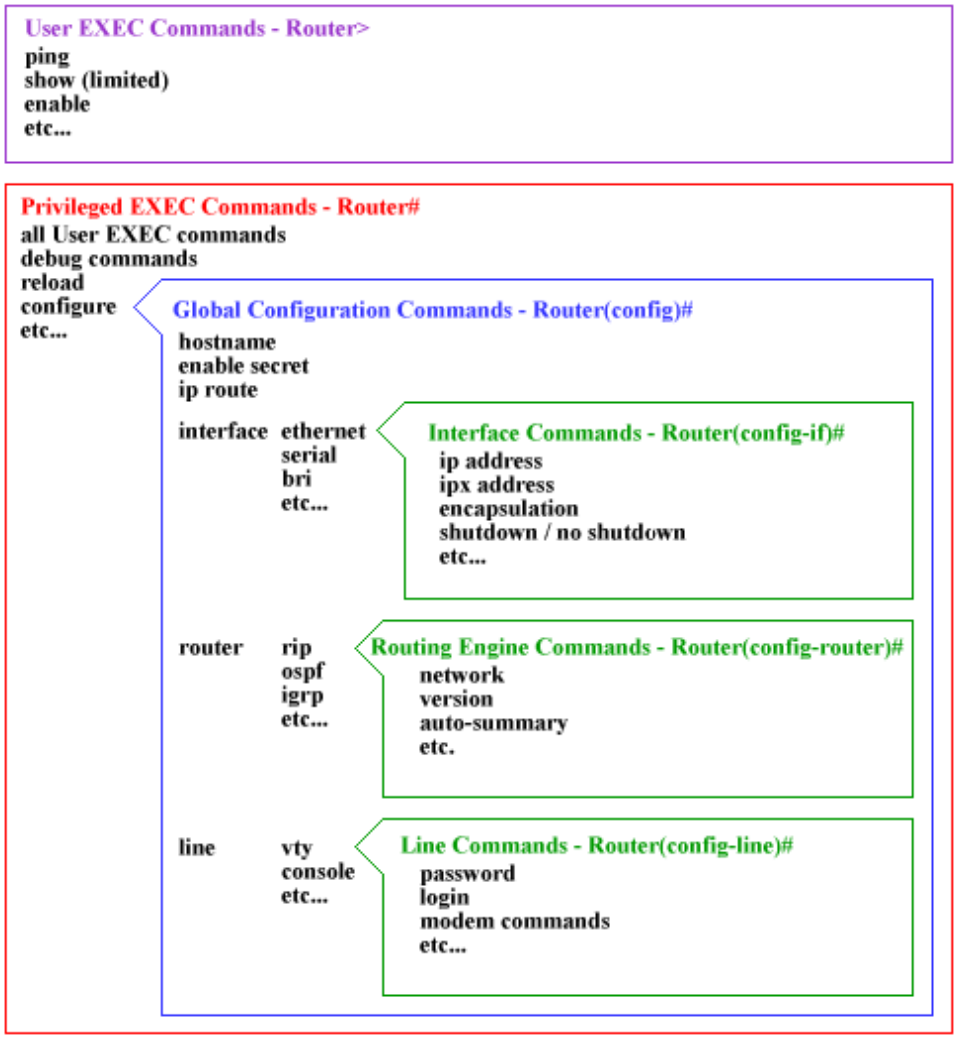
Ultimate Switch and Router Command Guide

Cisco IOS Command Line with Examples and Explanations

Professor Eno



Professor Eno | Computer Information Systems

Cisco Internetworking Operating System Commands (IOS) with Examples

Professor Eno

Warning and Disclaimers

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There may be typographical and/or content errors. Therefore, this guide should not be the ultimate source of information.

Enology 2019

CONTENTS

Modes

Level	Mode	Prompt
1	User EXEC	Device>
2	Privileged EXEC	Device#
3	Global Config	Device(config)#
4**a**	Interface Config	Device(config-if)#
4**b**	Line Config	Device(config-line)

General Commands

Short Command	Complete Command	Function
en	enable	user EXEC > privileged EXEC
conf t	config terminal	privileged EXEC > global config
int	interface	global config > interface config
li	line	global config > line config
sh run	show running-config shows	current config
no ip dom lo	no ip domain-lookup	keeps router from trying to read bad cmds as host names
er st	erase startup-config	MUST use after labs to reset router configs
del vlan.dat	delete vlan.dat	MUST use after labs to reset router configs
cop r s	copy running-config startup-config	Saves current config

Keyboard Shortcuts

Up Arrow	Automatically re-types last command
Ctrl+Shift+6	Oh crap, stop! (cancels whatever it's currently doing)
Ctrl+C	Exits config mode
Ctrl+Z	Applies current command & returns to priv. EXEC mode
Ctrl+U	Erases anything on current prompt line
Tab	Completes abbreviated command

Basic Switch and Router Commands

//prevents domain lookup by starting name resolution process
Switch(config)#***no ip domain-lookup***

//to ask for help on the command line
Switch>***?***

//moving from User Exec mode to Privileged Exec mode
Switch>***enable***
Switch>***en***

//moving from Privileged Exec mode to Global Configuration mode
Switch#***configure terminal***
Switch#***conf t***

//moving from Global Config mode to Interface Config mode for FastEthernet port 1
Switch(config)#**interface [interface-name]**
Switch(config)#***interface fastethernet0/1***
Switch(config)#***int fa0/1***

//setting an IP address and netmask on an interface
Router(config-if)#***ip address 192.168.10.1 255.255.255.0***

//deleting an IP address and netmask from an interface
Router(config-if)#***no ip address***

//changing hostname of a device (switch)
Switch(config)#**hostname [name]**
Switch(config)#***hostname SW1***
SW1(config)#

//moves from current mode back one mode
Switch(config)#***exit***
Switch#

//moves from current mode back to Privilege Exec Mode
Switch(config-if)#***end***
Switch#

//activate (turn on) port
Switch(config-if)#***no shutdown***
Switch(config-if)#***no shut***

//deactivate (turn off) port
Switch#(config-if)#***shutdown***
Switch#(config-if)#***shut***

//setting up message of the day banner
Switch(config)banner motd [special character] [message] [special character]
Switch(config#***)banner motd # Unauthorize User #***

//backup running configuration to startup configuration
Switch#*copy running-config startup-config*
Switch#*cp run star*

//setting a domain name
Router(config)#ip domain-name [domainname.com]
Router(config)#*ip domain-name www.enology.com*

Security

//sets a password on **console** (blue rollover cable)
Switch#***line console 0***
Switch#password [password]
*Switch#****password $Ekr!t***

//setting the Enable password in clear text (always use enable secret password)
Switch#enable password [password]
Switch#***enable password $Ekr!t***

//setting the Enable password encrypted
Switch#enable secret password [password]
Switch#***enable secret password $Ekr!t***

//encrypts clear text passwords from running-config (such as console and vty)
Switch#***service password-encryption***

//setting maximum password length to 10 characters
Router(config)#***security passwords min-length 10***

//block login attempt after 2 failed attempts for 120 seconds (or 2 minutes)
Router(config)#***login block-for 30 attempts 2 within 120***

Security - Privilege Groups

Cisco has 16 different levels of access to the Cisco IOS: 0 through 15. By default, only two of these are used: 1 is for user EXEC access, and 15 is for privileged EXEC access. Setting the "enable" password is giving the default (no username) login privilege **level 15** or unrestricted privilege access. Meaning the user can use any command on the switch or router. You can create privilege groups and assign different types of access.

Setting restricted access:

//privilege level 15 group - unrestricted access
Switch(config)#**username sradmin privilege 15 password Eno123!**

//privilege level 10 group - limited access
Switch(config)#**username jradmin privilege 10 password Ziggy123!**

NOTE: Set line console and line vty to "login local"

Setting some Privileges for level 10 group (as sradmin):

//granting access to the configure terminal command
Switch(config)#**privilege exec level 10 conf t**
Switch(config)#**privilege configure level 10 interface**

//ability to configure mode access to a switchport
Switch(config)#**privilege interface level 10 switchport mode access**
Switch(config)#**privilege interface level 10 switchport access vlan**

//ability to create a vlan
Switch(config)#**privilege configure level 10 vlan**

//ability to turn on a switchport
Switch(config)#**privilege interface level 10 shutdown**

//ability to configure mode trunk to a switchport
Switch(config)#**privilege interface level 10 switchport mode trunk**
Switch(config)#**privilege interface level 10 switchport trunk allowed**

//ability to use the show run command
Switch(config)#**privilege exec level 10 show run**

NOTE: To see the privileges level 10 group has, go to the end of the show run screen listing ran as sradmin.

SSH Configuration

Router

//configure ip address with netmask
Router(config-if)#***ip address 192.168.1.1 255.255.255.0***

//configure hostname
Router(config)#***hostname R1***

//create encrypted password
R1(config)#***enable password cisco***

//create domain name
R1(config)#***ip domain-name ccna-lab.com***

//generate key pair for encryption
Router(config)#crypto key generate rsa modulus 1024
R1(config)#***crypto key generate rsa***
R1(config)#***lp ssh version 2***

//create a username and password
R1(config)#***username admin privilege 15 secret adminpass***

//enable 5 virtual (**vty**) lines (connections) on the device (over Ethernet)
R1(config)#***line vty 0 4***

//enables on the ssh process (disables telnet)
R1(conf-line)#***transport input ssh***

//enables the authentication with user and password
R1(conf-line)#***login local***

PC

Configure IP Address 192.168.1.2 255.255.255.0 (and gateway)
C:/>***ssh -l admin 192.168.1.1***
C:/>Password: ***adminpass***

Telnet Configuration

//enable 5 virtual (**vty**) lines (connections) on the device (over Ethernet)
Router(config)#**line vty 0 4**

//sets telnet password
Router(conf-line)#**password $Ekr!t**

//enable login process
Router(conf-line)**#login**

//session expires after 5 minutes of inactivity
Router(conf-line)#exec-timeout minutes [seconds]
Router(conf-line)#**exec-timeout 5**
Router(conf-line)#**no exec-timeout 0 0** //no time out

//suppress logging messages
Router(config)#**no logging console**

Switch VIrtual Interface (SVI)

First setup virtual (vty) lines to be able to connect (see Telnet Configuration).

//basic setup
Switch>**en**
Switch#**conf t**

//default vlan 1 (for security create a management vlan and add switchports)
Switch(config)#**int vlan 1**

//configure ip address and netmask
Switch(config-if)#**ip address 192.168.1.1 255.255.25.0**

//configure default gateway to be able to connect from other networks
Switch(config)#**ip default-gateway 192.168.1.1**

//enable (turn on) interface
Switch(config-if)#**no shut**

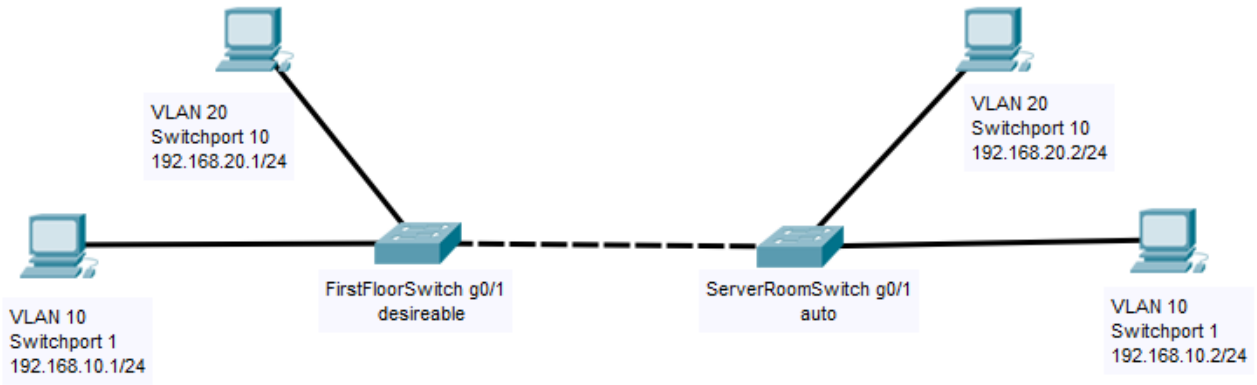
Trunking

//connect two switches and configure "trunk" mode
Switch#**configure terminal**
Switch(config)#**interface gigabitethernet0/0**
Switch(config-if)#**switchport mode trunk**
Switch(config-if)#**switchport trunk allowed vlan 1-99**

Dynamic Trunking Protocol (DTP)

Connect first floor switch gigabit interface 0/1 to server room switch gigabit interface 0/1.
//dynamic **desirable** mode - first floor switch
FirstFloorSwitch#**conf t**
FirstFloorSwitch(config)#**int g0/1**
FirstFloorSwitch(config-if)#**switchport mode dynamic desirable**

//dynamic **auto** mode - server room switch
ServerRoomSwitch#**conf t**
ServerRoomSwitch(config)#**int g0/1**
ServerRoomSwitch(config-if)#**switchport mode dynamic auto**



VLAN Configuration

//create a VLAN with the ID (10) and NAME (science)
Switch(config)#**vlan 10**
Switch(config-vlan)#**name science**

//create a second VLAN with ID (20) and NAME (math)
Switch(config)#**vlan 20**
Switch(config-vlan)#**name math**

//adding the interface in VLans 10 and 20 and setting the switchports as access ports
Switch(config)#**int g0/1**
Switch(config-if)#**switchport mode access**
Switch(config-if)#**switchport access vlan 10**

//using range option
Switch(config)#**int range fa01-10**
Switch(config-if)#**switchport mode access**
Switch(config-if)#**switchport access vlan 20**

//setting up VLAN Tagging (802.1q) - on both switches
Switch(config)#**int fa0/24**
Switch(config)#**switchport mode trunk**
Switch(config)#**switchport trunk allowed vlan 10,20**

Remove VLAN Database

//remove vlan database and erase startup config
Switch#**en**
Switch#**erase startup-config**
Switch#**delete flash:vlan.dat**
Switch#**reload**
[confirm]**<enter>**

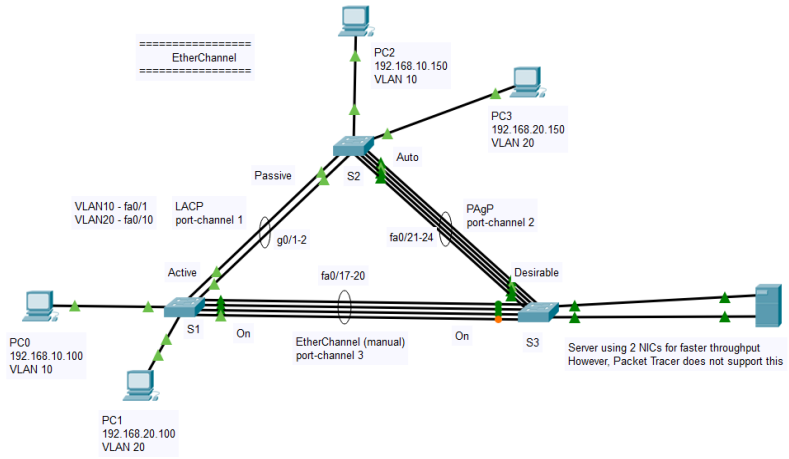
Virtual Trunking Protocol (VTP)

//setting up vtp server [client or transparent] with domain “mike”, password “eno”
Switch(config)#**vtp domain mike**
Switch(config)#**vtp mode server [client | transparent]**
Switch(config)#**vtp password eno**

EtherChannel Configuration

//wiring

PC0	to	S1	F0/1
PC1	to	S1	F0/10
PC2	to	S2	F0/1
PC3	to	S2	F0/10
Server	to	S3	F0/1 and F0/10
S1	to	S2	G0/0 and G0/1
S2	to	S3	F0/21-24
S3	to	S1	F0/17-20



//creating the VLANs

S1(config)# **vlan 10**
S1(config-vlan)# **vlan 20**
S1(config-vlan)# **exit**
S1(config)# **int f0/1**
S1(config-if)# **switchport mode access**
S1(config-if)# **switchport access vlan 10**
S1(config-if)# **int f0/10**
S1(config-if)# **switchport mode access**
S1(config-if)# **switchport access vlan 20**

Repeat commands above on S2 and S3

//LACP (IEEE 802.1AX) - ACTIVE

S1(config)# **int range g0/1-2**
S1(config-if)# **channel-group 1 mode active**
S1(config-if)# **exit**

//LOGICAL PORT TRUNK

b **int port-channel 1**
S1(config-if)# **switchport mode trunk**
S1(config-if)# **switchport trunk allowed vlan 10,20**

//LACP (IEEE 802.1AX) - PASSIVE

S2(config)# **int range g0/1-2**
S2(config-if)# **channel-group 1 mode passive**
S2(config-if)# **exit**

//LOGICAL PORT TRUNK

S2(config)# **int port-channel 1**
S2(config-if)# **switchport mode trunk**
S2(config-if)# **switchport trunk allowed vlan 10,20**

//PAgP - MODE DESIRABLE

S3(config)# **int range f0/21-24**
S3(config-if)# **channel-group 2 mode desirable**
S3(config-if)# **exit**
S3(config)# **int port-channel 2**
S3(config-if)# **switchport mode trunk**
S3(config-if)# **switchport trunk allowed vlan 10,20**

//PAgP - MODE AUTO

S2(config)# **int range f0/21-24**
S2(config-if)# **channel-group 2 mode auto**
S2(config-if)# **exit**

//LOGICAL PORT TRUNK

S2(config)# **int port-channel 2**
S2(config-if)# **switchport mode trunk**
S2(config-if)# **switchport trunk allowed vlan 10,20**

//EtherChannel Cisco Manual - MODE ON

S3(config)# **int range f0/17-20**
S3(config-if)# **channel-group 3 mode on**
S3(config-if)# **exit**

//LOGICAL PORT TRUNK

S3(config)# **int port-channel 3**
S3(config-if)# **switchport mode trunk**
S3(config-if)# **switchport trunk allowed vlan 10,20**

//EtherChannel Cisco Manual = MODE ON

S1(config)# **int range f0/17-20**
S1(config-if)# **channel-group 3 mode on**
S1(config-if)# **exit**

//LOGICAL PORT TRUNK

S1(config)# **int port-channel 3**
S1(config-if)# **switchport mode trunk**
S1(config-if)# **switchport trunk allowed vlan 10,20**

Static Routes

//ip route destination-network netmask next-hop (IP of interface of next hop)
Router(config)#**ip route 192.168.10.0 255.255.255.0 172.16.0.0**

//ip route destination-network netmask next-hop (interface of next hop)
Router(config)#**ip route 10.0.0.0 255.0.0.0 s0/0/1**

//Gateway of last resort
Router(config)#**ip route 0.0.0.0 0.0.0.0 172.16.0.0**

Dynamic Routes (using RIP)

//creates the RIP process
Router(config)#**router rip**

//sets the version of RIP (to allow subnetting)
Router(conf-router)#**version 2**

//add a network (directly connected) in the RIP process
//subnetted networks only need network (not the subnets)
Router(conf-router)#**network 192.168.10.0**

//turns off the automatic summarization of RIP routes
Router(conf-router)#**no auto-summary**

Loopback Interface

//configuring two virtual loopback interfaces
Router(config)#**int loopback 1**
Router(config-if)#**ip address 10.0.0.1 255.0.0.0**
Router(config-if)#**no shut**
R1(config-if)#**exit**
R1(config)#**int loopback 2**
R1(config-if)#**ip add 3.0.0.1 255.0.0.0**
R1(config-if)#**no shut**
R1(config-if)#**exit**

EMAIL

Email Domain Name: **enology.com** (hit set)
users with passwords (hit "**+**" to add)

DHCP - Router

//creating a DHCP pool with the necessary settings (network, mask, default gateway and DNS)
Router(config)#**ip dhcp pool voice**
Router(dhcp-config)#**network 10.0.0.0 255.0.0.0**
//exclude IP address from main pool (gateway and other static addresses)
Router(dhcp-config)#**ip dhcp excluded-address 10.0.0.1**

//this command goes on any router interface that have networks looking for DHCP pool voice
Router(dhcp-config)#**ip helper-address 10.0.0.5**

DNS - Router

//configure DNS and default router
Router(dhcp-config)#**domain-name cisco.com**
Router(dhcp-config)#**dns-server 10.0.0.1**
Router(dhcp-config)#**default-router 10.0.0.1**

HTTP - Pointer

//identify the http server
Router(dhcp-config)#**ip http server**

Router on a Stick (RoaS)

//setup two vlans first, vlan 10 and vlan 20

//creating sub-interfaces on the router interface **fa0/1**, the VLANs have a default gateway, enabling you to forward between VLANs.
//configure the sub-interfaces on the router fa0/1 for VLAN ID 10
forward between VLANs
Router(config)#**int fa0/1.10**
Router(config-subif)#**encap dot1q 10**
Router(config-subif)#**ip address 10.0.0.1 255.0.0.0**
Router(config-subif)#**no shut**
Router(config-subif)#**exit**

//configure the sub-interfaces on the router fa0/1 for VLAN ID 20
Router(config-if)# **int fa0/1.11**
Router(config-subif)# **encap dot1q 11**
Router(config-subif)# **ip address 11.0.0.1 255.0.0.0**
Router(config-subif)# **no shut**

Voice over IP (VoIP)

//setting up four (4) VoIP phones
Router>**en**
Router#**conf t**
Router(config)#**int Fa0/0**
Router(config-if)#**ip address 192.168.1.1 255.255.255.0**
Router(config-if)#**no shut**

Router(config)#**ip dhcp pool VOICE**
Router(dhcp-config)#**network 192.168.1.0 255.255.255.0**
Router(dhcp-config)#**default-router 192.168.1.1**
Router(dhcp-config)#**option 150 ip 192.168.1.1**

Router(config)#**telephony-service**
Router(config-telephony)#**max-dn 5**
Router(config-telephony)#**max-ephones 5**
Router(config-telephony)#**ip source-address 192.168.1.1 port 2000**
Router(config-telephony)#**auto assign 1 to 5**

Switch(config)#int range fa0/2-6
Switch(config-if-range)#**switchport mode access**
Switch(config-if-range)#**switchport voice vlan 1**

//**phone 1**
Router(config)#**ephone-dn 1**
Router(config-ephone-dn)#**number 1010**

//**phone 2**
Router(config)#**ephone-dn 2**
Router(config-ephone-dn)**#number 2020**

//**phone 3**
Router(config)#**ephone-dn 3**
Router(config-ephone-dn)#**number 3030**

//**phone 4**
Router(config)#**ephone-dn 4**
Router(config-ephone-dn)#**number 4040**

//**phone 45**Router(config)#**ephone-dn 5**
Router(config-ephone-dn)#**number 4050**

IPv6 Configuration Methods (TOC)

Simple Configuration
Link-Local
Unique Local
Subnetting
Dual Stacking
Dynamic Routing (RIPng)
Static Routing
    IP of Interface
    Interface name
    Last resort
Static Routing SLAAC (eui-64)
RoaS
Stateful DHCP
Stateless DHCP

IPv6 Autoconfiguration

//enable unicast routing
Router#**ipv6 unicast-routing**
Router(config)#**interface fa0/1**
//enable IPv6 on the interface
Router(config-if)#**ipv6 enable**
//assign IP-Address
Router(config-if)#**ipv6 address 2000:1::1/64 eui-64**
Router(config-if)#**no shut**

PC
2000:1::2/64 EUI-64

Different Network (gateway)
2000:2::1/64 eui-64

Dual Stacking (IPv4 and IPv6)

//configure interface (fa0/1) for IPv4 and IPv6 (dual stack)
Router(config)#**ipv6 unicast-routing**
Router(config)#**interface fastethernet 0/0**

//enable IPv6 on the interface
Router(config-if)#**ipv6 enable**
Router(config-if)#**ipv6 address 2001:db8:3c4d:1::/64 eui-64**
Router(config-if)#**ip address 192.168.255.1 255.255.255.0**
Router(config-if)#**no shut**

RIPng (IPv6)

```
//starting the IPv6 process on a router
Router(config)#ipv6 unicast-routing

//configure interface (fa0/1) with IPv6 address
Router(config)#Int fa0/1
Router(config-if)#Ipv6 address 2050::2/64

//create a new RIPng process
Router(config-if)#ipv6 rip mike enable
```

IPv6 Router on a Stick (RoaS)

```
//configure unicast routing
Router(config)#ipv6  unicast-routing

//configure sub-interfaces on interface g0/1
Router(config)#int  g0/1.10
Router(config-subif)#encap  dot1q  10
Router(config-subif)#ipv6  enable
Router(config-subif)#ipv6  address  2000::1:0:0:0:1/64
Router(config-subif)#ipv6  address  2001:db8:aaaa::/64 eui-64
Router(config-subif)#ipv6  add address  2001:db8:aaaa::/64 eui-64
Router(config-subif)#ipv6  address  fe80::1  link-local

//enable RIPng
Router(config-subif)#ipv6  rip  mike  enable
```

IPv6 MAC Address Change

```
//configure a new MAC-Address
Router(config)#int  g0/0
Router(config-if)#mac-address  0000.1111.1111
```

Password Recovery

A console cable is used to connect a PC to a Cisco networking device such as a router or a switch in order to configure it.

In order to use Putty to connect to your Cisco network device you must use the following settings:

Speed / bps: 9600
Data Bits: 8
Stop Bits: 1
Parity: None
Flow Control: None

Toggle Power on Router

Press the CTRL + Pause|Break keys during startup to enter Rommon mode

PC Connect to Router via Console Cable:

Rommon 1>**confreg 0x2142**
Rommon 2>**boot**

Router:

Router>**enable**
Router#copy startup-config running-config
PW-RECOVERY#**conf t**
PW-RECOVERY (config)#**line console 0**
PW-RECOVERY (config-if)#**password cisco**
PW-RECOVERY (config-if)#**login**
PW-RECOVERY (config-if)#**exit**
PW-RECOVERY (config)#**config-register 0x2102**
PW-RECOVERY #**exit**
PW-RECOVERY #**show version**
PW-RECOVERY #**copy running-config startup-config**
PW-RECOVERY #**reload**

Switch Cleanup

Go to privilege exec mode (#) and run the command:

>**en**
#**erase startup-config**
Hit <enter> to confirm

Run the command

#**reload**
Hit <enter>

Verify the startup-config has been erased by running the command

#**show running-config**
Repeat steps as needed
Unplug all ethernet cables from the switch(es)

If you need to remove vlans

#**delete flash:vlan.dat**
#**reload**

Verification and Troubleshooting Commands
Intermediary Devices

//displays software, hardware and IOS version information (try sh inventory)
sh ver

//show all the user accounts
sh users

//displays currently running configuration in DRAM
sh run
sh run | section dhcp
sh run | section rip

//displays configuration in NVRAM which will be loaded after reboot
sh start

//Displays all interfaces configuration and status of line
sh int

//show IP information about the interfaces
sh ip int

//display name, IP and status of all interfaces
sh ip int brief

//display trunk port information
sh int trunk

//display port security information
sh port-security

//display the ip route table
sh ip route

//display arp table
sh arp

//display detailed information about neighboring devices discovered using **CDP**
sh cdp neighbors detail

//display history of commands used in this session
sh history

//display ipv6 interfaces
do sh ipv6 int brief

//displays vlan number, name, status and ports associated with it
sh vlan

//concisely displays vlan number, name, status and ports associated with it
sh int vlan brief

//displays VTP mode, Number of existing vlans and config revision
sh vtp [status | password]

//display general information about interfaces
sh int

//displays a summary of configured routing protocol information
sh ip protocols

//display RIP table
sh rip

//display DHCP Pools
sh ip dhcp pool

//display the IP address bindings and their associated leases
sh ip dhcp binding

//displays information of connected devices
sh cdp neighbors [details]

//display IOS **command history**
sh history

//displays the mac address table
sh mac address-table

//displays the flash memory information
sh flash

//displays the boot path to the image
sh boot

//displays the system clock
sh clock

//display the burnt in mac address
sh in g0/1 | inc bia

End Device Commands

//ping ip-address (or domain-name)

//ping loopback to test internal TCP/IP stack
ping 127.0.0.1

//
pathping

//display mac-to-ip address table
arp -a

//display the hops (routers) from the source to the destination
tracert domain-name

//display ip address (es) of a domain-name
nslookup IP-Address

//display network statistics
netstat -n
netstat -an

//display NIC configurable information
ipconfig
/all /release /renew /flushdns

//display port number mappings
nmap -sP 10.0.0.0/24