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Basic Router Operations

To get to Privileged mode	enable
To get to User mode	disable
To Exit router	exit or logoff
Previous Command	up arrow or Ctrl-P
Next Command	down arrow or Ctrl-N
Move forward one character	right arrow or Ctrl-F
Move backward one character	left arrow or Ctrl-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 Console port	line console 0 login password cisco
Set password for Telnet	line vty 0 4 login password sanjose
Set password for Privileged mode	enable password cisco
Set Encrypted password for Privileged 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 interface 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 till 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 View RIP debug stuff View IGRP debug stuff	show ip route debug ip rip 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 + IPX-RIP 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 encapsulation = novell-ether	ipx network 4A encap novell-ether
-- 802.2 encapsulation = sap	ipx network 4A encap sap
-- Ethernet II encapsulation = arpa	ipx network 4A encap arpa
-- Snap Encapsulation = snap	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	
Watch real-time AppleTalk updates and status	debug appletalk events
View RTMP routing update 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
Access-Lists, IP Standard = 1-99, filter on Source address	
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
Access-Lists, IP Extended = 100-199, filter on Source + Dest, Port, etc...	
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
Named IP/IPX Access-Lists	
Allows editing of lines instead of deleting entire list	ip access-list standard cool_list
supports standard and extended	deny 1.1.1.1
(Named IP requires 11.2 or later)	permit any
(Named IPX requires 11.3 or later)	interface ethernet 0 ip access-group cool_list in
Access-Lists, IPX Standard = 800-899, filter Source & Dest	
Stop network 7A from getting to network 8000	access-list 800 deny 7a 8000
Implicit deny all, allow all other networks	access-list 800 permit -1
Doesn't do anything until you bind it to an interface	interface ethernet 0 ipx access-group 800 out
Access-Lists, IPX Extended = 900-999, filter on Source & Dest + Socket, etc...	
Stop SAPs on socket 3378 from all networks to all networks	access-list 900 deny sap any 3378 -1
Implicit deny all, allow all other SAPs	access-list 900 permit sap any all -1
Doesn't do anything until you bind it to an interface	interface ethernet 0 ipx access-group 900 out
Access-Lists, IPX SAP Filters = 1000-1099, filter on Source, Port, Service Name	
Stop SAPs from server 1 from coming in Ethernet 0	access-list 1000 deny 7A.0000.0000.0001 4
Permit all others	access-list 1000 permit -1
Bind it to an interface	interface ethernet 0
Stop it coming in	ipx input-sap-filter 1000
Or stop it going out	ipx output-sap-filter 1000
Access-Lists, Appletalk = 600-699, filter on Cable-Range & Zone	
Deny cable range 1000-1999	access-list 600 deny cable-range 1000-1099
Permit all other cable ranges	access-list 600 permit other-access
Deny the zone Workgroup1	access-list 600 deny zone Workgroup1
Permit all other zones	access-list 600 permit additional-zones
Bind it to an interface	interface ethernet 0 appletalk access-group 600

PPP

Interface commands

Enable PPP on the interface

encapsulation ppp

Enable authentication (chap or pap)

ppp authentication chap

specify chap hostname (defaults to router name)

ppp chap hostname MyRouter

Specify chap password (defaults to enable password)

ppp chap password Clearwater

Specify pap username

ppp pap sent-username ArnoldZiffle

Global Commands

Create a username and password for logging in

username OtherRouter password Skywalker

Show Commands

See encapsulation, open LCP's and more

show interface serial 0

Debug Commands

View the authentication process

debug ppp authentication

X.25

Interface commands

Enable X.25 on an interface and specify encap type

encapsulation x25 ietf

Specify YOUR Local x121 address

x25 address 301222333444

Map the OTHER IP to OTHER x121 address (global)

x25 map ip 200.1.1.1 301999888777 broadcast

Enable broadcasts for RIP & such

OPTIONAL Interface commands

Adjust Incoming Packet Size, must match on both sides

x25 ips 512

Adjust Outgoing Packet Size, must match on both sides

x25 ops 512

Adjust Incoming Windows Size, must match on both sides

x25 win 7

Adjust Outgoing Window Size, must match on both sides

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 encap type + ONE side is DCE

encapsulation x25 dce ietf

Set DCE-side to transmit clocking frequency in Kbits/Sec

clockrate 9600

Frame-Relay

Interface commands

Enable Frame-Relay on an interface and specify encap type

encapsulation frame-relay ietf

Specify LMI Type (11.2+ will autosense LMI type)

frame-relay lmi-type ansi

If Inverse ARP won't work, Map OTHER IP to YOUR DLCI # (local)

frame-relay map ip 3.3.3.3 100 broadcast

Can also allow broadcast and specify encap type

Define local DLCI (in LMI not working)

frame-relay local-dlci 100

Adjust keepalive period

keepalive 10

Show Commands

View DLCI & LMI Info

show interface serial 0

View PVC traffic statistics

show frame-relay pvc

View Route Maps (static or dynamic)

show frame-relay map

View LMI info

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

frame-relay switching

Tell DCE-side to support DCE frame-relay functions on what interface

frame-relay intf-type dce

Tell DCE-side which interface & DLCI to switch current interface to

frame-relay route {dlci} interface {int} {dlci}

Set DCE-side to transmit clocking frequency in Kbits/Sec

clockrate 64000

Config-Reg

RXBOOT (diagnostics mode, use 'b' to continue booting)	config-reg 0x2000
Boot to ROM, use NVRAM (upgrade flash in run-from-flash routers)	config-reg 0x2101
Boot to ROM, skip NVRAM (disaster recovery)	config-reg 0x2141
Boot to Flash, use NVRAM (normal operation)	config-reg 0x2102
Boot to Flash, skip NVRAM (password recovery)	config-reg 0x2142

Auto-Install

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

Password Recovery

Step 1, halt router bootup on console port (requires physical access)	CTRL-BREAK
Step 2, enter RXBOOT command to set config-reg bits & stop NVRAM	o/r 0x2142
Step 3, bypassing NVRAM startup allows Enable mode without pwd	enable
Step 4, once in Enable mode, copy NVRAM startup to RAM	copy startup-config running-config
Step 5, change Enable and all other passwords as desired	enable password whatever
Step 6, save RAM back into NVRAM, but now with new password	copy running-config startup-config
Step 7, change config-reg bits back, so router boots normally	config-reg 0x2102