

Basic Router Operations

To Get to priveledge mode	enable
To Get to user mode	disable
to exit router	exit or logoff
Previous Command	up arrow or ctl-p
Next Command	down arrow or ctl-n
Move forward one character	right arrow or ctl-f
Move backward one character	left arrow or ctl-b
Break Key	<shft>+<ctl>+6 'x'
Auto complete command	<tab>

Viewing Router Information

IOS version info	show version
current config (ram)	show running-config
saved config (nvram)	show startup-config
IOS file and free space	show flash
processor utilization	show processes cpu

Configuring the Router

from the terminal session (keyboard) to running (ram)	configure terminal
from tftp (file server) to running (ram)	copy tftp running-config
from saved config (nvram) to running (ram)	copy startup-config running-config
Upgrade the IOS from file server	copy tftp flash
save backup copy of IOS to file server	copy flash tftp
Save your configuration (from ram) to non-volatile (nvram)	copy running-config startup-config
Tell the router which IOS file in Flash to boot from	boot system flash {filename}
Tell the router which IOS file to request from tftp (fallback)	boot system tftp {filename}

Passwords

set password for connecting through console port	line console 0 login password cisco
Set password for Telnet	line vty 0 4 login password sanjose
Set password for priveledge mode	enable password cisco
Set encrypted password for priveledge mode	enable secret cisco

Configuring a Serial Interface

is it DCE or DTE?	show controller serial 1
from global config	interface serial 1
set clock rate on DCE	clock rate 64000
set the bandwidth	bandwidth 64
enable the interface	no shutdown
Check interface status	show interface serial 1 show ip interface brief

Cisco Discovery Protocol

see directly connect neighbors (add 'detail' for more info)	show cdp neighbor
see which inteface are running cdp	show cdp interface
see one neighbors detail	show cdp entry P1R1
Turn off CDP for whole router (from global config)	no cdp run
turn off cdp on an interface	no cdp enable
change how often you send cdp info	cdp timer 120
change how long you will til you remove a cdp neighbor	cdp holdtime 240

TCP/IP

Disable IP routing on the router (enabled by default)	no ip routing
to put an ip address on an interface	interface serial 0 ip address 157.89.1.3 255.255.0.0 interface ethernet 0 ip address 208.1.1.4 255.255.255.0
Configure RIP	router rip network 157.89.0.0 network 208.1.1.0
Configure IGRP	router IGRP 200 network 157.89.0.0 network 208.1.1.0
view ip routing table	show ip route
view rip debug stuff	debug ip rip
view igrp debug stuff	debug ip igrp events debug ip igrp transactions

IPX/SPX	
Enable IPX on the router (disabled by default)	ipx routing
Enable Load balancing	ipx maximum-paths 6
Interface Commands	
enable IPX on an interface	interface serial 0
-- default encapsulation	ipx network 4A
--- defaults to novell-ether on ethernet, HDLC on serial	
**** TO FORCE ENCAPSULATION TYPE:	
-- 802.3 encap	ipx network 4A encap novell-ether
-- 802.2 encapsulation	ipx network 4A encap sap
-- Ethernet II encapsulation	ipx network 4A encap arpa
-- Snap Encapsulation	ipx network 4A encap snap
IPX Rip routing is automatically enabled as soon as you put an IPX address on an interface	
Show Commands	
view ipx routing table	show ipx route
view ipx address on an interface	show ipx interface
view SAP table	show ipx servers
view traffic statistics	show ipx traffic
Debug Commands	
debug IPX RIP Packets	debug ipx routing activity
debug SAP packets	debug ipx sap
Appletalk	
Enable appletalk on the router (disabled by default)	appletalk routing
Interface commands	
specify routing protocol (default to RTMP) -- optional	appletalk protocol eigrp
	appletalk protocol aurp
Assign a cable range to an interface (required)	appletalk cable-range 1000-1999
Assign a zone to an interface (required)	appletalk zone Workgroup1
Put interface into discovery mode, it will find range & zone	appletalk cable-range 0-0
	or appletalk discovery
Show Commands	
View the appletalk address on an interface	show appletalk interface serial 0
View the appletalk routing table	show appletalk routing
View appletalk zones	show appletalk zones
Show Global appletalk settings	show appletalk globals
Debug Commands	
View RTMP Packets	debug appletalk routing
Access-Lists	
All Access-List numbered ranges (some not covered in ICRC)	
<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 which interface	show ip interface serial 0
	show ipx interface serial 0
	show appletalk interface serial 0
View the access-lists	show access-lists
	show ip access-lists
	show ipx access-lists
	show appletalk access-lists

Goal- stop subnet 200.1.1.0 255.255.255.0 from sending packets into ethernet 0

A. Deny the subnet **access-list 1 deny 200.1.1.0 0.0.0.255**
B. Implicit deny all, so must permit others **access-list 1 permit any**
C. Doesn't do anything until we bind it to an interface **interface ethernet 0**
ip access-group 1 in

Goal - stop host 1.1.1.1 from telneting out e0 going to host 2.2.2.2 and stop subnet 3.3.3.0 from web surfing anywhere

A. Remember access-list # source destination options **access-list 100 deny tcp host 1.1.1.1 host 2.2.2.2 eq 23**
B. Stop that web surfing **access-list 100 deny tcp 3.3.3.0 0.0.0.255 any eq 80**
C. Implicit deny, allow all others **access-list 100 permit ip any any**
D. Doesn't do anything, until you bind it to an interface **interface ethernet 0**
ip access-group 100 out

Allows editing of lines instead of deleting entire list
supports standard and extended
(Named IP requires 11.2 or later)
(Named IPX requires 11.3 or later)

ip access-list standard cool_list
deny 1.1.1.1
permit any
interface ethernet 0
ip access-group cool_list in

Stop network 7A from getting to network 8000
implicit deny all, allow all other networks
Doesn't do anything until you bind it to an interface

access-list 800 deny 7a 8000
access-list 800 permit -1
interface ethernet 0
ipx access-group 800 out

Stop SAPs on socket 3378 from all networks to all networks
implicit deny all, allow all other SAPs
Doesn't do anything until you bind it to an interface

access-list 900 deny sap any 3378 -1
access-list 900 permit sap any all -1
interface ethernet 0
ipx access-group 900 out

Stop SAPs from server 1 from coming in Ethernet 0
Permit all others
Bind it to an interface
stop it coming in
or stop it going out

access-list 1000 deny 7A.0000.0000.0001 4
access-list 1000 permit -1
interface ethernet 0
ipx input-sap-filter 1000
ipx output-sap-filter 1000

Deny cable range 1000-1999
permt all other cable ranges
deny the zone Workgroup1
permit all other zones
Bind it to an interface

access-list 600 deny cable-range 1000-1099
access-list 600 permit other-access
access-list 600 deny zone Workgroup1
access-list 600 permit additional-zones
interface ethernet 0
appletalk access-group 600

Interface commands

Enable PPP on the interface
Enable authentication (chap or pap)
specify chap hostname (defaults to router name)

encapsulation ppp
ppp authentication chap

X.25

Interface commands

Enable X.25 on an interface and specify encaps type
specify YOUR x121 address
Map the OTHER IP to OTHER x121 address (global)
enable broadcasts for RIP & such

```
encapsulation x25 ietf
x25 address 301222333444
x25 map ip 200.1.1.1 301999888777 broadcast
```

OPTIONAL Interface commands

Adjust Incoming Packet Size, must match on both sides
Adjust Outgoing Packet Size, must match on both sides
Adjust Incoming Windows Size, must match on both sides
Adjust Outgoing Window Size, must match on both sides

```
x25 ips 512
x25 ops 512
x25 win 7
x25 wout 7
```

Show Commands

View Encapsulation, LAPB Status, & more

```
show interface serial 0
```

Back-to-Back x25 routers (for lab testing)

Note, x25 does not care about which ONE router has DCE cable

Enable X.25 on interface and specify encaps type + ONE side is DCE
Set DCE-side to transmit clocking frequency in Kbits/Sec

```
encapsulation x25 dce ietf
clockrate 9600
```

Frame-Relay

Interface commands

Enable Frame-Relay on an interface and specify encaps type
Specify LMI Type (11.2+ will autosense LMI type)
If Inverse ARP won't work, Map OTHER IP to YOUR DLCI # (local)
can also allow broadcast and specify encaps type
Define local DLCI (in LMI not working)
Adjust keepalive period

```
encapsulation frame-relay ietf
frame-relay lmi-type ansi
frame-relay map ip 3.3.3.3 100 broadcast
```

```
frame-relay local-dlci 100
keepalive 10
```

Show Commands

View DLCI & LMI Info
View PVC traffic statistics
View Route Maps (static or dynamic)
View LMI info

```
show interface serial 0
show frame-relay pvc
show frame-relay map
show frame-relay lmi
```

Back-to-Back frame-relay routers (for lab testing)

Note, must match DCE-side router commands with DCE cable

Enable Frame-Relay switching on DCE-side router
Tell DCE-side to support DCE frame-relay functions on what interface
Tell DCE-side which interface & DLCI to switch current interface to
Set DCE-side to transmit clocking frequency in Kbits/Sec

```
frame-relay switching
frame-relay intf-type dce
frame-relay route {dlci} interface {int} {dlci}
clockrate 64000
```

Config-Reg

RXBOOT (diagnostics mode, use 'b' to continue booting)
Boot to ROM, use NVRAM (upgrade flash in run-from-flash routers)
Boot to ROM, skip NVRAM (disaster recovery)
Boot to Flash, use NVRAM (normal operation)
Boot to Flash, skip NVRAM (password recovery)

```
config-reg 0x2000
config-reg 0x2101
config-reg 0x2141
config-reg 0x2102
config-reg 0x2142
```

Auto-Install

Router broadcasts to get its own TCP/IP address using
Router broadcasts again to locate the file server IP address using
Router attempts TFTP to get the IP-to-Hostname mapping file
If above fails, fallback to 8.3 DOS compatible filename convention
Router attempts TFTP to get its specific Hostname running-config
If above fails, fallback to 8.3 DOS compatible filename convention

```
BOOTP
TFTP
network-config
cisco.net.cfg
{Hostname}-config
{Hostname}.cfg
```

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

Password Recovery

Step 1, halt router bootup on console port (requires physical access)
Step 2, enter RXBOOT command to set config-reg bits & stop NVRAM
Step 3, bypassing NVRAM startup allows Enable mode without pwd
Step 4, once in Enable mode, copy NVRAM startup to RAM
Step 5, change Enable and all other passwords as desired
Step 6, save RAM back into NVRAM, but now with new password
Step 7, change config-reg bits back, so router boots normally

```
CTRL-BREAK
o/r 0x2142
enable
copy startup-config running-config
enable password whatever
copy running-config startup-config
config-reg 0x2102
```