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

## Viewing Router Information

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

## Cisco Discovery Protocol

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

## Managing Configuration Files

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

## Password

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

## Router Identification

| | |
|---|---|
| Message of the day | Router(config)#**banner motd # You are in… #** |
| Give the router a hostname | Router(config)#**hostname RouterC** |

## Auto-Install

| | |
|---|---|
| Router broadcasts to get its own TCP/IP address using | **BOOTP** |
| Router broadcasts again to locate the file server IP addr using | **TFTP** |
| Router attempts TFTP to get the IP-to-Hostname mapping file | Network-confg |
| If above fails, fallback to 8.3 DOS compatible filename conven | Cisconet.cfg |
| Router attempts TFTP to get its specific Hostname running config | {Hostname}-confg |
| If above fails, fallback to 8.3 DOS compatibile filename conven | {Hostname}.cfg |

Note: {Hostname}is determined by parsing network-confg file and checking all Hostnames listed against own IP address

## Configuring a Serial Interface

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

## TCP/IP

| | |
|---|---|
| Disable IP routing on a router (enabled by default) | Router(config)#**no ip routing** |
| Put an IP address on an interface | Router(config)#**interface serial 0**<br>Router(config-if)#**ip address 172.16.1.3 255.255.0.0**<br>Router(config-if**)#exit**<br>Router(config)#**interface ethernet 0**<br>Router(config-if)#**ip address 208.10.10.3 255.255.255.0** |
| Configure RIP | Router(config)#**router rip**<br>Router(config-router)#**network 157.2.0.0**<br>Router(config-router)#**network 177.2.0.0** |
| Disable RIP routing | Router(config)# **no router rip** |
| Configure IGRP | Router(config)#**router igrp 300**<br>Router(config-router)#**network 157.2.0.0**<br>Router(config-router)#**network 177.2.0.0** |
| Disable IGRP routing | Router(config)#**no router igrp 300** |
| View the IP routing table<br>View RIP Debug<br>View IGRP Debug | Router#**show ip route**<br>Router#**debug ip rip**<br>Router#**debug ip igrp events**<br>Router#**debug ip igrp transactions** |

## IPX/SPX

| | |
|---|---|
| Enable IPX on the router (disabled by default) | Router(config)#**ipx routing** |
| Enable load balancing | Router(config)#**ipx maximum-paths 4** |
| Enable IPX on an interface<br>Set the IPX network number to 2000 use default encapsulation<br>Ethernet = novell-ether Serial = HDLC | Router(config)#**interface serial 0**<br>Router(config-if)#**ipx network 2000** |

**Note: IPX routing is automatically enabled as soon as an IPX address is on an interface.**

| | |
|---|---|
| To force and encapsulation type: | |
| Ethernet_802.3 => novell-ether | Router(config-if)#**ipx network 2000 encap novell-ether** |
| Ethernet_802.2 => sap | Router(config-if)#**ipx network 2000 encap sap** |
| Ethernet_II => arpa | Router(config-if)#**ipx network 2000 encap arpa** |
| Ethernet_SNAP => snap | Router(config-if)#**ipx network 2000 encap snap** |
| View the SAP tables [list the servers discovered by SAP's] | Router#**show ipx servers** |
| View the IPX routing table | Router#**show ipx route** |
| View traffic statistics [displays RIP and SAP information] | Router#**show ipx traffic** |
| View the IPX address and encapsulation on an interface | Router#**show ipx interface** |
| View the routed protocols on the router | Router#**show protocol** |
| Test host to host connectivity | Router#**ping ipx <host_address>** |

### Debug Commands

| | |
|---|---|
| Debug IPX RIP packets | Router#**debug ipx routing activity** |
| Debug SAP packets | Router#**debug ipx sap** |
| Turn off the debug command | Router#**undebug ipx routing activity** |

## Config-Reg

| | |
|---|---|
| ROM Monitor Mode [prompt will be either: > or **rommon>**] | Router(config)#**Config-reg 0x0000** |
| Boot from ROM and enter RXBOOT mode<br>[prompt will be: **Router_Name(boot)>** ] | Router(config)#**Config-reg 0x0001** |
| Boot from ROM & check NVRAM for startup [boot] commands | Router(config)#**Config-reg 0x0002 [through to 0x000F]** |
| RXBOOT (diagnostics mode, use 'b' to continue boot) | Router(config)#**Config-reg 0x2000** |
| Boot from ROM, use NVRAM (upgrade flash in run-from-flash ) | Router(config)#**Config-reg 0x2101** |
| Boot from ROM, skip NVRAM (disaster recovery) | Router(config)#**Config-reg 0x2141** |
| Boot from FLASH, use NVRAM (normal operation) | Router(config)#**Config-reg 0x2102** |
| Boot from FLASH, skip NVRAM (password recovery) | Router(config)#**Config-reg 0x2142** |

## 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#**show ip interface serial 0**<br>Router#**show ipx interface serial 0**<br>Router#**show appletalk interface serial 0** |
| View **all** access lists on the router and list each line of the list | Router#**show access-lists** |
| View **ip** access lists only | Router#**show ip access-lists** |
| View **ipx** access lists only | Router#**show ipx access-lists** |
| View **appletalk** access lists only | Router#**show appletalk access-lists** |

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

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

## 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) | Router(config)#**access-list 101 deny tcp 4.4.4.0 0.0.0.255 any eq 80** |
| Stop host 2.2.2.2 from telneting to host 3.3.3.3 out E0 | Router(config)#**access-list 101 deny tcp host 2.2.2.2 host 3.3.3.3 eq 23** |
| Permit all others to have access | Router(config)#**access-list 101 permit any any** |
| **An implicit deny all other traffic is the default line of an access list➔** | *Router(config)#**access-list 101 deny any any*** |
| The access list is not operational until bound to an interface | Router(config)#**interface e0** |
| | Router(config-if)#**ip access-group 101 out** |

## IPX Standard Access-Lists [800-899] filter on Srce+Dest Address Template

| | |
|---|---|
| Stop network 7B from getting to network 8000 | Router(config)#**access-list 801 deny 7B 8000** |
| Allow all other networks [**-1 ➔ any network**] | Router(config)#**access-list 801 permit –1 -1** |
| **An implicit deny all other traffic is the default line of an access list➔** | |
| The access list is not operational until bound to an interface | Router(config)#**interface e0** |
| | Router(config-if)#**ipx access-group 801 out** |

## IPX Extended Access-Lists [900-999] filter on Srce+Dest Address Template, Socket, Protocol

| | |
|---|---|
| Deny all traffic from network 50 going to network **10 [0=all skts]** | Router(config)#**access-list 901 deny –1 50 0 10 0** |
| Permit all other traffic to all other networks | |
| **An implicit deny all other traffic is the default line of an access list➔** | Router(config)#**access-list 901 permit -1 –1 0 -1 0** |
| The access list is not operational until bound to an interface | Router(config)#**interface e0** |
| | Router(config-if)#**ipx access-group 901 out** |

## 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. [**0 = all service types**] | Router(config)#**access-list 1001 permit 11.0000.0000.0001 0** |
| The access list is not operational until bound to an interface | Router(config)#**interface e0** |
| Stop it coming in | Router(config-if)#**ipx input-sap-filter 1001** |
| Or stop it going out | Router(config-if)#**ipx output-sap-filter 1001** |

## 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 encap type | RouterA(config)**#int s0**<br>RouterA(config-if)**#encapsulation frame-relay** <Cisco\|IETF><br>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**<br>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**<br>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**<br>RouterA(config-if)**#encapsulation ppp** |

### Interface Commands

| | |
|---|---|
| Enable authentication (chap or pap) | RouterA(config-if)**#ppp authentication chap** |
| Specify chap hostname(default to routuer 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** |