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**Welcome
To
Network for you
CISCO Routers**



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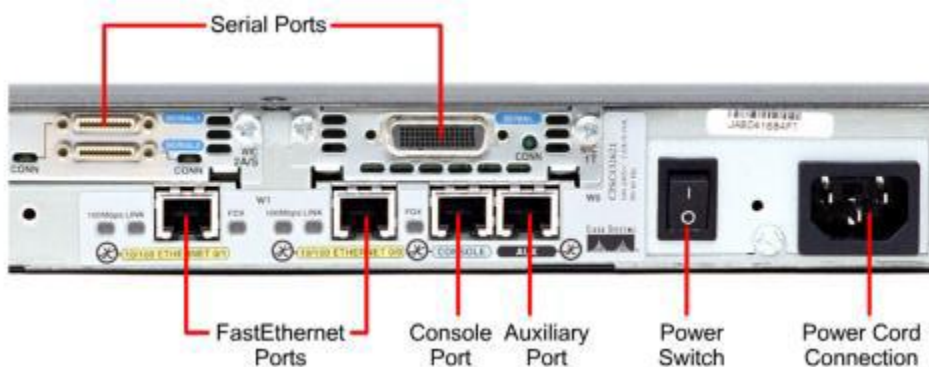
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CISCO Router:

- Router is a device work on Layer 3 or Network layer of OSI Model.
- Router is use to make communication between two or more different network.
- Router is use to control broadcast and it is use to connect LAN network with WAN.
- Router is a device which select best path on the basis of routing protocol.
- Router perform routing that is static or dynamic and also other various function such as NAT, ACL and Intervlan routing etc.
- Router is a device which makes communication between two or more different network.
- Routers interconnect different networks or in simple way we can say switch is use to connect devices with a network whereas router is use to connect different networks.
- It works on Layer 3 (Network Layer).
- It chooses the best path for packet transfer.
- It performs Routing.



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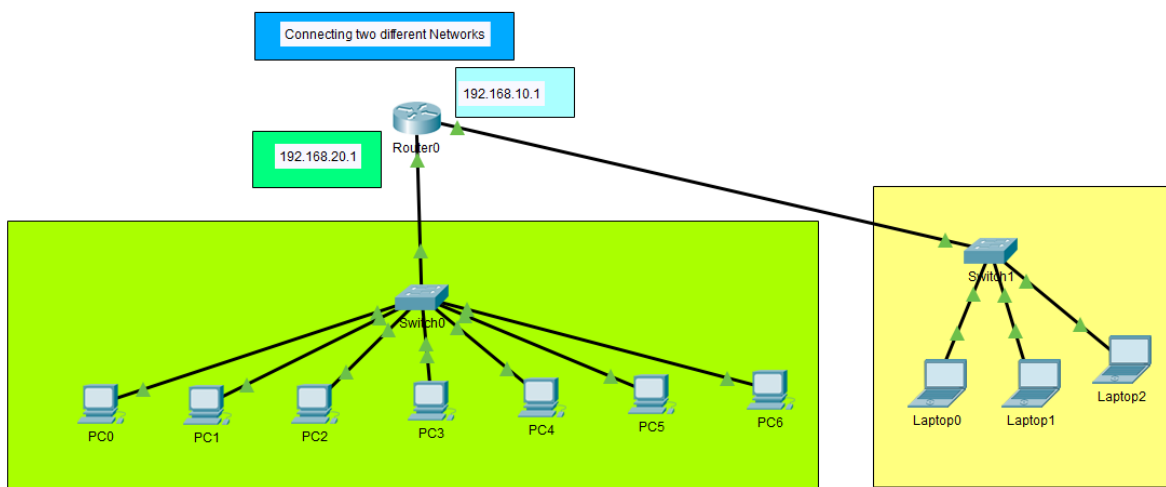
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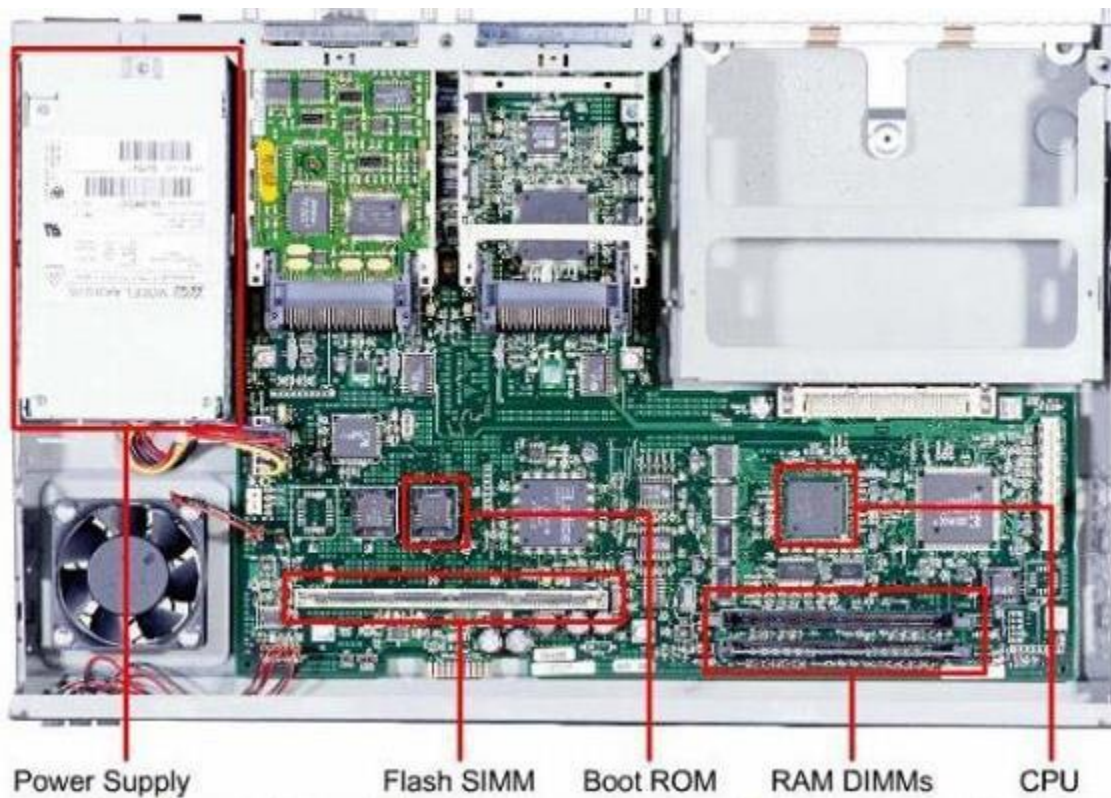
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A Router consists of the following major components:

- CPU
- ROM
- RAM
- NVRAM
- Flash Memory.
- RXBOOT Image
- Interfaces
- Buses
- Power Supply
- Configuration Register



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CPU: The CPU executes the instructions of the operating system. Also Perform functions such as system initialization, routing functions, and network interface control etc.

We can check:

Router#sh processes

CPU utilization for five seconds: 0%/0%; one minute: 0%; five minutes: 0%

PID QTy PC Runtime (ms) Invoked uSecs Stacks TTY Process

- 1 Csp 602F3AF0 0 1627 0 2600/3000 0 Load Meter
- 2 Lwe 60C5BE00 4 136 29 5572/6000 0 CEF Scanner
- 3 Lst 602D90F8 1676 837 2002 5740/6000 0 Check heaps
- 4 Cwe 602D08F8 0 1 0 5568/6000 0 Chunk Manager
- 5 Cwe 602DF0E8 0 1 0 5592/6000 0 Pool Manager
- 6 Mst 60251E38 0 2 0 5560/6000 0 Timers
- 7 Mwe 600D4940 0 2 0 5568/6000 0 Serial Backgrou
- 8 Mwe 6034B718 0 1 0 2584/3000 0 OIR Handler
- 9 Mwe 603FA3C8 0 1 0 5612/6000 0 IPC Zone Manage
- 10 Mwe 603FA1A0 0 8124 0 5488/6000 0 IPC Periodic Ti
- 11 Mwe 603FA220 0 9 0 4884/6000 0 IPC Seat Manage
- 12 Lwe 60406818 124 2003 61 5300/6000 0 ARP Input
- 13 Mwe 60581638 0 1 0 5760/6000 0 HC Counter Time
- 14 Mwe 605E3D00 0 2 0 5564/6000 0 DDR Timers
- 15 Msp 80164A38 0 79543 0 5608/6000 0 GraphIt
- 16 Mwe 802DB0FC 0 2 011576/12000 0 Dialer event
- 17 Cwe 801E74BC 0 1 0 5808/6000 0 Critical Bkgnd
- 18 Mwe 80194D20 4 9549 010428/12000 0 Net Background

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- 19 Lwe 8011E9CC 0 20 011096/12000 0 Logger
- 20 Mwe 80140160 8 79539 0 5108/6000 0 TTY Background
- 21 Msp 80194114 0 95409 0 8680/9000 0 Per-Second Job
- 22 Mwe 8047E960 0 2 0 5544/6000 0 dot1x
- 23 Mwe 80222C8C 4 2 2000 5360/6000 0 DHCPD Receive
- 24 Mwe 800844A0 0 1 0 5796/6000 0 HTTP Timer
- 25 Mwe 80099378 0 1 0 5612/6000 0 RARP Input
- 26 Mst 8022F178 0 1 011796/12000 0 TCP Timer
- 27 Lwe 802344C8 0 1 011804/12000 0 TCP Protocols
- 28 Hwe 802870E8 0 1 0 5784/6000 0 Socket Timers
- 29 Mwe 80426048 64 3 21333 4488/6000 0 L2MM
- 30 Mwe 80420010 4 1 4000 5592/6000 0 MRD
- 31 Mwe 8041E570 0 1 0 5584/6000 0 IGMP SN
- 32 Hwe 80429B40 0 1 0 2604/3000 0 IGMP Snooping P
- 33 Mwe 804F43B0 0 5 0 5472/6000 0 Cluster L2
- 34 Mwe 804F18D0 0 17 0 5520/6000 0 Cluster RARP
- 35 Mwe 804EA650 0 23 0 5440/6000 0 Cluster Base
- 36 Lwe 802A1158 4 1 4000 5592/6000 0 Router Autoconf
- 37 Mwe 80022058 0 1 0 5624/6000 0 Syslog Traps
- 38 Mwe 8031CE88 0 1 0 5788/6000 0 AggMgr Process
- 39 Mwe 8035EF88 0 407 0 5592/6000 0 PM Callback
- 40 Mwe 80437B58 0 3 0 5556/6000 0 VTP Trap Proces
- 41 Mwe 80027D40 0 2 0 5676/6000 0 DHCPD Timer
- 42 Mwe 8040D3B0 0 2 0 2560/3000 0 STP STACK TOPOLOG
- 43 Hwe 8040E338 0 2 0 2560/3000 0 STP FAST TRANSI

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ROM: This maintains the instructions for POST (Power on Self-Test) for diagnosis and also stores the bootstrap program and basic OS Software.

RAM: It stores the routing tables and the configuration file while the router is powered ON. The running - configuration is stored here. The contents of **the RAM are lost** when the router is restarted or powered OFF.

NVRAM: It stores the startup configuration. **NVRAM configuration remain even after the router is power off or reboot.**

Flash Memory: In Flash Memory CISCO IOS Image (i.e. OS of router) store. The configuration of Flash memory **remains even after reboot or shut down.**

RXBOOT Image: This is a cut down version of the IOS located in the router's ROM

Buses: We have system and CPU Buses in routers to move bits among the different components of the router. System bus communicates between the CPU and the Interfaces.

Interfaces: They are physical connectors that connect the router to the network for IP packet entry and exit.

Power Supply: The power supplies can be internal or external to the router. Some routers have multiple power supply for redundancy.

Configuration Register: Routers use a 16-bit software configuration register with which you can set specific system parameters. And It will store in NVRAM.

Example: The Factory-default setting of the configuration register is 0*2102.

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Console Cable:



USB to Serial Port:



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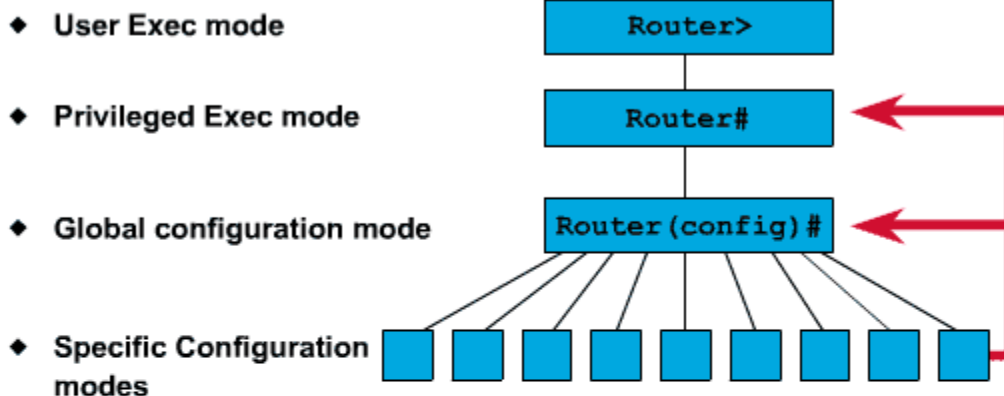
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Router Modes:

Overview of Router Modes



Configuration Mode	Prompt
Interface	Router (config-if) #
Subinterface	Router (config-subif) #
Controller	Router (config-controller) #
Map-list	Router (config-map-list) #
Map-class	Router (config-map-class) #
Line	Router (config-line) #
Router	Router (config-router) #
IPX-router	Router (config-ipx-router) #
Route-map	Router (config-route-map) #

User Mode (Default Mode): In this mode we can do some basic monitoring.

Router>

We can run some cmds such as ping, telnet, Ver etc.

Privileged Mode: In this mode we can do monitoring and some troubleshooting.

Router#

We can run some cmds such as clock, ping, Telnet, Save, Show, history etc.

Global Configuration Mode: In this mode we can do All configuration that effect the router globally.

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Router(config)#

Interface Mode: In this Mode configurations done on the specific interface.

- Router(config)#int f0/0
- Look like this when we are in Int mode.
- Router(config-if)#
- Router(config-if)#ip add 10.1.1.1 255.0.0.0
- Router(config-if)# no sh

Rommon Mode: We use this mode Generally when we want password recovery.

- How to go in Rommon mode?
- Power ON router and press Ctrl+Break
- Then you will enter in Rommon mode.

CISCO Operating Systems:

IOS (Internetwork Operating System):

- IOS is an Operating System used on CISCO Devices, such as router and switches.
- CISCO IOS is a family of Software.
- To Configure a CISCO device running IOS, the Command-Line Interface (CLI) is used.
- The CLI is usually accessed from local or remote device running Telnet or SSH.
- The CLI comes with predefined number of commands to configure routing and switching.
- The IOS is usually stored as a system image within a router or switch flash memory.

```
---
R1#
R1#sh ver
Cisco IOS Software, 3600 Software (C3640-JK9S-M), Version 12.4(16), RELEASE SOFTWARE (fc1)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled wed 20-Jun-07 11:43 by prod_rel_team

ROM: ROMMON Emulation Microcode
ROM: 3600 Software (C3640-JK9S-M), Version 12.4(16), RELEASE SOFTWARE (fc1)

R1 uptime is 0 minutes
System returned to ROM by unknown reload cause - suspect boot_data[BOOT_COUNT] 0x0, BOOT_COUNT 0,
BOOTDATA 19
```

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Basic Commands:

User mode:

Router> enable

Privilege mode:

Router# show running-config
Router# show startup-config
Router# show flash
Router# show version
Router# show ip int br

Basic Configuration for Routers:

Configuring Enable Mode Password in Router	
Description	Commands
Set Enable mode password	Enable password 12345
Set Enable encrypted password	Enable secret cisco123
Telnet Configuration in Router	
Go to line VTY	Line vty 0 4
Set vty password	Password 123
Enables password checking at login	Login
SSH Configuration in Router	
Create local user and password	Username admin password admin
Set domain name	Ip domain-name Networkforyou.com
Go to line VTY	Line vty 0 4
To enable checking in local database user	Login local
Incoming traffic	Transport input ssh
Basic Commands	
To Set time in Router or Switch	clock set 14:05:00 september 9 2020
To Check Clock in Router or Switch	Sh Clock
To copy our running configuration to the startup	SW1#copy running-config startup-config

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configuration

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