**CCNA**

640-802

**Cisco’s**

**Internetworking Operating System (IOS)**

**and Security Device Manager (SDM):**



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**Cisco Router User Interface**

* The Cisco Internetwork Operating System (IOS) is the kernel of Cisco routers and most switches.
* A kernel is the basic, indispensable part of an operating system that allocates resources and manages things such as low-level hardware interfaces and security.
* Almost all Cisco routers run the same IOS, in contrast to only about half of their switches.



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**Cisco Router IOS**

* The Cisco IOS was created to deliver network services and enable networked applications. It
* runs on most Cisco routers and on some Cisco Catalyst switches, such as the Catalyst 2950.



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**Cisco Router IOS (contd.)**

* These are some of the important things the Cisco router IOS software is responsible for:
  + Carrying network protocols and functions
  + Connecting high-speed traffic between devices
  + Adding security to control access and stop unauthorized network use
  + Providing scalability for ease of network growth and redundancy
  + Supplying network reliability for connecting to network resources
* You can access the Cisco IOS through the console port of a router, from a modem into the auxiliary (or Aux) port, or even through Telnet. Access to the IOS command line is called an EXEC session.



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**Connecting to a Cisco Router**

* You can connect to a Cisco router to configure it, verify its configuration, and check statistics.
* First place you would connect to is the console port.
* The console port is usually an RJ-45 (8-pin Modular) connection located at the back of the router—by default, there’s no password set.
* You can also connect to a Cisco router through an auxiliary port -which is really the same thing as a console port.
* The third way to connect to a Cisco router is in-band, through the program Telnet.
* Telnet is a terminal emulation program that acts as though it’s a dumb terminal. You can use Telnet to connect to any active interface on a router like an Ethernet or serial port.



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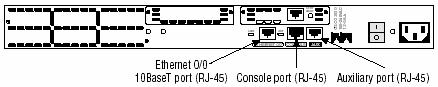
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**Cisco Router’s**

A Cisco 2501 router



A Cisco 2600 router



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**Bringing Up a Router**

* Cisco router, first run’s a power-on self-test (POST). If it passes, it will then look for and load the Cisco IOS from flash memory-if an IOS file is present.
* Flash memory is an electronically erasable programmable read-only memory-an EEPROM.
* The IOS then proceeds to load and looks for a valid configuration-the startupconfig-that’s stored by default in nonvolatile RAM, or NVRAM.



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**Bringing Up a Router (contd.)**

* The following messages appear when you first boot or reload a router:
* System Bootstrap, Version 12.2(13)T, RELEASE SOFTWARE (fc1)
* Copyright (c) 2000 by cisco Systems, Inc.
* C2600 platform with 32768 Kbytes of main memory



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**Bringing Up a Router (contd.)**

* The next part, shown below, shows us that the IOS is being

decompressed into RAM:

program load complete, entry point: 0x80008000, size:

0x43b7fc

Self decompressing the image :

################################################################################

################################################################################

################################################################################

################################################################################

################################################################################

################################################################################

################### [OK]



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**Bringing Up a Router (contd.)**

* After the IOS is decompressed into RAM, the IOS is then loaded and starts running the router, as shown below

(notice that the IOS version is stated as version 12.1[13]):

Cisco Internetwork Operating System Software

IOS (tm) C2600 Software (C2600-I-M), Version 12.2(13),

RELEASE SOFTWARE (fc1)

Copyright (c) 1986-2001 by cisco Systems, Inc.

Compiled Tue 17-Dec-03 04:55 by kellythw

Image text-base: 0x80008088, data-base: 0x8080853C



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**Bringing Up a Router (contd.)**

* Once the IOS is loaded, the information learned from the POST will be displayed next, as shown here:

cisco 2621 (MPC860) processor (revision 0x101) with 26624K/6144K bytes of memory.

Processor board ID JAD050697JB (146699779)

M860 processor: part number 0, mask 49

Bridging software.

X.25 software, Version 3.0.0.

2 FastEthernet/IEEE 802.3 interface(s)

1 Serial network interface(s)

32K bytes of non-volatile configuration memory.

8192K bytes of processor board System flash (Read/Write)



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**Setup Mode**

* Setup mode have two options, Basic management and Extended setup
  + Basic Management only gives you enough configurations to allow connectivity to the router.
  + Extended Setup gives you the power to configure some global parameters as well as interface configuration parameters.
* To enter Setup mode, just say “yes” or “y” to the following question:



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**Setup Mode (contd.)**

* + --- System Configuration Dialog ---
  + Would you like to enter the initial configuration dialog?
  + [yes/no]:y
  + At any point you may enter a question mark '?' for help.
  + Use ctrl-c to abort configuration dialog at any prompt.
  + Default settings are in square brackets '[]'.
* You can use Ctrl+C to abort configuration dialog at any prompt, and that the default settings are in square brackets:[].



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**Setup Interface Summary**

Would you like to enter basic management setup?[yes/no]:**n**

First, would you like to see the current interface summary? [yes]:***[Enter]*** Any interface listed with OK? value "NO" does not have a valid

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| configuration |  |  |  |  |  |
| Interface | IP-Address | OK? | Method | Status | Protocol |
| FastEthernet0/0 | unassigned | NO | unset | up | up |
| FastEthernet0/1 | unassigned | NO | unset | up | up |

Configuring global parameters:



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**Setup Initial Global Parameters**

Enter host name [Router]:**Todd**

The enable secret is a password used to protect access to privileged EXEC and configuration modes. This password, after entered, becomes encrypted in the configuration. Enter enable secret:**todd**

The enable password is used when you do not specify an enable secret password,with some older software versions,

and some boot images.

Enter enable password:**todd**

* Please choose a password that is different from the enable secret

Enter enable password: **todd1**

The virtual terminal password is used to protect access to the router over a network interface. Enter virtual terminal password: **todd**



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**Setup Initial Protocol Configurations**

Configure SNMP Network Management? [yes]:***[Enter]*** or **[no]**

Community string [public]:**[no]**

Configure DECnet? [no]:***[Enter]***

Configure AppleTalk? [no]:***[Enter]***

Configure IP? [yes]:***[Enter]***

Configure IGRP routing? [yes]:**no**

Configure RIP routing? [no]:***[Enter]***

Configure bridging? [no]:***[Enter]***

Configure IPX? [no]:***[Enter]***



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**Setup Interface Parameters**

BRI interface needs isdn switch-type to be configured

Valid switch types are:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| [0] | none.......... | Only if you don't want to | | | configure BRI |
| [1] | basic-1tr6.... | 1TR6 | switch type | for Germany | |
| [2] | basic-5ess.... | AT&T | 5ESS switch | type for | the US/Canada |

1. basic-dms100..Northern DMS-100 switch type for US/Canada

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| [4] | basic-net3.... | NET3 switch | | type for UK and Europe |
| [5] | basic-ni...... | National ISDN switch type | | |
| [6] | basic-ts013... | TS013 switch type for Australia | | |
| [7] | ntt........... | NTT | switch type for Japan | |
| [8] | vn3........... | VN3 | and VN4 | switch types for France |

Choose ISDN BRI Switch Type [2]:2



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**Setup Interface Parameters (contd.)**

Configuring interface parameters:

Do you want to configure FastEthernet0/0 interface?

[yes]:***[Enter]***

Use the 100 Base-TX (RJ-45) connector? [yes]:***[Enter]***

Operate in full-duplex mode? [no]: **y** *and* ***[Enter]***

Configure IP on this interface? [yes]:***[Enter]***

IP address for this interface: **1.1.1.1**

Subnet mask for this interface [255.0.0.0]: **255.255.0.0**

Class A network is 1.0.0.0, 16 subnet bits; mask is /16

Do you want to configure FastEthernet0/1 interface?

[yes]:***[Enter]***

Use the 100 Base-TX (RJ-45) connector? [yes]:***[Enter]***

Operate in full-duplex mode? [no]:**y** *and* ***[Enter]***

Configure IP on this interface? [yes]:***[Enter]***

IP address for this interface: **2.2.2.2**

Subnet mask for this interface [255.0.0.0]: **255.255.0.0** Class A network is 2.0.0.0, 16 subnet bits; mask is /16



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**Setup Script Review and Use**

The following configuration command script was created:

hostname Todd

enable secret 5 $1$B0wu$5F0m/EDdtRkQ4vy4a8qwC/

enable password todd1

line vty 0 4

password todd

snmp-server community public

!

no decnet routing

no appletalk routing

ip routing

no bridge 1

no ipx routing

!

interface FastEthernet0/0

media-type 100BaseX

full-duplex

ip address 1.1.1.1 255.255.0.0

no mop enabled

Output continued…



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**Setup Script Review and Use (contd.)**

!

interface FastEthernet0/1

media-type 100BaseX

full-duplex

ip address 2.2.2.2 255.255.0.0

no mop enabled

dialer-list 1 protocol ip permit

dialer-list 1 protocol ipx permit

!

end

1. Go to the IOS command prompt without saving this config.
2. Return back to the setup without saving this config.
3. Save this configuration to nvram and exit.

Enter your selection [2]:**0**



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**Command-Line Interface**

* The command-line interface (CLI) truly is the best way to configure a router.
* To use the CLI, just say No to entering the initial configuration dialog.
* The router will respond with messages that tell you all about the status of each and every one of the router’s interfaces. Here’s an example:



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**Command-Line Interface (contd.)**

Would you like to enter the initial configuration dialog? [yes]:**n**

Would you like to terminate autoinstall? [yes]:***[Enter]*** Press RETURN to get started!

00:00:42: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up

! ………………

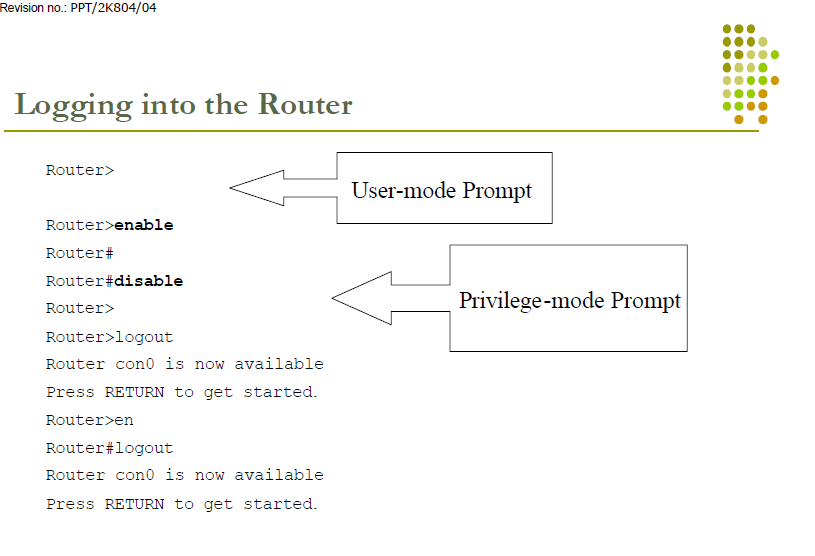
00:01:38: %SYS-5-RESTART: System restarted -- Cisco Internetwork Operating System Software

IOS (tm) 2600 Software (2600-BIN-M), Version 12.2(13), RELEASE SOFTWARE (fc1)

Copyright (c) 1986-2003 by cisco Systems, Inc.

Compiled Tue 04-May-04 19:23 by dschwart





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**Router User-Mode Command List**

Router>?

Exec commands:

access-enable Create a temporary Access-List entry

atmsig Execute Atm Signalling Commands

cd Change current device

clear Reset functions

connect Open a terminal connection

dir List files on given device

disable Turn off privileged commands

disconnect Disconnect an existing network connection

enable Turn on privileged commands

exit Exit from the EXEC

help Description of the interactive help system

lat Open a lat connection

lock Lock the terminal

login Log in as a particular user

logout Exit from the EXEC

-- More --

* You can abbreviate a command to the fewest characters that make a unique character string.



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**Router Privileged-Mode Command List**

Router#?

Exec commands:

access-enable Create a temporary Access-List entry

access-profile Apply user-profile to interface access-template Create a temporary Access-List entry

bfe For manual emergency modes setting

cd Change current directory

clear Reset functions

clock Manage the system clock

configure Enter configuration mode

connect Open a terminal connection

copy Copy from one file to another

debug Debugging functions (see also 'undebug')

delete Delete a file

dir List files on a filesystem

disable Turn off privileged commands

disconnect Disconnect an existing network connection

enable Turn on privileged commands

erase Erase a filesystem

exit Exit from the EXEC

help Description of the interactive help system

-- More –

* You can complete a command string by entering the unique character string, then pressing the Tab key.



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**CLI Prompts**

* To Configure interface, use the interface command from

global configuration mode:

Router(config)#**interface ?**

!

FastEthernet FastEthernet IEEE 802.3

!

Loopback Loopback interface

MFR Multilink Frame Relay bundle interface

!

Router(config)#**interface fastethernet 0/0**

Router(config-if)#



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**CLI Prompts (contd.)**

* Subinterfaces allow you to create logical interfaces within the router.

Router(config)#**int fastethernet0/0.?** <0-4294967295> FastEthernet interface number Router(config)#**int fastethernet0/0.1** Router(config-subif)#



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**CLI Prompts (contd.)**

* To configure user-mode passwords, use the line command.

Router#**config t**

Enter configuration commands, one per line. End with

CNTL/Z.

Router(config)#**line ?**

|  |  |  |
| --- | --- | --- |
| <0-70> | | First Line number |
| aux | Auxiliary line | |
| console | | Primary terminal line |
| tty |  | Terminal controller |
| vty | Virtual terminal | |
| x/y | Slot/Port for Modems | |

2600A(config)#line

Router(config)#**line console 0**

Router(config-line)#



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**Editing and Help Features**

Router#**?**

Exec commands:

access-enable Create a temporary Access-List entry

access-profile Apply user-profile to interface

access-template Create a temporary Access-List entry

bfe For manual emergency modes setting

clear Reset functions

--More—



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**Editing and Help Features (contd.)**

Router#clock set 10:30:10

% Incomplete command.

Router(config)#access-list 110 permit host 1.1.1.1

^

|  |  |  |  |
| --- | --- | --- | --- |
| % Invalid | input detected at '^' marker | Syntax Checking |  |
| Router#sh | te |  |  |
|  |  |



* Ambiguous command: "sh te" Router#sh te?

tech-support template terminal



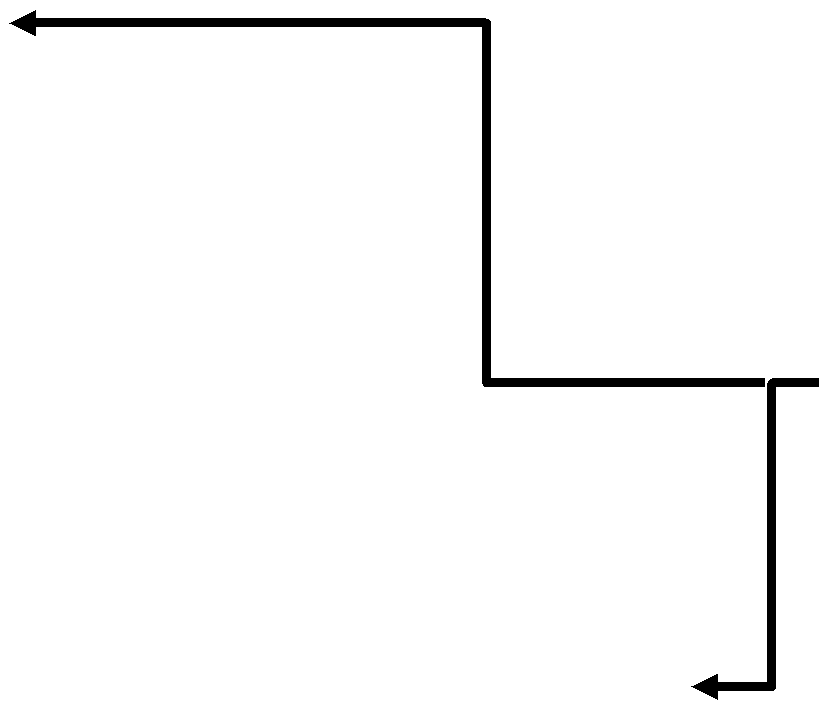
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**Editing and Help Features (contd.)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Router#**clock ?** |  |  |  |  |
| set Set the time and date | |  |  |  |
| Router#**clock set** | **?** |  |  |  |
| hh:mm:ss Current Time | |  |  |  |
| Router#**clock set 10:30:10 ?** | |  |  |  |
| <1-31> Day of the month | |  |  |  |
| MONTH Month of the year | |  |  |  |
| Command Prompting |  |  |
| Router#**clock set** | **10:30:10 28 ?** |  |  |
| MONTH Month of the year | |  |  |  |
| Router#**clock set** | **10:30:10 28 august ?** |  |  |  |
| <1993-2035> Year |  |  |  |  |
| Router#**clock set** | **10:30:10 28 august 2003 ?** |  |  |  |
| <cr> |  |  |  |  |
| Router# |  |  |  |  |
|  |  |  |  |  |



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**Enhanced Editing Commands**

|  |  |
| --- | --- |
| **Command** | **Meaning** |
| Ctrl+A | Moves your cursor to the beginning of the line |
| Ctrl+E | Moves your cursor to the end of the line |
| Esc+B | Moves back one word |
| Ctrl+B | Moves back one character |
| Ctrl+F | Moves forward one character |
| Esc+F | Moves forward one word |
| Ctrl+D | Deletes a single character |
| Backspace | Deletes a single character |
| Ctrl+R | Redisplays a line |
| Ctrl+U | Erases a line |
| Ctrl+W | Erases a word |
| Ctrl+Z | Ends configuration mode and returns to EXEC |
| Tab | Finishes typing a command for you |
|  |  |



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**Router-Command History**

**Command** **Meaning**

Ctrl+P or up arrow Shows last command entered

Ctrl+N or down arrow Shows previous commands entered

show history Shows last 10 commands entered by default

show terminal Shows terminal configurations and history

buffer size

terminal history size Changes buffer size (max 256)



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**Router-Command History**

* The show history command displays the last 10 commands that were entered on the router:

Router#**sh history**

en

sh history

show terminal

sh cdp neig

sh ver

sh flash

*[output cut]*



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**Router-Command History (contd.)**

* The show terminal command to verify the terminal history size:

Router#**sh terminal**

Line 0, Location: "", Type: ""

*[output cut]*

History is enabled, history size is 10.

No special data dispatching characters

*[output cut]*

Group codes: 0

Router#**terminal history size ?**

<0-256> Size of history buffer

Router#**terminal history size 25**

Router#**sh terminal**

|  |  |  |
| --- | --- | --- |
| Line 0, | Location: "", Type: "" | |
| *[output* | *cut]* | |
| Editing | is | enabled. |
| History | is | enabled, history size is 25. |
| *[output* | *cut]* | |
|  |  |  |



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**Gathering Basic Routing Information**

* The show version command will provide basic configuration for the system hardware as well as the software version, the names and sources of configuration files, and the boot images.

Router#**sh version**

Cisco Internetwork Operating System Software IOS (tm) C2600 Software (C2600-BIN-M), Version

12.2(13)T1,RELEASE SOFTWARE(fc1) TAC Support: http://www.cisco.com/tac Copyright (c) 1986-2003 by cisco Systems, Inc. Compiled Sat 04-Jan-03 05:58 by ccai

Image text-base: 0x80008098, data-base: 0x80C4AD94

Router uptime is 1 week, 2 hours, 39 minutes System returned to ROM by reload

System image file is "flash:c2600-bin-mz.122-13.T1.bin“

(output omitted)

--More--

Configuration register is 0x2102



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**Setting Password**

* Console password

Router(config)#line console 0

Router(config-line)#login

Router(config-line)#password todd1

* Virtual Terminal Password

Router(config)#line vty 0 4

Router(config)#password todd2

* Enable Password

Router(config)#enable password todd

* Secret Password

Router(config)#enable secret pass

* Disable password

Router(config)#no enable secret pass



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**Encrypting Your Passwords**

* To manually encrypt your passwords, use the service password-encryption command.

Router#**config t**

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#**service password-encryption**

Router(config)#**^Z**

Router#**sh run**

Building configuration...

*[output cut]*

!

enable secret 5 $1$rFbM$8.aXocHg6yHrM/zzeNkAT.

enable password 7 0835434A0D

!

*[output cut]*

end

Router#**config t**

Router(config)#**no service password-encryption**

Router(config)#**^Z**



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**Setting Banner**

* Banner message is displayed at the time of login. It can be used to convey the security messages, command used is Banner motd
  + MOTD stands for “Message of The Day”



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**Setting Banner (contd.)**

* The command is a Global configuration mode command.

Router(config)#**banner motd ?**

LINE c banner-text c, where 'c' is a delimiting character Router(config)#**banner motd #**

Enter TEXT message. End with the character '#'.

**$ Acme.com network, then you must disconnect immediately.**

**#**

Router(config)#**^Z**

Router#

00:25:12: %SYS-5-CONFIG\_I: Configured from console by console

Router#**exit**

Router con0 is now available

Press RETURN to get started.

If you are not authorized to be in Acme.com network, then you must disconnect immediately.

Router>



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**Router Interfaces**

Router(config)#interface *type number* Router(config-if)#

* *type* includes serial, ethernet, token ring, fddi, hssi, loopback,dialer, null, async, atm, bri, tunnel, and so on
* *number* is used to identify individual interfaces

Router(config)#interface *type slot/port* Router(config-if)#

* For modular routers, selects an interface

Router(config-if)#exit

* Quits from current interface configuration mode



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**Configuring a Serial Interface**

* Enter Global Configuration Mode

Router#configure terminal Router(config)#

* Specify Interface

Router(config)#interface serial 0 Router(config-if)#

* Set Clock Rate (on DCE interfaces only)

Router(config-if)#clock rate 64000 Router(config-if)#

* Set Bandwidth (recommended)

Router(config-if)#bandwidth 64 Router(config-if)#exit Router(config)#exit

Router#



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**Ethernet media-type Command**

* Selects the media-type connector for the Ethernet interface

Router(config)#int fa 0/0

Router(config-if)#media-type ?

100BaseX Use RJ45 for -TX; SC FO for -FX

MII Use MII connector



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**Bringing Up an Interface**

Router#**config t**

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#**int ethernet0**

Router(config-if)#**no shutdown**

Router(config-if)#**^Z**

00:57:08: %LINK-3-UPDOWN: Interface Ethernet0, changed state to up

00:57:09: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0, changed state to up

Router#**sh int ethernet0**

Ethernet0 is up, line protocol is up *[output cut]*



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**Configuring an IP Address on an Interface**

Router(config)#int e0

Router(config-if)#ip address 172.16.10.2 255.255.255.0 Router(config-if)#no shut

Router(config-if)#ip address 172.16.20.2 255.255.255.0 secondary

Router(config-if)#^Z

Router#sh run

Building configuration...

Current configuration:

[output cut]

!

interface Ethernet0

ip address 172.16.20.2 255.255.255.0 secondary

ip address 172.16.10.2 255.255.255.0

!

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**Configuring Hostnames**

Router#**config t**

Enter configuration commands, one per line. End with

CNTL/Z.

Router(config)#**hostname Todd**

Todd(config)#**hostname Atlanta**

Atlanta(config)#



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**Configuring Description**

Atlanta(config)#**int e0**

Atlanta(config-if)#**description Sales Lan**

Atlanta(config-if)#**int s0**

Atlanta(config-if)#**desc Wan to Miami circuit:6fdda4321**

Atlanta#**sh run**

[cut]

interface Ethernet0

description Sales Lan

ip address 172.16.10.30 255.255.255.0

no ip directed-broadcast

!

interface Serial0

description Wan to Miami circuit:6fdda4321

no ip address

no ip directed-broadcast

no ip mroute-cache

Atlanta#



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**Saving Configuration**

* Whenever you modify the configuration, the changes take place in Running-configuration stored in RAM.
* If you want these changes to be effected next time when you start router, you must save the current modified running configuration to NVRAM or Startup-configuration.
  + The above is performed by the command
    - Router#copy running-config startup config
    - or
    - Router#copy run start



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**Verifying Configuration**

* show running-config

Router#show run

* show startup-config

Router#show start

* Ping

Router#ping 172.16.0.1

* Traceroute

Router#traceroute 172.16.0.1



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**Router show interfaces Command**

Router#**show interfaces**

Ethernet0 is up, line protocol is up

Hardware is Lance, address is 00e0.1e5d.ae2f (bia 00e0.1e5d.ae2f)

Internet address is 10.1.1.11/24

MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec, rely 255/255, load 1/255

Encapsulation ARPA, loopback not set, keepalive set (10 sec)

ARP type: ARPA, ARP Timeout 04:00:00

Last input 00:00:07, output 00:00:08, output hang never

Last clearing of "show interface" counters never

Queueing strategy: fifo

Output queue 0/40, 0 drops; input queue 0/75, 0 drops 5 minute input rate 0 bits/sec, 0 packets/sec 5 minute output rate 0 bits/sec, 0 packets/sec

81833 packets input, 27556491 bytes, 0 no buffer

Received 42308 broadcasts, 0 runts, 0 giants, 0 throttles

1 input errors, 0 CRC, 0 frame, 0 overrun, 1 ignored, 0 abort

0 input packets with dribble condition detected

55794 packets output, 3929696 bytes, 0 underruns

0 output errors, 0 collisions, 1 interface resets

0 babbles, 0 late collision, 4 deferred

0 lost carrier, 0 no carrier

0 output buffer failures, 0 output buffers swapped out



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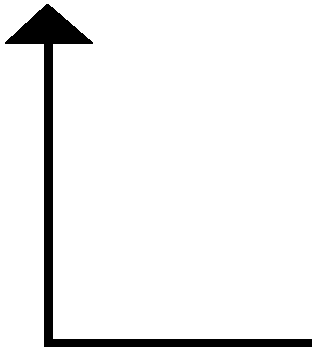
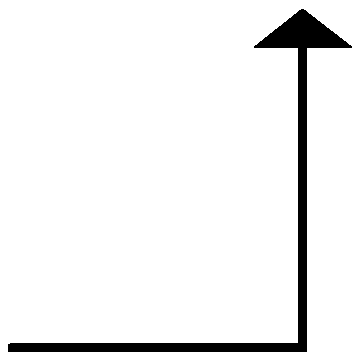


**Interpreting the Interface Status**

Router#show interface serial 1 **Serial1 is up, line protocol is up**

Hardware is HD64570

Description: 64kb line to san Jose



:: :: :: :: :: :: :: :: ::

**Carrier Detect** **Keepalives**

**Operational**……………………Serial1 is up, Line protocol is up

**Connection problem**…Serial1 is up, Line protocol is down **Interface problem**……Serial1 is down, Line protocol is down

**Disabled**……………………………Serial1 is administratively down, Line

protocol is down



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**Verifying a Serial Interface Configuration**

**Router#show interface serial 0**

**Serial0 is up**, line protocol is up

Hardware is HD64570

Internet address is 10.140.4.2/24

MTU 1500 bytes, **BW 64 Kbit**, DLY 20000 usec, rely 255/255, load 1/255 Encapsulation HDLC, loopback not set, keepalive set (10 sec)

Last input 00:00:09, output 00:00:04, output hang never Last clearing of "show interface" counters never

Input queue: 0/75/0 (size/max/drops); Total output drops: 0

Queueing strategy: weighted fair

Output queue: 0/1000/64/0 (size/max total/threshold/drops)

Conversations 0/1/256 (active/max active/max total)

Reserved Conversations 0/0 (allocated/max allocated)

5 minute input rate 0 bits/sec, 0 packets/sec

5 minute output rate 0 bits/sec, 0 packets/sec (*output omitted)*



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**Verifying with the show ip interface Command**

* Router#sh ip interface
* FastEthernet0/0 is up, line protocol is up
* Internet address is 1.1.1.1/24
* Broadcast address is 255.255.255.255
* Address determined by setup command
* MTU is 1500 bytes
* Helper address is not set
* Directed broadcast forwarding is disabled
* Outgoing access list is not set
* Inbound access list is not set
* Proxy ARP is enabled
* Security level is default
* Split horizon is enabled
* [output cut]



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**Using the show ip interface brief Command**

Router#**sh ip int brief**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Interface | IP-Address | OK? Method | Status | Protocol |
| FastEthernet0/0 | 192.168.1.33 | YES manual | up | up |
| FastEthernet0/1 | 10.3.1.88 | YES manual | up | up |
| Serial0/0 | 10.1.1.1 | YES manual | up | up |
| Serial0/1 | unassigned | YES NVRAM | administratively down | down |



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**Using the show controllers Command**

Router#**sh controllers serial 0/0**

HD unit 0, idb = 0x1229E4, driver structure at 0x127E70 buffer size 1524 HD unit 0, **V.35 DTE cable**

cpb = 0xE2, eda = 0x4140, cda = 0x4000

Router#**sh controllers serial 0/1**

HD unit 1, idb = 0x12C174, driver structure at 0x131600 buffer size 1524 HD unit 1, **V.35 DCE cable** cpb = 0xE3, eda = 0x2940, cda = 0x2800

• Shows the cable type of serial cables



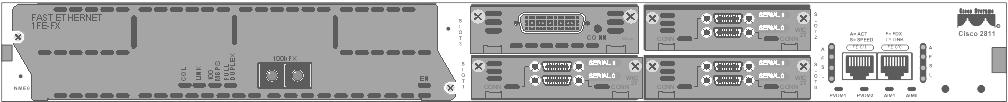
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**A Cisco 2800 router**

* 2800 series router has replaced the 2600 series router series and is referred to as an Integrated Services Router (ISR).It gets its name because many of the services, like security, are built into it. It’s a modular device like the 2600, but it’s much faster and a lot more sleek—it’s elegantly designed to support a broad new range of interface options.



* Security is built in—the 2800 has the Security Device Manager (SDM) preinstalled.
* The SDM is a Web-based device-management tool for Cisco routers that can help you configure a router via a web console.



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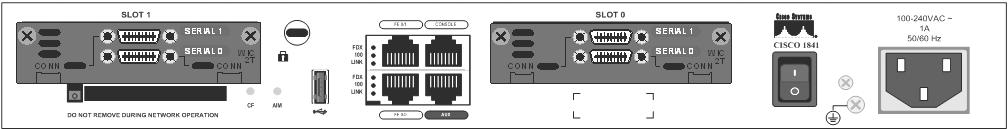
* There are a couple of other series of routers that are less expensive then the 2800 series:
* The 1800 and 800 series. You may want to look into these routers if you’re looking for a less expensive alternative to the 2800 but still want to run the same 12.4 IOS and the latest SDM.
* Figure shows an 1841 router that holds most of the same interfaces as the 2800, but it’s smaller and less expensive. The real reason you would opt for a 2800 instead of an 1800 series router comes down to the more advanced interfaces you can run on the 2800—things like the wireless controller and switching modules.

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**A Cisco 1841 router**



**Doing the *do* Command**

Beginning with IOS version 12.3, Cisco has finally added a command to the IOS that allows you to view the configuration and statistics from within configuration mode. In fact, with a pre-12.3 router, you’d get the following error if you tried to view the configuration from global-config:



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Router(config)#**sh run**



^

% Invalid input detected at ‘^’ marker.

Compare that to the output I get from entering that same command on my router that’s running the 12.4 IOS:

Enter configuration commands, one per line. End with CNTL/Z.

Todd(config)#**do show run**

Building configuration...

Current configuration : 3276 bytes

!

[output cut]

Todd(config)#**do sh int f0/0**

FastEthernet0/0 is up, line protocol is down

Hardware is MV96340 Ethernet, address is 001a.2f55.c9e8 (bia

001a.2f55.c9e8)

Description: Sales VLAN

[output cut]



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**Using the Pipe**



* Pipe means output modifier. This pipe ( | ) allows us to wade through all the configurations or other long outputs and get straight to our goods fast. So basically, the pipe symbol (output modifier) is what you need to help you get where you want to go light years faster than mucking around in a router’s entire configuration.



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**An example1:**



Todd#**sh run | ?**

append Append redirected output to URL

(URLs supporting append operation only)

begin Begin with the line that matches

exclude Exclude lines that match

include Include lines that match

redirect Redirect output to URL

section Filter a section of output

tee Copy output to URL



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Todd#**sh run | begin interface**



interface FastEthernet0/0

description Sales VLAN

ip address 10.10.10.1 255.255.255.248

duplex auto

speed auto

!

interface FastEthernet0/1



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ip address 172.16.20.2 255.255.255.0 secondary ip address 172.16.10.2 255.255.255.0 duplex auto



speed auto

!

interface Serial0/0/0

description Wan to SF circuit number 6fdda 12345678

no ip address

!



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An example2:

Todd#**sh ip route | include 192.168.3.32**

R 192.168.3.32 [120/2] via 10.10.10.8, 00:00:25,

FastEthernet0/0

Todd#



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**Cisco’s Security Device Manager (SDM)**

* Cisco’s SDM is used to help you configure a router from an HTTP or HTTPS interface.
* SDM is available on Cisco router models from Cisco 830 Series to 7301. Plus, it’s preinstalled on all new 850, 870, 1800, 2800, and 3800 series routers.

**Note:**

For the Cisco PIX product, use the Pix Device Manager (PDM), not the SDM.



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* SDM is a really great tool for advanced configurations—not the super small, simple configurations .If you wanted to set up an advanced access list, VPN with IPSec, and intrusion protection on your router.



**Note:**

To find more details about SDM, go to www.cisco.com/go/sdm



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