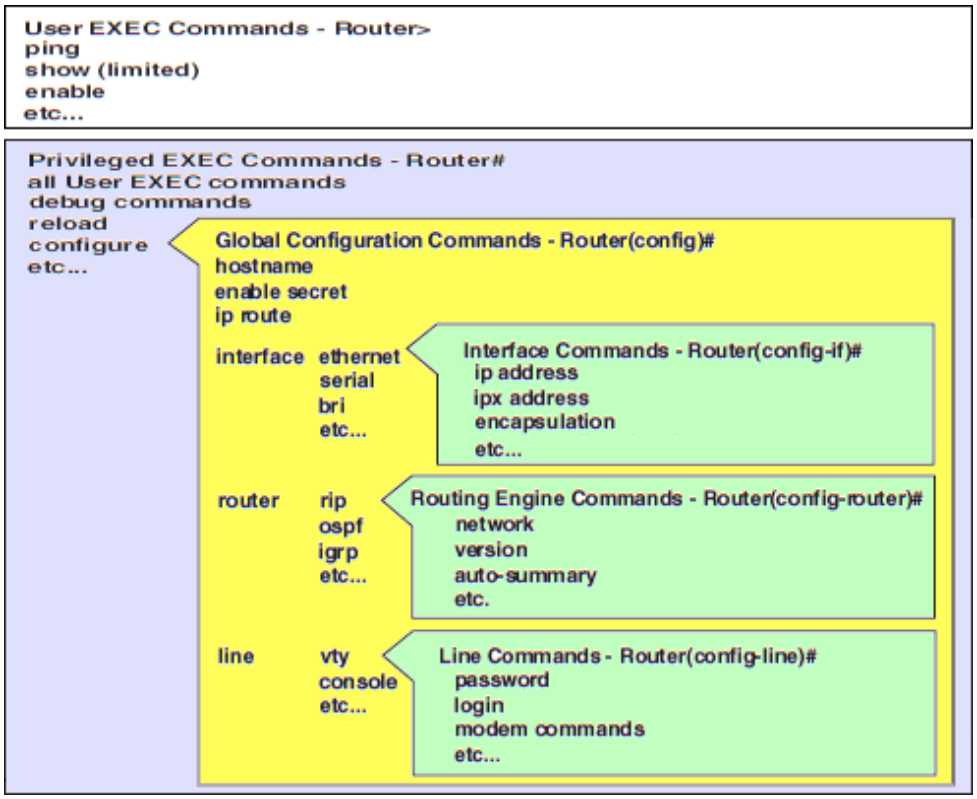
CISCO Internetwork Operating System (IOS)
Command Line Interface (CLI)



Help and Shortcut Keys	
TAB	finishes a partial command
Ctl-Z	ends configuration mode and returns to Privilege Exec
Up Arrow or Down Arrow	scrolls forward and backward through former commands
?	gives list of available commands, very useful
Show Function	
Router#show *running-config* or *run*	current operating configuration
Router#*show ip interface*	FastEthernet, Serial, Vlans, Brief, Loopback, trunk
Router#*show cdp neighbor [detail]*	Information about directly connected devices
Router#*show protocols*	active network routing protocols
Switch#*show vlan brief* or *vtp status*	VTP VLAN status by VLAN name, and domain status
Basic Configuration - Router & Switch	
Router>*enable*	change User to Privilege mode
Router#*configure terminal* or *config t*	switches to Global Configuration level
Router(config)#*hostname R1*	naming device
R1(config)#*enable secret cisco* or *enable pass cisco*	Privilege mode password, encrypted used with *secret*
R1(config)#*no ip domain-lookup*	disable DNS based host name-to-address translation
R1(config)#*banner motd #* message here *#*	banner is displayed at Logon
R1(config)#*line console 0* or *line c 0*	Line interface
R1(config)#*line vty 0 4* or *line vty 0 15*	Virtual Terminal Lines - Router 5 lines & Switch 16 lines
R1(config-line)#*password cisco* or *pass cisco*	setting password to Console & VTY (plain text)
R1(config-line)#*service password-encryption cisco*	setting password to Console & VTY (encrypted text)
R1(config-line)#*login*	sets password to Log-on to Router/Switch
R1(config-line)# *exec-timeout 0 0*	Sets time limit when console automatically logs off
R1(config-line)# *logging synchronous*	command you are typing will not be interrupted
R1(config-line)#*end* or *exit*	moves back to global config mode or up one level
R1#*copy run start* or *copy r s*	saves running config to NVRAM
R1#*erase start* or *erase vram*	erase the startup configuration
Basic Configuration - Switch Only	
Switch(config)# *ip default-gateway 192.168.1.1*	Default gateway directly connected to the switch
Switch(config)#*int fa0/1* or *int range fa0/1-24*	enter selected interface(s), range for multiple ports
Switch(config-if-range)#*shutdown* or *shut*	disable selected port(s), routers shutdown by default
Switch#*delete flash:vlan.dat*	Deletes stored VLAN information **CAUTION delete flash**

Advanced Configuration - Router

Interface Configuration

Router(config)#*int se0/1* or *fa0/1*
Router(config-if)#*description Server Interface*
Router(config-if)#*ip address 192.168.1.1 255.255.255.0*
Router(config-if)#*clock rate 56000* DCE serial port only
Router(config-if)#*no shut* turns interface on

Sub-Interface (virtual)

Router(config)#*int fa0/1.1*
Router(config-subif)#*encapsulation dot1q 1*
Router(config-subif)#*ip add 192.168.1.1 255.255.255.0*

- virtual interface up by default
- native VLAN must be consistent with switch

Loopback

Router(config)#*int loopback 1*
Router(config-if)#*ip add 207.24.160.22 255255255.0*

Routing Protocol Configuration

Static Routing

Router(config)#*ip route 10.1.2.0 255.0.0.0 10.1.1.0*
Router(config)#*ip route 10.1.2.0 255.0.0.0 se0/0/0*

- destination network, subnet, next hop/interface

RIP - Routing Information Protocol version 1 or 2

Router(config)#*router rip*
Router(config-router)#*version 2* specifies version 2
Router(config-router)#*version 1* specifies version 1
Router(config-router)#*network 192.168.1.0*
Router(config-router)#*no auto-summary*

- RIPv2 summarizes networks at classful boundary
- RIPv2 uses Classless Routing (CDIR)

EIGRP - Enhanced Interior Gateway Routing Protocol

Router(config)#*router eigrp 100* autonomous-system
Router(config-router)#*network 192.168.1.0*
Router(config-router)#*no auto-summary*

OSPF - Open Shortest Path First

Router(config)#*router ospf 100* process ID
Router(config-router)#*network 10.0.1.0 0.0.0.255 area 0*

- wild card mask determines interface to advertise
- reads - any interface in 10.0.1.x use area 0

Frame Relay

DCE Switch – Interfaces Must Be Shutdown

Router(config)#*frame-relay switching*
*Apply To Interface
Router(config-if)#*encapsulation frame-relay*
Router(config-if)#*frame-relay intf-type dce*
Router(config-if)#*frame-relay interface-dlci xxx*
Router(config-if)#*no shut*

DTE Switch – Interfaces Must Be Shutdown

Router(config-if)#*encapsulation frame-relay*
Router(config-if)#*no shut*

Dynamic Host Configuration Protocol (DHC)

Router(config)#*ip dhcp exclude add 10.1.1.1 10.1.1.10*
Router(config)#*ip dhcp pool NAME*
Router(dhcp-config)#*network 10.1.1.0 255.255.255.0*
Router(dhcp-config)#*default router 10.1.1.1* Gateway

- pool name, VLAN name, interface must match

Access Control Lists (ACL)

Standard ACLs

Router(config)#*access-list 1 permit 192.168.0.11 0.0.0.0*
Router(config)#*access-list 1 permit any*
*Apply To Interface
Router(config-if)#*ip access-group NAME out*

- source address then destination address
- always include an explicit permit statement
- Standard List Number 1-99

Extended ACLs

Router(config)#*access-list 110 deny tcp 10.1.1.11 0.0.0.0 host 10.1.2.22 eq 21*
Router(config)#*access-list 110 permit ip any any*
or
Router(config)#*ip access-list extended NAME*
Router(config-ext-nacl)#*deny tcp 10.1.1.11 0.0.0.0 host 10.1.2.22 eq 21*
Router(config)#*access-list 110 permit ip any any*
*Apply To Interface
Router(config-if)#*ip access-group NAME out*

- Extended List Number 100-199

HDLC - PPP - CHAP - PAP

Router(config)# *username cisco password cisco*
Router(config-if)#*encapsulation ppp* or *hdlc*
Router(config-if)#*ppp authentication chap* or *pap*
Router(config-if)#*ppp authentication pap chap* or *chap pap*

- configure username and password first
- both interface must have same encapsulation

Network Address Translation (NAT)

Static NAT

Router(config)#*ip nat inside source static 10.0.0.10 75.1.5.6*
Router(config)#*int se0/0/1*
Router(config-if)#*ip nat outside*
Router(config-if)#*int fa0/0*
Router(config-if)#*ip nat inside*

Dynamic NAT

Router(config)#*ip nat pool NAT NAME 209.165.200.241 209.165.200.246 netmask 255.255.255.246*
*Create an Extended ALC
Router(config)#*ip nat inside source list ACL NAME pool NAT NAME*
Router(config-if)#*ip nat inside*

Advanced Configuration - Switch

Interface Configuration

Switch(config)# *int fa0/1* or *int range fa0/1-24*
Switch(config-if)#*switchport mode access*
or
Switch(config-if)#*switchport mode trunk*
Switch(config-if)#*switchport trunk native vlan 99*
Switch(config-if)#*no shut*

Spanning Tree

Switch(config)#*spanning-tree vlan 1*
Switch(config)# *spanning-tree mode pvst* or *rapid-pvst*
Switch(config)# *spanning-tree mode portfast*

VLAN Trunking Protocol (VTP)

Switch(config)#*vtp mode client*

- server (default), client, transparent, off

Switch(config)#*vtp domain NAME*
Switch(config)#*vtp password cisco*

VLAN

Switch(config)#*vlan 99*
Switch(config-vlan)#*name cisco*

- VLAN 1 cannot be created - default VLAN