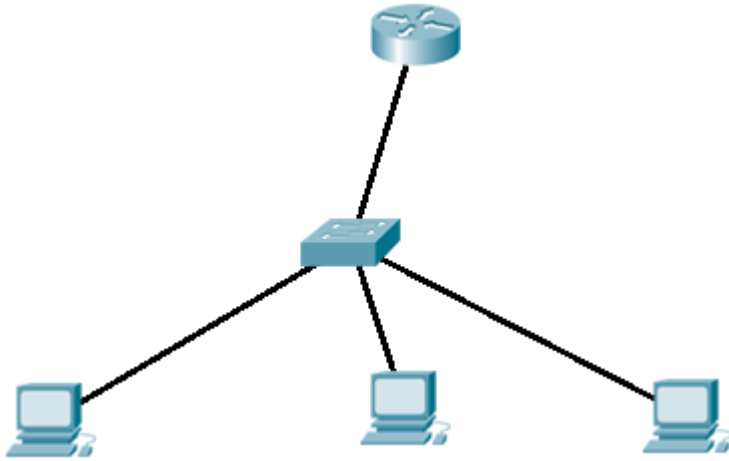
- First, connect the terminal using the RJ-45 to DB9 rollover cable
- Then, open Putty and configure the terminal for 9600 baud, 8 data bits, no parity, 1 stop bit, and no flow control (see Category → Connection → Serial preference)
- Fire up putty, and select the serial radio button, the Serial Line, and Speed boxes will be populated for you. However, make sure that speed is 9600. And save the connection (give it a name) and save it

- View Console



IV. Lab Practice

1. Network Layout



2. Lab steps

Note: *x: will be designated for your group number.*

[Switch]: only configured on Switches

[Router]: only configured on Routers

- Configuring 1 switch 2960 connected to LANx, named SwLANx
- Configuring 1 router CEx (type 1800 series)

This lab document describes how to use the Cisco IOS command-line interface (CLI) to perform a basic software configuration for your Cisco devices (Switch and Router).

(a) Contents

This section contains the following procedures:

- Reset devices to Factory default (Optional)
- Configuring the Device Hostname and Prompt (Required)
- Configuring a Message-of-the-Day Login Banner (Optional)
- Configuring Time and Date Manually (Required)
- Configuring the Enable and Enable Secret Passwords (Required)
- [Switch] Setting a Telnet Password for a Terminal Line (Required)
- Configuring the Console Idle Privileged EXEC Timeout (Optional)
- [Router] Configuring Fast Ethernet and Gigabit Ethernet Interfaces (Required)
- [Switch] Manually Assigning IP Information (Optional)
- [Router] Specifying a Default Route or Gateway of Last Resort (Required)

- [Router] Configuring Virtual Terminal Lines for Remote Console Access (Required)
- Configuring the Auxiliary Line (Optional)
- Verifying Network Connectivity (Required)
- Saving Your Device Configuration (Required)
- Saving Backup Copies of Your Configuration and System Image (Optional)
- Reset all devices to Factory default

Note: Each step, you have to type: `device#copy running-config startup-config` for saving the running configuration to NVRAM

(b) Reset devices to Factory default

[Switch 2960]

Through either a physical console or a Telnet connection

```
Switch# write erase
Switch# reload
```

By hard reset

1. Power off the switch by unplugging its cord.
2. Press and hold the "MODE" button as you reconnect it to its power source.
3. At Switch: prompt, type:

```
Switch: flash_init
switch: rename flash:config.text flash:config.old
switch: boot
```
4. Enter "n" at the prompt to abort the initial configuration dialog.

```
Continue with configuration dialog? [yes/no]: n
```
5. Check by: `device#show running-config` or `show version` (**configuration register must be 0x2102**)

[Router 1801]

1. Check the configuration register on the router by issuing the ***show version*** command.

The configuration register setting is displayed in the last line of the show version command output and should be set to 0x2102. If this is not the case, enter the `config-register 0x2102` command once in global configuration mode.

```
router#configure terminal

router(config)#config-register 0x2102

router(config)#end

router#
```

2. Erase the current start-up configuration on the router with the ***write erase*** command.
3. Reload the router with the ***reload*** command. When prompted to save the configuration, **DO NOT** save.

```
router#reload
```

System configuration has been modified. Save? [yes/no]: **n**

Proceed with reload? [confirm]

4. Once the router reloads, the System Configuration Dialog appears.

--- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: **n**

5. The router is now reset to the original factory defaults.
6. Check by: **device#show running-config or show version (configuration register must be 0x2102)**

(c) Configuring the device Hostname and Prompt

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **hostname name (SwLANx, CEx)**
4. Verify that the device prompt displays your new **hostname**.
5. **end**

(d) Configuring a Message-of-the-Day Login Banner

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **banner motd**

This is a secure site. Only authorized users are allowed.

For access, contact technical support.

#
4. **end**

(e) Configuring Time and Date Manually

SUMMARY STEPS

1. **enable**
2. **clock set hh:mm:ss day month year** or **clock set hh:mm:ss month day year**

This example shows how to manually set the system clock to 1:32 p.m. on July 23, 2010:

```
device# clock set 13:32:00 27 Sep 2010
```


(f) Configuring the Enable and Enable Secret Passwords

SUMMARY STEPS

1. enable
2. configure terminal
3. enable password *password* (*NetLab@switchx*, *NetLab@routerx*)
4. enable secret *password* (*NetLab@switchx*, *NetLab@routerx*)
5. exit
6. enable
7. exit

(g) [Switch] Setting a Telnet Password for a Terminal Line

SUMMARY STEPS

1. enable
2. configure terminal
3. line vty 0 15
4. password *password* (*NetLab@switchx*, *NetLab@routerx*)
5. end

(h) Configuring the Console Idle Privileged EXEC Timeout (10mn by default)

SUMMARY STEPS

1. enable
2. configure terminal
3. line console 0
4. exec-timeout *minutes* [*seconds*] (*0 0* : no time out, *30 0*: time out 30 minutes)
5. end
6. show running-config
7. exit

(a) [Router] Configuring Fast Ethernet and Gigabit Ethernet Interfaces

SUMMARY STEPS

1. enable
2. show ip interface brief
3. configure terminal
4. interface {*fastethernet* | *gigabitethernet*} *port* (*0*)
5. description *string* (*Port on RouterX connect to SwitchX, NetLab LAN*)
6. ip address *ip-address mask* (*172.28.13.2x 255.255.255.0* where *x* for group number)
7. no shutdown
8. end
9. show ip interface brief

(b) [Switch] Manually Assigning IP Information on SVIs

SUMMARY STEPS

1. enable
2. show ip interface brief
3. configure terminal
4. interface vlan *vlan-id* (1)
5. ip address *ip-address subnet-mask* (172.28.13.3x 255.255.255.0)
6. exit
7. ip default-gateway *ip-address* (172.28.13.2x)
8. end
9. show interfaces vlan *vlan-id* (1)
10. show ip redirects
11. copy running-config startup-config

When you create an SVI, it does not become active until you associate it with a physical port

12. Assigning Static-Access Ports to a VLAN
13. interface *interface-id* (fastethernet0)
14. switchport mode access
15. switchport access vlan *vlan-id* (1)
16. end
17. copy running-config startup-config

(c) [Router] Specifying a Default Route or Gateway of Last Resort

SUMMARY STEPS

1. enable
2. configure terminal
3. ip routing
4. ip route *dest-prefix mask next-hop-ip-address* [admin-distance] [permanent] (172.28.10.0 255.255.255.0 172.28.13.1)
5. ip default-network *network-number* (172.28.10.0)
6. end
7. show ip route

(d) [Router] Configuring Virtual Terminal Lines for Remote Console Access

SUMMARY STEPS

1. enable
2. configure terminal
3. line vty *line-number* [ending-line-number] (1 4 : IOS supports 4 vty)
4. password *password* (NetLab@switchx, NetLab@routerx)
5. login
6. end
7. show running-config

8. From another network device, attempt to open a Telnet session to the router.

(e) Configuring the Auxiliary Line

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **line aux 0**
4. See the tech notes and sample configurations to configure the line for your particular implementation of the AUX port.

(f) Verifying Network Connectivity

PRE-REQUISITES

- Complete all previous configuration tasks in this document.
- The router must be connected to a properly configured network host.

SUMMARY STEPS

1. **enable**
2. **ping** [*ip-address* | *hostname*]
3. **telnet** {*ip-address* | *hostname*}

(g) Saving Your Router Configuration

SUMMARY STEPS

1. **enable**
2. **copy running-config startup-config**

(h) Saving Backup Copies of Your Configuration and System Image

SUMMARY STEPS

1. **enable**
2. **copy nvram:startup-config {ftp:|rcp:|tftp:}** (tftp:, destination files will be named SwLANx-config or CEx-config)
3. **show flash:** (some files will be shown, image: c180x-Xxx.bin, VLAN database: vlan.dat)
4. **copy flash:{ftp:|rcp:|tftp:}** (tftp)

Example: Copying from Flash Memory to a TFTP Server

The following example shows the use of the **show flash:** command in privileged EXEC to learn the name of the system image file and the use of the **copy flash: tftp:** privileged EXEC command to copy the system image to a TFTP server.

```
Device# ping 172.28.13.11
```

```
device# show flash:
```

```
System flash directory:.....
```

```
device# copy flash: tftp:
```

```
Source filename []? (c180x-broadband-mz.124-15.T9.bin or vlan.dat)
```

```
IP address of remote host [255.255.255.255]? 172.28.13.11
```

```
filename to write on tftp host? (SwLANx-image or CEx-image or SwLANx-vlan.dat)
```

```
writing SwLANx-image !!!!!...
```

```
successful tftp write.
```

(i) Reset devices to Factory default

V. Result

Lab report assessment will be done by marking on saved copies and images:

- SwLANx-config, SwLANx-image, SwLANx-vlan.dat
- Cex-config, CEx-image

VI. Submission

Complete the network topology in section *IV.1* on GNS3. Compress the project into Lab2_<student_code>.zip and submit this file onto Sakai.

Requirement: Configure DHCP server on Router so that each computer is able to get IP address automatically.