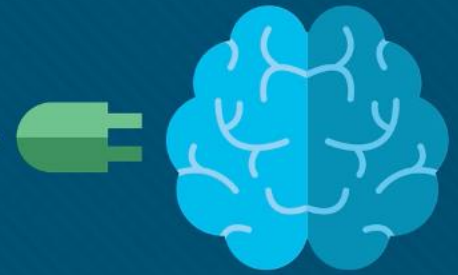


Module 17: Cisco Switches and Routers

Networking Essentials (NETESS)

Module Objectives

Module Title: Cisco Switches and Routers
Module Objective: Compare in-band and out-of-band management access

Topic Title	Topic Objective
Cisco Switches	Describe Cisco LAN switches.
Switch Boot Process	Describe the Cisco LAN switch boot process.
Cisco Routers	Describe Cisco small business routers.
Router Boot Process	Describe the Cisco router boot process.

17.1 Cisco Switches

Connect More Devices

- LAN switches provide connectivity for a local area network.
- Routers interconnect local networks and are needed in a WAN environment.

Cisco Catalyst 9300 Series Switches

Cisco 4300 Series Routers

Cisco LAN Switches

When selecting a switch, keep in mind the type of ports, speed required, expandability, and manageability of the device.

Type of Ports

- Lower-cost switches support only copper twisted-pair ports.
- Higher priced switches may have fiber-optic connections to link the switch to other switches that may be located over long distances.

Speed Required

- A 10/100 Ethernet port can only function at either 10 or 100 Mbps.
- Switches may also include gigabit Ethernet ports that can also operate at 10/100 Mbps.
- The Cisco Catalyst 9300 48S switch in the figure has two 40 Gbps uplink ports.

Cisco LAN Switches (Cont.)

Expandability

- Fixed configurations have a specific type and number of ports or interfaces.
- Modular devices have expansion slots that provide the flexibility to add new modules as required such as the Cisco Catalyst 9600 chassis.

Manageability

- A managed switch can be configured and controlled.

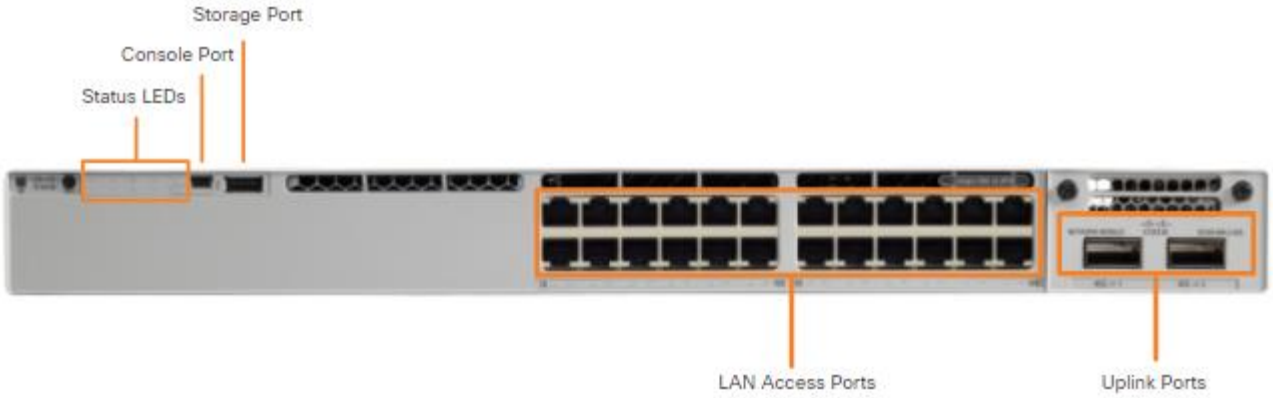
Video - Components of a LAN Switch - Part 1

Video - Components of a LAN Switch - Part 2

LAN Switch Components

- Switches that support Power over Ethernet (PoE) allows some devices to be powered by attaching a cable from the device to a switch port.
- Uplink ports are used to connect to other switches.

Cisco Catalyst 9300 24 UPOE Switch



17.2 Switch Boot Process

Power Up the Switch

1. Check the components. Ensure all the components that came with the switch are available. These could include a console cable, power cord, Ethernet cable, and switch documentation.
2. Connect the console cable to the switch and start a terminal emulation session. Connect the AC power cord.
3. Power up the switch and note that some models do not have an on/off sw
   Power-on self-test (POS
   begins.

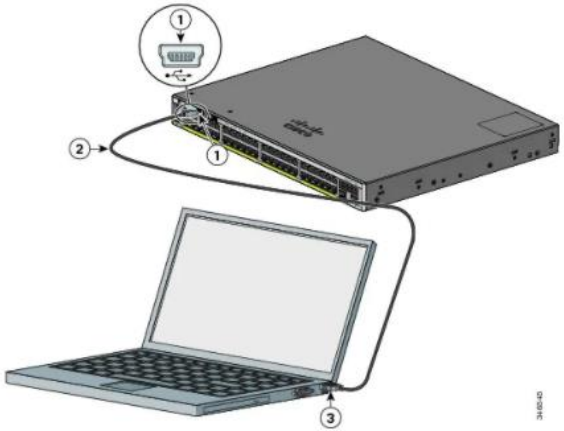

Catalyst 2960 Switch


Console Cable


AC Power Cord


Ethernet (Category 5)
Straight-through Cable


Documentation



Video - In-Band and Out-Of-Band Device Management

In-Band and Out-of-Band Management

Two methods to connect a PC to a network device to monitor or configure

- Out-of-band management
- In-band management

Out-of-band management

- Requires a console cable connection, not a network connection, and a terminal emulation client
- Commonly done to initially configure a device
- Might be done if network connectivity is not possible

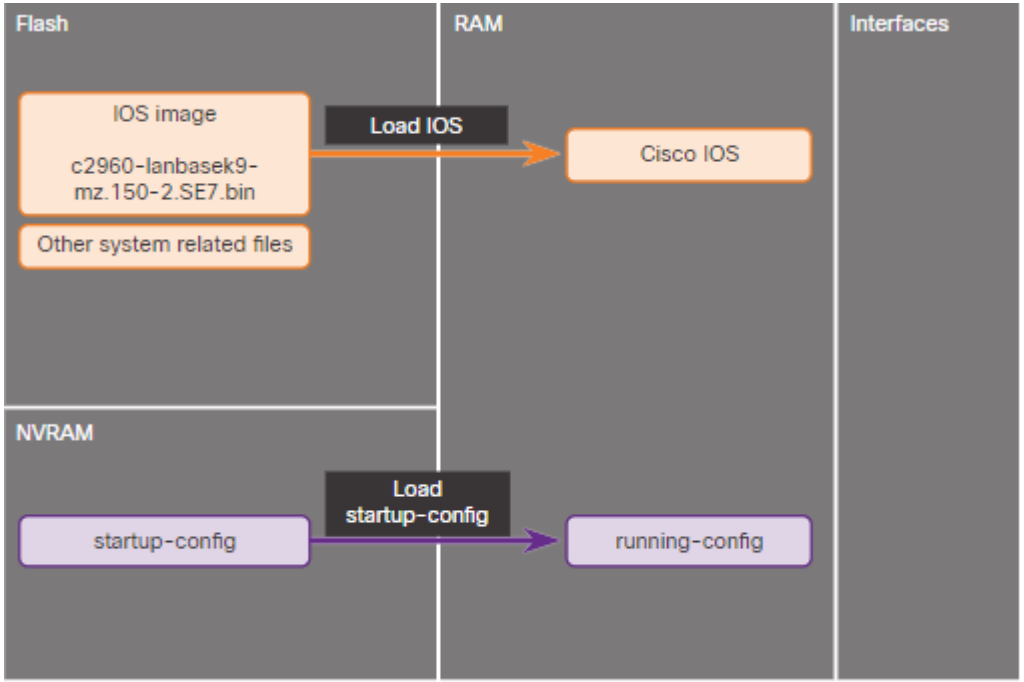
Console Cable

In-band management

- Uses a network connection and an IP address to connect to the network device.
- Telnet, HTTP, or SSH used

Ethernet (Category 5)
Straight-through Cable

IOS Startup Files



Two files load into RAM when a switch boots

- IOS image file that is initially stored in flash, but loaded into RAM
- Startup configuration file that is initially stored in NVRAM (then loaded into RAM) and contains configuration commands

Video - Establish a Console Connection

17.3 Cisco Routers

Video - Cisco Router Components

Router Components

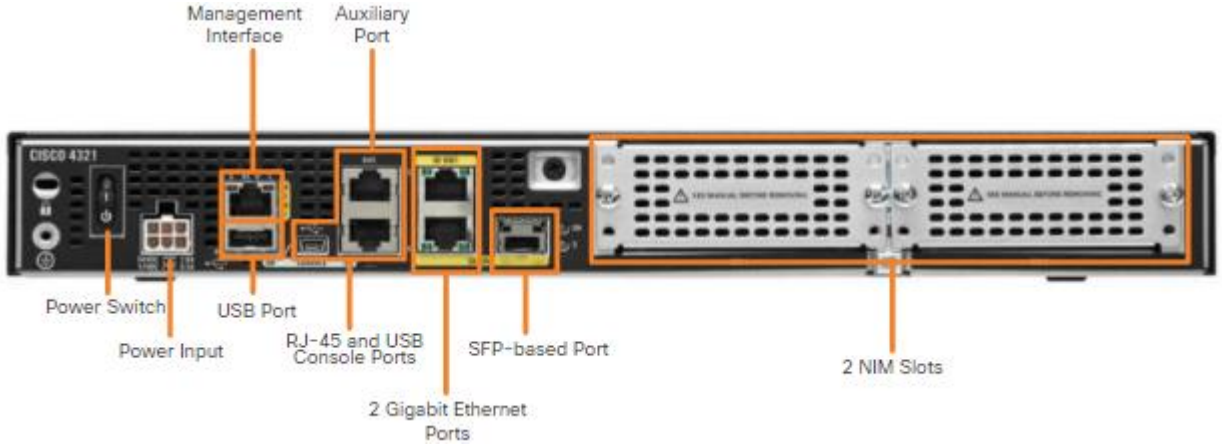
Routers have components similar to computers, tablets, and smart devices:

- Operating system (OS) that is Cisco Internetwork Operating System (IOS)
- Central processing unit (CPU)
- Random-access memory (RAM)
- Nonvolatile random-access memory (NVRAM)

Router Interface Ports

Each router model has a different type and number of ports. An example is a Cisco 4321 Integrated Services Router (ISR) that has the following connections:

- Multiple console ports used for initial configuration and command-line interface (CLI) work that includes an RJ-45 and mini-B USB connectors.
- Two RJ-45 LAN Gigabit Ethernet interfaces
- Expansion slots that can hold network interface modules (NIMs)

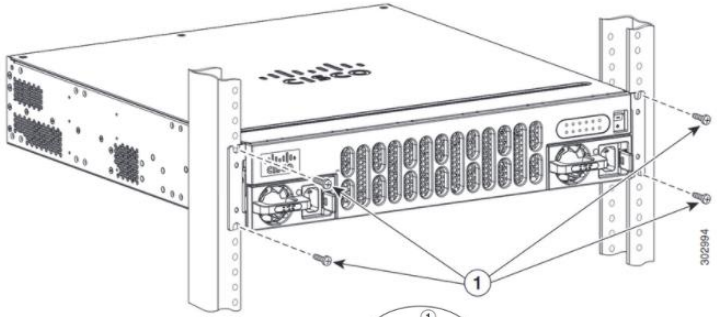


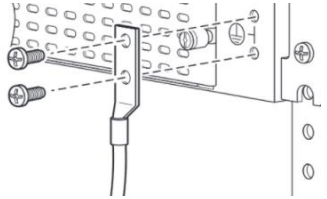
17.4 Router Boot Process

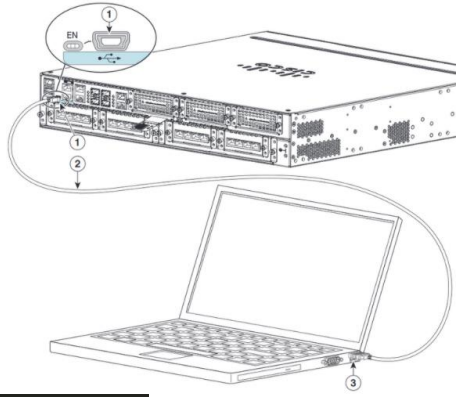
Power Up the Router

Router boot process steps

1. Mount the device to the rack.
2. Ground the device.
3. Connect power cord.
4. Connect a console cable and use terminal emulation software on the PC/laptop used to configure the router.
5. Turn on the router.
6. Observe startup messages.







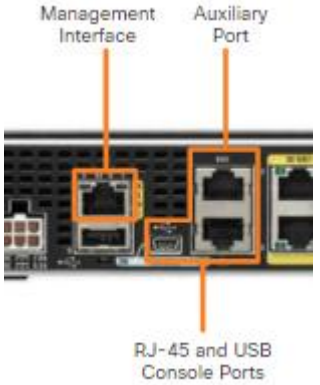

```
Located isr4200-universalk9_ias.16.09.04.SPA.bin
##################################################....
(output omitted)

Package header rev 3 structure detected
IsoSize = 486723584
Calculating SHA-1 hash...Validate package: SHA-1 hash:
        calculated 4155409B:CC0DB23E:6D72A6AE:EA887F82:AC94DC6A
        expected   4155409B:CC0DB23E:6D72A6AE:EA887F82:AC94DC6A
RSA Signed RELEASE Image Signature Verification Successful.
Image validated
```

Management Ports

To access the CLI on a router three methods can be used

- Console port (serial or USB connection) for out-of-band management
- SSH using the network and an IP address on the router
- AUX port that can connect to a modem and a dial-up telephone line

LAN and WAN interfaces are available as a type of network interface.



Video - The Cisco Router Boot Process

17.5 Cisco Switches and Routers Summary

Packet Tracer – Compare In-Band and Out-of-Band Management Access

In this activity, you will access Cisco devices using in-band and out-of-band management.

What Did I Learn in this Module?

- A switch connects devices to a LAN.
- When selecting a switch consider the number and type of ports including uplink ports used to connect to other switches.
- A managed switch can be configured and controlled.
- To power up a switch ensure the correct components are within the box, connect the cables, and power up the switch.
- Two ways to configure and monitor network devices are through out-of-band management and in-band management.
- Use a laptop or PC to directly connect to the console port for out-of-band management.
- Use the network and SSH to connect to an IP address on the device for in-band management.
- Cisco routers have an operating system, CPU, RAM, ROM, NVRAM, console port, LAN interfaces, and expansion slots.
- To power up the router, securely mount it into the rack, ground it, connect the power cable, connect a console cable and use a terminal emulation program, turn on the router, and observe startup messages.

Module 17 – New Terms and Commands

- port types
- port speeds
- switch expandability
- switch manageability
- managed switch
- LAN access ports
- uplink ports
- POST
- SYST LED
- console cable
- console connection
- out-of-band management
- in-band management
- IOS image file
- startup configuration file
- NVRAM
- small form-factor pluggable (SFP) attachment
- Network Interface Modules (NIMs)
- management interface
- auxiliary (AUX) port
- ground
- startup messages
- SSH
- command line interface (CLI)
- expansion slot


CISCO