

# Cisco Internetworking Revision Sheet

## Basic Router Operations

To get to User Mode	Press ENTER and a password if required.
To get to Privileged Mode	Router> <b>enable</b>
To get back to User Mode	Router# <b>disable</b>
To Exit the Router	Router> <b>exit</b> or <b>logoff</b>
Break Key	<b>&lt;shift&gt;+&lt;ctrl&gt;+6 'x'</b>
To move to the beginning of the command line	<b>Ctrl+A</b>
To move to the end of the command line	<b>Ctrl+E</b>
To move forward one character	<b>Ctrl+F</b> [or right arrow key]
To move back one character	<b>Ctrl+B</b> [or left arrow key]
To repeat the previous command	<b>Ctrl+P</b> [or up arrow key]
To repeat the most recent (last) command	<b>Ctrl+N</b> [or down arrow key]
To move back one word	<b>Esc+B</b>
To move forward one word	<b>Esc+F</b>
To erase a word	<b>Ctrl+W</b>
To erase a line	<b>Ctrl+U</b>
To redisplay a line	<b>Ctrl+R</b>
Ends configuration mode and returns to privileged mode	Router# <b>Ctrl+Z</b>
To auto complete a command	<b>&lt;tab&gt;</b>
To show the command buffer	Router> <b>show history</b>
To set the command buffer size	Router> <b>terminal history size</b>
To disable advanced editing features	Router> <b>terminal no editing</b>
To re-enable advanced editing features	Router> <b>terminal editing</b>

## Viewing Router Information

View IOS version	Router# <b>show version</b>
View current configuration file (RAM)	Router# <b>show running-config</b>
View saved configuration file (NVRAM)	Router# <b>show startup-config</b>
View IOS version, size of IOS, and free space in FLASH	Router# <b>show flash</b>
View CPU utilization	Router# <b>show processes cpu</b>
View info about programs in RAM	Router# <b>show processes</b>
Display interfaces on router and their status	Router# <b>show interface</b>
Display the ip interfaces on router and their status	Router# <b>show ip interface</b>
Display which protocols are configured on the router	Router# <b>show protocol</b>
Display ip protocol info	Router# <b>show ip protocol</b>

## Cisco Discovery Protocol

View info of neighboring Cisco devices (routers, switches,etc)	Router# <b>show cdp neighbors</b> [ show cdp neighbor detail]
View interface info, default encap, cdp update and holdtime freq	Router# <b>show cdp interface</b>
View a neighbors details	Router# <b>show cdp entry RouterB</b>
View cdp update and holdtime frequency	Router# <b>show cdp</b>
Change update frequency	Router# <b>cdp timer 90</b> [60 sec is default]
Change how long to hold a CDP entry of a neighbor for	Router# <b>cdp holdtime 240</b>
Turn off CDP on an interface	Router(config-if)# <b>no cdp enable</b>
CDP is enabled globally [CDP is enabled by default]	Router(config)# <b>cdp run</b>

## Managing Configuration Files

Run the initial configuration dialog	Router# <b>setup</b>
Reboot the router and reload the startup config from NVRAM	Router# <b>reload</b>
Enter global configuration mode	Router# <b>config terminal</b>
Copy configuration file in RAM to NVRAM	Router# <b>copy running-config startup-config</b>
Copy configuration file in NVRAM to RAM	Router# <b>copy startup-config running-config</b>
Erase the configuration file in NVRAM [run initial config dialog]	Router# <b>erase startup-config</b>
Copy startup config file from TFTP to NVRAM	Router# <b>copy tftp startup-config</b>
Copy startup config file from NVRAM to TFTP	Router# <b>copy startup-config tftp</b>
Copy startup config file from TFTP to RAM	Router# <b>copy tftp running-config</b>
Copy running config file from RAM to TFTP	Router# <b>copy running-config tftp</b>
Backup IOS to file server	Router# <b>copy flash tftp</b>
Upgrade the IOS from the file server	Router# <b>copy tftp flash</b>
Tell router which IOS file in Flash to boot from	Router(config)# <b>boot system flash (ios_filename)</b>
Tell router which IOS to request from the TFTP server (fallback)	Router(config)# <b>boot system tftp (ios_filename) tftp_ip_address</b>
Tell router to boot from IOS in ROM	Router(config)# <b>boot rom</b>

## Password

Set the enable secret password [to enter privileged mode]	Router(config)# <b>enable secret Rimmer</b>
Set the enable password	Router(config)# <b>enable Rimmer</b>
Set the password for Telnet	Router(config)# <b>line vty 0 4 ;0 4 specifies num of telnet sessions</b> Router(config-line)# <b>login</b>
Set the console port password	Router(config-line)# <b>password Holly</b> Router(config)# <b>line con 0</b> Router(config-line)# <b>login</b>
Set the auxiliary password	Router(config-line)# <b>password Holly</b> Router(config)# <b>line aux 0</b> Router(config-line)# <b>login</b>
Passwords can be encrypted	Router(config-line)# <b>password Holly</b> Router(config)# <b>service password-encryption</b>
To de-encrypt the passwords	Router(config)# <b>no service password-encryption</b>

## Router Identification

Message of the day	Router(config)# <b>banner motd # You are in... #</b>
Give the router a hostname	Router(config)# <b>hostname RouterC</b>

## Auto-Install

Router broadcasts to get its own TCP/IP address using	<b>BOOTP</b>
Router broadcasts again to locate the file server IP addr using	<b>TFTP</b>
Router attempts TFTP to get the IP-to-Hostname mapping file	Network-config
If above fails, fallback to 8.3 DOS compatible filename conven	Cisconet.cfg
Router attempts TFTP to get its specific Hostname running config	{Hostname}-config
If above fails, fallback to 8.3 DOS compatible filename conven	{Hostname}.cfg
Note: {Hostname} is determined by parsing network-config file and checking all Hostnames listed against own IP address	

## Configuring a Serial Interface

Is it DCE or DTE?	Router# <b>show controller serial 1</b>
Enter sub interface mode	Router(config)# <b>interface serial 1</b>
Set clock rate on DCE	Router(config-if)# <b>clock rate 64000 [or clockrate 64000]</b>
Set the bandwidth	Router(config-if)# <b>bandwidth 64</b>
Enable the interface	Router(config-if)# <b>no shutdown</b>
Check interface status	Router# <b>show interface serial 1</b> Router# <b>show ip interface brief</b>

TCP/IP	
Disable IP routing on a router (enabled by default)	Router(config)# <b>no ip routing</b>
Put an IP address on an interface	Router(config)# <b>interface serial 0</b> Router(config-if)# <b>ip address 172.16.1.3 255.255.0.0</b> Router(config-if)# <b>exit</b> Router(config)# <b>interface ethernet 0</b> Router(config-if)# <b>ip address 208.10.10.3 255.255.255.0</b>
Configure RIP	Router(config)# <b>router rip</b> Router(config-router)# <b>network 157.2.0.0</b> Router(config-router)# <b>network 177.2.0.0</b>
Disable RIP routing	Router(config)# <b>no router rip</b>
Configure IGRP	Router(config)# <b>router igrp 300</b> Router(config-router)# <b>network 157.2.0.0</b> Router(config-router)# <b>network 177.2.0.0</b>
Disable IGRP routing	Router(config)# <b>no router igrp 300</b>
View the IP routing table	Router# <b>show ip route</b>
View RIP Debug	Router# <b>debug ip rip</b>
View IGRP Debug	Router# <b>debug ip igrp events</b> Router# <b>debug ip igrp transactions</b>
IPX/SPX	
Enable IPX on the router (disabled by default)	Router(config)# <b>ipx routing</b>
Enable load balancing	Router(config)# <b>ipx maximum-paths 4</b>
Enable IPX on an interface Set the IPX network number to 2000 use default encapsulation Ethernet = novell-ether      Serial = HDLC	Router(config)# <b>interface serial 0</b> Router(config-if)# <b>ipx network 2000</b>
<b>Note: IPX routing is automatically enabled as soon as an IPX address is on an interface.</b>	
To force and encapsulation type:	
Ethernet_802.3 => novell-ether	Router(config-if)# <b>ipx network 2000 encap novell-ether</b>
Ethernet_802.2 => sap	Router(config-if)# <b>ipx network 2000 encap sap</b>
Ethernet_II => arpa	Router(config-if)# <b>ipx network 2000 encap arpa</b>
Ethernet_SNAP => snap	Router(config-if)# <b>ipx network 2000 encap snap</b>
View the SAP tables [list the servers discovered by SAP's]	Router# <b>show ipx servers</b>
View the IPX routing table	Router# <b>show ipx route</b>
View traffic statistics [displays RIP and SAP information]	Router# <b>show ipx traffic</b>
View the IPX address and encapsulation on an interface	Router# <b>show ipx interface</b>
View the routed protocols on the router	Router# <b>show protocol</b>
Test host to host connectivity	Router# <b>ping ipx &lt;host_address&gt;</b>
<b>Debug Commands</b>	
Debug IPX RIP packets	Router# <b>debug ipx routing activity</b>
Debug SAP packets	Router# <b>debug ipx sap</b>
Turn off the debug command	Router# <b>undebug ipx routing activity</b>
Config-Reg	
ROM Monitor Mode [prompt will be either: > or <b>rommon&gt;</b> ]	Router(config)# <b>Config-reg 0x0000</b>
Boot from ROM and enter RXBOOT mode [prompt will be: <b>Router_Name(boot)&gt;</b> ]	Router(config)# <b>Config-reg 0x0001</b>
Boot from ROM & check NVRAM for startup [boot] commands	Router(config)# <b>Config-reg 0x0002 [through to 0x000F]</b>
RXBOOT (diagnostics mode, use 'b' to continue boot)	Router(config)# <b>Config-reg 0x2000</b>
Boot from ROM, use NVRAM (upgrade flash in run-from-flash )	Router(config)# <b>Config-reg 0x2101</b>
Boot from ROM, skip NVRAM (disaster recovery)	Router(config)# <b>Config-reg 0x2141</b>
Boot from FLASH, use NVRAM (normal operation)	Router(config)# <b>Config-reg 0x2102</b>
Boot from FLASH, skip NVRAM (password recovery)	Router(config)# <b>Config-reg 0x2142</b>

## Access-Lists

<1-99>	IP standard access list
<100-199>	IP extended access-list
<200-299>	Protocol type-code access list
<300-399>	DECnet access list
<400-499>	XNS standard access list
<500-599>	XNS extended access list
<600-699>	Appletalk access list
<700-799>	48 bit MAC address access list
<800-899>	IPX standard access list
<900-999>	IPX extended access list
<1000-1099>	IPX SAP access list
<1100-1199>	Extended 48 bit MAC address access list
<1200-1299>	IPX summary address access list

View which access lists are applied to an interface	Router# <b>show ip interface serial 0</b> Router# <b>show ipx interface serial 0</b> Router# <b>show appletalk interface serial 0</b>
View <b>all</b> access lists on the router and list each line of the list	Router# <b>show access-lists</b>
View <b>ip</b> access lists only	Router# <b>show ip access-lists</b>
View <b>ipx</b> access lists only	Router# <b>show ipx access-lists</b>
View <b>appletalk</b> access lists only	Router# <b>show appletalk access-lists</b>

### IP Standard Access-Lists [1-99] filter on Source Address Template

Deny the subnet 200.10.10.0/24 from entering port E0 Permit all others [ <b>any =0.0.0.0 255.255.255.255</b> ] Implicit deny all at the end of the access list → The access list is not operational until bound to an interface	Router(config)# <b>access-list 1 deny 200.10.10.0 0.0.0.255</b> Router(config)# <b>access-list 1 permit any</b> Router(config)# <b>access-list 1 deny any any</b> Router(config)# <b>interface e0</b> Router(config-if)# <b>ip access-group 1 in</b>
Deny the host 200.10.10.2/24 from entering port E0 Permit all others [ <b>host =200.10.10.2 0.0.0.0</b> ] <b>An implicit deny all other traffic is the default line of an access list</b> → The access list is not operational until bound to an interface	Router(config)# <b>access-list 88 deny host 200.10.10.2</b> Router(config)# <b>access-list 88 permit any</b> Router(config)# <b>access-list 88 deny any any</b> Router(config)# <b>interface e0</b> Router(config-if)# <b>ip access-group 88 in</b>

### IP Extended Access-Lists [100-199] filter on Srce+Dest Address Template, Port, Protocol

Stop all hosts on network 4.4.4.0 from accessing the web (www) Stop host 2.2.2.2 from telneting to host 3.3.3.3 out E0 Permit all others to have access <b>An implicit deny all other traffic is the default line of an access list</b> → The access list is not operational until bound to an interface	Router(config)# <b>access-list 101 deny tcp 4.4.4.0 0.0.0.255 any eq 80</b> Router(config)# <b>access-list 101 deny tcp host 2.2.2.2 host 3.3.3.3 eq 23</b> Router(config)# <b>access-list 101 permit any any</b> Router(config)# <b>access-list 101 deny any any</b> Router(config)# <b>interface e0</b> Router(config-if)# <b>ip access-group 101 out</b>
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### IPX Standard Access-Lists [800-899] filter on Srce+Dest Address Template

Stop network 7B from getting to network 8000 Allow all other networks [ <b>-1 → any network</b> ] <b>An implicit deny all other traffic is the default line of an access list</b> → The access list is not operational until bound to an interface	Router(config)# <b>access-list 801 deny 7B 8000</b> Router(config)# <b>access-list 801 permit -1 -1</b> Router(config)# <b>interface e0</b> Router(config-if)# <b>ipx access-group 801 out</b>
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### IPX Extended Access-Lists [900-999] filter on Srce+Dest Address Template, Socket, Protocol

Deny all traffic from network 50 going to network 10 [ <b>0=all skts</b> ] Permit all other traffic to all other networks <b>An implicit deny all other traffic is the default line of an access list</b> → The access list is not operational until bound to an interface	Router(config)# <b>access-list 901 deny -1 50 0 10 0</b> Router(config)# <b>access-list 901 permit -1 -1 0 -1 0</b> Router(config)# <b>interface e0</b> Router(config-if)# <b>ipx access-group 901 out</b>
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### IPX SAP Access-Lists [1000-1999] filter on Source, Port, Service Name

Allow all packets from network to enter E0 and be included in SAP updates across the network. [ <b>0 = all service types</b> ] The access list is not operational until bound to an interface	Router(config)# <b>access-list 1001 permit 11.0000.0000.0001 0</b> Router(config)# <b>interface e0</b> Router(config-if)# <b>ipx input-sap-filter 1001</b> Router(config-if)# <b>ipx output-sap-filter 1001</b>
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## Frame-Relay

### Global Commands

Create a subinterface, or ref a previously created subinterface RouterA(config)#**interface serial0.2** <point-to-point|multipoint>

### Interface Commands

Enable Frame-Relay on an interface and specify encaps type RouterA(config)#**int s0**  
RouterA(config-if)#**encapsulation frame-relay** <Cisco|IETF>  
Note: Cisco is the default encapsulation.

Define a DLCI used for a VC to another DTE RouterA(config-if)#**frame-relay interface-dlci 16**  
Specify type of LMI msgs to the switch (11.2+ autosense) RouterA(config-if)#**frame-relay lmi-type** <ansi|q933a|cisco>  
Statically define a mapping between an IP addr and a DLCI RouterA(config-if)#**frame-relay map ip 5.5.5.5 100 broadcast**  
RouterA(config-if)#**frame-relay map ipx 1.0200.bbbb.dddd 502 broadcast**

Adjust the keepalive period: how often LMI status msg sent. RouterA(config-if)#**frame-relay keepalive 20**  
Adjust the bandwidth:metric with some routing protocols RouterA(config-if)#**frame-relay bandwidth 64000**

### Show Commands

View LMI information RouterA#**show interface serial 0**  
View PVC traffic statistics:show PVC's and DLCI's **sho run** RouterA#**show frame-relay pvc**  
View Route Maps (static or dynamic) RouterA#**show frame-relay map**  
View LMI information RouterA#**show frame-relay lmi**  
View frame relay ip statistics RouterA#**show frame-relay ip**

## PPP

### Global Commands

Create a username and password for logging in RouterA(config)#**username OtherRouter password Lister**  
Enable PPP on the interface RouterA(config)#**int s0**  
RouterA(config-if)#**encapsulation ppp**

### Interface Commands

Enable authentication (chap or pap) RouterA(config-if)#**ppp authentication chap**  
Specify chap hostname(default to router name) RouterA(config-if)#**ppp chap hostname MyRouter**  
Specify chap password (default to enable password) RouterA(config-if)#**ppp chap password Rimmer**  
Specify pap username RouterA(config-if)#**ppp pap sent-username Holly**

### Show Commands

View encapsulation, open LCP's and more RouterA(config)#**show interface serial 0**

### Debug Commands

View the authentication process RouterA(config)#**debug ppp authentication**