Instructor Materials
Chapter 8
Configuring Cisco Devices

Networking Essentials

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Chapter 8: Configuring Cisco Devices

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Chapter 8 - Sections & Objectives

- 8.1 Cisco LAN Devices
  - Explain the basic features of Cisco LAN switches.

- 8.2 Internetworking Devices
  - Explain the features of a Cisco router.

- 8.3 Exploring the Cisco IOS
  - Explain how to use the Cisco IOS

- 8.4 Using Show Commands
  - Use common show commands to view device status.

- 8.5 Configuring a Cisco Network
  - Build a switch and router network.

8.1 Cisco LAN Devices

LAN Switches and Wireless Devices

- A switch is used to connect devices on the same network. A router is used to connect multiple networks to each other.

- When choosing a switch for a particular LAN, there are a number of factors to consider: types and number of ports, the speed required, expandability and manageability.

- Cisco Catalyst 2960 Series Ethernet switches are suitable for small and medium sized networks. They provide 10/100 Fast Ethernet and 10/100/1000 Gigabit Ethernet LAN connectivity.

Type of Ports

Speed Required

Expandability

Manageability

Connecting to the Switch

- When the switch is on, the power-on self-test (POST) begins. During POST, the LEDs blink while a series of tests determine that the switch is functioning properly. POST is completed when the SYST LED rapidly blinks green. If the switch fails POST, the SYST LED turns amber.

- Out-of-band management requires a computer to be directly connected to the console port of the network device that is being configured. Use in-band management to monitor and make configuration changes to a network device over a network connection.
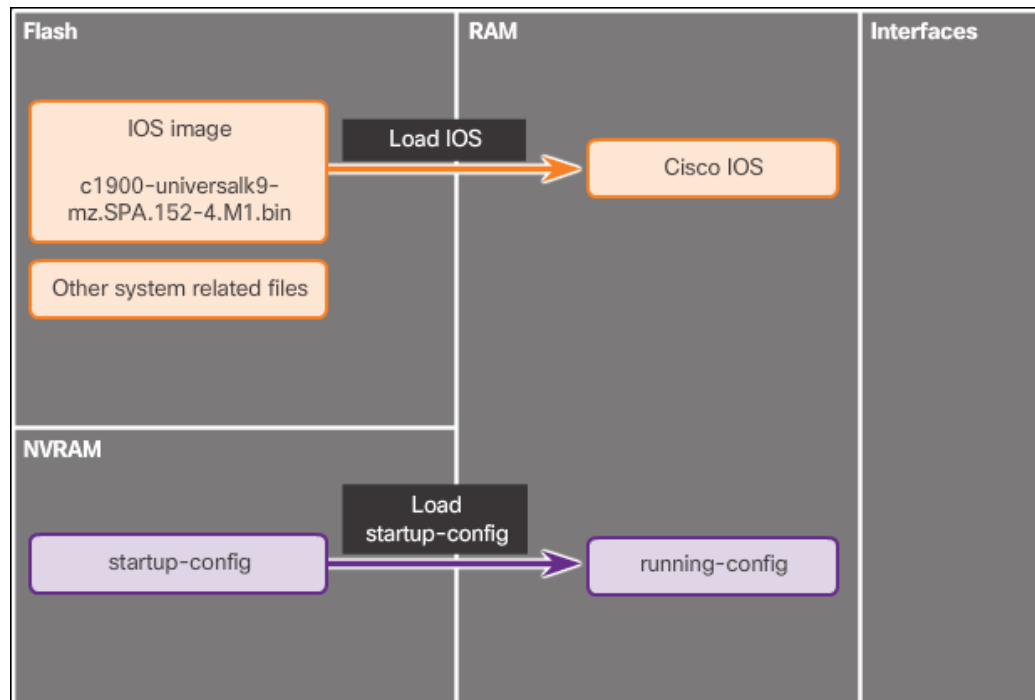
- A Cisco device loads the following two files into RAM when it is booted:
    - IOS Image file
    - Startup configuration file
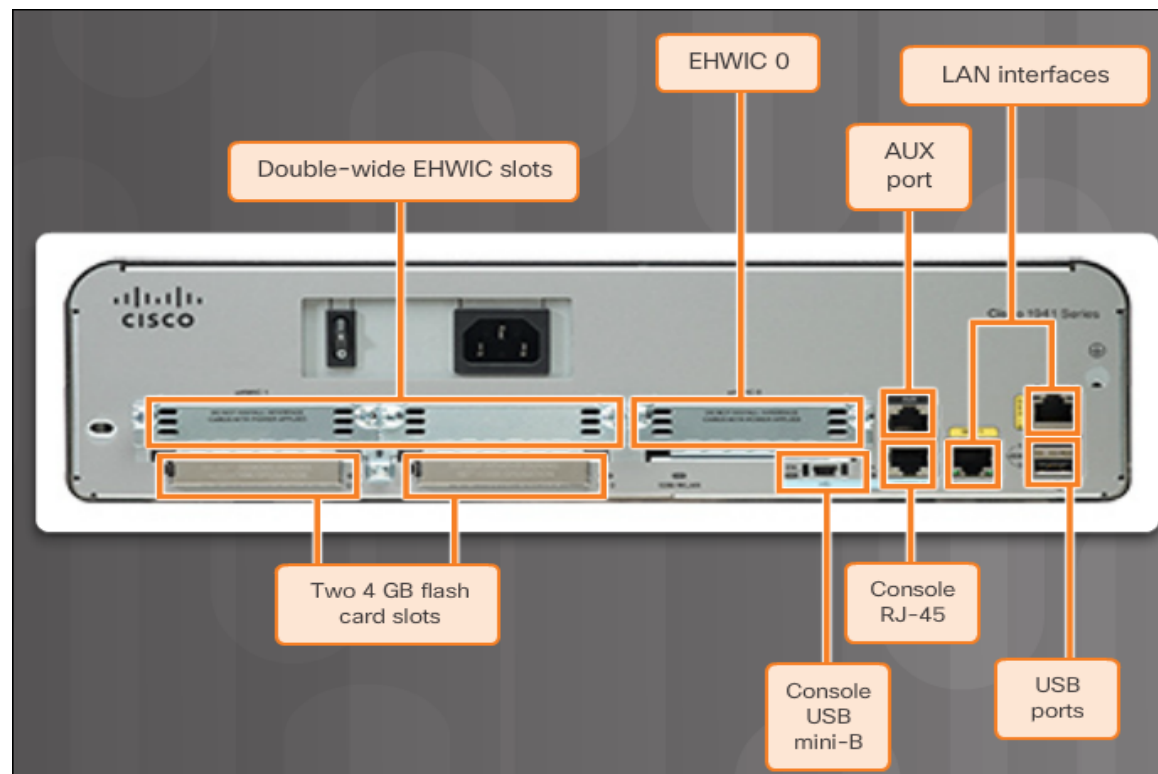
8.2 Internetworking Devices

Cisco Routers

- All routers are essentially computers. Just like computers, routers require: operating systems (OS), central processing units (CPU), random-access memory (RAM), read-only memory (ROM), and nonvolatile random-access memory (NVRAM).

- Every Cisco router has the same general hardware components, and these connections: console ports, 2 LAN interfaces, and enhanced high-speed WAN interface card (EHWIC) slots.

Setting Up the Router

- Follow these steps to power up a Cisco router:

  1. Mount and ground the device chassis.

  2. Seat the external compact flash card.

  3. Connect the power cable.

  4. Configure the terminal emulation software on the PC and connect the PC to the console port.

  5. Turn on the router.

  6. Observe the startup messages on the PC as the router boots up.

- The two most common methods to access the command line interface are console and SSH.
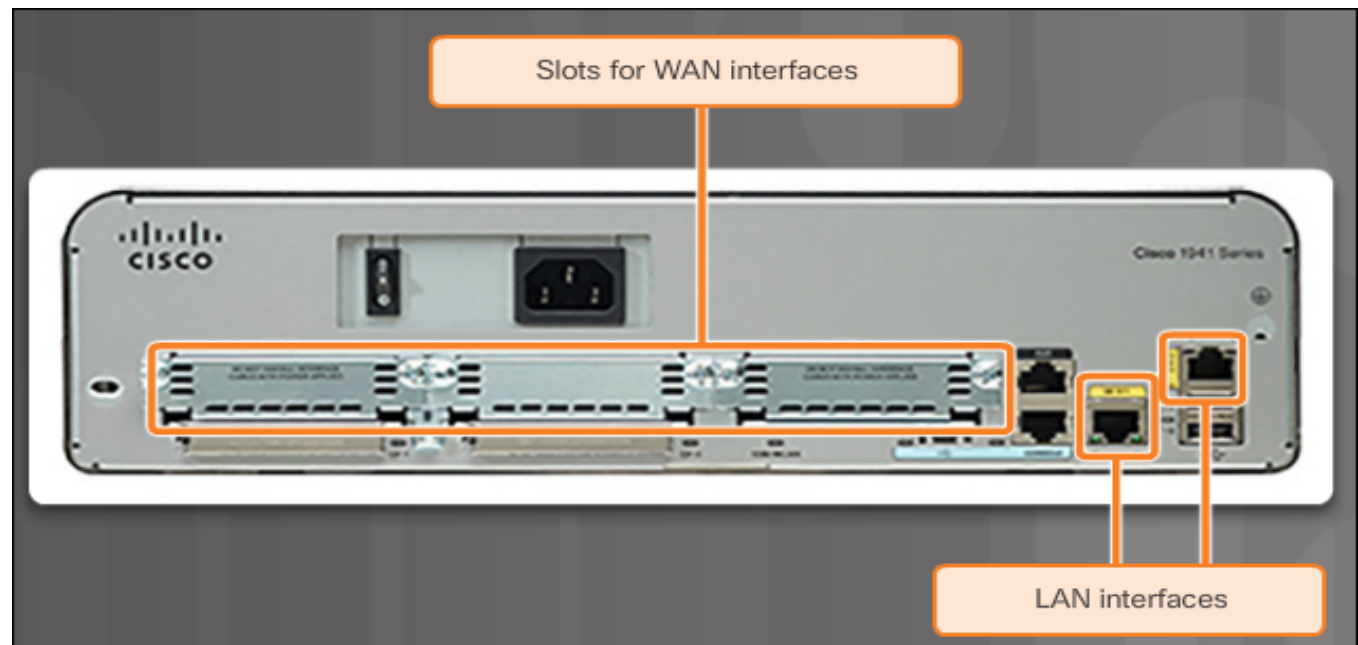
Slots for WAN interfaces

LAN interfaces

8.3 Exploring the Cisco IOS

Navigate the IOS

- The Cisco IOS command line interface (CLI) is a text-based program that enables entering and executing Cisco IOS commands to configure, monitor, and maintain Cisco devices.

- To initially configure a Cisco device, a console connection must be established.

- As a security feature, the Cisco IOS software separates management access into the following two command modes: user EXEC mode and privileged EXEC mode.

- Global configuration mode is identified by a prompt that ends with (config)# after the device name, such as **Switch(config)#**.

Command Mode	Description	Default Device Prompt
User Exec Mode	• Mode allows access to only a limited number of basic monitoring commands. • It is often referred to as "view-only" mode.	`Switch>` `Router>`
Privileged EXEC Mode	• Mode allows access to all commands and features. • The user can use any monitoring commands and execute configuration and management commands.	`Switch#` `Router#`

The Command Structure

- The general syntax for a command is the command followed by any appropriate keywords and arguments:

  - **Keyword** - a specific parameter defined in the operating system (in the figure, ip protocols)

  - **Argument** - not predefined; a value or variable defined by the user (in the figure, 192.168.10.5)
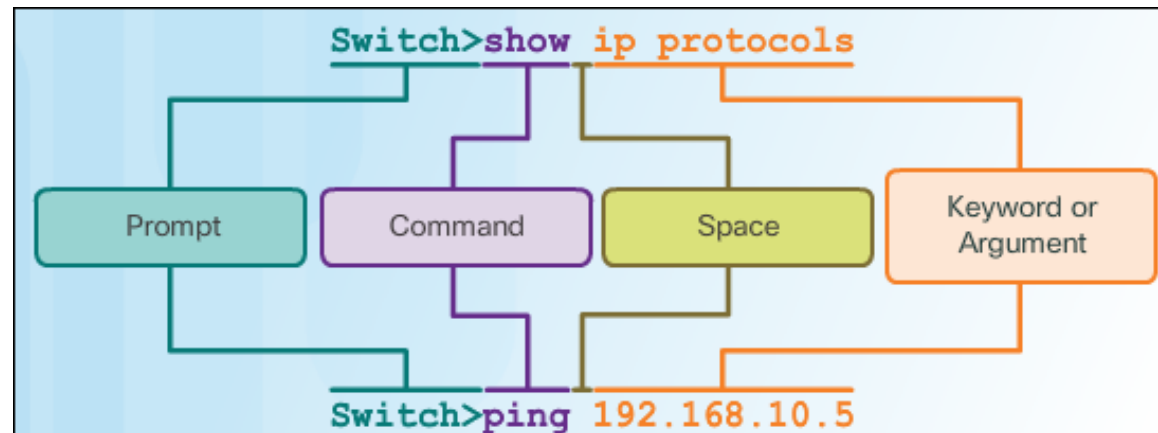
- **ping** *ip-address* - The command is ping and the user-defined argument is the ip-address of the destination device.
- **traceroute** *ip-address* - The command is traceroute and the user-defined argument is the ip-address of the destination device.
- The Cisco IOS has both context sensitive help and command syntax check.
- Commands and keywords can be shortened to the minimum number of characters that identify a unique selection.

8.4 Using Show Commands

Viewing Device Information

- To verify and troubleshoot network operation, examine the operation of the devices using the **show** command:

  - **show running-config**

  - **show interfaces**

  - **show arp**

  - **show ip route**

  - **show protocols**

  - **show version**

```
R1# show running-config

Building configuration...
Current configuration : 1063 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
hostname R1
enable secret 5 $1$i6w9$dvdpVM6zV10E6tSyLdkR5/
no ip domain lookup
```

- If you are logged into a router
or switch remotely, the **show version** command is an excellent means of quickly finding useful summary information about the particular device to which you are connected.

8.5 Configuring a Cisco Network

Basic Switch Configuration

1. Configure the device name.

2. Secure the user EXEC mode.

3. Secure remote Telnet/SSH access.

4. Secure privileged EXEC mode.

5. Secure all passwords in the config file.

6. Provide legal notification.

7. Configure the management SVI.

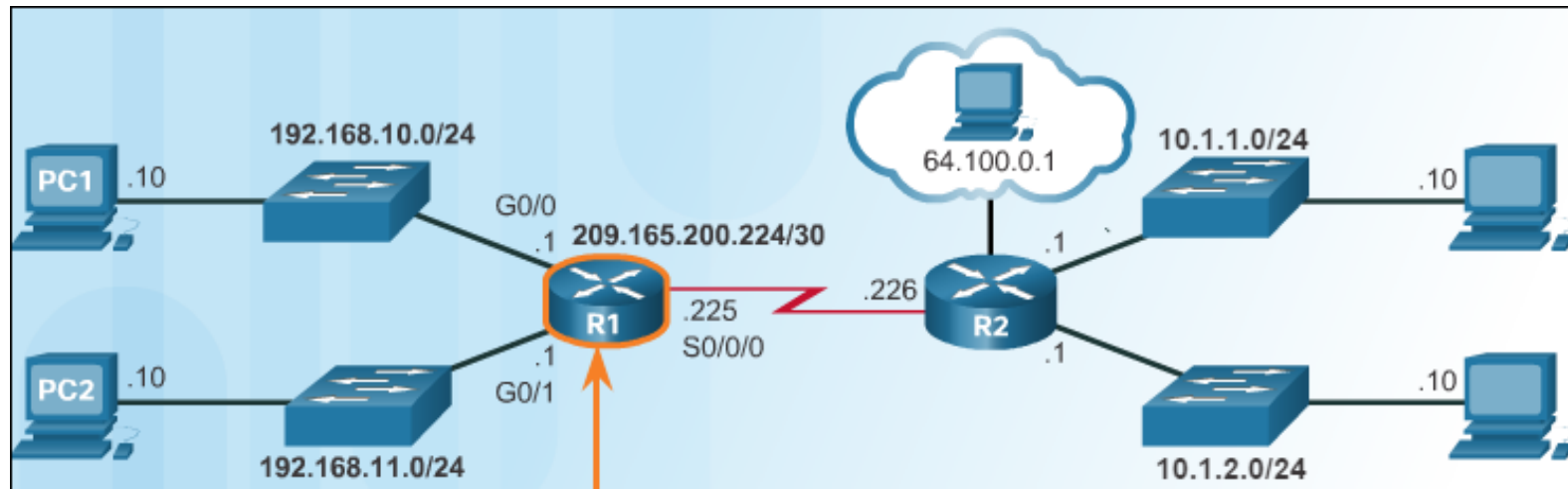8. Save the configuration.
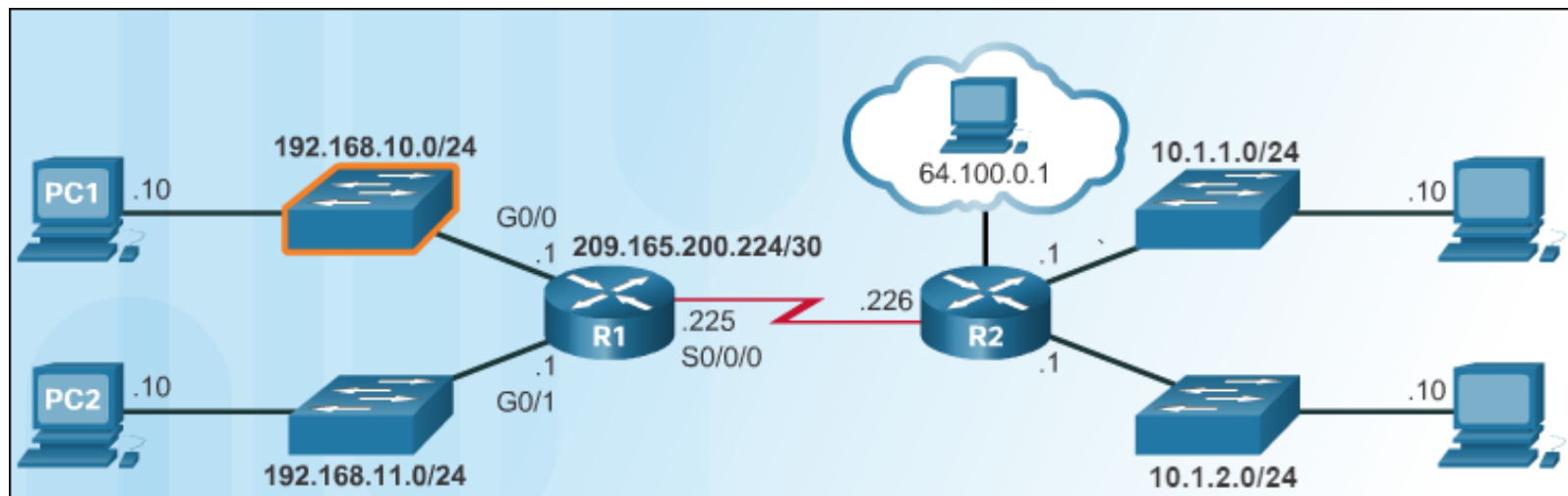
Basic Router Configuration

1. Configure the device name.

2. Secure the user EXEC mode.

3. Secure remote Telnet/SSH access.

4. Secure privileged EXEC mode.

5. Secure all passwords in the config file.

6. Provide legal notification.

7. Save the configuration.

Basic Router Configuration (Cont.)

- Configure the interface:
  - **interface** *type-and-number*
  - **description** *description-text*
  - **ip address** *ipv4-address subnet-mask*
  - **no shutdown**

- One of the most useful commands for verifying interface configuration is the **show ip interface brief** command. The output displays all interfaces, their IPv4 address, and their current status. The configured and connected interfaces should display a Status of "up" and Protocol of "up".

- Other interface verification commands include:
- **show ip route** - Displays the contents of the IPv4 routing table stored in RAM.
- **show interfaces** - Displays statistics for all interfaces on the device.
- **show ip interface** - Displays the IPv4 statistics for all interfaces on a router.

```
R1#show ip interface brief
Interface          IP-Address       OK?  Method Status                 Protocol

GigabitEthernet0/0 192.168.10.1     YES  manual up                     up
GigabitEthernet0/1 192.168.11.1     YES  manual up                     up
Serial0/0/0        209.165.200.225  YES  manual up                     up
Serial0/0/1        unassigned       YES  NVRAM  administratively down   down
Vlan1              unassigned       YES  NVRAM  administratively down   down
R1#
R1#ping 209.165.200.226
```

Securing the Devices

- As good practice, use different authentication passwords for each of these levels of access.

- Setting a password for console connection access is done in global configuration mode. These commands prevent unauthorized users from accessing user mode from the console port.

  - **Switch(config)# line console 0**

  - **Switch(config)# password [password]**

  - **Switch(config)# login**

```
Sw-Floor-1(config)# line console 0
Sw-Floor-1(config-line)# password cisco
Sw-Floor-1(config-line)# login
Sw-Floor-1(config-line)# exit
Sw-Floor-1(config)#
Sw-Floor-1(config)# line vty 0 15
Sw-Floor-1(config-line)# password cisco
Sw-Floor-1(config-line)# login
Sw-Floor-1(config-line)#
```

Securing the Devices (Cont.)

1. Verify SSH support.

2. Configure the IP domain.

3. Generate RSA key pairs.

4. Configure user authentication.

5. Configure the vty lines.

6. Enable SSH version 2.


```
S1# configure terminal
S1(config)# ip domain-name cisco.com
S1(config)# crypto key generate rsa
The name for the keys will be: S1.cisco.com
...
How many bits in the modulus [512]: 1024
...
S1(config)# username admin secret ccna
S1(config-line)# line vty 0 15
S1(config-line)# transport input ssh
S1(config-line)# login local
S1(config-line)# exit
S1(config)# ip ssh version 2
S1(config)# exit
S1#
```
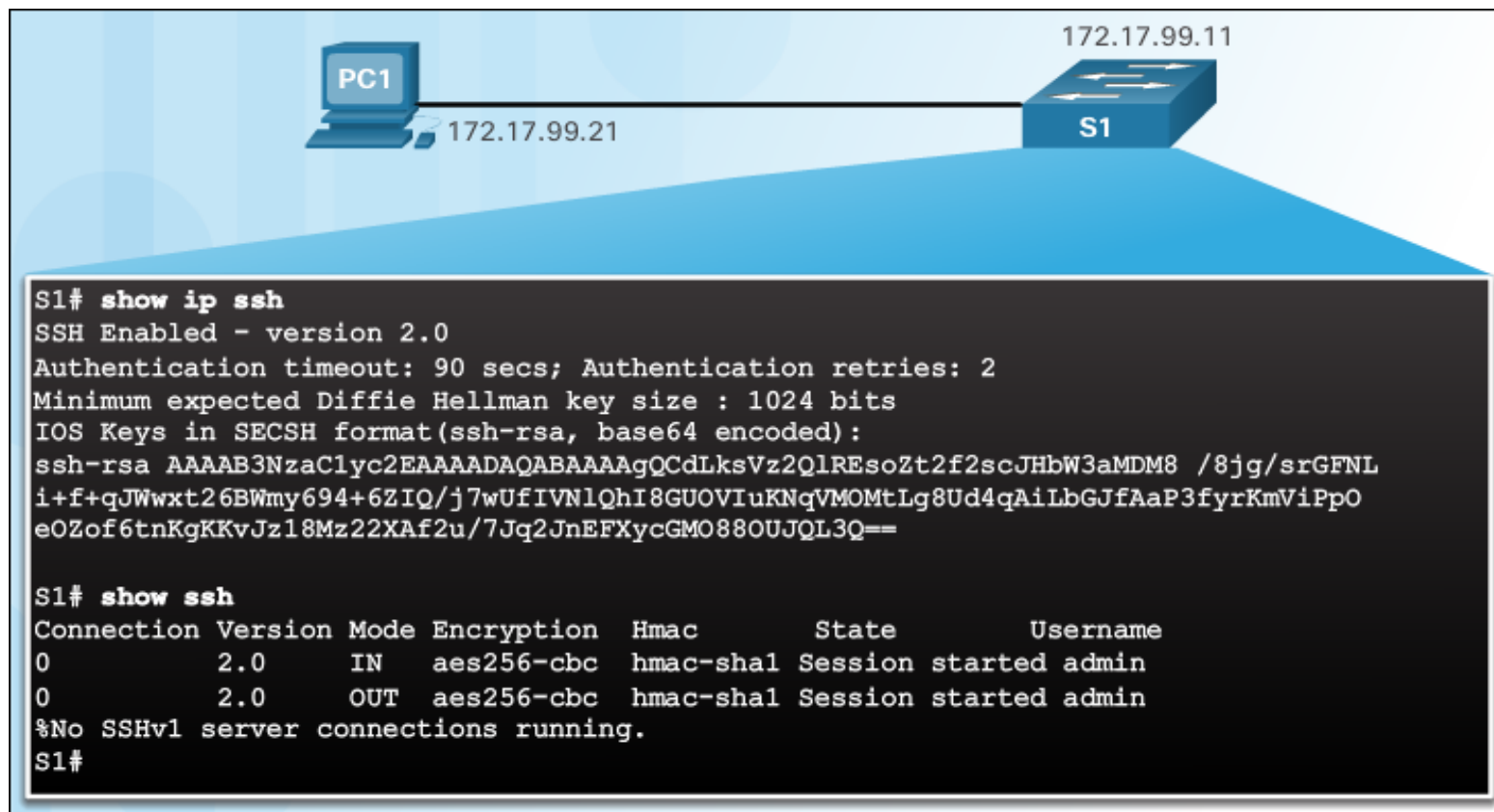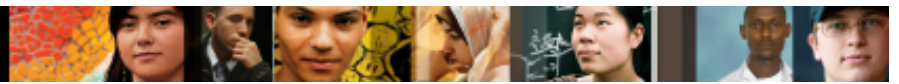
Securing the Devices (Cont.)

- To display the version and configuration data for SSH on the device that you configured as an SSH server, use the **show ip ssh** command.


```
S1# show ip ssh
SSH Enabled - version 2.0
Authentication timeout: 90 secs; Authentication retries: 2
Minimum expected Diffie Hellman key size : 1024 bits
IOS Keys in SECSH format(ssh-rsa, base64 encoded):
ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAAAgQCdLksVz2QlREsoZt2f2scJHbW3aMDM8 /8jg/srGFNL
i+f+qJWwxt26BWmy694+6ZIQ/j7wUfIVNlQhI8GUOVIuKNqVMOMtLg8Ud4qAiLbGJfAaP3fyrKmViPpO
eOZof6tnKgKKvJz18Mz22XAf2u/7Jq2JnEFXycGMO88OUJQL3Q==

S1# show ssh
Connection Version Mode Encryption  Hmac       State           Username
0             2.0    IN   aes256-cbc hmac-sha1  Session started admin
0             2.0    OUT  aes256-cbc hmac-sha1  Session started admin
%No SSHv1 server connections running.
S1#
```

Configuring a Cisco Network
Connecting the Switch to the Router

- The default gateway address is generally the router interface address attached to the local network of the host. The IP address of the host device and the router interface address must be in the same network.

- To configure a default gateway on a switch, use the **ip default-gateway** global configuration command. The IP address configured is that of the router interface of the connected switch.


```
S1# show running-config
Building configuration...
!
 <output omitted>
service password-encryption
!
hostname S1
!
Interface Vlan1
ip address 192.168.10.50
!
ip default-gateway
192.168.10.1
 <output omitted>
```

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