



**CISCOM**

THE WORLD OF POSSIBILITIES

# CCNA LAB MANUAL

PREPARED  
BY

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The new Cisco **CCNA** curriculum validates the ability to install, configure, operate, and troubleshoot medium-size routed and switched networks, including implementation and verification of connections to remote sites in a WAN. The new curriculum also includes basic mitigation of security threats, introduction to wireless network concepts and terminology, and the addition of more compelling lab exercises.

The recommended **CCNA** training includes the Interconnecting Cisco Network Devices (ICND) Part 1 and ICND Part 2 courses. ICND Part 1 is also the recommended training for CCENT (link to go/ccent) certification.

For more information about the new **CCNA** curriculum, visit:

[www.cisco.com/go/ccna](http://www.cisco.com/go/ccna)

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## *Lab 1(Basic IOS of Router + Security)*

Parts	Basic Fundamentals of LAN	Page NO
1a	Configure Basic Password and Hostname	6
1b	User Authentication	7
1c	Telnet Password	7
1d	Configure Banner	8
1e	SSH Configuration	8
1f	Switch Static IP address Configuration	9
1g	Verify the SSH Session	10
1h	Configure VLAN & assign interface	12
1g	Port Security	15

## *Lab 2 (Basic IOS of Switches + Security)*

Parts	Basic Fundamentals of WAN	Page NO
2a	Configure IP address	19
2b	Configure Telnet & User Based Authentication	21
2c	Configure SSH Server	23
2d	Configure Serial Connectivity	25
2e	Configure Static Routes	27
2f	Configure PPP	30

## *Lab 3(VTP and STP)*

Parts	VTP	Page NO
3a	Configure VTP Server and Clients	34
3b	Verify VTP	35
3c	Configure & Verify STP	36

## *Lab 4 (Routing Protocols)*

Parts	Routing Protocols	Page NO
5a	EIGRP	41
5b	OSPF	44

## *Lab 5 (Security & Port Mapping)*

Parts	Access-list and Nat	Page NO
5a	Named Based Access-List	47
5b	Static Nat, Dynamic Nat, PAT	50

## *Lab 6 (Wide Area Network)*

Parts	Frame Relay	Page NO
6a	Configure Hub and Spoke	61

## *Lab 7 (Inter VLAN Routing)*

Parts	INTER VLAN ROUTING	Page NO
7a	Configure Inter V LAN Routing.	68

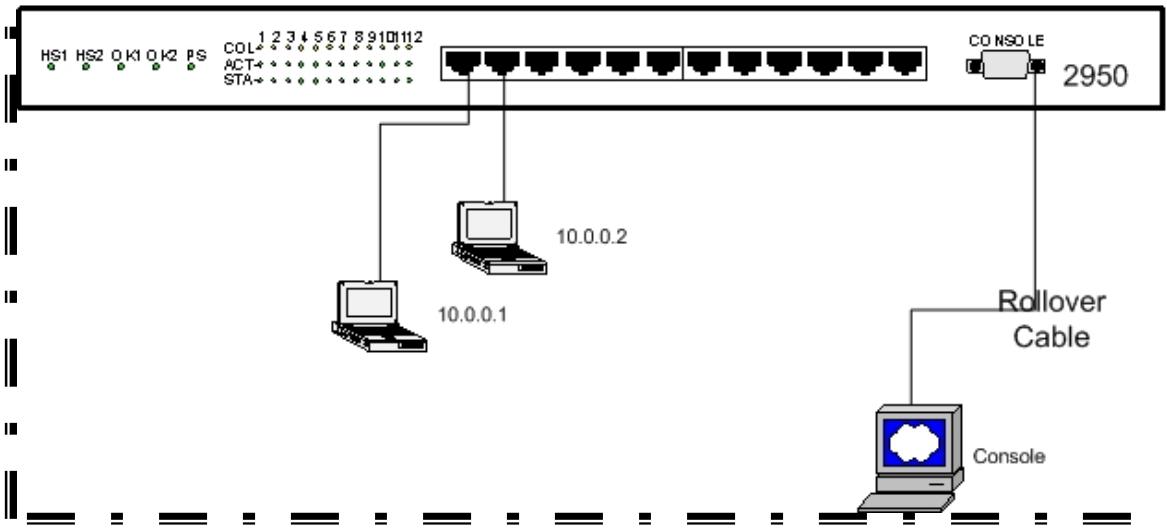
## *Lab 8 Configure IP V6 to IP V4 Tunnel*

Parts	IPV6	Page NO
8a	Configure EIGRP for IPv4	81
8b	Create a 6 to 4 Tunnel	81
8c	Configure IP V6 static Routes	82

## *Lab 9 (Secure Device Manager)*

Parts	Secure Device Manager	Page NO
9a	How to Install SDM	84
9b	How to configure SDM	87
9b	Configure DHCP Server	89

### Basic Fundamentals of LAN



### Instruction's Before LAB

- Before Configuration on Switch the Connectivity is established between PC 10.0.0.1 & PC 10.0.0.2.
- A terminal is connected to console port.
- Erase the entire configuration.
- Putty Software is used to manage the SSH Session.

Switch>**enable**  
Switch# **configure terminal**

## How to Set Hostname and Configure Console Password

```
Switch(config)# hostname CISCO
CISCO(config)# line console 0
CISCO(config-line)# password cisco123
CISCO(config-line)# login
```

### How to Set Privilege level password

!!! Clear Text Password not encrypted(less priority)  
CISCO(config)# **enable password ciscompass**

!!! Encrypted password (more Priority)  
CISCO(config)# **enable secret ciscomit**

### Verify the Password

```
CISCO(config)# exit
CISCO# exit
```

CISCO con0 is now available

Press RETURN to get started.

User Access Verification  
!!! TYPE HERE LINE CONSOLE Password  
Password:

CISCO>**enable**  
!!! TYPE HERE Privilege Level Password  
Password:

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## How to Set User Authentication in Switch

```
CISCO# conf t
CISCO(config)# line console 0
CISCO(config-line)# login local
CISCO(config-line)# exit
CISCO(config)#username ciscom password cisco
```

### Verify the Authentication

```
CISCO(config)# exit
CISCO# exit
User Access Verification
```

Username: **ciscom**  
 Password:  
 CISCO> **enable**  
 Password:

### Verify the User Status

!!!The \* Shows user is active and Connected to Console Port  
 CISCO# **sh users**

Line	User	Host(s)	Idle	Location
*	0 con 0	ciscom	idle	00:00:00

## How to Set Telnet password

```
CISCO(config)# line vty 0 15
CISCO(config-line)# password cisco
CISCO(config-line)# login
CISCO(config-line)# exit
!!! Encrypted Telnet password
CISCO(config)# service password-encryption
```

### How to Set Banner

```
CISCO(config)# banner login # WORLD OF POSSIBILITES #
```

### Verify the Banner

```
CISCO(config)# exit  
CISCO# exit
```

### **WORLD OF POSSIBLITES**

User Access Verification

Username: Ciscom  
Password:  
CISCO>**enable**  
Password:  
CISCO#

## Configure SSH

!!! create a local user name  
CISCO(config)# **username ciscom password cisco**

!!! Assign a domain name  
CISCO(config)# **ip domain-name cisco.com**

!!! This Command takes few a min to generate key  
CISCO(config)# **crypto key generate rsa**

```
CISCO(config)# line vty 0 15  
CISCO(config-line)# password cisco  
CISCO(config-line)# login local
```

!!! Configure vty ports for using SSH  
CISCO(config-line)# **transport input telnet ssh**

---

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### Verify Command's

```
CISCO# show crypto key mypubkey rsa
```

## Switch Static IP address Configuration

!!! To Manage Telnet, SSH Session on a Switch we need IP address

!!! Enter Vlan1 Configuration Mode

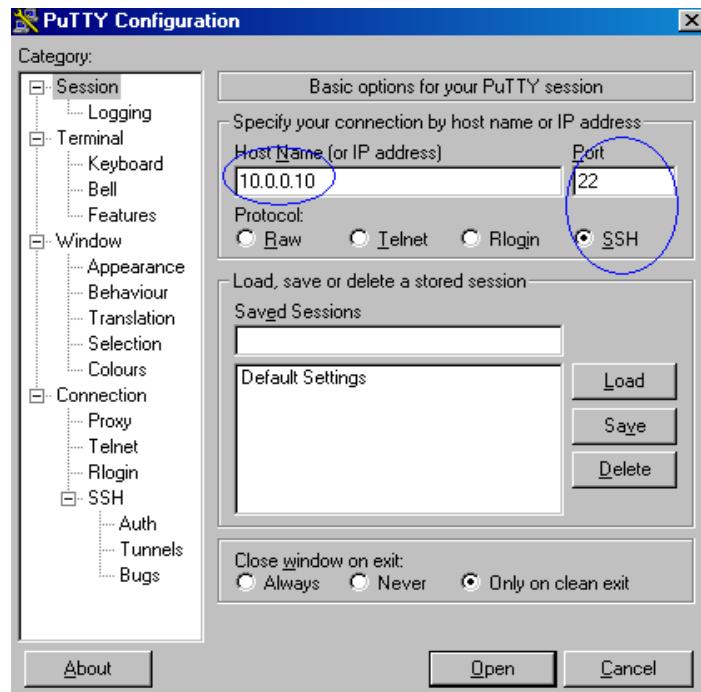
```
CISCO(config)# interface vlan1
CISCO(config-if)# ip address 10.0.0.10 255.0.0.0
CISCO(config-if)# no shutdown
CISCO(config-if)# exit
CISCO(config)# ip default-gateway 10.0.0.100
```

### Verify Command's

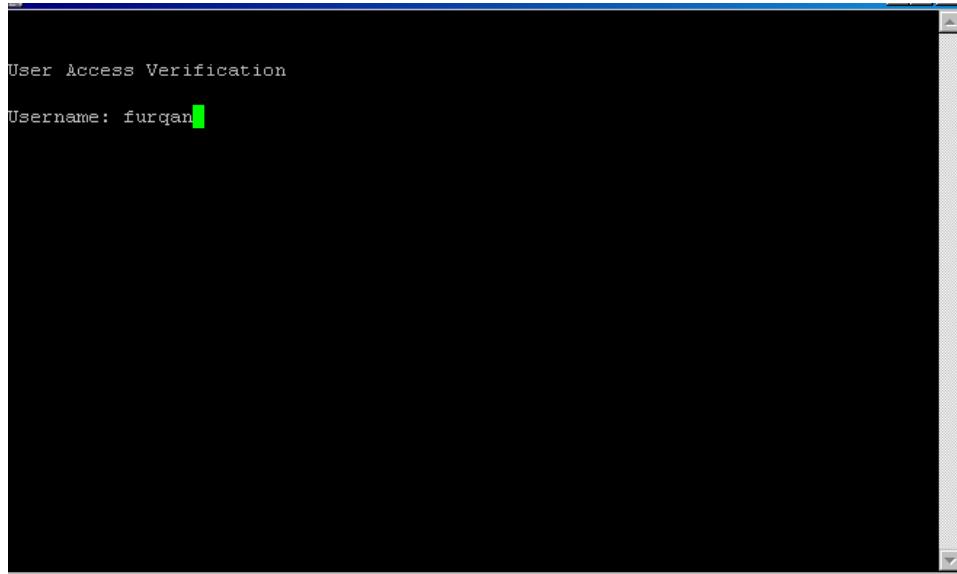
```
CISCO# show running-config
CISCO# show ip interface vlan 1
CISCO# show ip interface brief
```

### Verify the SSH Session

!!! Enter the ip address of Switch and Select SSH Protocols



!!! Enter Username and Password to authentication



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CISCO(config)# **sh line**

Tty	Typ	Tx/Rx	A Modem	Roty	AccO	AccI	Uses	Noise	OVERRUNS
0	CTY	- - - - -		0	3			0/0	
*	1 VTY	- - - - -		67	0			0/0	
2	VTY	- - - - -		7	0			0/0	
3	VTY	- - - - -		134	0			0/0	
4	VTY	- - - - -		81	0			0/0	
5	VTY	- - - - -		1	0			0/0	
6	VTY	- - - - -		40	0			0/0	
7	VTY	- - - - -		12	0			0/0	
8	VTY	- - - - -		0	0			0/0	
9	VTY	- - - - -		0	0			0/0	
10	VTY	- - - - -		0	0			0/0	
11	VTY	- - - - -		0	0			0/0	
12	VTY	- - - - -		0	0			0/0	
13	VTY	- - - - -		0				0/0	
14	VTY	- - - - -		0	0			0/0	
15	VTY	- - - - -		0	0			0/0	
16	VTY	- - - - -		0	0			0/0	

!!! **"\*"** show that one VTY Session is active

---

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CISCO# **sh vlan**

VLAN Name	Status	Ports
1 default	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4 Fa0/5, Fa0/6, Fa0/7, Fa0/8 Fa0/9, Fa0/10, Fa0/11, Fa0/12 Fa0/13, Fa0/14, Fa0/15, Fa0/16 Fa0/17, Fa0/18, Fa0/19, Fa0/20 Fa0/21, Fa0/22, Fa0/23, Fa0/24 Gi0/1, Gi0/2
1002 fddi-default	act/unsup	
1003 token-ring-default	act/unsup	
1004 fddinet-default	act/unsup	
1005 trnet-default	act/unsup	

!!! By Default all port are member of Vlan 1

Connectivity established b/w all ports and Switch because of Same Vlan

```
C:\Documents and Settings\Administrator>ipconfig
Windows IP Configuration

Ethernet adapter Local Area Connection:
  Connection-specific DNS Suffix . . . . . : 10.0.0.1
  IP Address . . . . . : 255.0.0.0
  Subnet Mask . . . . . : 10.0.0.10
  Default Gateway . . . . . : 10.0.0.10

C:\Documents and Settings\Administrator>ping 10.0.0.2
Pinging 10.0.0.2 with 32 bytes of data:
Reply from 10.0.0.2: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.0.2:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
  Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Documents and Settings\Administrator>
```

---

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## Creating VLAN and Assign port on VLAN

!!! Switch port 1 is a Part of Vlan10 & Switch port 2 is a part Vlan 20

```
CISCO(config)#vlan 10
CISCO(config)#name cisco
CISCO(config)#exit
```

```
CISCO(config)#vlan 20
CISCO(config)#name linux
CISCO(config)#exit
```

```
CISCO(config)#int fastEthernet 0/1
CISCO(config-if)#switchport access vlan 10
```

```
CISCO(config)#int fastEthernet 0/2
CISCO(config-if)#switchport access vlan 20
```

**CISCO# sh vlan brief**

VLAN Name	Status	Ports
1 default	active	Fa0/3, Fa0/4, Fa0/5, Fa0/6 Fa0/7, Fa0/8, Fa0/9, Fa0/10 Fa0/11, Fa0/12, Fa0/13, Fa0/14 Fa0/15, Fa0/16, Fa0/17, Fa0/18 Fa0/19, Fa0/20, Fa0/21, Fa0/22 Fa0/23, Fa0/24, Gi0/1, Gi0/2
10 cisco	active	Fa0/1
20 linux	active	Fa0/2
1002 fddi-default	act/unsup	
1003 token-ring-default	act/unsup	
1004 fddinet-default	act/unsup	
1005 trnet-default	act/unsup	

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After assign different port's 10.0.0.1 and 10.0.0.2 are not ping each other.

```
C:\Documents and Settings\Administrator>ipconfig  
'ipconfig' is not recognized as an internal or external command,  
operable program or batch file.  
  
C:\Documents and Settings\Administrator>ipconfig  
Windows IP Configuration  
  
Ethernet adapter Local Area Connection:  
  
    Connection-specific DNS Suffix . :  
        IP Address . . . . . : 10.0.0.1  
        Subnet Mask . . . . . : 255.0.0.0  
        Default Gateway . . . . . : 10.0.0.10  
  
C:\Documents and Settings\Administrator>ping 10.0.0.2  
  
Pinging 10.0.0.2 with 32 bytes of data:  
  
Request timed out.  
Request timed out.  
Request timed out.  
Request timed out.  
  
Ping statistics for 10.0.0.2:  
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),  
C:\Documents and Settings\Administrator>
```

---

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## Port Security

CISCO# **sh mac-address-table**

Vlan	Mac Address	Type	Ports
All	0008.21d1.f100	STATIC	CPU
All	0100.0ccc.cccc	STATIC	CPU
All	0100.0ccc.cccd	STATIC	CPU
All	0100.0cdd.dddd	STATIC	CPU
1	00b0.d097.5303	DYNAMIC	Fa0/2
1	00b0.d0ca.04f6	DYNAMIC	Fa0/1

Total Mac Addresses for this criterion: 6

CISCO# **sh port-security interface fastEthernet 0/1**

```

Port Security      : Disabled
Port Status        : Secure-down
Violation Mode    : Shutdown
Aging Time         : 0 mins
Aging Type         : Absolute
SecureStatic Address Aging : Disabled
Maximum MAC Addresses   : 1
Total MAC Addresses   : 0
Configured MAC Addresses : 0
Sticky MAC Addresses   : 0
Last Source Address    : 0000.0000.0000
Security Violation Count : 0

```

---

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!!! Configure port Security on Fast Ethernet 0/1.

```
CISCO(config)# int fastEthernet 0/1
CISCO(config-if)# switchport mode access
CISCO(config-if)# switchport port-security
CISCO(config-if)# switchport port-security maximum 1
CISCO(config-if)# switchport port-security mac-address sticky
CISCO(config-if)# switchport port-security violation shutdown
```

CISCO# sh port-security interface fastEthernet 0/1

```
Port Security      : Enabled
Port Status        : Secure-up
Violation Mode    : Shutdown
Aging Time        : 0 mins
Aging Type        : Absolute
SecureStatic Address Aging : Disabled
Maximum MAC Addresses : 1
Total MAC Addresses : 1
Configured MAC Addresses : 0
Sticky MAC Addresses : 1
Last Source Address : 00b0.d0ca.04f6
Security Violation Count : 0
```

CISCO# sh mac-address-table

Mac Address Table

---

Vlan	Mac Address	Type	Ports
All	0008.21d1.f100	STATIC	CPU
All	0100.0ccc.cccc	STATIC	CPU
All	0100.0ccc.cccd	STATIC	CPU
All	0100.0cdd.dddd	STATIC	CPU
10	00b0.d0ca.04f6	STATIC	Fa0/1
20	00b0.d097.5303	DYNAMIC	Fa0/2

---

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CISCO# **sh port-security**

Secure Port Action	MaxSecureAddr (Count)	CurrentAddr (Count)	SecurityViolation (Count)	Security
Fa0/1	1	1	0	Shutdown

Total Addresses in System (excluding one mac per port) : 0  
 Max Addresses limit in System (excluding one mac per port) : 1024

CISCO# **sh port-security address**

Vlan	Mac Address	Type	Ports	Remaining Age (mins)
10	00b0.d0ca.04f6	SecureSticky	Fa0/1	-

Total Addresses in System (excluding one mac per port) : 0  
 Max Addresses limit in System (excluding one mac per port) : 1024

CISCO# **sh ip interface fastEthernet 0/1**

FastEthernet0/1 is up, line protocol is up

Inbound access list is not set

---

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!!! After Changing the PC on Fast 0/1

CISCO# **sh port-security**

Secure Port MaxSecureAddr CurrentAddr SecurityViolation Security

Action

(Count) (Count) (Count)

Secure Port	MaxSecureAddr	CurrentAddr	SecurityViolation	Security
Fa0/1	1	1	1	Shutdown

Total Addresses in System (excluding one mac per port) : 0

Max Addresses limit in System (excluding one mac per port) : 1024

CISCO# **sh port-security interface fastEthernet 0/1**

Port Security : Enabled

Port Status : Secure-shutdown

Violation Mode : Shutdown

Aging Time : 0 mins

Aging Type : Absolute

SecureStatic Address Aging : Disabled

Maximum MAC Addresses : 1

Total MAC Addresses : 1

Configured MAC Addresses : 0

Sticky MAC Addresses : 1

Last Source Address : 00b0.d097.5303

Security Violation Count : 1

CISCO# **sh ip interface fastEthernet 0/1**

FastEthernet0/1 is down, line protocol is down

Inbound access list is not set

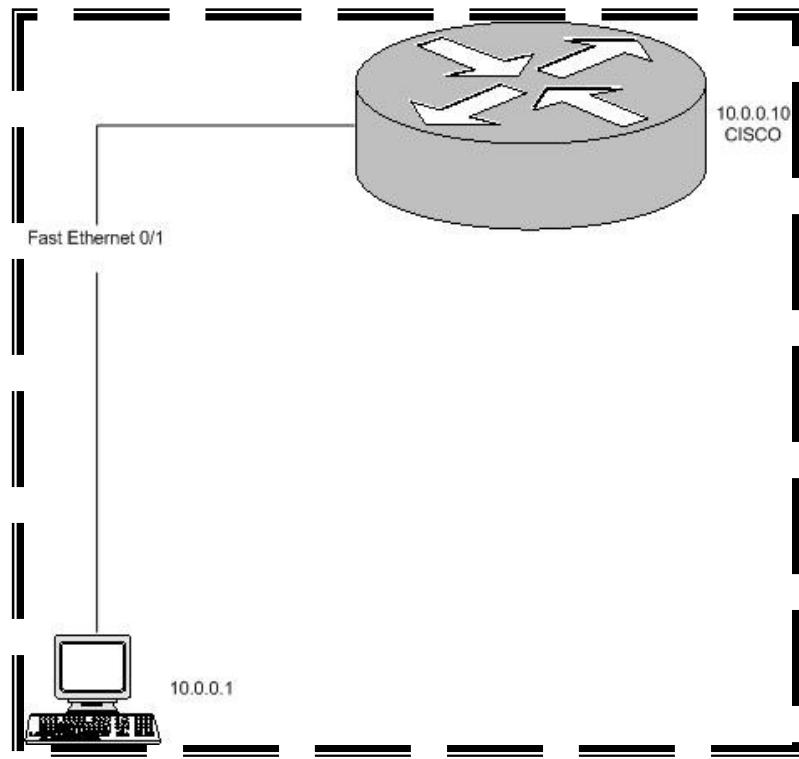
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## Configure IP Address on Fast Ethernet 0/1



```
Router(config)# hostname CISCO
CISCO(config)# int fastEthernet 0/1
CISCO(config-if)# ip address 10.0.0.10 255.0.0.0
CISCO(config-if)# no shutdown
```

CISCO# sh ip int brief

Interface	IP-Address	OK?	Method	Status	Prot
FastEthernet0/0	unassigned	YES	unset	administratively down	
FastEthernet0/1	10.0.0.10	YES	manual	up	
Serial0/3/0	unassigned	YES	unset	administratively down	down
Serial0/3/1	unassigned	YES	unset	administratively down	down

!!! Make Sure the Connectivity established b/w 10.0.0.1 and 10.0.0.10 after assign ip.

```
C:\WINDOWS\system32\cmd.exe
Windows IP Configuration

Ethernet adapter Local Area Connection:

  Connection-specific DNS Suffix . :
  IP Address . . . . . : 10.0.0.1
  Subnet Mask . . . . . : 255.0.0.0
  Default Gateway . . . . . : 10.0.0.10

C:\Documents and Settings\Administrator>ping 10.0.0.10

Pinging 10.0.0.10 with 32 bytes of data:
Reply from 10.0.0.10: bytes=32 time=1ms TTL=255
Reply from 10.0.0.10: bytes=32 time<1ms TTL=255
Reply from 10.0.0.10: bytes=32 time<1ms TTL=255
Reply from 10.0.0.10: bytes=32 time<1ms TTL=255

Ping statistics for 10.0.0.10:
  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
  Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\Documents and Settings\Administrator>
```

## Configure Telnet & Privilege mode Password

!!! Clear Text Password

```
CISCO(config)# enable password cisco
```

!!! Encrypted Password

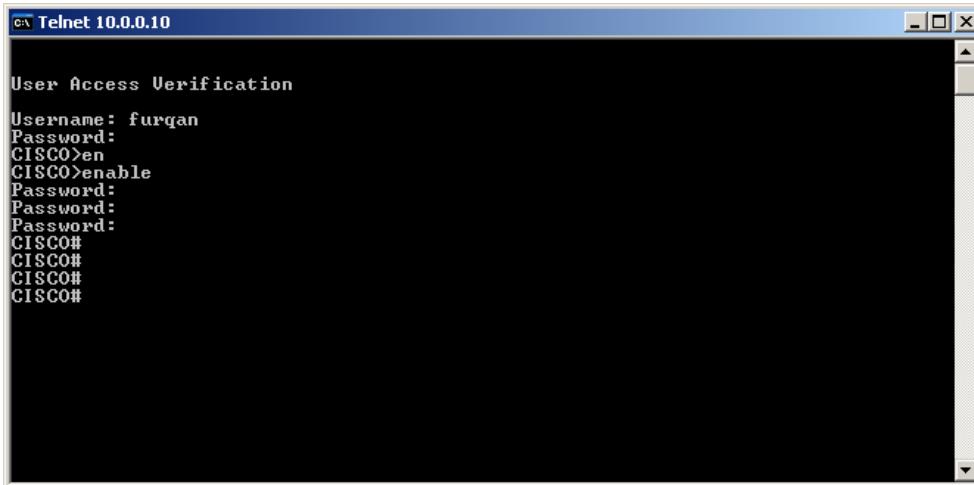
```
CISCO(config)# enable secret cisco123
```

!!! Line Console Password

```
CISCO(config)# line console 0
CISCO(config-line)# password ctcc
CISCO(config-line)# login
CISCO(config-line)# exit
```

!!! User Created so Telnet Session are authenticate with userid

```
CISCO (config)# username furqan password cisco
CISCO(config)# line vty 0 4
CISCO(config-line)# password cisco
CISCO(config-line)# login local
CISCO(config-line)# exit
```



CISCO# **sh line**

Tty	Line	Typ	Tx/Rx	A Modem	Roty	AccO	Accl	Uses	Noise	OVERRUNS
Int										
*	0	0	CTY	- - - - -	0	0	0/0	-		
	1	1	AUX	9600/9600	- - - - -	0	0	0/0	-	
*	194	194	VTY	- - - - -	1	0	0/0	-		
	195	195	VTY	- - - - -	0	0	0/0	-		
	196	196	VTY	- - - - -	0	0	0/0	-		
	197	197	VTY	- - - - -	0	0	0/0	-		
	198	198	VTY	- - - - -	0	0	0/0	-		

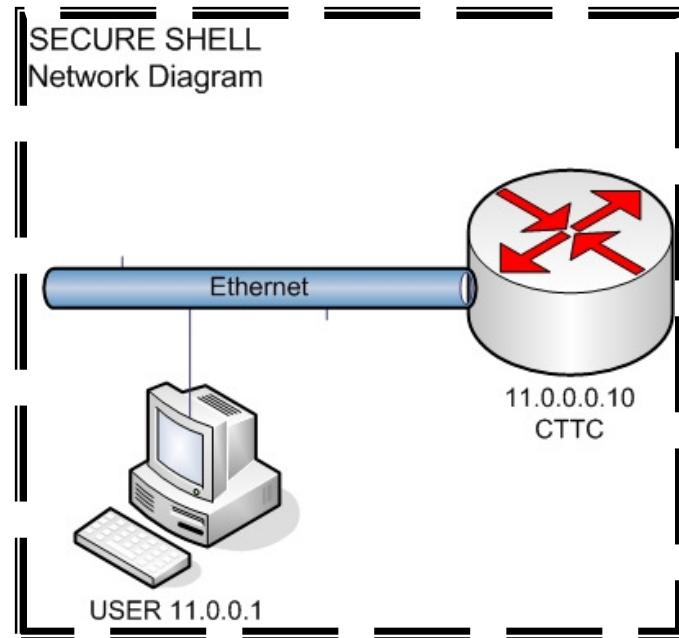
Line(s) not in async mode -or- with no hardware support

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## Configure SSH



User IP 11.0.0.1 and Connect to 11.0.0.10 fastEthernet0/1 On Router  
 To SSH Connectivity  
 Ping 11.0.0.1 to 11.0.0.10  
 !!!!! 100% Succeed

```
cisco1841 (config)#interface fastethernet 0/1
cisco1841 (config-if)#ip address 11.0.0.10 255.0.0.0
cisco1841 (config-if)#no shutdown
cisco1841(config)#hostname cttc
cttc(config)#ip domain-name cisco.com
cttc(config)#crypto key generate rsa
```

The name for the keys will be: cttc.cttc.net  
 Choose the size of the key modulus in the range of 360 to 2048 for your General Purpose Keys. Choosing a key modulus greater than 512 may take a few minutes.

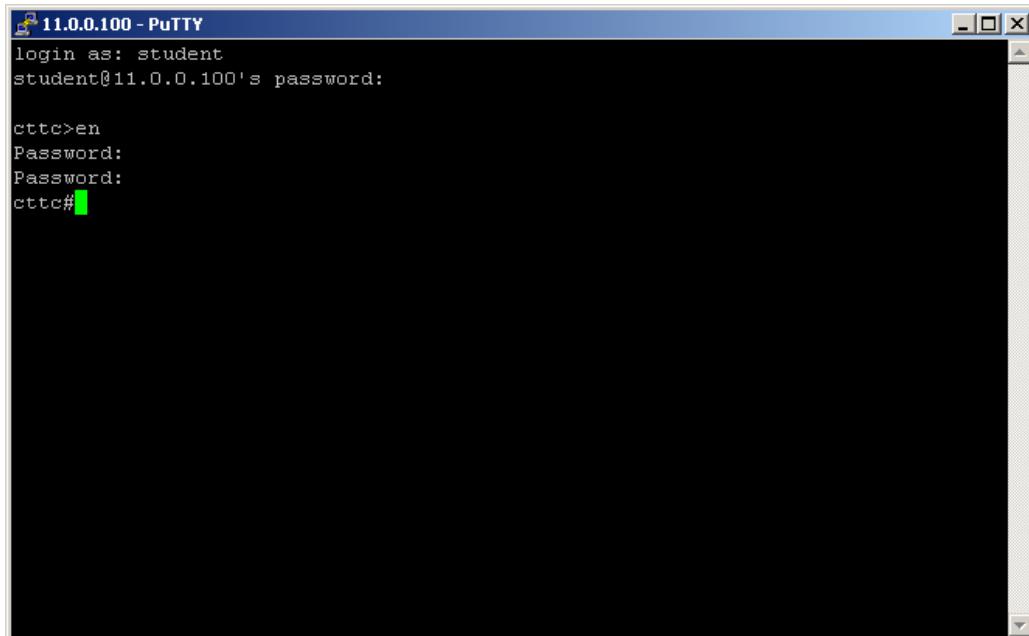
How many bits in the modulus (512):

% Generating 512 bit RSA keys, keys will be non-exportable...(OK)

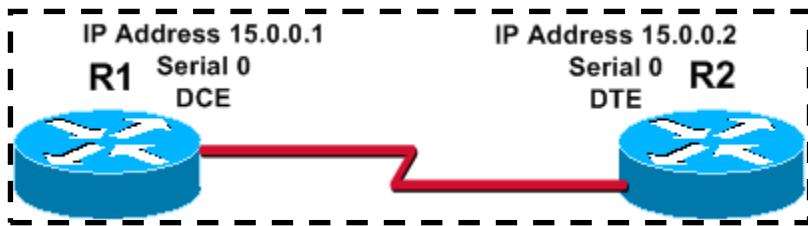
```
cttc(config)# username student password furqan
cttc(config)# enable password cisco123
cttc(config)# line vty 0 4
cttc(config-line)# transport input ssh
cttc(config-line)# login local
```

!!! PC 11.0.0.1  
!!! Open Putty.exe  
!!! Type the fast Ethernet IP 11.0.0.100

Giving Username & Password



## Configure Serial Connectivity



!!! Assign the IP address on CISCO

```
Cisco 2500(config)# hostname CISCO
CISCO(config)# interface serial 0
CISCO(config-if)# ip address 15.0.0.1 255.0.0.0
CISCO(config-if)# no shutdown
CISCO(config-if)# clock rate 64000 (Clock Rate will set only DCE
Interface)
CISCO(config-if)# end
```

!!! Assign the IP address on R2

```
R2(config)# hostname R2
R2(config)# interface serial 0
R2(config-if)# ip address 15.0.0.2 255.0.0.0
R2(config-if)# no shutdown
R2(config-if)# end
```

CISCO# **show interfaces serial 0**

```
Serial0 is up, line protocol is up
Hardware is HD64570
Internet address is 15.0.0.1/8
MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation HDLC, loopback not set
Keepalive set (10 sec)
Last input 00:00:04, output 00:00:00, output hang never
Last clearing of "show interface" counters 01:48:12
Queueing strategy: fifo
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
```

CISCO# **show ip interface brief**

Interface	IP-Address	OK	Method	Status	Protocol
Ethernet0 down	unassigned	YES	unset	administratively down	
Serial0	15.0.0.1	YES	manual	up	up
Serial1	unassigned	YES	NVRAM	administratively down	down

CISCO# **ping 15.0.0.2**

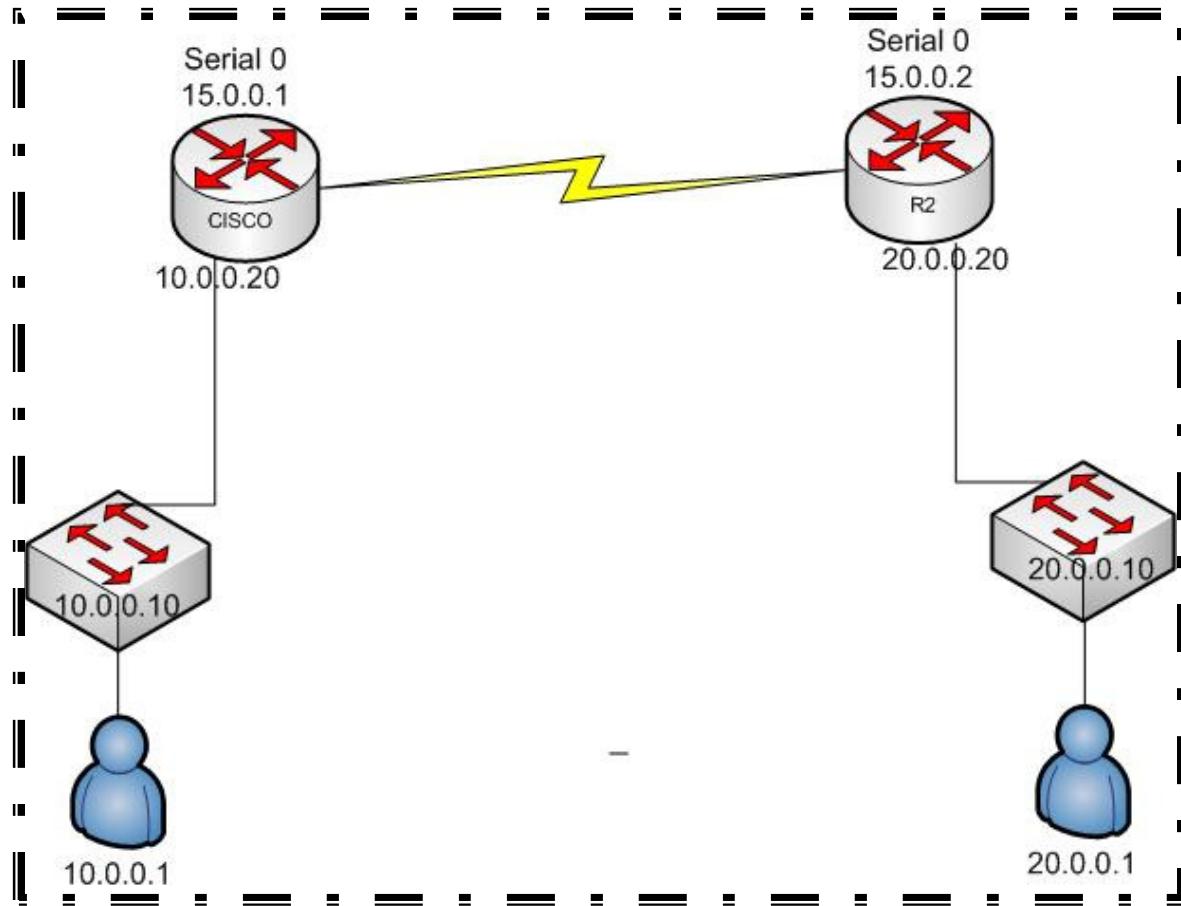
Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 15.0.0.2, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 32/32/32 ms

## Configure Static Routes



```
CISCO(config)# interface serial 0
CISCO(config-if)# ip address 15.0.0.1 255.0.0.0
CISCO(config-if)# no shutdown
CISCO(config-if)# clock rate 64000 (Clock Rate will set only DCE Interface)
CISCO(config-if)# exit
CISCO(config)# interface ethernet 0
CISCO(config-if)# ip address 10.0.0.20 255.0.0.0
CISCO(config-if)# no shutdown
CISCO(config-if)# end
```

!!! Assign IP on R2

```
R2(config)# interface serial 0
R2(config-if)# ip address 15.0.0.2 255.0.0.0
R2(config-if)# no shutdown
R2(config-if)# end
R2(config)# interface ethernet 0
R2(config-if)# ip address 20.0.0.2 255.0.0.0
R2(config-if)# no shutdown
R2(config-if)# end
```

!!! ITS Shows Directly Connected Network

```
CISCO# sh ip route
C 10.0.0.0/8 is directly connected, Ethernet0
C 15.0.0.0/8 is directly connected, Serial0
```

R2# sh ip route

```
C 20.0.0.0/8 is directly connected, Ethernet0
C 15.0.0.0/8 is directly connected, Serial0
```

!!! Static Route Define on CISCO

!!! 20.0.0.0 is the destination Network

```
CISCO(config)# ip route 20.0.0.0 255.0.0.0 15.0.0.2
```

!!! Static Route Define on R2

!!! 10.0.0.0 is the destination Network

```
R2(config)# ip route 10.0.0.0 255.0.0.0 15.0.0.1
```

!!! Static Entry now show on Routing Table

CISCO# **sh ip route**

```
S 20.0.0.0/8 (1/0) via 15.0.0.2
C 10.0.0.0/8 is directly connected, Ethernet0
C 15.0.0.0/8 is directly connected, Serial0
```

S means Static

20.0.0.0 mean network to reach

/8 means subnet

1 mean AD

0 Mean next hop

15.0.0.2 mean packet flow from here.

R2# **sh ip route**

```
C 20.0.0.0/8 is directly connected, Ethernet0
S 10.0.0.0/8 (1/0) via 15.0.0.1
C 15.0.0.0/8 is directly connected, Serial0
```

!!! Verify the connectivity

C:\> **ping 20.0.0.1**

Pinging 20.0.0.1 with 32 bytes of data:

Reply from 20.0.0.1: bytes=32 time=20ms TTL=254

Reply from 20.0.0.1: bytes=32 time=20ms TTL=254

Ping statistics for 20.0.0.1:

  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

  Approximate round trip times in milli-seconds:

    Minimum = 10ms, Maximum = 20ms, Average = 15ms

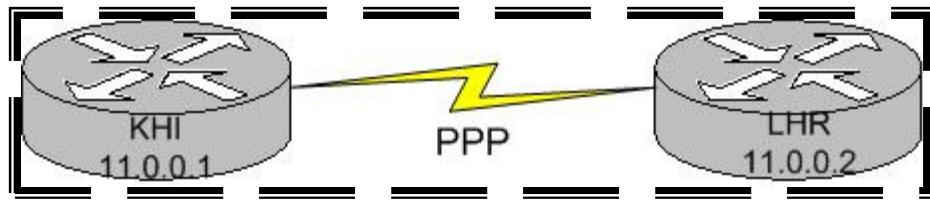
---

Lab2

Prepared by

Sir Umar Gul

## Configure PPP



Configure PPP Authentication using PAP and CHAP

### [\*\*!!!LHR Router Configuration\*\*](#)

```
ROUTER>enable  
ROUTER# configure terminal  
ROUTER(config)# hostname LHR  
LHR(config)# int serial 0/3/1  
LHR(config-if)# ip address 11.0.0.2 255.0.0.0  
LHR(config-if)# no shutdown  
LHR(config-if)# clock rate 56000  
LHR(config-if)# exit  
LHR(config)# exit  
LHR(config-if)# encapsulation ppp  
LHR(config-if)# exit  
LHR(config)# username KHI password cisco  
LHR(config)# interface serial 0/3/1  
LHR(config-if)# ppp authentication chap pap
```

### !!!KHI Router Configuration

```

ROUTER>enable
ROUTER# configure terminal
ROUTER(config)# hostname KHI
KHI(config)# int serial 0/3/1
KHI(config-if)# ip address 11.0.0.1 255.0.0.0
KHI(config-if)# no shutdown
KHI(config-if)# clock rate 56000
KHI(config-if)# exit
KHI(config)# exit
KHI(config-if)# encapsulation ppp
KHI(config-if)# exit
KHI(config)# username LHR password cisco
KHI(config)# interface serial 0/3/1
KHI(config-if)# ppp authentication chap pap

```

LHR# **sh ip int brief**

Interface	IP-Address	OK	Method	Status	Protocol
FastEthernet0/0	unassigned	YES	unset	administratively down	down
FastEthernet0/1	unassigned	YES	unset	administratively down	down
Serial0/3/0	unassigned	YES	unset	administratively down	down
Serial0/3/1	11.0.0.2	YES	manual	up	up

Lab2

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KHI# **sh ip int brief**

Interface	IP-Address	OK	Method	Status	Protocol
FastEthernet0/0	unassigned	YES	unset	administratively down	down
FastEthernet0/1	unassigned	YES	unset	administratively down	down
Serial0/3/0	unassigned	YES	unset	administratively down	down
Serial0/3/1	11.0.0.1	YES	manual	up	up

LHR# **sh int serial 0/3/1** **ual up**

Serial0/3/1 is up, line protocol is up

Hardware is GT96K Serial

Internet address is 11.0.0.2/8

MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,  
reliability 255/255, txload 1/255, rxload 1/255

Encapsulation PPP, LCP Open

Open: IPCP, CDPCP, loopback not set

Keepalive set (10 sec)

Last input 00:00:15, output 00:00:08, output hang never

Last clearing of "show interface" counters 00:09:26

Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0

Queueing strategy: weighted fair

Output queue: 0/1000/64/0 (size/max total/threshold/drops)

    Conversations 0/1/256 (active/max active/max total)

    Reserved Conversations 0/0 (allocated/max allocated)

    Available Bandwidth 1158 kilobits/sec

5 minute input rate 0 bits/sec, 0 packets/sec

5 minute output rate 0 bits/sec, 0 packets/sec

    577 packets input, 10392 bytes, 0 no buffer

    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles

    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort

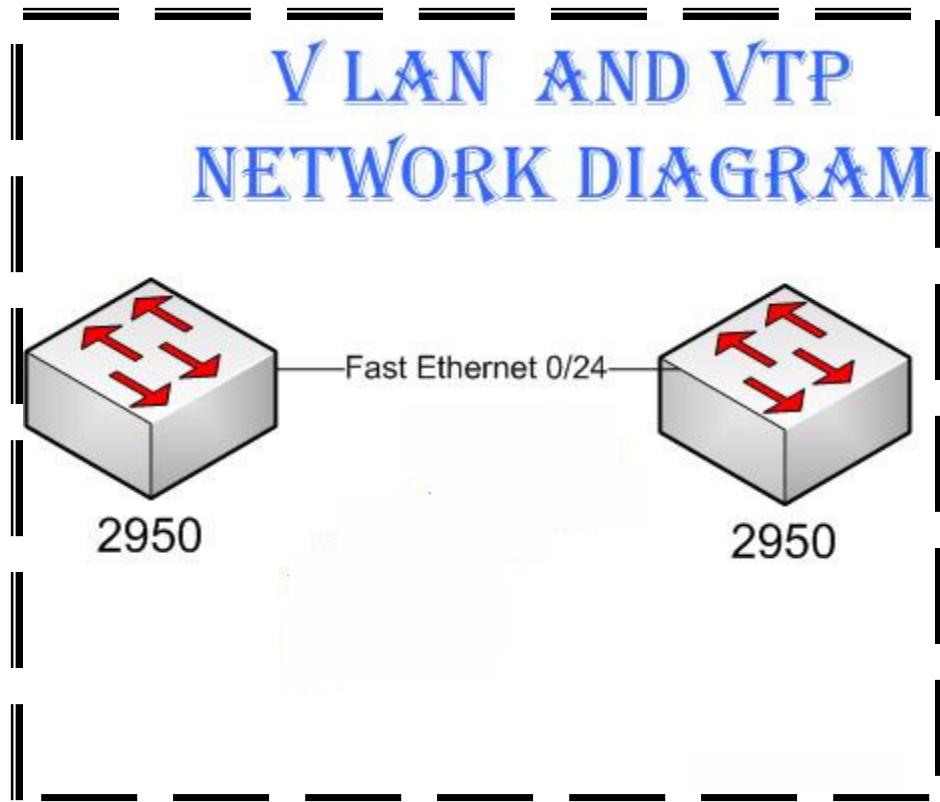
    672 packets output, 11929 bytes, 0 underruns

    0 output errors, 0 collisions, 114 interface resets

0 output buffer failures, 0 output buffers swapped out

223 carrier transitions

DCD=up DSR=up DTR=up RTS=up CTS=up

LAB 3**!!! Switch -A Configuration**

```
2950-SWA (config)# vtp domain CISCO  
2950-SWA(config)# vtp mode server  
2950-SWA(config)# int fastEthernet 0/24  
2950-SWA(config-if)# switchport mode trunk
```

**!!! Switch -B Configuration**

```
2950-SWB(config)# vtp domain CISCO  
2950-SWB(config)# vtp mode client  
2950-SWB(config)# int fastEthernet 0/24  
2950-SWB(config-if)# switchport mode trunk
```

## Verify VTP

!!! Switch A–Verification

2950-SWA # **sh vtp status**

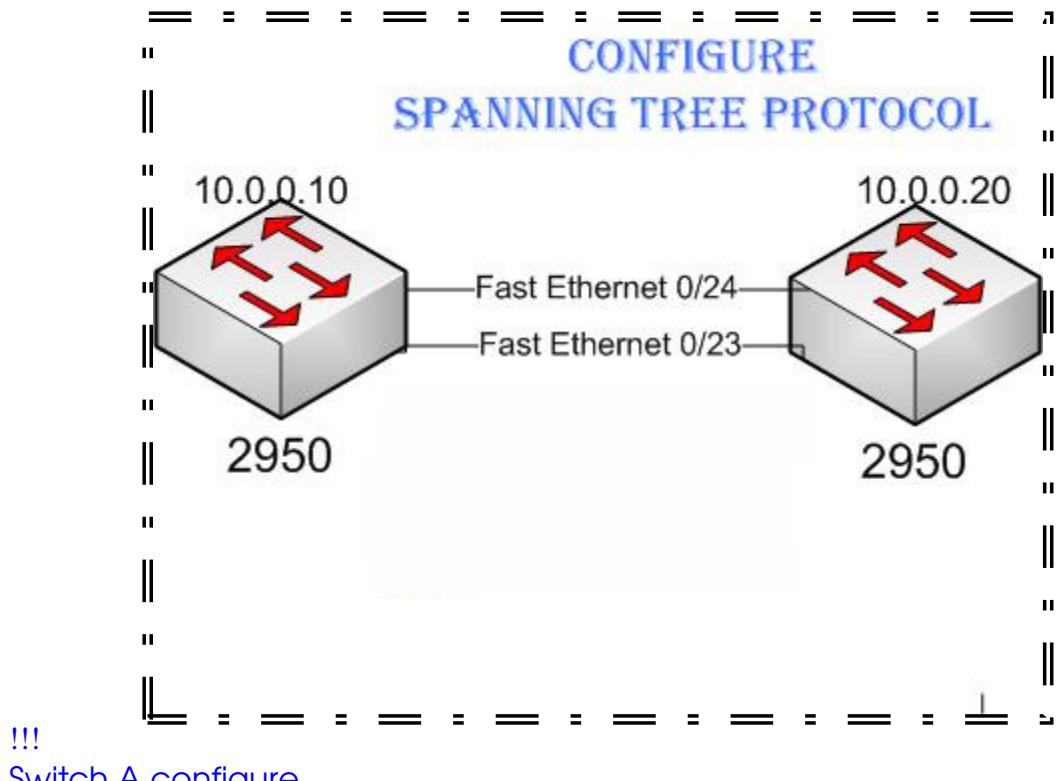
```
VTP Version : 2
Configuration Revision : 3
Maximum VLANs supported locally : 1005
Number of existing VLANs : 6
VTP Operating Mode : Server
VTP Domain Name : CISCO
VTP Pruning Mode : Disabled
VTP V2 Mode : Disabled
VTP Traps Generation : Disabled
```

!!! Switch B–Verification

2950-SWB# **sh vtp status**

```
VTP Version : 2
Configuration Revision : 3
Maximum VLANs supported locally : 250
Number of existing VLANs : 6
VTP Operating Mode : Client
VTP Domain Name : CISCO
VTP Pruning Mode : Disabled
VTP V2 Mode : Disabled
VTP Traps Generation : Disabled
```

## Configure STP



```
2950-SWA# show spanning-tree
```

```
VLAN0001
```

```
Spanning tree enabled protocol ieee
```

```
Root ID Priority 32769
```

```
Address 000b.5f03.f9c0
```

```
This bridge is the root
```

```
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
```

Bridge ID Priority 32769 (priority 32768 sys-id-ext 1)  
 Address 000b.5f03.f9c0  
 Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec  
 Aging Time 300

Interface	Role	Sts	Cost	Prio.Nbr	Type
Fa0/1	Desg	FWD	19	128.1	P2p
Fa0/23	Desg	FWD	19	128.23	P2p
Fa0/24	Desg	FWD	19	128.24	P2p

### 2950-SWA# **show spanning-tree detail**

VLAN0001 is executing the ieee compatible Spanning Tree protocol  
 Bridge Identifier has priority 32768, sysid 1, address 000b.5f03.f9c0  
 Configured hello time 2, max age 20, forward delay 15  
 We are the root of the spanning tree  
 Topology change flag not set, detected flag not set  
 Number of topology changes 4 last change occurred 00:05:35 ago  
     from FastEthernet0/23  
 Times: hold 1, topology change 35, notification 2  
     hello 2, max age 20, forward delay 15  
 Timers: hello 1, topology change 0, notification 0, aging 300

#### **Port 1 (FastEthernet0/1) of VLAN0001 is forwarding**

Port path cost 19, Port priority 128, Port Identifier 128.1.  
 Designated root has priority 32769, address 000b.5f03.f9c0  
 Designated bridge has priority 32769, address 000b.5f03.f9c0  
 Designated port id is 128.1, designated path cost 0  
 Timers: message age 0, forward delay 0, hold 0  
 Number of transitions to forwarding state: 1  
 Link type is point-to-point by default  
 BPDU: sent 1657, received 0

#### **Port 23 (FastEthernet0/23) of VLAN0001 is forwarding**

Port path cost 19, Port priority 128, Port Identifier 128.23.  
 Designated root has priority 32769, address 000b.5f03.f9c0  
 Designated bridge has priority 32769, address 000b.5f03.f9c0  
 Designated port id is 128.23, designated path cost 0  
 Timers: message age 0, forward delay 0, hold 0  
 Number of transitions to forwarding state: 1  
 Link type is point-to-point by default  
 BPDU: sent 170, received 2

#### **Port 24 (FastEthernet0/24) of VLAN0001 is forwarding**

Port path cost 19, Port priority 128, Port Identifier 128.24.  
 Designated root has priority 32769, address 000b.5f03.f9c0

Designated bridge has priority 32769, address 000b.5f03.f9c0  
 Designated port id is 128.24, designated path cost 0  
 Timers: message age 0, forward delay 0, hold 0  
 Number of transitions to forwarding state: 1  
 Link type is point-to-point by default  
 BPDU: sent 1643, received 3

### [!!! Switch B configure](#)

2950-SWB# **show spanning-tree**

VLAN0001

Spanning tree enabled protocol ieee  
 Root ID Priority 32769  
     Address 000b.5f03.f9c0  
     Cost 19  
     Port 23 (FastEthernet0/23)  
     Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 32769 (priority 32768 sys-id-ext 1)  
     Address 000f.2468.0500  
     Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec  
     Aging Time 300

Interface	Role	Sts	Cost	Prio.Nbr	Type
Fa0/1	Desg	FWD	19	128.1	P2p
Fa0/23	Root	FWD	19	128.23	P2p
Fa0/24	Altn	BLK	19	128.24	P2p

2950-SWB# **show spanning-tree detail**

**VLAN0001 is executing the ieee compatible Spanning Tree protocol**  
**Bridge Identifier has priority 32768, sysid 1, address 000f.2468.0500**  
**Configured hello time 2, max age 20, forward delay 15**  
Current root has priority 32769, address 000b.5f03.f9c0  
Root port is 23 (FastEthernet0/23), cost of root path is 19  
Topology change flag not set, detected flag not set  
Number of topology changes 7 last change occurred 00:13:53 ago  
from FastEthernet0/23  
Times: hold 1, topology change 35, notification 2  
hello 2, max age 20, forward delay 15  
Timers: hello 0, topology change 0, notification 0, aging 300

**Port 1 (FastEthernet0/1) of VLAN0001 is forwarding**

Port path cost 19, Port priority 128, Port Identifier 128.1.  
Designated root has priority 32769, address 000b.5f03.f9c0  
Designated bridge has priority 32769, address 000f.2468.0500  
Designated port id is 128.1, designated path cost 19  
Timers: message age 0, forward delay 0, hold 0  
Number of transitions to forwarding state: 1  
Link type is point-to-point by default  
BPDU: sent 1910, received 0

**Port 23 (FastEthernet0/23) of VLAN0001 is forwarding**

Port path cost 19, Port priority 128, Port Identifier 128.23.  
Designated root has priority 32769, address 000b.5f03.f9c0  
Designated bridge has priority 32769, address 000b.5f03.f9c0  
Designated port id is 128.23, designated path cost 0  
Timers: message age 1, forward delay 0, hold 0  
Number of transitions to forwarding state: 1  
Link type is point-to-point by default  
BPDU: sent 2, received 433

**Port 24 (FastEthernet0/24) of VLAN0001 is blocking**

Port path cost 19, Port priority 128, Port Identifier 128.24.  
Designated root has priority 32769, address 000b.5f03.f9c0  
Designated bridge has priority 32769, address 000b.5f03.f9c0  
Designated port id is 128.24, designated path cost 0  
Timers: message age 2, forward delay 0, hold 0  
Number of transitions to forwarding state: 2  
Link type is point-to-point by default  
BPDU: sent 3, received 1906

---

Lab3

Prepared by  
Sir Umar Gul

### !!! Select Root Port by Changing Cost on Switch-B

```
2950-SWB(config)# int fastEthernet 0/24
2950-SWB(config-if)# spanning-tree vlan 1 cost 18
```

## Verify

```
2950-SWB# sh spanning-tree
```

VLAN0001

Spanning tree enabled protocol ieee

Root ID	Priority	32769
	Address	000b.5f03.f9c0
	Cost	18
	Port	24 (FastEthernet0/24)
	Hello Time	2 sec Max Age 20 sec Forward Delay 15 sec

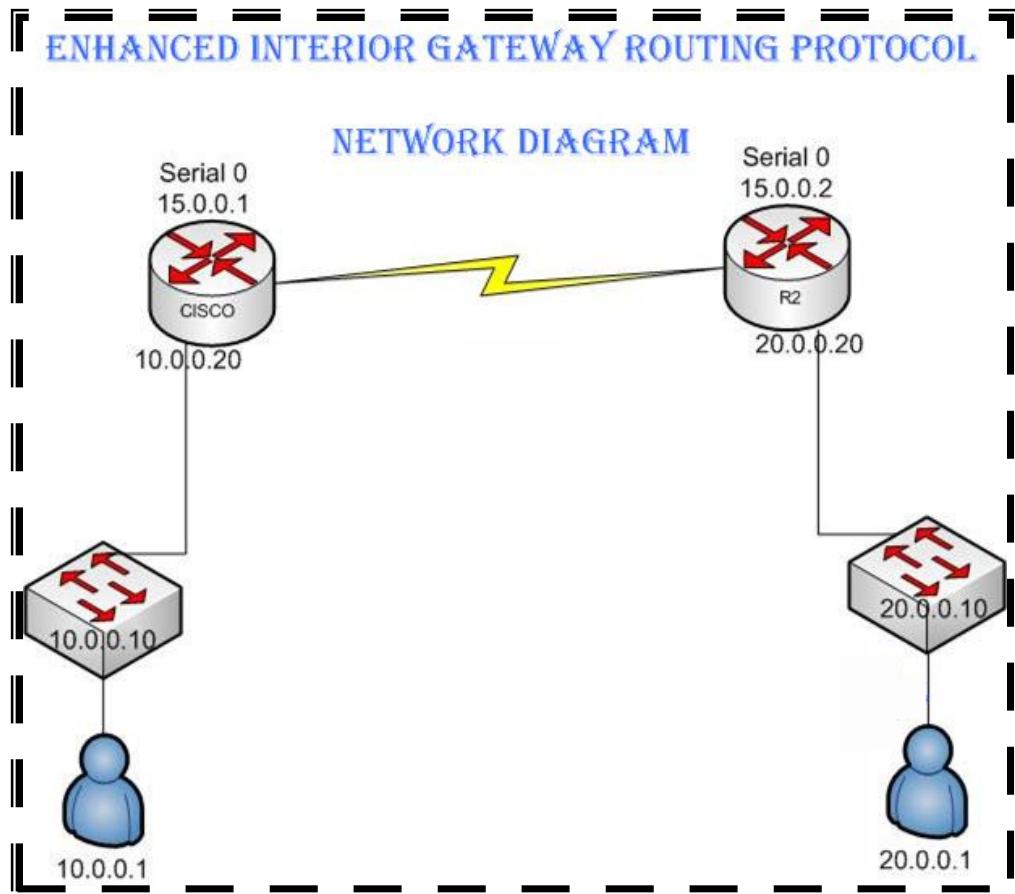
Bridge ID	Priority	32769 (priority 32768 sys-id-ext 1)
	Address	000f.2468.0500
	Hello Time	2 sec Max Age 20 sec Forward Delay 15 sec
	Aging Time	300

Interface	Role	Sts	Cost	Prio.Nbr	Type
Fa0/1	Desg	FWD	19	128.1	P2p
Fa0/23	Altn	BLK	19	128.23	P2p
<b>Fa0/24</b>	<b>Root</b>	<b>FWD</b>	<b>18</b>	<b>128.24</b>	<b>P2p</b>

## LAB 4

### Routing

#### EIGRP



```
CISCO(config)# interface serial 0
CISCO(config-if)# ip address 15.0.0.1 255.0.0.0
CISCO(config-if)# no shutdown
CISCO(config-if)# clock rate 64000
CISCO(config-if)# exit
CISCO(config)# interface ethernet 0
CISCO(config-if)# ip address 10.0.0.20 255.0.0.0
CISCO(config-if)# no shutdown
CISCO(config-if)# end
```

```
R2(config)#interface serial 0
R2(config-if)#ip address 15.0.0.2 255.0.0.0
R2(config-if)#no shutdown
R2(config-if)#end
R2(config)#interface ethernet 0
R2(config-if)#ip address 20.0.0.2 255.0.0.0
R2(config-if)#no shutdown
R2(config-if)#exit
```

```
RA(config)#router eigrp 10
RA(config-router)#network 10.0.0.0
RA(config-router)#network 15.0.0.0
```

```
RB(config)#router eigrp 10
RB(config-router)#network 20.0.0.0
RB(config-router)#network 15.0.0.0
```

RA#**sh ip route**

```
D 20.0.0.0/8 (90/2195456) via 15.0.0.2, 00:04:42, Serial0
C 10.0.0.0/8 is directly connected, Ethernet0
C 15.0.0.0/8 is directly connected, Serial0
```

RB#**sh ip route**

```
C 20.0.0.0/8 is directly connected, Ethernet0
D 20.0.0.0/8 (90/2195456) via 15.0.0.1, 00:01:12, Serial0
C 15.0.0.0/8 is directly connected, Serial0
```

```
C:\>ping 20.0.0.1
```

Pinging 20.0.0.1 with 32 bytes of data:

Reply from 20.0.0.1: bytes=32 time=20ms TTL=254

Reply from 20.0.0.1: bytes=32 time=20ms TTL=254

Reply from 20.0.0.1: bytes=32 time=10ms TTL=254

Reply from 20.0.0.1: bytes=32 time=10ms TTL=254

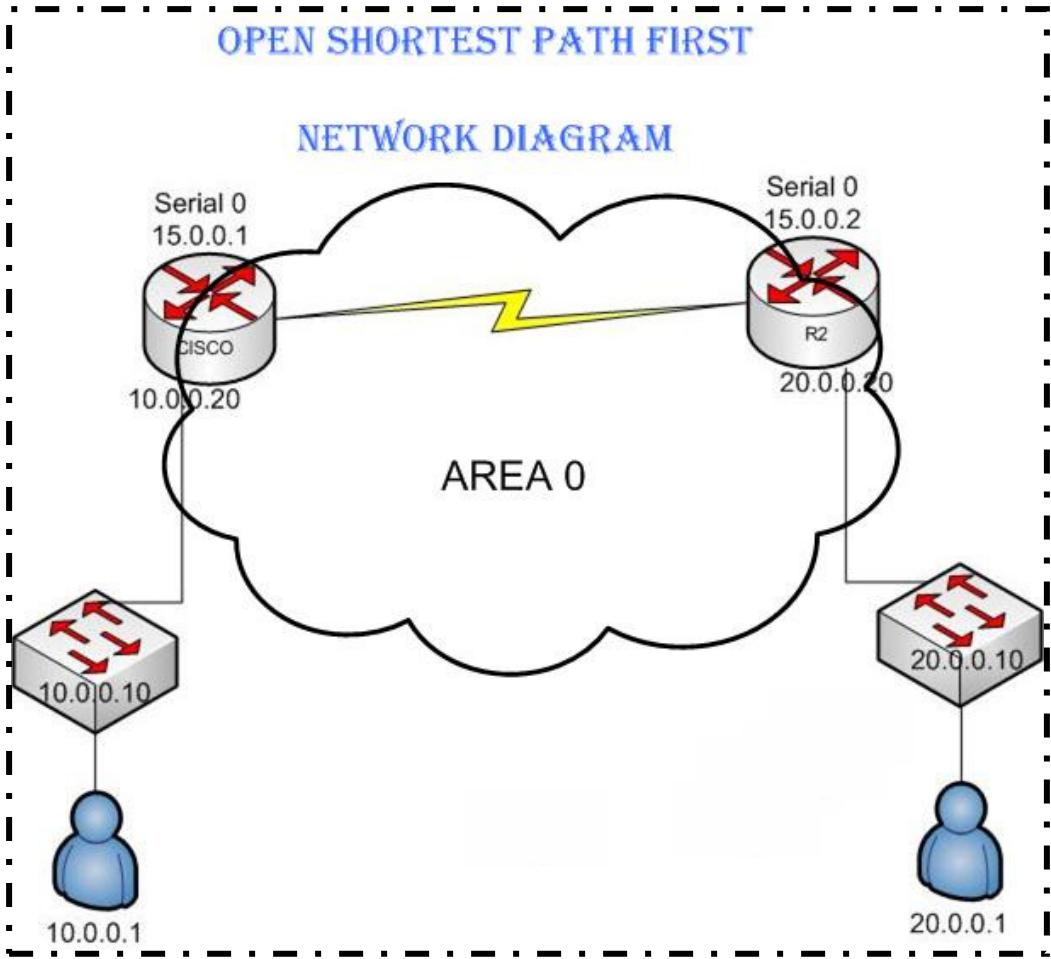
Ping statistics for 20.0.0.1:

  Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

  Approximate round trip times in milli-seconds:

    Minimum = 10ms, Maximum = 20ms, Average = 15ms

## OSPF



```
CISCO(config)# interface serial 0
CISCO(config-if)# ip address 15.0.0.1 255.0.0.0
CISCO(config-if)# no shutdown
CISCO(config-if)# clock rate 64000
CISCO(config-if)# exit
CISCO(config)# interface ethernet 0
CISCO(config-if)# ip address 10.0.0.20 255.0.0.0
CISCO(config-if)# no shutdown
CISCO(config-if)# end
```

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```
R2(config)#interface serial 0
R2(config-if)#ip address 15.0.0.2 255.0.0.0
R2(config-if)#no shutdown
R2(config-if)#end
R2(config)#interface ethernet 0
R2(config-if)#ip address 20.0.0.2 255.0.0.0
R2(config-if)#no shutdown
R2(config-if)#exit
```

```
CISCO(config)#router ospf 64
CISCO(config-router)#network 10.0.0.0 0.255.255.255 area 0
CISCO(config-router)#network 15.0.0.0 0.255.255.255 area 0
```

```
R2(config)#router ospf 64
R2(config-router)#network 15.0.0.0 0.255.255.255 area 0
R2(config-router)#network 20.0.0.0 0.255.255.255 area 0
```

CISCO#**sh ip route**

```
O 20.0.0.0/8 (110/74) via 15.0.0.2, 00:22:17, Serial0
C 10.0.0.0/8 is directly connected, Ethernet0
C 15.0.0.0/8 is directly connected, Serial0
```

R2#**sh ip route**

```
C 20.0.0.0/8 is directly connected, Ethernet0
O 10.0.0.0/8 (110/74) via 15.0.0.1, 00:20:57, Serial0
C 15.0.0.0/8 is directly connected, Serial0
```

---

Lab4

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**CISCO# show ip ospf neighbor**

Neighbor ID	Pri	State	Dead Time	Address	Interface
20.0.0.20	1	FULL/ -	00:00:36	15.0.0.2	Serial0

**R2# show ip ospf neighbor**

Neighbor ID	Pri	State	Dead Time	Address	Interface
15.0.0.1	1	FULL/ -	00:00:36	15.0.0.1	Serial0

**CISCO# show ip ospf database**

OSPF Router with ID (15.0.0.1) (Process ID 64)

Router Link States (Area 0)

Link ID	ADV Router	Age	Seq#	Checksum	Link count
15.0.0.1	15.0.0.1	2040	0x80000004	0x7C99	3
20.0.0.20	20.0.0.20	708	0x80000006	0x9957	3

**R2# show ip ospf database**

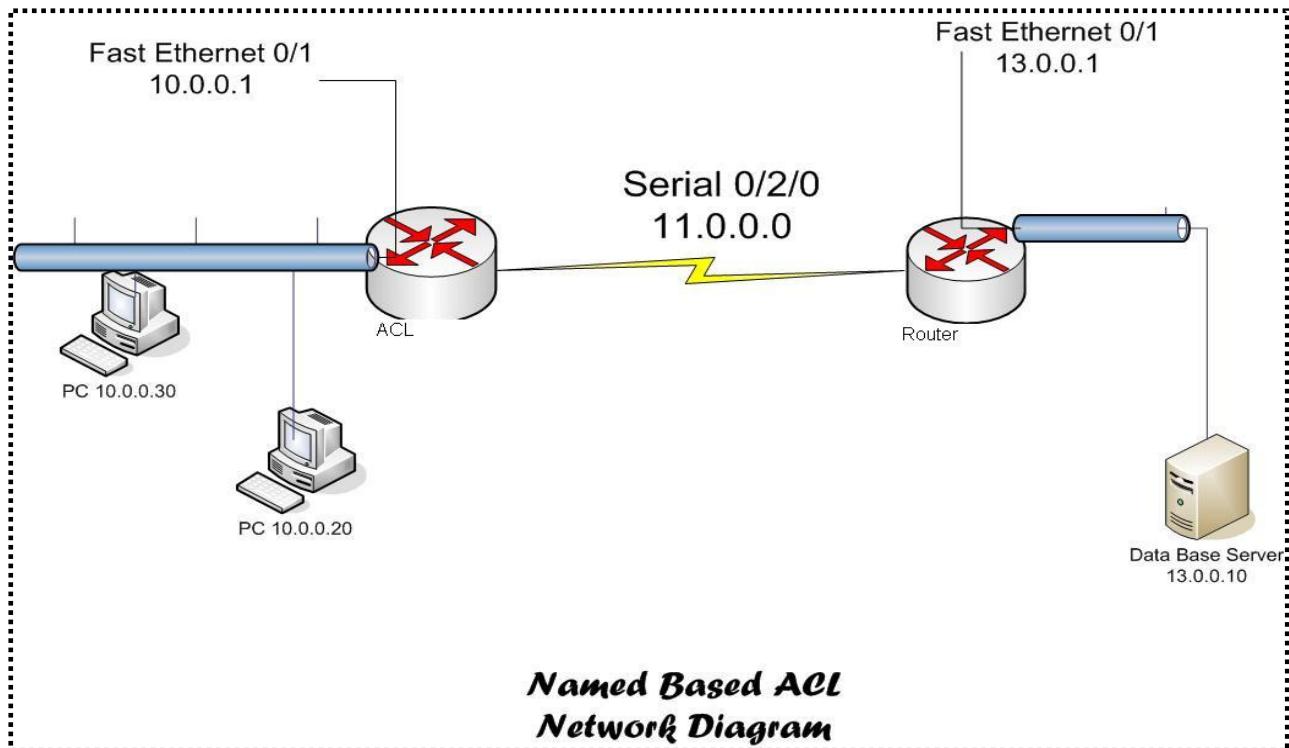
OSPF Router with ID (20.0.0.20) (Process ID 64)

Router Link States (Area 0)

Link ID	ADV Router	Age	Seq#	Checksum	Link count
15.0.0.1	15.0.0.1	105	0x80000005	0x7A9A	3
20.0.0.20	20.0.0.20	820	0x80000006	0x9957	3

## LAB 5

### Access Control List



The task on this Lab is to configure a Named Based ACL

- 1) PC 10.0.0.20 only telnet 13.0.0.10
- 2) PC 10.0.0.30 only www 13.0.0.10
- 3) All other service is denied.

!!! Assign IP Address on ACL Router

```
ACL (config)# int fastEthernet 0/1  
ACL (config-if)# ip address 10.0.0.1 255.0.0.0  
ACL (config-if)# no shutdown
```

```
ACL (config)# int serial 0/2/0  
ACL (config-if)# ip address 11.0.0.1 255.0.0.0  
ACL (config-if)# clock rate 64000  
ACL (config-if)# no shutdown
```

!!! Assign IP Address on Router

```
Router(config)# int serial 0/2/0  
Router(config-if)# ip address 11.0.0.2 255.0.0.0  
Router(config-if)# no shutdown  
Router(config-if)# exit
```

```
Router(config)# int fastEthernet 0/1  
Router(config-if)# ip address 13.0.0.1 255.0.0.0  
Router(config-if)# no shutdown  
Router(config-if)# exit
```

!!! After Configuration Make Sure Connectivity Establish b/w 11.0.0.1 & 11.0.0.2

!!! Configure a static Route on Both Router to make sure the Connectivity b/w End to End Network 10.0.0.0 must ping Network 30.0.0.0

```
ACL (config)# ip route 13.0.0.0 255.0.0.0 11.0.0.2  
Router(config)# ip route 10.0.0.0 255.0.0.0 11.0.0.1
```

!!! Configure NAMED BASED ACL

```
ACL (config)# ip access-list extended ciscom
```

```
ACL (config-ext-nacl)# permit tcp host 10.0.0.30 host 13.0.0.10 eq www  
ACL (config-ext-nacl)# permit tcp host 10.0.0.20 host 13.0.0.10 eq telnet  
ACL (config)# int fastEthernet 0/1  
ACL (config-if)# ip access-group ciscom in  
ACL (config-if)# exit
```

## Verification:-

Go to PC 10.0.0.20  
<http://13.0.0.10>  
!!!! Success Rate 0%

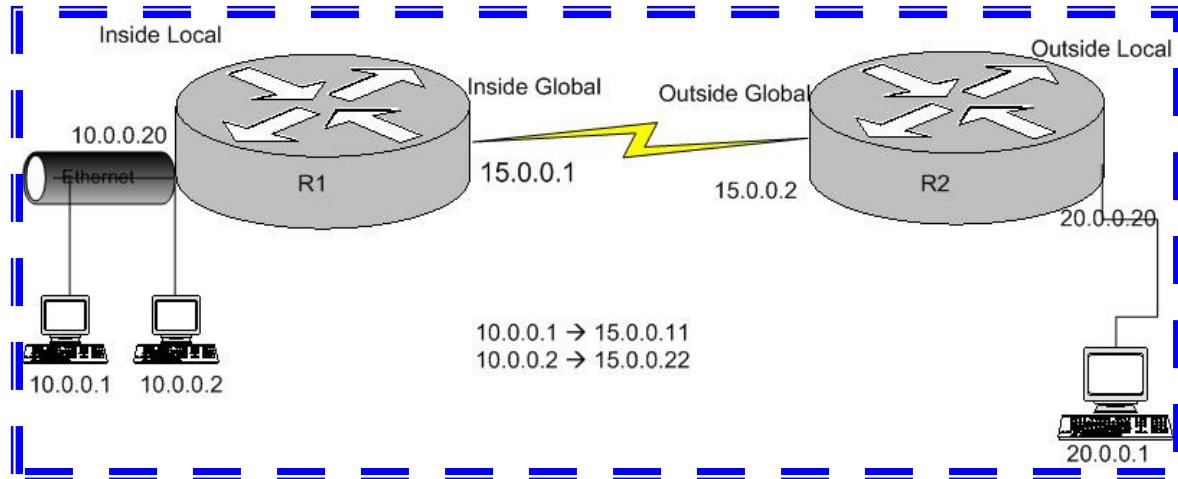
C:>telnet 13.0.0.10  
!!!! Success Rate 100%

Similarly

Go to PC 10.0.0.30  
<http://13.0.0.10>  
!!!! Success Rate 100%

C:>telnet 13.0.0.10  
!!!! Success Rate 0%

## Static Nat:-



!!! Assign the IP Address on R1

```
R1(config)# interface serial 0
R1(config-if)# ip address 15.0.0.1 255.0.0.0
R1(config-if)# no shutdown
R1(config-if)# clock rate 64000
R1(config-if)# exit
R1(config)# interface ethernet 0
R1(config-if)# ip address 10.0.0.20 255.0.0.0
R1(config-if)# no shutdown
R1(config-if)# end
```

!!! Assign the IP Address on R2

```
R2(config)# interface serial 0
R2(config-if)# ip address 15.0.0.2 255.0.0.0
R2(config-if)# no shutdown
R2(config-if)# end
R2(config)# interface ethernet 0
R2(config-if)# ip address 20.0.0.2 255.0.0.0
R2(config-if)# no shutdown
R2(config-if)# exit
```

!!! Checking the Routing Table of R1

R1# **sh ip route**

C 10.0.0.0/8 is directly connected, Ethernet0  
C 15.0.0.0/8 is directly connected, Serial0

**C means Directly Connected Network**

!!! Checking the Routing Table of R2

R2# **sh ip route**

C 20.0.0.0/8 is directly connected, Ethernet0  
C 15.0.0.0/8 is directly connected, Serial0

!!! Enable RIP Routing Protocol on R1

R1(config)# **router rip**

R1(config-router)# **network 10.0.0.0**

R1(config-router)# **network 15.0.0.0**

!!! Enable RIP Routing Protocol on R2

R2(config)# **router rip**

R2(config-router)# **network 20.0.0.0**

R2(config-router)# **network 15.0.0.0**

!!! Checking the Routing Table of R1

R1# **sh ip route**

R 20.0.0.0/8 (120/1) via 15.0.0.2, 00:04:42, Serial0

C 10.0.0.0/8 is directly connected, Ethernet0

C 15.0.0.0/8 is directly connected, Serial0

**R Means Learn From RIP**

!!! Checking the Routing Table of R2

R2# **sh ip route**

```
C 20.0.0.0/8 is directly connected, Ethernet0
R 20.0.0.0/8 (120/1) via 15.0.0.1, 00:01:12, Serial0
C 15.0.0.0/8 is directly connected, Serial0
```

!!! Enable the inside NAT Translation

R1(config)# **int Ethernet 0**

R1(config-if)# **ip nat inside**

!!! Enable the outside NAT Translation

R1(config)# **int serial 0**

R1(config-if)# **ip nat outside**

!!! Configure the static Nat Translation

R1(config)# **ip nat inside source static 10.0.0.1 15.0.0.11**

R1(config)# **ip nat inside source static 10.0.0.2 15.0.0.22**

## Verification:-

Go to PC 10.0.0.1 and Ping 20.0.0.1

GO to PC 10.0.0.2 and Ping 20.0.0.1

R1# show ip nat translations

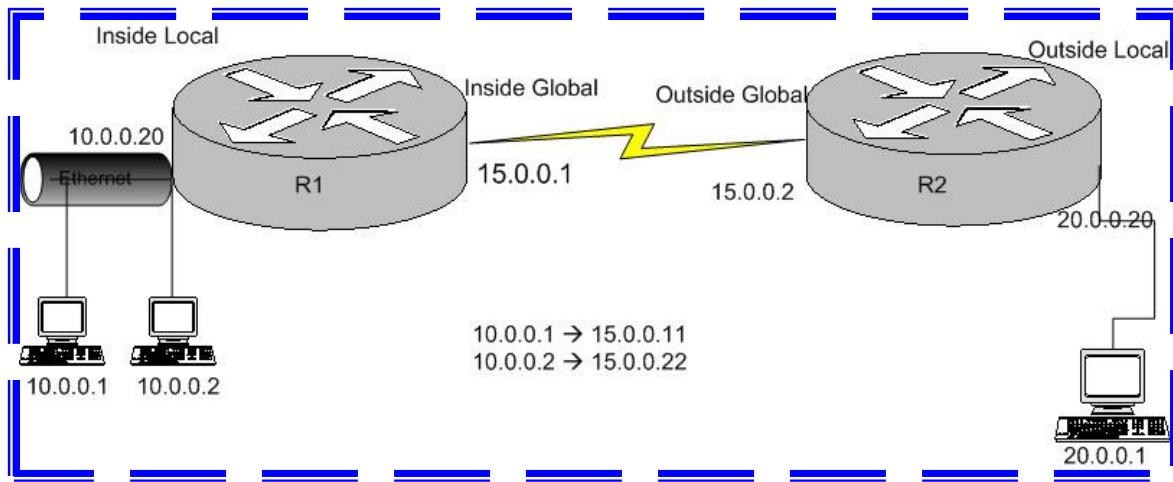
Pro	Inside global	Inside local	Outside local	Outside global
---	15.0.0.11	10.0.0.1	---	---
---	15.0.0.22	10.0.0.2	---	---

Lab5

Prepared by

Sir Umar Gul

## Dynamic Nat:-



The task on this Lab is to configure a Dynamic Nat

- 1) Configure IP address on All interface
- 2) Routing Enable
- 3) Enable Nat on interface
- 4) Defines a Pool of global
- 5) Access-list
- 6) Dynamic Source Translation

!!! Assign the IP Address on R1

```
R1(config)# interface serial 0
R1(config-if)# ip address 15.0.0.1 255.0.0.0
R1(config-if)# no shutdown
R1(config-if)# clock rate 64000
R1(config-if)# exit
R1(config)# interface ethernet 0
R1(config-if)# ip address 10.0.0.20 255.0.0.0
R1(config-if)# no shutdown
R1(config-if)# end
```

!!! Assign the IP Address on R2

```
R2(config)# interface serial 0
R2(config-if)# ip address 15.0.0.2 255.0.0.0
R2(config-if)# no shutdown
R2(config-if)# end
R2(config)# interface ethernet 0
R2(config-if)# ip address 20.0.0.2 255.0.0.0
R2(config-if)# no shutdown
R2(config-if)# exit
```

!!! Checking the Routing Table of R1

```
R1# sh ip route
C 10.0.0.0/8 is directly connected, Ethernet0
C 15.0.0.0/8 is directly connected, Serial0
```

**C means Directly Connected Network**

!!! Checking the Routing Table of R2

```
R2# sh ip route
C 20.0.0.0/8 is directly connected, Ethernet0
C 15.0.0.0/8 is directly connected, Serial0
```

!!! Enable RIP Routing Protocol on R1  
R1(config)#**router rip**  
R1(config-router)#**network 10.0.0.0**  
R1(config-router)#**network 15.0.0.0**

!!! Enable RIP Routing Protocol on R2  
R2(config)#**router rip**  
R2(config-router)#**network 20.0.0.0**  
R2(config-router)#**network 15.0.0.0**

!!! Checking the Routing Table of R1

R1#**sh ip route**  
R 20.0.0.0/8 (120/1) via 15.0.0.2, 00:04:42, Serial0  
C 10.0.0.0/8 is directly connected, Ethernet0  
C 15.0.0.0/8 is directly connected, Serial0

### **R Means Learn From RIP**

!!! Checking the Routing Table of R2

R2#**sh ip route**  
C 20.0.0.0/8 is directly connected, Ethernet0  
R 20.0.0.0/8 (120/1) via 15.0.0.1, 00:01:12, Serial0  
C 15.0.0.0/8 is directly connected, Serial0

!!! Enable the inside NAT Translation

R1(config)#**int Ethernet 0**  
R1(config-if)#**ip nat inside**

!!! Enable the outside NAT Translation

R1(config)#**int serial 0**  
R1(config-if)#**ip nat outside**

```
R1(config)# ip nat pool ctte 15.0.0.41 15.0.0.45 prefix-length 8  
R1(config)# access-list 1 permit 10.0.0.0 0.255.255.255  
R1(config)# ip nat inside source list 1 pool ctte
```

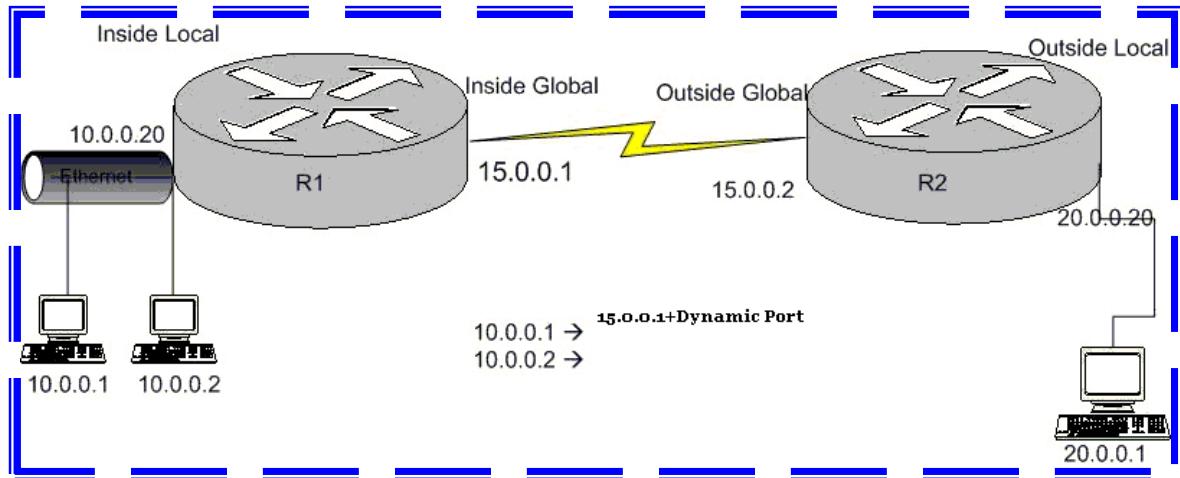
## Verification:-

Go to PC 10.0.0.1 and Ping 20.0.0.1  
GO to PC 10.0.0.2 and Ping 20.0.0.1

R1# **show ip nat translations**

Pro	Inside global	Inside local	Outside local	Outside global
---	15.0.0.41	10.0.0.1	---	---
---	15.0.0.42	10.0.0.2	---	---

## Overload Nat (PAT):-



The task on this Lab is to configure a Dynamic Nat

- 1) Configure IP address on All interface
- 2) Routing Enable
- 3) Enable Nat on interface
- 4) Defines a Pool of global
- 5) Access-list
- 6) Overload on Port

!!! Assign the IP Address on R1

```
R1(config)# interface serial 0
R1(config-if)# ip address 15.0.0.1 255.0.0.0
R1(config-if)# no shutdown
R1(config-if)# clock rate 64000
R1(config-if)# exit
R1(config)# interface ethernet 0
R1(config-if)# ip address 10.0.0.20 255.0.0.0
R1(config-if)# no shutdown
R1(config-if)# end
```

!!! Assign the IP Address on R2

```
R2(config)# interface serial 0
R2(config-if)# ip address 15.0.0.2 255.0.0.0
R2(config-if)# no shutdown
R2(config-if)# end
R2(config)# interface ethernet 0
R2(config-if)# ip address 20.0.0.2 255.0.0.0
R2(config-if)# no shutdown
R2(config-if)# exit
```

!!! Checking the Routing Table of R1

```
R1#sh ip route
C 10.0.0.0/8 is directly connected, Ethernet0
C 15.0.0.0/8 is directly connected, Serial0
```

**C means Directly Connected Network**

!!! Checking the Routing Table of R2

```
R2#sh ip route
C 20.0.0.0/8 is directly connected, Ethernet0
C 15.0.0.0/8 is directly connected, Serial0
```

!!! Enable RIP Routing Protocol on R1  
R1(config)#**router rip**  
R1(config-router)#**network 10.0.0.0**  
R1(config-router)#**network 15.0.0.0**

!!! Enable RIP Routing Protocol on R2  
R2(config)#**router rip**  
R2(config-router)#**network 20.0.0.0**  
R2(config-router)#**network 15.0.0.0**

!!! Checking the Routing Table of R1

R1#**sh ip route**  
R 20.0.0.0/8 (120/1) via 15.0.0.2, 00:04:42, Serial0  
C 10.0.0.0/8 is directly connected, Ethernet0  
C 15.0.0.0/8 is directly connected, Serial0

### R Means Learn From RIP

!!! Checking the Routing Table of R2

R2#**sh ip route**  
C 20.0.0.0/8 is directly connected, Ethernet0  
R 20.0.0.0/8 (120/1) via 15.0.0.1, 00:01:12, Serial0  
C 15.0.0.0/8 is directly connected, Serial0

!!! Enable the inside NAT Translation

R1(config)#**int Ethernet 0**  
R1(config-if)#**ip nat inside**

!!! Enable the outside NAT Translation

R1(config)#**int serial 0**  
R1(config-if)#**ip nat outside**

```
R1(config)# ip nat pool cttc 15.0.0.200 15.0.0.200 prefix-length 8  
R1(config)# access-list 1 permit 10.0.0.0 0.255.255.255  
R1(config)# ip nat inside source list 1 pool cttc overload
```

## Verification:-

Go to PC 10.0.0.1 and Ping 20.0.0.1  
GO to PC 10.0.0.2 and Ping 20.0.0.1

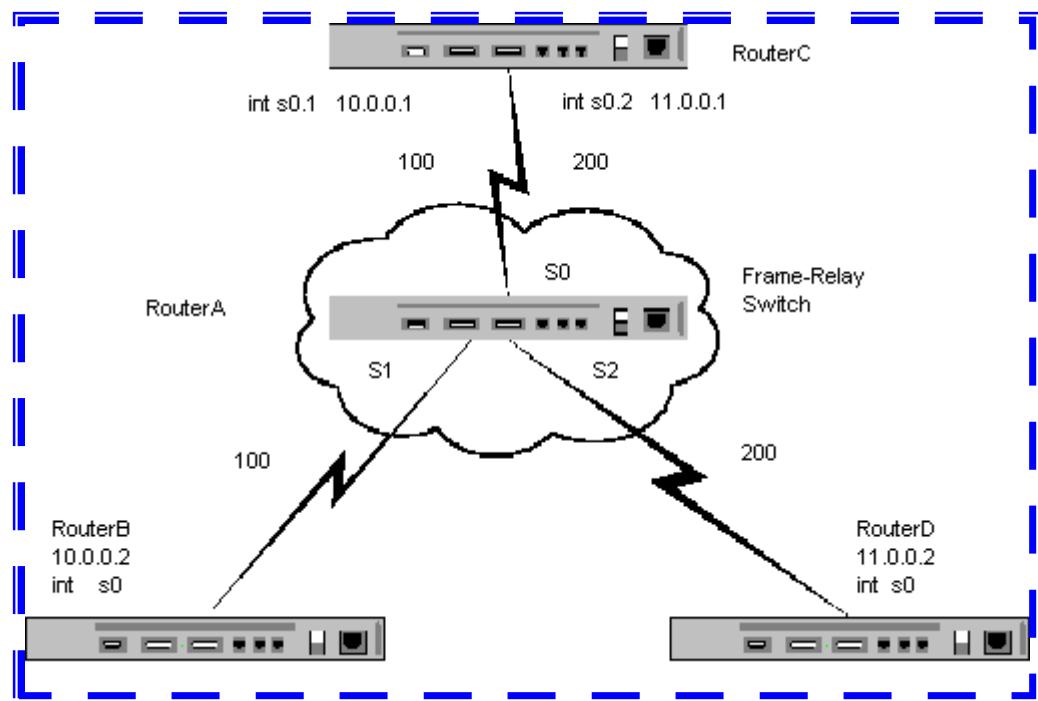
R1# show ip nat translations

Protocol	Inside global	Inside local	Outside local	Outside global
tcp	15.0.0.200:1041	10.0.0.1:1041	20.0.0.1:80	20.0.0.1:80
tcp	15.0.0.200:1042	10.0.0.2:1042	20.0.0.1:80	20.0.0.1:80

## LAB 6

### Frame-Relay

### Hub and Spoke



### !!! Configuration of Frame-Relay Switch

#### !!! Enable Frame Relay Switching

```
FRSwitch(config)# frame-relay switching
```

#### !!! Enable Encapsulation on Serial Interface

```
FRSwitch (config)# int s0
```

```
FRSwitch(config-if)# no ip address
```

```
FRSwitch(config-if)# encapsulation frame-relay
```

```
FRSwitch(config-if)# frame-relay intf-type dce
```

#### !!! Configure DLCI on Frame Relay Switch

```
FRSwitch(config-if)# frame-relay route <local DLCI> Int<Remote DLCI>
```

```
FRSwitch(config-if)# frame-relay route 100 int s1 100
```

```
FRSwitch(config-if)# frame-relay route 200 int s2 200
```

```
FRSwitch(config-if)# no shutdown
```

```
FRSwitch(config)# int s1
```

```
FRSwitch(config-if)# no ip address
```

#### !!! Enables encapsulation

```
FRSwitch(config-if)# encapsulation frame-relay
```

```
FRSwitch(config-if)# frame-relay intf-type dce
```

```
FRSwitch(config-if)# frame-relay route 100 int s0 100
```

```
FRSwitch(config-if)# no shutdown
```

```
FRSwitch(config)# int s2
```

```
FRSwitch(config-if)# encapsulation frame-relay
```

```
FRSwitch(config-if)# frame-relay intf-type dce
```

```
FRSwitch(config-if)# frame-relay route 200 int s0 200
```

```
FRSwitch(config-if)# no shutdown
```

!!! Configure Router B as a Frame-Relay Connectivity

```
RouterB(config)# int s0
RouterB(config-if)# ip address 10.0.0.2 255.0.0.0
RouterB(config-if)# encapsulation frame-relay
RouterB(config-if)# no shutdown
```

!!! Configure Router C acts as a Central Router

```
RouterC(config)# int s0
RouterC(config-if)# no ip address
RouterC(config-if)# encap frame-relay
```

!!! Configure Point to Point Connectivity

```
RouterC(config-if)# int s0.1 point-to-point
RouterC(config-subif)# ip address 10.0.0.1 255.0.0.0
RouterC(config-subif)# frame-relay interface-dlci 100
```

!!! Configure Point to Point Connectivity

```
RouterC(config)# int s0.2 point-to-point
RouterC(config-subif)# ip address 11.0.0.1 255.0.0.0
RouterC(config-subif)# frame-relay interface-dlci 200
```

!!! Configure Router D as a Frame-Relay Connectivity

```
RouterD(config)# int s0
RouterD(config-if)# encapsulation frame-relay
RouterD(config-if)# ip address 11.0.0.2 255.0.0.0
RouterD(config-if)# no shutdown
```

## Verification:-

FRSwitch # **sh frame-relay route**

Input Intf	Input Dlci	Output Intf	Output Dlci	Status
Serial0	100	Serial1	100	active
Serial0	200	Serial2	200	active
Serial1	100	Serial0	100	active
Serial2	200	Serial0	200	active

**Active Shows all Site are connected.**

FRSwitch # **sh frame-relay pvc**

### **PVC Statistics for interface Serial0 (Frame Relay DCE)**

DLCI = 100, DLCI USAGE = SWITCHED, PVC STATUS = ACTIVE, INTERFACE = Serial0

input pkts 21	output pkts 17	in bytes 3040
out bytes 1650	dropped pkts 1	in FECN pkts 0

pvc create time 00:08:58, last time pvc status changed 00:02:18

DLCI = 200, DLCI USAGE = SWITCHED, PVC STATUS = ACTIVE, INTERFACE = Serial0

input pkts 27	output pkts 35	in bytes 3814
---------------	----------------	---------------

### **PVC Statistics for interface Serial1 (Frame Relay DCE)**

DLCI = 100, DLCI USAGE = SWITCHED, PVC STATUS = ACTIVE, INTERFACE = Serial1

pvc create time 00:07:12, last time pvc status changed 00:02:32

### **PVC Statistics for interface Serial2 (Frame Relay DCE)**

DLCI = 200, DLCI USAGE = SWITCHED, PVC STATUS = ACTIVE, INTERFACE = Serial2

input pkts 36	output pkts 27	in bytes 2632
out bytes 3814	dropped pkts 0	in FECN pkts 0

pvc create time 00:06:29, last time pvc status changed 00:03:13

```
RouterB# sh int s0
Serial0 is up, line protocol is up
  Internet address is 10.0.0.2/8
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation FRAME-RELAY, loopback not set, keepalive set (10 sec)
LMI DLCI 1023 LMI type is CISCO frame relay DTE
Broadcast queue 0/64, broadcasts sent/dropped 1/0, interface broadcasts 0
09:18: %FR-5-DLCICHANGE: Interface Serial0 - DLCI 100 state changed to ACTIVE
00:09:19: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0, changed
                                state to up
```

```
RouterB# ping 11.0.0.1
Sending 5, 100-byte ICMP Echos to 11.0.0.1, timeout is 2 seconds:
```

.....  
Success rate is 0 percent (0/5)

```
RouterB# ping 11.0.0.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 11.0.0.2, timeout is 2 seconds:
```

.....  
Success rate is 0 percent (0/5)

```
RouterB(config)# router rip
RouterB(config-router)# network 10.0.0.0
RouterB# sh ip route
```

```
C  10.0.0.0/8 is directly connected, Serial0
R  11.0.0.0/8 (120/1) via 10.0.0.1, 00:00:10, Serial0
```

```
RouterB# ping 11.0.0.1
Sending 5, 100-byte ICMP Echos to 11.0.0.1, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 60/68/100 ms
```

```
RouterB# ping 11.0.0.2
Sending 5, 100-byte ICMP Echos to 11.0.0.2, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 116/116/116 ms
```

RouterB# **sh frame-relay map**

Serial0 (up): ip 10.0.0.1 dlci 100(0x64,0x1840), dynamic,  
broadcast,, status defined, active

RouterC# **sh frame-relay pvc**

PVC Statistics for interface Serial0 (Frame Relay DTE)

DLCI = 100, DLCI USAGE = LOCAL, PVC STATUS = ACTIVE, INTERFACE = Serial0.1  
input pkts 102      output pkts 126      in bytes 8950

DLCI = 200, DLCI USAGE = LOCAL, PVC STATUS = ACTIVE, INTERFACE = Serial0.2  
input pkts 211      output pkts 119      in bytes 12124  
out bytes 16096      dropped pkts 0      in FECN pkts 0

RouterC# sh frame-relay map

**Serial0.1 (up): point-to-point dlci, dlci 100(0x64,0x1840), broadcast  
status defined, active**

**Serial0.2 (up): point-to-point dlci, dlci 200(0xC8,0x3080), broadcast  
status defined, active**

RouterC# ping 10.0.0.2

Sending 5, 100-byte ICMP Echos to 10.0.0.2, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 60/60/60 ms

RouterC# ping 10.0.0.1

Sending 5, 100-byte ICMP Echos to 10.0.0.1, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 112/116/124 ms

---

Lab6

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```
RouterD# sh int s0
Serial0 is up, line protocol is up
  Hardware is HD64570
  Internet address is 11.0.0.2/8
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation FRAME-RELAY, loopback not set, keepalive set (10 sec)
  LMI enq sent 3, LMI stat recv 0, LMI upd recv 0, DTE LMI up
  LMI enq recv 6, LMI stat sent 0, LMI upd sent 0
LMI DLCI 1023 LMI type is CISCO frame relay DTE
```

RouterD#sh frame-relay lmi

<b>LMI Statistics for interface Serial0 (Frame Relay DTE) LMI TYPE = CISCO</b>	
Invalid Unnumbered info 0	Invalid Prot Disc 0
Invalid dummy Call Ref 0	Invalid Msg Type 0

**00:03:56: %FR-5-DLCICHANGE: Interface Serial0 - DLCI 200 state changed to ACTIVE**

RouterD#sh frame-relay pvc

**PVC Statistics for interface Serial0 (Frame Relay DTE)**

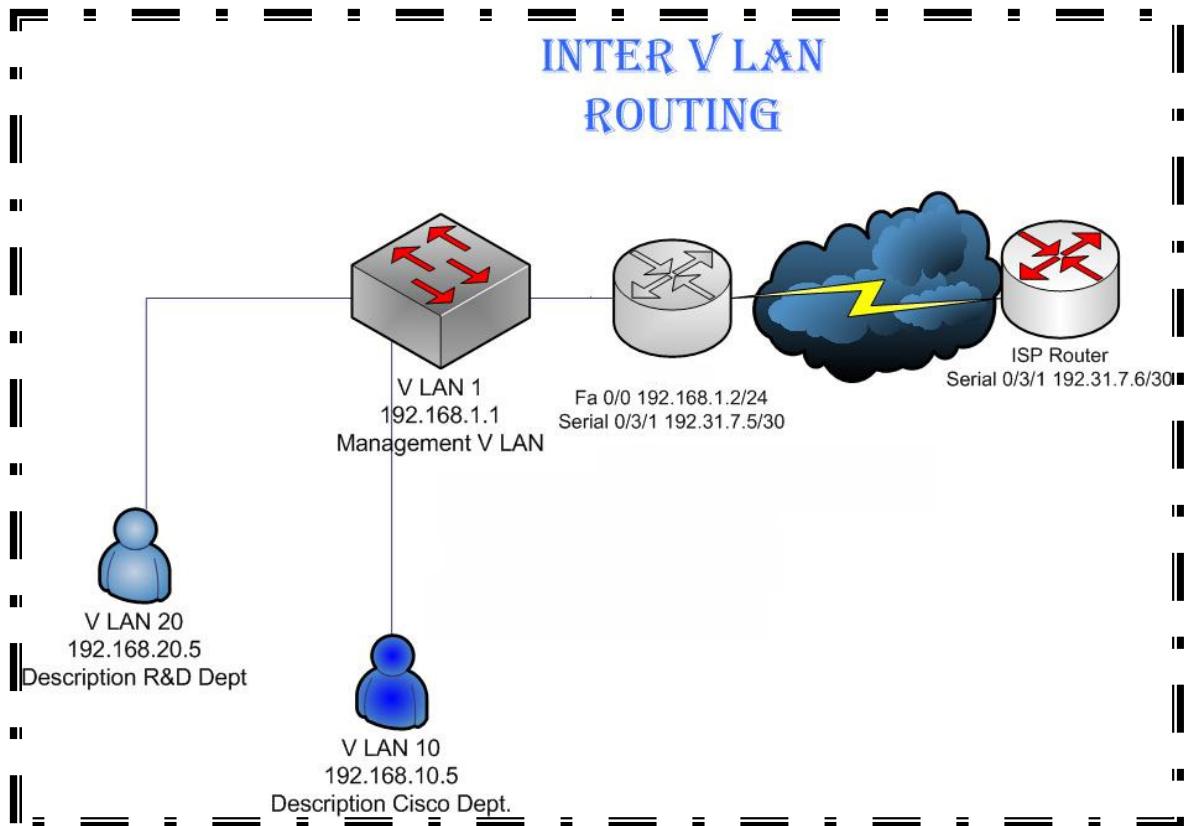
**DLCI = 200, DLCI USAGE = LOCAL, PVC STATUS = ACTIVE, INTERFACE = Serial0**

input pkts 171	output pkts 309	in bytes 22582
out bytes 16864	dropped pkts 3	in FECN pkts 0
in BECN pkts 0	out FECN pkts 0	out BECN pkts 0
in DE pkts 0	out DE pkts 0	
out bcast pkts 263	out bcast bytes 12124	

pvc create time 00:45:18, last time pvc status changed 00:45:08

## LAB 7

### Inter VLAN Routing



Router>**enable**  
 Router# **conf t**  
 Enter configuration commands, one per line. End with CNTL/Z.

```
Router(config)# hostname ISP
ISP(config)# int serial 0/3/1
ISP(config-if)# ip address 192.31.7.5 255.255.255.252
ISP(config-if)# clock rate 64000
ISP(config-if)# no shutdown
ISP(config-if)#

ISP(config)# int loopback 0
ISP(config-if)# ip address 198.133.219.1 255.255.255.0
ISP(config-if)# description SIMUALTES THE REMOTE WEBSITES
ISP(config-if)# exit
ISP(config)# exit
```

### !!! Save The Configuration

```
ISP# write memory
Building configuration...
(OK)
```

ISP# <b>sh ip int brief</b>	Interface	IP-Address	OK?	Method	Status	Protocol
	FastEthernet0/0	nassigned	YES	unset	administratively down	down
	FastEthernet0/1	unassigned	YES	unset	administratively down	down
	Serial0/3/0	unassigned	YES	unset	administratively down	down
	Serial0/3/1	192.31.7.5	YES	manual	up	up
	Loopback0	198.133.219.1	YES	manual	up	up

```
Router>
Router>en
Router# conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# hostname CISCOM
CISCOM(config)# int Serial 0/3/1
CISCOM(config-if)# ip address 192.31.7.6 255.255.255.252
CISCOM(config-if)# no shutdown
CISCOM(config-if)# description ISP_LINK
CISCOM(config-if)# exit
CISCOM(config)# int fastEthernet 0/0
CISCOM(config-if)# no shutdown
CISCOM(config-if)# duplex full
CISCOM(config-if)# exit
```

#### [!!! Configure Management VLAN](#)

```
CISCOM(config)# int fastEthernet 0/0.1
CTSCOM(config-subif)# description MANAGE VLAN
CTSCOM(config-subif)# encapsulation dot1Q 1 native
CTSCOM(config-subif)# ip address 192.168.1.1 255.255.255.0
CTSCOM(config-subif)# exit
```

```
CISCOM(config)# int fastEthernet 0/0.10
```

```
CTSCOM(config-subif)# description CISCO DEPT. VLAN 10
```

#### [!!! Encapsulation Dot1q](#)

```
CTSCOM(config-subif)# encapsulation dot1Q 10
CTSCOM(config-subif)# ip address 192.168.10.1 255.255.255.0
```

Lab7

Prepared by  
Sir Umar Gul

### !!! Configure Sub Interface

```
CISCOM(config-if)# int fastEthernet 0/0.20
CISCOM(config-subif)# description R&D Dept. vlan 20
CISCOM(config-subif)#encapsulation dot1Q 20
CISCOM(config-subif)# ip address 192.168.20.1 255.255.255.0
CISCOM(config-subif)# exit
CISCOM(config)# exit
CISCOM#copy running-config startup-config
```

Destination filename (startup-config)?

Building configuration...

(OK)

### CISCOM# sh ip int brief

Interface	IP-Address	OK?	Method	Status	Protocol
FastEthernet0/0	unassigned	YES	unset	up	up
FastEthernet0/0.1	192.168.1.1	YES	manual	up	up
FastEthernet0/0.10	192.168.10.1	YES	manual	up	up
FastEthernet0/0.20	192.168.20.1	YES	manual	up	up
FastEthernet0/1	unassigned	YES	unset	administratively down	down
Serial0/3/0	unassigned	YES	unset	administratively down	down
Serial0/3/1	192.31.7.6	YES	SLARP	up	up

### CISCOM# sh interfaces fastEthernet 0/0.1 description

Interface	Status	Protocol	Description
Fa0/0.1	up	up	MANAGE VLAN

**CISCOM#sh interfaces fastEthernet 0/0.10**

FastEthernet0/0.10 is up, line protocol is up  
 Hardware is Gt96k FE, address is 0007.0e68.60b6 (bia 0007.0e68.60b6)  
 Description: CISCO DEPT. VLAN 10  
 Internet address is 192.168.10.1/24  
 MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,  
 reliability 255/255, txload 1/255, rxload 1/255  
 Encapsulation 802.1Q Virtual LAN, Vlan ID 10.  
 ARP type: ARPA, ARP Timeout 04:00:00  
 Last clearing of "show interface" counters never

**CISCOM# sh interfaces fastEthernet 0/0.20**

FastEthernet0/0.20 is up, line protocol is up  
 Hardware is Gt96k FE, address is 0007.0e68.60b6 (bia 0007.0e68.60b6)  
 Description: R&D Dept. vlan 20  
 Internet address is 192.168.20.1/24  
 MTU 1500 bytes, BW 100000 Kbit, DLY 100 usec,  
 reliability 255/255, txload 1/255, rxload 1/255  
 Encapsulation 802.1Q Virtual LAN, Vlan ID 20.  
 ARP type: ARPA, ARP Timeout 04:00:00  
 Last clearing of "show interface" counters never

Press RETURN to get started  
 Switch>enable  
 Switch# **config terminal**  
 Switch(config)# **hostname Layer2-SWITCH**  
 Layer2-SWITCH(config)# **no ip domain-lookup**

**!!! Create VLAN**  
 Layer2-SWITCH(config)# **vlan 10**

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!!!Optional Command

```
Layer2-SWITCH(config-vlan)# name CISCO_DEPT  
Layer2-SWITCH(config-vlan)# exit
```

```
Layer2-SWITCH(config)# vlan 20
```

```
Layer2-SWITCH(config-vlan)# name R&D  
Layer2-SWITCH(config-vlan)# exit
```

!!! Assign Range to Vlan 10

```
Layer2-SWITCH(config)# int range fastEthernet 0/1 – 5  
Layer2-SWITCH(config-if-range)# switchport mode access  
Layer2-SWITCH(config-if-range)# switchport access vlan 10  
Layer2-SWITCH(config-if-range)# exit
```

!!!Assign port Range to VLAN 20

```
Layer2-SWITCH(config)# int range fastEthernet 0/6 – 10  
Layer2-SWITCH(config-if-range)# switchport mode access  
Layer2-SWITCH(config-if-range)# switchport access vlan 20  
Layer2-SWITCH(config-if-range)# exit
```

!!! Trunking Port

```
Layer2-SWITCH(config)# int fastEthernet 0/22  
Layer2-SWITCH(config-if)# description TRUNK LINK B/W CTTC AND SWITCH  
Layer2-SWITCH(config-if)# switchport mode trunk
```

05:33:53: %LINEPROTO-5-UPDOWN: Line protocol on Interface  
FastEthernet0/22, changed state to up

```
Layer2-SWITCH(config-if)# exit  
Layer2-SWITCH(config)# int vlan 1
```

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!!! Assign IP address to VLAN 1 for Manage the Switch

Layer2-SWITCH(config-if)# **ip address 192.168.1.2 255.255.255.0**

Layer2-SWITCH(config-if)# **no shutdown**

Layer2-SWITCH(config-if)# **exit**

Layer2-SWITCH(config)# **ip default-gateway 192.168.1.1**

Layer2-SWITCH(config)# **exit**

!!! Configuration Saved

Layer2-SWITCH# **write mem**

Building configuration...

(OK)

Assign IP ADDRESS TO PC 192.168.10.5 which exist in VLAN 10

Assign IP ADDRESS TO PC 192.168.20.5 which exist in VLAN 20

---

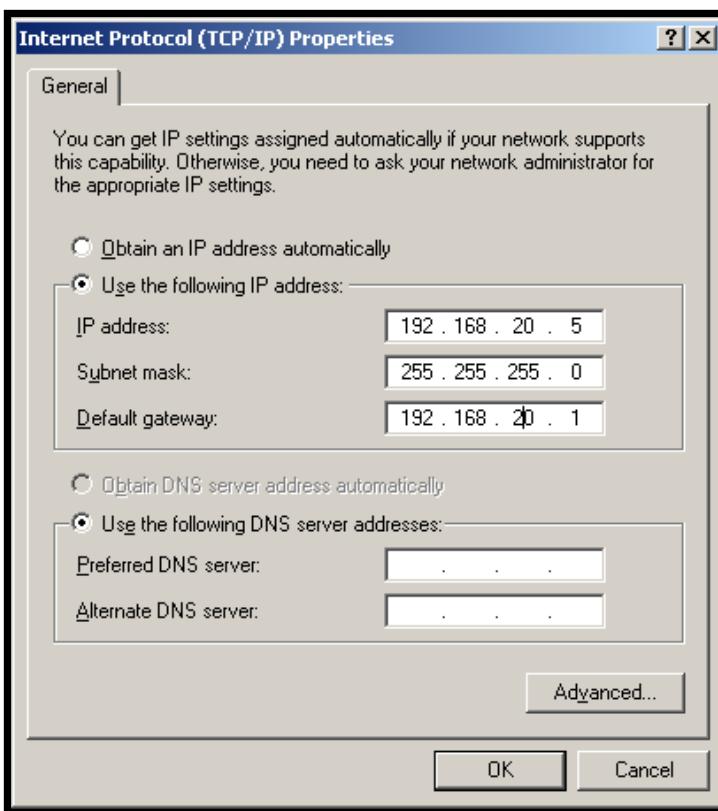
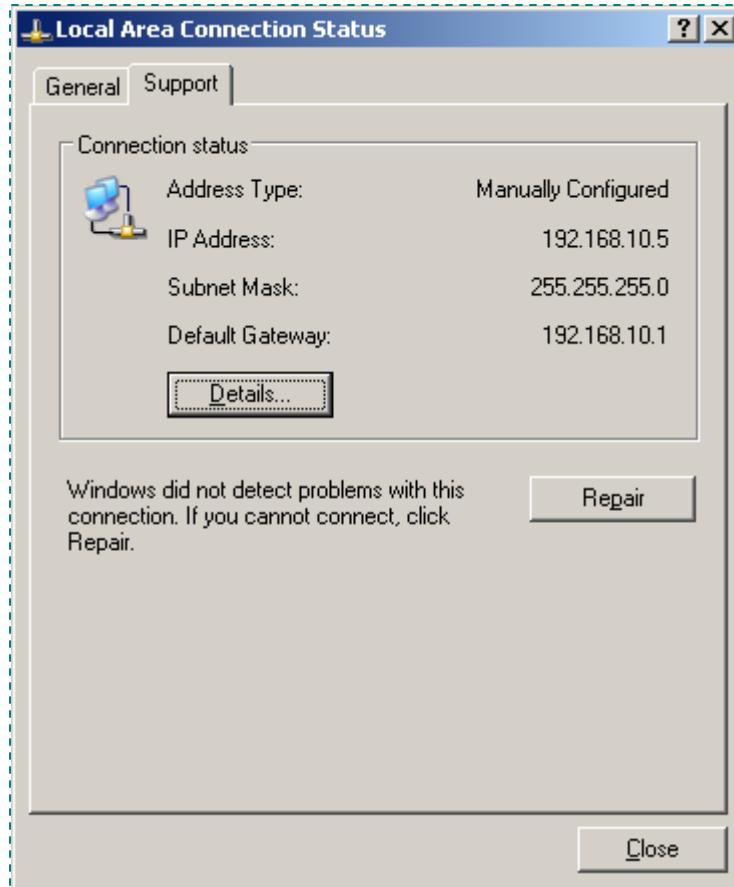
Lab7

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```
C:\WINDOWS\system32\cmd.exe
Windows IP Configuration

Ethernet adapter Local Area Connection:

  Connection-specific DNS Suffix . . . . .
  IP Address . . . . . : 192.168.10.5
  Subnet Mask . . . . . : 255.255.255.0
  IP Address . . . . . : fe80::2b0:d0ff:feca:4f6x4
  Default Gateway . . . . . : 192.168.10.1

Tunnel adapter Teredo Tunneling Pseudo-Interface:

  Connection-specific DNS Suffix . . . .
  IP Address . . . . . : fe80::5445:5245:444fx5
  Default Gateway . . . . .

Tunnel adapter Automatic Tunneling Pseudo-Interface:

  Connection-specific DNS Suffix . . .
  IP Address . . . . . : fe80::5efe:192.168.10.5x2
  Default Gateway . . . . .

C:\Documents and Settings\Administrator>
```

```
C:\WINDOWS\system32\cmd.exe - ping 192.168.20.5 -t
  IP Address . . . . . : fe80::2b0:d0ff:feca:4f6x4
  Default Gateway . . . . . : 192.168.10.1

Tunnel adapter Teredo Tunneling Pseudo-Interface:

  Connection-specific DNS Suffix . . .
  IP Address . . . . . : fe80::5445:5245:444fx5
  Default Gateway . . . . .

Tunnel adapter Automatic Tunneling Pseudo-Interface:

  Connection-specific DNS Suffix . . .
  IP Address . . . . . : fe80::5efe:192.168.10.5x2
  Default Gateway . . . . .

C:\Documents and Settings\Administrator>ping 192.168.20.5 -t

Pinging 192.168.20.5 with 32 bytes of data:

Reply from 192.168.20.5: bytes=32 time<1ms TTL=127
```

## Show Commands For Verify:

**CISCOM#sh vlans**

Virtual LAN ID: 1 (IEEE 802.1Q Encapsulation)

vLAN Trunk Interface: FastEthernet0/0.1

This is configured as native Vlan for the following interface(s)

:FastEthernet0/0

Protocols Configured:	Address:	Received:	Transmitted:
IP	192.168.1.1	0	0
Other		0	27

49 packets, 8187 bytes input

27 packets, 7313 bytes output

Virtual LAN ID: 10 (IEEE 802.1Q Encapsulation)

vLAN Trunk Interface: FastEthernet0/0.10

Protocols Configured:	Address:	Received:	Transmitted:
IP	192.168.10.1	411	350
Other		0	4

Virtual LAN ID: 10 (IEEE 802.1Q Encapsulation)

vLAN Trunk Interface: FastEthernet0/0.10

Protocols Configured:	Address:	Received:	Transmitted:
IP	192.168.10.1	411	350
Other		0	4

411 packets, 36469 bytes input

354 packets, 28128 bytes output

Virtual LAN ID: 20 (IEEE 802.1Q Encapsulation)

vLAN Trunk Interface: FastEthernet0/0.20

Protocols Configured:		Address:	Received:	Transmitted:
IP		192.168.20.1	407	361
Other			0	4

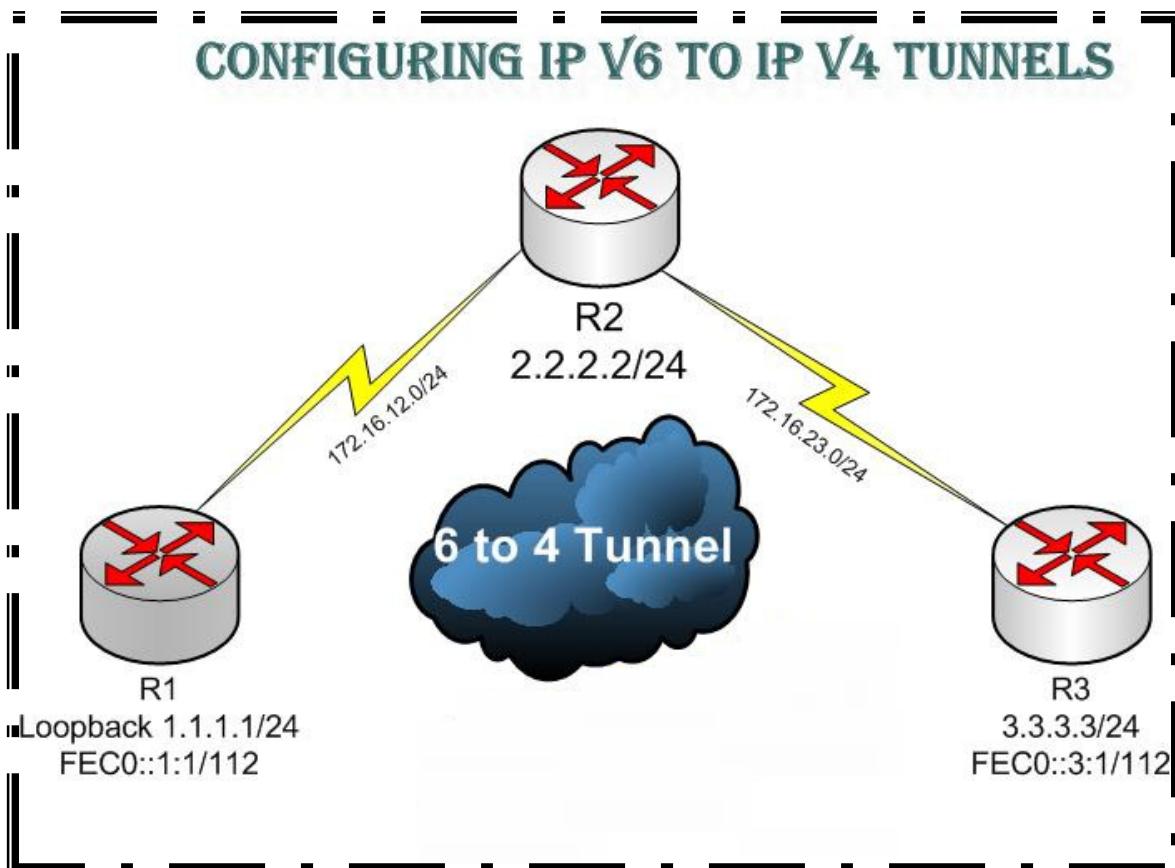
407 packets, 34990 bytes input  
365 packets, 28986 bytes output

**CISCOM#sh vlans dot1q**

Total statistics for 802.1Q VLAN 1:  
53 packets, 8769 bytes input  
28 packets, 7685 bytes output  
Total statistics for 802.1Q VLAN 10:  
488 packets, 42475 bytes input  
431 packets, 34134 bytes output  
Total statistics for 802.1Q VLAN 20:  
474 packets, 40400 bytes input  
431 packets, 34134 bytes output

## Lab 8

### Configure 6 to 4 Tunnel



```
R1(config)# interface loopback0
R1(config-if)# ip address 1.1.1.1 255.255.255.0

R1(config-if)# ipv6 address FEC0::1:1/112

R1(config-if)# interface serial0/0/0
R1(config-if)# ip address 172.16.12.1 255.255.255.0
R1(config-if)# clockrate 64000
R1(config-if)# no shutdown
```

```
R2(config)# interface loopback0
R2(config-if)# ip address 2.2.2.2 255.255.255.0
R2(config-if)# interface serial0/0/0
R2(config-if)# ip address 172.16.12.2 255.255.255.0
R2(config-if)# no shutdown

R2(config-if)# interface serial0/0/1
R2(config-if)# ip address 172.16.23.2 255.255.255.0
R2(config-if)# clockrate 64000
R2(config-if)# no shutdown
```

```
R3(config)# interface loopback0
R3(config-if)# ip address 3.3.3.3 255.255.255.0
R3(config-if)# ipv6 address FEC0::3:1/112
R3(config-if)# interface serial0/0/1
R3(config-if)# ip address 172.16.23.3 255.255.255.0
R3(config-if)# no shutdown
```

## Configure EIGRP

!!! Make sure you disable auto summarization

```
R1(config)# router eigrp 1
R1(config-router)# no auto-summary
R1(config-router)# network 10.0.0.0
R1(config-router)# network 172.16.0.0
```

```
R2(config)# router eigrp 1
R2(config-router)# no auto-summary
R2(config-router)# network 10.0.0.0
R2(config-router)# network 172.16.0.0
```

```
R3(config)# router eigrp 1
R3(config-router)# no auto-summary
R3(config-router)# network 10.0.0.0
R3(config-router)# network 172.16.0.0
```

## Create a 6 to 4 Tunnel

!!! Configure a Manual IPV6 Tunnel

```
R1(config)# interface tunnel 0
R1(config-if)# tunnel mode ipv6ip 6to4
R1(config-if)# ipv6 address 2002:AC10:0C01:1::1/64
R1(config-if)# tunnel source serial0/0/0
R1(config-if)# exit
R1(config)# ipv6 route 2002::/16 tunnel0
```

```
R3(config)# interface tunnel 0
R3(config-if)# tunnel mode ipv6ip 6to4
R3(config-if)# ipv6 address 2002:AC10:1703:1::3/64
R3(config-if)# tunnel source serial0/0/1
R3(config-if)# exit
R3(config)# ipv6 route 2002::/16 tunnel0
```

R1# **ping 2002:AC10:1703:1::3**

Type escape sequence to abort.  
Sending 5, 100-byte ICMP Echos to 2002:AC10:1703:1::3, timeout is 2 seconds:  
!!!!Success rate is 100 percent (5/5), round-trip min/avg/max = 64/67/68 ms

## Configure a IPV6 Static Routes

```
R1(config)# ipv6 unicast-routing
R1(config)# ipv6 route FEC0::3:0/112 2002:AC10:1703:1::3
```

```
R3(config)# ipv6 unicast-routing
R3(config)# ipv6 route FEC0::1:0/112 2002:AC10:C01:1::1
```

**Verify the status:-**

**R1#show ipv6 route**

IPv6 Routing Table - 8 entries

Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP

U - Per-user Static route

I1 - ISIS L1, I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary

O - OSPF intra, OI - OSPF inter, OE1 - OSPF ext 1, OE2 - OSPF ext 2

ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2

D - EIGRP, EX - EIGRP external

S 2002::/16 (1/0)via ::, Tunnel0

C 2002:AC10:C01:1::/64 (0/0) via ::, Tunnel0

L 2002:AC10:C01:1::1/128 (0/0)via ::, Tunnel0

L FE80::/10 (0/0)via ::, Null0

C FEC0::1:0/112 (0/0)via ::, Loopback0

L FEC0::1:1/128 (0/0)via ::, Loopback0

S FEC0::3:0/112 (1/0)via 2002:AC10:1703:1::3

L FF00::/8 (0/0)via ::, Null0

**R1# ping FEC0::3:1**

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to FEC0::3:1, timeout is 2 seconds:

Success rate is 100 percent (5/5), round-trip min/avg/max = 64/67/68 ms

**R3# ping FEC0::1:1**

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to FEC0::1:1, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 64/66/68 ms

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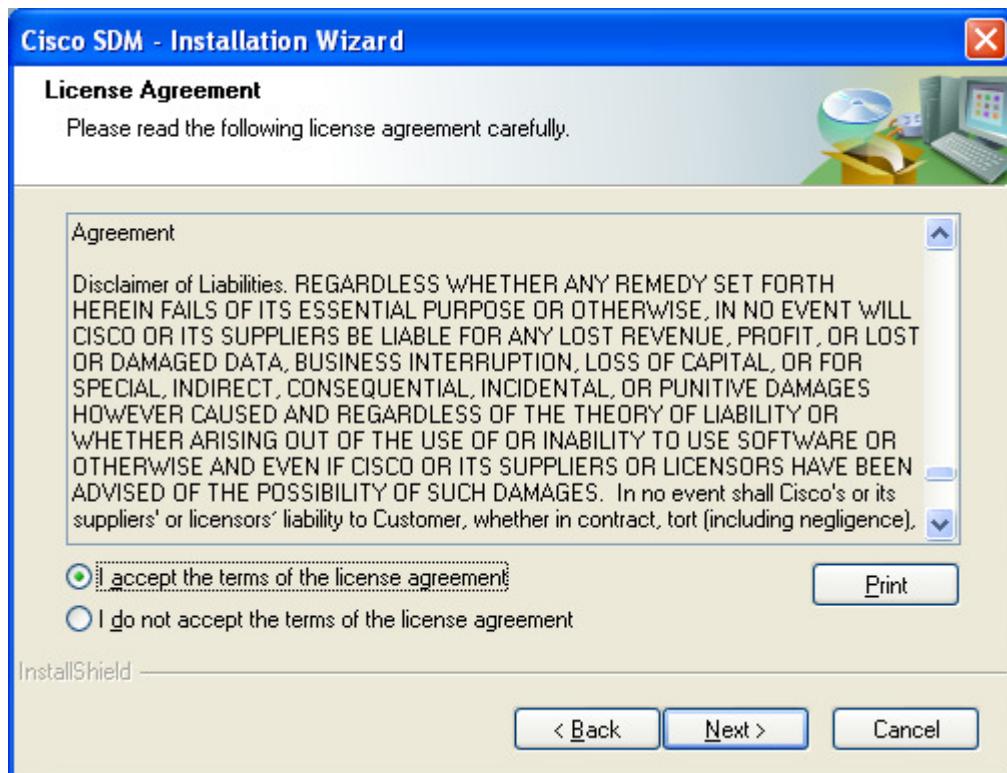
## LAB 8

### SDM (Secure Device Manager)

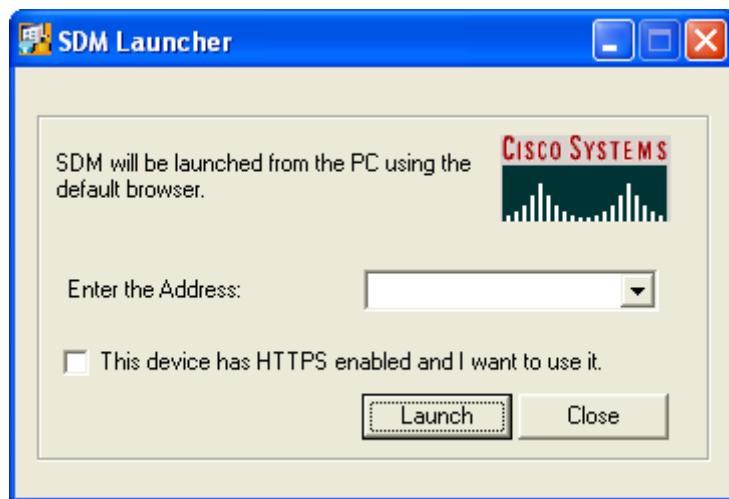
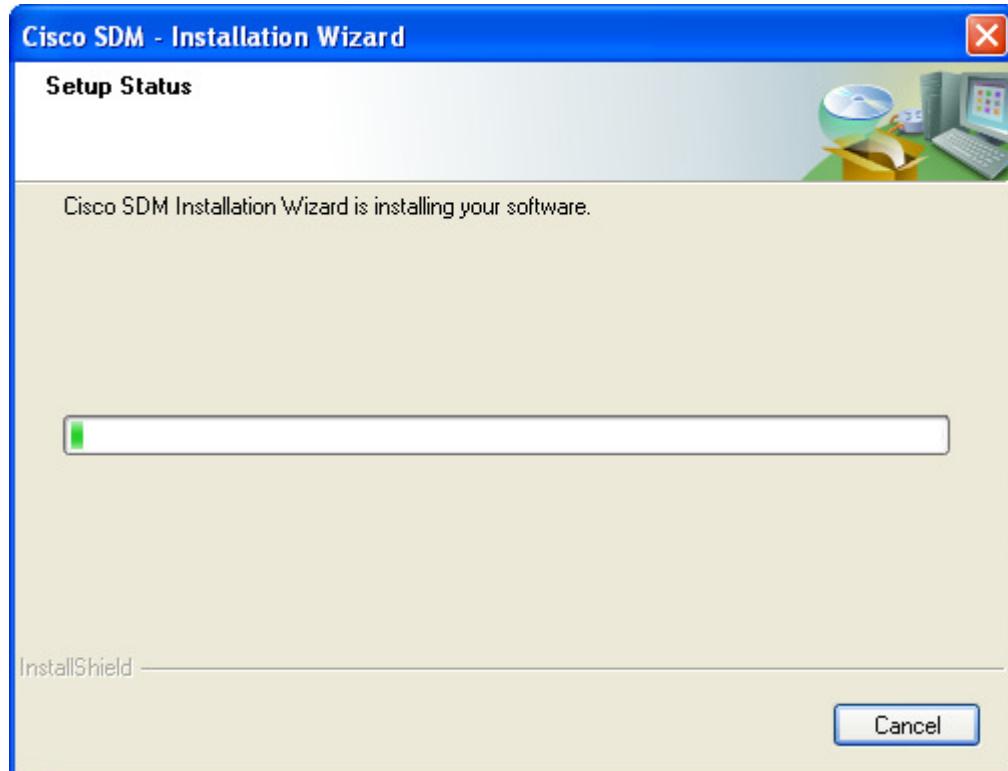
#### Installation



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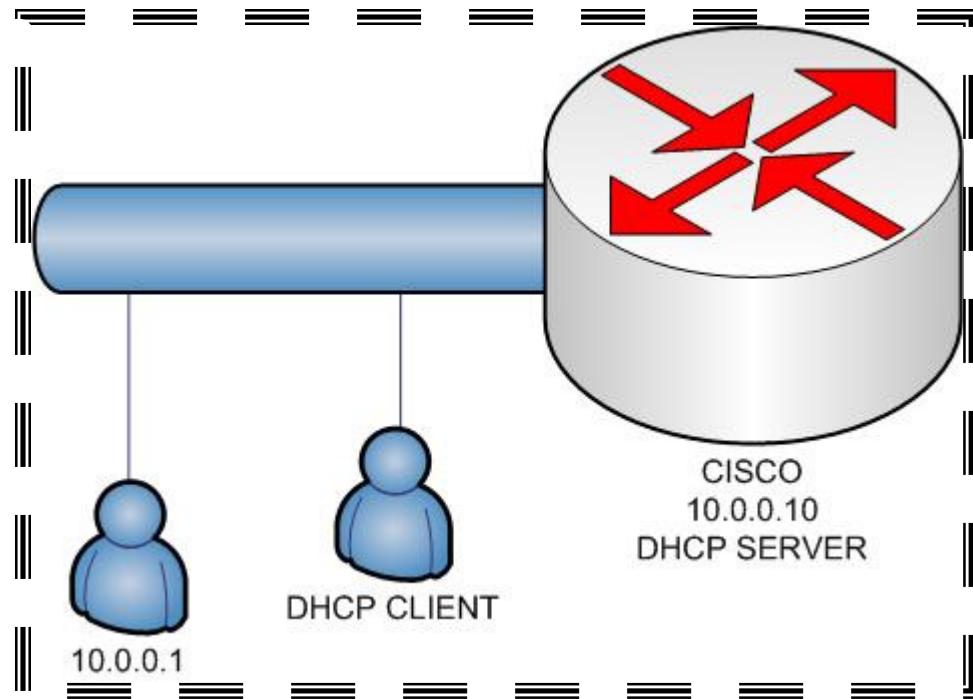


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Sir Umar Gul



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Prepared by  
Sir Umar Gul

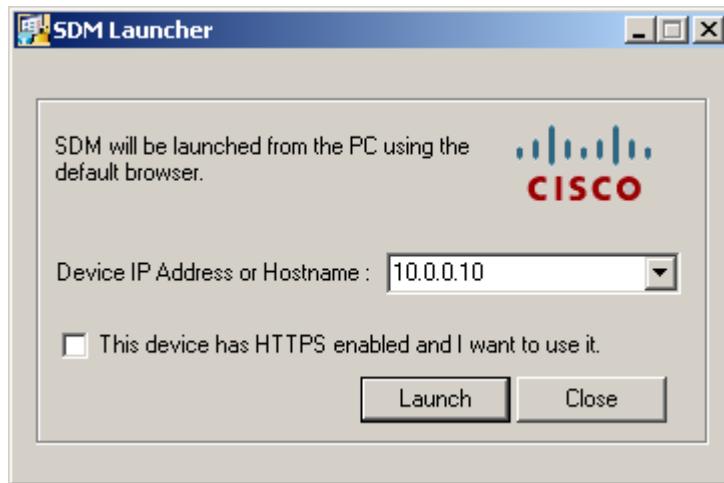
## Configuration and Network Diagram



!!! Enable HTTP Server.

```
CISCO(config)# ip http server
CISCO(config)# ip http authentication local
CISCO(config)# username furqan password cisco
CISCO(config)# enable password ctfc
```

!!! Go to SDM Desktop Icon and double Click



!!! After Establish a connection this screen is shown

The image shows the Cisco Router and Security Device Manager (SDM) interface. The window title is "Cisco Router and Security Device Manager (SDM): 10.0.0.10". The menu bar includes File, Edit, View, Tools, and Help. The toolbar includes Home, Configure, Monitor, Refresh, Save, Search, and Help buttons. The Cisco logo is in the top right corner.

The main pane displays the "Interfaces and Connections" section. The left sidebar shows "Tasks" and various icons for Firewall and ACL, VPN, Security Audit, Routing, NAT, Intrusion Prevention, Quality of Service, NAC, and Additional Tasks. The "Interfaces and Connections" tab is selected, showing the "Edit Interface/Connection" sub-tab. The "Interface List" table shows the following interfaces:

Interface	IP	Type	Slot	Status	Description
FastEthernet0/0	no IP address	10/100Ethernet	0	Down	
FastEthernet0/1	10.0.0.10	10/100Ethernet	0	Up	
Serial0/3/0	no IP address	Serial	0	Down	
Serial0/3/1	no IP address	Serial	0	Down	

Below the table, details about the FastEthernet0/1 interface are shown:

Item Name	Item Value
IP address/subnet mask	10.0.0.10/255.0.0.0
NAT	<None>
Access Rule - inbound	<None>
Access Rule - outbound	<None>
IPSec Policy	<None>
Inspect Rule - inbound	<None>
Inspect Rule - outbound	<None>
Easy VPN Remote	<None>
QoS policy - outbound	<None>
QoS Policy - inbound	<None>

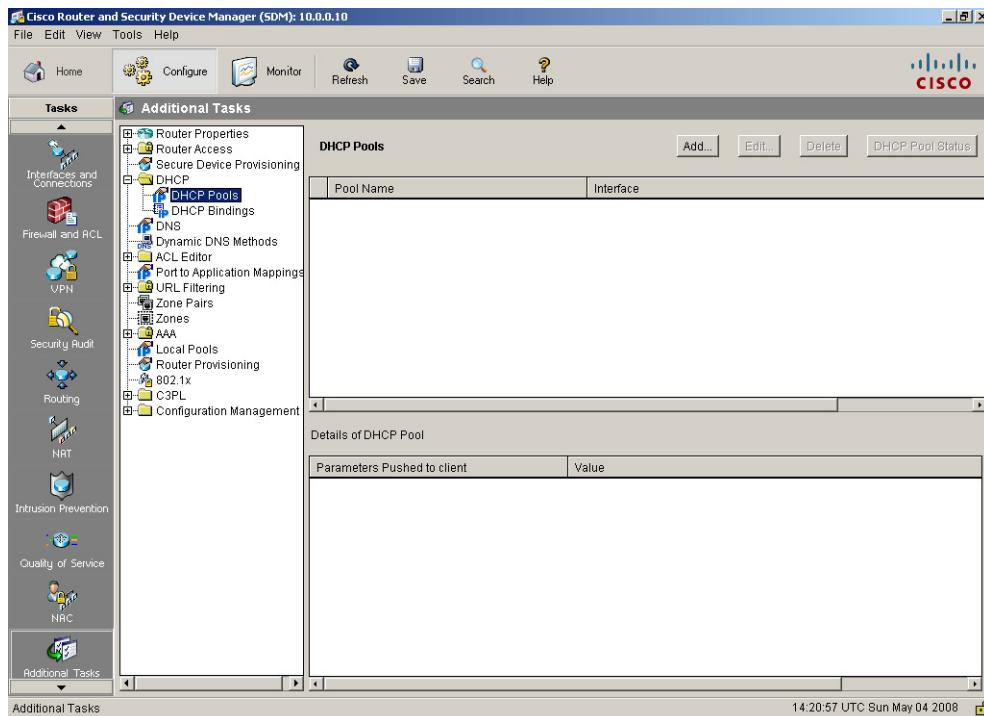
The status bar at the bottom shows "14:18:24 UTC Sun May 04 2008".

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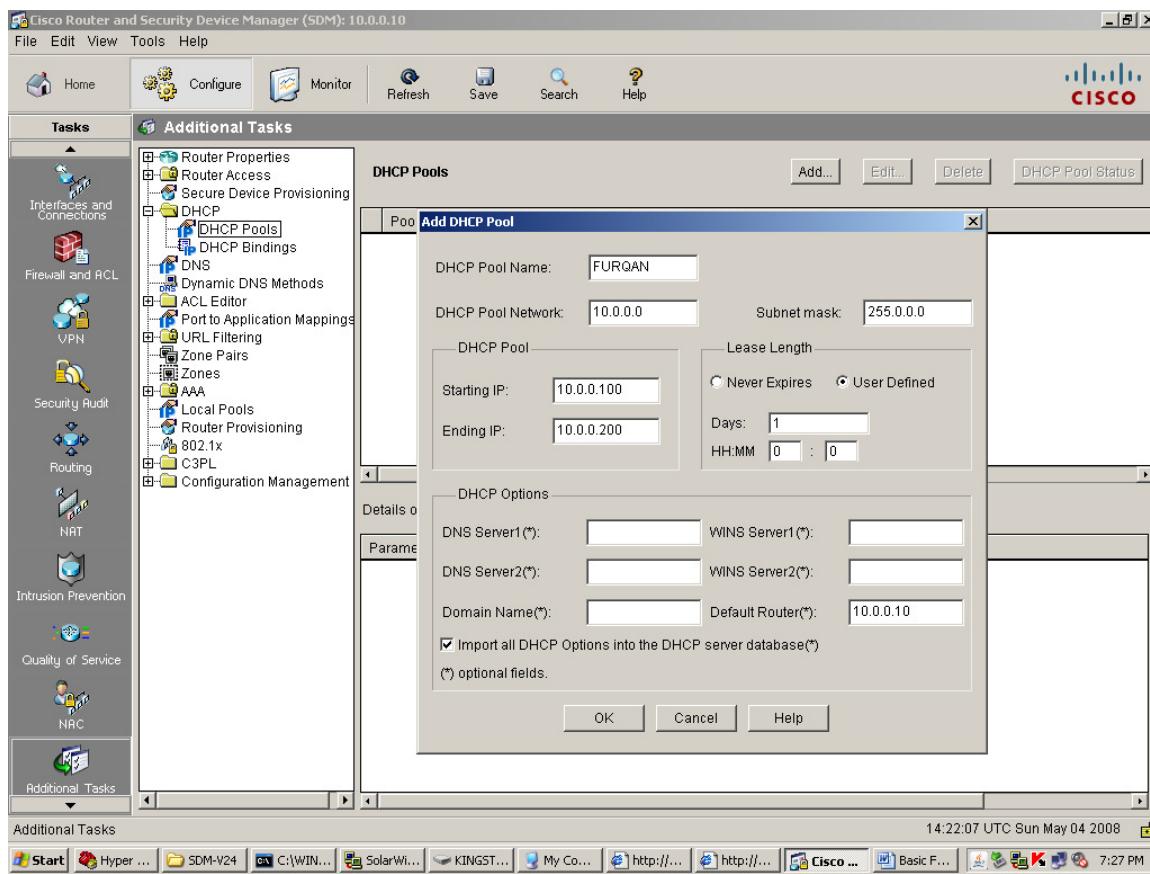
For Configure DHCP SERVER AS a Router go to

Additional Task → DHCP → DHCP POOL → ADD

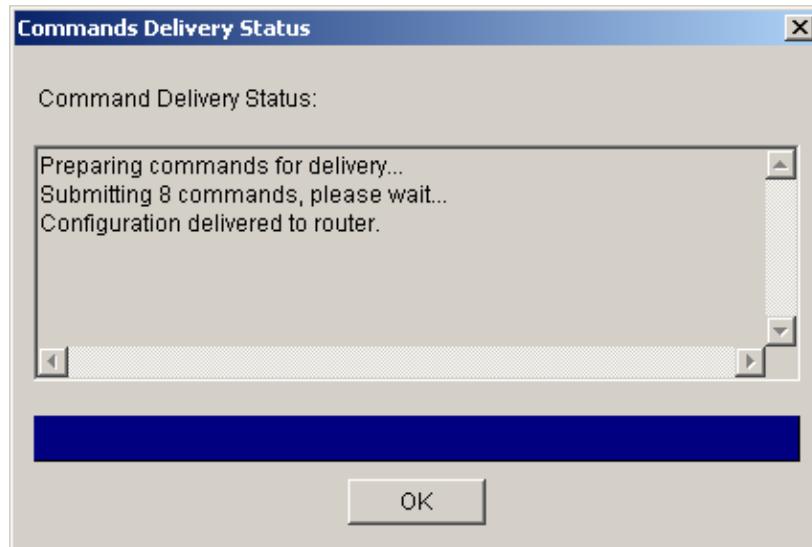


!!! This Screen Appears after Press ADD Button

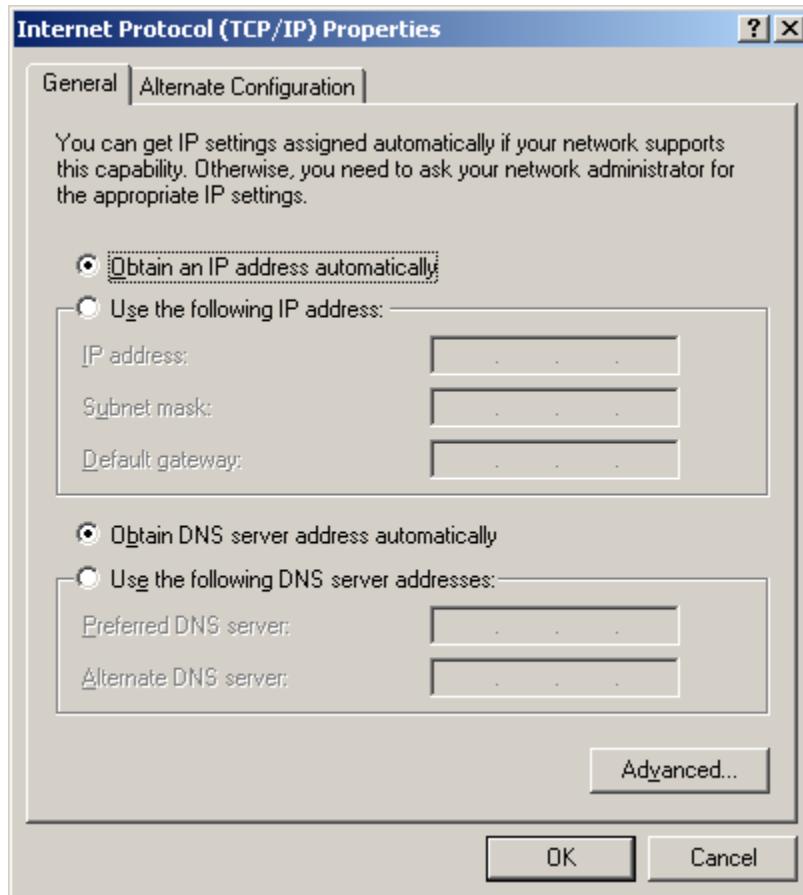
- Assign DHCP Pool Name
- Assign DHCP Pool Network
- Assign Subnet Mask
- Assign Starting IP and Ending
- Assign Default Router
- Then Click ok
- Apply the Settings



### !!! Policy Push on Router



### Verification



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## IP assign to DHCP Client using DHCP Server

```

C:\> C:\WINDOWS\system32\cmd.exe
Windows IP Configuration

Ethernet adapter Local Area Connection:
  Connection-specific DNS Suffix . :
  IP Address . . . . . : 10.0.0.100
  Subnet Mask . . . . . : 255.0.0.0
  Default Gateway . . . . . : 10.0.0.10

Tunnel adapter Teredo Tunneling Pseudo-Interface:
  Connection-specific DNS Suffix . :
  IP Address . . . . . : fe80::5445:5245:444f%5
  Default Gateway . . . . . :

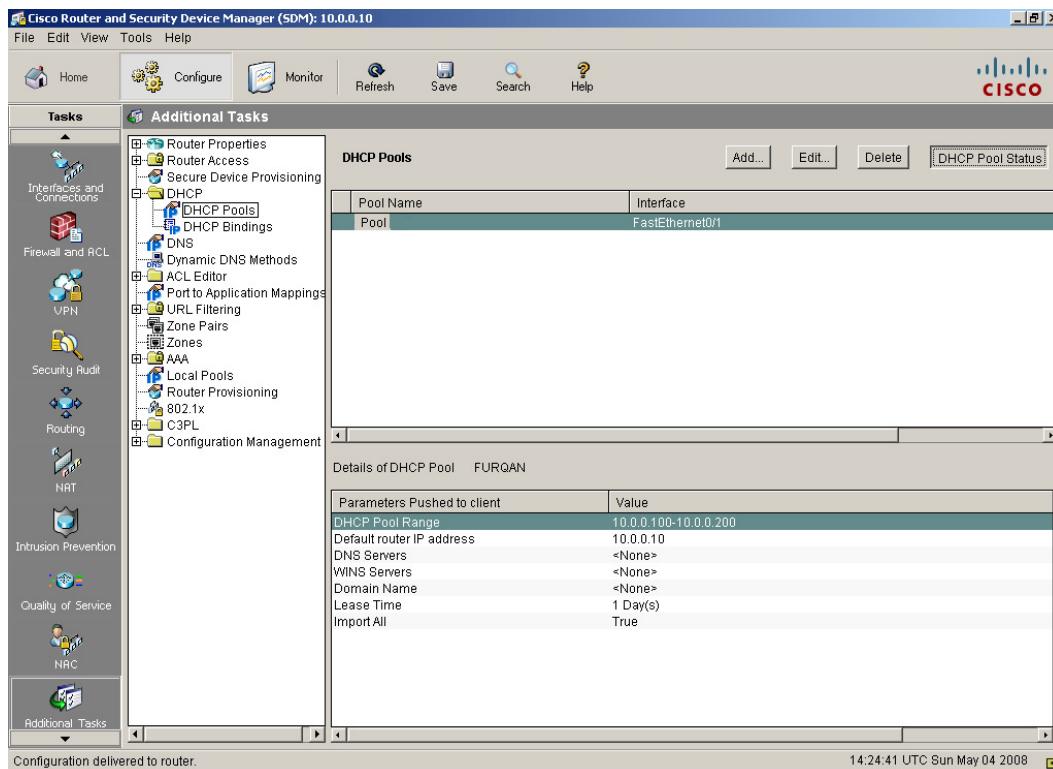
Tunnel adapter Automatic Tunneling Pseudo-Interface:
  Connection-specific DNS Suffix . :
  IP Address . . . . . : fe80::5efe:10.0.0.100%2
  Default Gateway . . . . . :

C:\>

```

!!! Verification in Router

Go to DHCP → DHCP Pools → Check the DHCP Pool Status to Show the lease ip.

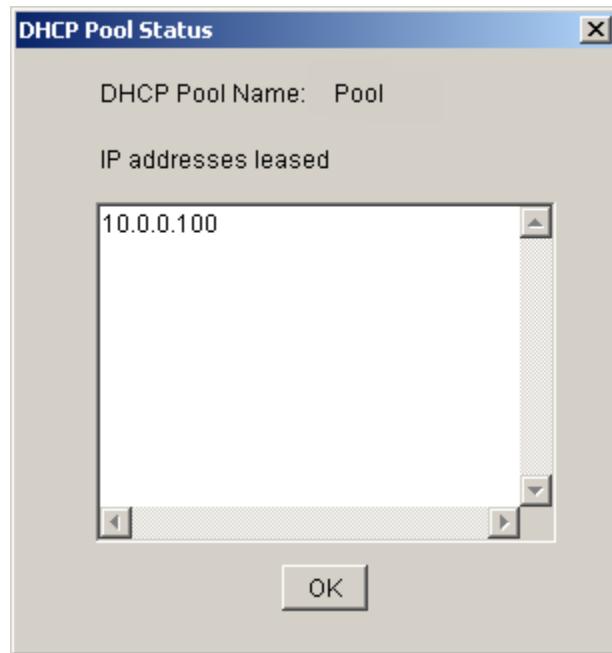


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The Lease ip addresses are listed below



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