



University of Colorado **Boulder**

Data Communications

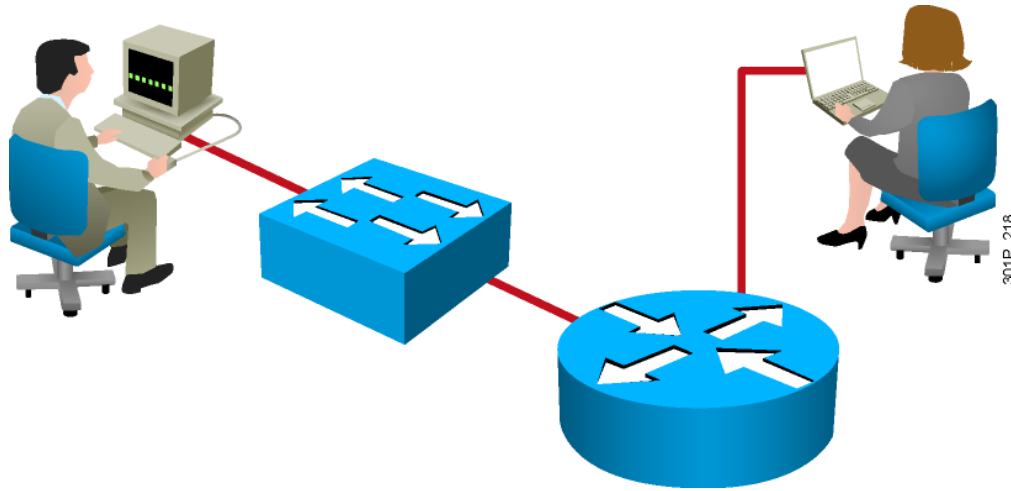
CSCI 5010

Introduction to Cisco IOS

Levi Perigo, Ph.D.
University of Colorado Boulder
Department of Computer Science
Network Engineering

Review

Cisco IOS Software



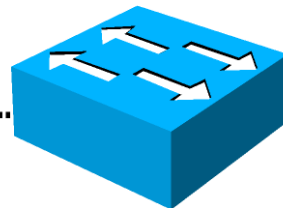
- Features to carry the chosen network protocols and functions
- Connectivity for high-speed traffic between devices
- Security to control access and prohibit unauthorized network use
- Scalability to add interfaces and capability as needed for network growth
- Reliability to ensure dependable access to networked resources

Configuring Network Devices

- Initial default settings are sufficient for the switch to operate at Layer 2 as a switch.
- A Cisco device will prompt for initial configuration if there is no configuration in memory.
- Additional configuration tasks set up the device with the following:
 - ***Protocol addressing and parameter settings***
 - ***Options for administration and management***

An Overview of Cisco Device Startup

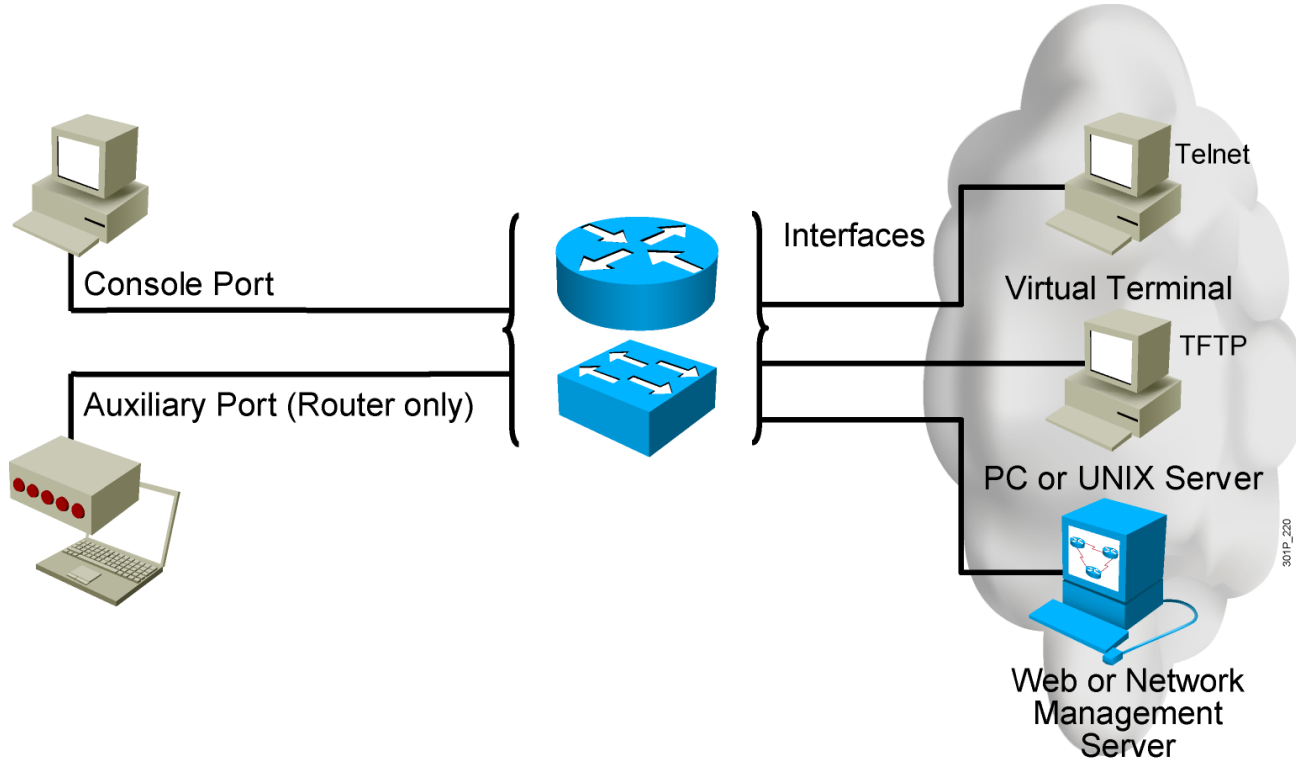
1. Find and check device hardware.
2. Find and load Cisco IOS software image.
3. Find and apply device configurations.



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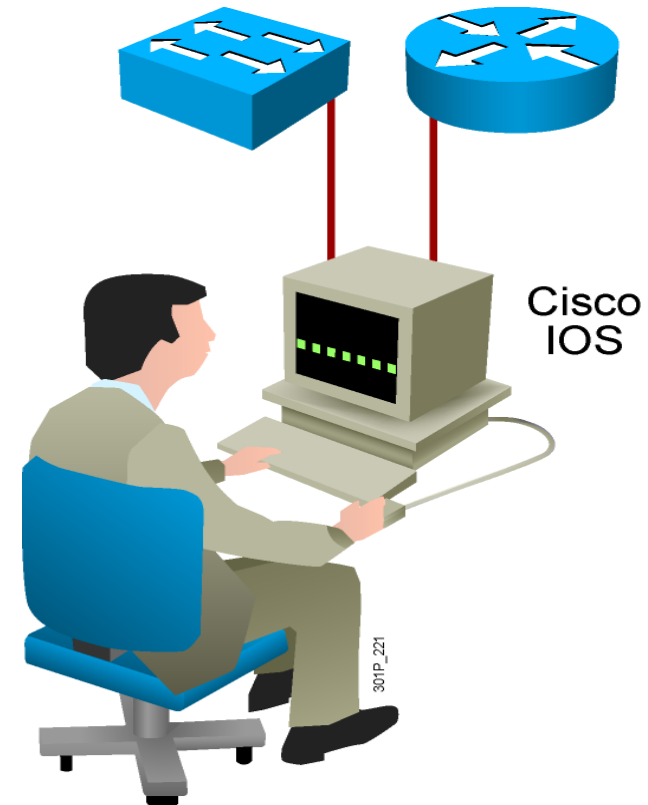
External Configuration Sources



- Configurations can come from many sources.
- Configurations will act in device memory.

Cisco IOS User Interface Functions

- CLI is used to enter commands.
- Operations vary on different internetworking devices.
- Users type or paste entries in the console command modes.
- Command modes have distinctive prompts.
- **Enter** key instructs device to parse and execute the command.
- Two primary EXEC modes are user mode and privileged mode.



Cisco IOS Software EXEC Mode (User)

There are two main EXEC modes for entering commands.

Make sure you look at the prompt for clues which mode you are in!



First Mode

User Mode

- Limited examination of switch or router
- Command prompt: **hostname>**

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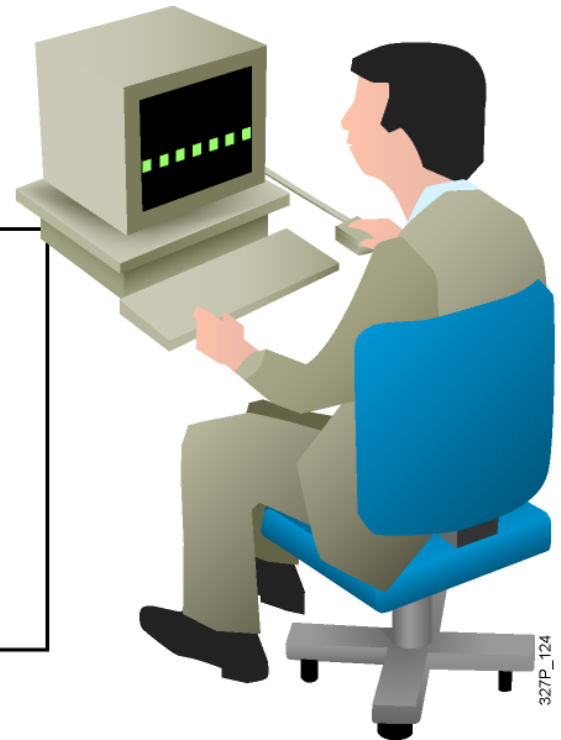
Cisco IOS Software EXEC Mode (Privileged)

- This is the “price for admission.”
- You have to type **enable** and then enter the password to “get in the door” to do everything else on a Cisco device.

Second Mode (and Most Commonly Used)

Privileged (aka Enabled) Mode

- Detailed examination of switch or router
- Enables configuration and debugging
- Prerequisite for other configuration modes
- Command prompt: **hostname#**



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Switch Command-Line Help Facilities

Context-Sensitive Help

Provides a list of commands and the arguments associated with a specific command.

Console Error Messages

Identifies problems with any switch commands that are incorrectly entered so that they can be altered or corrected.

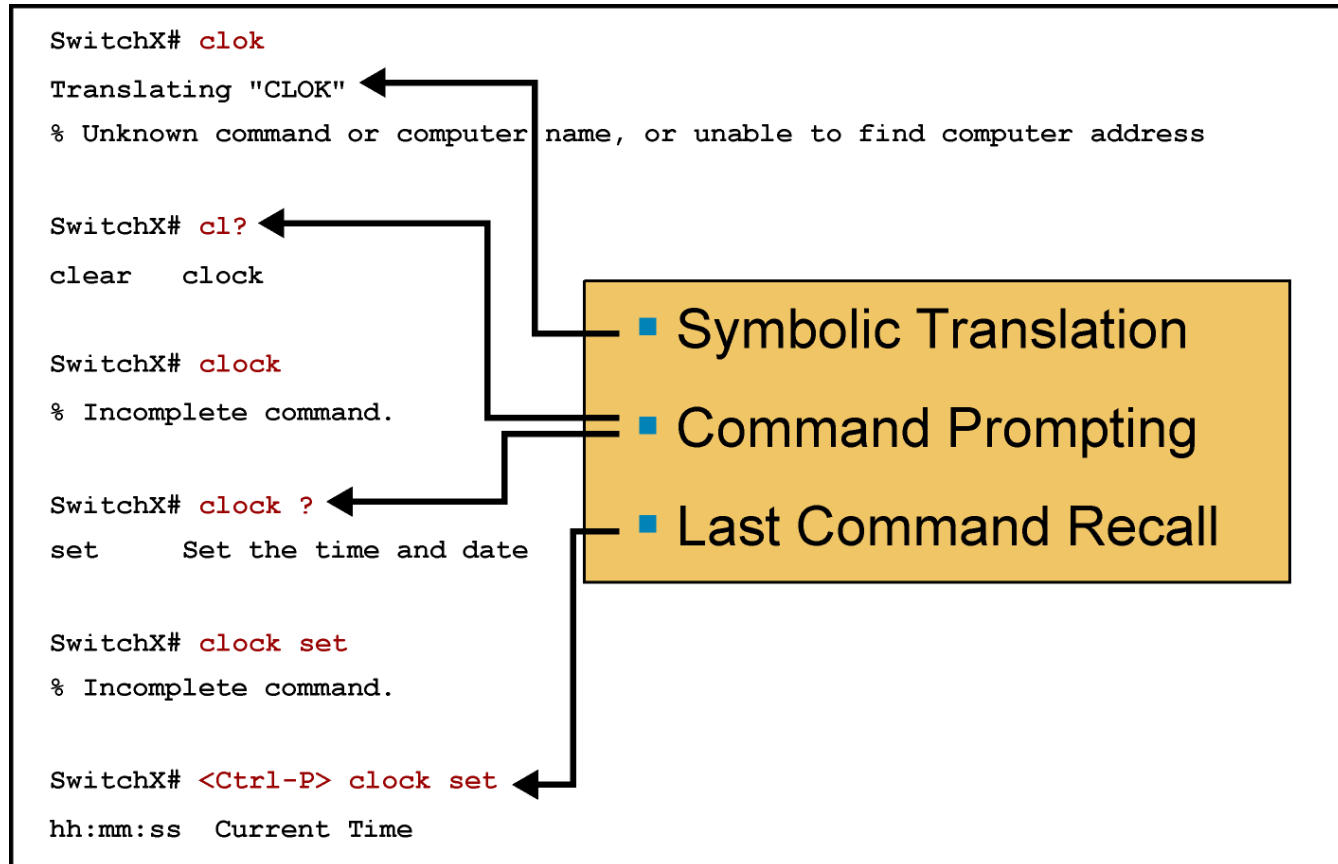
Command History Buffer

Allows recall of long or complex commands or entries for re-entry, review, or correction.

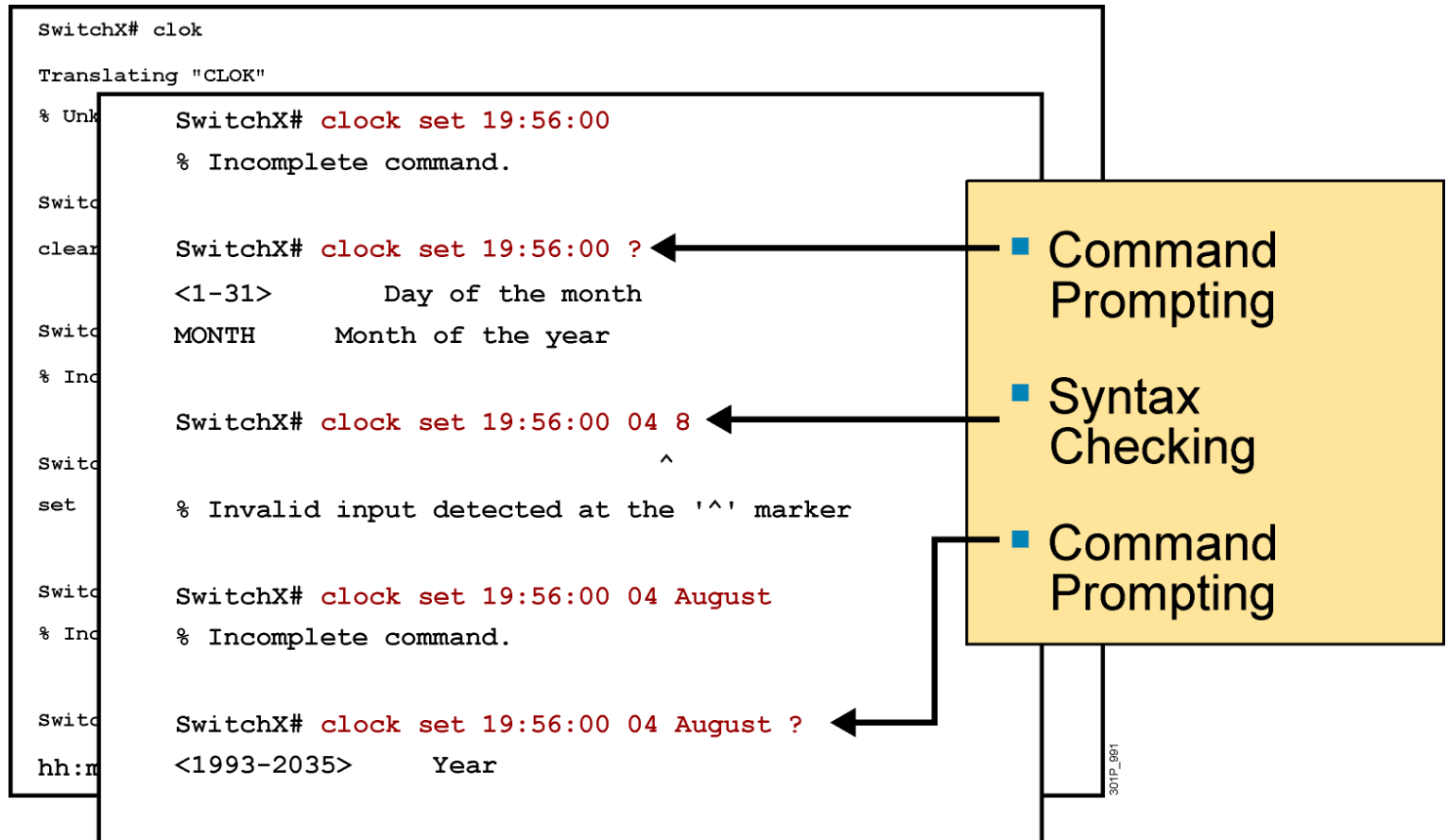
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Context-Sensitive Help



Context-Sensitive Help (Cont.)



Enhanced Editing Commands (Cont.)

SwitchX>\$ value for customers, employees, and partners.

	(Automatic scrolling of long lines)
Ctrl-A	Move to the beginning of the command line.
Ctrl-E	Move to the end of the command line.
Esc-B	Move back one word.
Esc-F	Move forward one word.
Ctrl-B	Move back one character.
Ctrl-F	Move forward one character.
Ctrl-D	Delete a single character.

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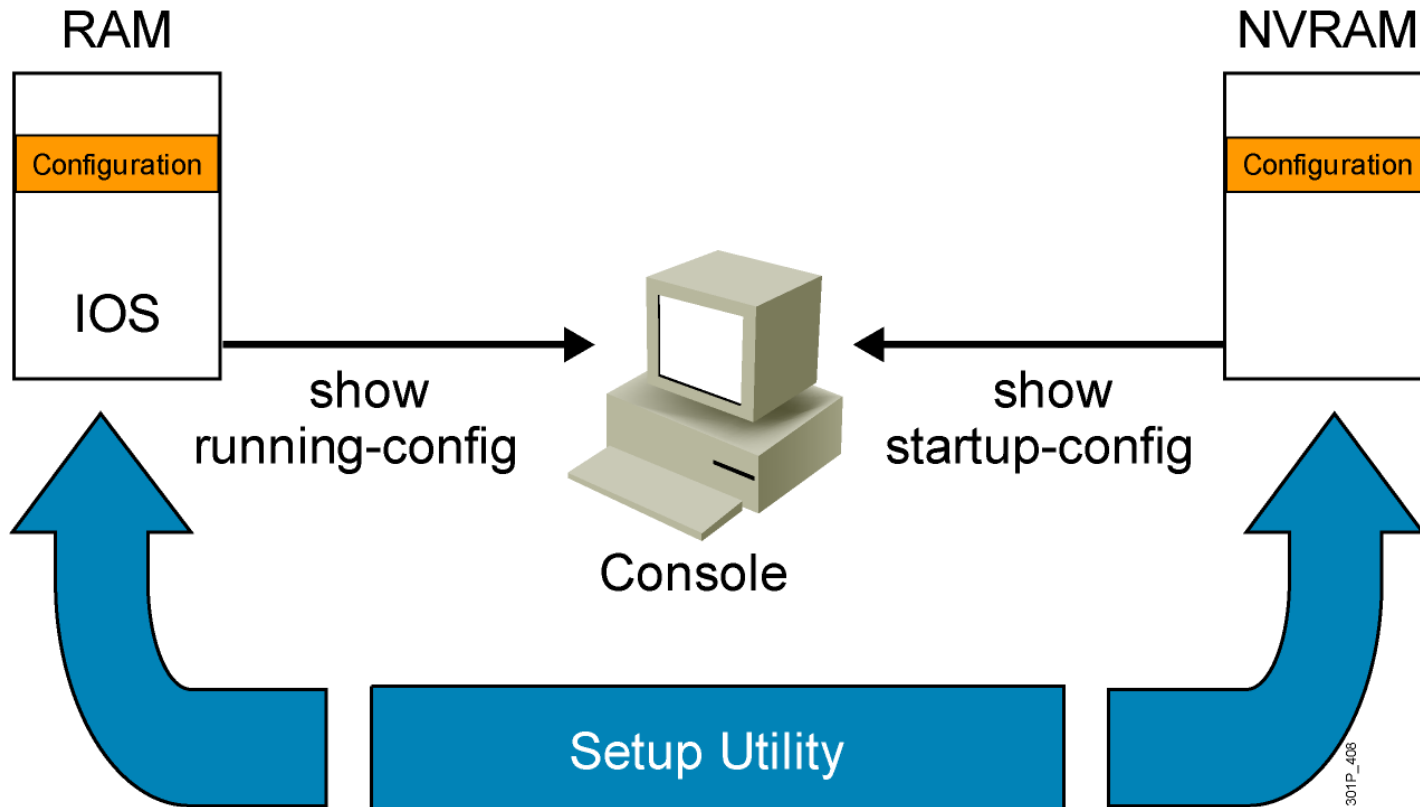
Router Command History

Ctrl-P or Up Arrow	Recalls last (previous) commands.
Ctrl-N or Down Arrow	Recalls more recent commands.
<code>show history</code>	Shows command buffer contents.
<code>terminal history size <i>lines</i></code>	Sets session command buffer size.

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Viewing the Configuration



show running-config (“show run”) and show startup-config (“show start”) Commands

In RAM

```
SwitchX#show running-config
Building configuration...??
Current configuration:?
!
version 12.0
!
-- More --
```

In NVRAM

```
SwitchX#show startup-config
Using 1359 out of 32762 bytes
!
version 12.0
!
-- More --
```

Displays the current and saved configuration

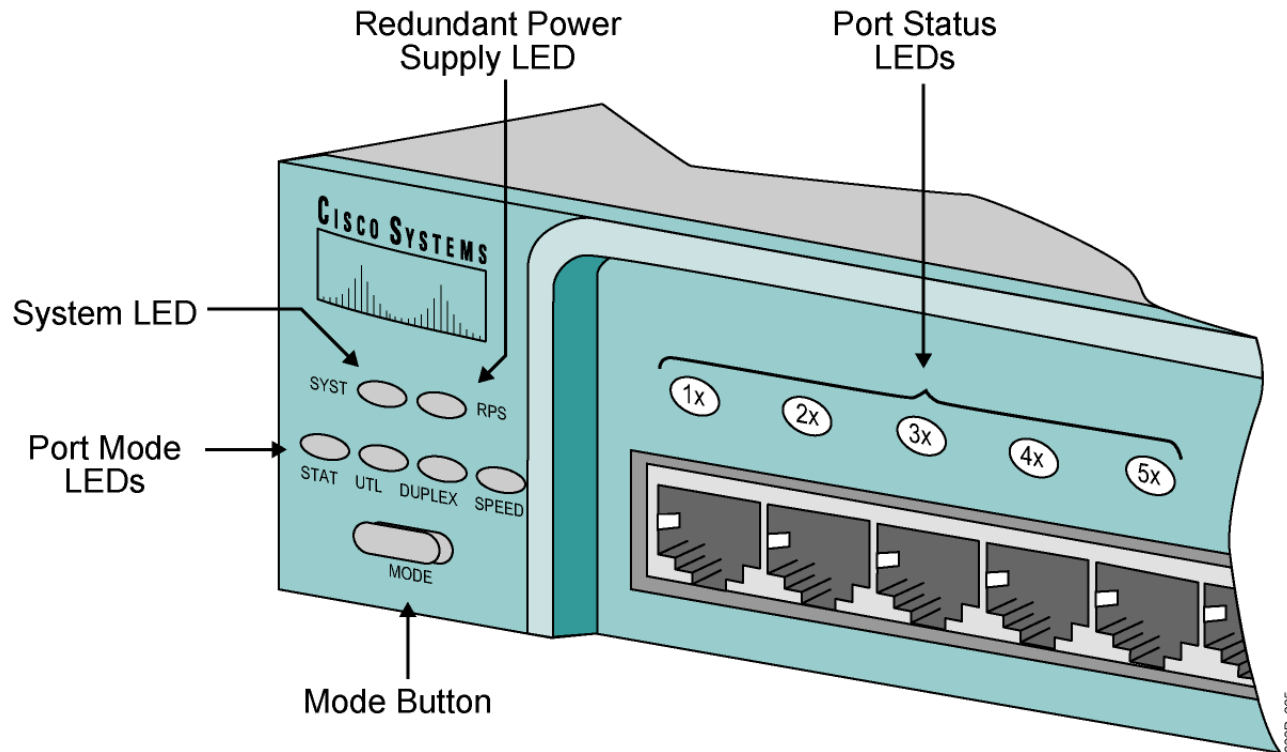
Initial Startup of the Catalyst Switch

- System startup routines initiate switch software.
- Initial startup uses default configuration parameters.

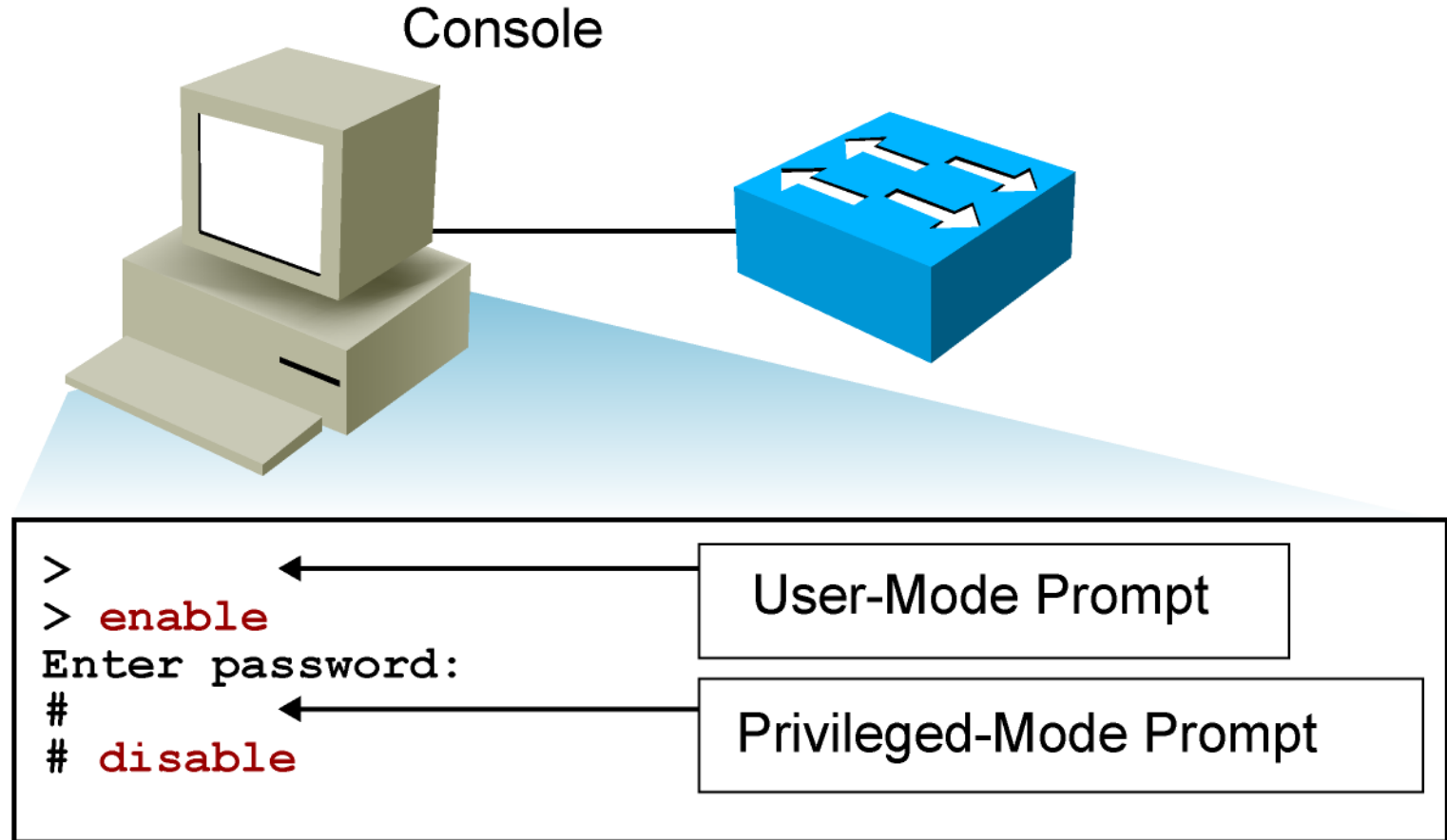
1. Before you start the switch, verify the cabling and console connection.
2. Attach the power cable plug to the switch power supply socket.
3. Observe the boot sequence:
 - LEDs on the switch chassis
 - Cisco IOS software output text



Catalyst 2960 Switch LED Indicators



Logging In to the Switch and Entering the Privileged EXEC Mode



Configuring the Switch



Configuration modes:

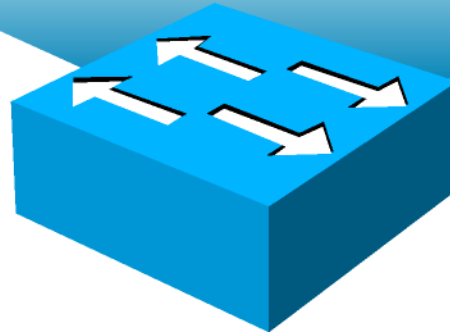
- Global configuration mode
 - SwitchX#configure terminal
 - SwitchX(config)#
- Interface configuration mode
 - SwitchX(config)#interface fa0/1
 - SwitchX(config-if)#

Configuring Switch Identification

Switch Name

```
(config) #hostname SwitchX  
SwitchX(config) #
```

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- **Sets the local identity for the switch**



Configuring the Switch IP Address

```
SwitchX(config)#interface vlan 1  
SwitchX(config-if)#ip address {ip address} {mask}
```

Example:

```
SwitchX(config)#interface vlan 1  
SwitchX(config-if)#ip address 10.5.5.11 255.255.255.0  
SwitchX(config-if)#no shutdown
```

Note: It is necessary to use the no shutdown command to make the interface operational.

Configuring the Switch Default Gateway



```
SwitchX(config)#ip default-gateway {ip address}
```

Example:

```
SwitchX(config)#ip default-gateway 172.20.137.1
```

Saving Configurations

```
SwitchX  
SwitchX copy running-config startup-config  
Destination filename [startup-config]?  
Building configuration..  
SwitchX
```

copy run start = Copies the current configuration to NVRAM

Showing Switch Initial Startup Status

```
SwitchX#show version
```

- Displays the configuration of the system hardware, software version, names and sources of configuration files, and boot images

```
SwitchX#show running-config
```

- Displays the current active configuration file of the switch

```
SwitchX#show interfaces
```

- Displays statistics for all interfaces configured on the switch

Switch show version Command

```
Switch#show version
```

```
Cisco IOS Software, C2960 Software (C2960-LANBASEK9-M), Version 12.2(25)SEE2, RELEASE
```

```
Copyright (c) 1986-2006 by Cisco Systems, Inc.
```

```
Compiled Fri 28-Jul-06 11:57 by yenanh
```

```
Image text-base: 0x00003000, data-base: 0x00BB7944
```

```
ROM: Bootstrap program is C2960 boot loader
```

```
BOOTLDR: C2960 Boot Loader (C2960-HBOOT-M) Version 12.2(25r)SEE1, RELEASE SOFTWARE (fc1)
```

```
Switch uptime is 24 minutes
```

```
System returned to ROM by power-on
```

```
System image file is "flash:c2960-lanbasek9-mz.122-25.SEE2/c2960-lanbasek9-mz.122-25.SEE2.bin"
```

```
cisco WS-C2960-24TT-L (PowerPC405) processor (revision B0) with 61440K/4088K bytes of memory.
```

```
Processor board ID FOC1052W3XC
```

```
Last reset from power-on
```

```
1 Virtual Ethernet interface
```

```
24 FastEthernet interfaces
```

```
2 Gigabit Ethernet interfaces
```

```
The password-recovery mechanism is enabled.
```

```
! text omitted
```

Switch show interfaces Command

```
SwitchX#show interfaces FastEthernet0/2
FastEthernet0/2 is up, line protocol is up (connected)
  Hardware is Fast Ethernet, address is 0008.a445.ce82 (bia 0008.a445.ce82)
  Hardware is Fast Ethernet, address is 0008.a445.ce82 (bia 0008.a445.ce82)
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Half-duplex, 10Mb/s
  Half-duplex, 10Mb/s s unsupported output flow-control is unsupported
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 4w6d, output 00:00:01, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    182979 packets input, 16802150 bytes, 0 no buffer
    Received 49954 broadcasts (0 multicast)
    0 runs, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 8 ignored
    0 watchdog, 201 0 CRC, cast, 0 pause input
    0 input packets with dribble condition detected
  3747473 packets output, 353656347 bytes, 0 underruns
```

--More--



Managing the MAC Address Table

Catalyst 2960 Series

```
SwitchX#show mac-address-table
          Mac Address Table
-----
Vlan      Mac Address      Type      Ports
----      -
All       0008.a445.9b40    STATIC    CPU
All       0100.0ccc.cccc    STATIC    CPU
All       0100.0ccc.cccd    STATIC    CPU
All       0100.0cdd.dddd    STATIC    CPU
1         0008.e3e8.0440    DYNAMIC    Fa0/2
Total Mac Addresses for this criterion: 5
SwitchX#
```