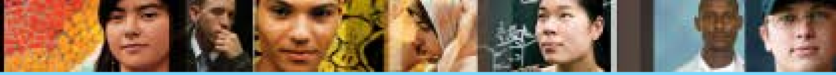
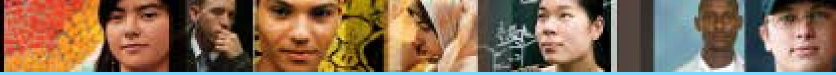
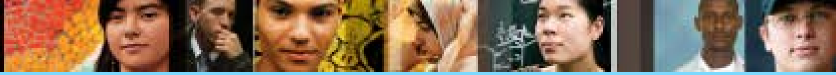


Chapter 2 B:
Configuring a Network Operating System



Configuring a Network Operating System

Someone (usually a technician) has to configure the NOS to detect and activate all devices connected so that the network will work as we want it to.



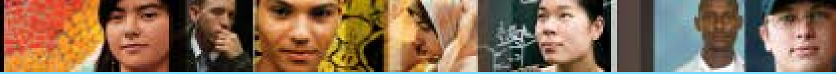
Configuring a Network Operating System

Services to devices are accessed using a command-line interface (CLI), via,

- the console port,
- the AUX port, or
- through telnet or SSH.

Once connected to the CLI, network technicians can make configuration changes to Cisco IOS devices.

This is done using Cisco commands.



The Command Structure

IOS Command Structure

Commands are entered at the prompt

```
Switch>
```

For example,

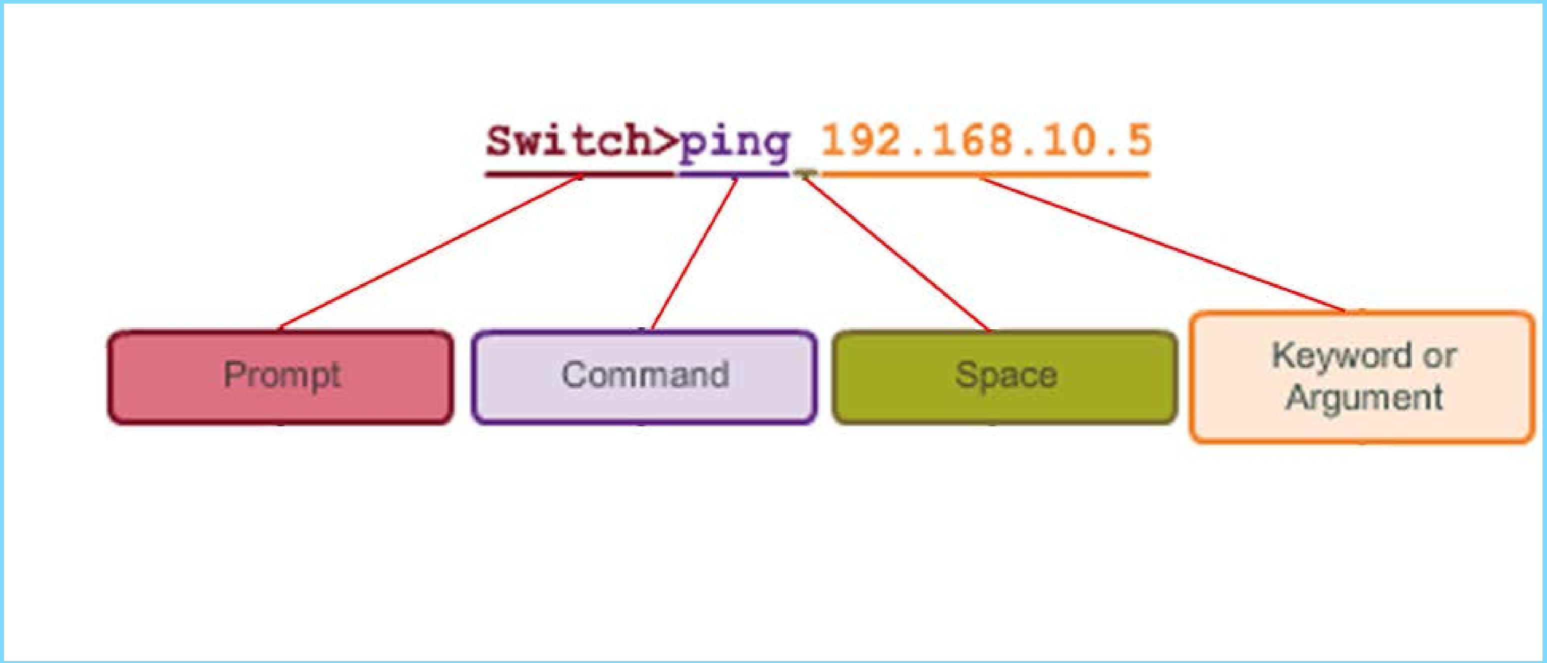
```
Switch>ping 192.168.10.5
```

The Command Structure

IOS Command Structure

A command line consists of:

- A command
- A space
- Keyword or argument

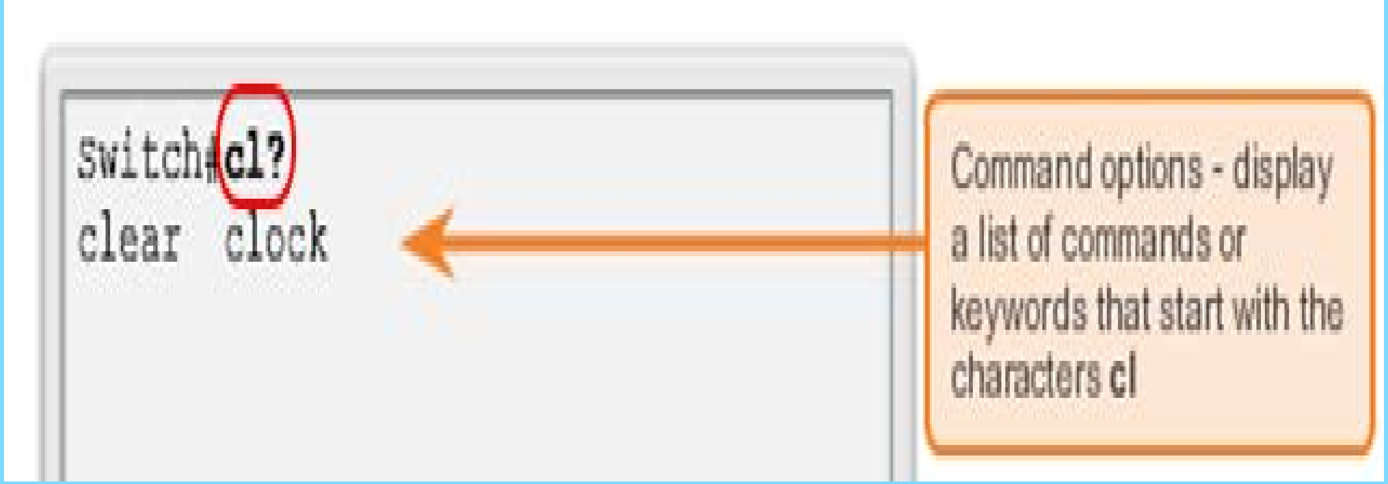


```
Switch>ping 192.168.10.5
```

The Command Structure

Context-Sensitive Help

You have to be familiar with all the commands you need.
At the command prompt, you can check available commands using a few letters and a question mark.

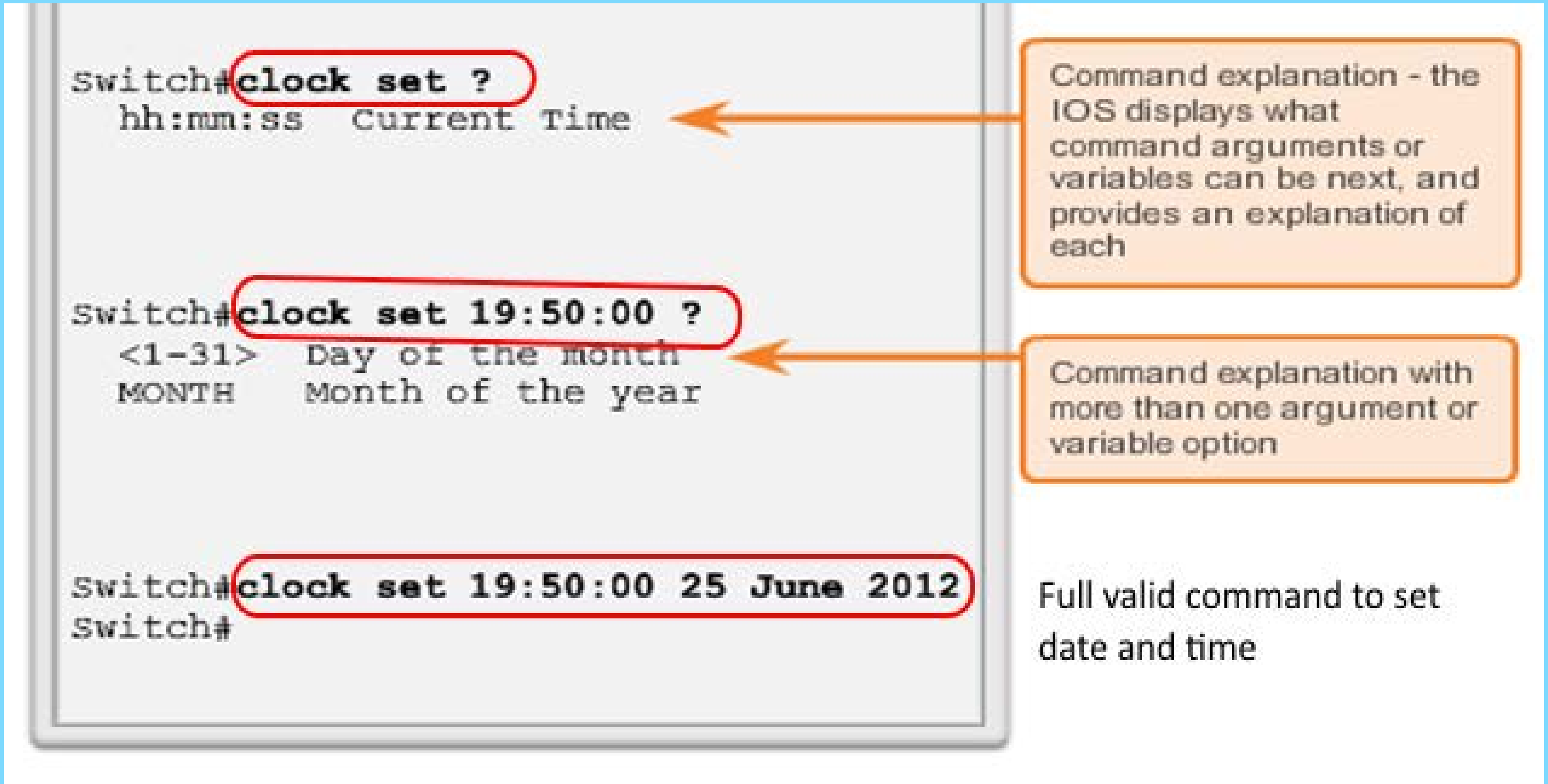


```
Switch#cl?
clear  clock
```

Command options - display a list of commands or keywords that start with the characters **cl**

The Command Structure

Context-Sensitive Help



```
Switch#clock set ?
  hh:mm:ss  Current Time
```

Command explanation - the IOS displays what command arguments or variables can be next, and provides an explanation of each

```
Switch#clock set 19:50:00 ?
  <1-31>  Day of the month
  MONTH   Month of the year
```

Command explanation with more than one argument or variable option

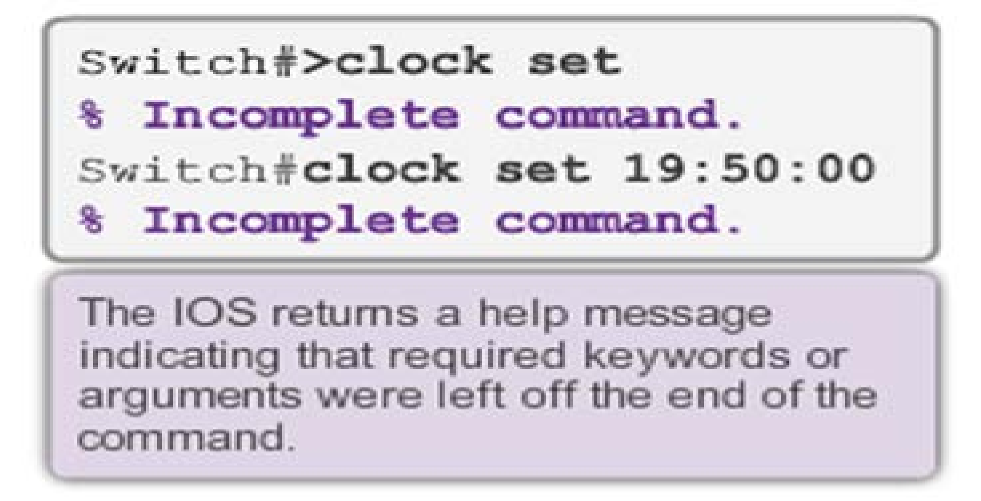
```
Switch#clock set 19:50:00 25 June 2012
Switch#
```

Full valid command to set date and time

The Command Structure

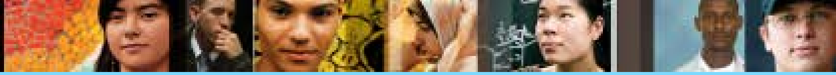
Command Syntax Check

Commands at the CLI must follow a fixed, format recognized by the IOS. This is known as syntax. If not, a help message will be displayed.



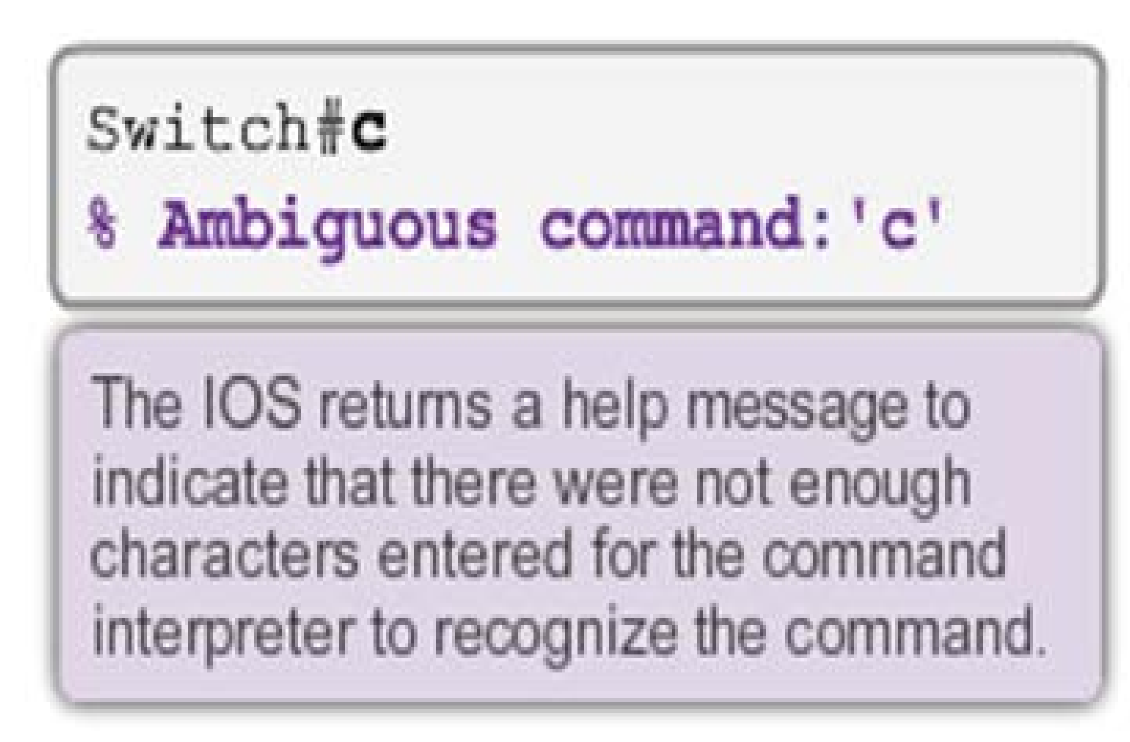
```
Switch#>clock set
% Incomplete command.
Switch#clock set 19:50:00
% Incomplete command.
```

The IOS returns a help message indicating that required keywords or arguments were left off the end of the command.



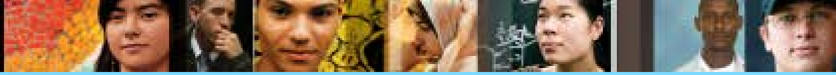
The Command Structure

Command Syntax Check



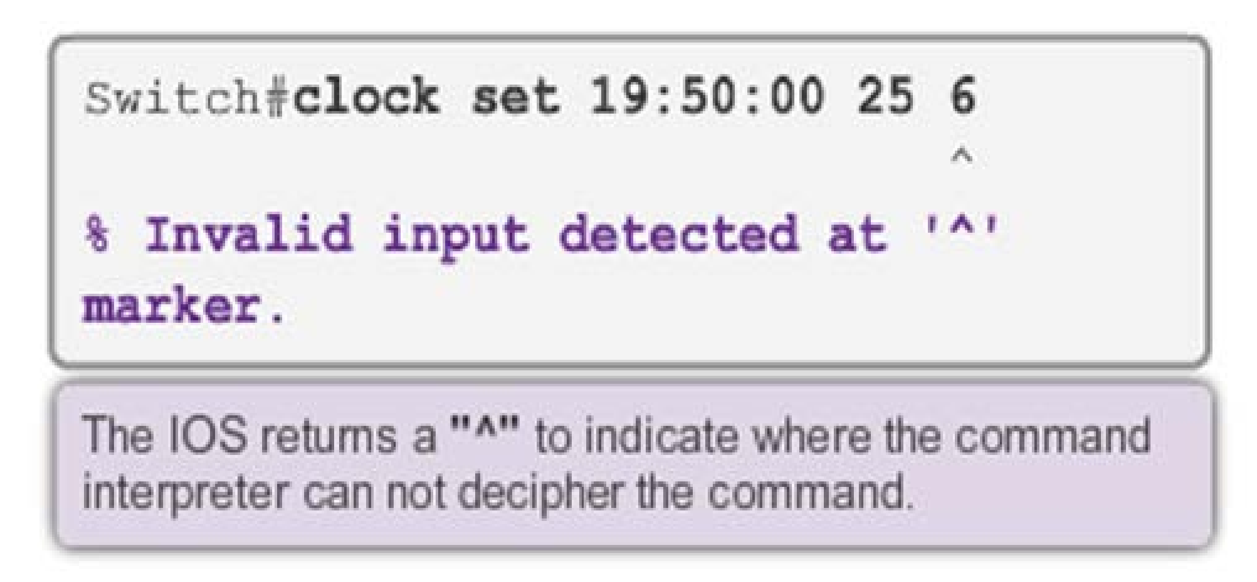
```
Switch#c
% Ambiguous command:'c'
```

The IOS returns a help message to indicate that there were not enough characters entered for the command interpreter to recognize the command.



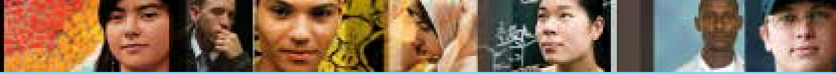
The Command Structure

Command Syntax Check



```
Switch#clock set 19:50:00 25 6
                             ^

% Invalid input detected at '^'
marker.
```

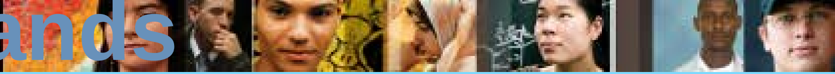
The IOS returns a "^" to indicate where the command interpreter can not decipher the command.



The Command Structure

Hot Keys and Shortcuts

- **Tab –** Completes the remainder of a partially typed command or keyword.
- **Ctrl-R –** Redisplays a line.
- **Ctrl-A –** Moves to the beginning of the line.
- **Ctrl-Z –** Exits the configuration mode and returns to user EXEC.
- **Down Arrow –** Allows the user to scroll forward through former commands.
- **Up Arrow –** Allows the user to scroll backward through former commands.
- **Ctrl-shift-6 –** Allows the user to interrupt an IOS process such as **ping** or **traceroute**.
- **Ctrl-C –** Exits the current configuration or aborts the current command.



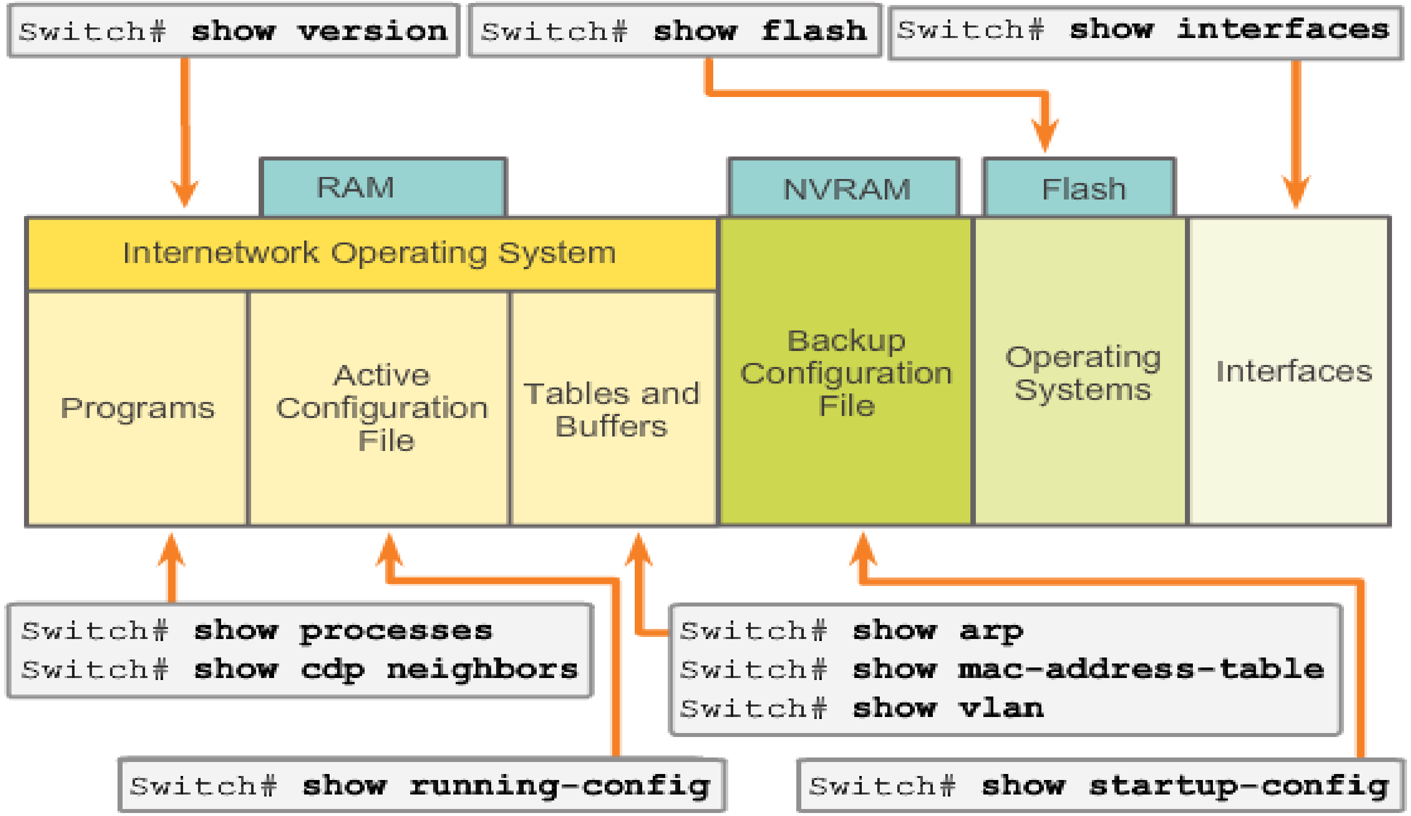
IOS Examination Commands

IOS ‘**Show**’ Commands can provide information about the configuration, operation and status of parts of a Cisco switch or router

- show version
- show flash
- show interfaces
- show processes
- show cdp neighbours
- show arp
- show mac-address-table
- show vlan
-show running-config
- show startup-config

IOS Examination Commands

‘Show’ Commands



```
Switch# show version
Switch# show flash
Switch# show interfaces
```

RAM
NVRAM
Flash
Internetwork Operating System
Programs
Active Configuration File
Tables and Buffers
Backup Configuration File
Operating Systems
Interfaces

```
Switch# show processes
Switch# show cdp neighbors
```

```
Switch# show arp
Switch# show mac-address-table
Switch# show vlan
```

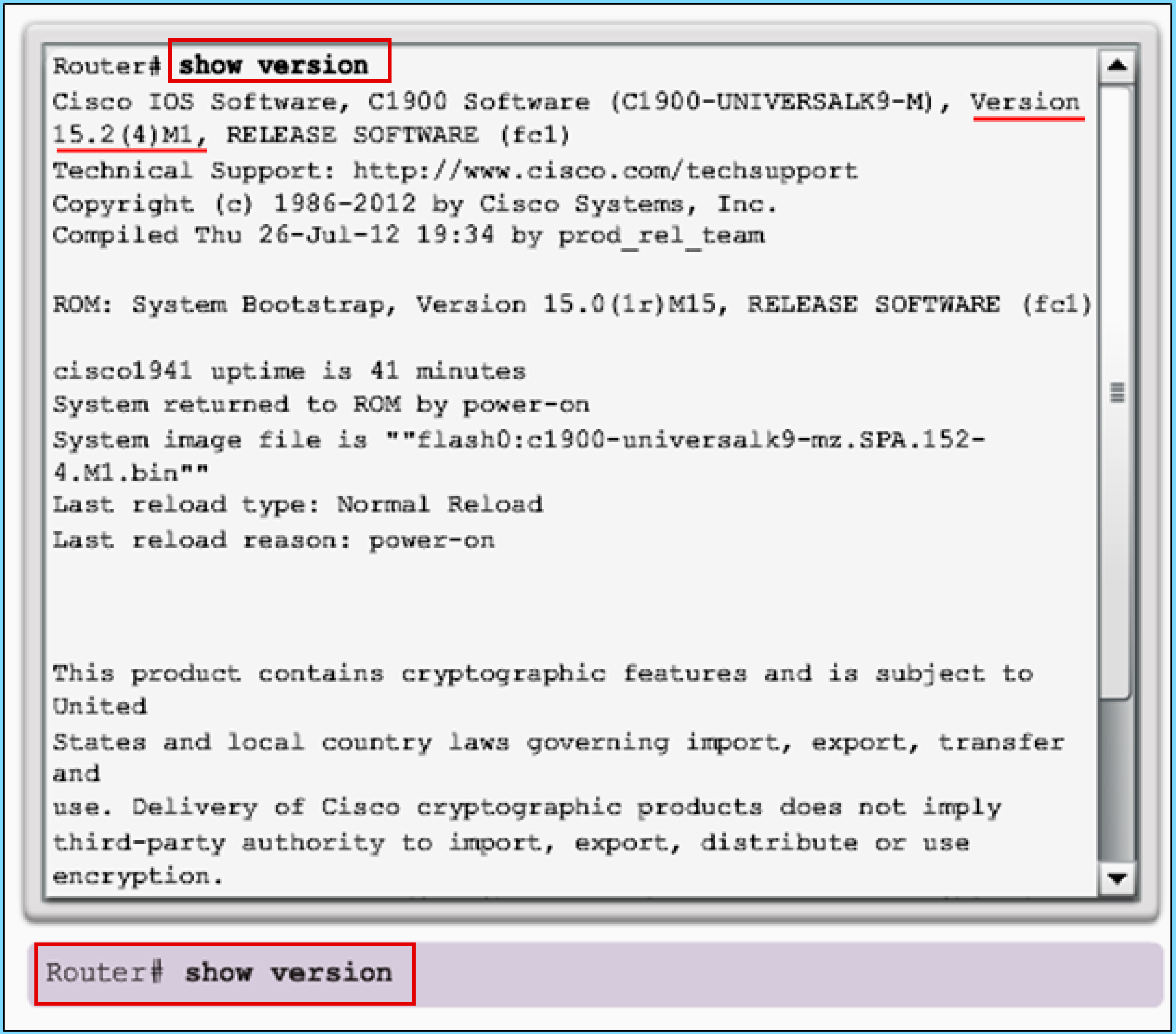
```
Switch# show running-config
```

```
Switch# show startup-config
```

IOS **show** commands can provide information about the configuration, operation, and status of parts of a Cisco switch or router.

The Command Structure

The ‘show version’ Command



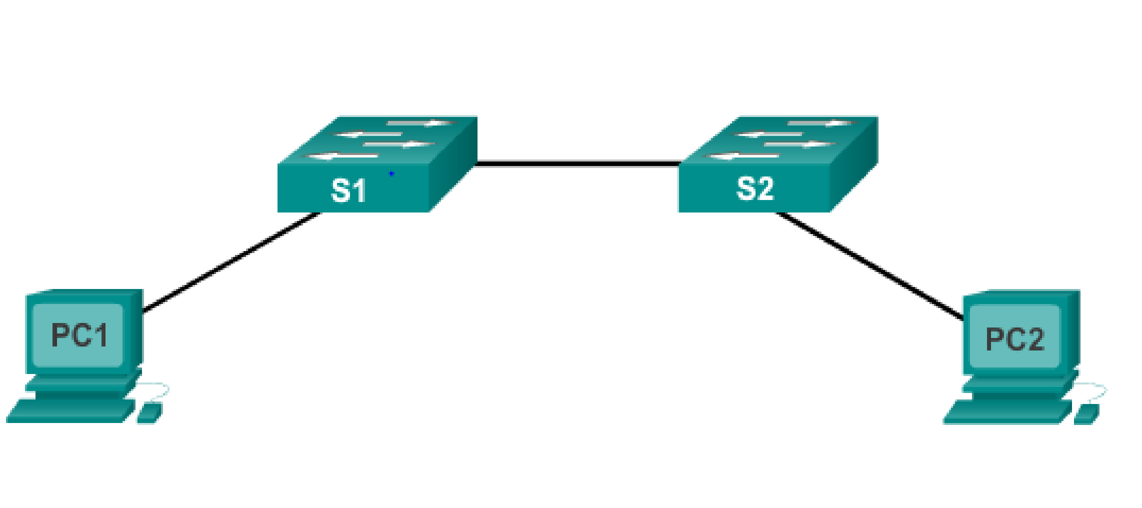
```
Router# show version
Cisco IOS Software, C1900 Software (C1900-UNIVERSALK9-M), Version
15.2(4)M1, RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2012 by Cisco Systems, Inc.
Compiled Thu 26-Jul-12 19:34 by prod_rel_team

ROM: System Bootstrap, Version 15.0(1r)M15, RELEASE SOFTWARE (fc1)

cisco1941 uptime is 41 minutes
System returned to ROM by power-on
System image file is ""flash0:c1900-universalk9-mz.SPA.152-
4.M1.bin""
Last reload type: Normal Reload
Last reload reason: power-on



This product contains cryptographic features and is subject to
United
States and local country laws governing import, export, transfer
and
use. Delivery of Cisco cryptographic products does not imply
third-party authority to import, export, distribute or use
encryption.
```

```
Router# show version
```

Hostnames
The Switch

Let’s focus on:

- Creating a two PC network connected via a switch
- Setting a name for the switch
- Limiting access to the device configuration
- Configuring banner messages
- Saving the configuration



Hostnames

The Switch

A network switch is a hardware that looks like this:

It is also known as a switch or switching hub. A network switch receives data, process and forward the data to the destination device that needs the data.

Hostnames

Device Naming Convention

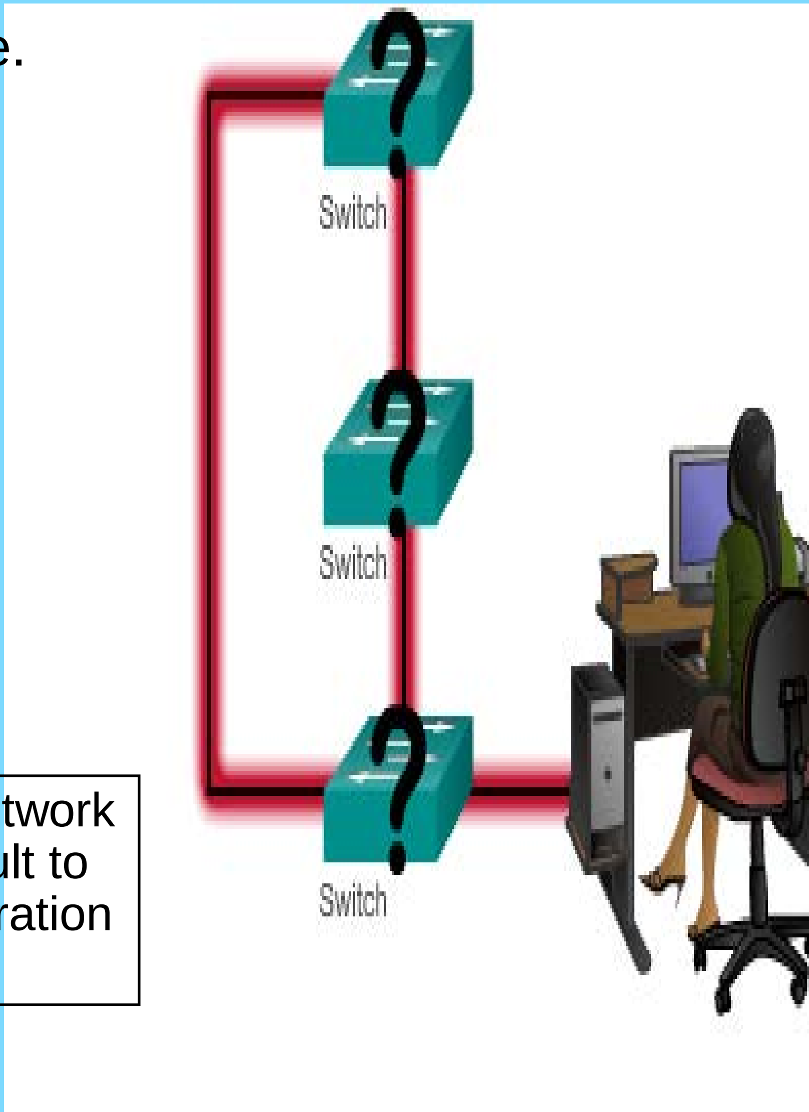
Each device on a network requires a name.

Some guidelines for naming conventions:

- Start with a letter
- Contains no spaces
- Ends with a letter or digit
- Uses only letters, digits, and dashes
- Be less than 64 characters in length

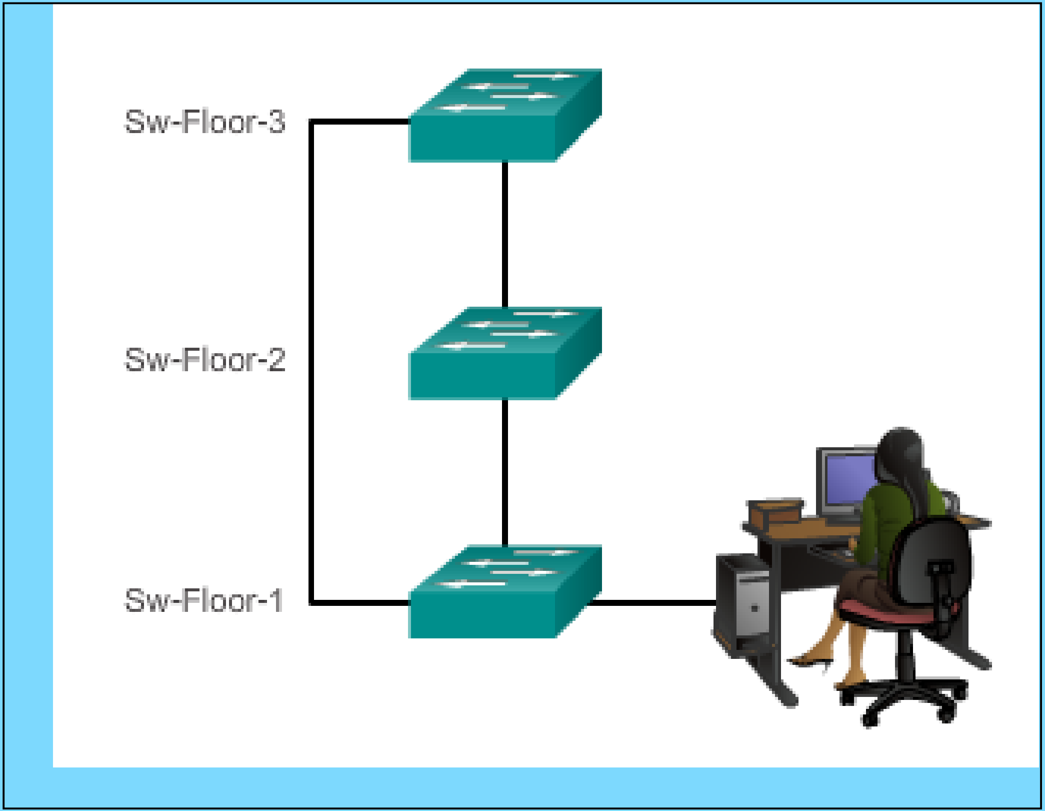
Eg – Switch01, PC_01, etc.

Without names, network devices are difficult to identify for configuration purposes.



Configuring Device Names

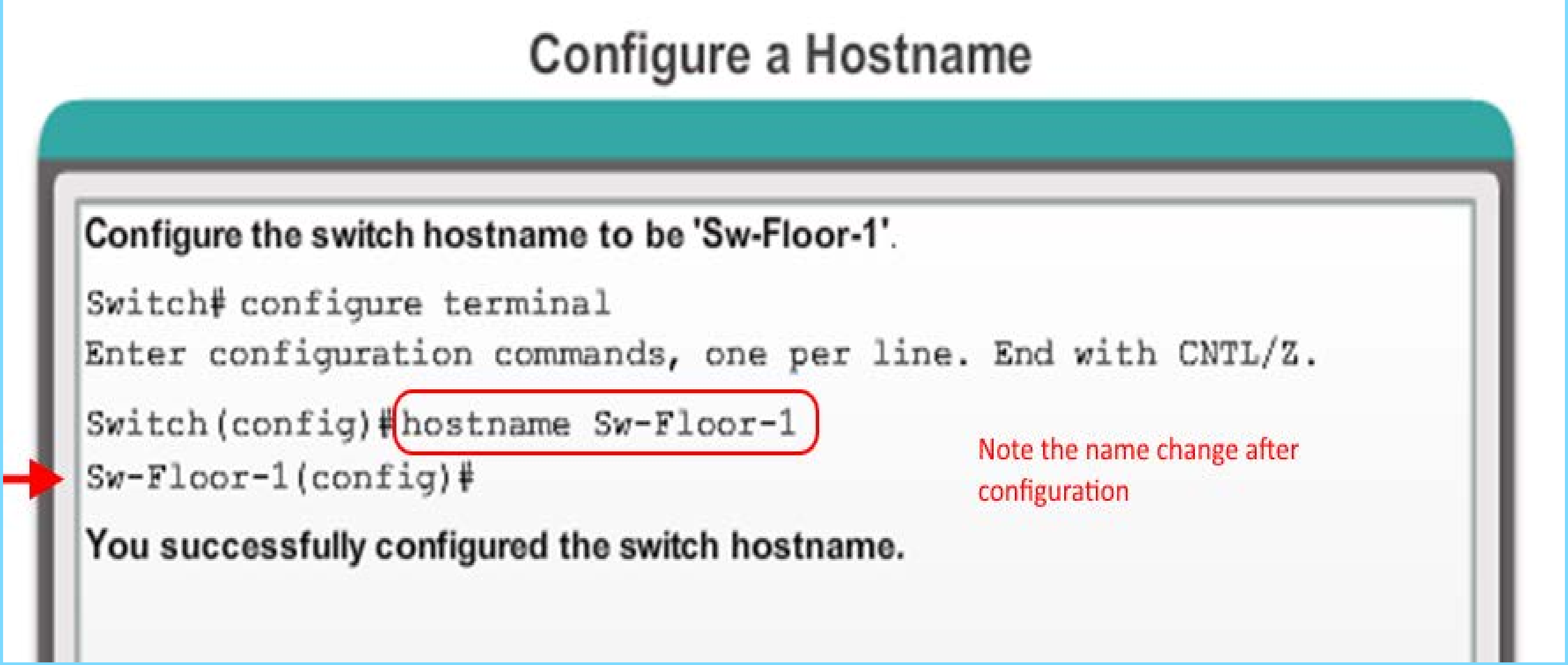
Hostnames allow devices to be identified by network administrators over a network or the Internet.



Hostnames

Configuring Hostnames

To configure a hostname, it can be done at the CLI.



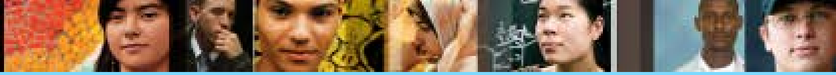
Configure a Hostname

Configure the switch hostname to be 'Sw-Floor-1'.

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname Sw-Floor-1
Sw-Floor-1(config)#
```

You successfully configured the switch hostname.

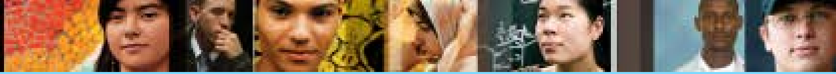
Note the name change after configuration



Limiting Access to Device Configurations

Securing Device Access

Devices on a network can be secured by setting passwords for access control.
This is to ensure that unauthorized personnel cannot meddle with the network devices.



Limiting Access to Device Configurations

Securing Device Access

These are device access passwords commands:

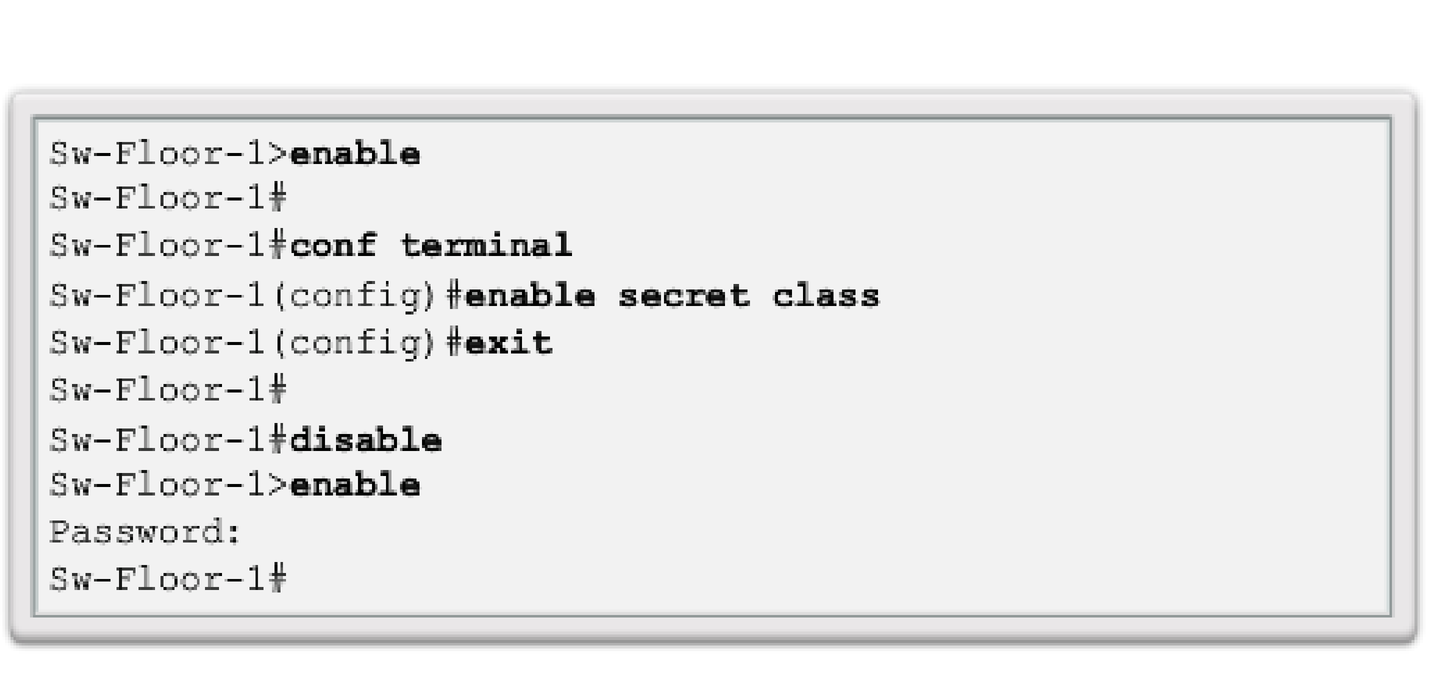
- **enable password** – Limits access to the privileged EXEC mode
- **enable secret** – Encrypted, limits access to the privileged EXEC mode
- **console password** – Limits device access using the console connection
- **VTY password** – Limits device access over Telnet

Note: In most of the labs in this course, we will be using simple passwords such as **cisco** or **class**.

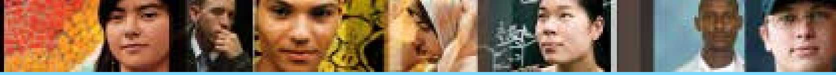
Limiting Access to Device Configurations

Securing Privileged EXEC Access Mode

- Use the ’**enable secret**’ command.
- This command provides greater security because the password is encrypted.



```
Sw-Floor-1>enable
Sw-Floor-1#
Sw-Floor-1#conf terminal
Sw-Floor-1(config)#enable secret class
Sw-Floor-1(config)#exit
Sw-Floor-1#
Sw-Floor-1#disable
Sw-Floor-1>enable
Password:
Sw-Floor-1#
```



Limiting Access to Device Configurations

Securing User EXEC Access

- Console port must be secured; it reduces the chance of unauthorized personnel physically plugging a cable into the device and gaining device access.

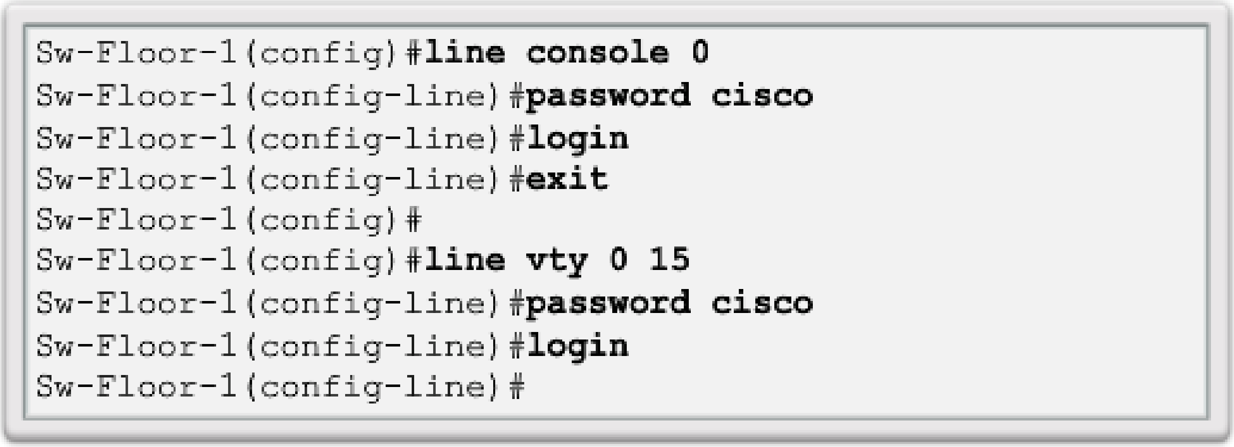
- VTY ports allow access to a Cisco device via Telnet. The number of VTY lines supported varies with the type of device and the IOS version.

- **VTY** ports are virtual TTY ports, used to Telnet or SSH into the router over the network to make configuration changes or check the status. Most routers have five **VTY** ports, numbered 0 to 4.

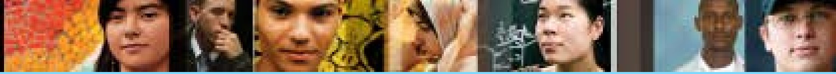
Limiting Access to Device Configurations

Securing User EXEC Access

Example of commands to access a router :



```
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)#
```



Limiting Access to Device Configurations

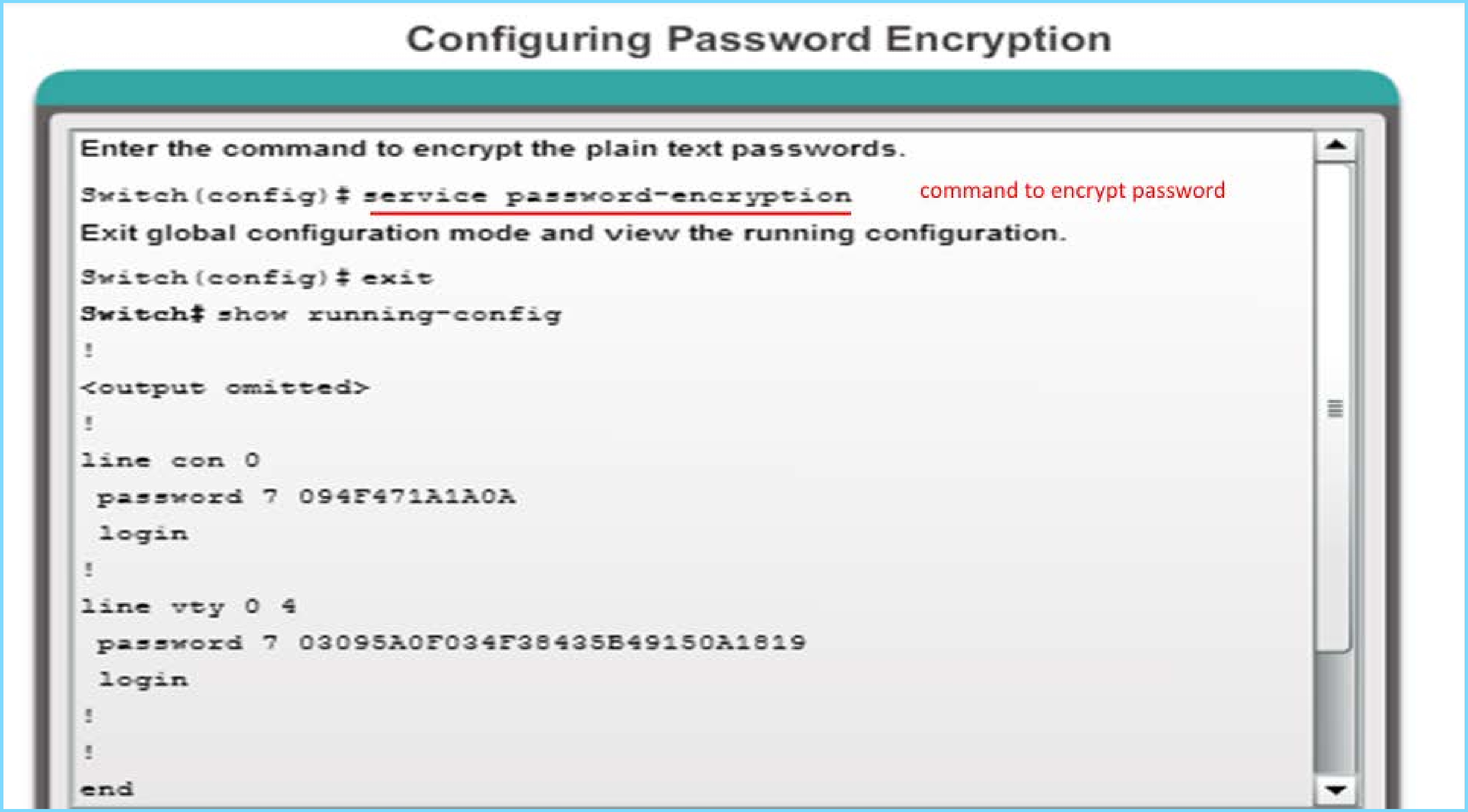
Encrypting Password Display

Objective of service password-encryption

- Prevents passwords from showing up as plain text when viewing the configuration file
- Keeps unauthorized individuals from viewing passwords in the configuration file
- Once applied, removing the encryption service does not reverse the encryption

Limiting Access to Device Configurations

Encrypting Password Display



Configuring Password Encryption

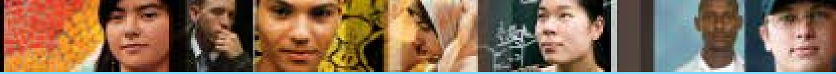
Enter the command to encrypt the plain text passwords.

```
Switch(config)# service password-encryption
```

command to encrypt password

Exit global configuration mode and view the running configuration.

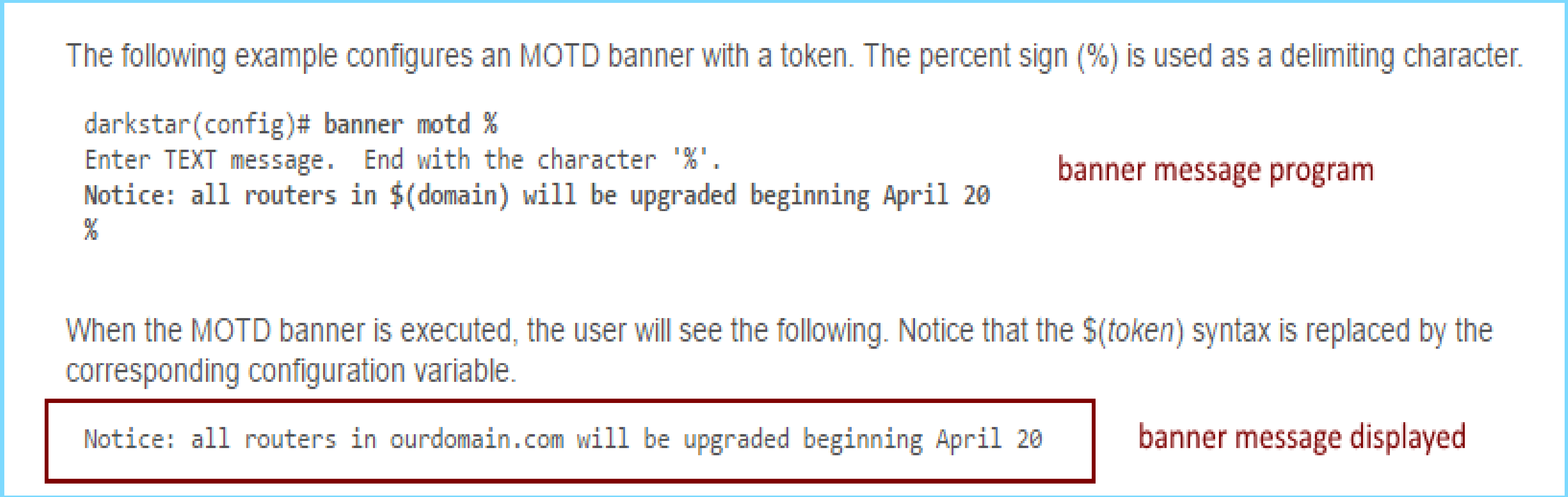
```
Switch(config)# exit
Switch# show running-config
!
<output omitted>
!
line con 0
 password 7 094F471A1A0A
 login
!
line vty 0 4
 password 7 03095A0F034F38435B49150A1819
 login
!
!
end
```



Limiting Access to Device Configurations

Banner Messages

- The banner is a **feature** used for **defining a text** to be displayed.
- Banner messages should be used **to warn would-be intruders** that they are not welcome on your network.
- Banner are useful to quickly **identify the terminal.**
- MOTD means ‘message of the day**’.**



The following example configures an MOTD banner with a token. The percent sign (%) is used as a delimiting character.

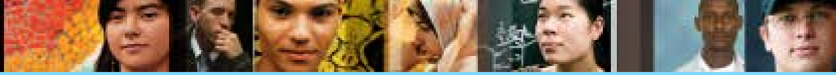
```
darkstar(config)# banner motd %
Enter TEXT message.  End with the character '%'.
Notice: all routers in $(domain) will be upgraded beginning April 20
%
```

banner message program

When the MOTD banner is executed, the user will see the following. Notice that the $(*token*) syntax is replaced by the corresponding configuration variable.

```
Notice: all routers in ourdomain.com will be upgraded beginning April 20
```

banner message displayed



Limiting Access to Device Configurations

Banner Messages

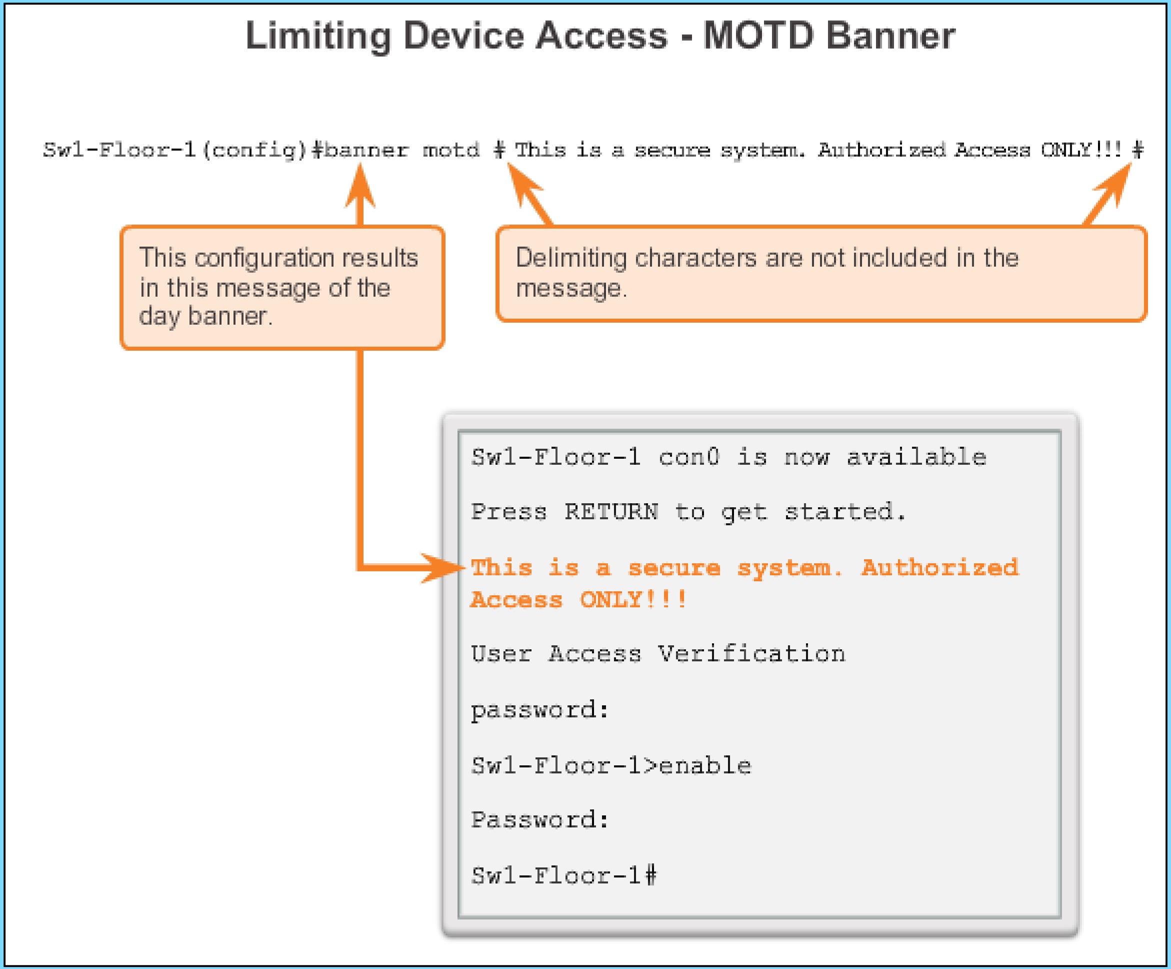
Banner messages are used for many purposes, but can also be used as part of the legal process in the event that someone is prosecuted for breaking into a device

Wording that implies that a login is "welcome" or "invited" is not appropriate

Banner messages are often used for legal notification because it is displayed to all connected terminals

Limiting Access to Device Configurations

Banner Messages



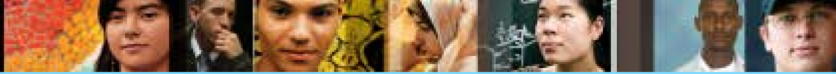
Limiting Device Access - MOTD Banner

```
Sw1-Floor-1(config)#banner motd # This is a secure system. Authorized Access ONLY!!! #
```

This configuration results in this message of the day banner.

Delimiting characters are not included in the message.

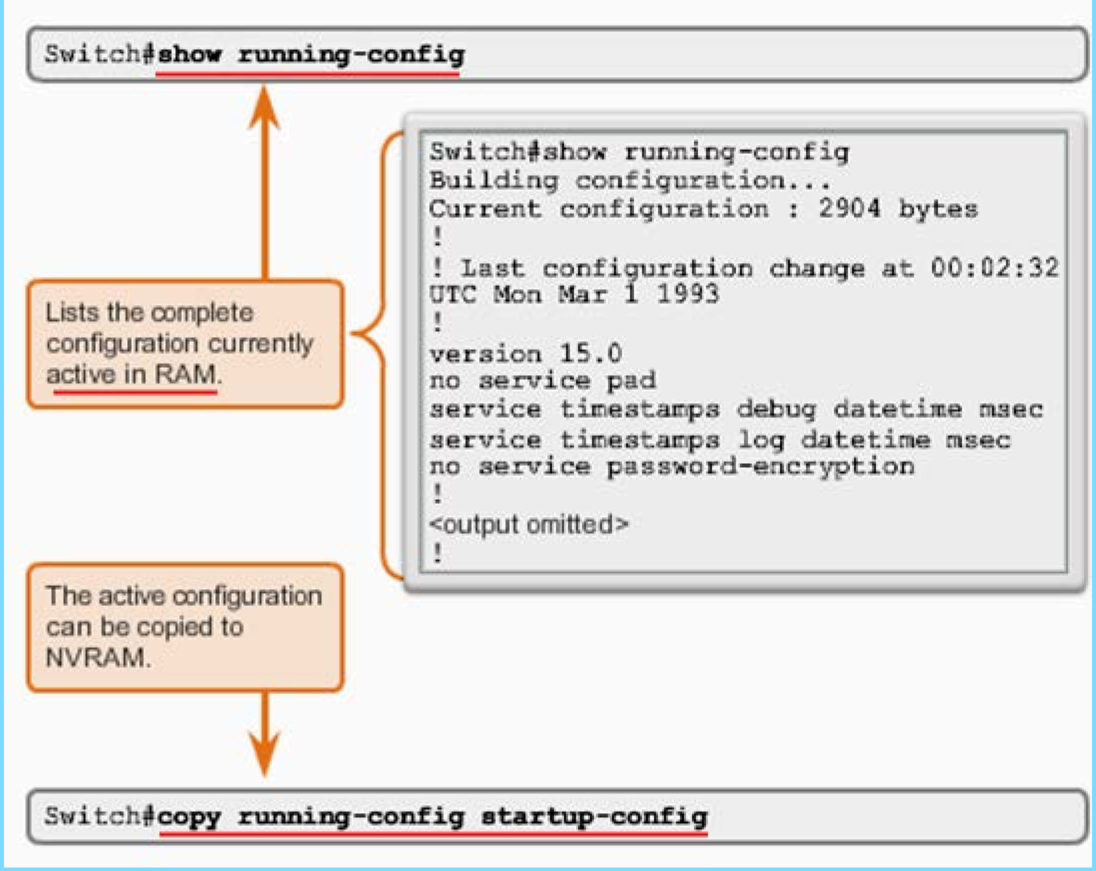
```
Sw1-Floor-1 con0 is now available

Press RETURN to get started.

This is a secure system. Authorized
Access ONLY!!!

User Access Verification

password:

Sw1-Floor-1>enable

Password:

Sw1-Floor-1#
```



Saving Configurations

Configuration Files

Commands to display config file, and copy it to NVRAM (Non-volatile random-access memory)



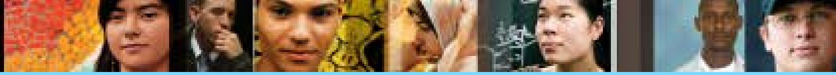
```
Switch#show running-config
```

Lists the complete configuration currently active in RAM.

```
Switch#show running-config
Building configuration...
Current configuration : 2904 bytes
!
! Last configuration change at 00:02:32
UTC Mon Mar 1 1993
!
version 15.0
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
<output omitted>
!
```

The active configuration can be copied to NVRAM.

```
Switch#copy running-config startup-config
```



Saving Configurations

Configuration Files

Commands to save config file, and delete config file.

- `Switch#` **reload**

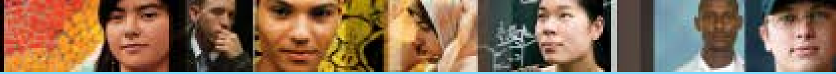
```
  System configuration has been modified. Save? [yes/no]: n
  Proceed with reload? [confirm]
```

- Startup configuration is removed by using the **`erase startup-config`**

```
 Switch# erase startup-config
```

- On a switch, you must also issue the **`delete vlan.dat`**

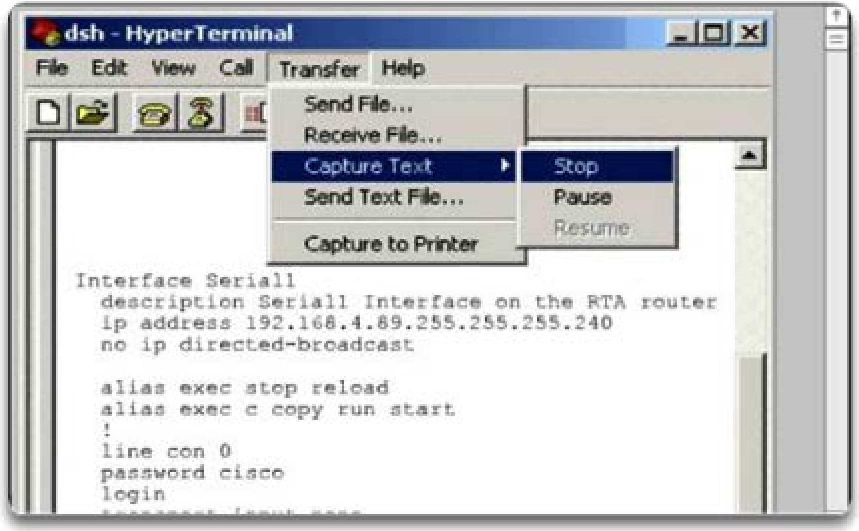
```
  Switch#  delete vlan.dat
  Delete filename [vlan.dat]?
  Delete flash:vlan.dat? [confirm]
```



Saving Configurations

Capturing Text

Saving to a Text File in HyperTerminal

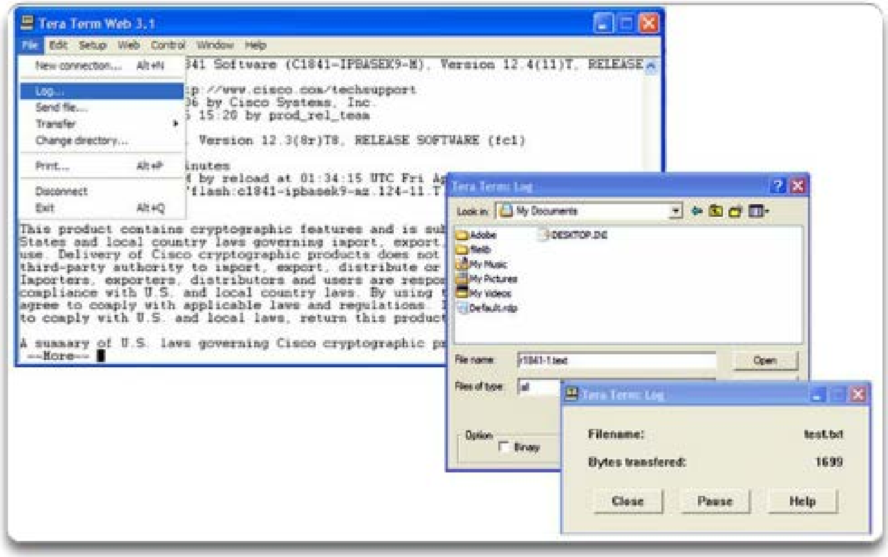


```
Interface Serial1
  description Serial1 Interface on the RTA router
  ip address 192.168.4.89.255.255.255.240
  no ip directed-broadcast

  alias exec stop reload
  alias exec c copy run start
  !
  line con 0
  password cisco
  login
```

In the terminal session:

1. Start the text capture process
2. Issue a **`show running-config`** command
3. Stop the capture process
4. Save the text file

Saving to a Text File in Tera Term



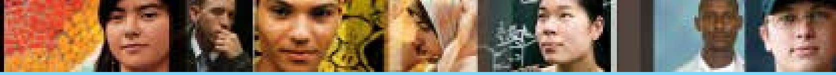
```
341 Software (C1841-IPBASEK9-M), Version 12.4(11)T, RELEASE
p://www.cisco.com/techsupport
36 by Cisco Systems, Inc.
5 15:20 by prod_rel_team
 Version 12.3(8r)T8, RELEASE SOFTWARE (fc1)
inutes
d by reload at 01:34:15 UTC Fri Ap
'flash:c1841-ipbasek9-mz.124-11.T

This product contains cryptographic features and is sub
States and local country laws governing import, export,
use. Delivery of Cisco cryptographic products does not
third-party authority to import, export, distribute or
Importers, exporters, distributors and users are respo
compliance with U.S. and local country laws. By using t
agree to comply with applicable laws and regulations. I
to comply with U.S. and local laws, return this product

A summary of U.S. laws governing Cisco cryptographic pr
 --More--
```

File name: r1841-1.txt
Files of type: all

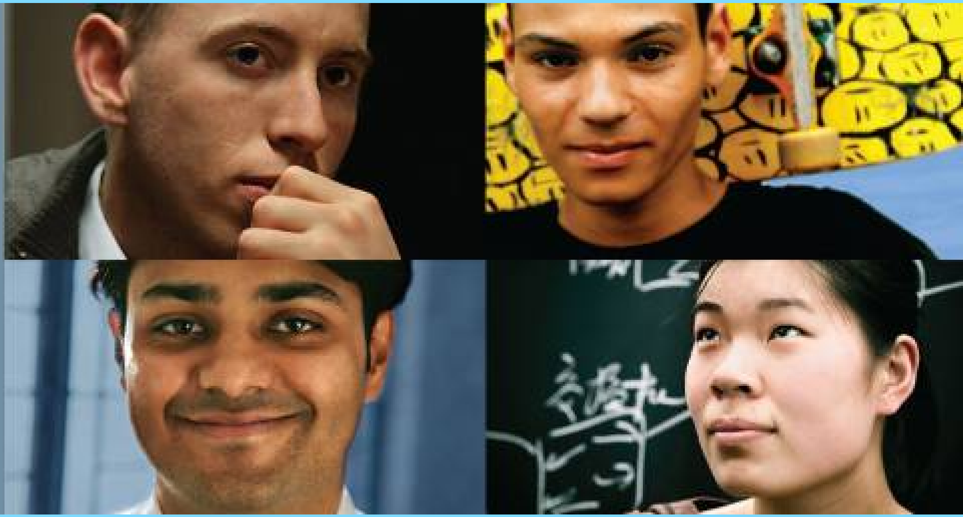
Filename: test.txt
Bytes transfered: 1699

In the terminal session:

1. Start the log process
2. Issue a **`show running-config`** command
3. Close the log



2.3 Addressing Schemes



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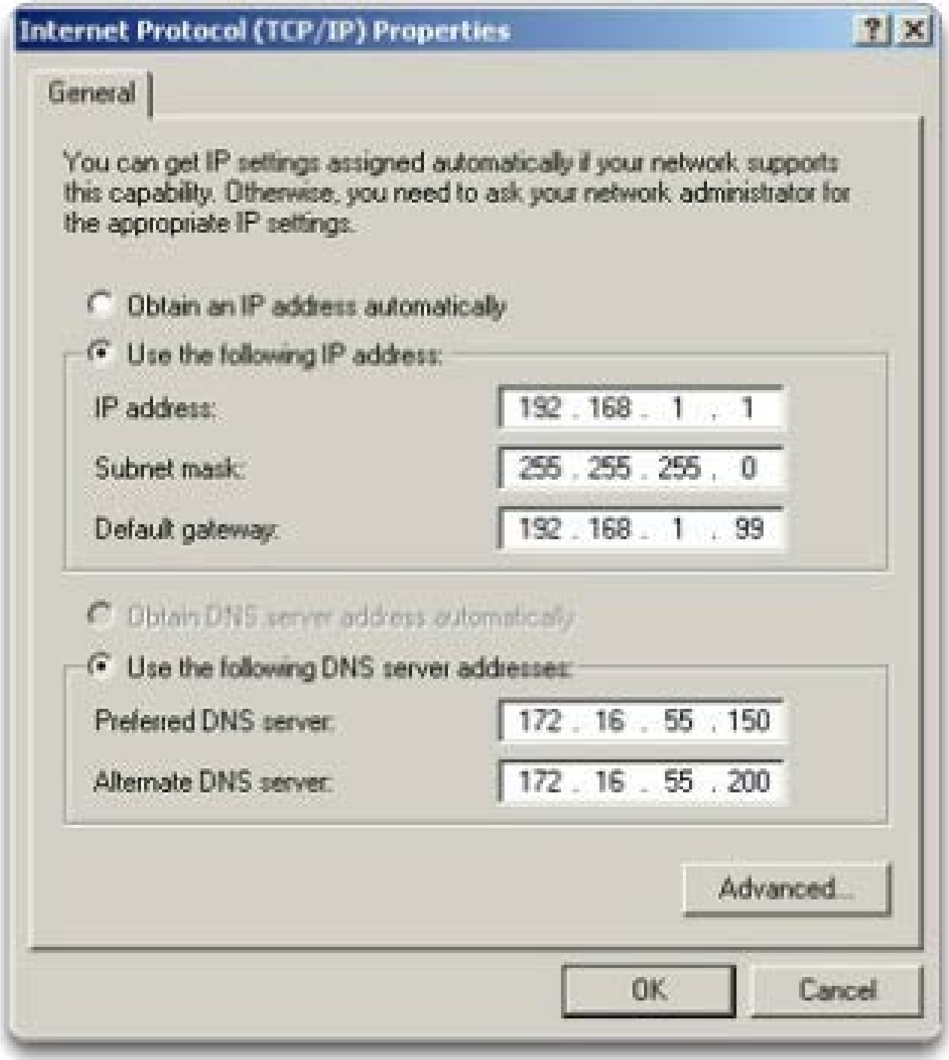
Mind Wide Open™

Ports and Addresses

IP Addressing of Devices

- Each end device on a network must be configured with an IP address.
- Structure of an IPv4 address is called *dotted decimal*.
- IP address displayed in decimal notation, with four decimal numbers between 0 and 255.
- With the IP address, a subnet mask is also necessary.
- IP addresses can be assigned to both physical ports and virtual interfaces.



Internet Protocol (TCP/IP) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

○ Obtain an IP address automatically

● Use the following IP address:

IP address: 192 . 168 . 1 . 1

Subnet mask: 255 . 255 . 255 . 0

Default gateway: 192 . 168 . 1 . 99

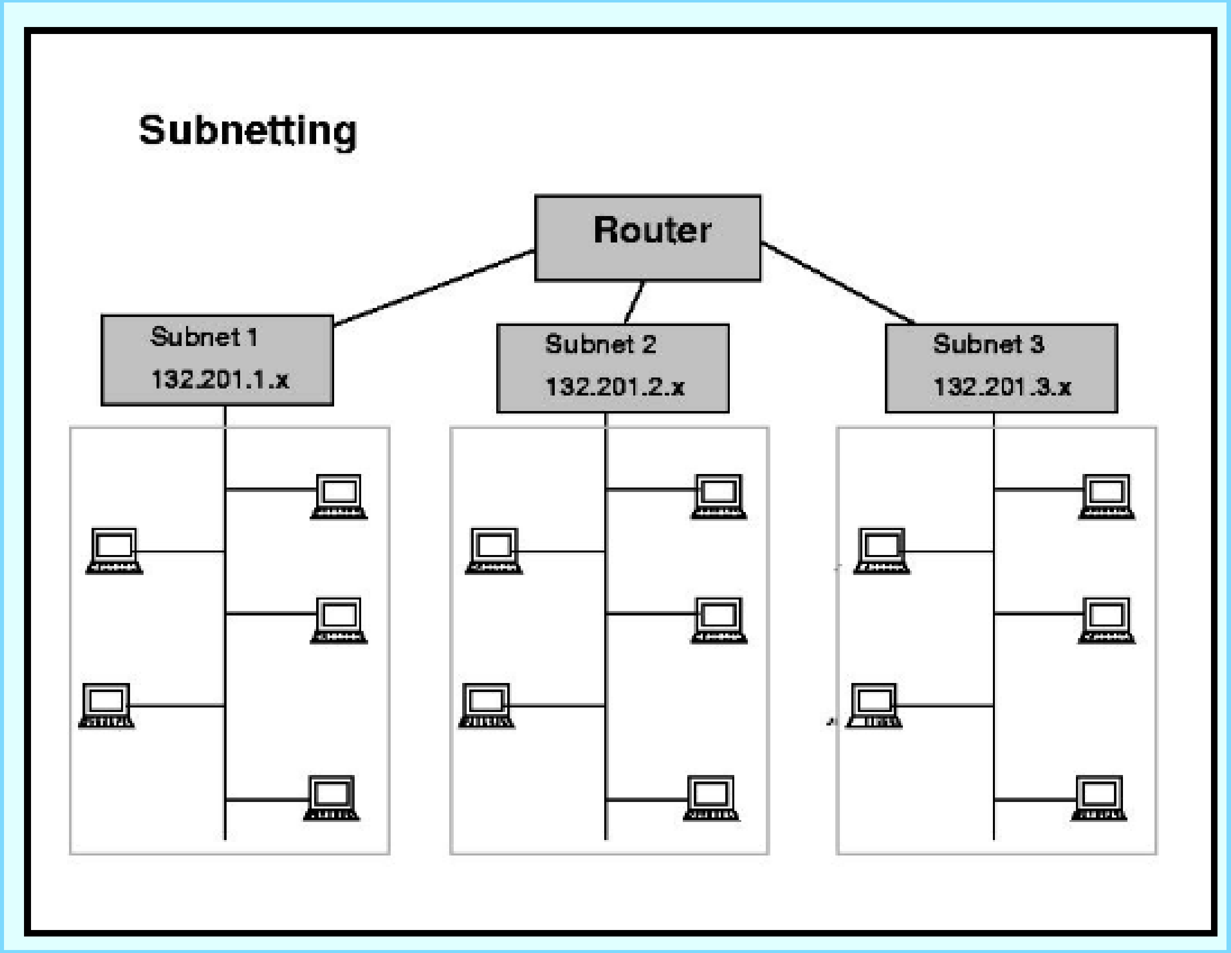
○ Obtain DNS server address automatically

● Use the following DNS server addresses:

Preferred DNS server: 172 . 16 . 55 . 150

Alternate DNS server: 172 . 16 . 55 . 200

Ports and Addresses



A network can be divided into smaller parts, called subnets.

Subnet mask is a mask used to determine what subnet an IP address belongs to.

Ports and Addresses

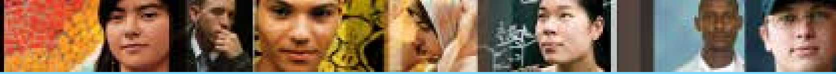
Interfaces and Ports

- Network communications depend on end user device interfaces, networking device interfaces, and the cables that connect them.
- Types of network media include, twisted-pair copper cables, fiber-optic cables, coaxial cables, or wireless.
- Different types of network media have different features and benefits.
- Ethernet is the most common local area network (LAN) technology.

Ports and Addresses

Interfaces and Ports

- Ethernet ports are found on end user devices, switch devices, and other networking devices.
- Cisco IOS switches have physical ports for devices to connect to, but also have one or more switch virtual interfaces (SVIs; no physical hardware on the device associated with it; created in software).
- SVI provides a means to remotely manage a switch over a network.



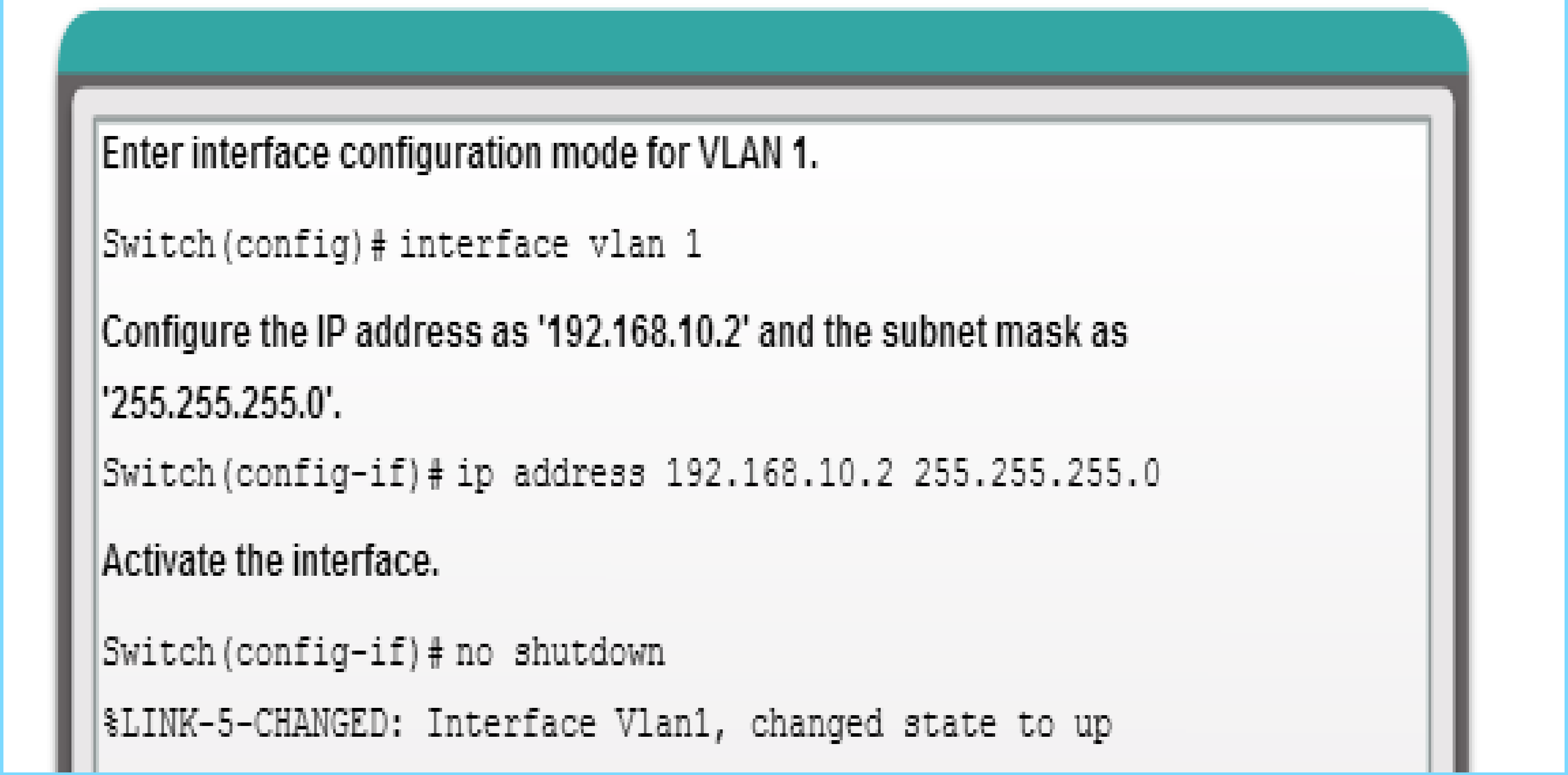
Addressing Devices

Configuring a Switch Virtual Interface (SVI)

- **IP address** – Together with subnet mask, uniquely identifies end device on internetwork.
- **Subnet mask** – Determines which part of a larger network is used by an IP address.
- **`interface VLAN 1`** – VLAN stands for Virtual LAN; Available in interface configuration mode,
- **`ip address 192.168.10.2 255.255.255.0`** – Configures the IP address and subnet mask for the switch.
- **no shutdown** – Administratively enables the interface.
- Switch still needs to have physical ports configured and VTY lines to enable remote management.

Addressing Devices

Configuring a Switch Virtual Interface



Enter interface configuration mode for VLAN 1.

```
Switch(config)# interface vlan 1
```

Configure the IP address as '192.168.10.2' and the subnet mask as '255.255.255.0'.

```
Switch(config-if)# ip address 192.168.10.2 255.255.255.0
```

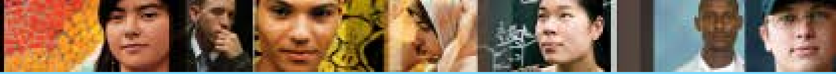
Activate the interface.

```
Switch(config-if)# no shutdown
%LINK-5-CHANGED: Interface Vlan1, changed state to up
```

Addressing Devices

IP Address Configuration for End Devices

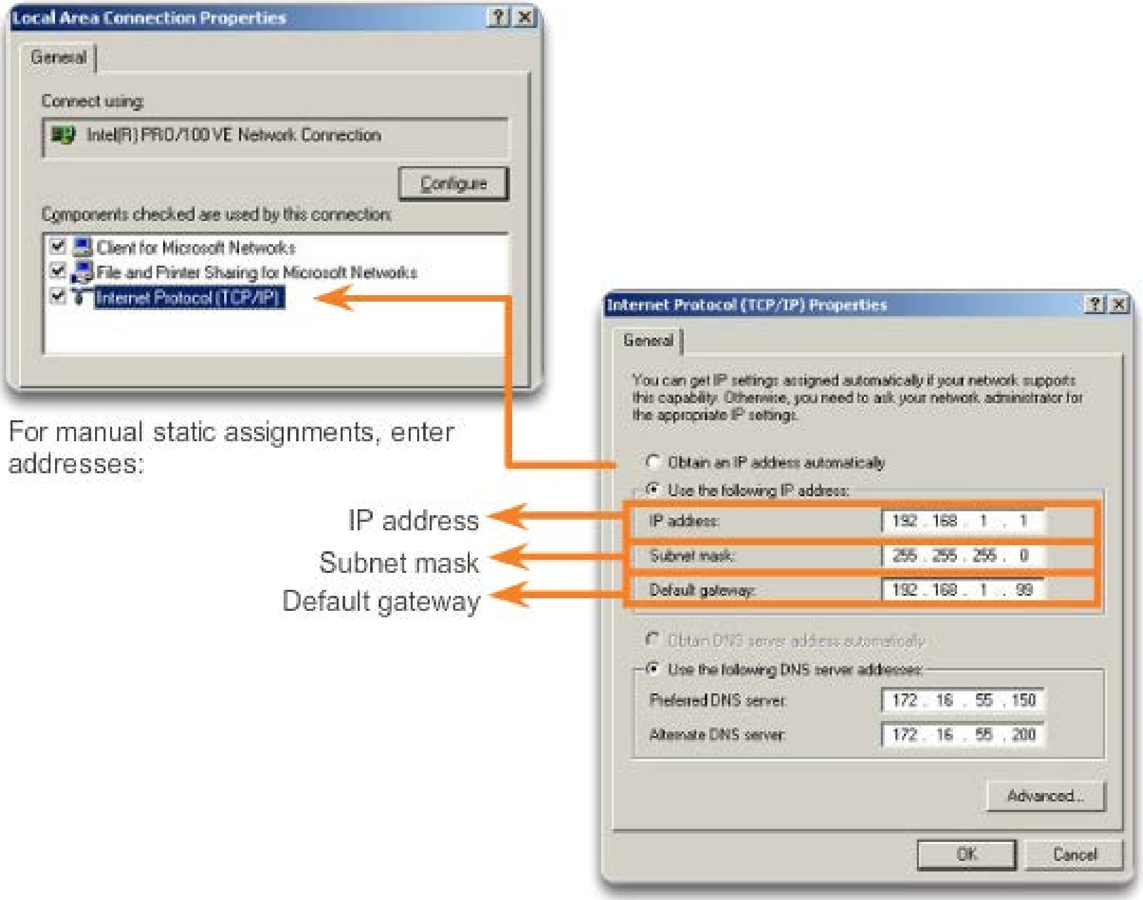
IP addresses can be configured manually or automatically



Addressing Devices

Manual IP Address Configuration for End Devices

Addressing End Devices



Local Area Connection Properties

General

Connect using:

Intel(R) PRO/100 VE Network Connection

Configure

Components checked are used by this connection:

☑ Client for Microsoft Networks

☑ File and Printer Sharing for Microsoft Networks

☑ Internet Protocol (TCP/IP)

For manual static assignments, enter addresses:

IP address

Subnet mask

Default gateway

Internet Protocol (TCP/IP) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

○ Obtain an IP address automatically

● Use the following IP address:

IP address:	192 . 168 . 1 . 1
Subnet mask:	255 . 255 . 255 . 0
Default gateway:	192 . 168 . 1 . 99

○ Obtain DNS server address automatically

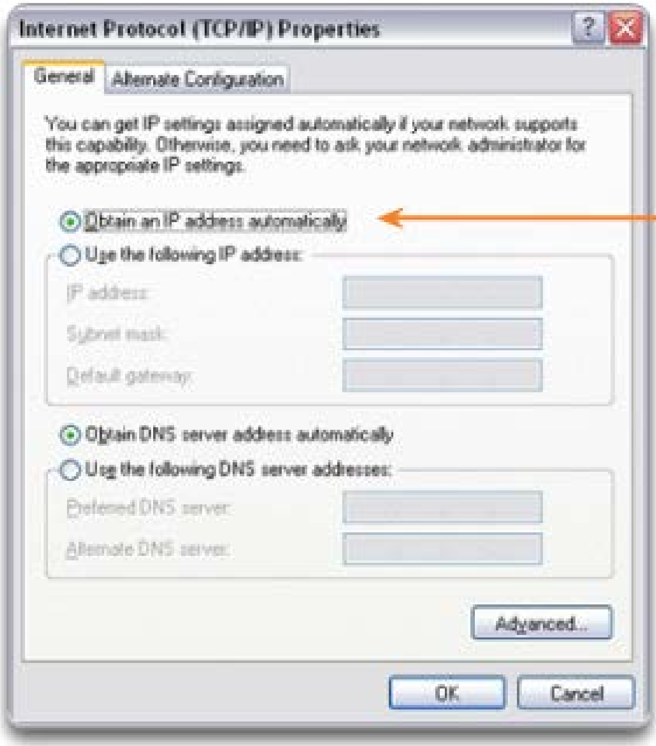
● Use the following DNS server addresses:

Preferred DNS server:	172 . 16 . 55 . 150
Alternate DNS server:	172 . 16 . 55 . 200

Addressing Devices

Automatic IP Address Configuration for End Devices

Assigning Dynamic Addresses



Internet Protocol (TCP/IP) Properties

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

● Obtain an IP address automatically

○ Use the following IP address:

IP address:

Subnet mask:

Default gateway:

● Obtain DNS server address automatically

○ Use the following DNS server addresses:

Preferred DNS server:

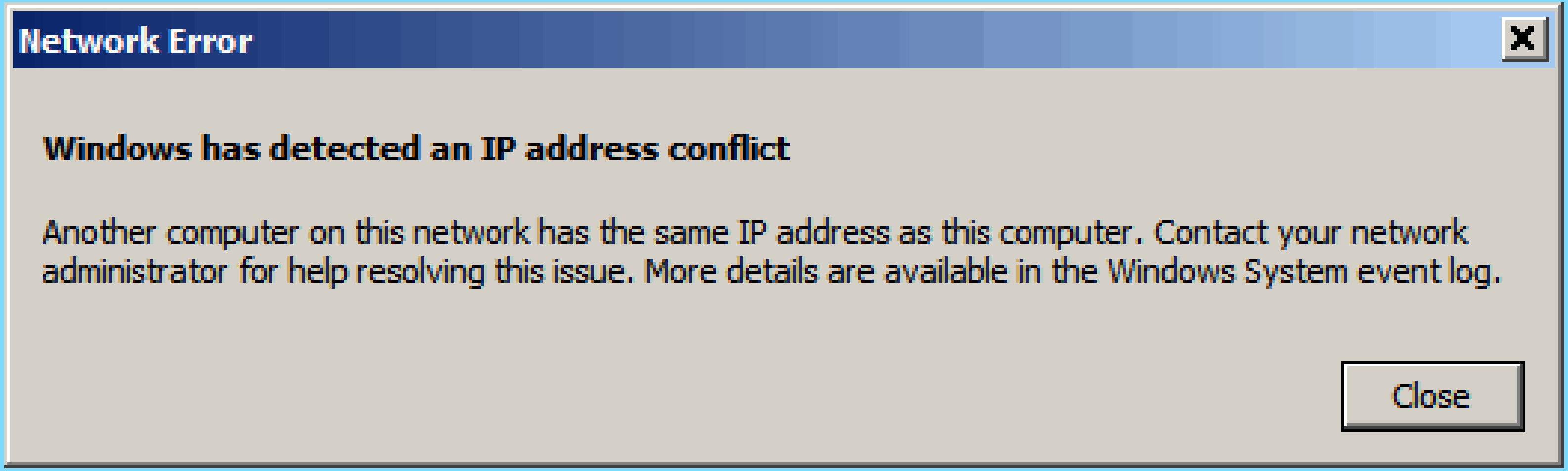
Alternate DNS server:

This property will set the device to obtain an IP address automatically.

Addressing Devices

IP Address Conflicts

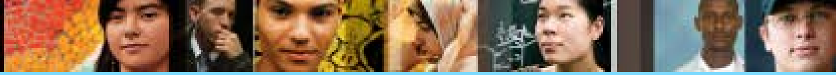
If more than one device try to use on IP address, there will be a IP conflict.



Network Error

Windows has detected an IP address conflict

Another computer on this network has the same IP address as this computer. Contact your network administrator for help resolving this issue. More details are available in the Windows System event log.



Verifying Connectivity

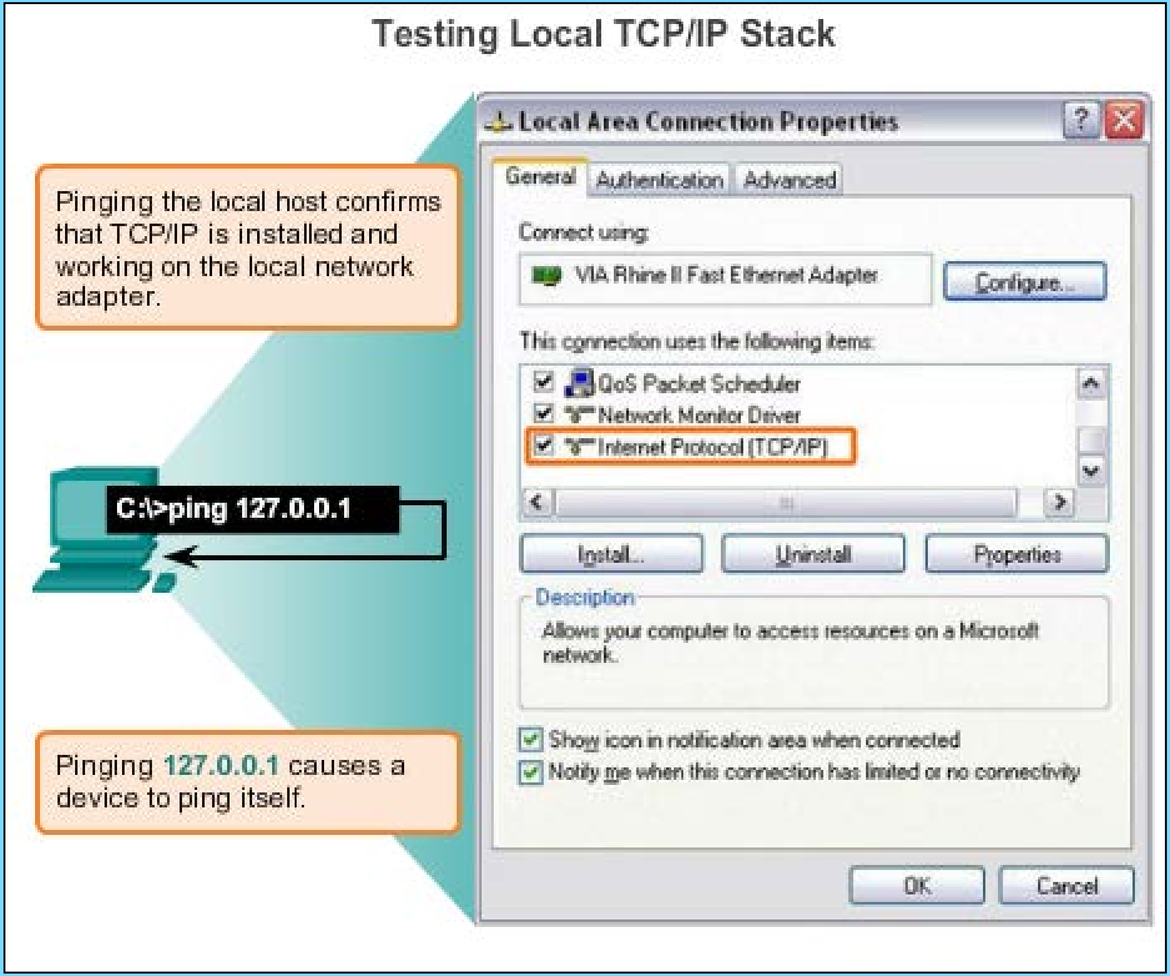
Loopback Address on an End Device

Loopback address is a special IP number (127.0.0.1) that is designated for the software loopback interface of a machine.
The loopback interface has no hardware associated with it, and it is not physically connected to a network.

The loopback interface allows IT professionals to test IP software without worrying about broken or corrupted drivers or hardware.

Verifying Connectivity

Testing Loopback Address on an End Device



Testing Local TCP/IP Stack

Pinging the local host confirms that TCP/IP is installed and working on the local network adapter.

```
C:\>ping 127.0.0.1
```

Pinging 127.0.0.1 causes a device to ping itself.

Local Area Connection Properties

Connect using:

VIA Rhine II Fast Ethernet Adapter

This connection uses the following items:

- ☑ QoS Packet Scheduler
- ☑ Network Monitor Driver
- ☑ Internet Protocol (TCP/IP)

Description

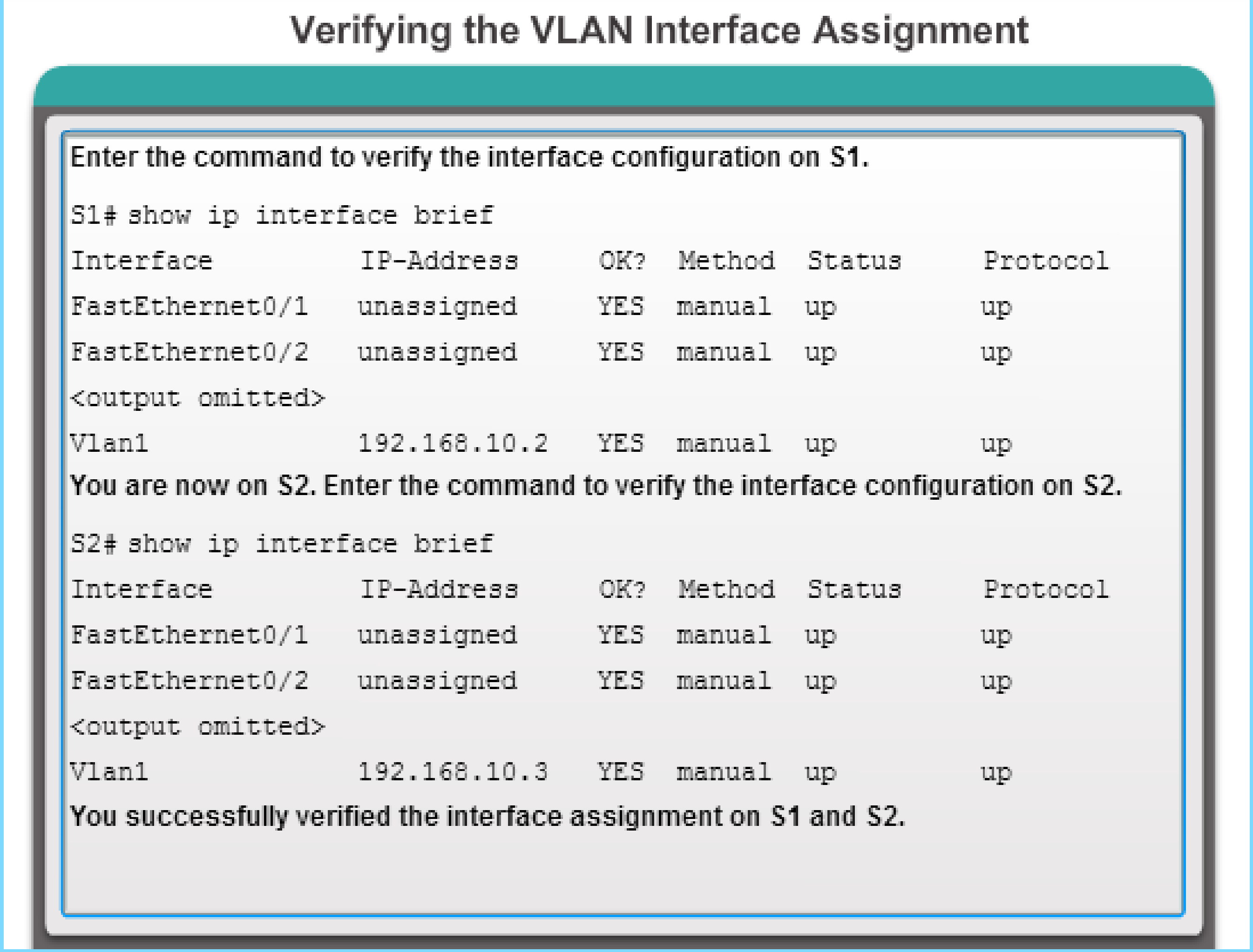
Allows your computer to access resources on a Microsoft network.

☑ Show icon in notification area when connected

☑ Notify me when this connection has limited or no connectivity

Verifying Connectivity

Testing the Interface Assignment



Verifying the VLAN Interface Assignment

Enter the command to verify the interface configuration on S1.

```
S1# show ip interface brief
Interface          IP-Address     OK?  Method  Status      Protocol
FastEthernet0/1    unassigned     YES  manual  up          up
FastEthernet0/2    unassigned     YES  manual  up          up
<output omitted>
Vlan1              192.168.10.2   YES  manual  up          up
```

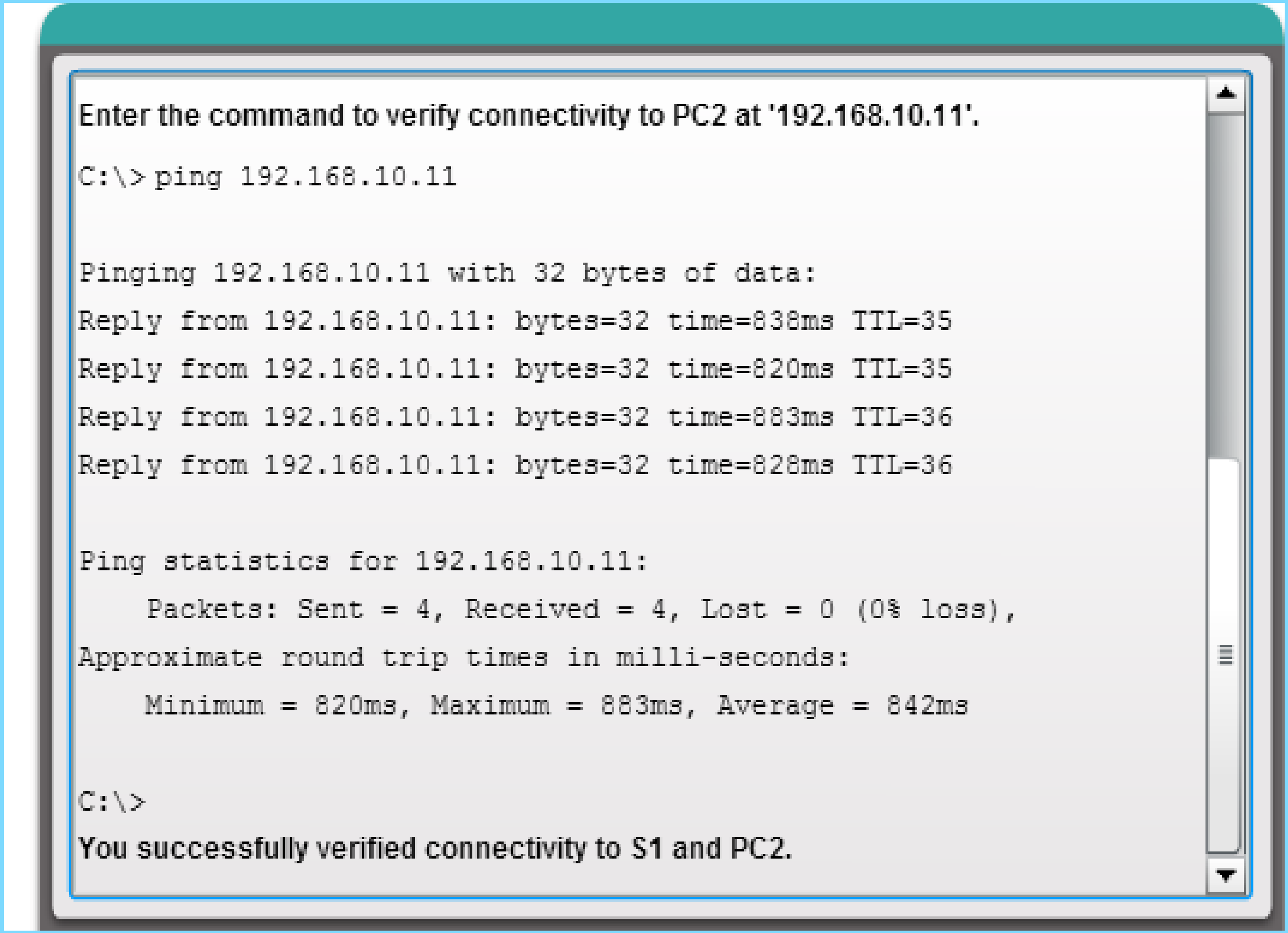
You are now on S2. Enter the command to verify the interface configuration on S2.

```
S2# show ip interface brief
Interface          IP-Address     OK?  Method  Status      Protocol
FastEthernet0/1    unassigned     YES  manual  up          up
FastEthernet0/2    unassigned     YES  manual  up          up
<output omitted>
Vlan1              192.168.10.3   YES  manual  up          up
```

You successfully verified the interface assignment on S1 and S2.

Verifying Connectivity

Testing End-to-End Connectivity



Enter the command to verify connectivity to PC2 at '192.168.10.11'.

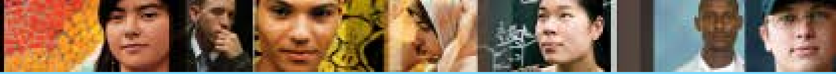
```
C:\> ping 192.168.10.11

Pinging 192.168.10.11 with 32 bytes of data:
Reply from 192.168.10.11: bytes=32 time=838ms TTL=35
Reply from 192.168.10.11: bytes=32 time=820ms TTL=35
Reply from 192.168.10.11: bytes=32 time=883ms TTL=36
Reply from 192.168.10.11: bytes=32 time=828ms TTL=36

Ping statistics for 192.168.10.11:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 820ms, Maximum = 883ms, Average = 842ms

C:\>
```

You successfully verified connectivity to S1 and PC2.

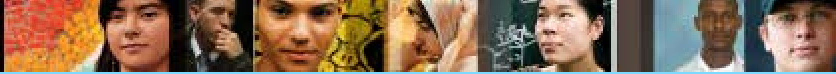


Configuring a Network Operating System

Chapter 2 Summary

Cisco IOS:

- The technician can enter commands to configure, or program, the device to perform various networking functions.
- Services are generally accessed using a command-line interface (CLI), which is accessed by either the console port, the AUX port, or through telnet or SSH.
- Once connected to the CLI, network technicians can make configuration changes to Cisco IOS devices.
- Cisco IOS is designed as a modal operating system, which means a network technician must navigate through various hierarchical modes of the IOS.
- Cisco IOS routers and switches support a similar modal operating system, support similar command structures, and support many of the same commands. In addition, both devices have identical initial configuration steps when implementing them in a network.



The Command Structure

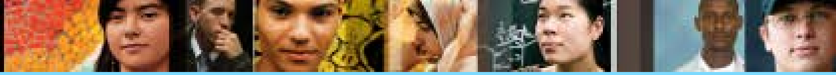
Cisco IOS Command Reference

To navigate to Cisco’s *IOS Command Reference* to find a command:

1. Go to http://www.cisco.com.
2. Click **Support**.
3. Click **Networking Software (IOS & NX-OS)**.
4. Click **15.2M&T** (for example).
5. Click **Reference Guides**.
6. Click **Command References**.
7. Click the particular technology that encompasses the command you reference.
8. Click the link on the left that alphabetically matches the command you referencing.
9. Click the link for the command.

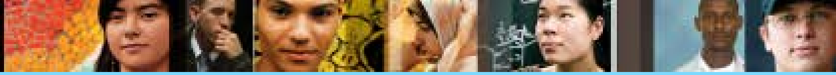
END OF CHAPTER 2

CHAPTER 2B REVIEW



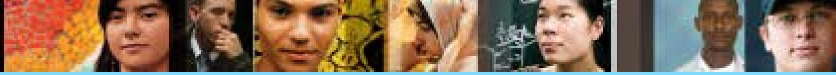
REVIEW

1. Once a network is set up, all devices must be ____________ by a technical personnel.



REVIEW

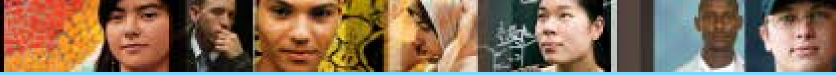
1. Once a network is set up, all devices must be configured by a technical personnel.



REVIEW

2. Access to Cisco devices can be done via _____, using the following methods:

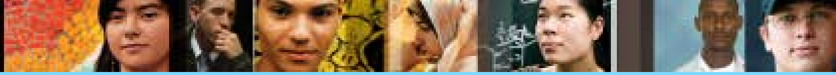
- the console port,
- the AUX port, or
- through telnet or SSH.



REVIEW

2. Access to Cisco devices can be done via CLI, using the following methods:

- the console port,
- the AUX port, or
- through telnet or SSH.



REVIEW

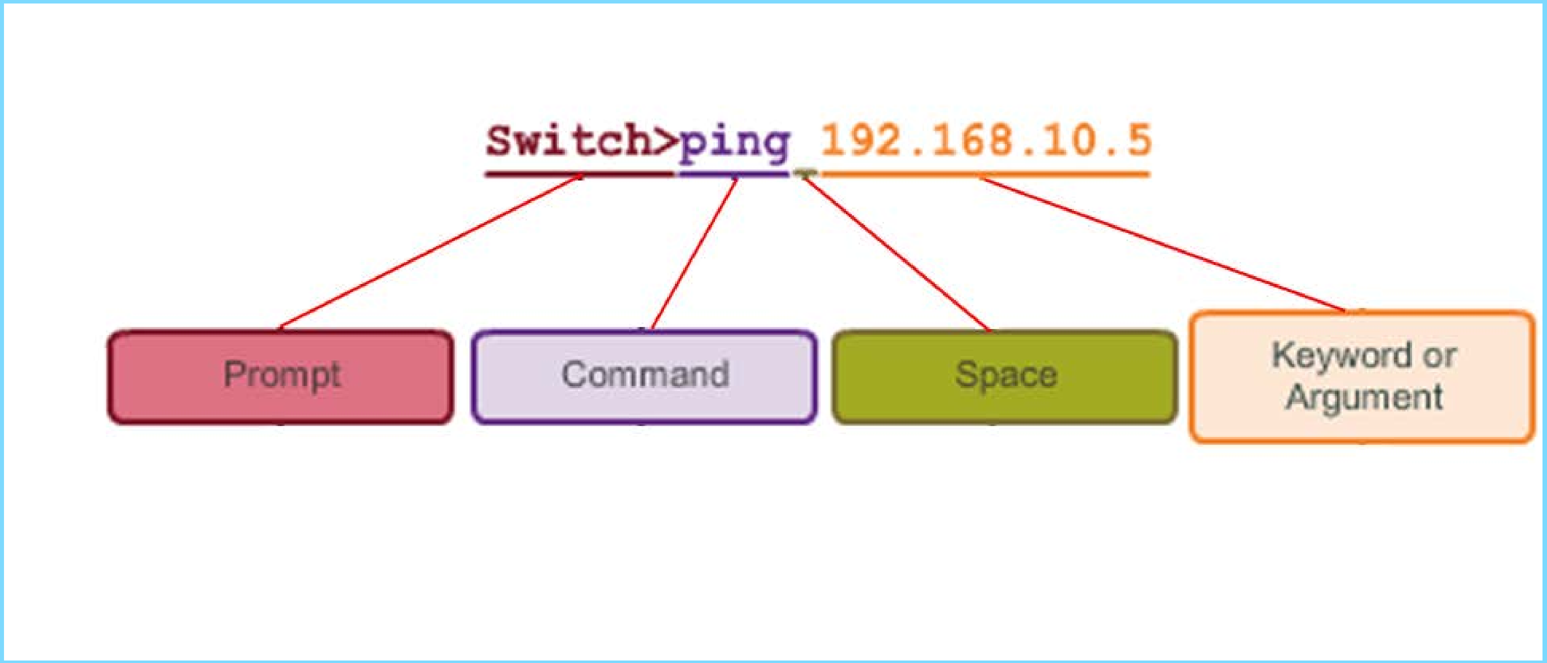
3. A command line consists of:

- A ________
- A _______
- ________ OR ________.

REVIEW

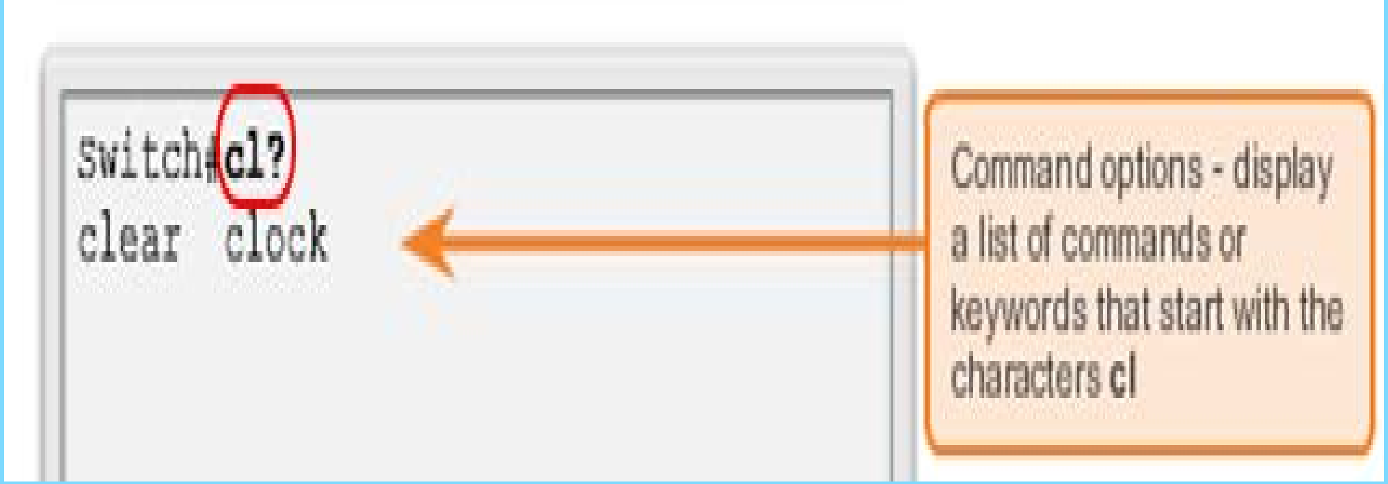
3. A command line consists of:

- A command
- A space
- Keyword or argument



REVIEW

4. At the command prompt, you can check available commands using a few letters and a ________ ____.

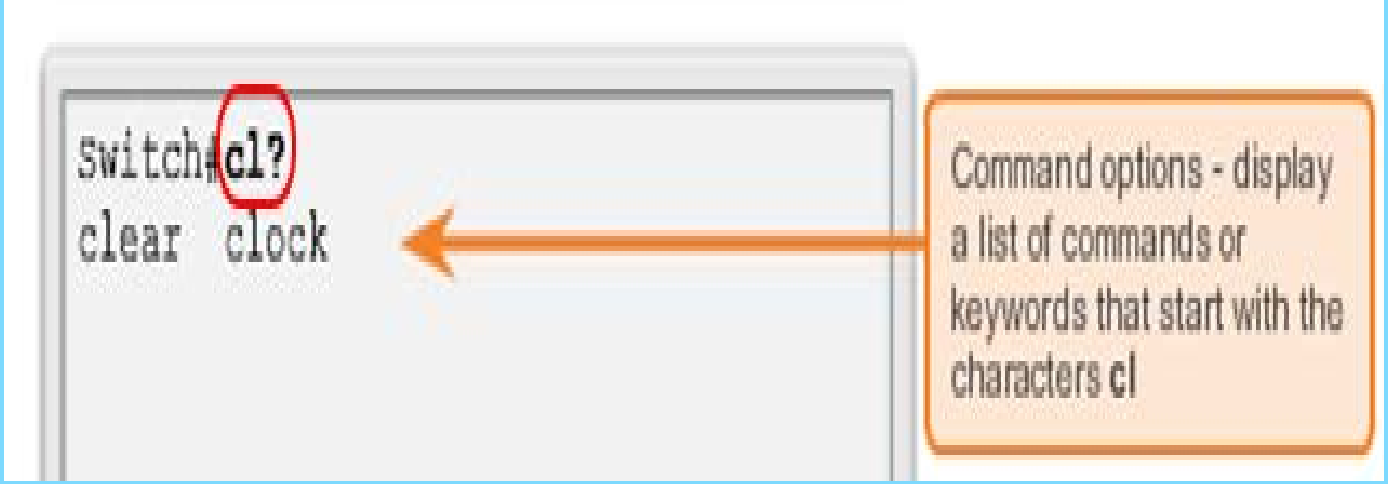


```
Switch#cl?
clear  clock
```

Command options - display a list of commands or keywords that start with the characters **cl**

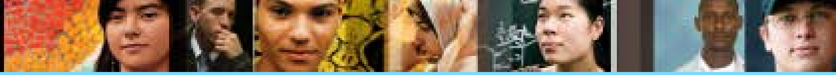
REVIEW

4. At the command prompt, you can check available commands using a few letters and a question mark.



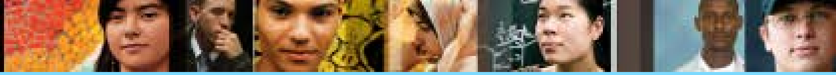
```
Switch#cl?
clear  clock
```

Command options - display a list of commands or keywords that start with the characters **cl**



REVIEW

5. Commands at the CLI must follow a fixed, format recognized by the IOS. This is known as ____________.

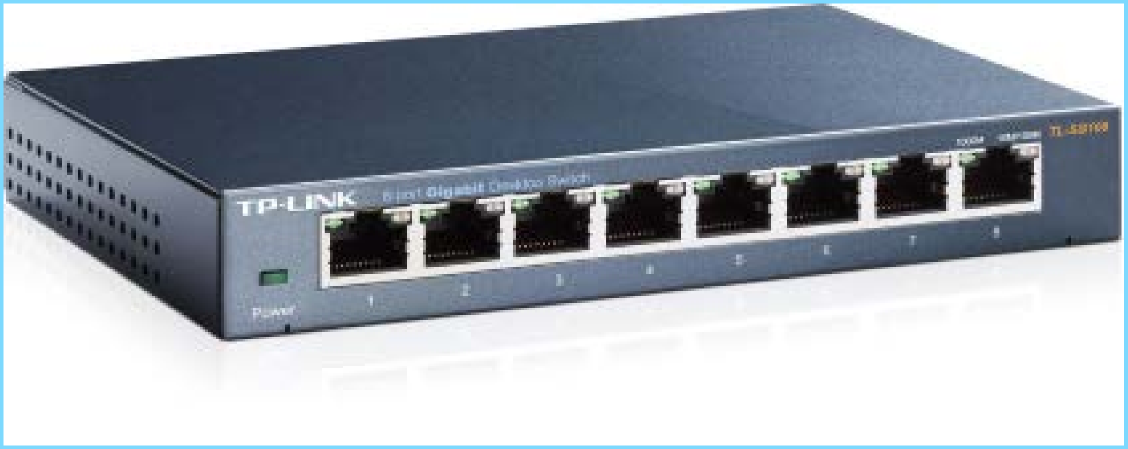


REVIEW

5. Commands at the CLI must follow a fixed, format recognized by the IOS. This is known as syntax.

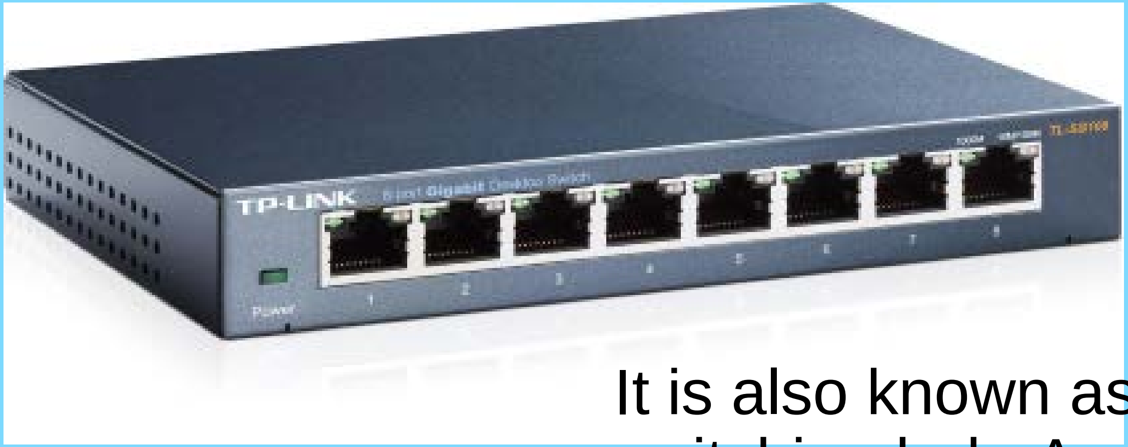
REVIEW

6. This is a _______.



REVIEW

6. This is a switch.

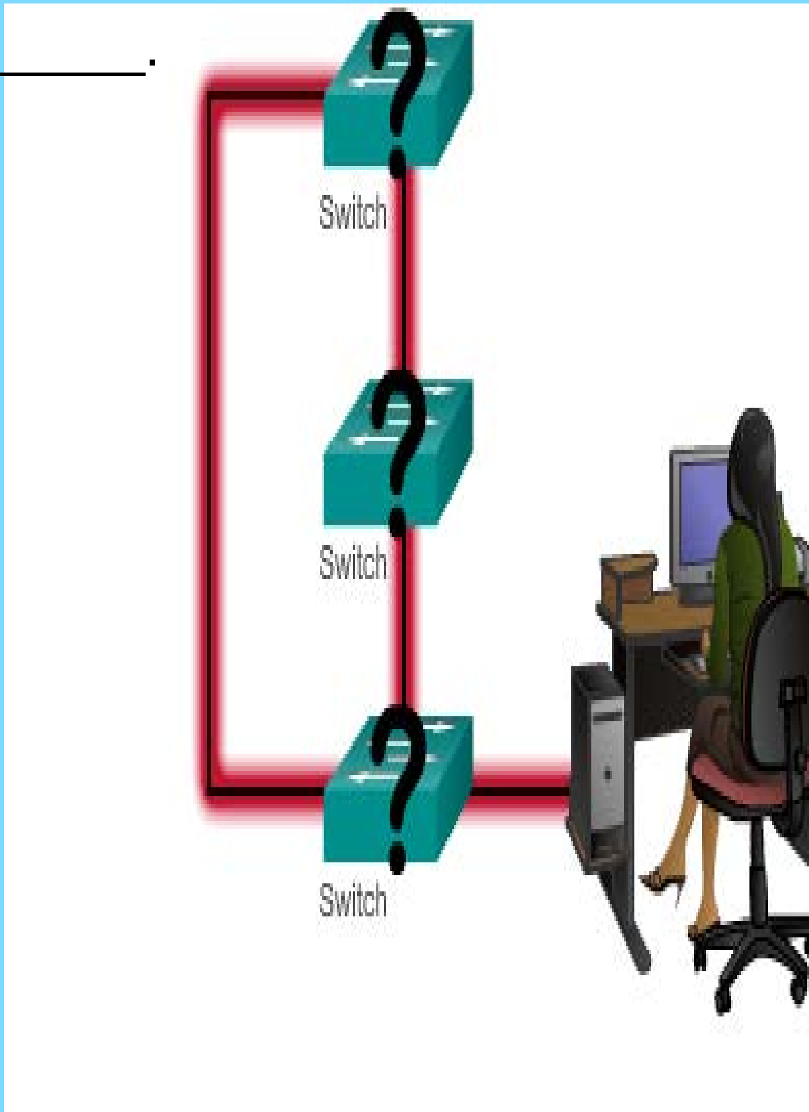


It is also known as a switch or switching hub. A network switch receives data, process and forward the data to the destination device that needs the data.

REVIEW

7. Each device on a network requires a ________.

.



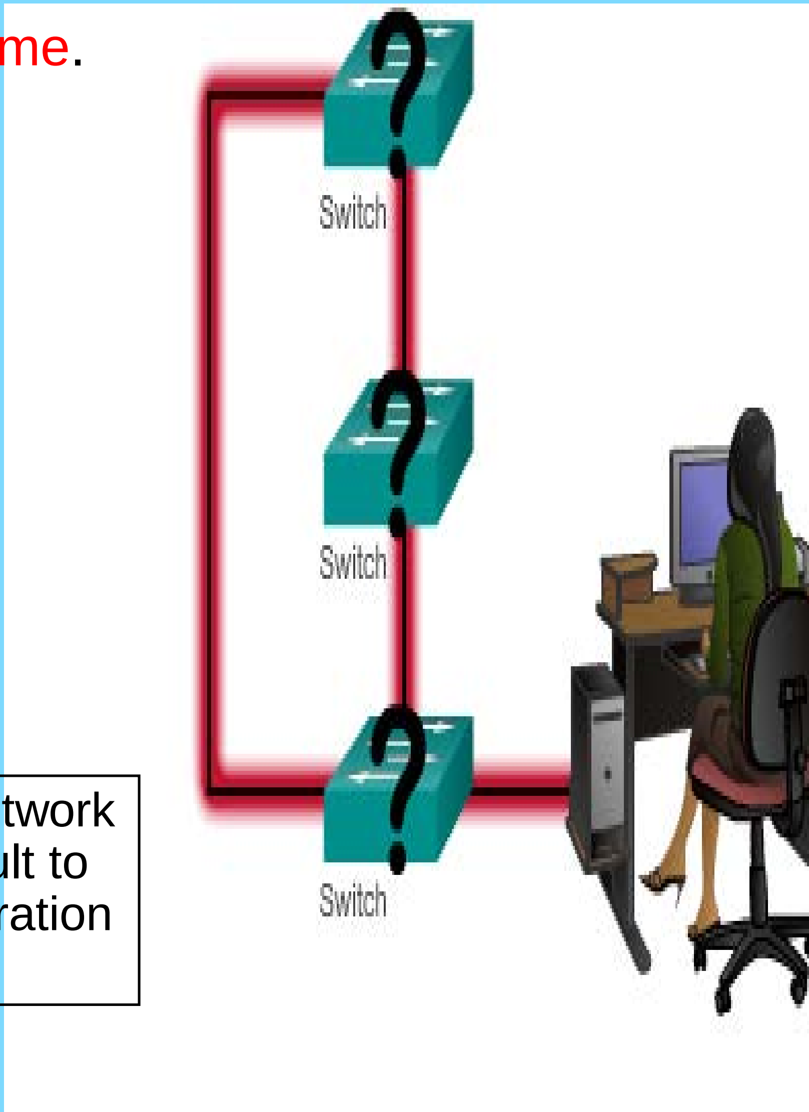
REVIEW

7. Each device on a network requires a name.

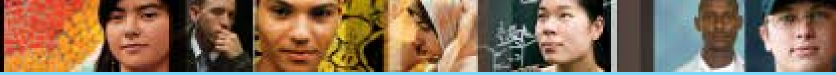
Some guidelines for naming conventions:

- Start with a letter
- Contains no spaces
- Ends with a letter or digit
- Uses only letters, digits, and dashes
- Be less than 64 characters in length

Eg – Switch01, PC_01, etc.



Without names, network devices are difficult to identify for configuration purposes.



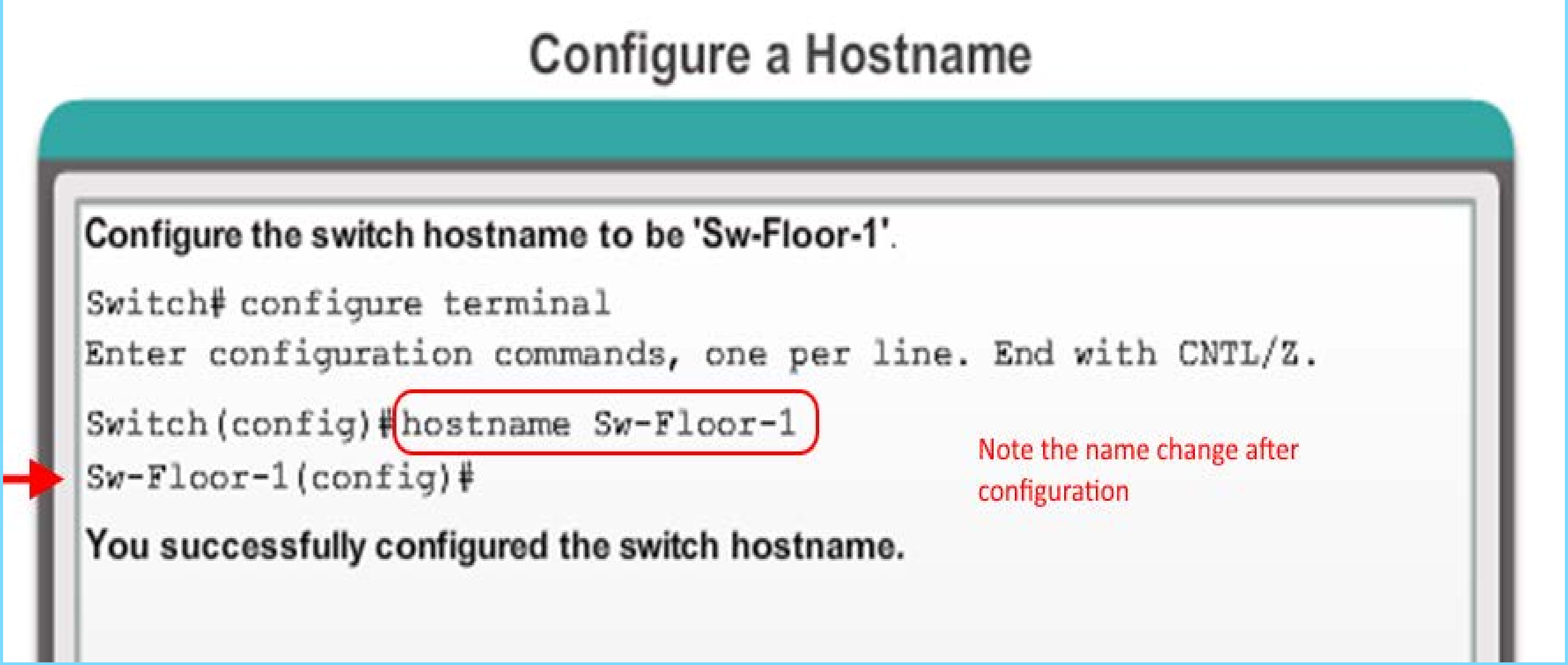
REVIEW

8. Hostnames can be done at the

______

REVIEW

8. Hostnames can be done at the CLI.



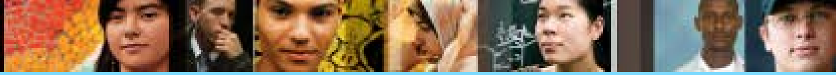
Configure a Hostname

Configure the switch hostname to be 'Sw-Floor-1'.

```
Switch# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname Sw-Floor-1
Sw-Floor-1(config)#
```

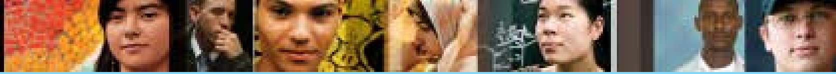
Note the name change after configuration

You successfully configured the switch hostname.



REVIEW

9. To prevent unauthorized access, devices on a network can be secured by setting __________.

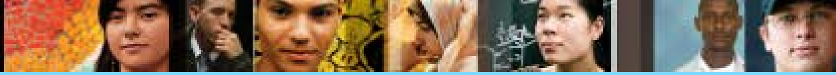


REVIEW

9. To prevent unauthorized access, devices on a network can be secured by setting passwords.

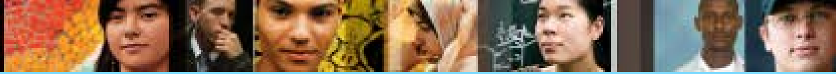
These are device access passwords commands:

- **enable password** – Limits access to the privileged EXEC mode
- **enable secret** – Encrypted, limits access to the privileged EXEC mode
- **console password** – Limits device access using the console connection
- **VTY password** – Limits device access over Telnet



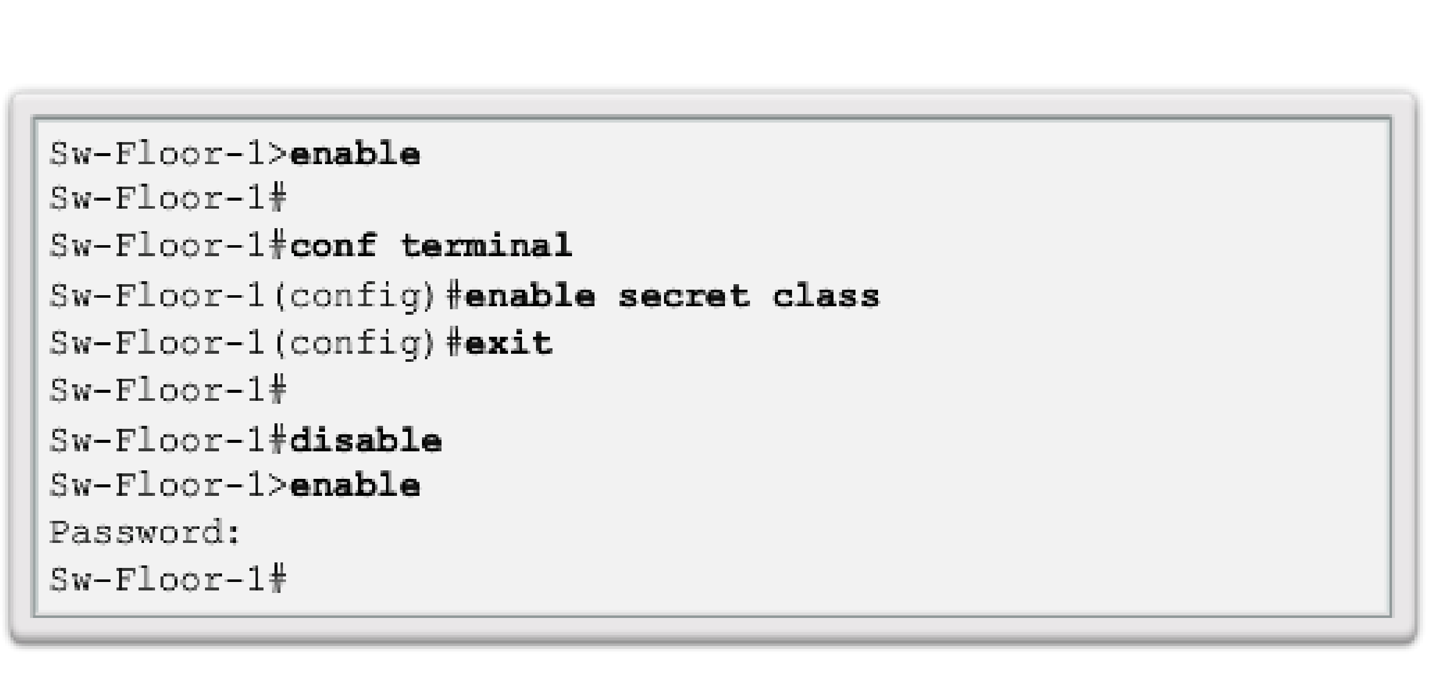
REVIEW

10. The **’enable secret’** command provides greater security because the ___________ is ____________.

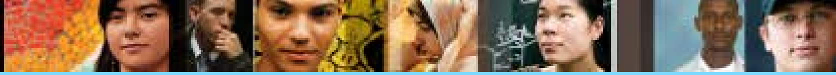


REVIEW

10. The ’**enable secret**’ command provides greater security because the password is encrypted.



```
Sw-Floor-1>enable
Sw-Floor-1#
Sw-Floor-1#conf terminal
Sw-Floor-1(config)#enable secret class
Sw-Floor-1(config)#exit
Sw-Floor-1#
Sw-Floor-1#disable
Sw-Floor-1>enable
Password:
Sw-Floor-1#
```



Limiting Access to Device Configurations

Securing User EXEC Access

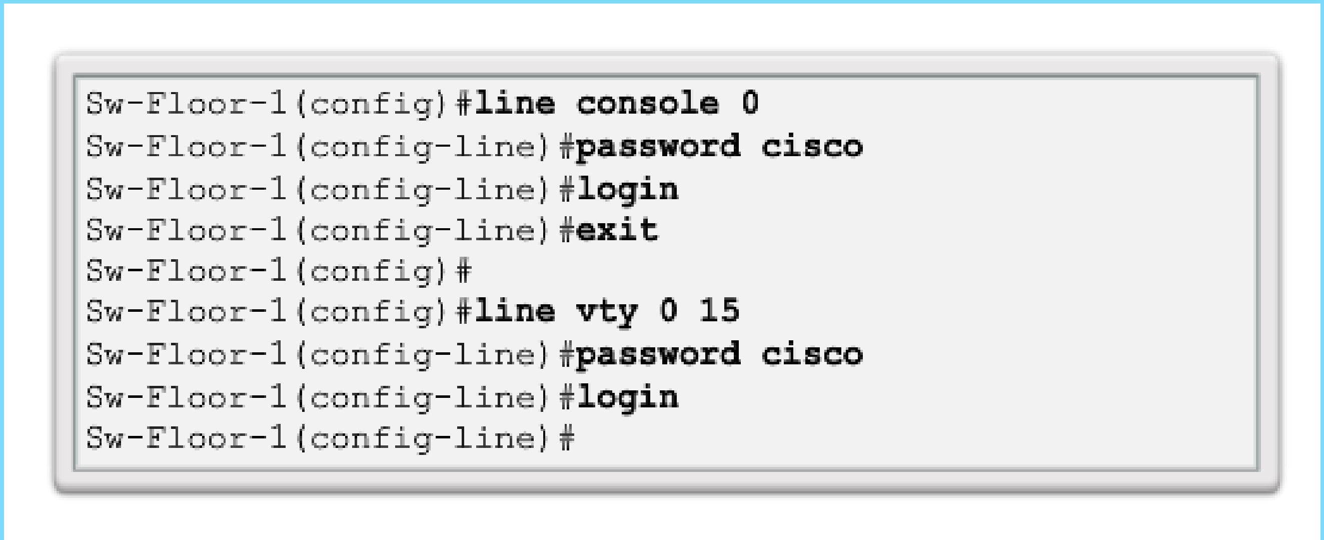
11. A Cisco device can be accessed via Telnet or SSH through _____ ports

Limiting Access to Device Configurations

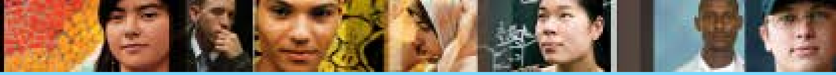
Securing User EXEC Access

11. A Cisco device can be accessed via Telnet or SSH through VTY ports

Most routers have five **VTY** ports, numbered 0 to 4.

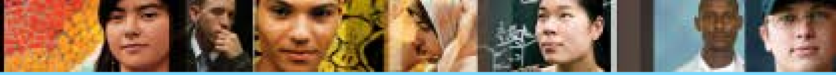


```
Sw-Floor-1(config)#line console 0
Sw-Floor-1(config-line)#password cisco
Sw-Floor-1(config-line)#login
Sw-Floor-1(config-line)#exit
Sw-Floor-1(config)#
Sw-Floor-1(config)#line vty 0 15
Sw-Floor-1(config-line)#password cisco
Sw-Floor-1(config-line)#login
Sw-Floor-1(config-line)#
```



REVIEW

- 12. Passwords are encrypted so that they do not appear as ______ ______ on display units.



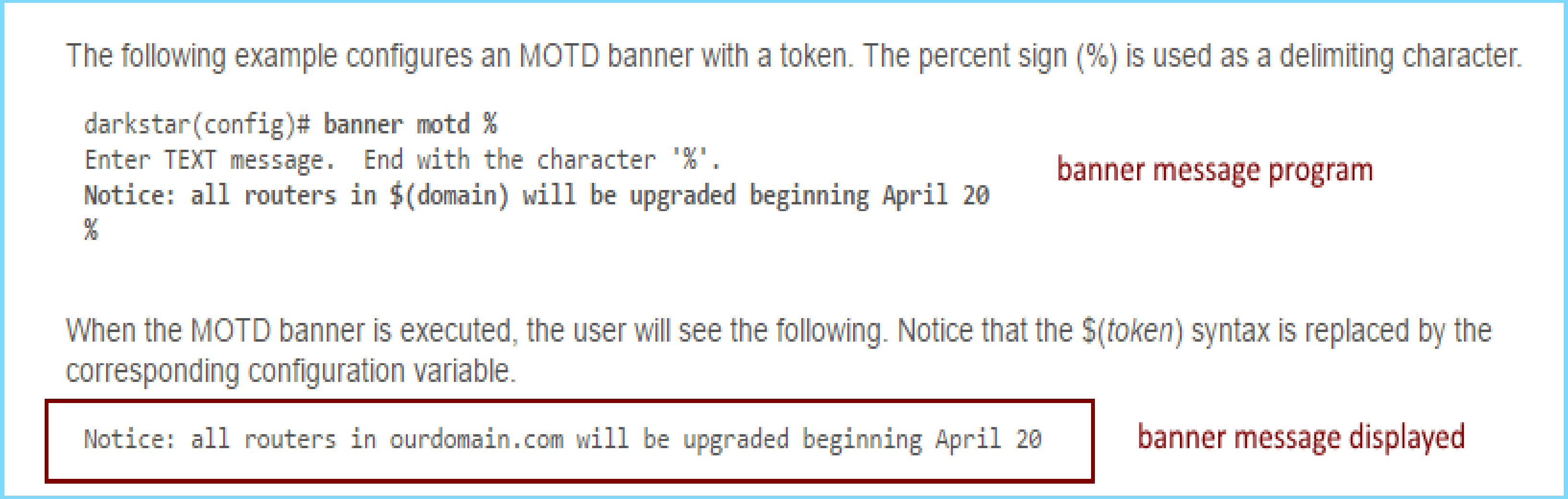
REVIEW

- 12. Passwords are encrypted so that they do not appear as plain texts on display units.

REVIEW

12. The banner is a **feature** used for __________ **a** _______ to be displayed.

MOTD means ______________________.



The following example configures an MOTD banner with a token. The percent sign (%) is used as a delimiting character.

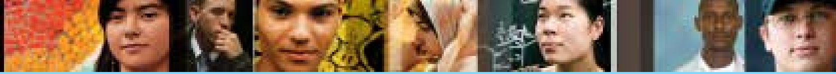
```
darkstar(config)# banner motd %
Enter TEXT message.  End with the character '%'.
Notice: all routers in $(domain) will be upgraded beginning April 20
%
```

banner message program

When the MOTD banner is executed, the user will see the following. Notice that the $(*token*) syntax is replaced by the corresponding configuration variable.

```
Notice: all routers in ourdomain.com will be upgraded beginning April 20
```

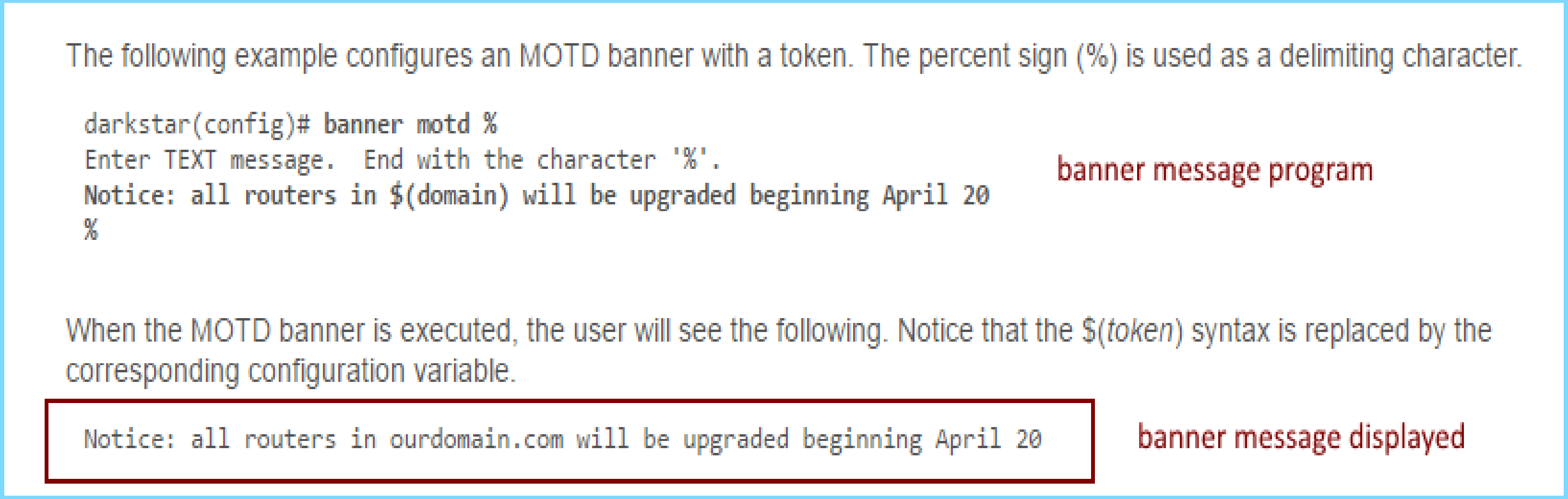
banner message displayed



REVIEW

12. The banner is a **feature** used for **defining a text** to be displayed.

- Banner messages should be used **to warn would-be intruders** that they are not welcome on your network.
- Banner are useful to quickly **identify the terminal.**
- MOTD means ‘message of the day**’.**



The following example configures an MOTD banner with a token. The percent sign (%) is used as a delimiting character.

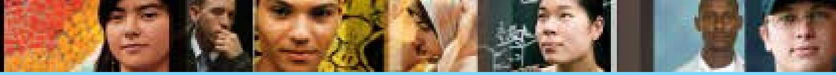
```
darkstar(config)# banner motd %
Enter TEXT message.  End with the character '%'.
Notice: all routers in $(domain) will be upgraded beginning April 20
%
```

banner message program

When the MOTD banner is executed, the user will see the following. Notice that the $(*token*) syntax is replaced by the corresponding configuration variable.

```
Notice: all routers in ourdomain.com will be upgraded beginning April 20
```

banner message displayed

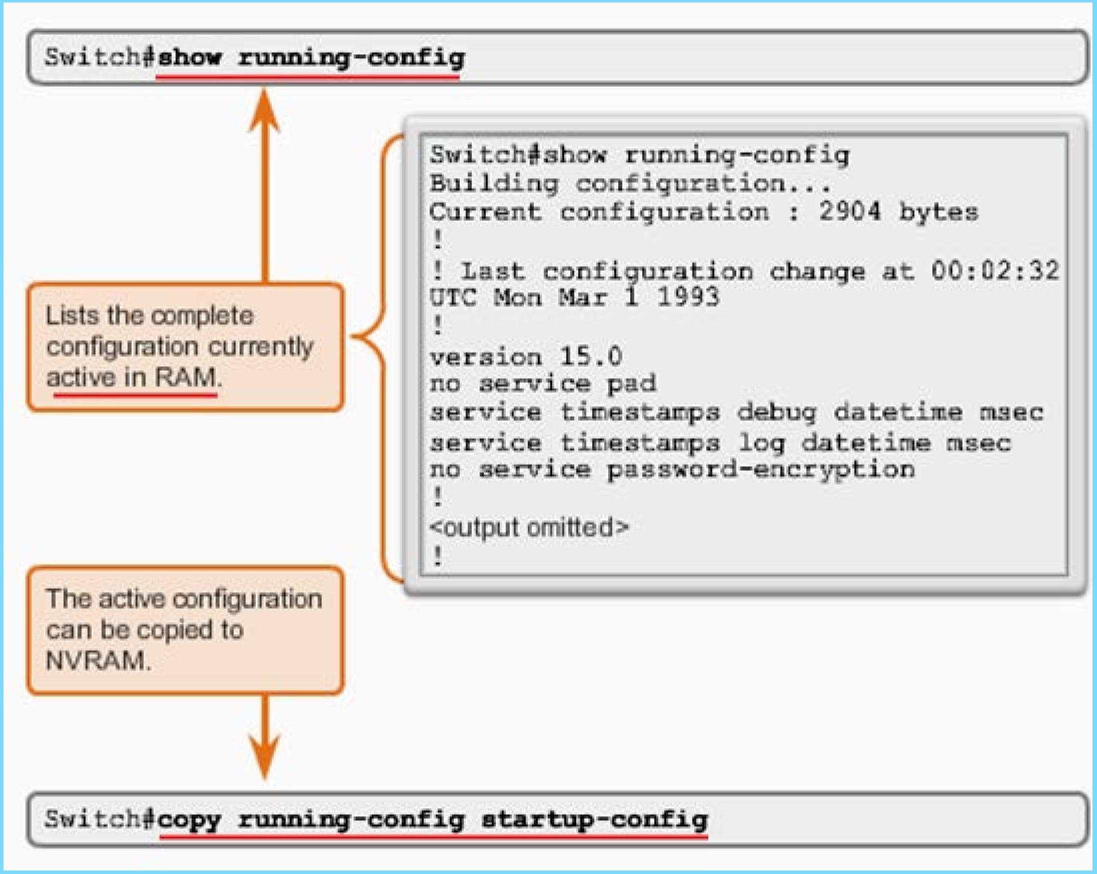


REVIEW

13. Commands can be saved into a ___________ file to be run in sequence.

REVIEW

13. Commands can be saved into a configuration file to be run in sequence.



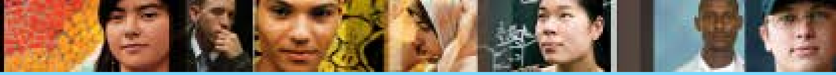
```
Switch#show running-config
```

Lists the complete configuration currently active in RAM.

```
Switch#show running-config
Building configuration...
Current configuration : 2904 bytes
!
! Last configuration change at 00:02:32
UTC Mon Mar 1 1993
!
version 15.0
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
<output omitted>
!
```

The active configuration can be copied to NVRAM.

```
Switch#copy running-config startup-config
```



REVIEW

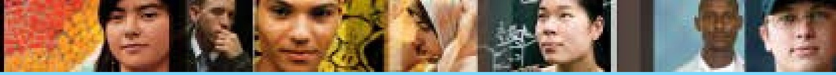
14. Each end device on a network must be configured with an __________.

The structure of an IPv4 address is called ____ ______.
IP address displayed in decimal notation, with four decimal numbers between ____ and _____.

REVIEW

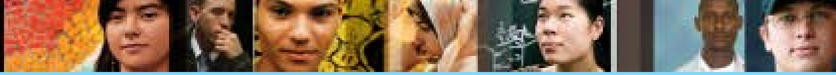
14. Each end device on a network must be configured with an IP Address.

The structure of an IPv4 address is called dotted decimal.
IP address displayed in decimal notation, with four decimal numbers between
0 and 255



REVIEW

15. With the IP address, a __________ ________is also necessary.
IP addresses can be assigned to both physical ports and virtual interfaces.

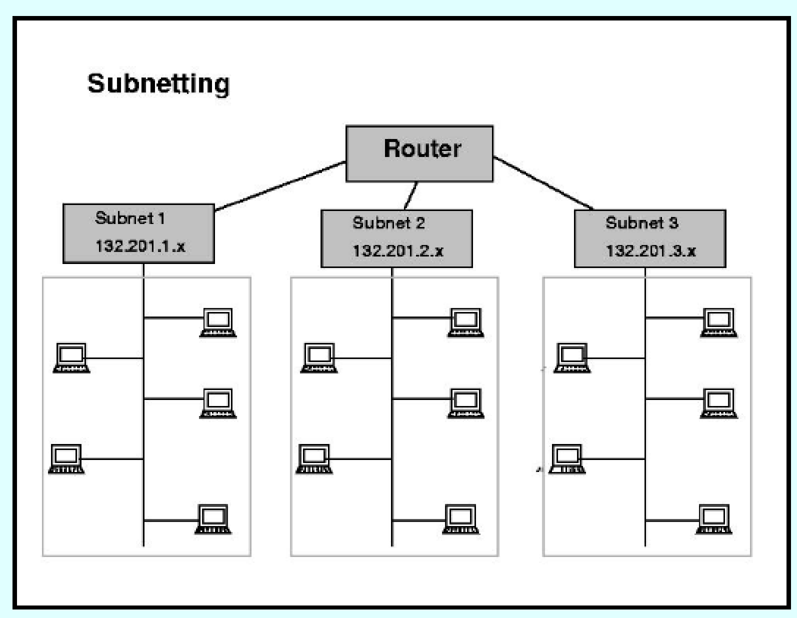


REVIEW

15. With the IP address, a subnet mask is also necessary.
IP addresses can be assigned to both physical ports and virtual interfaces.

REVIEW

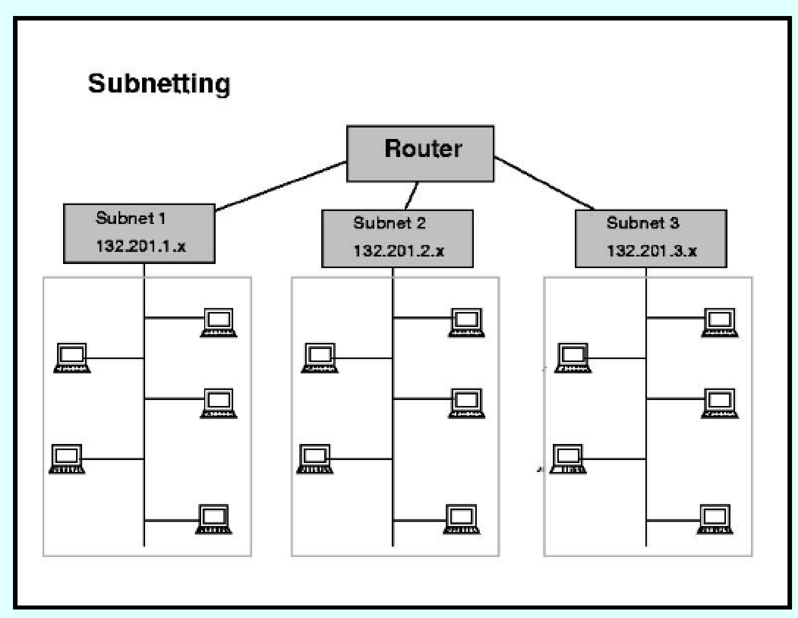
16. A network can be divided into smaller parts, called subnets.
Subnet mask is a mask used to determine what subnet an IP address belongs to.



REVIEW

16. A network can be divided into smaller parts, called ____________

Subnet ________ is a mask used to determine what subnet an IP address belongs to.



REVIEW

17. __________ is the most common local area network (LAN) technology.

REVIEW

17. Ethernet is the most common local area network (LAN) technology.

REVIEW

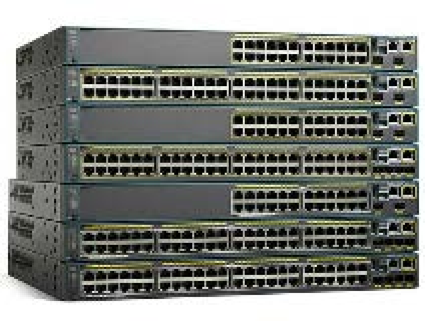
18. Cisco IOS switches have ____________________(SVI).

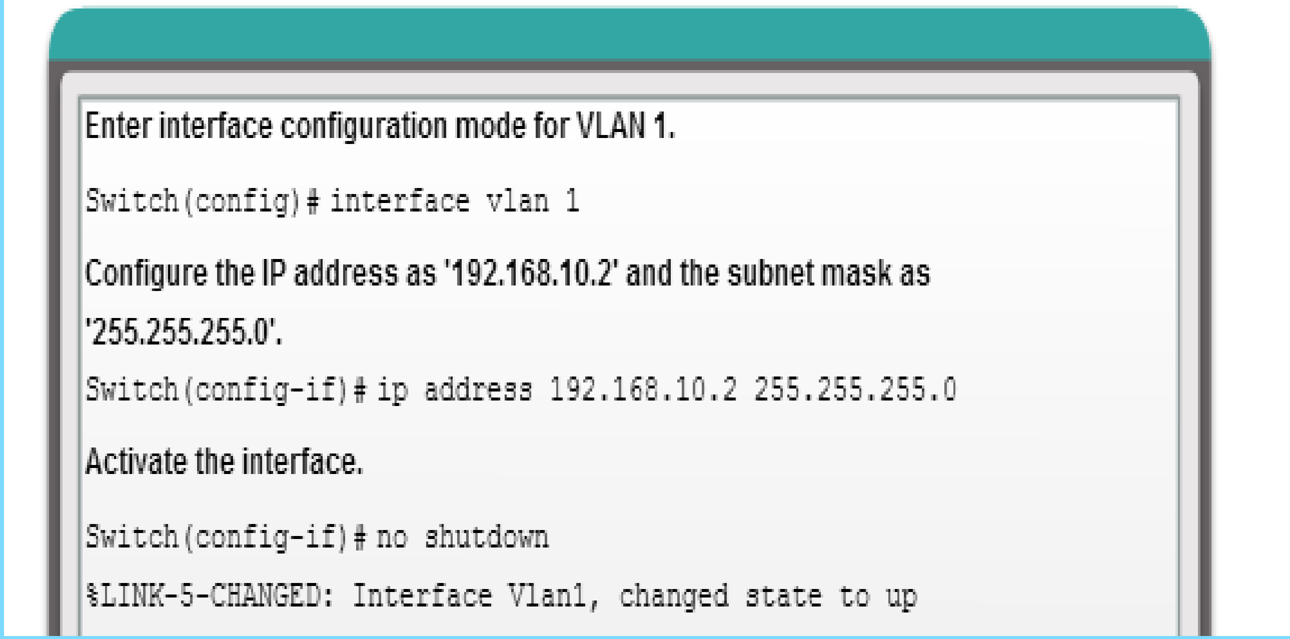
- SVI provides a means to _________ manage a switch over a network.

REVIEW

18. Cisco IOS switches have switch virtual interfaces (SVI).

- SVI provides a means to remotely manage a switch over a network.





Enter interface configuration mode for VLAN 1.

```
Switch(config)# interface vlan 1
```

Configure the IP address as '192.168.10.2' and the subnet mask as '255.255.255.0'.

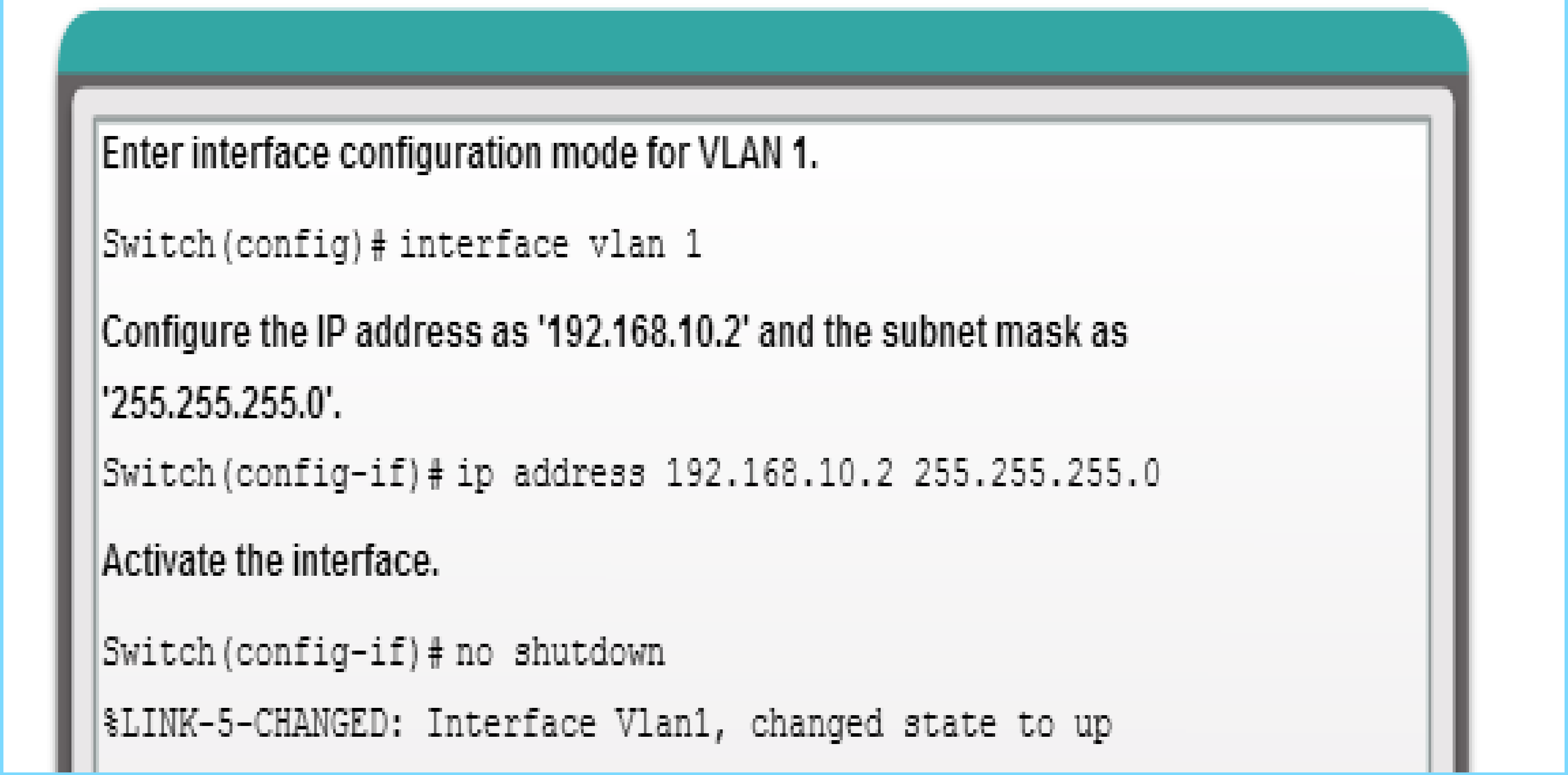
```
Switch(config-if)# ip address 192.168.10.2 255.255.255.0
```

Activate the interface.

```
Switch(config-if)# no shutdown
%LINK-5-CHANGED: Interface Vlan1, changed state to up
```

Addressing Devices

Configuring a Switch Virtual Interface



Enter interface configuration mode for VLAN 1.

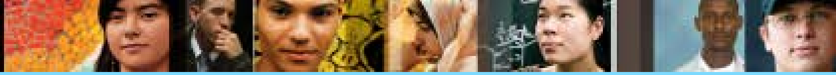
```
Switch(config)# interface vlan 1
```

Configure the IP address as '192.168.10.2' and the subnet mask as '255.255.255.0'.

```
Switch(config-if)# ip address 192.168.10.2 255.255.255.0
```

Activate the interface.

```
Switch(config-if)# no shutdown
%LINK-5-CHANGED: Interface Vlan1, changed state to up
```



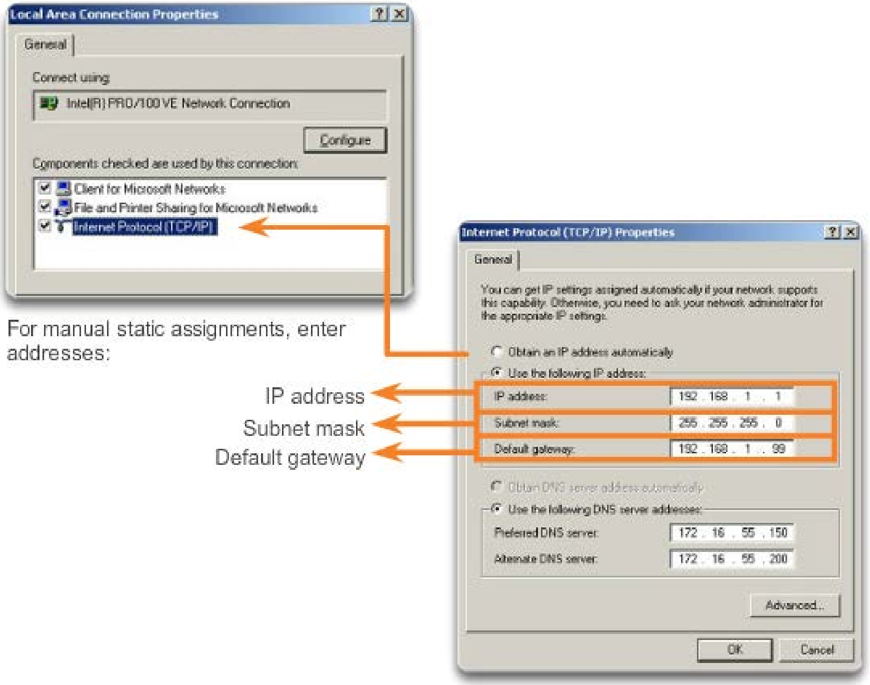
REVIEW

19. IP addresses can be configured _________ or ____________.

REVIEW

19. IP addresses can be configured manually or automatically

Addressing End Devices



Local Area Connection Properties

General

Connect using:

Intel(R) PRO/100 VE Network Connection

Configure

Components checked are used by this connection:

☑ Client for Microsoft Networks
☑ File and Printer Sharing for Microsoft Networks
☑ Internet Protocol (TCP/IP)

For manual static assignments, enter addresses:

- IP address
- Subnet mask
- Default gateway

Internet Protocol (TCP/IP) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

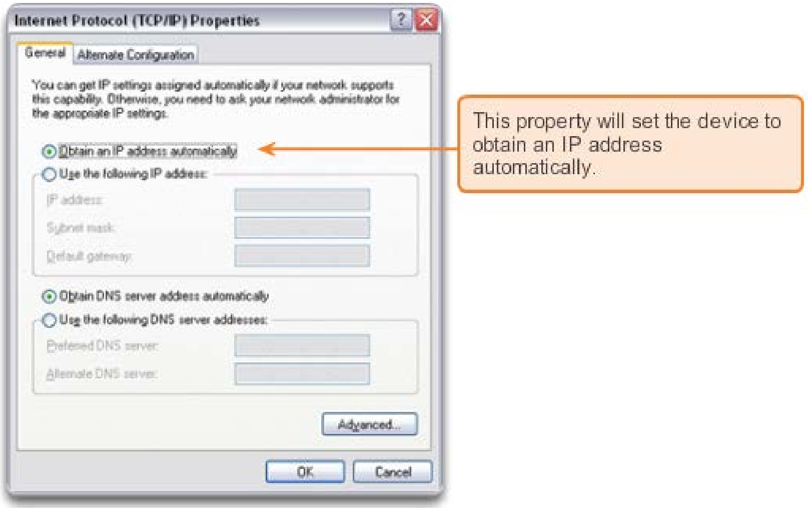
○ Obtain an IP address automatically
● Use the following IP address:

IP address:	192 . 168 . 1 . 1
Subnet mask:	255 . 255 . 255 . 0
Default gateway:	192 . 168 . 1 . 99

○ Obtain DNS server address automatically
● Use the following DNS server addresses:

Preferred DNS server:	172 . 16 . 55 . 150
Alternate DNS server:	172 . 16 . 55 . 200

Assigning Dynamic Addresses



Internet Protocol (TCP/IP) Properties

General | Alternate Configuration

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

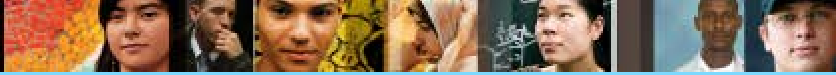
● Obtain an IP address automatically
○ Use the following IP address:

IP address:
Subnet mask:
Default gateway:

● Obtain DNS server address automatically
○ Use the following DNS server addresses:

Preferred DNS server:
Alternate DNS server:

This property will set the device to obtain an IP address automatically.

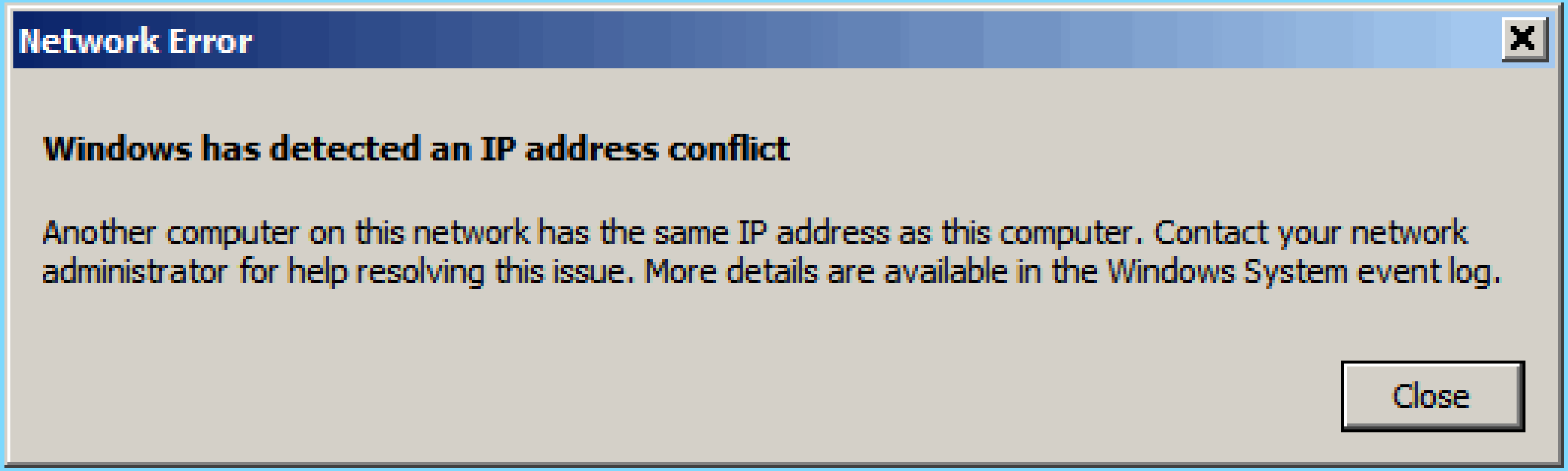


REVIEW

20. If more than one device try to use one IP address, there will be a ______________.

REVIEW

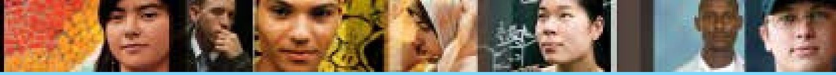
20. If more than one device try to use one IP address, there will be a IP conflict.



Network Error

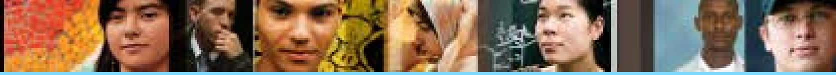
Windows has detected an IP address conflict

Another computer on this network has the same IP address as this computer. Contact your network administrator for help resolving this issue. More details are available in the Windows System event log.



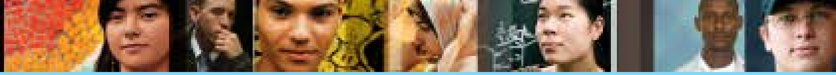
REVIEW

21. Loopback address is a special IP number ________



REVIEW

21. Loopback address is a special IP number 127.0.0.1

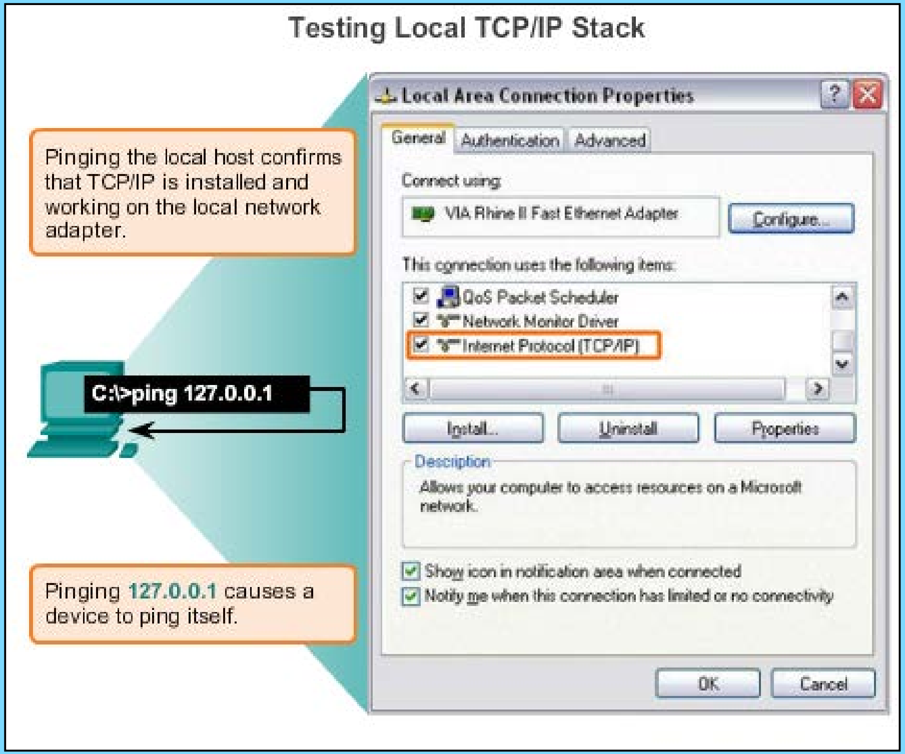


REVIEW

22. The loopback interface allows IT professionals ________________ without worrying about broken or corrupted drivers or hardware.

REVIEW

22. The loopback interface allows IT professionals to test IP software without worrying about broken or corrupted drivers or hardware.



Testing Local TCP/IP Stack

Pinging the local host confirms that TCP/IP is installed and working on the local network adapter.

```
C:\>ping 127.0.0.1
```

Pinging 127.0.0.1 causes a device to ping itself.

Local Area Connection Properties

Connect using: VIA Rhine II Fast Ethernet Adapter

This connection uses the following items:

- ☑ QoS Packet Scheduler
- ☑ Network Monitor Driver
- ☑ Internet Protocol (TCP/IP)

Description

Allows your computer to access resources on a Microsoft network.

☑ Show icon in notification area when connected

☑ Notify me when this connection has limited or no connectivity