

## What is Microsoft?

Microsoft is Company Name This Company Are Product Windows or Software

Product:→ Windows XP. 2000. 98. 2003 ETC

Also Product:→ Application Software M.S Office. ETC

## What is Four Pillars of I.T?

Meaning of I.T (Information Technology)

1:→ Programs

(Visual Basic)

Java / oracle

2:→ Data Base

(SQL Server)

3:→ Web Page

(ASP.Net)

3:→ Network

(MCSE / Mcitp)

## What is Cisco System

Cisco System INC is an American Multination Corporation that is Designs and Sells Consumer Electronics Network Such Router. Switch. Access Point. Pix firewall. Bridge ETC

Cisco has more Then 65000 Are Employment Working all of the world

The have in 2010 Income Billion \$ Business the Main Branch of Cisco is in Sanfrancisco California USA

The World Cisco is taking Frame Word Fran Cisco



Golden Bridge

## What is Cisco Certification Level?

1:→ Architecture

CCAP

2:→ Expert

CCIE

Cisco Certified Internet work Expert

3:→ Professional

CCNP

Cisco Certified Network Professional

4:→ Associate

CCNA

Cisco Certified Network Administrator

ICND 2

Inter Connection Cisco Network Devices 2

5:→ Entry

ICND 1

Inter Connection Cisco Network Devices 1

## What is Certification Cisco Level System CCNA

By port

Full

ICND 1{640-822}

CCNA {640-812}

ICND 2{640-816}

Cisco Certified Network Administrator

## What is CCENT

Cisco Certified Enter Network Technology

About Version Information Cisco System

CCNA {1.0} Years 2000

CCNA {2.0} Years No Information

CCNA {3.0} Years July. 2000

CCNA {4.0} Year Sep. 2007

## CCNA Exam Procedure

### Online Registration

[www.VUE.Com](http://www.VUE.Com) {640-802} {640-822} {640-816}

Select I.T: → Cisco → CCNA → ICND 1 → ICND 2

Create Profile

Select Counter Name

Select Exam Center

Reschedule Exam

Exam Total Number is 1000

Exam Paper Time only "90" Mantis

Provisional Certificate after 2 Mont original Certificate you will Receive

Total Paper Cost

CCNA 250 \$

ICND2 125 \$

ICND1 125 \$

Also Exam Question MCQS

Multiplan Choice Question

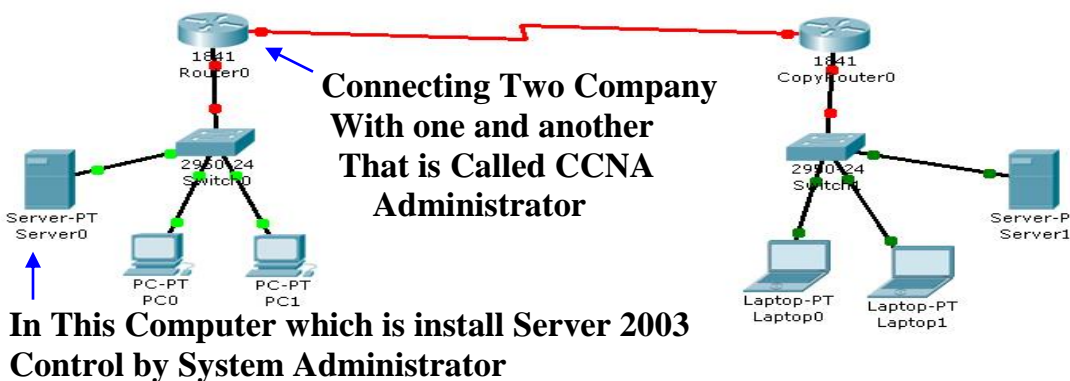
Dumps Out of Paper

Pass 4 Sure

Testing



## What Is Defend between MCSE and CCNA



## What is Network?

LAN

MAN

WAN

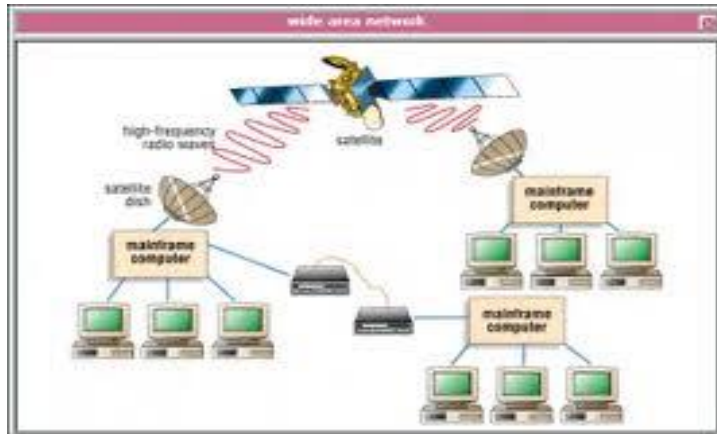
→ What is LAN: Local Area Network

A Group of Pc Are Connected with One Another by Cable which is Single Location That Is Called LAN  
EXP: Room, LAB, Building, and Company



### →What is MAN: Metropolitan Area Network

Combine Different LAN with One Another With in City That Is Called MAN



### →What is WAN: Wide Area Network

Group OF Pc Are Connected With One Another By Geographically



### What is Network

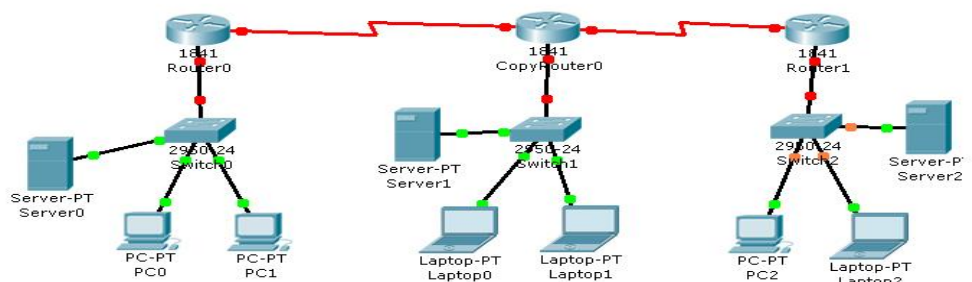
A Group of Pc Are connected with one And Another by Cable that is Called Network



### What is Networking?

A Group of Pc Are Connected with one and another by Cable they are sharing Resources that is called Networking

### A Have Some Network on Some Different Place



## What is Internetwork?

Combination of LAN or WAN is Called Internetwork

Combination of Network with One and another that is Called Internetwork

## What is Segment?

When we divide Large Internet into Small Network that is Called Network Segment



## What is LAN Requirement?

### Wired LAN

- Pc
- Connector
- LAN Card
- Cable
- Switch /Hub /Bridge
- Crimping Tools
- Testing Meter

### Wireless LAN

- Access Point
- Wife
- Wireless USB
- LAN Card
- PC Card

## What is LAN Card?

Used to connect two Devices With one Another that is LAN card.

Names of LAN Cards

- Network Adapter
- Nice Card
- Network Interface Card



## Types of LAN card

### → Beltane

→ What is Beltane :- Attach in Mother Board

→ What is Non Beltane :- Manually insert in Expansion Slot

### → Non-Beltane

## What is HUB

Meaning of HUB {Hybrid Unit Board}

- Half Duplex
- 10 Mbps
- Non-intelligent
- Collision / One Door
- Work On Physical Layer
- Low Bandwidth
- Old Technology
- Used In LAN
- Broad Costing
- Have 8,16,24,32, ports
- High Latency
- Also Called Multipart Repeater



## What is Duplex?

Meaning of Duplex (Communication a Way)

### Simplex

→ What is Simple Duplex:

Only Receive Information

Exp: TV Antenna

### Haif

→ What is Half Duplex

Only One Time Information Sending or Receiving

Exp: Hub

### Full

→ What is Full Duplex:

At one Time Sending or Receiving

Exp: Internet, Mobil

## Types of HUB

### Passive

Not Amplifier Send and Receive Data

Oldest Device

### Active

Amplifier Send and Receive Data

Monitoring Ports

2 Ports Sending and Receive

### Intelligent

## What is Amplifier?

Convert Weak Signals into Strong Signals

## What is Intelligent?

### Normal

Used in LAN Side

Can't Block Ports

Can't Control Management

Can't Create, Change, Delete Ports

### Catalyst

Used in LAN Side

Block Ports

Control Management

Create, Change, Delete only Ports

### Multi layer

Used in WAN Side

Just Like Catalyst

Switch

Fast Communication

## What is Bridge

→ LAN Device

→ Full Duplex

→ 100 Mbps

→ Low Latency

→ Work On Data Link Layer

→ Operating On Software

→ Have 2, 4 ports

→ 100 Mbps

→ Intelligent Device

→ Mac Table

Is used to Store Mac address of LAN Card

Send / Receive LAN According MAC Address

Send / Receive WAN According IP Address

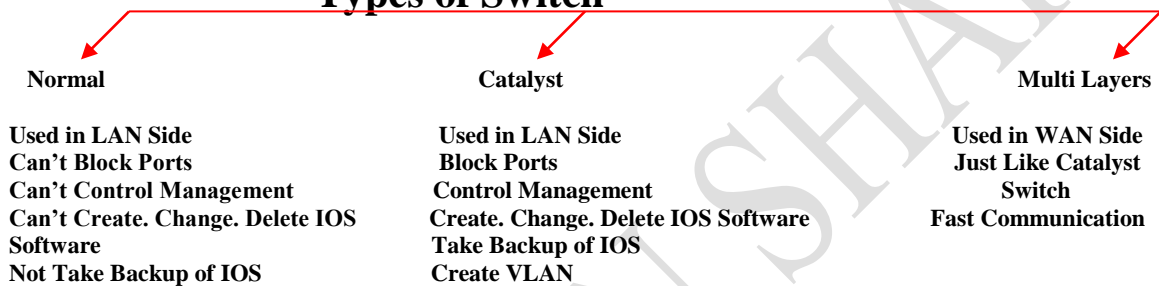


## What is Switch

- LAN Device
- Intelligent Device
- Have 8, 16, 32 ports
- Broadcast
- 10, 100 Mbps
- Half and Full Duplex
- Low Latency
- Mac Table
- Work on Hardware (Application Specific Integrated Circuit)
- Operating On Data Link Layer
- New Technology
- Bridge / Switch Work Faster Than Router



## Types of Switch



Note: → IOS Internet work Operation System This Software Installed in Switch

## Connector

**R J**  
**Register Jack**

Modem 11      LAN 45



## Crimping Tools

Or

Punching Tools





## How Many Cable

→ Coaxial Cable

→ Fiber Optic Cable

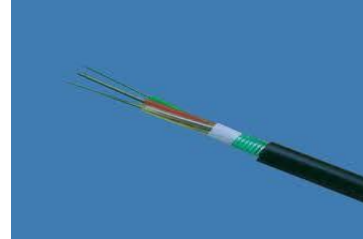
→ Twisted pair cable

### Fiber Optic Cable

→ Fiber Optic Cable use for High communication Speed

→ Fast Data Transfer

→ Mostly use in WAN side



### Coaxial Cable

→ Coaxial Cable is use in TV cable is called Coaxial cable

→ This is used in Bus Topology



### Twisted Pair cable

#### UTP

Unshielded Twisted Pair

Use in LAN

Cheaper Then STP

Not Good Quality

Then STP



#### STP

Shield Twisted pair

Used in LAN

Expensive

Good Quality



### Cable

→ Used For Some Device

→ Combination Of Cress Cable

→ Side (1) W+Orange == Orange == W+Green == Blue == W+Blue == Green == W+Brown == Brown

→ Side (2) W+Green == Green == W+Orange == Blue == W+Blue == Orange == W+Brown == Brown

→ Formula 12 36 send or Receiving

→ Formula 36 12 Send or Receiving

→ EXP:

→ HUB → Hub

→ Switch → Switch

→ Pc → Pc

Pin ID	side A	side B
1	Orange-white	green-white
2	Orange	green
3	green-white	orange-white
4	blue	brown-white
5	blue-white	brown
6	green	orange
7	brown-white	blue
8	brown	blue-white

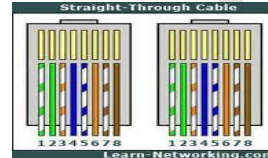
## Straight Cable

→ When We Face Different Device for this Purpose we have Use Straight Cable  
 → We covet or Make Straight Cable

→ Side (1) W+Orange==Orange==W+Green==Blue==W+Blue==Green== W+Brown==Brown

→ Side (2) W+Orange==Orange==W+Green==Blue==W+Blue==Green==W+Brown==Brown

→ Formal 12 36 Send or Receiving  
 → Formal 12 36 Send or Receiving



## What is Router

LAN / WAN Device → Router Work in our LAN also Work on WAN Said

Break up Collision →

Routing Table → All Information of Router save Here

Routed Protocol → That Means Forward Information from One Router to Another

Routing Protocol → Find Best part for you self which Router is near to our Router

Security

Netting → Convert LAN IP into WAN IP Address

Send / Receive Data According to IP Address

Operator / Network Layer → Frame become to Packet



## What is OSI Model

Meaning of OSI Model Open System Interconnection

Meaning of OSI Model Organization Standardization International

Development in 1984

Development by 150 Organization Standardization International

First Time Two Different Company Computers was not Connecting with One and Another for this Propose OSI Company is Coming then Start our Project

Exp: → Dell Company → Intel Company at was not Work With one and another  
 Compaq Company → Dell Company

When This Company Start Our Project in 1977 Up to 1984 these are Complete Our Project  
 After That Two Company Work with one and another Connected Start

Dell Company → Intel Company  
 Compaq Company → Dell Company

## What is Layers

1: → Application Layer  
 2: → Presentation Layer  
 3: → Session Layer  
 4: → Transport Layer  
 5: → Network Layer  
 6: → Data Link Layer  
 7: → Physical Layer

This Four Layers Work on Host or Computer

This Tree Layers Work on Network or Cable, Switch, Router, HUB



## What is Physical Layer

Last Layer of OSI Model

Work on Bit Transmission

Work on Signal

Work on Repeater, Hub, NIC Card

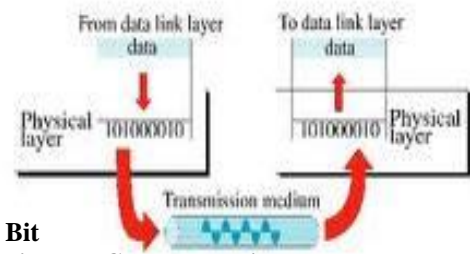
All Cable Used Here

Encode. Decode

Note: When We Press Same Alphabet {A} this A is Converting to Bit

Hub is Also Understanding Bit When Some Date is come to Hub this Date Convert to Bit

Cable is Also Understanding Bit When we Sending Some Date this Date is out from Cable in this Time Date Converting On Bit or going by Bit



## What is Data Link Layers

Work on Bridge, Switch, NIC Card

Bit Become Frame

MAC Table

Sending or Receive Farm According to MAC Address

Sub Layer Are DC

{Meaning of DC Direct Connect}

LLC 8.2.3

Logical Link Control

Used to Establish Maintain  
Connection B/W Devices

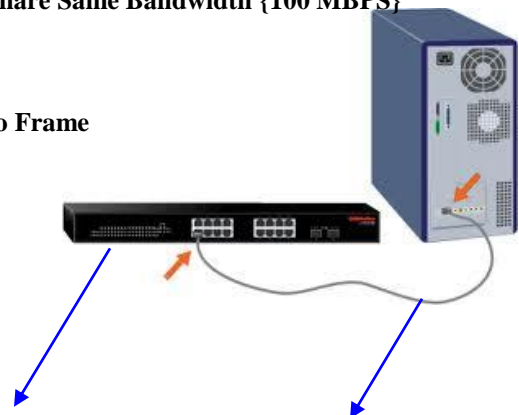
MAC

Media Access Control

Used to Share Same Bandwidth {100 MBPS}

{Protocol}

Note: When the Date Come in Switch in this Time Bit Convert to Frame



Frame Working

BIT Working

## Types of Connection

Logical

{Software or Protocol}

Physical

{Hardware}

LAN Code 802.2

Wife Code 802.11

UFone Code 0333

Jazz Code 0300

## What is Network Layers

Router Used in This Layer

Router Table

Routing Protocol

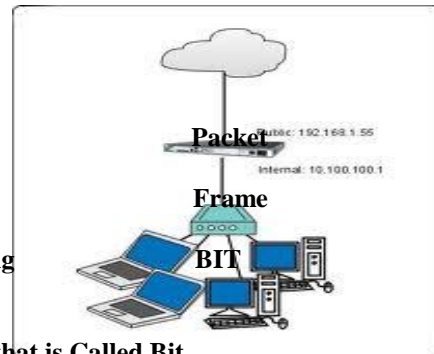
Routed Protocol

Frame Become to Packet

Sending or Receiving Packet According to IP Address

Netting LAN to WAN converting that is Called Netting

Security Used in Here



Note: When we Sending something that is out of Computer that is Called Bit

When Data Go to Switch That Time Become to BIT Convert to Frame

When Data Out of Switch Frame Convert to Packet

## What is Routing Protocol

The Process of Moving a Packet of Data from Source to Destination that is Called Routing Protocol

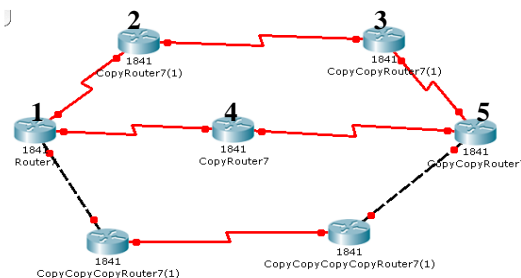
Used to Find Best Path between Routers

Used to Learn Route for Routed Protocol

Routing Protocol Are Protocol That Specifies How Router Communication with Each Other

Routers 1 do Communication with Router 5

The Best Part of Router 1 is Router 4



## What is Routed Protocol

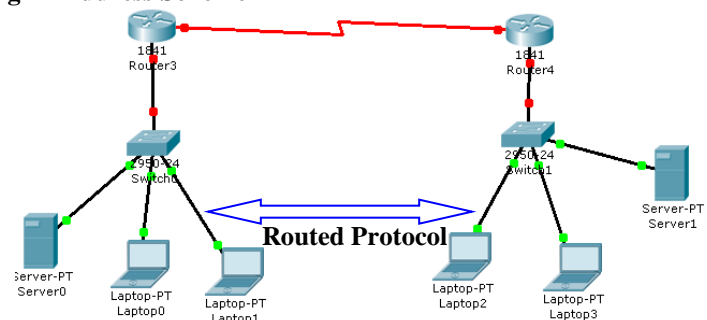
Routed Protocol is Used to Carry User Data Traffic Such as Email, FTP, that Best Path Defines Routing Protocol

Transfer Data one Router to Another VIA Using IP Address Scheme

Routed Protocol

TCP

UDP



## Types of Routed Protocol

Routable

TCP

UDP

ETC

Non Routable

Let Bios

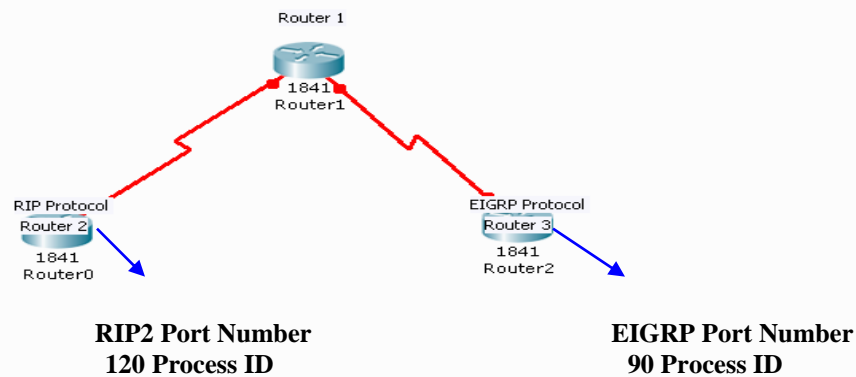
Basic Input and Output System

Share Domain Name Every Side

## What is Routed Protocol Basically

**Administrative Distance** is a Value that Router Used in Order to Select that Best Path When There are Two or More Defend Routed to the Same Destination from Two Defend Routing Protocol  
Each Routing Protocol Has its Own Port

**Note:**→ Less Administrator Distance Consider as Best Route Protocol Number Each Routing Protocol Has Own Port Number Start : 0 End: 255

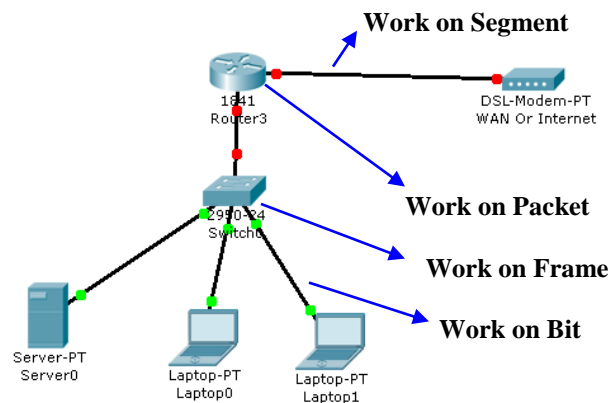


## What is Routing Table?

Used to Store all Successor or Neighbor Router IP Address and all Information of another Router save Hare in Routing Table

## What is Transport Layers?

Also Called Layers 4  
Packet Become to Segment  
Communication Start Hare  
Protocol  
Port  
Multiplexing / Demultiplexing  
Flow Control  
Windowing



## Protocol

Set of Rules That Govern on Data Communication or Language of Network is Protocol

Exp:

## Sport

Hockey

Football

Cricket

## Types of Protocol

### TCP

Transmission Control Protocol  
 Connection oriented  
 Reliable  
 Hello. Acknowledgement  
 Slow Communication

### UDP

user Data gram protocol  
 Connection  
 Unreliable  
 Hello  
 Fast Communication

## Types of TCP

IP	Internet Protocol:→	We have Assign IP Address in LAN Card
FTP	File Transfer protocol:→	We have Transfer or Upload Data in WAN Said
SMTP	Simple Mail Transfer Protocol:→	Mail of one Computer go to Another Computer
PoP3	Post Office Protocol:→	When we have offline our Mail Save in our Index
Http	Hyper Text Transfer Protocol:→	This is Used for Browsing Website any one
Telnet	Tele Communication Network:→	This is Work on CMD or Command Mode
RDP	Remote Desktop Protocol:→	This is Used for Remotely giving another Computer
HTTPS	Hyper Text Transfer Protocol Service:→	This is Used Protect our Index

## Types of UDP

DHCP Dynamic Host Configuration Protocol:→ Used to Provides Automatic IP Address to Client Pc  
 TFTP Trivial File Transfer Protocol:→ Used to take Backup of Router and Switch IOS and also Provide Restoration Facilities

## What is Port?

### Communication Channel

Each Protocol has its own Port Number  
 Range of Port Number 1 65535

## Types of Ports

### Physical

Mouse Port  
 Keyboard port  
 Printer Port

### Logical

FTP 20.21  
 HTTP 80  
 HTTPS 443

## Port and Protocol

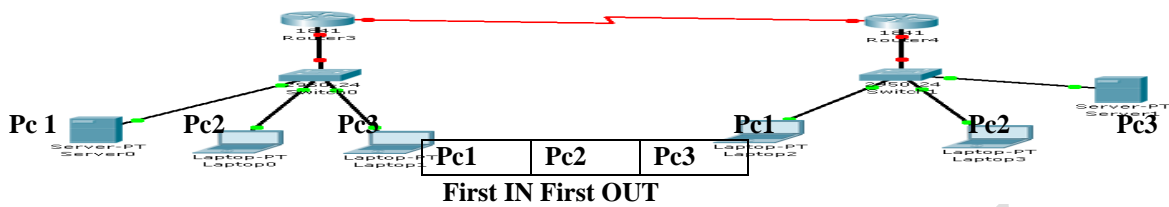
Protocol	Port
FTP	20.21
HTTP	80
HTTPS	443
SMTP	25
POP3	110
TELNET	23
DHCP	67.68
DNS	53

## What is Flow Control?

This is a Technique by which we Know that how Network Traffic Manage Control



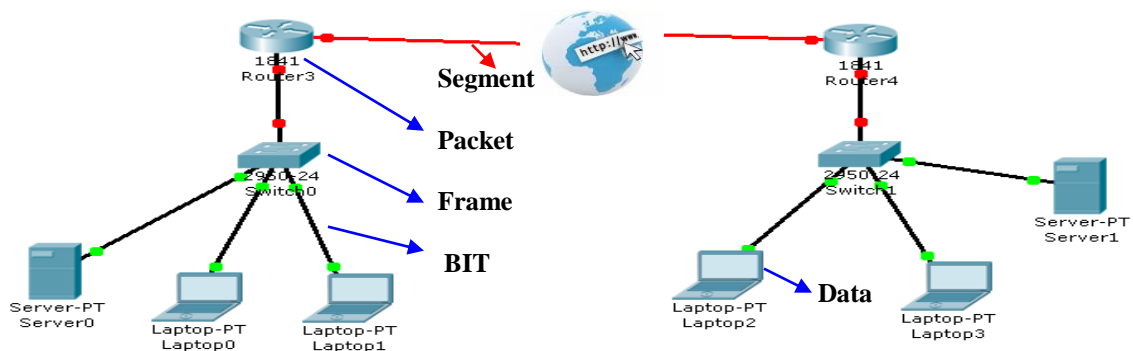
### What is Windowing?



### What is Session Layer

Segment Become to Data

**Session Layer:** This layer is responsible for establishing the process-to-process communication between the hosts in the network. This layer is responsible for establishing and ending the sessions across the network. The interactive login is an example of services provided by this layer in which the connectives are re-connected in care of any interruption.

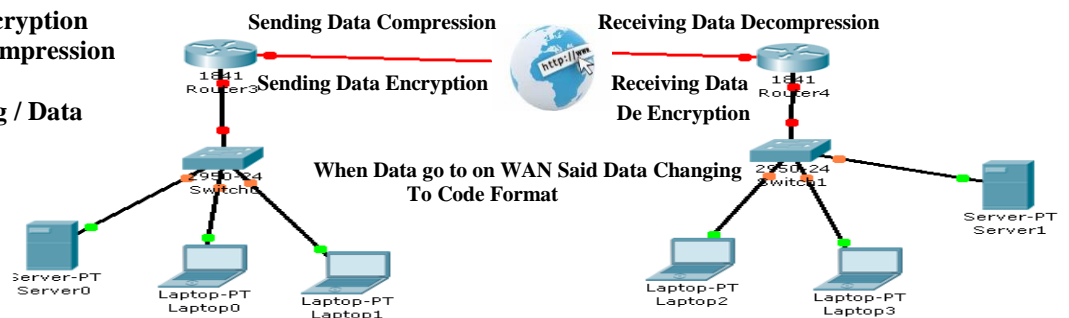


**Note:** When Data of another Computer Branch receive this is Called Session Layer

### What is Presentation Layer

Data

Encryption / De Encryption  
Compression / Decompression  
Code Format  
Image / Video / Song / Data



## Compression

A Technique That is used to increase Hard disk Space and Decreases File Size that is Called Compression

## Decompression

A Technique that is used to come back data into original Size that is Called Decompression

## Encryption

A Technique that is used to Secure files Data from unauthorized user that is called Encryption

## De Encryption

A Technique that is used to come back Data Encryption from to Readable that is Called De Encryption

## What is Code Format

When the Data go on the WAN Said Data come into Code Format

Exp:     #? #A@   This is Called Code Format

Note of Presentation Layer:→

The Presentation layer is responsible for protocol conversion, data encryption/decryption, Expanding graphics command and the data compression. This layer makes the communications between two hosts possible.

## What is Application Layer?

Data

User Working on Computer

FTP. SMTP. HTTP. Chatting. ETC

Application Layer: The application layer provides different services to the application. Example of services provided by this layer are file transfer, electronic messaging e-mail, virtual terminal access and network management.



## All Layers

Application Layers	{Data}
Presentation Layers	{Data}
Session Layers	{Data}
Transport Layers	{Segment}
Network Layers	{Packet}
Data Link Layers	{Frame}
Physical Layers	{Bit}

## What is Cisco Hierarchical Model

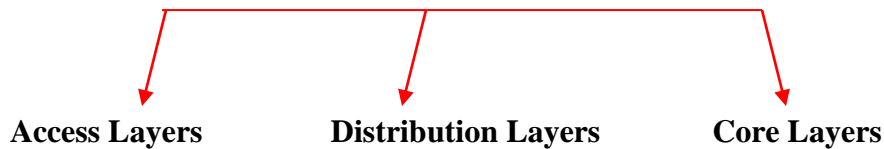
Also Cisco Internetworking Model

Logical

Cisco has 3 Layer



## Cisco Layers



### What is Access Layers

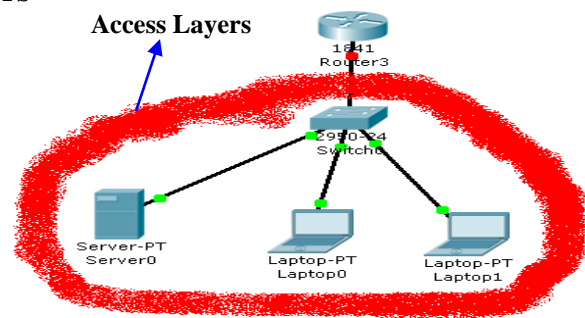
Desktop Layers

Workstation

Switch. Hub. Nice Card. Laptop. Etc

Mac Table

Note:→ Access layer this layer includes hubs and Switches. This layer is also called the desktop Layer because it focuses on connecting client Nodes, such as workstations to the network. This Layer ensures that packets are delivered to end User computers



### What is Distribution Layers?

Also Called Workgroup Layers

Router. Pix Firewall. Catalyst Switch

Routing Table

Routing Protocol

Routed Protocol

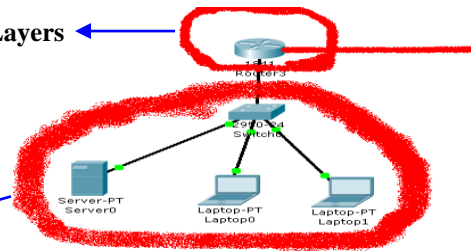
Send or Receive Packet According to IP Address

Security

Netting VLAN

Access Layers

Distribution Layers



Note:→ Distribution layer: This layer includes LAN-based routers and layer 3 switches. This layer ensures that packets are properly routed between subnets and Vlan in your enterprise. This layer is also called the Workgroup layer.

### What is Core Layers?

High Speed Communication

Used in WAN Side

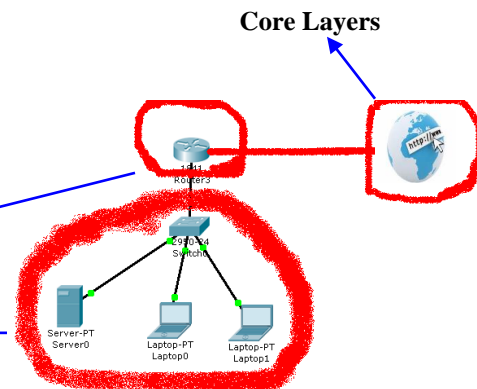
Used High Speed Cable Such as Fiber Optic Cable

Used in Backbone of Network

Distribution Layers

Access Layers

Core Layers



Note:→ Core layer: This layer is considered the backbone of the network and includes the high-end switches and high-speed cables such as fiber cables. This layer of the network does not route traffic at the LAN. In addition, no packet manipulation is done by devices in this layer. Rather, this layer is concerned with speed and ensures reliable delivery of packets.

## What is IP ADDRESS?

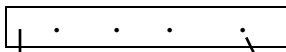
The Meaning of IP is Internet Protocol Address

By which have two or More Device Communication with One and Another

This is Also Types of TCP

## Kinds of IP Address

### IP Version 4



Octed Format

Each Octed has 8BIT

Each 8 BIT have 255 IP

Dotted Format

Used Network / Host

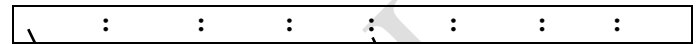
Used Classes Concept

Used Broad Cast

Easily Configure

Short IP Address

### IP Version 6



Quartet Format

Each Quartet Has 16 BIT

Use Colon Format

Used Network / Host

Not Used Classes Concept

Used Multicast

Hard Configure

Long IP Address

**IETF** :-> Internet Engineer Task Farce

Design IPv4 and IPv6

This is an Organization

IPv4 Start on 1981 Set Come on the World

**IANA**:-> Internet Assign Number Autterity

This is an Organization

Buy IPv4 and IPv6 Frame IETF

Implement 50 me Rules Regulation in IPv4 and IPv6

**ISP**:-> Internet Service Provider

Buy IPv4 and IPv6 Address from IANA

Procedure on Customer

## What is IPv4

32 BIT

Use Dotted Format

Use Octed Concept

Consist 4 Octets

Each Octet has 8 BIT

Digital Value of Each octet Start From 0 Up to 255

Use Classes Concept

Use Network / Host

Less IP Address Then IPv6

32

Total IP Address {2} 4294967296

## Class

A

B

C

E

### Class Use

Network	Host pc
Network IP 10.0.0.0	Host Pc 10.0.0.1
	255

### Class A

#### Format of Class A

Network.	Host.	Host.	Host	English
8.	0.	0.	0	Number
.	00000000,	00000000		Binary

Rule: First Bit IS Off / Remaining Bit Are On

128	64	32	16	8	4	2	1
<b>64+32+16+8+4+2+1=127</b>							
0				127			
Network				Default Router			

This Two IP Is Not Using One Is Network ID Another Is Router IP

Start = Run = 127.0.0.1 =ok

Valid Range of Class A network Acted

1 == 126

Formula to Find Host Class A per Network

**8+8+8=24**

24

(2) 16777216 - 2 = 16777214

Network ID	10.0.0.0
Host IP	10.0.0.1
Last IP	10.254.254.254

## Class B

### Format of Class B

Network,	Network,	Host,	Host	English
,	,	00000000,	00000000	Binary
8	8	0	0	Number

Formal First Bit On / Second Bit is OFF And Reaming Bit Are ON

128	32	16	8	4	2	1

$$128+32+16+8+4+2+1=191$$

Rang of class B Network Octet

128                  191

Find Total Host in Class B

16

$$(2) 65536 - 2 = 65534$$

One is Server IP and Second Is Router IP

Start IP 128.16.0.1

End IP 128.31.255.255

Subnet Mask Class B 255.255.0.0

## Class C

### Format of Class C

Network.	Network.	Network.	Host	English
8	8	8	0	Number
			00000000	Binary

### Formal of Class c

First / Second Bit are ON and Third Bit is OFF / Reaming Bit Are ON

128	64	16	8	4	2	1

$$128+64+16+8+4+2+1=223$$

Range of Class C Network Octet

192                  223

Find Total Host in Class C

8

$$(2) 256 - 2 = 254$$

Start IP 192.168.100.1

End IP 192.168.100.254

## Class D and E

### Class D

Range of Class D

224 239

Multi Costing

### Class E

Range of Class E

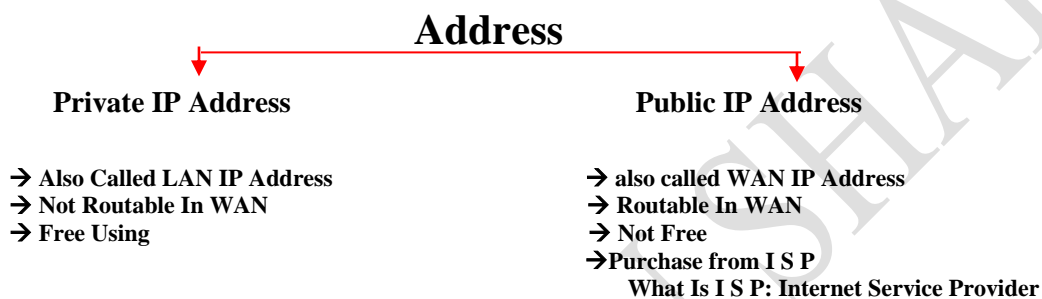
240 255

Future Experiment

## Range OF All Classes

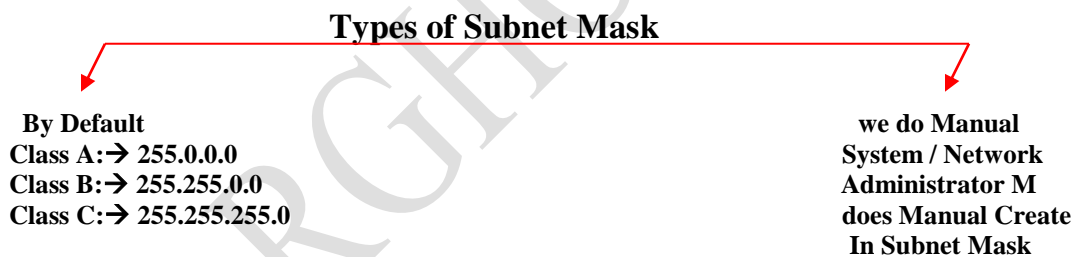
A:	1	127
B:	128	191
C:	192	223
D:	224	239
E:	240	255

## What Is Difference between Private and Public IP



## What is Subnet Mask?

By which we identify that which Class we are Using



## What is CIDR?

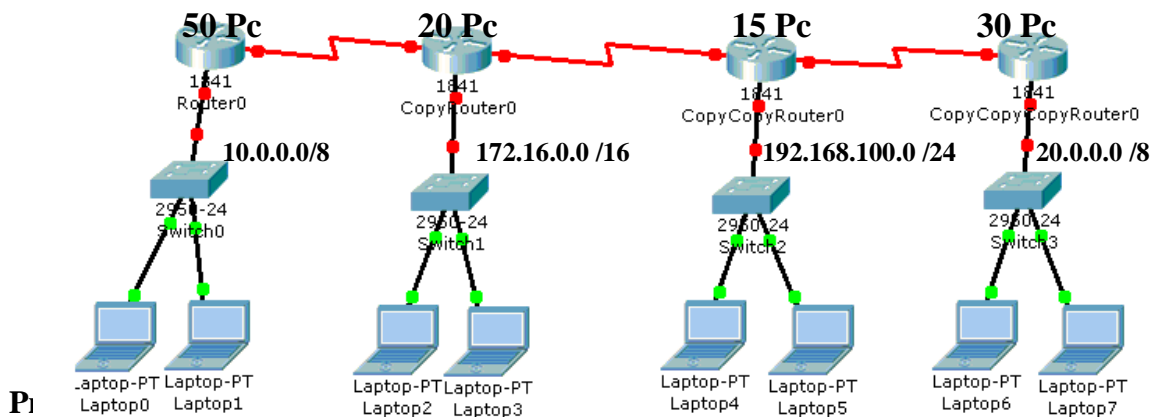
Meaning of Class less Inter Domain Routing

This is The Company Name

This is Development in 1991

By which we easily identify that how many Host in Network

Before of 1991 all Router Used in Class Less Protocol



## What is Subnetting?

When we divided the Large Network into Small Network for the Purposes to Save IP address from wasting that is Called Subnetting

OR

In Creasing the Network BIT into Host Portion and Decreasing BIT in Host Portion for Subnetting that is Called Subnetting

When Subnetting Starting in Class A

Network. Host. Host. Host

|||||||. 00000000. 00000000. 00000000

10.0.0.0 /8 Not Started

this two last not using

|||||||. |0000000. 00000000. 00000000

Now Started Subnetting in Class A

8+1=9 up to 30

When Subnetting Starting in Class B

Network. Network. Host. Host

|||||||. |||||||. 00000000. 00000000

172.16.0.0 /16 Not Started

|||||||. |||||||. |0000000. 00000000

Now Started Subnetting in Class B

8+8+1=17 Up to 30

When Subnetting Starting in Class C

Network. Network. Network . Host

|||||||. |||||||. |||||||. 00000000

192.168.100.0 /24 Not Started

|||||||. |||||||. |||||||. |0000000

8+8+8+1=25 Up to 30

## Subnetting

Subnetting in Class C

192.168.1.0 /25

Network. Network. Network. Host

			128	
8	8	8	000000	128+64+32+16+8+4+2+1=255
255	255	255	24+1=25	
			128	

How to Find Total Network

1

{2} 2 Network

How to Find Total Host

7

{2} 128 - 2 = 126 Host

Network ID    Loop Back IP

Network A

192.168.1.0 Network ID

192.168.1.1 Host IP

Network B

192.168.1.128 Network ID

192.168.1.129 Host IP

192.168.1.126 Host IP

192.168.1.127 Loop Back IP

255.255.255.128 Subnet Mask

192.168.1.254 Host IP

192.168.1.255 Loop Back IP

255.255.255.128 Subnet Mask



## Subnetting

### Subnetting in Class C

192.168.1.0 /26

Network. Network. Network. Host

			128+64=192	
8	8	8	000000	128+64+32+16+8+4+2+1=255
255	255	255		24+2=26
			192	

### How to Find Total Network

2

{2} 4 Network

### How to Find Total Host

6

{2} 64 - 2 = 62 Host

2x2x2x2x2x2=64

Network ID    Loop Back IP

### Network A

192.168.1.0 Network ID

192.168.1.1 Host IP

192.168.1.62 Host IP

192.168.1.63 Loop Back IP

### Network C

192.168.1.128 Network ID

192.168.1.129 Host IP

192.168.1.190 Host IP

192.168.1.191 Loop Back IP

### Network B

192.168.1.64 Network ID

192.168.1.65 Host IP

192.168.1.126 Host IP

192.168.1.127 Loop Back IP

### Network D

192.168.1.192 Network ID

192.168.1.193 Host IP

192.168.1.254 Host IP

192.168.1.255 Loop Back IP

## Subnetting

### Subnetting in Class C

192.168.1.0 /27

Network. Network. Network. Host

			128+64+32=224	
8	8	8	00000	128+64+32+16+8+4+2+1=255
255	255	255		24+3=27
			224	

### How to Find Total Network

3

{2} 8 Network

### How to Find Total Host

5

{2} 32 - 2 = 30 Host

2x2x2x2x2=32

Network ID    Loop Back IP

**Network A**

192.168.1.0 Network ID  
192.168.1.1 Host IP

192.168.1.30 Host IP  
192.168.1.31 Loop Back IP

**Network C**

192.168.1.64 Network ID  
192.168.1.65 Host IP

192.168.1.94 Host IP  
192.168.1.95 Loop Back IP

**Network E**

192.168.1.128 Network ID  
192.168.1.129 Host IP

192.168.1.158 Host IP  
192.168.1.159 Loop Back IP

**Network H**

192.168.1.192 Network ID  
192.168.1.193 Host IP

192.168.1.222 Host IP  
192.168.1.223 Loop Back IP

**Network B**

192.168.1.32 Network ID  
192.168.1.33 Host IP

192.168.1.62 Host IP  
192.168.1.63 Loop Back IP

**Network D**

192.168.1.96 Network ID  
192.168.1.97 Host IP

192.168.1.126 Host IP  
192.168.1.127 Loop Back IP

**Network F**

192.168.1.160 Network ID  
192.168.1.161 Host IP

192.168.1.190 Host IP  
192.168.1.191 Loop Back IP

**Network I**

192.168.1.224 Network ID  
192.168.1.225 Host IP

192.168.1.254 Host IP  
192.168.1.255 Loop Back IP

**Subnetting****Subnetting in Class C**

192.168.1.0 /28

Network. Network. Network. Host

				128+64+32+16=240
8	8	8	0000	128+64+32+16+8+4+2+1=255
255	255	255	240	24+4=28

**How to Find Total Network**

4

{2} 16 Network

**How to Find Total Host**

4

{2} 16 - 2 = 14 Host

2x2x2x2=16

Network ID    Loop Back IP

**Network A**

192.168.1.0 Network ID  
192.168.1.1 Host IP

192.168.1.14 Host IP  
192.168.1.15 Loop Back IP

**Network C**

192.168.1.32 Network ID  
192.168.1.33 Host IP

192.168.1.46 Host IP  
192.168.1.47 Loop Back IP

**Network E**

192.168.1.64 Network ID  
192.168.1.65 Host IP

192.168.1.78 Host IP  
192.168.1.79 Loop Back IP

**Network G**

192.168.1.96 Network ID  
192.168.1.97 Host IP

192.168.1.110 Host IP  
192.168.1.111 Loop Back IP

**Network I**

192.168.1.128 Network ID  
192.168.1.129 Host IP

192.168.1.142 Host IP  
192.168.1.143 Loop Back IP

**Network K**

192.168.1.160 Network ID  
192.168.1.161 Host IP

192.168.1.174 Host IP  
192.168.1.175 Loop Back IP

**Network M**

192.168.1.192 Network ID  
192.168.1.193 Host IP

192.168.1.206 Host IP  
192.168.1.207 Loop Back IP

**Network O**

192.168.1.224 Network ID  
192.168.1.225 Host IP

192.168.1.238 Host IP  
192.168.1.239 Loop Back IP

**Network B**

192.168.1.16 Network ID  
192.168.1.17 Host IP

192.168.1.30 Host IP  
192.168.1.31 Loop Back IP

**Network D**

192.168.1.48 Network ID  
192.168.1.49 Host IP

192.168.1.62 Host IP  
192.168.1.63 Loop Back IP

**Network F**

192.168.1.80 Network ID  
192.168.1.81 Host IP

192.168.1.94 Host IP  
192.168.1.95 Loop Back IP

**Network H**

192.168.1.112 Network ID  
192.168.1.113 Host IP

192.168.1.126 Host IP  
192.168.1.127 Loop Back IP

**Network J**

192.168.1.144 Network ID  
192.168.1.145 Host IP

192.168.1.158 Host IP  
192.168.1.159 Loop Back IP

**Network L**

192.168.1.176 Network ID  
192.168.1.177 Host IP

192.168.1.190 Host IP  
192.168.1.191 Loop Back IP

**Network N**

192.168.1.208 Network ID  
192.168.1.209 Host IP

192.168.1.222 Host IP  
192.168.1.223 Loop Back IP

**Network P**

192.168.1.240 Network ID  
192.168.1.241 Host IP

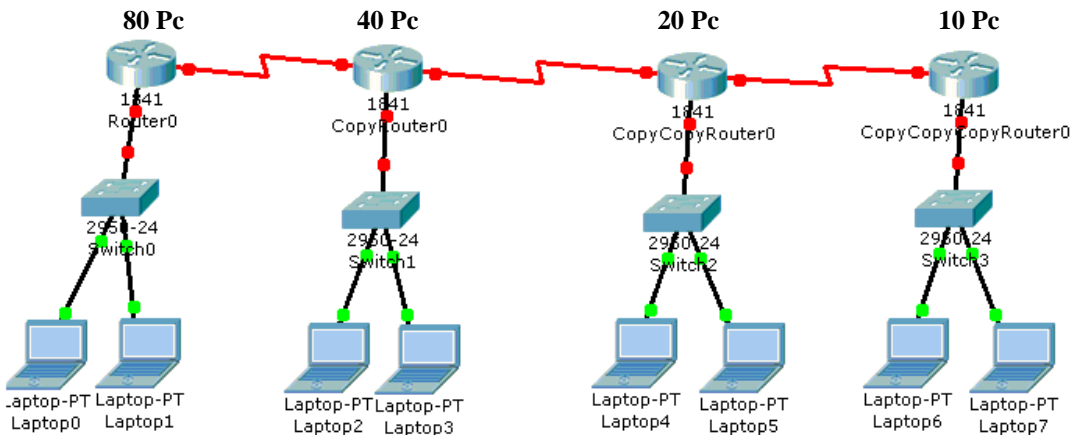
192.168.1.254 Host IP  
192.168.1.255 Loop Back IP

## What Is VLSM

Visible Length Subnet Mask

Used in Department

Big Block Size Solve First      If Some Company has Many Computer Start from That  
Must have Idea about Subnetting



128 ← 64 32 16 8 4 2 1

Start from Big Branch I Means from 80 Pc

192.168.1.0/25

Network. Network. Network. Host

			128	
8	8	8	000000	128+64+32+16+8+4+2+1=255
255	255	255		24+1=25
			128	

How to Find Total Network

1

{2} 2 Network

How to Find Total Host

7

{2}  $128 - 2 = 126$  Host

Network ID    Loop Back IP

Start IP Address

192.168.1.0 Network ID

192.168.1.1 Host IP

192.168.1.126 Host IP

192.168.1.127 Loop Back IP

128	
- 80	
48	→ Wasted IP Address

128      64      32      16      8      4      2      1

Scand Start From 40 I Means this is Also Big Branch

192.168.1.0/26

Network. Network. Network. Host

			000000	128+64=192
8	8	8		128+64+32+16+8+4+2+1=255
255	255	255	192	24+2=26

How to Find Total Network

2

{2} 4 Network

How to Find Total Host

6

{2} 64 - 2 = 62 Host

2x2x2x2x2x2=64

Network ID    Loop Back IP

Start IP Address

192.168.1.128 Network ID

192.168.1.129 Host IP

192.168.1.190 Host IP

192.168.1.191 Loop Back IP

64
- 40
<u>24</u>

24 → Wasted IP Address

128      64      32      16      8      4      2      1

Scand Start From 20 I Means this is Also Big Branch

192.168.1.0 /27

Network. Network. Network. Host

			00000	128+64+32=224
8	8	8		128+64+32+16+8+4+2+1=255
255	255	255	224	24+3=27

How to Find Total Network

3

{2} 8 Network

How to Find Total Host

5

{2} 32 - 2 = 30 Host

2x2x2x2x2=32

Network ID    Loop Back IP

Start IP Address

192.168.1.192 Network ID

192.168.1.193 Host IP

192.168.1.222 Host IP

192.168.1.223 Loop Back IP

30
- 20
<u>12</u>

12 → Wasted IP Address

128      64      32      16      8      4      2      1

Scand Start from 10 I Means This is the Lost Branch Pc

192.168.1.0 /28

Network. Network. Network. Host

128+64+32+16=240  
 |||||      |||||      |||||      ||||0000      128+64+32+16+8+4+2+1=255  
 8      8      8      ||||      24+4=28  
 255      255      255      240

How to Find Total Network

4

{2} 16 Network

How to Find Total Host

4

{2} 16 - 2 = 14 Host

2x2x2x2=16

Network ID    Loop Back IP

Start IP Address

192.168.1.224 Network ID

192.168.1.225 Host IP

192.168.1.238 Host IP

192.168.1.239 Loop Back IP Address

16  
- 10  
6 → Wasted IP Address

## What is FLSM?

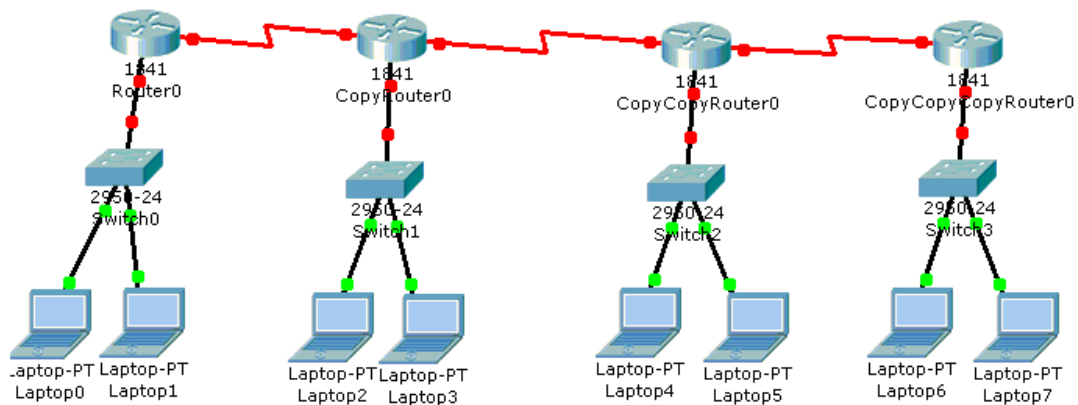
Fixed Length Subnetting Mask

80 Pc

40 Pc

20 Pc

10 Pc





128 ← 64 32 16 8 4 2 1

Start from Big Branch I Means from 80 Pc

192.168.1.0/25

Network. Network. Network. Host

			128	
8	8	8	000000	128+64+32+16+8+4+2+1=255
255	255	255	128	24+1=25

How to Find Total Network

1

{2} 2 Network

How to Find Total Host

7

{2}  $128 - 2 = 126$  Host

Network ID Loop Back IP

Start IP Address

192.168.1.0 Network ID

192.168.1.1 Host IP

192.168.1.80 Host IP

192.168.1.81 Loop Back IP

128 64 32 16 8 4 2 1

Scand Start From 40 I Means this is Also Big Branch

192.168.1.82/26

Network. Network. Network. Host

			128+64=192	
8	8	8	000000	128+64+32+16+8+4+2+1=255
255	255	255	192	24+2=26

How to Find Total Network

2

{2} 4 Network

How to Find Total Host

6

{2}  $64 - 2 = 62$  Host

$2 \times 2 \times 2 \times 2 \times 2 = 64$

Network ID Loop Back IP

Start IP Address

192.168.1.82 Network ID

192.168.1.83 Host IP

192.168.1.122 Host IP

192.168.1.123 Loop Back IP Address

128          64          32          16          8          4          2          1

Scand Start From 20 I Means this is Also Big Branch

192.168.1.0 /27

Network. Network. Network. Host

128+64+32=224  
 |||||      |||||      |||||      |||00000    128+64+32+16+8+4+2+1=255  
   8        8        8        |||        24+3=27  
 255      255      255      224

How to Find Total Network

3

{2} 8 Network

How to Find Total Host

5

{2} 32 - 2 = 30 Host

2x2x2x2x2=32

Network ID    Loop Back IP

Start IP Address

192.1687.1.124 Network ID

192.168.1.125 Host IP

192.168.1.144 Host IP

192.168.1.145 Loop Back IP Address

128          64          32          16          8          4          2          1

Scand Start from 10 I Means this is the Lost Branch Pc

192.168.1.0 /28

Network. Network. Network. Host

128+64+32+16=240    |||||    |||||    |||||    |||0000  
 128+64+32+16+8+4+2+1=255  
   8        8        8        |||        24+4=28  
 255      255      255      240

How to Find Total Network

4

{2} 16 Network

How to Find Total Host

4

{2} 16 - 2 = 14 Host

2x2x2x2=16

Network ID    Loop Back IP

Start IP Address

192.1687.1.146 Network ID

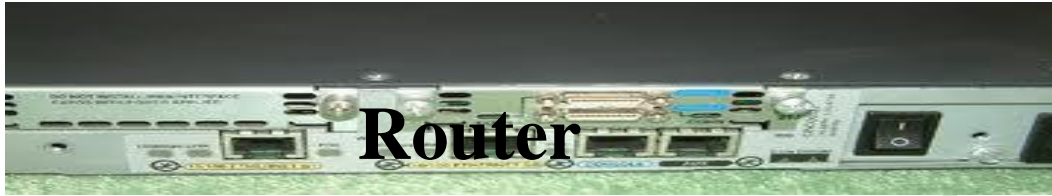
192.168.1.147 Host IP

192.168.1.156 Host IP

192.168.1.157 Loop Back IP Address

## Introduction of Cisco Router

Router is Function is Just Like Computer Such as Computer Need to O/S to Run Application Software But Router is Also Need IOS Software Create Configuration File



## What is Configuration File?

When we applied Commands in Router All Commands go to the Ram and Create Configuration File

## What is DRAM? →

Dynamic Ram  
Types of Ram  
Configuration files Store Here for Temp Purpose

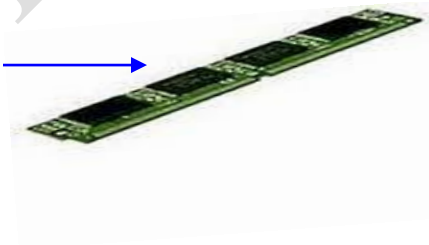


## What is NV RAM?

Non – Volatile Random access Memory Play Role as Hard Disk in Router Configuration file  
Permantly Store Hare

## What is flash Memory? →

Types of Ram  
Used to Store Router IOS Software



## What is Boot Strap?

Types of Rom  
Used to boot Router

## What is Interfaces?

By Which We Communication with Local {Remote Network}

## What is Fast Ethernet {LAN with Router}

By Types of Fast Ethernet we have Connected LAN with Router

## What is Serial

This Types of Interface Used to Connect Our Network with WAN

## What is Console Port?

Also Celled Door of Router  
By which we enter all Commands in Router through Computer

### What is Auxiliary Ports?

By which we remotely connect with Router through Modem

### What is Ethernet

Such Types of Environment that provides 10 MBPS or less that is Called Ethernet

Device: —————> NIC Card —————> HUB

### Types of Ethernet

Fast Ethernet

GIGO Ethernet

### What is Fast Ethernet?

Such Types of Environment that provides 100 MBPS or less that is Called Fast Ethernet

Device: —————> NIC Card —————> Switch or Router

### What is GIGO ETHERNET?

Such Types of Environment that provides 1000 MBPS or less Speed that is Called GIGO Ethernet

Device: —————> NIC Card —————> Switch —————> Multi Layer Switch or Router

### LAB 1

#### Ethernet



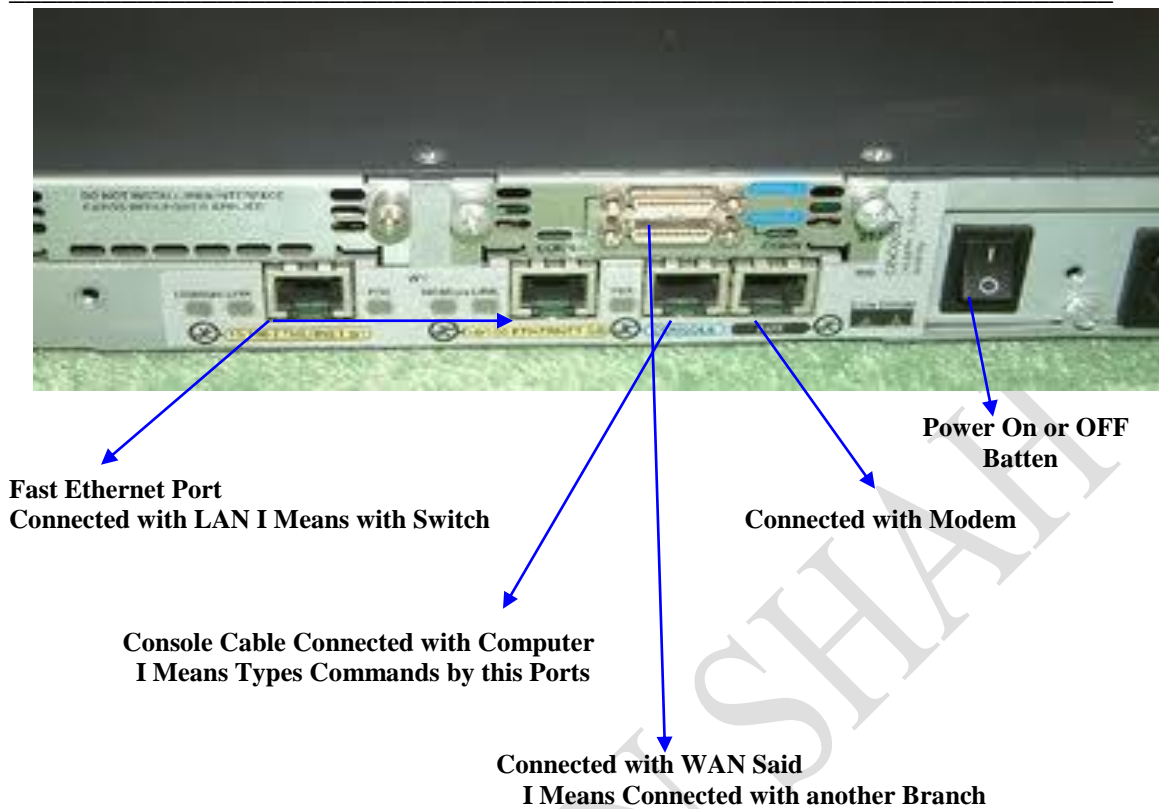
Speed 10 MBPS

### LAB 2

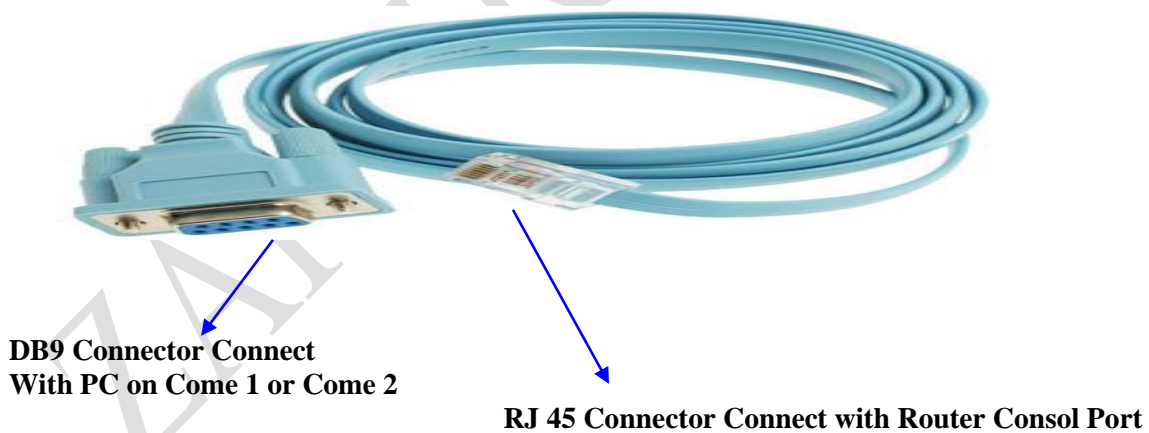
#### Fast Ethernet



Speed 100 MBPS



### How to See Console Cable?



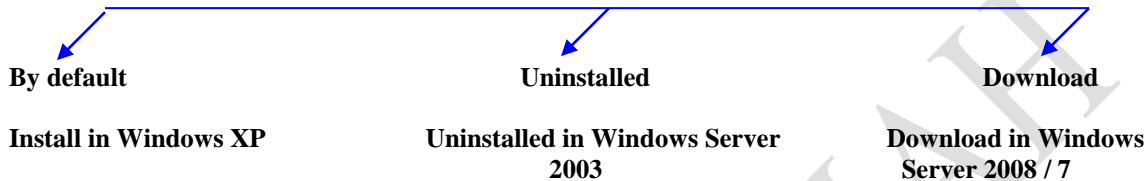
### How to See Serial Cable



## What is Hyper Terminal?

Hyper Terminal is Software that is used to Provide Interface in which we enter Command of in Router or Catalyst Switch by the Help of Hyper Terminal

## Installation of Hyper Terminal Software

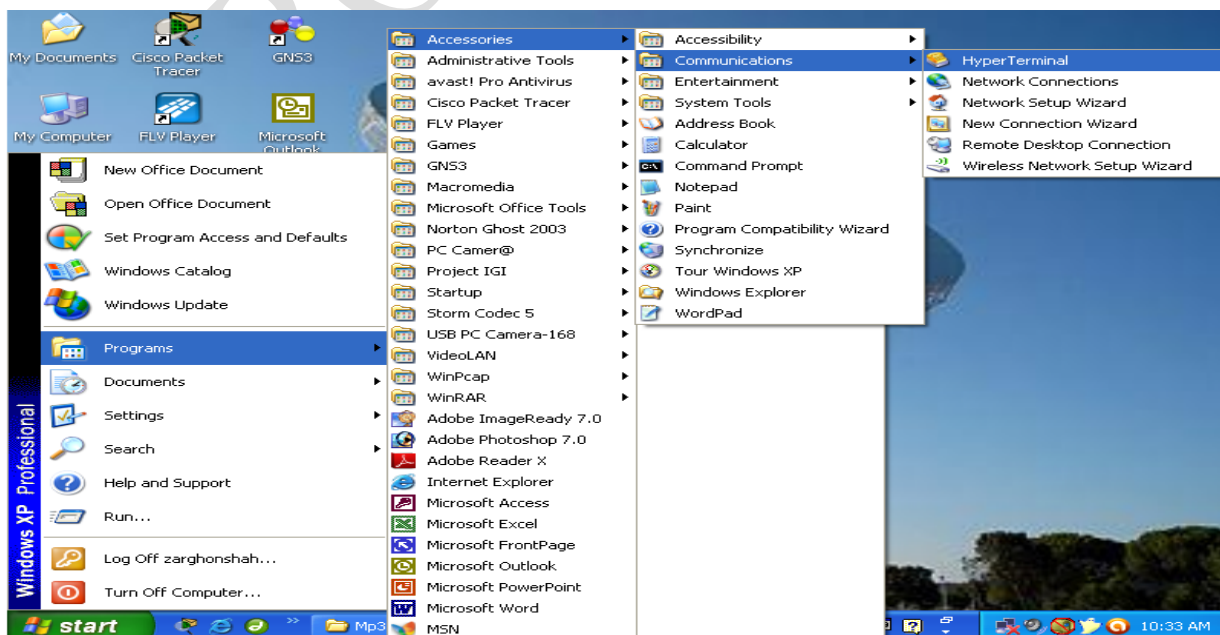


## How to Install Hyper Terminal in Windows Server 2003

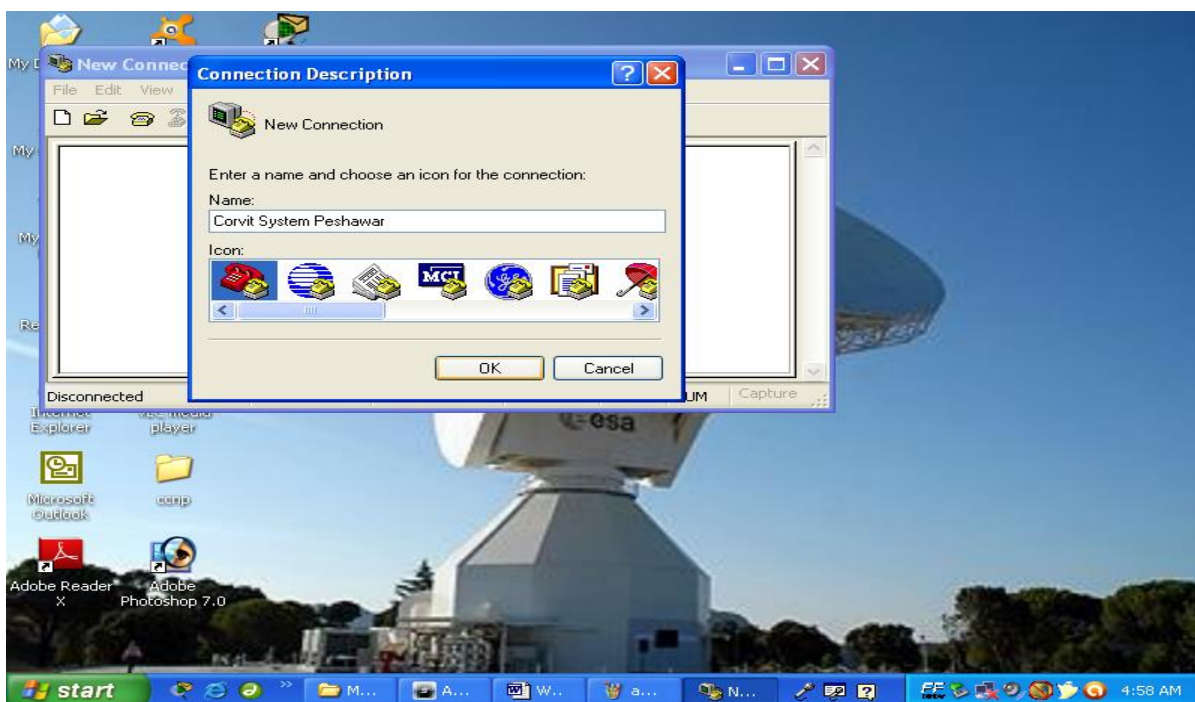
Start → Setting → Control Panel → Double Click on Add/ Remove Program → Click on Add/Remove Windows Component → Double Click on Accessories → Double Click on Communication → Check on Hyper Terminal → Ok → Ok → Next → Insert Server CD → Finish

## How to Access Hyper Terminal

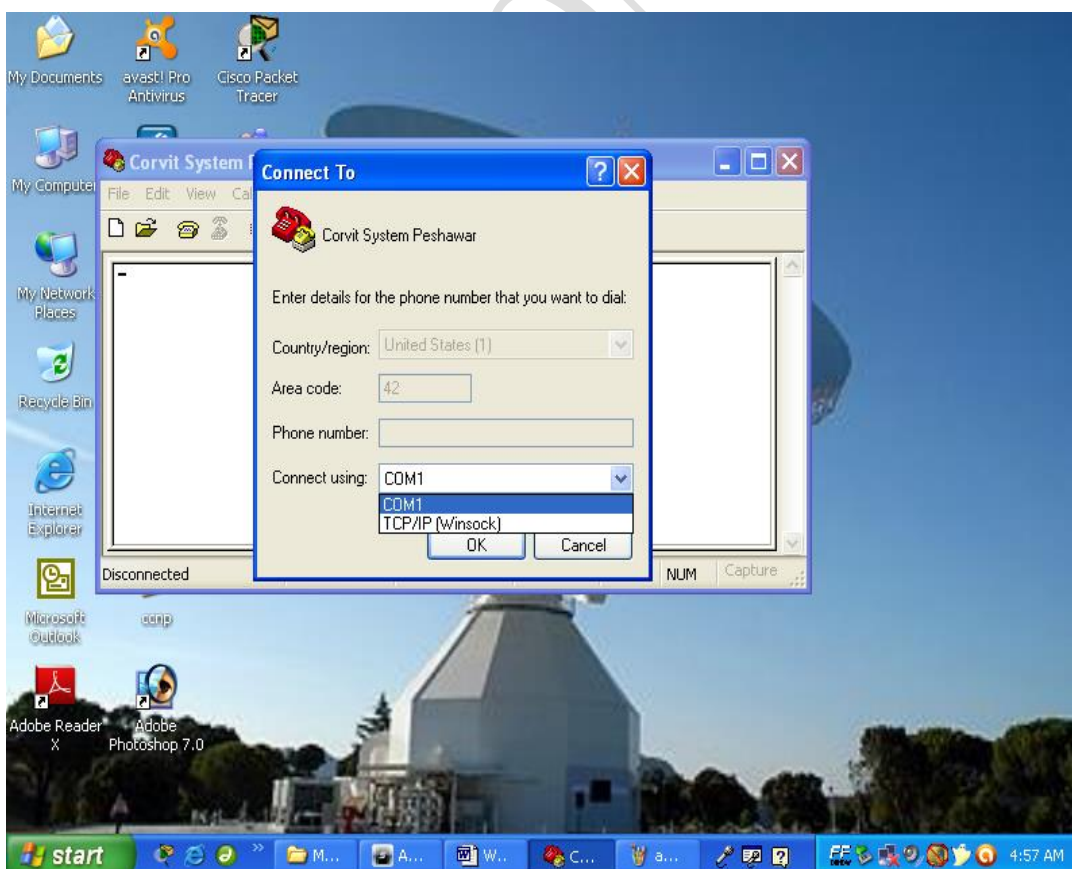
Start → Programs → Accessories → Click on Communication → Click on Hyper Terminal



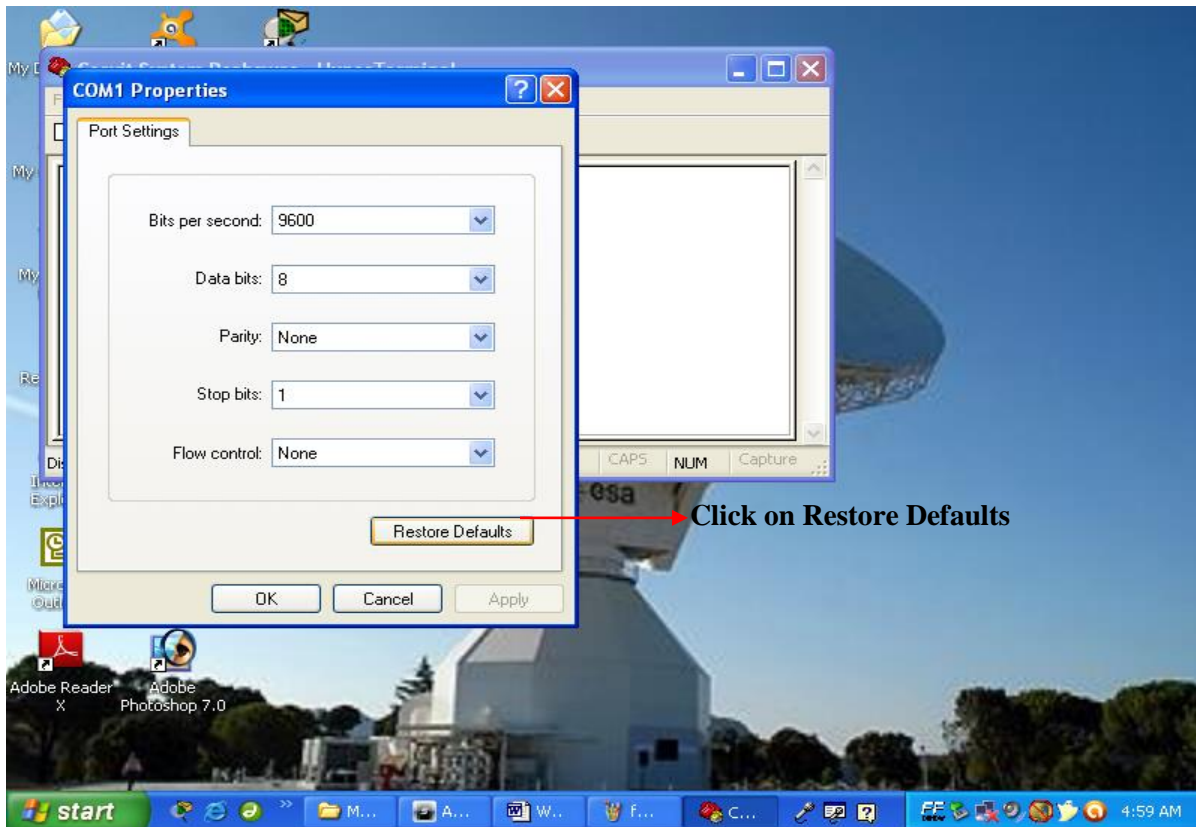




Wirt Something in the Name: Corvit System Peshawar → Click on OK



Select Com 1 or Com 2 in Which Com You Have Connect You DB9 Connector  
→ Then Click on Ok



Click on Ok

### Modes of Router

1:→ User Modes 2:→ Administrator Modes 3:→ Global Configuration Modes  
4:→ Line Modes 5:→ Interface Modes 6:→ Router Modes 7:→ DHCP Modes

First User Modes:→ When we start Commands Router Already on User Modes

**Router>** this is User Mode

```

export@cisico.com.

Cisco 1841 (revision 5.0) with 114688K/16384K bytes of memory.
Processor board ID FTX0347ZL0K
M960 processor: part number 0, mask 49
2 FastEthernet/IEEE 802.3 interface(s)
191K bytes of NVRAM.
63488K bytes of ATA CompactFlash (Read/Write)
Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M), Version 12.4(15)T1,
RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 18-Jul-07 04:52 by pt_team

--- System Configuration Dialog ---
Continue with configuration dialog? [yes/no]: n

Press RETURN to get started!

Router>
Router>
  
```

User Modes

**2:→ Administrator Modes:→**

**Router> En** → **Press Enter By This Commands Router Come on Administrator Modes**

**Router#** this is Called Administrator Modes

```
Router con0 is now available
```

```
Press RETURN to get started.
```

```
Router>EN → Administrator Modes  
Router#
```

**3:→ Global Configuration Modes:→**

**Router# configure terminal Or Conf T** → **Press Enter Router go to Global Modes**

**Router (Config) #** this is Called Global Modes

```
Press RETURN to get started.
```

```
Router>EN  
Router#con  
Router#conf  
Router#configure ter  
Router#configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
Router (config) # → Global Configuration Modes
```

**4:→ Line Consol Modes:→**

**Router (Config) # Line CONSOL 0** → **Press Enter go to Consol Modes**  
**Router (Config-line) #** **this is Called Line Modes**

Press RETURN to get started.

```
Router>EN
Router#con
Router#conf
Router#configure ter
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#line console 0
Router(config-line)#
```

→ **Line Consol Modes**

**5:→ Interface FastEthernet Modes:→**

**Router (Config) #interfaces FastEthernet 0/0** → **Press Enter go to Interface Modes**  
**Router (Config-if) #** **this is Called Interface FastEthernet Modes**

```
< FastEthernet/1000 802.3 interface(s)
191K bytes of NVRAM.
63488K bytes of ATA CompactFlash (Read/Write)
Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M), Version 12.4(15)T1,
RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 18-Jul-07 04:52 by pt_team
```

--- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]: n

Press RETURN to get started!

```
Router>
Router>EN
Router#CONF T
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#Interface Fas
Router(config)#Interface FastEthernet 0/0
Router(config-if)#
```

→ **Interface Fast Ethernet Modes**

**6:→ Interface Serial Modes:→**

**Router (Config) #interfaces Serial 0/0** → **Press Enter go to Interface Modes**  
**Router (Config-if) #** **this is Called Interface Serial Modes**

```
2 Low-speed serial(sync/async) network interface(s)
191K bytes of NVRAM.
63488K bytes of ATA CompactFlash (Read/Write)
Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M), Version 12.4(15)T1,
RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 18-Jul-07 04:52 by pt_team
```

--- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]: n

Press RETURN to get started!

```
Router>EN
Router#CONF T
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#INTERFACE SERIAL 0/0/0
Router(config-if)#
```

→ **Interface Serial Modes**

**7:→ Router Modes:→**

**Router (Config) # Router RIP, EIGRP, OSPF** → **Press Enter goes to Router Modes**  
**Router (Config-Router) #** **this is Called Router Modes**

```
171K bytes of NVRAM.
63488K bytes of ATA CompactFlash (Read/Write)
Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M), Version 12.4(15)T1,
RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 18-Jul-07 04:52 by pt_team
```

--- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]: n

Press RETURN to get started!

```
Router>EN
Router#CONF T
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#ROUTER RIP
Router(config-router)#
```

→ **Router Modes**

### How to Change Router Name

<b>Router &gt; EN</b>	<b>Press Enter</b>
<b>Router # Conf t</b>	<b>Press Enter</b>
<b>Router (Config) # Hostname Corvit</b>	<b>Press Enter</b>
<b>Corvit (Config) #</b>	

Router con0 is now available

Press RETURN to get started.

```
Router>EN
Router#CONF T
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#HOSTNAME CORVIT
CORVIT(config)#
```

→ **Changed Router Name**

### How to Restart Router

<b>Corvit (Config) # Exit</b>	<b>Press Enter</b>
<b>Corvit # Reload</b>	<b>Press Enter</b>

**Proceed with reload? [Confirm] press Y**

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 Copyright (c) 1986-2007 by Cisco Systems, Inc.  
 Compiled Wed 18-Jul-07 04:52 by pt\_team

--- System Configuration Dialog ---

Continue with configuration dialog? [yes/no]: n

Press RETURN to get started!

```
Router>
Router>EN
Router#Conf T
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#Hostnam Corvit
Corvit(config)#Exit
Corvit#
*SYS-5-CONFIG_I: Configured from console by console
Corvit#Reload
Proceed with reload? [confirm]
```

→ **Reload Option Just Press Y**

## How to Set Plan Password on Administrator Modes

Corvit (Config) # Enable Password Khan

Press Enter

## How to See Plan Password

Corvit (Config) # Do Sh Run

Press Enter

```
Corvit>En
Corvit#Conf t
Enter configuration commands, one per line. End with CNTL/Z.
Corvit(config)#Enable Password Khan → Password Set on Administrator
Corvit(config)#Do Sh Run
Building configuration...

Current configuration : 571 bytes
!
version 12.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname Corvit
!
!
!
enable password Khan → See Password
!
!
!
!
!
!
!
--More--
```

## How to Set Encryption Password on Administrator

Corvit (Config) # Service Password-Encryption

Press Enter

## How to See Encryption Password

Corvit (Config) # Do Sh Run

Press Enter

```
Corvit(config)#
Corvit(config)#
Corvit(config)#
Corvit(config)#
Corvit(config)#
Corvit(config)#
Corvit(config)#Service Password-Encryption → Password Set on Administrator
Corvit(config)#
Corvit(config)#Do Sh Run
Building configuration...

Current configuration : 576 bytes
!
version 12.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname Corvit
!
!
!
enable password 7 080A444F07 → See Encryption Password
!
!
```

## How to Set Strong Password on Administrator Modes

Corvit (Config) # Enable Secret Khan

Press Enter

## How to See Strong Password

Corvit (Config) # Do Sh Run

Press Enter

```

Corvit(config)#
Corvit(config)#
Corvit(config)#
Corvit(config)#Enable Secret Khan → Strong Password Set on Administrator Modes
Corvit(config)#
Corvit(config)#Do Sh Run
Building configuration...

Current configuration : 623 bytes
!
version 12.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname Corvit
!
!
!
enable secret 5 $1$mERr$GxVDRq14NP6Ww0sX0IxBA. → See Encryption Password
enable password 7 080A444P07
!
!
!
!
!

```

## How to See Password

When We Start on Router Commands Come into Administrator Modes This Time Giving Password

Corvit > EN

Press Enter

Password:

Router commands now available

Press RETURN to get started.

```

Router>
Router>
Router>en
Password:
Password:
Password:

```

→ Giving Password Give in Go to Start Commands



<b>Corvit (Config) # No Enable Password</b>	<b>Press Enter</b>
<b>Corvit (Config) # No Service Password-Encryption</b>	<b>Press Enter</b>
<b>Corvit (Config) # No Enable Secret</b>	<b>Press Enter</b>

```
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#  
Router(config)#No Enable Password  
Router(config)#No Service Password-Encryption  
Router(config)#N  
% Ambiguous command: "N"  
Router(config)#  
Router(config)#No Enable Secret  
Router(config)#
```

**Corvit (Config) # Do Sh History** **Press Enter**

```
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#Do Sh History
Enable Password kha
Service Password-encryption
Enable Secret kha
No Enable Password
No Service Password-Encryption
N
No Enable Secret
do sh history
Do Sh History
Router(config)#
```

History Commands

Apply Histories

## How to See History Size

Corvit (Config) # Do Sh Terminal

Press Enter

```
Router(config)#
Router(config)#
Router(config)#
Router(config)#
Router(config)#Do Sh Terminal → History Size Commands
Line 0, Location: , Type:
Length: 24 lines, Width: 80 columns
Baud rate (TX/RX) is 9600/9600, no parity, 1 stopbits, 8 databits
Status: PSI Enabled, Ready, Active, Automore On
Capabilities: none
Modem state: Ready
Modem hardware state: CIS* noDSR DTR RTS
Special Chars: Escape Hold Stop Start Disconnect Activation
                ^^x none - - none
Timeouts:      Idle EXEC Idle Session Modem Answer Session Dispatch
                00:10:00 never none not set
                Idle Session Disconnect Warning
                never
                Login-sequence User Response
                00:00:30
                Autoselect Initial Wait
                not set

Modem type is unknown.
Session limit is not set.
Time since activation: 00:03:04
Editing is enabled.
History is enabled, history size is 10. → History Size only 10
```

## How to Change History Size

Corvit (Config) # Do Terminal History Size 100

Press Enter

## How to See History Size

Corvit (Config) # Do Sh Terminal

Press Enter

```
Router(config)#
Router(config)#Do Terminal History Size 100 → By this Commands Changing History Size
Router(config)#
Router(config)#Do Sh Terminal
Line 0, Location: , Type:
Length: 24 lines, Width: 80 columns
Baud rate (TX/RX) is 9600/9600, no parity, 1 stopbits, 8 databits
Status: PSI Enabled, Ready, Active, Automore On
Capabilities: none
Modem state: Ready
Modem hardware state: CIS* noDSR DTR RTS
Special Chars: Escape Hold Stop Start Disconnect Activation
                ^^x none - - none
Timeouts:      Idle EXEC Idle Session Modem Answer Session Dispatch
                00:10:00 never none not set
                Idle Session Disconnect Warning
                never
                Login-sequence User Response
                00:00:30
                Autoselect Initial Wait
                not set

Modem type is unknown.
Session limit is not set.
Time since activation: 00:03:04
Editing is enabled.
History is enabled, history size is 100. → Changed History Size
```

## How to Set Password on Console Ports

Corvit (Config) # Line Console 0	Press Enter
Corvit (Config-line) # Password Khan	Press Enter
Corvit (Config-line) # Login	Press Enter
Corvit (Config-line) # Exit	Press Enter
Corvit (Config) # Exit	Press Enter
Corvit # Exit	Press Enter

```
Router>
Router>En
Router#Conf T
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#Line Consol 0
Router(config-line)#Password Khan
Router(config-line)#Login
Router(config-line)#Exit
Router(config)#Exit
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#Exit
```

Set Password for Consol Ports

Press RETURN to get started!

User Access Verification

Password: | → Assign Password then go to For Commands Start

## How to See Interfaces

Corvit (Config) # Do Sh IP Interface Brief	Press Enter
--	-------------

Continue with configuration dialog? [yes/no]: n

Press RETURN to get started!

```
Router>
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#do sh ip interface brief
```

See Interfaces

Interface	IP-Address	OK?	Method	Status	Protocol
FastEthernet0/0	unassigned	YES	unset	administratively down	down
FastEthernet0/1	unassigned	YES	unset	administratively down	down
Serial0/0/0	unassigned	YES	unset	administratively down	down
Serial0/0/1	unassigned	YES	unset	administratively down	down
Vlan1	unassigned	YES	unset	administratively down	down

Router(config)#

**Press Enter**

**Press Enter**

## See Time and Date

**Press Enter**

## Information about Flash of Router

```
System flash directory:
File Length Name/status
  3 33591768 c1841-adviservicesk9-mz.124-15.T1.bin
  2 28282 sigdef-category.xml
  1 227537 sigdef-default.xml
[33947587 bytes used, 30168797 available, 64016384 total]
63498K bytes of processor board System flash (Read/Write)
```

**Press Enter**

```
System returned to ROM by power-on
System image file is "flash:cl84l-adviservicesk9-mz.124-15.T1.bin"
```

## What is Telnet?

Telecommunication Network

Developed in 1991

Basically Telnet is Protocol

Types of TCP

Used to Control Server or Router by Command Prompt

Port Number 23

Plain Text Password

No Encrypt Password

## How to Enable Telnet in Router

Router (Config) # line VTY 0 4

Press Enter {by one Time from 0 up to 4 pc Control our Router}

Router (Config-line) # Password Corvit

Press Enter

Router (Config-line) # Login

Press Enter

Router (Config-line) # Exit

Press Enter

## How to Set Password on Administrator Modes

Router (Config) # Enable Secret Jan

Press Enter

Router>En

Router#conf t

Enter configuration commands, one per line. End with CNTL/Z.

Router(config)#

Router(config)#line VTY 0 4

Telnet Enable and Set Password

Router(config-line)#Password Corvit

Router(config-line)#Login

Router(config-line)#Exit

Router(config)#

Router(config)#Enable Secret Jan

Administrator Mode Password

Router(config)#

Router(config)#Exit

Router#

%SYS-5-CONFIG\_I: Configured from console by console

Router#

Router#

Router#

Router#

## How to Access Router in From Client Pc by Telnet

Start → Run → CMD → Ok

Administrator> Telnet 10.0.0.1

this is Router IP Address

Press Enter

(User Access Verification)

Password: Corvit

Telnet Password

Press Enter

Router> EN

Press Enter

Password: Jan

Administrator Mode Password

Press Enter

```
PC>telnet 10.0.0.1
Trying 10.0.0.1 ...Open

User Access Verification

Password:
Router>en
Password:
Router#
Router#
Router#conf t
```

Telnet Password: Corvit

Administrator Password: Jan

## What Is DHCP

Dynamic Host Configuration Protocol

Used To Provides Dynamic IP Address to Client PC

Also called Dora

Used To Solve IP Conflict Problem

Reduce Network / System Administrator Work Automatic Provide IP Address, Subnet Mask, Default Gateway, DNS, Wins IP Address

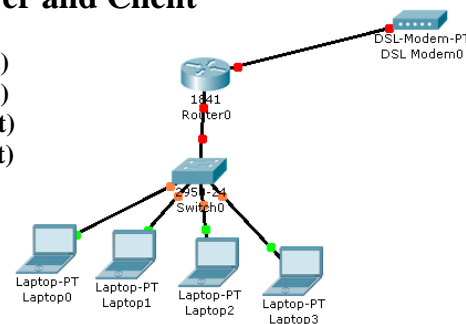
Types of UDP Protocol

67 = Client to Server Communication by this Ports

68 = Server to Client Communication by this ports

## DHCP Messages B/W Server and Client

DHCP Discover (Client to Server 67 Port)  
 DHCP Offers (Server to Client 68 Port)  
 DHCP Request (Client to Server 67 Port)  
 DHCP Acknowledgement (Server to Client 68 Port)



## DHCP Terminology

Scope Name: Set DHCP Scope Name  
 Range: Define Range  
 Exclude IP Address: Define Not Distribute IP Address  
 Lease Duration: Define How Long Time DHCP Will Give IP to Client PC  
 Reservation: Set Specialty IP Address for Specific PC by MAC Address  
 Set Domain Name: When the Client gives IP address also giving Domain Name

## Start DHCP Server in Router

```

Router> EN
Router # Conf T
Router (Config) # Int Fa0/0
Router (Config-If) # IP Address 10.0.0.1 255.0.0.0
Router (Config-If) # No Shut
Router (Config-If) # Exit
Router (Config) #IP DHCP Pool Corvit
Router (Dhcp-Config) #Network 10.0.0.0 255.0.0.0
Router (Dhcp-Config) #Default-Router 10.0.0.1
Router (Dhcp-Config) # Dns-Server 10.0.0.2
Router (Dhcp-Config) # Domain-Name Corvit.Com
Router (Dhcp-Config) # Lease 1 2 3
Router (Dhcp-Config) # Exit
Router (Config) #IP Dhcp Excluded-address 10.0.0.1 10.0.0.1
Router (Config) #IP Dhcp Excluded-address 10.0.0.2 10.0.0.2
Router (Config) # IP Dhcp Excluded-address 10.0.0.3 10.0.0.100
  
```

Press Enter  
 Press Enter  
 Press Enter  
 Press Enter  
 Press Enter  
 Press Enter  
 Press Enter  
 Press Enter  
 Press Enter  
 Press Enter  
 Press Enter  
 Press Enter  
 Press Enter  
 Press Enter  
 Press Enter  
 Press Enter

Note:→ Now Obtain All Client Pc IP address

```

Router Show Ip Dhcp Binding
Router # Show Arp
Router (Config) # Do Sh Ip Dhcp Pool
Router (Config) # Do Sh Ip Dhcp Database
  
```

Press Enter  
 Press Enter  
 Press Enter  
 Press Enter

## What is Serial Interface?

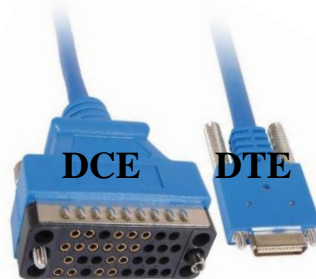
**DCE**

**Data Communication Equipment**

**DTE**

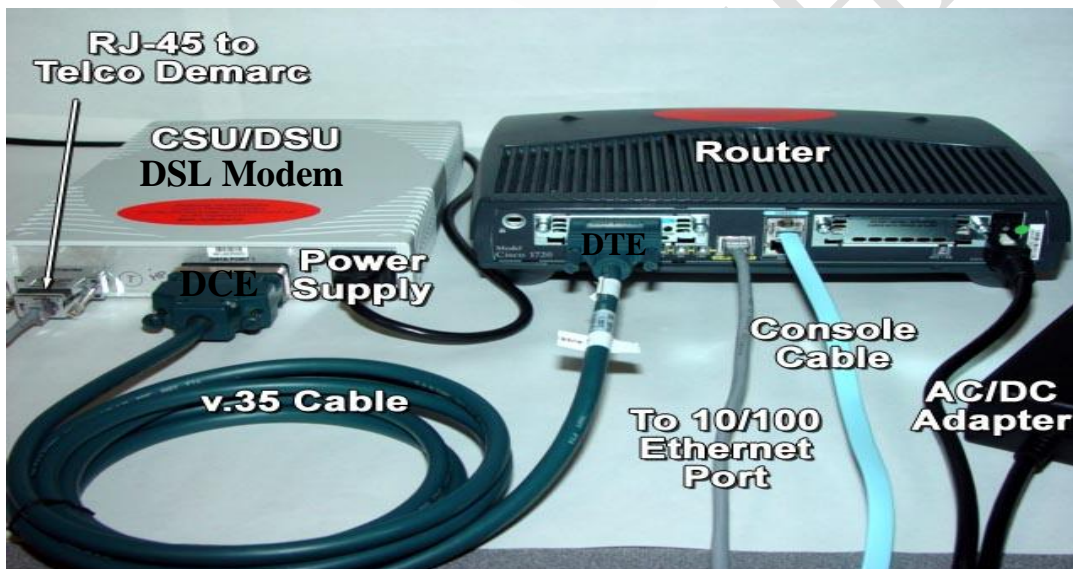
**Data Terminal Equipment**

This connected with  
CSU / DSU Device  
DSL Mode



This Side Connected With  
Router

## Another Picture



This is completely Setup of Branch or One Office

## How to Check DCE and DTE

Router # Sh Controllers S0/0  
Router # Sh Controllers S0/1

Press Enter  
Press Enter

DCE  
DTE

```
Router>
Router>EN
Router#CONF T
Enter configuration commands, one per line. End with CMTL/Z.
Router(config)#Do Sh Controllers s0/0/0
Interface Serial0/0/0
Hardware is PowerQUICC MPC860
DCE V.35, no clock
idb at 0x81081A04, driver data structure at 0x81084A00
SCC Registers:
General [GSMR]=0x2:0x00000000, Protocol-specific [PSMR]=0x8
Events [SCCE]=0x0000, Mask [SCCM]=0x0000, Status [SCCS]=0x00
Transmit on Demand [TODR]=0x0, Data Sync [DSR]=0x7E7E
Interrupt Registers:
Config [CICR]=0x00367F80, Pending [CIPR]=0x00000000
Mask [CIMR]=0x00200000, In-srv [CISR]=0x00000000
Command register [CR]=0x580
Port A [PADIR]=0x1030, [PAPAR]=0xFFFF
[PAODR]=0x0010, [PADAT]=0xCBFF
Port B [PBDIR]=0x09C0F, [PEPAR]=0x0800E
[PBDOR]=0x000000, [PBDAT]=0x3FFFD
Port C [PCDIR]=0x00C, [PCPAR]=0x200
[PCSOI]=0x0C20, [PCDAT]=0xDF2, [PGINT]=0x00F
Receive Ring
rmd(68012830): status 9000 length 60C address 3B6DAC4
rmd(68012838): status E000 length 60C address 3E6D444
```

## How to Assign IP Address in DCE in Router

Router > EN	Press Enter
Router # Conf T	Press Enter
Router (Config) # Int S0/0	Press Enter
Router (Config-If) # IP Address 1.1.1.1 255.0.0.0      this is Public IP Address	Press Enter
Router (Config-If) # Clock Rate 64000	Press Enter
Router (Config-If) # No Shut	Press Enter
Router (Config-If) # Do Sh Interface S0/0	Press Enter

```

Router(config)#
Router(config)#Int S0/0/0
Router(config-if)#IP Address 1.1.1.1 255.0.0.0
Router(config-if)#Clock Rate 64000
Router(config-if)#No Shut

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to down
Router(config-if)#Do Sh Interface S0/0/0
Serial0/0/0 is down, line protocol is down (disabled)
  Hardware is HD64570
  Internet address is 1.1.1.1/8
  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 never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)
    Conversations 0/0/256 (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

```

IP Address in DCE

## How to Assign IP Address in DTE in Router

Router > EN	Press Enter
Router # Conf T	Press Enter
Router (Config) # Int S0/1	Press Enter
Router (Config-If) # IP Address 1.1.1.2 255.0.0.0      this is Privet Address	Press Enter
Router (Config-If) # No Shut	Press Enter
Router (Config-If) # Do Sh Interface S0/0	Press Enter

```

Router>
Router>En
Router#Conf T
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#Int S0/1
Router(config-if)#IP Address 1.1.1.2 255.0.0.0
Router(config-if)#No Shut

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up

Router(config-if)#Do Sh In
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed stat
Router(config-if)#
Router(config-if)#Do Sh Interface s0/1
Serial0/0/0 is up, line protocol is up, connected)
  Hardware is HD64570
  Internet address is 1.1.1.2/8
  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 never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/1000/64/0 (size/max total/threshold/drops)

```

IP Address in DTE



## What is Routing Protocol

Process that is used to transfer packet from one router to another that is called Routing Protocol

## What is Routing Protocol?

Routing Protocol is used to find Best Path between Routers

## Routing Protocol List

RIP Version 1  
Rip Version 2  
Eigrp  
OSPF

## What is Routed Protocol?

Routed Protocol is used to bring data from one router to another router by using routing protocol

## What is Administrative Distance?

Administrative Distance is used to define the range of each routing protocol

Administrative Distance range Starts From 0 255

## Administrative Distance List

Default Route	0
Static Route	1
RIP 1 2	120
IGRP	100
EIGRP	90
OSPF	110

## What is Metric?

Calculation of Best Path is called metric

## What is Load Balancing?

50/50 From Both Side of Router s

Both Side Two Router 50/50 Loading

## What is Class Full Routing Protocol

RIP Version 1 and IGRP EIGRP is Class full Routing Protocol

Not Support VLSM and Route Summarization

Not Share Subnet Mask

Used in Small Networks

## What is Class less Routing Protocol?

**RIP Version 2 Eigrp OSPF**

**Support Vlsn and Route Summarization**

**Used for Small / Large Network**

**EIGRP is a Class Full Routing Protocol and we set it as Class Less Routing Protocol for This Purpose We Apply No\_ auto \_Summarization Command**

### Types of Routing Protocol

**Static**

**Static Default Route Floating**

**Dynamic**

**RIPS 1.2 EIGRP OSPF IGRP**

## What is Static Routing Protocol?

**Types of Manual Routing Protocol**

**Manually Add / Change / Delete / Record in Router**

**Administrator must have idea about Static Routing Protocol**

**Static Routing Administrative Distance 1**

**Full Time Job for Network Administrator**

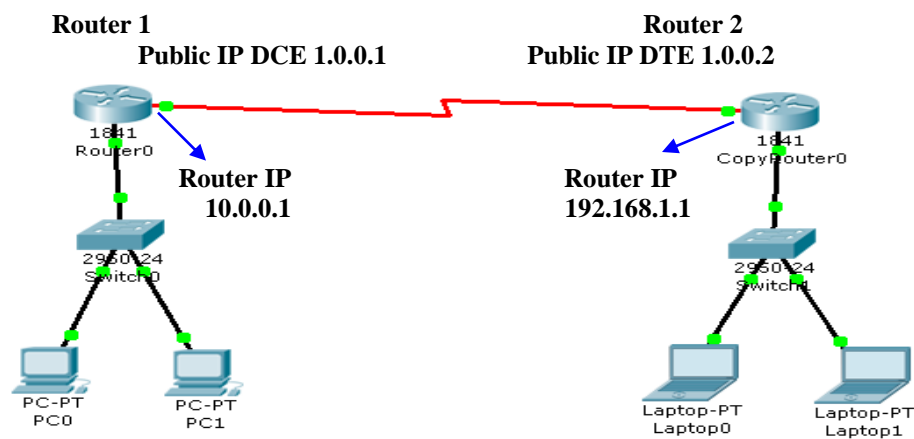
### Syntax of Static Routing Protocol

**Routing (Config) #IP Route “Destination Network ““Subnet Mask “next hop”**

**Route → is used Command that is used to Create Routing Table in Router**

**Destination Network → another Router**

**Next hop → which interface is used to send Receive Data to another router**



## Configuration of Routers

### Router 1

### FastEthernet 10.0.0.1

```
Router>en
Router#conf t
Router (config) # int fa0/0
Router (config-if) # Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 1

### Serial DCE 1.0.0.1

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 2

### FastEthernet 192.168.1.1

```
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-if) #exit
```

### Router 2

### Serial DTE 1.0.0.2

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 1

### Static Route

```
Router (config) #Ip route 192.168.1.1 255.255.255.0 1.0.0.2
Router (config) #do ping 192.168.1.1
```

Type escapes sequence to abort.

Sending 5, 100-byte ICMP Echoes to 192.168.1.1, timeout is 2 seconds:

!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 31/31/32 ms

### Router 2

### Static Route

```
Router (config) #Ip route 10.0.0.0 255.0.0.0 1.0.0.1
```

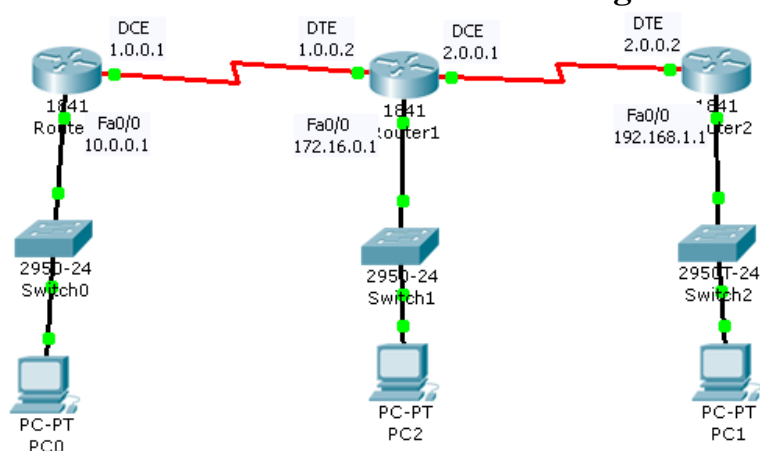
```
Router (config) #do Sh Ip route
```

```
C 1.0.0.0/8 is directly connected, Serial0/0/0
```

```
S 10.0.0.0/8 [1/0] via 1.0.0.1
```

```
C 192.168.1.0/24 is directly connected, FastEthernet0/0
```

### Static Router 3 Routers Configuration



#### Router 1

#### FastEthernet 10.0.0.1

```
Router>en
Router#conf t
Router (config) # int fa0/0
Router (config-if) # Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

#### Router 1

#### Serial DCE 1.0.0.1

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

#### Router 2

#### FastEthernet 172.16.0.1

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 172.16.0.1 255.255.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

#### Router 2

#### Serial DTE 1.0.0.2

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****Serial DCE 2.0.0.1**

```
Router (config) #int s0/0/1
Router (config-if) #Ip address 2.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) # exit
```

**Router 3****FastEthernet 192.168.1.1**

```
Router>
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-if) #exit
```

**Router 3****Serial DTE 2.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 2.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****Static Route**

```
Router (config) #Ip route 172.16.0.0 255.255.0.0 1.0.0.2
Router (config) #Ip route 192.168.1.0 255.255.255.0 1.0.0.2
Router (config) #Ip route 2.0.0.0 255.0.0.0 1.0.0.2
```

**Router 2****Static Route**

```
Router (config) #Ip route 10.0.0.0 255.0.0.0 1.0.0.1
Router (config) #Ip route 192.168.1.0 255.255.255.0 2.0.0.2
```

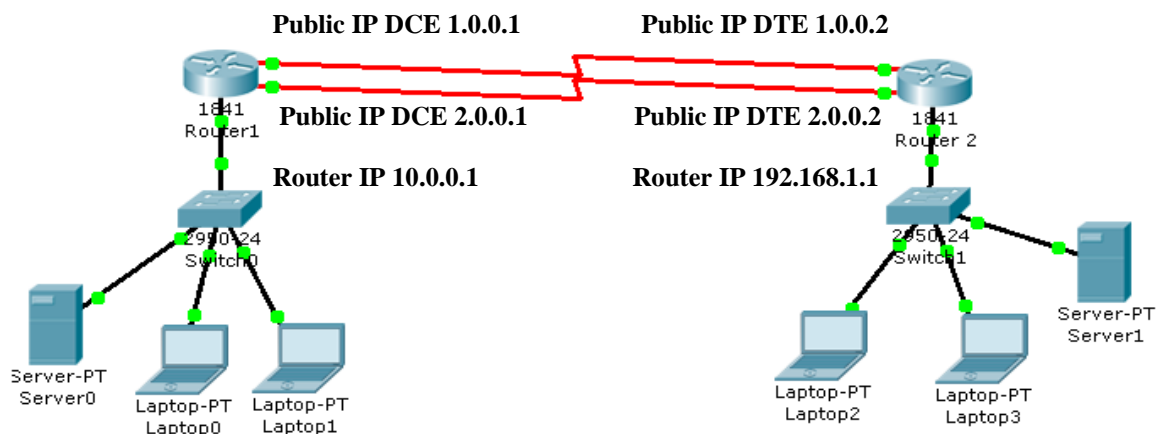
**Router 3****Static Route**

```
Router (config) #Ip route 172.16.0.0 255.255.0.0 2.0.0.1
Router (config) #Ip route 10.0.0.0 255.0.0.0 2.0.0.1
Router (config) #Ip route 1.0.0.0 255.0.0.0 2.0.0.1
```

```
Router (config) #do Sh Ip route
```

```
S 1.0.0.0/8 [1/0] via 2.0.0.1
C 2.0.0.0/8 is directly connected, Serial0/0/0
S 10.0.0.0/8 [1/0] via 2.0.0.1
S 172.16.0.0/16 [1/0] via 2.0.0.1
C 192.168.1.0/24 is directly connected, FastEthernet0/0
```

### Floating in Static Route



### Configuration in Static Route Floating

#### Router 1

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

FastEthernet 10.0.0.1

#### Router 1

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

Serial DCE 1.0.0.1

#### Router 1

```
Router (config) #int s0/0/1
Router (config-if) #Ip address 2.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

Serial DCE 2.0.0.1

#### Router 2

```
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-if) #exit
```

FastEthernet 192.168.1.1

**Router 2****Serial DTE 1.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****Serial DTE 2.0.0.2**

```
Router (config) #int s0/0/1
Router (config-if) #Ip address 2.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****Static Route Floating**

```
Router (config) #Ip route 192.168.1.0 255.255.255.0 1.0.0.2
Router (config) #Ip route 192.168.1.0 255.255.255.0 2.0.0.2
```

```
Router (config) #do Sh Ip route
```

```
C 1.0.0.0/8 is directly connected, Serial0/0/0
C 2.0.0.0/8 is directly connected, Serial0/0/1
C 10.0.0.0/8 is directly connected, FastEthernet0/0
S 192.168.1.0/24 [1/0] via 1.0.0.2
    [1/0] via 2.0.0.2
```

**Router 2****Static Route Floating**

```
Router (config) #Ip route 10.0.0.0 255.0.0.0 1.0.0.1
Router (config) #Ip route 10.0.0.0 255.0.0.0 2.0.0.1
```

```
Router (config) #do Sh Ip route
```

```
C 1.0.0.0/8 is directly connected, Serial0/0/0
C 2.0.0.0/8 is directly connected, Serial0/0/1
S 10.0.0.0/8 [1/0] via 1.0.0.1
    [1/0] via 2.0.0.1
C 192.168.1.0/24 is directly connected, FastEthernet0/0
```

**What is Default Route**

Also Called Gateway of Last Resort

Types of Static Routing Protocol

Administrative Distance 1

Representation in Routing Table S

Use in Stub Network

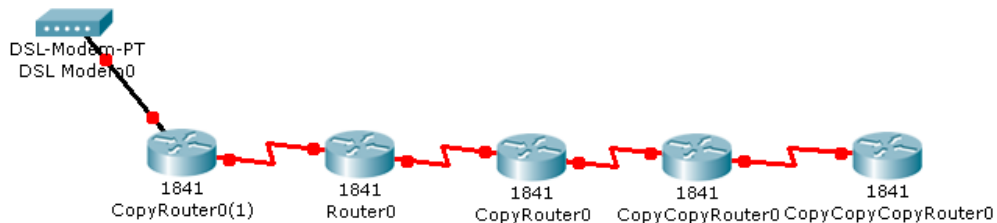


Such Types of Network that has only one Entry / Exit Way for Remote Network

## What is Route Summarization?

A Process that is used to summarize Multiple Routing Table Entries into Single Entry that is Called Route Summarization

## Just only Use in Building



→ Wild Card Mask Inverse of Subnet Mask

## Wild Card Mask Inverse of Subnet Mask

### Subnet Mask

Class A: 255.0.0.0  
Class B: 255.255.0.0  
Class C: 255.255.255.0

### Wild Card Mask

0.255.255.255  
0.0.255.255  
0.0.0.255

### Network ID

Class A: 10.0.0.0  
Class B: 172.16.0.0  
Class C: 192.168.1.0

0.255.255.255  
0.0.255.255  
0.0.0.255

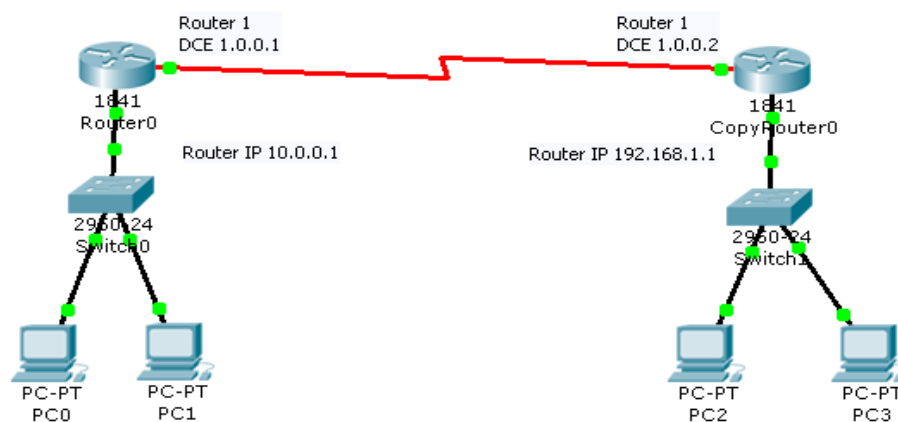
### Network IP

Class A: 10.0.0.1  
Class B: 172.16.0.1  
Class C: 192.168.1.1

0.0.0.0  
0.0.0.0  
0.0.0.0

## What is the Different between Static and Default Rout

Default Route: → We have No Idea about Destination about Net loop we have Net loop Address in Default Route These are No Entry of Destination Network in Routing Table





**Router 1****FastEthernet 10.0.0.1**

```
Router>en
Router#conf t
Router (config) # int fa0/0
Router (config-if) # Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****Serial DCE 1.0.0.1**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****FastEthernet 192.168.1.1**

```
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-if) #exit
```

**Router 2****Serial DTE 1.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

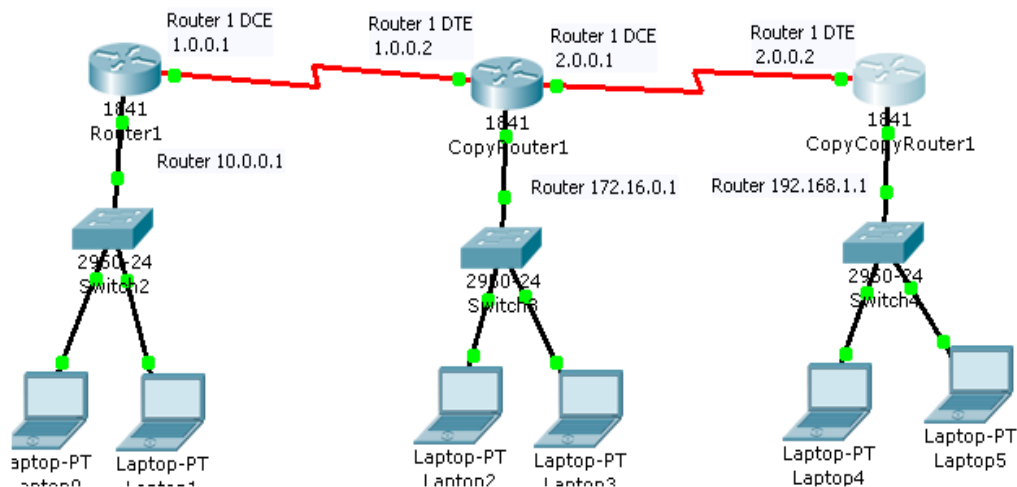
**Router 1****Default Route**

```
Router (config) #Ip route 0.0.0.0 0.0.0.0 1.0.0.2
Router (config) #do Sh Ip route
-
C 1.0.0.0/8 is directly connected, Serial0/0/0
C 10.0.0.0/8 is directly connected, FastEthernet0/0
S* 0.0.0.0/0 [1/0] via 1.0.0.2
```

**Router 2****Default Route**

```
Router (config) #Ip route 0.0.0.0 0.0.0.0 1.0.0.1
Router (config) #do Sh Ip route
C 1.0.0.0/8 is directly connected, Serial0/0/0
C 192.168.1.0/24 is directly connected, FastEthernet0/0
S* 0.0.0.0/0 [1/0] via 1.0.0.1
```

### Configuration of 3 Routers by Default Route



#### Router 1

#### FastEthernet 10.0.0.1

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

#### Router 1

#### Serial DCE 1.0.0.1

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

#### Router 2

#### FastEthernet 172.16.0.1

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 172.16.0.1 255.255.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

#### Router 2

#### Serial DTE 1.0.0.2

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****Serial DCE 2.0.0.1**

```
Router (config) #int s0/0/1
Router (config-if) #Ip address 2.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 3****FastEthernet 192.168.1.1**

```
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-if) #exit
```

**Router 3****Serial DTE 2.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 2.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****Default Route**

```
Router (config) #Ip route 0.0.0.0 0.0.0.0 1.0.0.2
Router (config) #do Sh Ip route

C 1.0.0.0/8 is directly connected, Serial0/0/0
C 10.0.0.0/8 is directly connected, FastEthernet0/0
S* 0.0.0.0/0 [1/0] via 1.0.0.2
```

**Router 2****Default Route**

```
Router (config) #Ip route 0.0.0.0 0.0.0.0 1.0.0.1
Router (config) #Ip route 0.0.0.0 0.0.0.0 2.0.0.2
Router (config) #do Sh Ip route

C 1.0.0.0/8 is directly connected, Serial0/0/0
C 2.0.0.0/8 is directly connected, Serial0/0/1
C 172.16.0.0/16 is directly connected, FastEthernet0/0
S* 0.0.0.0/0 [1/0] via 1.0.0.1
    [1/0] via 2.0.0.2
```

**Router 3****Default Route**

```
Router (config) #Ip route 0.0.0.0 0.0.0.0 2.0.0.1
Router (config) #do Sh Ip route

C 2.0.0.0/8 is directly connected, Serial0/0/0
C 192.168.1.0/24 is directly connected, FastEthernet0/0
S* 0.0.0.0/0 [1/0] via 2.0.0.1
```

## What is Dynamic Routing Protocol?

Used to Find Best Path Automatically  
 Used to Update Routing Table Automatically  
 Reduce network Administrator Work  
 Automatically Add or Change Network  
 Used Bandwidth  
 Used in WAN Side

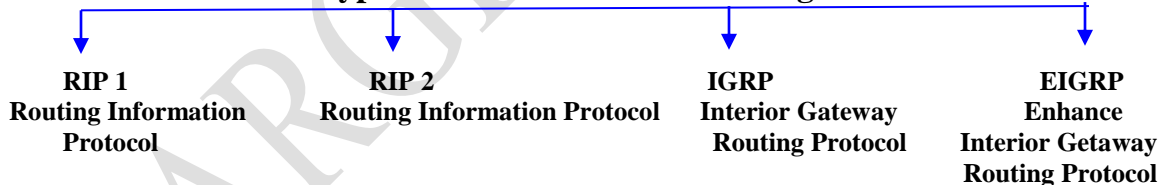
### Types of DRP (Dynamic Routing Protocol)



## What is Distance Vector Routing Protocol

Used to Find Best Path by Hop Count Metric  
 Share Copy of Routing Table to another Router by Every 30 second  
 Create only one Table      Routing Table  
 Slow Convergence      When the Two Router Routing Table Same that is Called Convergence  
 Use Looping Technique  
 Class full / Classless      Some Protocol is Use Class Full or Some is Use Classless

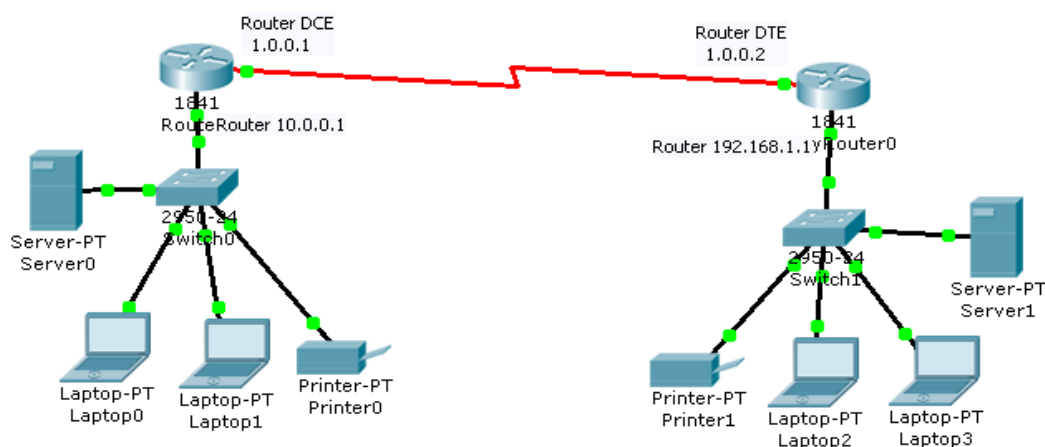
### Types of Distance Vector Routing Protocol



## What is RIP?

Developed in 1988  
 UDP Types Protocol  
 Use Port Number 520  
 By default Class Full  
 It Means that not Support to VLSM Router Summarization  
 Use Metric as hop count  
 Update Every 30 Second  
 Maximum Loop count 15  
 16 Loop Count Unreachable  
 Administrator Distance 120  
 Update Routing Table to another by using Broadcast Technique  
 Slow convergence  
 Find Best Path by Hop Count

## Configuration of RIP 1 Routing Protocol



### Router 1

### FastEthernet 10.0.0.1

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 1

### Serial DCE 1.0.0.1

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 2

### FastEthernet 192.168.1.1

```
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-if) #exit
```

### Router 2

### Serial DTE 1.0.0.2

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****RIP Route**

```

Router (config) #route rip
Router (config-router) #network 10.0.0.0
Router (config-router) #network 1.0.0.0
Router (config-router) #exit

Router (config) #do Sh Ip route

C 1.0.0.0/8 is directly connected, Serial0/0/0
C 10.0.0.0/8 is directly connected, FastEthernet0/0
R 192.168.1.0/24 [120/1] via 1.0.0.2, 00:00:18, Serial0/0/0

```

```

Router (config) #Do Sh Ip protocol
Redistributing: rip
  Interface      Send Recv Triggered RIP Key-chain
FastEthernet0/0    1    2    1
Serial0/0/0        1    2    1

```

Routing for Networks:

1.0.0.0

10.0.0.0

Passive Interface(s):

Routing Information Sources:

Gateway	Distance	Last Update
1.0.0.2	120	00:00:25

Distance: (default is 120)

**Router 2****RIP Route**

```

Router (config) #router rip
Router (config-router) #network 192.168.1.1
Router (config-router) #network 1.0.0.1
Router (config-router) #exit

Router (config) #Do Sh Ip routes

C 1.0.0.0/8 is directly connected, Serial0/0/0
R 10.0.0.0/8 [120/1] via 1.0.0.1, 00:00:07, Serial0/0/0
C 192.168.1.0/24 is directly connected, FastEthernet0/0

```

```

Router (config) #Do Sh Ip protocol
Redistributing: rip
Default version control: send version 1, receive any version
  Interface      Send Recv Triggered RIP Key-chain
FastEthernet0/0    1    2    1
Serial0/0/0        1    2    1

```

Routing for Networks:

1.0.0.0

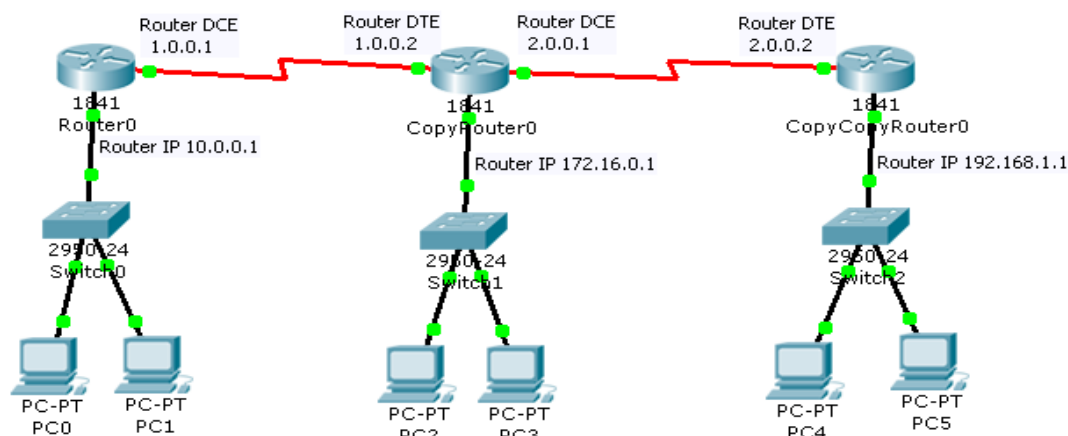
192.168.1.0

Routing Information Sources:

Gateway	Distance	Last Update
1.0.0.1	120	00:00:06

Distance: (default is 120)

### Configuration 3 Router RIP Protocol



#### Router 1

#### FastEthernet 10.0.0.1

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

#### Router 1

#### Serial DCE 1.0.0.1

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

#### Router 2

#### FastEthernet 172.16.0.1

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 172.16.0.1 255.255.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

#### Router 2

#### Serial DTE 1.0.0.2

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****Serial DCE 2.0.0.1**

```
Router (config) #int s0/0/1
Router (config-if) #Ip address 2.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 3****FastEthernet 192.168.1.1**

```
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-if) #exit
```

**Router 3****Serial DTE 2.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 2.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****RIP Route**

```
Router (config) #router rip
Router (config-router) #network 10.0.0.0
Router (config-router) #network 1.0.0.0
Router (config-router) #exit

Router (config) #do Sh Ip route
C 1.0.0.0/8 is directly connected, Serial0/0/0
R 2.0.0.0/8 [120/1] via 1.0.0.2, 00:00:23, Serial0/0/0
C 10.0.0.0/8 is directly connected, FastEthernet0/0
R 172.16.0.0/16 [120/1] via 1.0.0.2, 00:00:23, Serial0/0/0
R 192.168.1.0/24 [120/2] via 1.0.0.2, 00:00:23, Serial0/0/0
```

**Router 2****RIP Route**

```
Router (config) #router rip
Router (config-router) #network 172.16.0.0
Router (config-router) #network 1.0.0.0
Router (config-router) #network 2.0.0.0
Router (config-router) #exit

Router (config) #do Sh Ip route
C 1.0.0.0/8 is directly connected, Serial0/0/0
C 2.0.0.0/8 is directly connected, Serial0/0/1
R 10.0.0.0/8 [120/1] via 1.0.0.1, 00:00:13, Serial0/0/0
C 172.16.0.0/16 is directly connected, FastEthernet0/0
R 192.168.1.0/24 [120/1] via 2.0.0.2, 00:00:19, Serial0/0/1
```



**Router 3****RIP Route**

```
Router (config) #router rip
Router (config-router) #network 192.168.1.0
Router (config-router) #network 2.0.0.0
Router (config-router) #exit
```

```
Router (config) #do Sh Ip route
```

```
R 1.0.0.0/8 [120/1] via 2.0.0.1, 00:00:00, Serial0/0/0
C 2.0.0.0/8 is directly connected, Serial0/0/0
R 10.0.0.0/8 [120/2] via 2.0.0.1, 00:00:00, Serial0/0/0
R 172.16.0.0/16 [120/1] via 2.0.0.1, 00:00:00, Serial0/0/0
C 192.168.1.0/24 is directly connected, FastEthernet0/0
```

**Note:** → Start Debug Command to all Routers this is use for Update Router Table See You About Interface of another Routers

**Router 1****RIP Route**

```
Router # Debug Ip RIP
```

**Router 2****RIP Route**

```
Router # Debug Ip RIP
```

**Router 3****RIP Route**

```
Router # Debug IP Rip
```

**How to Stop Debug Command**

```
Router # Undebug IP Rip
```

**How to Change Set Timer**

I Means When I am Start Debug Command that can be Start Give Speed Update

**Router 2****RIP Route**

```
Router # En
Router (config) # Router Rip
Router (config-router) # Timers-basic 3 4 5 6
Router (config-router) # Exit
Router (config) # Exit
Router # Debug Ip Rip
```

## Only Receive Update from another Router But not Send it own Update

### Router 2

### RIP Route

```
Router (config) # Router Rip
Router (config-router) # Passive-interface S0/0
Router (config-router) # Exit
Router (config) # Exit
Router # Debug Ip Rip
```

you can with which serial

**Note:** → the other Router information are Coming but our Update not go to for Those Router

## How to Send Update to Specific Router

### Router 2

### RIP Route

```
Router (config) # Router Rip
Router (config-router) # Neighbor 10.0.0.1
Router (config-router) # Exit
Router (config) # Exit
Router # Debug Ip Rip
```

**Note:** → Give my information to this Router but not give to another Router  
I Means 192.168.1.1 this Router not see my information

### Router 2

### RIP Route and MD5

```
Router (config) # key chain Corvit
Router (config-key) # Key 1
Router (config-key) # Key-String Khan
Router (config-key) # Exit
Router (config-key) # Exit
Router (config) # Int S0/0
Router (config-if) # Ip Rip Authentication Key-Chain Corvit
Router (config-if) # Ip Rip Authentication Mode Text
```

Our Password can be Show to  
Another Router

### Router 3

### RIP Route and MD5

```
Router (config) # key chain Corvit
Router (config-key) # Key 1
Router (config-key) # Key-String Khan
Router (config-key) # Exit
Router (config-key) # Exit
Router (config) # Int S0/0
Router (config-if) # Ip Rip Authentication Key-Chain Corvit
Router (config-if) # Ip Rip Authentication Mode Text or Md5
```

Our Password can be Show to another Router  
If we Wirth Md5 My Password can by Encrypting

## What is RIP 2

Routing Information Protocol 2

Classless

Support VLSM / Route Summarization

15 Hop Count

16 Hop Count is Unreachable

Multicasting → Update (224.0.0.9)

Update Every 30 Second

Use Loop Technique

Slow Convergences

Use in Small Network

**Note:** → RIP 1 Use Update by Broadcasting RIP 2 Use Update by Multicasting

## What is Digital Signature?

A Process that is used to attach same Digital Code of Electronic Message that unique (Dentil yes) the Sender

→ Features of Digital Signature

→ Use Encryption Technique

→ Use Key Concept

**Note:** → We have Use one Key To All Routers Key Means Password

IF Someone Key is Wrong That Router Can't Communication With Other Routers

## What is MD5?

Message Digest 5

Basically Glyptography

128 Bit

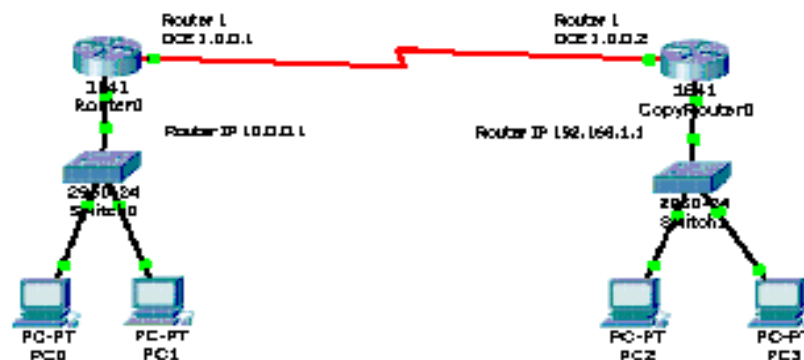
Digital Signature Application

Save From Virus

No Data Last in MD5

One Hash Key Function

## Configuration of Router by RIP 2



**Router 1****FastEthernet 10.0.0.1**

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****Serial DCE 1.0.0.1**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****FastEthernet 192.168.1.1**

```
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-if) #exit
```

**Router 2****Serial DTE 1.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****RIP Route**

```
Router (config) #route rip
Router (config-router) #network 10.0.0.0
Router (config-router) #network 1.0.0.0
Router (config-router) # Version 2
Router (config-router) #exit
```

Router (config) #do Sh Ip route

```
C 1.0.0.0/8 is directly connected, Serial0/0/0
C 10.0.0.0/8 is directly connected, FastEthernet0/0
R 192.168.1.0/24 [120/1] via 1.0.0.2, 00:00:18, Serial0/0/0
```

Router (config) #Do Sh Ip protocol

Redistributing: rip

Interface	Send	Recv	Triggered	RIP	Key-chain
FastEthernet0/0	1	2	1		
Serial0/0/0	1	2	1		

Routing for Networks:

1.0.0.0

10.0.0.0

Passive Interface(s):

Routing Information Sources:

Gateway	Distance	Last Update
1.0.0.2	120	00:00:25

Distance: (default is 120)

## Router 2

## RIP Route

Router (config) #router rip

Router (config-router) #network 192.168.1.1

Router (config-router) #network 1.0.0.1

Router (config-router) # Version 2

Router (config-router) #exit

Router (config) #Do Sh Ip routes

```
C 1.0.0.0/8 is directly connected, Serial0/0/0
R 10.0.0.0/8 [120/1] via 1.0.0.1, 00:00:07, Serial0/0/0
C 192.168.1.0/24 is directly connected, FastEthernet0/0
```

Router (config) #Do Sh Ip protocol

Redistributing: rip

Default version control: send version 1, receive any version

Interface	Send	Recv	Triggered	RIP	Key-chain
FastEthernet0/0	1	2	1		
Serial0/0/0	1	2	1		

Routing for Networks:

1.0.0.0

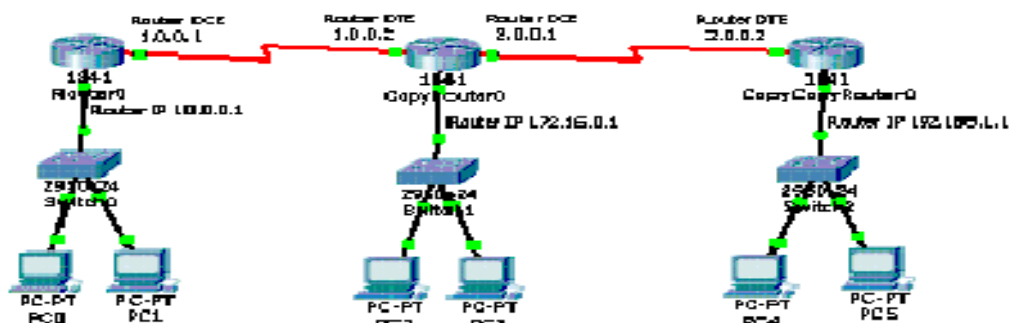
192.168.1.0

Routing Information Sources:

Gateway	Distance	Last Update
1.0.0.1	120	00:00:06

Distance: (default is 120)

## Configuration of 3 Routers by RIP 2



### Router 1

### FastEthernet 10.0.0.1

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 1

### Serial DCE 1.0.0.1

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 2

### FastEthernet 172.16.0.1

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 172.16.0.1 255.255.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 2

### Serial DTE 1.0.0.2

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****Serial DCE 2.0.0.1**

```
Router (config) #int s0/0/1
Router (config-if) #Ip address 2.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 3****FastEthernet 192.168.1.1**

```
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-if) #exit
```

**Router 3****Serial DTE 2.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 2.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****RIP Route**

```
Router (config) #router rip
Router (config-router) #network 10.0.0.0
Router (config-router) #network 1.0.0.0
Router (config-router) # Version 2
Router (config-router) #exit
```

```
Router (config) #do Sh Ip route
C 1.0.0.0/8 is directly connected, Serial0/0/0
R 2.0.0.0/8 [120/1] via 1.0.0.2, 00:00:23, Serial0/0/0
C 10.0.0.0/8 is directly connected, FastEthernet0/0
R 172.16.0.0/16 [120/1] via 1.0.0.2, 00:00:23, Serial0/0/0
R 192.168.1.0/24 [120/2] via 1.0.0.2, 00:00:23, Serial0/0/0
```

**Router 2****RIP Route**

```
Router (config) #router rip
Router (config-router) #network 172.16.0.0
Router (config-router) #network 1.0.0.0
Router (config-router) # Version 2
Router (config-router) #network 2.0.0.0
Router (config-router) #exit
```

```
Router (config) #do Sh Ip route
C 1.0.0.0/8 is directly connected, Serial0/0/0
C 2.0.0.0/8 is directly connected, Serial0/0/1
R 10.0.0.0/8 [120/1] via 1.0.0.1, 00:00:13, Serial0/0/0
C 172.16.0.0/16 is directly connected, FastEthernet0/0
R 192.168.1.0/24 [120/1] via 2.0.0.2, 00:00:19, Serial0/0/1
```

**Router 3****RIP Route**

```
Router (config) #router rip
Router (config-router) #network 192.168.1.0
Router (config-router) #network 2.0.0.0
Router (config-router) # Version 2
Router (config-router) #exit
```

```
Router (config) #do Sh Ip route
```

```
R 1.0.0.0/8 [120/1] via 2.0.0.1, 00:00:00, Serial0/0/0
C 2.0.0.0/8 is directly connected, Serial0/0/0
R 10.0.0.0/8 [120/2] via 2.0.0.1, 00:00:00, Serial0/0/0
R 172.16.0.0/16 [120/1] via 2.0.0.1, 00:00:00, Serial0/0/0
C 192.168.1.0/24 is directly connected, FastEthernet0/0
```

**Note:** → Start Debug Command to all Routers this is use for Update Router Table See You

**Router 1****RIP Route**

```
Router # Debug Ip RIP
```

**Router 2****RIP Route**

```
Router # Debug Ip RIP
```

**Router 3****RIP Route**

```
Router # Debug IP Rip
```

**How to Stop Debug Command**

```
Router # Undebug IP Rip
```

**How to Change Set Timer**

I Means When I am Start Debug Command that can be Start Give Speed Update

**Router 2****RIP Route**

```
Router # En
Router (config) # Router Rip
Router (config-router) # Timers-basic 3 4 5 6
Router (config-router) # Exit
Router (config) # Exit
Router # Debug Ip Rip
```



## Only Receive Update from another Router But not Send it own Update

### Router 2

### RIP Route

```
Router (config) # Router Rip
Router (config-router) # Passive-interface S0/0      you can with which serial
Router (config-router) # Exit
Router (config) # Exit
Router # Debug Ip Rip
```

Note: → the other Router information are Coming but our Update not go to for Those Router

## How to Send Update to Specific Router

### Router 2

### RIP Route

```
Router (config) # Router Rip
Router (config-router) # Neighbor 10.0.0.1
Router (config-router) # Exit
Router (config) # Exit
Router # Debug Ip Rip
```

Note: → Give my information to this Router but not give to another Router  
I Means 192.168.1.1 this Router not see my information

### Router 2

### RIP Route and MD5

```
Router (config) # key chain Corvit
Router (config-key) # Key 1
Router (config-key) # Key-String Khan
Router (config-key) # Exit
Router (config-key) # Exit
Router (config) # Int S0/0
Router (config-if) # Ip Rip Authentication Key-Chain Corvit
Router (config-if) # Ip Rip Authentication Mode Text
```

Our Password can be Show to  
Another Router

### Router 3

### RIP Route and MD5

```
Router (config) # key chain Corvit
Router (config-key) # Key 1
Router (config-key) # Key-String Khan
Router (config-key) # Exit
Router (config-key) # Exit
Router (config) # Int S0/0
Router (config-if) # Ip Rip Authentication Key-Chain Corvit
Router (config-if) # Ip Rip Authentication Mode Text or Md5
```

Our Password can be Show to another Router  
If we Wirth Md5 My Password can by Encrypting

## What is EIGRP PROTOCOL?

Enhanced Interior Gateway Routing Protocol

Types of Hybrid Routing Protocol (I Means Connecting Distance Vector Routing and Link State Protocol)

Also Called Advance Distance Vector Routing Protocol (I Means Which Router near our Router)

About Used Feature of Link (I Means When Two Routers connecting with one and other that is Called Link)

Administrative Distance 90 (Internal Side our Counter)

Administrative Distance 170 (External Out of our Counter)

By default Maximum Hop Count 100 (Connecting 100 Routers)

Support Hop Count 255 (Connecting Up to 255 Routers)

By default Class full

But this Command We Can Use it as Classless for we will use (No Auto-Summarize) Command

Basically Cisco Protocol

Only Communication with Cisco Devices Not to other Bound Routers

Faster Convergence

Used Autonomous Number System or Process ID

Used RTP Protocol (Reliable Transport Protocol)

Developed in 1994

Port Number 88

Multicast 224.0.0.10

Check Neighbor Relation Ship Every 5 Second by Using Hello Packet

## What is RTP?

Reliable Transport Protocol

Used to Establish and Maintain Connection B/T Eigrp Router (I Means Connecting Continue with Other Router)

Used Reliable and Unreliable Technique

Provide as Guarantee to Send/Receive Packet from another Router

## What is RTP PACKET?

- **Hello Packet:**
  - Unicast and Multicast
  - 224.0.0.10
  - Unreliable / Reliable
  - Used to Establish Neighbor
- **Acknowledgement Packet:**
  - Relationship with another Router
  - Unreliable / Reliable
  - By this Packet Our Relationship Establish with another Router
- **Query Packet:**
  - Unicast / Multicast
  - Reliable
  - Used to Send another Router When Successor is Lost in Routing Table
- **Reply Packet:**
  - Unicast
  - Used to Send Successor Address to Router on the Behalf of Query Packet
- **Update:**
  - Unicast / Multicast
  - Send to another Router to Updating of Internet work Such as Add / Chang / Delete / ETC

### Types of Metrics

1):→ Hop count	→	RIP 1 and RIP 2
2):→ Bandwidth	→	IGRP and EIGRP
3):→ Delay	→	IGRP and EIGRP
4):→ MTU	→	IGRP and EIGRP
5):→ Load	→	IGRP and EIGRP
6):→ Reliability	→	IGRP and EIGRP
7):→ Cost	→	Use in OSPF

### How Goes to Router Down in EIGRP

When Relationship Establish B/T Router For Example:→ Router 1 Send Hello Packet To Router 2 After 5 Second so in This Situation Router 1 Send 16 Hello Packet to Router 2 After Every 5 Second and Then Router 2 No Send Acknowledgement Packet to Router 1 After 16 Hello Packet so Router 1 Consider that Router 2 Goes Down

### What is Topology Table

All Internet Work Information Stored Here  
Work by Autonomous Number System

Find Successor

Find Feasible Successor

Advertise Distance

Feasible Distance

Passive

Active

Reported Distance

Note:→ Create all These Function Topology Table

### What Is Successor

Stored in Routing Table

Neighbor is Also Called Successor

### What is Feasible Successor?

Backup of Successor

Stored in Topology

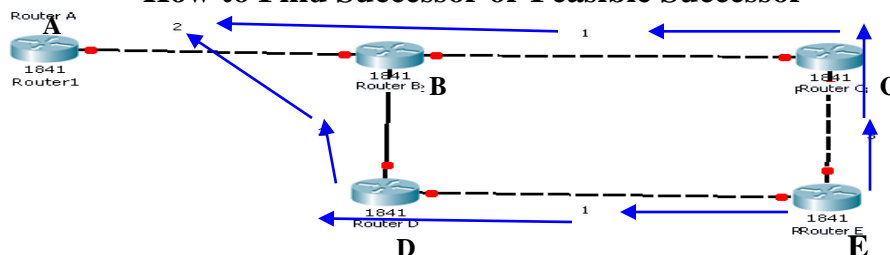
### What is Passive Mode?

If Two Router Connecting With One and Another In This Time We See Routing Table In Front of Router Table Come Option Our Router is Work on Right this is Called Passive Mode

### What is Active Mode?

If some one Router Changing Our Routing Table or Other Something this is Called Active Mode

### How to Find Successor or Feasible Successor



**E:→ D+B= (5) this is Called Successor (Also Called Advertise Distance)**

**E:→ C+B= (6) this is Called Feasible Successor (Also Called Feasible Distance)**

### What is Reported Distance?

Older Name is Advertise Distance

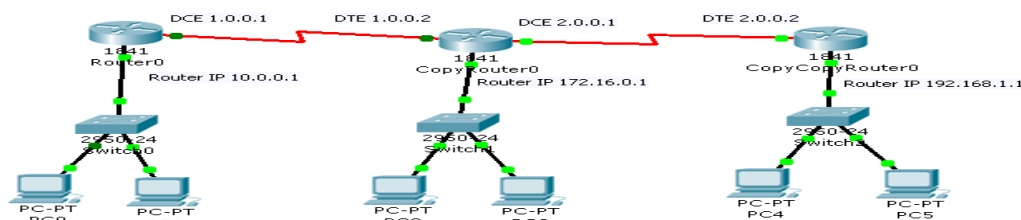
Calculate Local Router

Best Path Find Feasible Distance

Stored in Topology Table

**Note:→ The Delay of Fast Ethernet is Called Reported Distance (100) the LAN Speed is Called Reported Distance**

### Configuration of EIGRP



#### Router 1

#### FastEthernet 10.0.0.1

```
Router>en
Router#conf t
Router (config) # int fa0/0
Router (config-if) # Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

#### Router 1

#### Serial DCE 1.0.0.1

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

#### Router 2

#### FastEthernet 172.16.0.1

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 172.16.0.1 255.255.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

#### Router 2

#### Serial DTE 1.0.0.2

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****Serial DCE 2.0.0.1**

```
Router (config) #int s0/0/1
Router (config-if) #Ip address 2.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) # exit
```

**Router 3****FastEthernet 192.168.1.1**

```
Router>
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-if) #exit
```

**Router 3****Serial DTE 2.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 2.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****EIGRP ROUTE**

```
Router (config) #router Eigrp 1
Router (config-router) #network 10.0.0.0
Router (config-router) #network 1.0.0.0
Router (config-router) #no auto-summary
Router (config-router) #exit
```

**Router 2****EIGRP ROUTE**

```
Router (config) #router Eigrp 1
Router (config-router) #network 172.16.0.0
Router (config-router) #network 1.0.0.0
Router (config-router) #network 2.0.0.0
Router (config-router) #no auto-summary
Router (config-router) # exit
```

**Router 3****EIGRP ROUTE**

```
Router (config) #router Eigrp 1
Router (config-router) #network 192.168.1.0
Router (config-router) #network 2.0.0.0
Router (config-router) #no auto-summary
Router (config-router) #exit
```

**Router 1****EIGRP ROUTE**

Router (config) #do Sh Ip route

```
C 1.0.0.0/8 is directly connected, Serial0/0/0
D 2.0.0.0/8 [90/2681856] via 1.0.0.2, 00:07:39, Serial0/0/0
C 10.0.0.0/8 is directly connected, FastEthernet0/0
D 172.16.0.0/16 [90/2172416] via 1.0.0.2, 00:08:36, Serial0/0/0
D 192.168.1.0/24 [90/2684416] via 1.0.0.2, 00:07:13, Serial0/0/0
```

Router (config) #Do Sh Ip protocol

Redistributing: Eigrp 1

Routing for Networks:

10.0.0.0

1.0.0.0

Routing Information Sources:

Gateway	Distance	Last Update
1.0.0.2	90	264187

Distance: internal 90 external 170

Router (config) #Do Sh Ip Eigrp topology

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,  
r - Reply status

```
P 10.0.0.0/8, 1 successors, FD is 28160
  via Connected, FastEthernet0/0
P 1.0.0.0/8, 1 successors, FD is 2169856
  via Connected, Serial0/0/0
P 172.16.0.0/16, 1 successors, FD is 2172416
  via 1.0.0.2 (2172416/28160), Serial0/0/0
P 2.0.0.0/8, 1 successors, FD is 2681856
  via 1.0.0.2 (2681856/2169856), Serial0/0/0
P 192.168.1.0/24, 1 successors, FD is 2684416
  via 1.0.0.2 (2684416/2172416), Serial0/0/0
```

**Router 2****EIGRP ROUTE**

Router (config) #do Sh Ip route

```
C 1.0.0.0/8 is directly connected, Serial0/0/0
C 2.0.0.0/8 is directly connected, Serial0/0/1
D 10.0.0.0/8 [90/2172416] via 1.0.0.1, 00:19:47, Serial0/0/0
C 172.16.0.0/16 is directly connected, FastEthernet0/0
D 192.168.1.0/24 [90/2172416] via 2.0.0.2, 00:18:24, Serial0/0/1
```

**What is EIGRP METRIC?**

K1= Bandwidth

K2= Load

K3= Delay

K4= Reliability

K5= MTU

### What is Bandwidth?

How Fast Physical Medium Transmit Data from Source to Destination (Sending / Receiving)

Note:→ Bandwidth is a Logical Phenomenon (Phenomenon meaning is a Process sending and Receiving)

### What is Clock Rate?

The Speed of Processor is Called Clock Rate

How Fast Processor Collect Data

### What is the Different B/T Bandwidth and Clock Rate?

Clock Rate	is Speed of processor
Bandwidth	is Speed of Internet or Link on Connection
Clock Rate	is Physical
Bandwidth	is Logical

### What is Delay?

Time take from Source to Destination

Note:→ Total Time Take Data to Reach From Source to Distention

### What is Load?

Load Means Utilization (Utilization Means Use)

### What is MTU

Maximum Transfer Unit

Note:→ How Much Data Transfer From Source to Distention

### What is Cost?

Cost is Inverse of Bandwidth

Note:→ Used in OSPF

By default Value	Metric Value
:→ 64000 Bit =====	64
:→ 10 Mb =====	10
:→ 100 Mb=====	100

## How to Set Bandwidth and Delay on DCE Serial Router

### Router 1

### Bandwidth/Delay DCE

```
Router (Config) # int S0/0/0
Router (Config-if) # Bandwidth 1544    (this is Speed of Internet 1 Mb)
Router (Config-if) # Delay 2000
Router (Config-if) # Exit
Router (Config) # Do Sh Ip Eigrp Topology
```

### Router 2

### Bandwidth/Delay DCE

```
Router (Config) # int S0/0/0
Router (Config-if) # Bandwidth 64    (this is Speed of Internet 1 Mb)
Router (Config-if) # Delay 2000
Router (Config-if) # Exit
Router (Config) # Do Sh Ip Eigrp Topology
Router (Config) # Do Sh Ip Eigrp Neighbors
Router (Config) # Do Sh Ip Eigrp Topology 10.0.0.0    (Show us Bandwidth and Delay of Router 1)
```

## How to Configuration MD5

### Router 1

### EIGRP Route and MD5

```
Router (config) # key chain Corvit
Router (config-key) # Key 1
Router (config-key) # Key-String Khan
Router (config-key) # Exit
Router (config-key) # Exit
Router (config) # Int S0/0
Router (config-if) # Ip Rip Authentication Key-Chain Corvit
Router (config-if) # Ip Rip Authentication Mode Text
```

Our Password can be Show to  
Another Router

### Router 2

### EIGRP Route and MD5

```
Router (config) # key chain Corvit
Router (config-key) # Key 1
Router (config-key) # Key-String Khan
Router (config-key) # Exit
Router (config-key) # Exit
Router (config) # Int S0/0
Router (config-if) # Ip Rip Authentication Key-Chain Corvit
Router (config-if) # Ip Rip Authentication Mode Text or Md5
    Our Password can be Show to another Router
    If we Wirth Md5 My Password can by Encrypting
```



## How to Encase Hello Packet and Hold Down Timer

### Router 1

### EIGRP Route

```
Router (config) # Int S0/0
Router (config-if) # Ip Hello-Interval Eigrp 1 20
Router (config-if) # Ip Hold-Time Eigrp 10 20
Router (config-if) # Exit
Router (config) # Exit
Router # Sh Ip Eigrp Interfaces Detail S0/0
```

### Router 2

### EIGRP Route

```
Router (config) # Int S0/0
Router (config-if) # Ip Hello-Interval Eigrp 1 20
Router (config-if) # Ip Hold-Time Eigrp 10 20
Router (config-if) # Exit
Router (config) # Exit
Router # Sh Ip Eigrp Interfaces Detail S0/0
```

**Note:** → Now This Two Router Do Communication with one Another So Fast  
I Means Send Update to Fast with Each Other

## What is Load Balancing?

A process That Used to Divide Another of Work That a Device Perform it by Two or More Devices That is Called Load Balancing

Or

When a Router Share Our Routing Table Divide on Multiple Router that is Called Load Balancing

## Types of Load Balancing

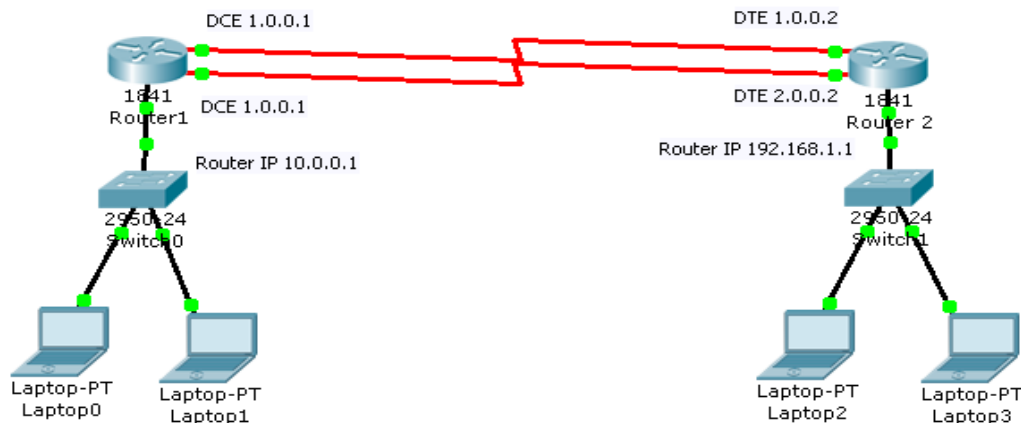
### Equal

### Unequal

When we Sent 1 GB Data to another Router we have Two Connection Valances 1 on Our Router  
This 1 GB goes to on 1 Connection Line

Unequal: → If we have Valance 2 this 1 GB go to on Two Connection or LAN

## How to Configuration Equal on Floating



**Router 1****Fast Ethernet 10.0.0.1**

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****Serial DCE 1.0.0.1**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****Serial DCE 2.0.0.1**

```
Router (config) #int s0/0/1
Router (config-if) #Ip address 2.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****FastEthernet 192.168.1.1**

```
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-if) #exit
```

**Router 2****Serial DTE 1.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****Serial DTE 2.0.0.2**

```
Router (config) #int s0/0/1
Router (config-if) #Ip address 2.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****EIGRP Route Floating**

```

Router (config) # Router Eigrp 1
Router (config-router) # Network 10.0.0.0
Router (config-router) # Network 1.0.0.0
Router (config-router) # Network 2.0.0.0
Router (config-router) # No Auto-Summarize
Router (config-router) # Exit

```

```

Router (config) #do Sh Ip route

```

```

C 1.0.0.0/8 is directly connected, Serial0/0/0
C 2.0.0.0/8 is directly connected, Serial0/0/1
C 10.0.0.0/8 is directly connected, FastEthernet0/0
D 192.168.1.0/24 [90/2172416] via 2.0.0.2, 00:00:11, Serial0/0/1
   [90/2172416] via 1.0.0.2, 00:00:11, Serial0/0/0

```

```

Router (config) #do Sh Ip Eigrp topology
IP-EIGRP Topology Table for AS 1

```

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,  
r - Reply status

```

P 10.0.0.0/8, 1 successors, FD is 28160
   Via Connected, FastEthernet0/0
P 1.0.0.0/8, 1 successors, FD is 2169856
   Via Connected, Serial0/0/0
P 2.0.0.0/8, 1 successors, FD is 2169856
   Via Connected, Serial0/0/1
P 192.168.1.0/24, 2 successors, FD is 2172416
   Via 2.0.0.2 (2172416/28160), Serial0/0/1
   Via 1.0.0.2 (2172416/28160), Serial0/0/0

```

```

Router (config) #do Sh Ip Eigrp neighbors

```

```

IP-EIGRP neighbors for process 1

```

H	Address	Interface	Hold	Uptime	SRTT	RTO	Q	Seq
		(Sec)	(ms)	Can't	Num			
0	1.0.0.2	Se0/0/0	14	00:05:43	40	1000	0	11
1	2.0.0.2	Se0/0/1	14	00:05:43	40	1000	0	12

```

Router (config) #do Sh Ip Eigrp topology 192.168.1.0

```

```

IP-EIGRP (AS 1): Topology entry for 10.0.0.0/8

```

State is Passive, Query origin flag is 1, 1 Successor(s), FD is 28160

Routing Descriptor Blocks:

0.0.0.0 (FastEthernet0/0), from Connected, Send flag is 0x0

Composite metric is (28160/0), Route is Internal

Vector metric:

Minimum bandwidth is 100000 Kbit

Total delay is 100 microseconds

Reliability is 255/255

Load is 1/255

Minimum MTU is 1500

**Router 2****EIGRP Route Floating**

```

Router (config) # Router Eigrp 1
Router (config-router) # Network 192.168.1.0
Router (config-router) # Network 1.0.0.0
Router (config-router) # Network 2.0.0.0
Router (config-router) # No Auto-Summarize
Router (config-router) # Exit

```

```

Router (config) #do Sh Ip route

```

```

C 1.0.0.0/8 is directly connected, Serial0/0/0
C 2.0.0.0/8 is directly connected, Serial0/0/1
D 10.0.0.0/8 [90/2172416] via 2.0.0.1, 00:00:42, Serial0/0/1
  [90/2172416] via 1.0.0.1, 00:00:42, Serial0/0/0
C 192.168.1.0/24 is directly connected, FastEthernet0/0

```

```

Router (config) #do Sh Ip Eigrp topology
IP-EIGRP Topology Table for AS 1

```

Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,  
r - Reply status

```

P 192.168.1.0/24, 1 successors, FD is 28160
  Via Connected, FastEthernet0/0
P 1.0.0.0/8, 1 successors, FD is 2169856
  Via Connected, Serial0/0/0
P 2.0.0.0/8, 1 successors, FD is 2169856
  Via Connected, Serial0/0/1
P 10.0.0.0/8, 2 successors, FD is 2172416
  Via 2.0.0.1 (2172416/28160), Serial0/0/1
  Via 1.0.0.1 (2172416/28160), Serial0/0/0

```

```

Router (config) #do Sh Ip Eigrp neighbors

```

```

IP-EIGRP neighbors for process 1

```

H	Address	Interface	Hold	Uptime	SRTT	RTO	Q	Seq
		(Sec)	(ms)	Can't	Num			
0	1.0.0.1	Se0/0/0	13	00:12:05	40	1000	0	7
1	2.0.0.1	Se0/0/1	13	00:12:05	40	1000	0	8

```

Router (config) #do Sh Ip Eigrp topology 10.0.0.0

```

```

IP-EIGRP (AS 1): Topology entry for 10.0.0.0/8

```

State is Passive, Query origin flag is 1, 2 Successor(s), FD is 2172416

Routing Descriptor Blocks:

2.0.0.1 (Serial0/0/1), from 2.0.0.1, Send flag is 0x0

Composite metric is (2172416/28160), Route is Internal

Vector metric:

Minimum bandwidth is 1544 Kbit

Total delay is 20100 microseconds

Reliability is 255/255

Load is 1/255

Minimum MTU is 1500

## How to Configuration Equal

### Router 1

### EIGRP Route

Router (Config) # Router Eigrp 1  
 Router (Config-router) # Variance 2  
 Router (Config-router) # Traffic-Share Balanced  
 Router (Config-router) # Exit

### Router 2

### EIGRP Route

Router (Config) # Router Eigrp 1  
 Router (Config-router) # Variance 2  
 Router (Config-router) # Traffic-Share Balanced  
 Router (Config-router) # Exit

**Note: → This is Called unequal Then Check Routing Table by this Command**

Router (config) #do Sh Ip Eigrp topology 192.168.1.0

IP-EIGRP (AS 1): Topology entry for 10.0.0.0/8  
 State is Passive, Query origin flag is 1, 1 Successor(s), FD is 28160  
 Routing Descriptor Blocks:  
 0.0.0.0 (FastEthernet0/0), from Connected, Send flag is 0x0  
 Composite metric is (28160/0), Route is Internal  
 Variance 2  
 Vector metric:  
 Minimum bandwidth is 100000 Kbit  
 Total delay is 100 microseconds  
 Reliability is 255/255  
 Load is 1/255  
 Minimum MTU is 1500  
 Hop count is 0

**Now Your Data 1 GB go to on Two Connection or Line**

**Only Receive Update from another Router  
 But not Send it own Update**

### Router 2

### EIGRP Route

Router (config) # Router Eigrp 1  
 Router (config-router) # Passive-interface S0/0  
 Router (config-router) # Passive-interface S0/1  
 Router (config-router) # Exit  
 Router (config) # Exit  
 Router # Debug Ip Packet

you can with which serial

**Note: → the other Router information are Coming but our Update not go to for Those Routers 1 and 3**

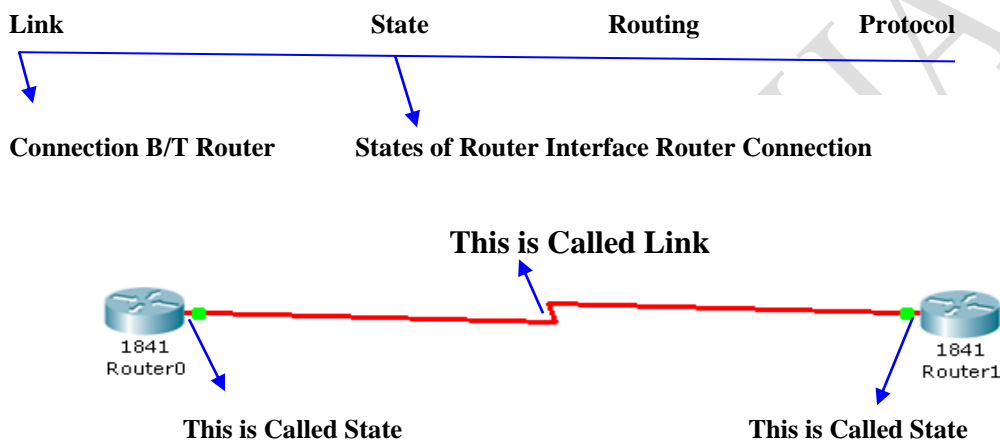
## How to Send Update to Specific Router

### Router 2

### EIGRP Route

```
Router (config) # Router EIGRP
Router (config-router) # Neighbor 10.0.0.1
Router (config-router) # Exit
Router (config) # Exit
Router # Debug Ip Packet
```

## What is Link State Routing Protocol?



## What is OSPF PROTOCOL?

Meaning of OSPF (Open Shortest Path First)

Link State Routing Protocol

Administrative Distance 110

Un Limit Hop Count

Fastest Convergence

Metric → Cost

Used Area Concept

Used Process ID Concept

Event Trigger (This is Router only Connect with Those Routers which one is Connect with this Router but not connecting with others Routers)

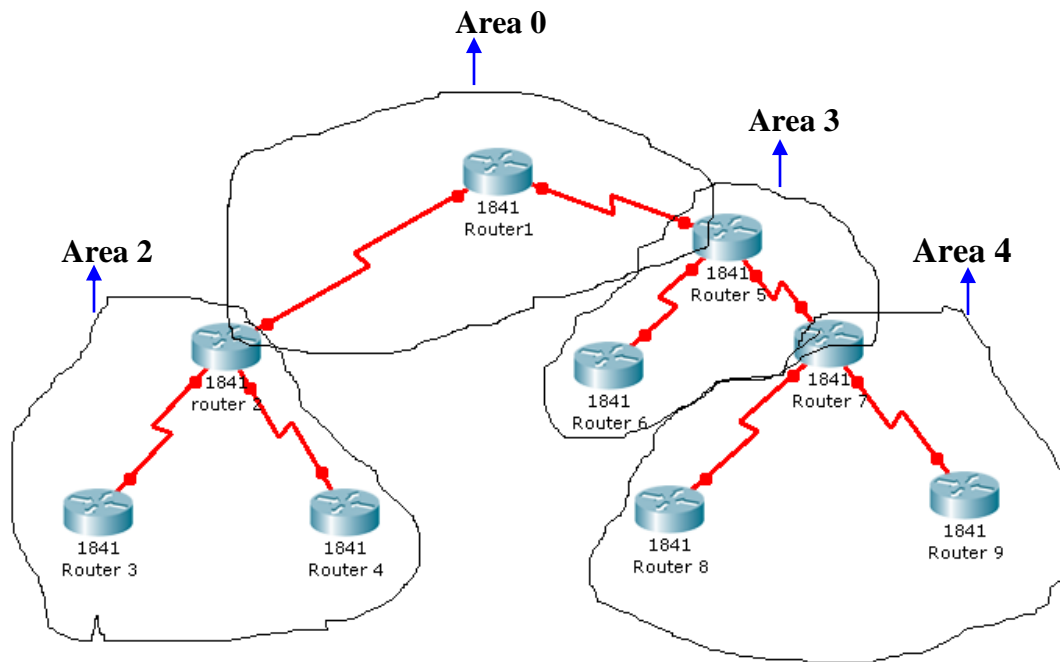
Use Wildcard Mask Concept

Process ID Range Start From 1 to 65535

Area Always Start From 0 up to 43 Billion

Use 3 Types of Tables

- 1) Neighbor Table
- 2) Routing Table
- 3) Topology Table



### What is Area?

Area is Collation of Network. Host. Router

### What is ABR

Area Border Router

Such Types of Router that is connected With Deferent Area that is Called Area Border Router

### What is Back bone Router

Router with in Area that is not Connect with another Router

### What is Duplicate Router

You don't have Assign for Two Routers in one Area Same Process ID

### What is Word cast Mask?

A: → IP Address 10.0.0.0 255.0.0.0

Word Cast Mask: 0.255.255.255

B: → IP Address 172.16.0.0 255.255.0.0

Word Cast Mask: 0.0.255.255

C: → IP Address 192.168.1.0 255.255.255.0

Word Cast Mask: 0.0.0.255

### When Change Network IP

A: → 10.0.0.1 Network IP

0.0.0.0 Word Cast Mask

B: → 172.16.0.1 Network IP

0.0.0.0 Word Cast Mask

C: → 192.168.1.1 Network IP

0.0.0.0 Word Cast Mask

### What is Syntax of OSPF?

Router (Config) #Router OSPF Process ID 1.2.3.4 etc  
 Router (Config-router) # Source Network ID Word Cast Mask Area Number  
 10.0.0.0 0.255.255.255 0-65535

### What is Adjacency?

Let Suppose Router 1 Want to Establish Neighbor Discovery with router 2 for this Purpose  
 Router 1 Send hello Packet to Router 2 and then Router 2 Response to router 1 on the Neighbor  
 Discovery Established between Router 1 and Router 2 that is Called Adjacency

### What is Link State Database?

Each Router in Link State Routing Protocol has its own Database that is used to Stored  
 Information About all Topology

Note:→ Each Router has on Database which has Save All Information Table Here

### What is Link State?

Advertisement on Another Router States Check by ISA (Link State Advertisement)

Note:→ This is only connected with another Router Interface

Or

When Two Router Connected With one and Another by Interface is Called Link State

### What is Link State Routing Protocol?

Developed in 1976-77  
 Implemented 1979  
 Also Called Shortest Path First  
 Interior Routing Protocol

### What is OSPF?

Developed in 1989 Version 1  
 Developed in 1998 Version 3  
 Open Standard Protocol

Note:→ This is Used Only Connected With Other Company Routers Also

### OSPF Terminology

Link:→ Connection between Routers

Router 1 \_\_\_\_\_ Link \_\_\_\_\_ Router 2

Link State:→ Link has State Information about router interfaces (UP/down)

Note:→ So it Means that ISA Send To another Router on the Behalf of Another router link up

Router 1 \_\_\_\_\_ State \_\_\_\_\_ Router 2



## Types of Link

Point to Point  
Link between Two Routers That is Called Point to Point

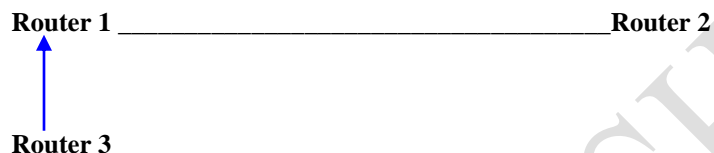
Or

When Two Routers are connected with one and another that is Called Point to Point

Router 1 \_\_\_\_\_ PTP \_\_\_\_\_ Router 2

## What is Transient Link?

According to OSPF when two or more network are Connected With one Routers That is Called Transient Link



## What is Sub Link?

Such Types of Network that have one Router Connected to Internet and all Routers send / Receive data by That Router



All Information goes to by Router 1 that is Called Sub Link

## What is Virtual Link?

Not Connected by Physical link that is logical link of Router is Called Virtual Link

Note:→ Two Router are not Connected with one and another by Physical Link That is Logical Connect that is Called Virtual Link

## What is Neighbor?

Router 1 is connected to Router 2 as Point to Point that is Called Neighbor

Router 1 \_\_\_\_\_ Neighbor >>> \_\_\_\_\_ Router 2

## What is Adjacency

When router 1 and Router 2 become Relationship occurred by Hello / Ack Packet and Packet That is Called Adjacency

Router 1 \_\_\_\_\_ Packet Send to >>> \_\_\_\_\_ Router 2  
Router 1 \_\_\_\_\_ <<<Packet Send to \_\_\_\_\_ Router 2

## What is LSA?

Link State Advertisement

By Using this Packet Router 1 Send it Own Link Database Information to Router 2

Router 1 \_\_\_\_\_ Send own Database information for \_\_\_\_\_ Router 2

## What is OSPF States

:→ Down State  
:→ Init State  
:→ Two Way State  
:→ Exchange Start State  
:→ Exchange State  
:→ Loading State  
:→ Full State

## What is Down State?

When a Router 1 in Power on in OSPF and Does Not Send Hello Packet to Neighbor that is Called Down State

Router 1 \_\_\_\_\_ Down State <<< \_\_\_\_\_ Router

**Note:**→ When we on router 1 in this time Router one not Send Packet to Neighbor Router we can say Router 1 is Down State

## What is Init or one Way State?

When a Router Send Hello Packet to Neighbor that is called init or One Way State and this State Hello Packet Send to Another without Router Process ID That is Called Init or One Way State

Router 1 \_\_\_\_\_ Hello Packet \_\_\_\_\_ >>> Router 2

## What is Two Way State?

When Router Send Hello / Ack Packet to neighbor with Each other that is Called Two Way State

Router 1 \_\_\_\_\_ >> Hello >> \_\_\_\_\_ <<Ack <<< \_\_\_\_\_ Router 2

## What is Exchange Start State?

In This State Election of Master and Slave Accrued and Highest Router IP Become to Master and Another Is Become to Salve

Router 1 (10.0.0.1) (Master) \_\_\_\_\_ Router 2 (9.0.0.1) (Salve)

### Exchange State

In this State OSPF Router Exchange Database Descriptor Packet that Consist on Link State Advertisement and ISA is Consist on Entire Link Database and Each Database Packet is Consist on Its Own Sequence Number Step When Information Exchange Between Master to Slave

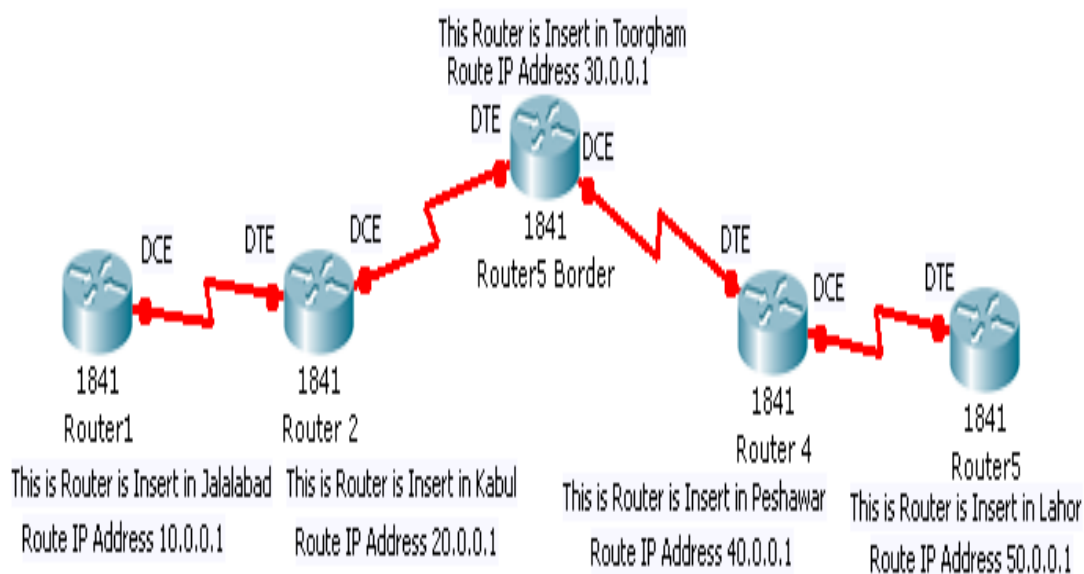
### Loading State

- ➔ Link State Request Packets are Send to Neighbors to Request any New LSA that were Found While in the Exchange State
- ➔ ISA (Link State Advertisement) Master to Salve
- ➔ ISR (Link State Request) Slave to Master
- ➔ ISU (Link State Update) Master to Salve

### What is Full State?

All LSA Information is synchronized among Adjacent Neighbors

### Configuration of OSPF



**Router 1****FastEthernet 10.0.0.1**

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****Serial DCE 1.0.0.1**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****FastEthernet 20.0.0.1**

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 20.0.0.1 255.255.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****Serial DTE 1.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****Serial DCE 2.0.0.1**

```
Router (config) #int s0/0/1
Router (config-if) #Ip address 2.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 3****FastEthernet 30.0.0.1**

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 30.0.0.1 255.0.0.0 78
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 3****Serial DTE 2.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 2.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 3****Serial DCE 3.0.0.1**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 3.0.0.1 255.0.0.0
Router (config-if) # Clock Rate 6400
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 4****FastEthernet 40.0.0.1**

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 40.0.0.1 255.0.0.0 78
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 4****Serial DTE 3.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 3.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 4****Serial DCE 4.0.0.1**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 4.0.0.1 255.0.0.0
Router (config-if) # Clock Rate 6400
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 5****FastEthernet 50.0.0.1**

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 50.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 5****Serial DTE 4.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 4.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****OSPF Route Area (0)**

Router (Config) # Router OSPF 1 → this is Called Process ID are Started From 0 up to 65535  
 Router (Config-router) # Network 10.0.0.0 0.255.255.255 Area 0 Area Also From 0 up to 43 Billion  
 Router (Config-router) # Network 1.0.0.0 0.255.255.255 Area 0  
 Router (Config-router) #Exit

**Router 2****OSPF Route Area (0)**

Router (Config) # Router OSPF 2 → Don't Same Process ID on one Area  
 Router (Config-router) # Network 20.0.0.0 0.255.255.255 Area 0  
 Router (Config-router) # Network 1.0.0.0 0.255.255.255 Area 0  
 Router (Config-router) # Network 2.0.0.0 0.255.255.255 Area 0  
 Router (Config-router) #Exit

**Router 4****OSPF Route Area (1)**

Router (Config) # Router OSPF 4  
 Router (Config-router) # Network 40.0.0.0 0.255.255.255 Area 1  
 Router (Config-router) # Network 3.0.0.0 0.255.255.255 Area 1  
 Router (Config-router) # Network 4.0.0.0 0.255.255.255 Area 1  
 Router (Config-router) #Exit

**Router 5****OSPF Route Area (1)**

Router (Config) # Router OSPF 5  
 Router (Config-router) # Network 50.0.0.0 0.255.255.255 Area 1  
 Router (Config-router) # Network 4.0.0.0 0.255.255.255 Area 1  
 Router (Config-router) #Exit

**Router 3****OSPF Border Router**

Router (Config) # Router OSPF 3  
 Router (Config-router) # Network 2.0.0.0 0.255.255.255 Area 0  
 Router (Config-router) # Network 3.0.0.0 0.255.255.255 Area 1  
 Router (Config-router) # Network 30.0.0.0 0.255.255.255 Area 0  
 Router (Config-router) #Exit

**How to See on Specific Router Table****Router 1****OSPF Route**

Router (config) #do Sh Ip route 2.0.0.1  
 Routing entry for 2.0.0.0/8  
 Known via "OSPF 1", distance 110, metric 128, type intra area  
 Last update from 1.0.0.2 on Serial0/0/0, 00:00:47 ago  
 Routing Descriptor Blocks:  
 \* 1.0.0.2, from 0.0.0.0, 00:00:47 ago, via Serial0/0/0  
 Route metric is 128, traffic share count is 1

### How to Delete all Router Table

Router 1

OSPF Route

Router #clear Ip route \* → Shift+8 With This Command our Router table Shout be Deleting

### How to Restore or Update or Router Table

Router 1

OSPF Route

Route # show Ip Route With this Command our Router Table shout be Updating

### How to Se Database of OSPF

Router 1

OSPF Route

Router #Sh Ip OSPF Database

OSPF Router with ID (10.0.0.1) (Process ID 1)

Router Link States (Area 0)

Link ID	ADV Router	Age	Seq#	Checksum	Link count
10.0.0.1	10.0.0.1	629	0x80000003	0x001368	3
20.0.0.1	20.0.0.1	629	0x80000004	0x00d88b	3

Summary Net Link States (Area 0)

Link ID	ADV Router	Age	Seq#	Checksum
2.0.0.0	20.0.0.1	624	0x80000001	0x0037d0
30.0.0.0	20.0.0.1	620	0x80000002	0x00d118

### How to See Neighbor

Router 1

OSPF Route

Router #Sh Ip OSPF Neighbor

Neighbor ID	Pry	State	Dead Time	Address	Interface
20.0.0.1	0	FULL/-	00:00:32	1.0.0.2	Serial0/0/0

### How to See Which Router is Border Router

Router 1

OSPF Route

Router #Sh Ip OSPF Border-routers

OSPF Process 1 internal Routing Table

Codes: i - Intra-area route, I - Inter-area route

i 20.0.0.1 [64] via 1.0.0.2, Serial0/0/0, ABR, Area 0, SPF 2

## How to See Point to Point Connection

### Router 1

### OSPF Route

Router #Sh Ip OSPF Interface  
FastEthernet0/0 is up, line protocol is up  
Internet address is 10.0.0.1/8, Area 0

Process ID 1, Router ID 10.0.0.1, Network Type POINT-TO-POINT, Cost: 64

## How to See Our Area

### Router 1

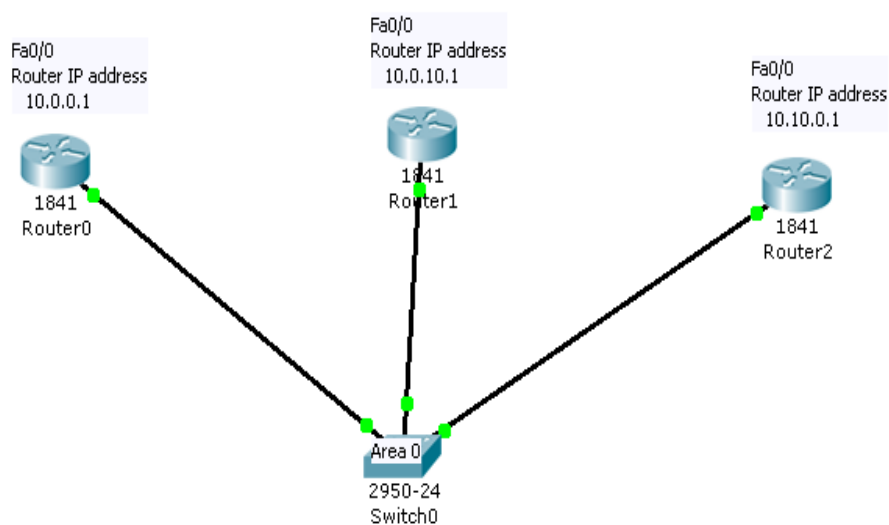
### OSPF Route

Router #Sh Ip OSPF  
Routing Process "OSPF 1" with ID 10.0.0.1  
Area BACKBONE (0)

## How to See DD Are and BDD Area

- DD Area Means Master
- BDD Area Means Slave

This is Only Used in Local Area Connection if we have Connected 3 Routers in One Local Area How to Find Which Route is Master and Which is Slave





**Router 1****FastEthernet 10.0.0.1**

```
Router (config) # int Fa0/0
Router (config-if) # Ip address 10.0.0.1 255.0.0.0
Router (config-if) # No Shut
Router (config-if) #Exit
```

**Router 2****FastEthernet 10.0.10.1**

```
Router (config) # int Fa0/0
Router (config-if) # Ip address 10.0.10.1 255.0.0.0
Router (config-if) # No Shut
Router (config-if) #Exit
```

**Router 3****FastEthernet 10.10.0.1**

```
Router (config) # int Fa0/0
Router (config-if) # Ip address 10.10.0.1 255.0.0.0
Router (config-if) # No Shut
Router (config-if) #Exit
```

**Router 1****OSPF Route**

```
Router (Config) # Router OSPF 1
Router (Config-route) # Network 10.0.0.1 0.0.0.0 Area 0
Router (Config-route) # Exit
```

**Router 2****OSPF Route**

```
Router (Config) # Router OSPF 2
Router (Config-route) # Network 10.0.10.1 0.0.0.0 Area 0
Router (Config-route) # Exit
```

**Router 3****OSPF Route**

```
Router (Config) # Router OSPF 3
Router (Config-route) # Network 10.10.0.1 0.0.0.0 Area 0
Router (Config-route) # Exit
```

**How to See Routing Table****Router 1****OSPF Route**

```
Router (config) #do Sh Ip OSPF Neighbor
```

Neighbor ID	Pry	State	Dead Time	Address	Interface
10.0.10.1	1	FULL/BDR	00:00:36	10.0.10.1	FastEthernet0/0
10.0.0.1	1	FULL/DROTHER	00:00:31	10.0.0.1	FastEthernet0/0

**Router 1****OSPF Route**

Router (config) #Do Sh Ip protocol

Routing Protocol is "OSPF"

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Router ID 10.10.0.1

Number of areas in this router is 1. 1 normal 0 stub 0 nssa

Maximum path: 4

Routing for Networks:

10.10.0.1 0.0.0.0 area 0

Routing Information Sources:

Gateway	Distance	Last Update
10.0.10.1	110	00:04:35
10.0.0.1	110	00:04:36

Distance: (default is 110)

**Note:→ There is DR or Master We Have IS Router 10.10.0.1**

**Master Router Always We Have That Router which have Connected With that all top pc**

**How to Change Priority****Router 1****OSPF Route**

Route (Config) # Int F0/0

Route (Config-if) # Ip OSPF Priority 100

Route (Config-if) # Exit

**Now How to Delete Database Table****Router 1****OSPF Route**

Router # Clear Ip OSPF-Process

Press (Y) Enter

Router # Sh Ip Route

Route # Sh Ip OSPF Neighbor

**How to Create MD5 in OSPF**

We have to 3 Types of Password

1):→ Zero Passwords

Meaning Zero No Passwords

2):→ Plain Passwords

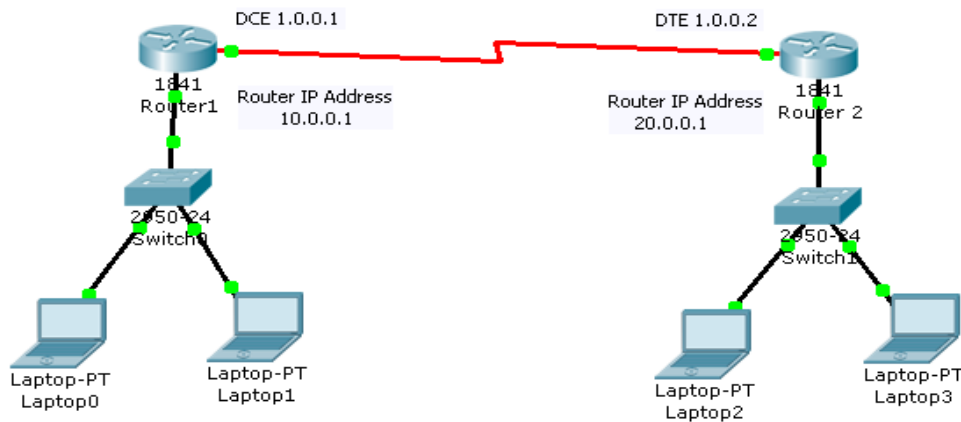
Meaning Text Passwords

3):→ Encrypt Passwords

Meaning Encrypt Passwords

**Note:→ Zero Passwords is already implemented in Router**

## How to Configuration of Plant Password



### Router 1

### FastEthernet 10.0.0.1

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 1

### Serial DCE 1.0.0.1

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 2

### FastEthernet 192.168.1.1

```
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-if) #exit
```

### Router 2

### Serial DTE 1.0.0.2

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****OSPF Route**

```

Router (Config) # Router OSPF 1
Router (Config-router) # Network 10.0.0.0 0.255.255.255 Area 0
Router (Config-router) # Network 1.0.0.0 0.255.255.255 Area 0
Router (Config-router) # Exit

```

**Router 2****OSPF Route**

```

Router (Config) # Router OSPF 2
Router (Config-router) # Network 20.0.0.0 0.255.255.255 Area 0
Router (Config-router) # Network 1.0.0.0 0.255.255.255 Area 0
Router (Config-router) # Exit

```

**Router 1****OSPF Route MD5**

```

Router (config) # Int S0/0
Router (config-if) # Ip OSPF Authentication
Router (config-if) # IP OSPF Authentication-key Corvit
Router (config-if) # Exit
Router (Config) #Exit
Router # Sh Ip OSPF Packet

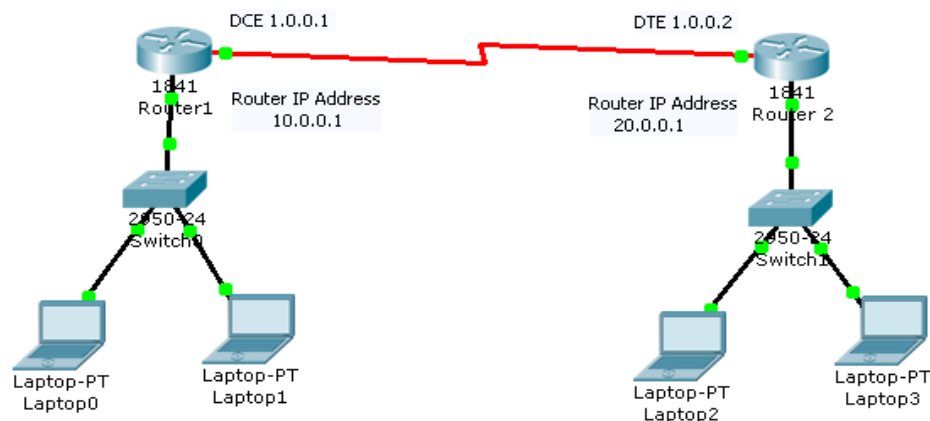
```

**Router 2****OSPF Route MD5**

```

Router (config) # Int S0/0
Router (config-if) # Ip OSPF Authentication
Router (config-if) # IP OSPF Authentication-key Corvit
Router (config-if) # Exit
Router (Config) #Exit
Router # Sh Ip OSPF Packet

```

**How to Set Encrypt Password**

**Router 1****FastEthernet 10.0.0.1**

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****Serial DCE 1.0.0.1**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****FastEthernet 192.168.1.1**

```
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-if) #exit
```

**Router 2****Serial DTE 1.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****OSPF Route**

```
Router (Config) # Router OSPF 1
Router (Config-router) # Network 10.0.0.0 0.255.255.255 Area 0
Router (Config-router) # Network 1.0.0.0 0.255.255.255 Area 0
Router (Config-router) # Exit
```

**Router 2****OSPF Route**

```

Router (Config) # Router OSPF 2
Router (Config-router) # Network 20.0.0.0 0.255.255.255 Area 0
Router (Config-router) # Network 1.0.0.0 0.255.255.255 Area 0
Router (Config-router) # Exit

```

**Router 1****OSPF Route MD5**

```

Router (config) # Int S0/0
Router (config-if) # Ip OSPF Authentication
Router (config-if) # IP OSPF Message-digest-key 1 Md5 Corvit
Router (config-if) # Exit
Router (Config) #Exit
Router # Sh Ip OSPF Packet

```

**Router 2****OSPF Route MD5**

```

Router (config) # Int S0/0
Router (config-if) # Ip OSPF Authentication
Router (config-if) # IP OSPF Message-digest-key 1 Md5 Corvit
Router (config-if) # Exit
Router (Config) #Exit
Router # Sh Ip OSPF Packet

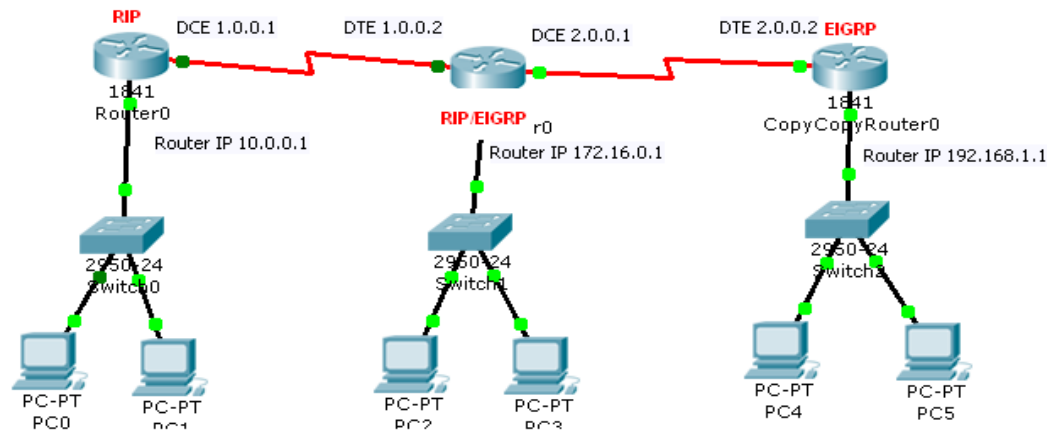
```

**What is Redistribution?**

A Process that is used to Sharing Routing Table from one Router Protocol to another Routing Protocol that is Called Redistribution

OR

Connecting Two Different Routing Protocol with One and another that is Called Redistribution

**How to Connecting RIP and EIGRP**

**Router 1****FastEthernet 10.0.0.1**

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****Serial DCE 1.0.0.1**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****FastEthernet 172.16.0.1**

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 172.16.0.1 255.255.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****Serial DTE 1.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****Serial DCE 2.0.0.1**

```
Router (config) #int s0/0/1
Router (config-if) #Ip address 2.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 3****FastEthernet 192.168.1.1**

```
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-if) #exit
```

**Router 3****Serial DTE 2.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 2.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****RIP Route**

```
Router (Config) # Router RIP
Router (Config-route) # Network 10.0.0.0
Router (Config-route) # Network 1.0.0.0
Router (Config-route) # Version 2
Router (Config-route) # Exit
```

**Router 3****EIGRP Route**

```
Router (Config) # Router EIGRP 1
Router (Config-route) # Network 192.168.1.0
Router (Config-route) # Network 2.0.0.0
Router (Config-route) # No Auto-Summarize
Router (Config-route) # Exit
```

**Router 2****RIP Route**

```
Router (Config) # Router RIP
Router (Config-route) # Network 172.16.0.0
Router (Config-route) # Network 1.0.0.0
Router (Config-route) # Version 2
Router (Config-route) # Exit
```

**Router 2****EIGRP Route**

```
Router (Config) # Router EIGRP 1
Router (Config-route) # Network 172.16.0.0
Router (Config-route) # Network 2.0.0.0
Router (Config-route) # No Auto-Summarize
Router (Config-route) # Exit
```

**Router 2****Redistribution****Router EIGRP**

```
Router (Config) # Router Eigrp 1
Router (Config-router) # Redistribution Rip metric 100 100 255 255 1500
```

Bandwidth Delay Reliability Loading MTU

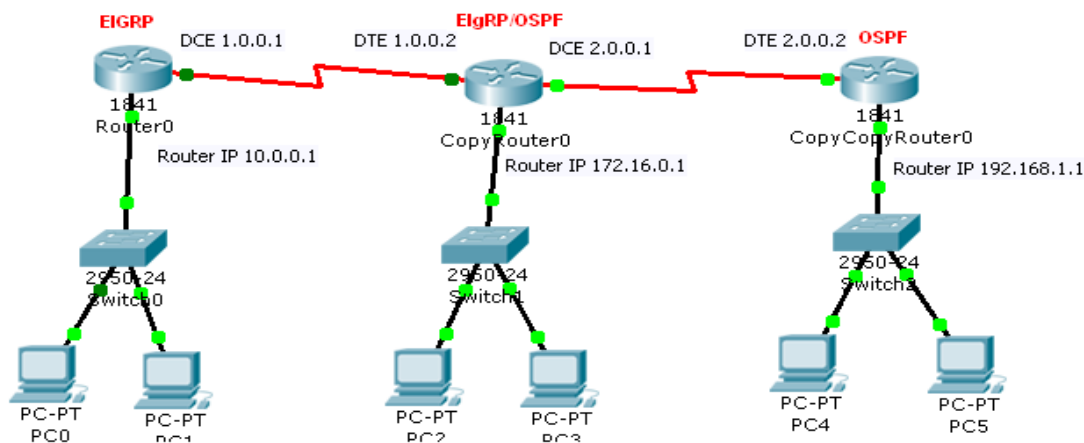
```
Router (Config-router) # Exit
```

**Router 2****Redistribution****Router EIGRP**

```
Router (Config) # Router Rip
Router (Config-route) # Redistribution EIGRP 1 Metric 4
Router (Config-route) # Exit
```



## How to Connecting EIGRP and OSPF



### Router 1

### FastEthernet 10.0.0.1

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 1

### Serial DCE 1.0.0.1

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 2

### FastEthernet 172.16.0.1

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 172.16.0.1 255.255.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 2

### Serial DTE 1.0.0.2

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****Serial DCE 2.0.0.1**

```
Router (config) #int s0/0/1
Router (config-if) #Ip address 2.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 3****FastEthernet 192.168.1.1**

```
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-if) #exit
```

**Router 3****Serial DTE 2.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 2.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****EIGRP Route**

```
Router (Config) # Router EIGRP 1
Router (Config-route) # Network 10.0.0.0
Router (Config-route) # Network 1.0.0.0
Router (Config-route) # No Auto-Summarize
Router (Config-route) # Exit
```

**Router 3****OSPF Route**

```
Router (Config) # Router OSPF 2
Router (Config-route) # Network 192.168.1.0 0.0.0.255 Area 0
Router (Config-route) # Network 2.0.0.0 0.255.255.255 Area 0
Router (Config-route) # Exit
```

**Router 2****EIGRP Route**

```
Router (Config) # Router EIGRP 1
Router (Config-route) # Network 172.16.0.0
Router (Config-route) # Network 1.0.0.0
Router (Config-route) # No Auto-Summarize
Router (Config-route) # Exit
```

**Router 2****OSPF Route**

```
Router (Config) # Router OSPF 3
Router (Config-router) # Network 172.16.0.0 0.0.255.255 Area 0
Router (Config-router) # Network 2.0.0.0 0.255.255.255 Area 0
Router (Config-router) # Exit
```

**Router 2****Redistribution****Router EIGRP**

```
Router (Config) # Router Eigrp 1
Router (Config-router) # Redistribution OSPF 1 metric 1000 100 255 255 1500
```

Bandwidth Delay Reliability Loading MTU

```
Router (Config-router) # Exit
```

**Router 2****Redistribution****Router EIGRP**

```
Router (Config) # Router OSPF 1
Router (Config-route) # Redistribution EIGRP 1 Metric 65 Subnets
Router (Config-route) # Exit
```

With This Command Chang Class Full By default is Classless

```
Router (Config) # Do Sh Ip Route
```

**What is Access-list?**

Groups of Command  
Used For Security  
Impose on Router Interfaces on Per Direction  
Blocking Unauthorized User cont Communication with our Router / Server / Host  
Also Called Access Control List

**Types of Access-list****What is Standard Access-list?**

Range Start from 1 Up to 99  
Used to Block / Allow Host / Network / Multiple Network  
Used to Block / Allow Entire Protocol / port

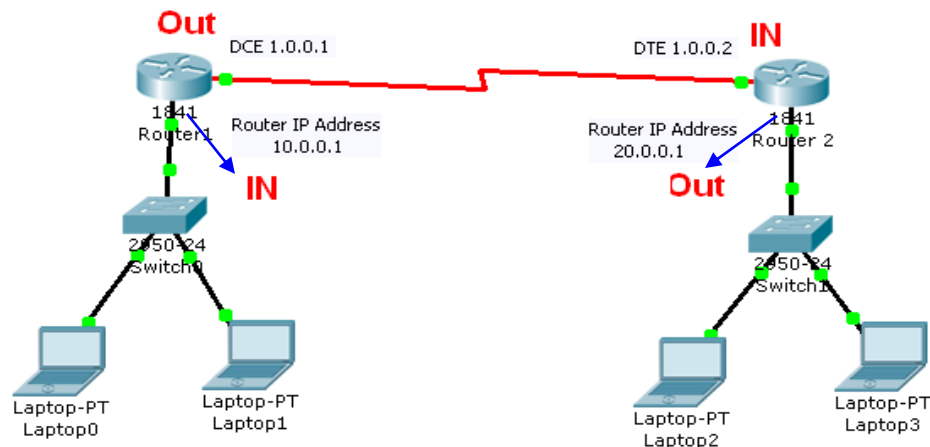
## What is Syntax of Standard Access-list?

# Access-list (Rang From 1 up to 99) (Permit / Deny) Host / Network /Any

## What is Inbound and Outbound?

When Packet Enter into Router Interface that Process is Called Inbound

When Packet Out From Router Interface that is Called Outbound



### Router 1

FastEthernet 10.0.0.1

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 1

Serial DCE 1.0.0.1

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 2

FastEthernet 192.168.1.1

```
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-if) #exit
```

**Router 2****Serial DTE 1.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****RIP Route**

```
Router (config) #route rip
Router (config-router) #network 10.0.0.0
Router (config-router) #network 1.0.0.0
Router (config-router) # Version 2
Router (config-router) #exit
```

**Router 2****RIP Route**

```
Router (config) #route rip
Router (config-router) #network 192.168.1.0
Router (config-router) #network 1.0.0.0
Router (config-router) # Version 2
Router (config-router) #exit
```

**How to Block Specific Computer****Router 1****Standard access-list**

```
Router (Config) # Access-list 1 Deny 192.168.1.3
Router (Config) # Access-list 1 Permit Any
Router (Config) # Int S0/0
Router (Config-if) # Ip Access-group 1 IN
Router (Config) #Exit
```

**How to Block Two Computers****Router 1****Standard access-list**

```
Router (Config) # Access-list 1 Deny 192.168.1.3
Router (Config) # Access-list 1 Deny 192.168.1.4
Router (Config) # Access-list 1 Permit Any
Router (Config) # Int S0/0
Router (Config-if) # Ip Access-group 1 IN
Router (Config) #Exit
```

## How to Block Entire network all but Allow one Computer

### Router 1

### Standard access-list

```

Router (Config) # Access-list 1 Permit 192.168.1.2
Router (Config) # Access-list 1 Deny 192.168.1.0
Router (Config) # Access-list 1 Permit Any
Router (Config) # Int Fa0/0
Router (Config-if) # Ip Access-Group 1 Out
Router (Config) # Exit
  
```

Do Any Thing in Router but not coming in Switch

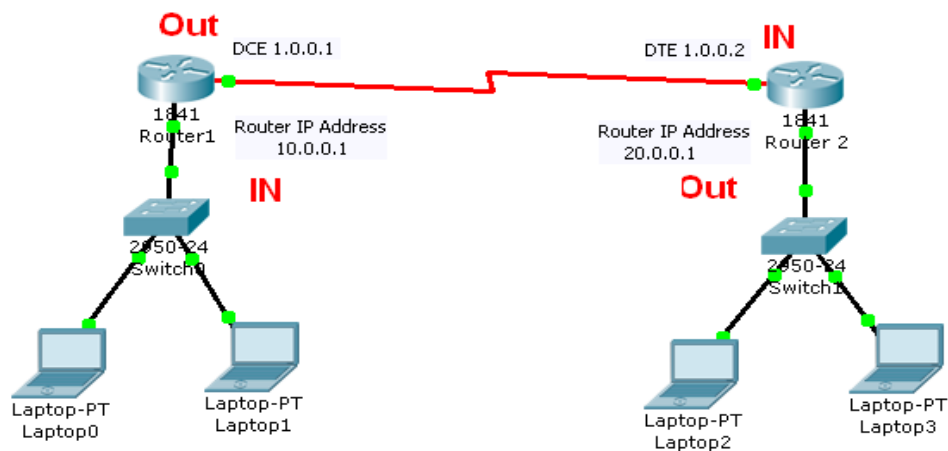
## How to Block on One Time Multiple Computers by Word Card Mask

192.168.1.0  
 192.168.1.1  
 192.168.1.2  
 192.168.1.3  
 192.168.1.4  
 192.168.1.5  
 192.168.1.6  
 192.168.1.7

### Subnet Mask or Rang of Bits One Octet

128	64	32	16	8	4	2	1
127	63	31	17	7	3	1	0

## Configuration of Standard Access-list Block 7 Pc



**Router 1****FastEthernet 10.0.0.1**

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****Serial DCE 1.0.0.1**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****FastEthernet 192.168.1.1**

```
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-if) #exit
```

**Router 2****Serial DTE 1.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****RIP Route**

```
Router (config) #route rip
Router (config-router) #network 10.0.0.0
Router (config-router) #network 1.0.0.0
Router (config-router) # Version 2
Router (config-router) #exit
```

**Router 2****RIP Route**

```

Router (config) #route rip
Router (config-router) #network 192.168.1.0
Router (config-router) #network 1.0.0.0
Router (config-router) # Version 2
Router (config-router) #exit

```

**Router 1****Standard Access-list**

```

Router (Config) # Access-list 1 permit 192.168.1.7
Router (Config) # Access-list 1 Deny 192.168.1.0 0.0.0.7
Router (Config) # Int Fa0/0
Router (Config-if) # IP Access-Group 1 Out
Router (Config) #Exit

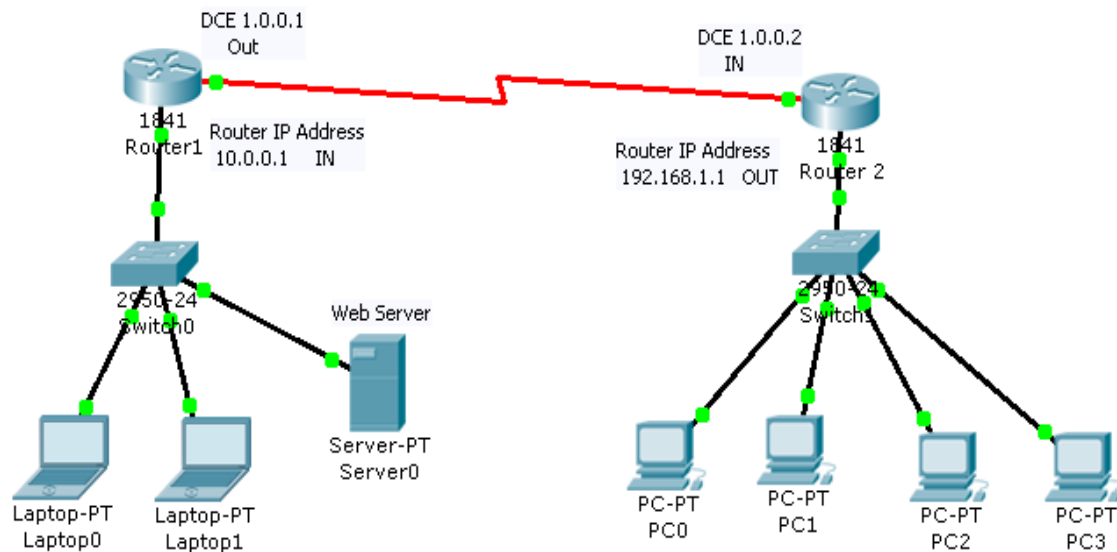
```

**What is Extended Access-list**

In This Type we don't have Blocking Complete PC Only Blocking Prot  
 EXP:→ DNS Server, DHCP Server, HTTP, Etc

**What is Extended Access-list Syntax**

# Access-list Rang (100 up to 199) Deny /Permit Protocol (TCP) Source Address Wild Card Mask  
 (Destination Address) Wild Card Mask Matching Port Name /Number

**How to Block Web server On This Computer 192.168.1.2**



**Router 1****FastEthernet 10.0.0.1**

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****Serial DCE 1.0.0.1**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****FastEthernet 192.168.1.1**

```
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-if) #exit
```

**Router 2****Serial DTE 1.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****RIP Route**

```
Router (config) #route rip
Router (config-router) #network 10.0.0.0
Router (config-router) #network 1.0.0.0
Router (config-router) # Version 2
Router (config-router) #exit
```

**Router 2****RIP Route**

```
Router (config) #route rip
Router (config-router) #network 192.168.1.0
Router (config-router) #network 1.0.0.0
Router (config-router) # Version 2
Router (config-router) #exit
```

**Router 1****Extended Access-list**

```
Router (Config) # Access-list 100 Deny TCP Host 192.168.1.2 Host 10.0.0.2 EQ 80
Router (Config) # Access-list 100 Permit IP Any Any
Router (Config) # Int Fa0/0
Router (Config-IF) # IP Access-group 100 IN
Router (Config-IF) # Exit
```

**What is netting**

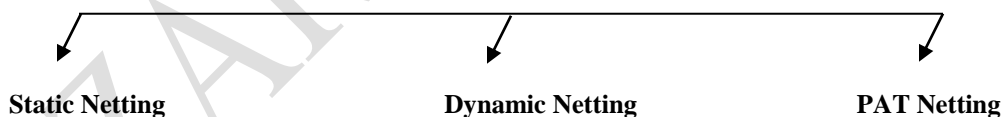
:→ Network Address Translation  
 :→ A Technique that is used to convert Private IP Address in to Public IP Address That is Called Netting

**Netting Futures**

:→ Hiding Original IP Address From Outside the Network  
 :→ Provide Security

**What is Netting Terminology?**

:→ Local = LAN  
 :→ Global = another Network  
 :→ Outside = WAN  
 :→ Inside = Our Network

**Types of Netting****What is Static Netting?**

:→ In Static Nat We Purchase Public Ip Address For Each Computer so it Means That we Will Purchase Each public IP Address For Each Computer So We Can Say That Static Nat IS Expensive Such as

Private IP Address	Public IP Address
10.0.0.1	1.0.0.1
10.0.0.2	1.0.0.2
10.0.0.3	1.0.0.3
10.0.0.4	1.0.0.4
10.0.0.5	1.0.0.5

**Note:→ Static NAT is Also Called One to One**

**IN These Types of we have Purchase For Each Pc Public IP Address This is To Mach Expensive For One Company and Access Manually IP Address**

### **What is Dynamic NAT**

**:→ IN Dynamic NAT we Create One Scope or Pool For Public IP Address and Which Router Convert Dynamically Local IP Address in to Public IP Address**

**Note:→ In This Types of we have create One Scope insert All Public IP address Which Pc are Connection With Another Branch Router Private IP Address Automatically Changing for Public IP Address Some Time by One IP Address or Same Time by Another IP Address At Cant Hacking Someone Our Pc This is Also Very Expensive For one Company**

### **What is PAT**

**:→ Port Address Translation**

**:→ Port Overloading**

**:→ Purchase One IP Address into one Public Address**

**:→ This is Very cheap for one Branch by one IP Address All Client Communication with one and another in WAN Side at is Very Useful**

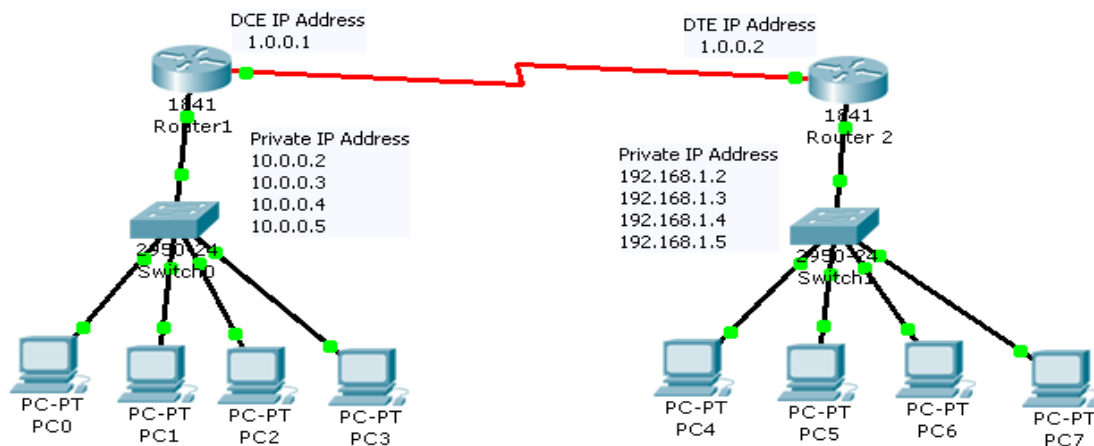
**:→ Also Called Many to One**

### **What is Netting Table?**

**Netting Table Stored in Router and Stored Information about Public IP Address and we can Also See Converting Private IP Address Into Public IP Address Information in to Netting Table**

**Note:→ This is creating one Table there is Information of All Computer Private IP Address and Public IP Address and Which can Change Private to Public and Public to Private IP Address**

### **How to Create Static Route**



**Router 1****FastEthernet 10.0.0.1**

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****Serial DCE 1.0.0.1**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****FastEthernet 192.168.1.1**

```
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-if) #exit
```

**Router 2****Serial DTE 1.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****RIP Route**

```
Router (config) #route rip
Router (config-router) #network 10.0.0.0
Router (config-router) #network 1.0.0.0
Router (config-router) # Version 2
Router (config-router) #exit
```

**Router 2****RIP Route**

```
Router (config) #route rip
Router (config-router) #network 192.168.1.0
Router (config-router) #network 1.0.0.0
Router (config-router) # Version 2
Router (config-router) #exit
```

**Router 1****Static Netting**

```
Router (Config) #Int Fa0/0
Router (Config-if) # Ip NAT Inside
Router (Config-if) # Exit
```

```
Router (Config) # Int S0/0
Router (Config-if) # IP NAT Outside
Router (Config-if) # Exit
```

```
Router (Config) # IP NAT Inside Source Static 10.0.0.2 1.0.0.6 this is Called Public IP Address
Router (Config) # IP NAT Inside Source Static 10.0.0.3 1.0.0.7
Router (Config) # IP NAT Inside Source Static 10.0.0.4 1.0.0.8
Router (Config) # IP NAT Inside Source Static 10.0.0.5 1.0.0.9
```

```
Router (Config) # EXIT
Router # Sh IP NAT Translations
Router # Sh IP NAT Statistics
Router # Debug IP NAT
```

**Router 2****Static Netting**

```
Router (Config) #Int Fa0/0
Router (Config-if) # Ip NAT Inside
Router (Config-if) # Exit
```

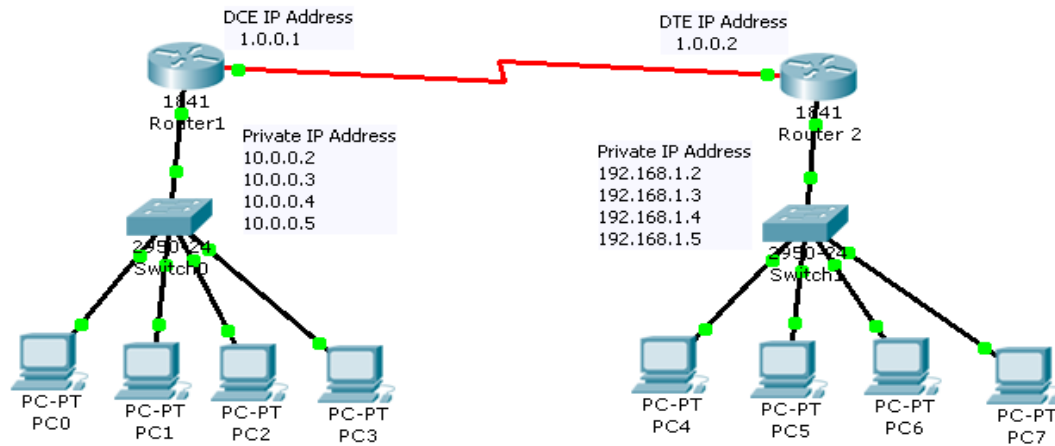
```
Router (Config) # Int S0/0
Router (Config-if) # IP NAT Outside
Router (Config-if) # Exit
```

```
Router (Config) # IP NAT Inside Source Static 192.168.1.2 1.0.0.20 this is Called Public IP Address
Router (Config) # IP NAT Inside Source Static 192.168.1.3 1.0.0.21
Router (Config) # IP NAT Inside Source Static 192.168.1.4 1.0.0.22
Router (Config) # IP NAT Inside Source Static 192.168.1.5 1.0.0.23
Router (Config) # EXIT
```

```
Router # Sh IP NAT Translations
Router # Sh IP NAT Statistics
```

```
Router # Debug IP NAT
```

## Configuration of Dynamic Netting



### Router 1

### FastEthernet 10.0.0.1

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 1

### Serial DCE 1.0.0.1

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 2

### FastEthernet 192.168.1.1

```
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-if) #exit
```

### Router 2

### Serial DTE 1.0.0.2

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****RIP Route**

```
Router (config) #route rip
Router (config-router) #network 10.0.0.0
Router (config-router) #network 1.0.0.0
Router (config-router) # Version 2
Router (config-router) #exit
```

**Router 2****RIP Route**

```
Router (config) #route rip
Router (config-router) #network 192.168.1.0
Router (config-router) #network 1.0.0.0
Router (config-router) # Version 2
Router (config-router) #exit
```

**Router 1****Dynamic Netting**

```
Router (Config) #Int Fa0/0
Router (Config-if) # Ip NAT Inside
Router (Config-if) # Exit
```

```
Router (Config) # Int S0/0
Router (Config-if) # IP NAT Outside
Router (Config-if) # Exit
```

```
Router (Config) # IP NAT Pool MCSE 1.0.0.10 1.0.0.20 Netmask 255.0.0.0
Router (Config) # Access-list 1 Permit 10.0.0.0 0.255.255.255
Router (Config) # IP NAT inside Source list 1 Pool MCSE
Router (Config) # Exit
```

this is Called Scope Name

```
Router # Sh IP NAT Translations
Router # Sh IP NAT Statistics
Router # Debug IP NAT
```

**Router 2****Dynamic Netting**

```
Router (Config) #Int Fa0/0
Router (Config-if) # Ip NAT Inside
Router (Config-if) # Exit
```

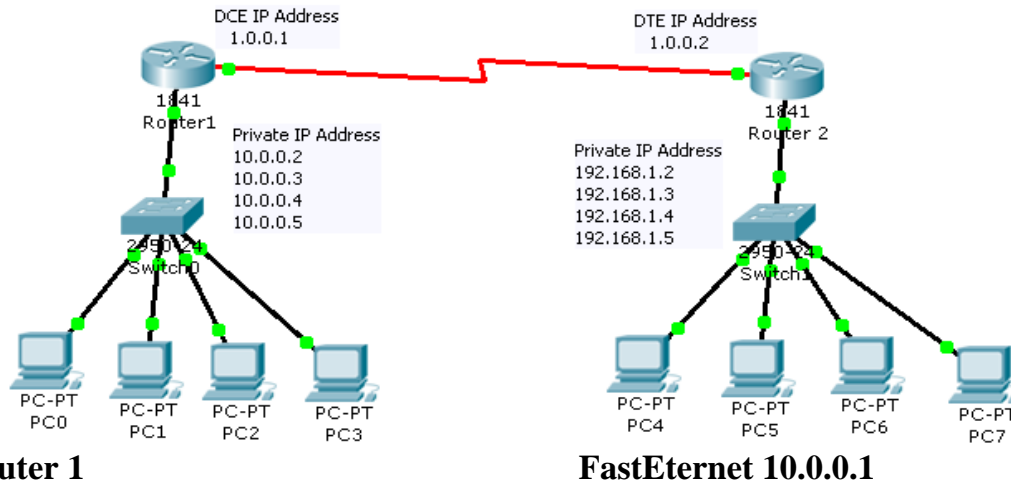
```
Router (Config) # Int S0/0
Router (Config-if) # IP NAT Outside
Router (Config-if) # Exit
```

```
Router (Config) # IP NAT Pool CCNA 1.0.0.50 1.0.0.60 Netmask 255.0.0.0
Router (Config) # Access-list 1 Permit 192.168.1.0 0.0.0.255
Router (Config) # IP NAT inside Source list 1 Pool CCNA
Router (Config) # Exit
```

this is Called Scope Name

```
Router # Sh IP NAT Translations
Router # Sh IP NAT Statistics
Router # Debug IP NAT
```

## How to Configuration PAT



```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1** **Serial DCE 1.0.0.1**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2** **FastEthernet 192.168.1.1**

```
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-if) #exit
```

**Router 2** **Serial DTE 1.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```



**Router 1****RIP Route**

```
Router (config) #route rip
Router (config-router) #network 10.0.0.0
Router (config-router) #network 1.0.0.0
Router (config-router) # Version 2
Router (config-router) #exit
```

**Router 2****RIP Route**

```
Router (config) #route rip
Router (config-router) #network 192.168.1.0
Router (config-router) #network 1.0.0.0
Router (config-router) # Version 2
Router (config-router) #exit
```

**Router 1****PAT Netting**

```
Router (Config) #Int Fa0/0
Router (Config-if) # Ip NAT Inside
Router (Config-if) # Exit
```

```
Router (Config) # Int S0/0
Router (Config-if) # IP NAT Outside
Router (Config-if) # Exit
```

```
Router (Config) # IP NAT Pool MCSE 1.0.0.10 1.0.0.10 Netmask 255.0.0.0
Router (Config) # Access-list 1 Permit 10.0.0.0 0.255.255.255
Router (Config) # IP NAT inside Source List 1 Pool MCSE Overload
```

**Router 2****PAT Netting**

```
Router (Config) #Int Fa0/0
Router (Config-if) # Ip NAT Inside
Router (Config-if) # Exit
```

```
Router (Config) # Int S0/0
Router (Config-if) # IP NAT Outside
Router (Config-if) # Exit
```

```
Router (Config) # IP NAT Pool CCNA 1.0.0.20 1.0.0.20 Netmask 255.0.0.0
Router (Config) # Access-list 1 Permit 192.168.1.0 0.0.0.255
Router (Config) # IP NAT inside Source List 1 Pool CCNA Overload
Router (Config) Exit
```

```
Router #Debug IP NAT
Router # Sh IP NAT Translations
Router # Sh IP NAT Statistics
```

## What Is IPv6

**Internet Protocol Version 6**

Also called net Generation address

Developed by IETF (Internet Engineer Task Force)

Developed in Dec 1998

Consist on 128 BITS

Consist on 8 Group of Quartet

Used Hexadecimal Format

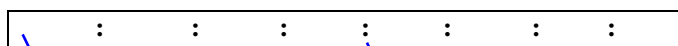
Used Colon Format

First Three Quartet Belong to network

One Quartet Belong to Subnet Mask

And Last 4 Quartet Belong to Interface or Host

### IP Version 6



Quartet Format

Use Colon Format

Each Quartet Has 16 BIT

Three Quartet Belong to Network  $16+16+16=48$

One is Belong to Subnet Mask 16

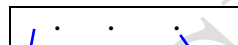
Last Four Quartet Belong to Host  $16+16+16+16=64$        $48+16=64$        $64+64=128$

Not Used Classes Concept

Used Network / Host

Used on Multicasting

### IPV4



Used Octet Format

8 BITS

255 IP Address

Used Dotted Format

:→ Used Network / Host

:→ Used Classes Concept

:→ Broadcasting

### Start IPv6

2001:0000:0000:0000:0000:0000:0000

This is Called Network ID

2001:0000:0000:0000:0000:0000:0000:0001

This is Called Network IP

### How to Shorted cat

2001::1

### Start IPv6

2001:000:0000:7777:7777:9999:7777:0001

### How to Shorted Cat

2001:: 7777:7777:9999:7777:1

## How to Install IPv6 in Windows XP Server 2003

Double Click on "Local Area Connection" → Click on Properties → Select on Internet Protocol (TCP/II) → Click on Install Button → Select on Protocol → Click on Add → Select on Microsoft TCP/IP → Ok

## How to Install IPv6 by Command

Start → Run → CMD → Ok

Administrator> IPv6 Install

Press Enter

## How to Assign IPv6 in Windows XP Server 2003

Administrator> NETSH

Press Enter

NETSH> Interface

Press Enter

NETSH INTERFACE> IPV6

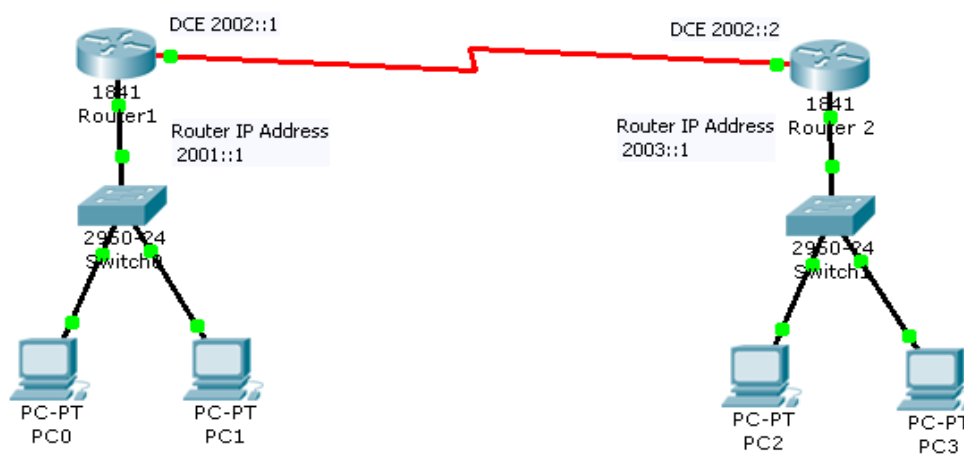
Press Enter

NETSH INTERFACE IPV6> Add Address Interface="Local Area Connection"2001::1 Press Enter

NETSH INTERFACE IPV6> Exit

Note: Assign to Other Pc by this Métier Then Ping

## How to Configuration of IPv6 in Static Route



Router 1

FastEthernet 2001::1

Router >

Router # Conf T

Router (Config) # IPv6 Unicast-routing

Router (Config) # Int Fa0/0

Router (Config-IF) # IPv6 Address 2001:: 1/64

Router (Config-IF) # No Shut

Router (Config-IF) # Exit

**Router 1****Serial DCE 2002:: 1**

```
Router (Config) # Int S0/0
Router (Config-IF) # Ipv6 Address 2002:: 1/64
Router (Config-IF) # Clock Rate 64000
Router (Config-IF) # No Shut
Router (Config-IF) # Exit
```

**Router 2****FastEthernet 2003::1**

```
Router >
Router # Conf T
Router (Config) # IPv6 Unicast-routing
Router (Config) # Int Fa0/0
Router (Config-IF) # IPv6 Address 2003:: 1/64
Router (Config-IF) # No Shut
Router (Config-IF) # Exit
```

**Router 2****Serial DTE 2002:: 2**

```
Router (Config) # Int S0/0
Router (Config-IF) # Ipv6 Address 2002:: 2/64
Router (Config-IF) # No Shut
Router (Config-IF) # Exit
```

**Router 1****Static Route**

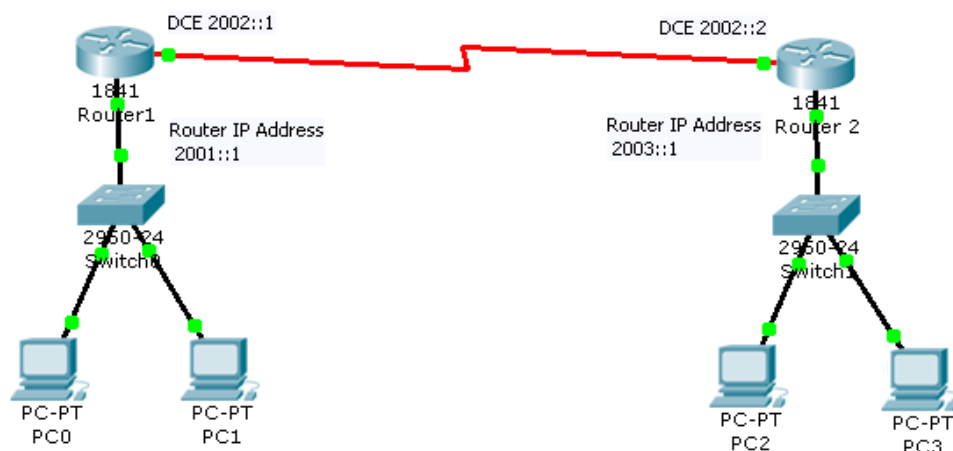
```
Router (Config) # IPv6 Route 2003:: /64 2002::2
Router (Config) # Do Sh Ipv6 Route
Router (Config) # Do Ping 2003::1
```

**Router 2****Static Route**

```
Router (Config) # IPv6 Route 2001:: /64 2002::1
```

```
Router (Config) # Do Sh Ipv6 Route
IPv6 Routing Table - 6 entries
Codes: C - Connected, L - Local, S - Static, R - RIP, B - BGP
       U - Per-user Static route, M - MIPv6
       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  2001:: /64 [1/0]
  Via 2002::1
C  2002:: /64 [0/0]
  Via: Serial0/0/0
L  2002::2/128 [0/0]
  Via: Serial0/0/0
C  2003:: /64 [0/0]
  Via: FastEthernet0/0
L  2003:: 1/128 [0/0]
```

## How to Configuration of RIP in IPv6



### Router 1

FastEthernet 2001::1

```
Router >
Router # Conf T
Router (Config) # IPv6 Unicast-routing
Router (Config) # Int Fa0/0
Router (Config-IF) # IPv6 Address 2001:: 1/64
Router (Config-IF) # Ipv6 RIP Corvit Enable
Router (Config-IF) # No Shut
Router (Config-IF) # Exit
```

### Router 1

Serial DCE 2002:: 1

```
Router (Config) # Int S0/0
Router (Config-IF) # Ipv6 Address 2002:: 1/64
Router (Config-IF) # Ipv6 RIP Corvit Enable
Router (Config-IF) # Clock Rate 64000
Router (Config-IF) # No Shut
Router (Config-IF) # Exit
```

### Router 2

FastEthernet 2003::1

```
Router >
Router # Conf T
Router (Config) # IPv6 Unicast-routing
Router (Config) # Int Fa0/0
Router (Config-IF) # IPv6 Address 2003:: 1/64
Router (Config-IF) # Ipv6 RIP Khan Enable
Router (Config-IF) # No Shut
Router (Config-IF) # Exit
```

**Router 2****Serial DTE 2002:: 2**

```

Router (Config) # Int S0/0
Router (Config-IF) # IPv6 Address 2002:: 2/64
Router (Config-IF) # IPv6 RIP Khan Enable
Router (Config-IF) # No Shut
Router (Config-IF) # Exit

```

```

Router (config) #do Sh IPv6 route

```

```

IPv6 Routing Table - 6 entries

```

```

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

```

```

U - Per-user Static route, M - MIPv6

```

```

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

```

```

R 2001:: /64 [120/1]

```

```

Via FE80:: 202:4AFF:FEDA:4001, Serial0/0/0

```

```

C 2002::/64 [0/0]

```

```

Via::, Serial0/0/0

```

```

L 2002::2/128 [0/0]

```

```

Via::, Serial0/0/0

```

```

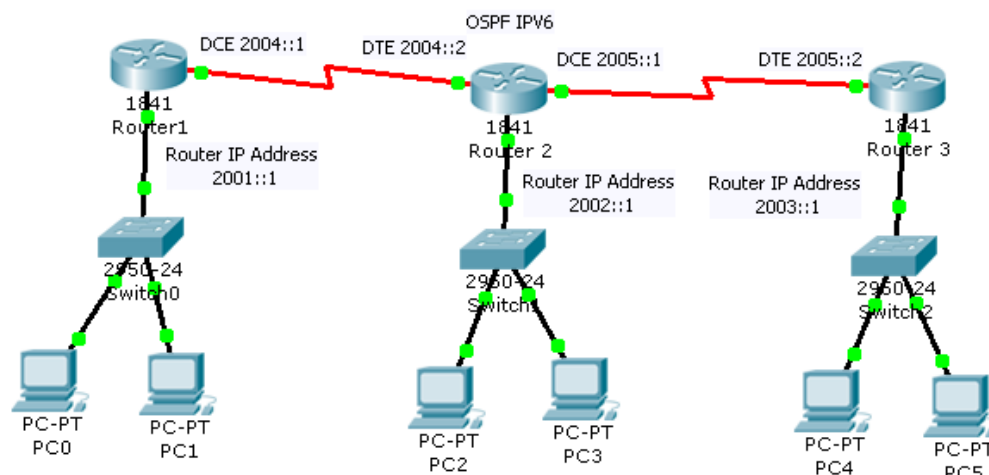
C 2003::/64 [0/0]

```

```

Via::, FastEthernet0/0

```

**How to Configuration of IPv6 in OSPF****Router 1****FastEthernet 2001::1**

```

Router >
Router # Conf T
Router (Config) # IPv6 Unicast-routing
Router (Config) # Int Fa0/0
Router (Config-IF) # IPv6 Address 2001:: 1/64
Router (Config-IF) # No Shut
Router (Config-IF) # Exit

```

**Router 1****Serial DCE 2004:: 1**

```
Router (Config) # Int S0/0
Router (Config-IF) # Ipv6 Address 2004:: 1/64
Router (Config-IF) # Clock Rate 64000
Router (Config-IF) # No Shut
Router (Config-IF) # Exit
```

**Router 2****FastEthernet 2002::1**

```
Router >
Router # Conf T
Router (Config) # IPv6 Unicast-routing
Router (Config) # Int Fa0/0
Router (Config-IF) # IPv6 Address 2002:: 1/64
Router (Config-IF) # No Shut
Router (Config-IF) # Exit
```

**Router 2****Serial DTE 2004:: 2**

```
Router (Config) # Int S0/0
Router (Config-IF) # Ipv6 Address 2004:: 2/64
Router (Config-IF) # No Shut
Router (Config-IF) # Exit
```

**Router 2****Serial DCE 2005:: 1**

```
Router (Config) # Int S0/1
Router (Config-IF) # Ipv6 Address 2005:: 1/64
Router (Config-IF) # Clock Rate 64000
Router (Config-IF) # No Shut
Router (Config-IF) # Exit
```

**Router 3****FastEthernet 2003::1**

```
Router >
Router # Conf T
Router (Config) # IPv6 Unicast-routing
Router (Config) # Int Fa0/0
Router (Config-IF) # IPv6 Address 2003:: 1/64
Router (Config-IF) # No Shut
Router (Config-IF) # Exit
```

**Router 3****Serial DTE 2005:: 2**

```
Router (Config) # Int S0/0
Router (Config-IF) # Ipv6 Address 2005:: 2/64
Router (Config-IF) # No Shut
Router (Config-IF) # Exit
```

**Router 1****OSPF Route**

```
Router (config) # IPv6 Unicast-routing
Router (config-rtr) # IPv6 Router OSPF 1
Router (config-rtr) # Router-id 20.20.20.20
Router (config-rtr) # Exit
```

```
Router (config) # Int Fa0/0
Router (config-IF) # IPv6 OSPF 1 Area 0
Router (config-IF) # Exit
```

```
Router (config) # Int S0/0
Router (config-IF) # IPv6 OSPF 1 Area 0
Router (config-IF) #Exit
```

**Router 2****OSPF Route**

```
Router (config) # IPv6 Unicast-routing
Router (config-rtr) # IPv6 Router OSPF 2
Router (config-rtr) # Router-id 20.20.20.21
Router (config-rtr) # Exit
```

```
Router (config) # Int Fa0/0
Router (config-IF) # IPv6 OSPF 2 Area 0
Router (config-IF) # Exit
```

```
Router (config) # Int S0/0
Router (config-IF) # IPv6 OSPF 2 Area 0
Router (config-IF) #Exit
```

**Router 3****OSPF Route**

```
Router (config) # IPv6 Unicast-routing
Router (config-rtr) # IPv6 Router OSPF 3
Router (config-rtr) # Router-id 20.20.20.22
Router (config-rtr) # Exit
```

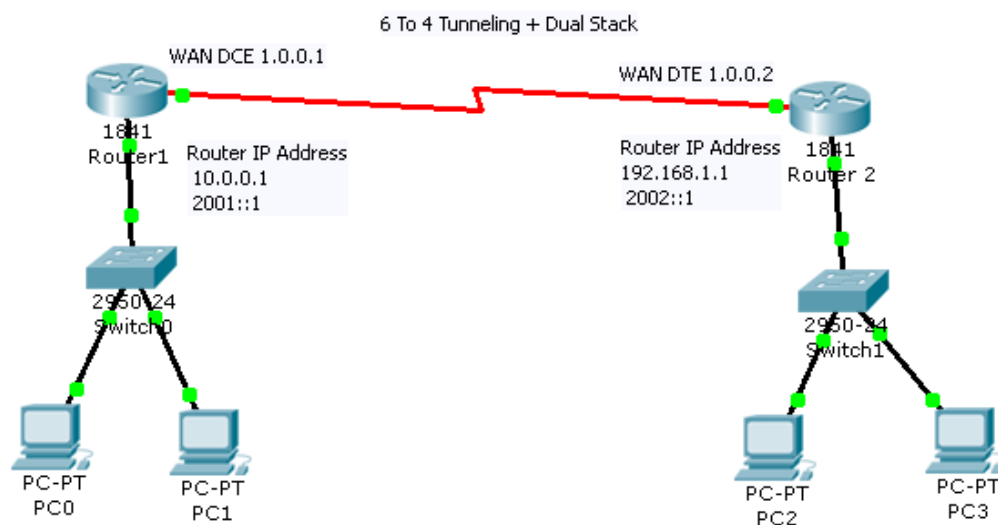
```
Router (config) # Int Fa0/0
Router (config-IF) # IPv6 OSPF 3 Area 0
Router (config-IF) # Exit
```

```
Router (config) # Int S0/0
Router (config-IF) # IPv6 OSPF 3 Area 0
Router (config-IF) #Exit
```

```
Router (Config) # Do Sh IPv6 Route
```



## 6 To 4 Tunneling + Dual Stack Configuration



### Router 1

### FastEthernet 10.0.0.1

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 1

### Serial DCE 1.0.0.1

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 2

### FastEthernet 192.168.1.1

```
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-if) #exit
```

**Router 2****Serial DTE 1.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****RIP Route**

```
Router (config) #route rip
Router (config-router) #network 10.0.0.0
Router (config-router) #network 1.0.0.0
Router (config-router) # Version 2
Router (config-router) #exit
```

**Router 1****FastEthernet 2001::1**

```
Router >
Router # Conf T
Router (Config) # IPv6 Unicast-routing
Router (Config) # Int Fa0/0
Router (Config-IF) # IPv6 Address 2001:: 1/64
Router (Config-IF) # No Shut
Router (Config-IF) # Exit
```

**Router 1****RIP Route**

```
Router (Config) # Int S0/0
Router (Config-IF) # IPv6 RIP Corvit Enable
Router (Config-IF) # Exit
```

```
Router (Config) # Int Fa0/0
Router (Config-IF) # IPv6 RIP Corvit Enable
Router (Config-IF) # Exit
```

**Router 2****FastEthernet 2002::1**

```
Router >
Router # Conf T
Router (Config) # IPv6 Unicast-routing
Router (Config) # Int Fa0/0
Router (Config-IF) # IPv6 Address 2002:: 1/64
Router (Config-IF) # No Shut
Router (Config-IF) # Exit
```

**Router 2****RIP Route**

```
Router (Config) # Int S0/0
Router (Config-IF) # IPv6 RIP Khan Enable
Router (Config-IF) # Exit
```

```
Router (Config) # Int Fa0/0
Router (Config-IF) # IPv6 RIP Khan Enable
Router (Config-IF) # Exit
```

**Router 1****Tunneling +Dual Stack**

```

Router (Config) # Int Tunnel 0
Router (Config-if) # Ipv6 Address 2001:: 1/64
Router (Config-if) # Tunnel Source 10.0.0.1
Router (Config-if) # Tunnel Destination 192.168.1.1
Router (Config-if) # Tunnel Mode IPv6ip
Router (Config-if) # Exit

```

**Router 2****Tunneling +Dual Stack**

```

Router (Config) # Int Tunnel 0
Router (Config-if) # Ipv6 Address 2002:: 1/64
Router (Config-if) # Tunnel Source 192.168.1.1
Router (Config-if) # Tunnel Destination 10.0.0.1
Router (Config-if) # Tunnel Mode IPv6ip
Router (Config-if) # Exit

```

```

Router # Show Ipv6 Route
Router # Show IPv6 Protocol
Router # Show IPv6 RIP
Router # Debug IPv6 RIP

```

**What is WAN?**

Groups of Pc Are connected with one and another By Geographically

WAN Terminology

CPE Device (Means Customer Premises Equipment Devices)

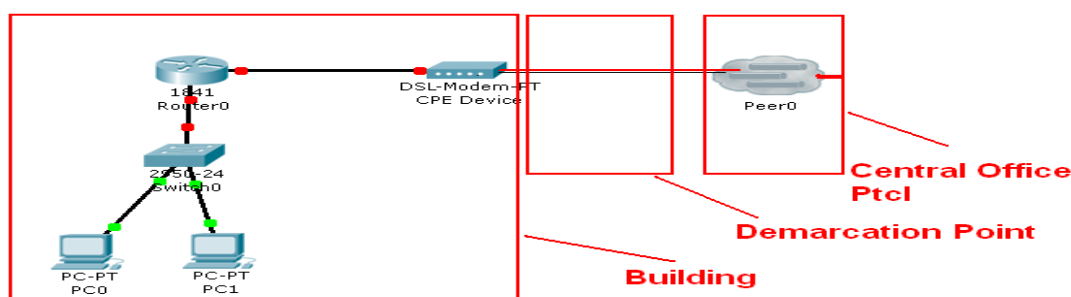
Demarcation Point

Local Loop

(I Means When Data go on Wan Said that is Called Local Loop)

Central Office PTCL

Used in Building

**What is Point to Point**

Also Called Lease Line or Dedicated Line Send for Single Connection

Expensive

Used For Short Distance

Pay Bill Used or Not Used

Protocol:→ HDLC (Meaning of High Laver Data Line Control)

**Note:**→ Point to Point Now a Day at Cont Used Just Used on Frame Relay Switch Using

## What is Circuit Switch?

Dialup Connection

Pay Bill When Used

Low Data Transfer

Voice Telephone

Protocol Used:→ ISDN (Meaning integrated service Digital Network) When Data go to WAN Side that is Used ISDN Protocol

## What is Frame Relay

Frame Relay is WAN Protocol

Use in Data link Layer

Used in Bandwidth

Packet Switching Technique

Share Same Bandwidth (I Means Same Speed for Ever one router)

Use Virtual Circuit Concept

## What is Packet Switching

Share Same Bandwidth

Save Many

Work on Virtual Circuit

Bandwidth Range 56 Kb – 45 Mb

This is Very Expansive for One Company but that is good For Large Internet worker

**Note:→** This is a Types of Switch All Routers Connecting With This Switch

This Types of Switch only with DSL or ISP Company is Available When we giving Connecting From ISP public IP Address ISP Company Connecting our Connection With Frame Relay Switch

## What is Virtual Circuit?

Frame Relay Work on Virtual Circuit

Reliable Communication

Less Expansive for Large Internet worker

We Can Connect With Multiples Network by Using Virtual Circuit

**Note:→** This is only Like Telephone if we Working a lot of Bill Coming to Match Expansive IF we Cont Use a lot of Bill at will coming Less Expansive

## What is DLCI

Data Link Connection Identifier

Each Virtual Circuit has its Own Number

Each Virtual Circuit Has Its Unique Number

## What is LMI?

Meaning of Local Management Interface

Used B/T from Relay Switch and Router

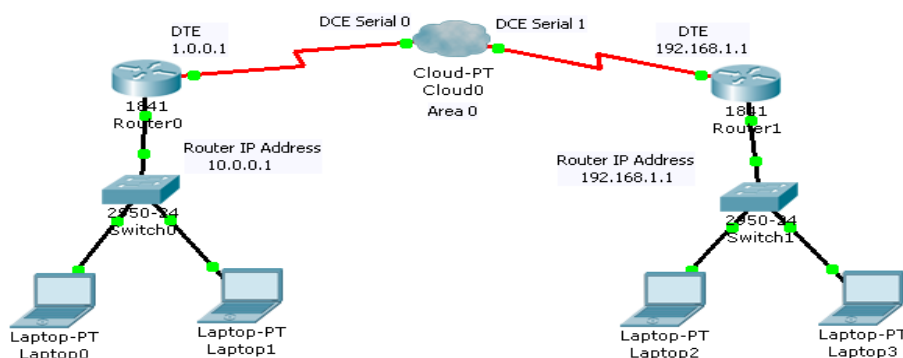
For This Purpose to Pass the Information

This is Working Data From Router up to PTCL Company Send Information

**Note:→ IF We Use From Relay Switch we have Used One Bandwidth for More our Network Exp: RIP 1 and RIP 2 and EIGRP and OSPF**

**But for Static Route We have Buy One by One Routers Manually Buying Bandwidth**

## How to Configure Pint to Point



### Router 1

FastEthernet 10.0.0.1

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 1

Serial DTE 1.0.0.1

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 2

FastEthernet 192.168.1.1

```
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-if) #exit
```

**Router 2****Serial DTE 1.0.0.2**

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****OSPF Route**

```
Router (config) #router OSPF 1
Router (config-router) #network 1.0.0.0 0.255.255.255 area 0
Router (config-router) #network 10.0.0.0 0.255.255.255 area 0
Router (config-router) #exit
```

**Router 2****RIP Route**

```
Router (config) #router OSPF 2
Router (config-router) #network 1.0.0.0 0.255.255.255 area 0
Router (config-router) #network 192.168.1.0 0.0.0.255 area 0
Router config-router) #exit
```

**Router 1****Point to Point Frame Relay**

```
Router (Config) # Hostname Peshawar
Peshawar (Config) # Int So/0/0/0
Peshawar (Config-IF) # Encapsulation Frame-Relay
Peshawar (Config-IF) #IP OSPF Network Point-To-Point
Peshawar (Config) # Exit
```

**Router 2****Point to Point Frame Relay**

```
Router (Config) # Hostname Lahore
Lahore (Config) # Int So/0/0/0
Lahore (Config-IF) # Encapsulation Frame-Relay
Lahore (Config-IF) #IP OSPF Network Point-To-Point
Lahore (Config) # Exit
```

## Configuration in Cloud or Virtual Circute

Double Click on Cloud → Click on S0/0/0

Physical Config

**GLOBAL**

Settings

TV Settings

**CONNECTIONS**

Frame Relay

DSL

Cable

**INTERFACE**

Serial0

Serial1

Serial2

Serial3

Modem4

Modem5

Ethernet6

Coaxial7

Frame Relay: Serial0

Port Status ☒ On

LMI Cisco

DLCI 102 Name Peshawar

Add Remove

**Click on Add**

DLCI	Name
102	Peshawar

Click on S0/0/1 another one Serial

**GLOBAL**

Settings

TV Settings

**CONNECTIONS**

Frame Relay

DSL

Cable

**INTERFACE**

Serial0

Serial1

Serial2

Serial3

Modem4

Modem5

Ethernet6

Coaxial7

Frame Relay: Serial1

Port Status ☒ On

LMI Cisco

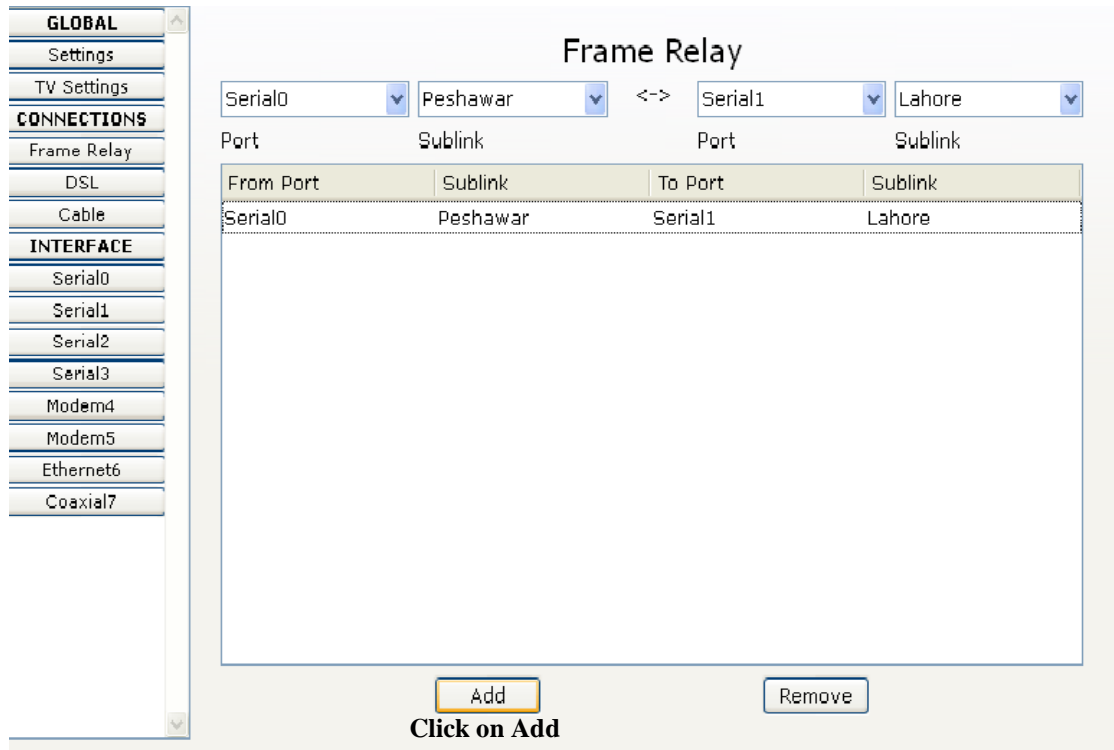
DLCI 201 Name Lahore

Add Remove

**Click on Add**

DLCI	Name
201	Lahore

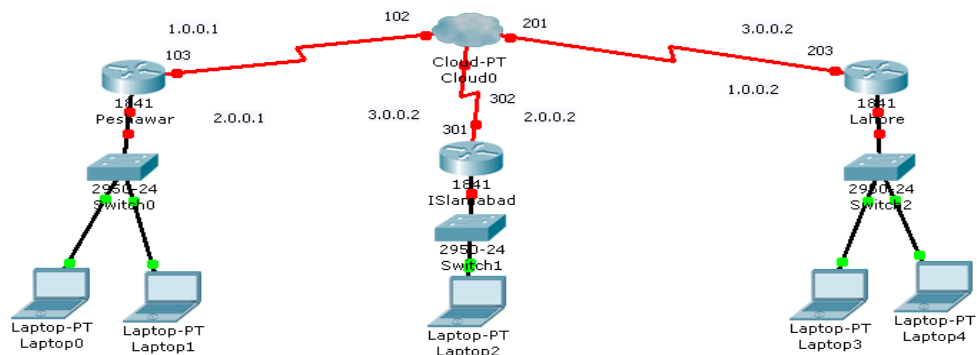
### New Click on Frame Relay Button



Peshawar (Config) # Do Ping 192.168.1.1

Press Enter

### How to Connecting Multiple Network





**Router 1****Interface Fast Ethernet IP Address**

```
Router>en
Router #conf t
Router (config) #int fa0/0
Router (config-if) #ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****Interface Serial IP Address**

```
Router (config) #int s0/0/0
Route (config-if) #encapsulation frame-relay
Router (config-if) #no shut
Router (config-if) #exit

Router (config) #int s0/0/0.102 point-to-point
Router (config-subif) #ip address 1.0.0.1 255.0.0.0
Router (config-subif) #frame-relay interface-dlci 102
Router (config-subif) #exit
```

```
Router (config) #int s0/0/0.103 point-to-point
Route r (config-subif) #ip address 2.0.0.1 255.0.0.0
Router (config-subif) #frame-relay interface-dlci 103
Router (config-subif) #exit
```

**Router 2****Interface Fast Ethernet IP Address**

```
Router>en
Router #conf t
Router (config) #int fa0/0
Router (config-if) #ip address 172.16.0.1 255.255.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****Interface Serial IP Address**

```
Router (config) #int s0/0/0
Route (config-if) #encapsulation frame-relay
Router (config-if) #no shut
Router (config-if) #exit

Router (config) #int s0/0/0.302 point-to-point
Router (config-subif) #ip address 3.0.0.2 255.0.0.0
Router (config-subif) #frame-relay interface-dlci 102
Router (config-subif) #exit
```

```
Router (config) #int s0/0/0.301 point-to-point
Route r (config-subif) #ip address 2.0.0.2 255.0.0.0
Router (config-subif) #frame-relay interface-dlci 301
Router (config-subif) #exit
```

**Router 3****Interface Fast Ethernet IP Address**

```
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-if) #exit
```

**Router 3****Interface Serial IP Address**

```
Router (config) #int s0/0/0
Route (config-if) #encapsulation frame-relay
Router (config-if) #no shut
Router (config-if) #exit

Router (config) #int s0/0/0.201 point-to-point
Router (config-subif) #ip address 1.0.0.2 255.0.0.0
Router (config-subif) #frame-relay interface-dlci 201
Router (config-subif) #exit

Router (config) #int s0/0/0.203 point-to-point
Route r (config-subif) #ip address 3.0.0.1 255.0.0.0
Router (config-subif) #frame-relay interface-dlci 203
Router (config-subif) #exit
```

**Router 1****Configuration of OSPF**

```
Router (Config) # Router OSPF 1
Router (Config-router) # Network 10.0.0.0 0.255.255.255 Area 0
Router (Config-router) # Network 1.0.0.0 0.255.255.255 Area 0
Router (Config-router) # Network 2.0.0.0 0.255.255.255 Area 0
Router (Config-router) # Exit
```

**Router 2****Configuration of OSPF**

```
Router (Config) # Router OSPF 2
Router (Config-router) # Network 172.16.0.0 0.0.255.255 Area 0
Router (Config-router) # Network 2.0.0.0 0.255.255.255 Area 0
Router (Config-router) # Network 3.0.0.0 0.255.255.255 Area 0
Router (Config-router) # Exit
```

**Router 3****Configuration of OSPF**

```
Router (Config) # Router OSPF 3
Router (Config-router) # Network 3.0.0.0 0.255.255.255 Area 0
Router (Config-router) # Network 1.0.0.0 0.255.255.255 Area 0
Router (Config-router) # Network 192.168.1.0 0.0.0.255 Area 0
Router (Config-router) # Exit
```

## How to Configuration in Cloud

### Click on Serial 0/0

Physical Config

**GLOBAL**

Settings

TV Settings

**CONNECTIONS**

Frame Relay

DSL

Cable

**INTERFACE**

Serial0

Serial1

Serial2

Serial3

Modem4

Modem5

Ethernet6

Coaxial7

Frame Relay: Serial0

Port Status ☒ On

LMI

DLCI  Name

DLCI	Name
102	Lahore
103	Islambad

**Click on Add One by One**

### Click on Serial 0/1

Physical Config

**GLOBAL**

Settings

TV Settings

**CONNECTIONS**

Frame Relay

DSL

Cable

**INTERFACE**

Serial0

**Serial1**

Serial2

Serial3

Modem4

Modem5

Ethernet6

Coaxial7

Frame Relay: Serial1

Port Status ☒ On

LMI

DLCI  Name

DLCI	Name
301	Pashawar
302	Lahore

**Click on Add One by One**

**Click on Serial 0/2**

Physical Config

**GLOBAL**

Settings

TV Settings

**CONNECTIONS**

Frame Relay

DSL

Cable

**INTERFACE**

Serial0

Serial1

Serial2

Serial3

Modem4

Modem5

Ethernet6

Coaxial7

Frame Relay: Serial2

Port Status ☒ On

LMI

DLCI  Name

**Click on Add One by One**

DLCI	Name
201	Pashawar
203	Islamabad

**Click on Frame Relay**

**GLOBAL**

Settings

TV Settings

**CONNECTIONS**

Frame Relay

DSL

Cable

**INTERFACE**

Serial0

Serial1

Serial2

Serial3

Modem4

Modem5

Ethernet6

Coaxial7

Frame Relay

Serial2  <-> Serial1

Port Sublink Port Sublink

From Port	Sublink	To Port	Sublink
Serial0	Lahor	Serial2	Pashawar
Serial1	Pashawar	Serial0	Islamabad
Serial2	Islamabad	Serial1	Lahor

**Select one by one and Add**

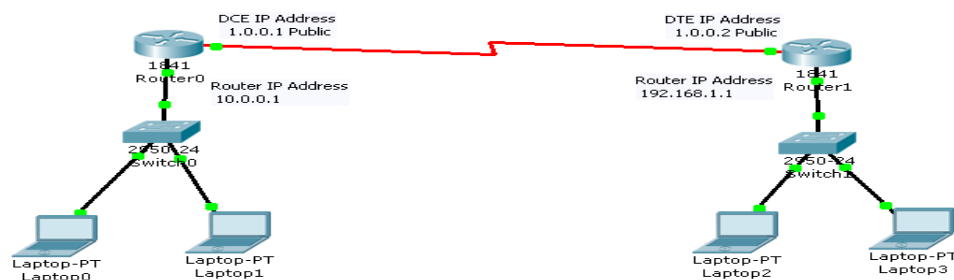
## What is CDP?

The Meaning of CDP is Cisco Discover Protocol

That is used to Show Hardware information of about Local and Remote Network and CDP is a Cisco Protocol (By default it is Disable)

**Note:** → This Protocol only used for Hardware information of another Router Sending

## Configuration of CDP



### Router 1

FastEthernet 10.0.0.1

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 1

Serial DCE 1.0.0.1

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 2

FastEthernet 192.168.1.1

```
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-if) #exit
```

### Router 2

Serial DTE 1.0.0.2

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****RIP Route**

```
Router (config) #route rip
Router (config-router) #network 10.0.0.0
Router (config-router) #network 1.0.0.0
Router (config-router) # Version 2
Router (config-router) #exit
```

**Router 2****RIP Route**

```
Router (config) #route rip
Router (config-router) #network 192.168.1.0
Router (config-router) #network 1.0.0.0
Router (config-router) # Version 2
Router (config-router) #exit
```

**Router 1****CDP Protocol**

```
Router (config) # Int S0/0/0
Router (config) # CDP Enable
Router (config) #
```

**Router 2****CDP Protocol**

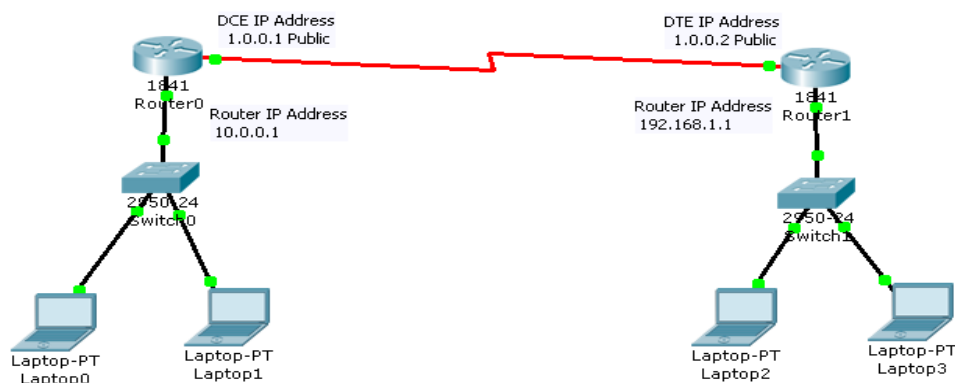
```
Router (config) # Int S0/0/0
Router (config) # CDP Enable
```

```
Router (config) # Do Sh CDP Entry * (Shift + 8 Batten)
Device ID: Switch
Entry addresses (as):
Platform: Cisco 2950, Capabilities: Switch
Interface: FastEthernet0/0, Port ID (outgoing port): FastEthernet0/1
Version:
Cisco Internet work Operating System Software
IOS (tm) C2950 Software (C2950-I6Q4L2-M), Version 12.1(22) EA4, RELEASE SOFTWARE (fc1)
Copyright (c) 1986-2005 by cisco Systems, Inc.
Compiled Wed 18-May-05 22:31 by jharirba
Advertisement version: 2
Duplex: full
-----
```

```
Device ID: Router
Entry addresses (es):
IP address: 1.0.0.1
Platform: cisco C1841, Capabilities: Router
Interface: Serial0/0/0, Port ID (outgoing port): Serial0/0/0
Hold time: 177
```

```
Version:
Cisco IOS Software, 1841 Software (C1841-ADVIPSERVICESK9-M), Version 12.4(15) T1,
RELEASE SOFTWARE (fc2)
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2007 by Cisco Systems, Inc.
Compiled Wed 18-Jul-07 04:52 by pt_team
```

## How to Control another Router by Telnet



### Router 1

### FastEthernet 10.0.0.1

```
Router>en
Router#conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 1

### Serial DCE 1.0.0.1

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

### Router 2

### FastEthernet 192.168.1.1

```
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-if) #exit
```

### Router 2

### Serial DTE 1.0.0.2

```
Router (config) #int s0/0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****RIP Route**

```
Router (config) #route rip
Router (config-router) #network 10.0.0.0
Router (config-router) #network 1.0.0.0
Router (config-router) # Version 2
Router (config-router) #exit
```

**Router 2****RIP Route**

```
Router (config) #route rip
Router (config-router) #network 192.168.1.0
Router (config-router) #network 1.0.0.0
Router (config-router) # Version 2
Router (config-router) #exit
```

**Router 1****Telnet 10.0.0.0**

```
Router (Config) # Hostname Peshawar
Peshawar (Config) # Line VTY 0 4      (From 0 up to 4 User Can Access Our Router by one Time)
Peshawar (Config-line) # Password Khan
Peshawar (Config-line) # Login
Peshawar (Config-line) # Exit
Peshawar (Config) # Enable Password Jan (this Password is For Administrator Mode)
```

**Router 2****Telnet 192.168.1.0**

```
Router (Config) # Hostname Kabul
Kabul (Config) # Line VTY 0 4      (From 0 up to 4 User Can Access Our Router by one Time)
Kabul (Config-line) # Password CCNA
Kabul (Config-line) # Login
Kabul (Config-line) # Exit
Kabul (Config) # Enable Password MCSE (this Password is For Administrator Mode)
```

**Router 2****How to Access Peshawar Router by Telnet**

```
Kabul (Config) # Telnet 10.0.0.1
```

```
Trying 10.0.0.1 ...Open
```

User Access Verification

```
Password:      (Telnet Password Assigns then Press Enter) Khan Password
```

```
Peshawar> en
```

```
Password:      (Administrator Password Assigns then Press Enter) Jan Password
```

```
Peshawar #
```

```
Peshawar #
```

**Note:→ Now Do anything on Your Link I Means do Configuration**



## What is BGP

{Meaning of BGP Border Gateway Protocol}

Developed in 1989

BGP 4.0 is Released in 1994 {First Time Released 0.3 Version}

Exterior Gateway Protocol

Used Port Number 179

TCP Types of Protocol

Administrative Distance 20, 200

{20 Number Prot work on External Side 200 Number Prot work on Internal Side}

Used to Exchange Information B/W ISP

Customer Connect with ISP by Using "IGP" and ISP Pass there Information by Using BGP

Used Classless

Share Entire Routing Table to Neighbor

Work as Distance Vector Routing Protocol

Not Send Periodic Update

### Types of BGP Protocol

Internal BGP (IBGP)

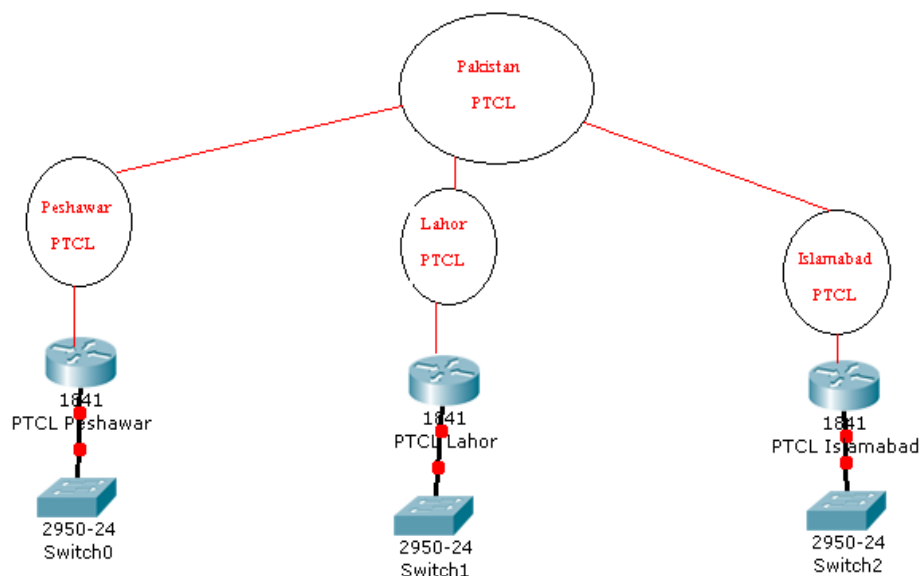
External BGP (EBGP)

### What is Internal BGP (IBGP)

→ ISP Use it and Pass there Information with Autonomous Number System

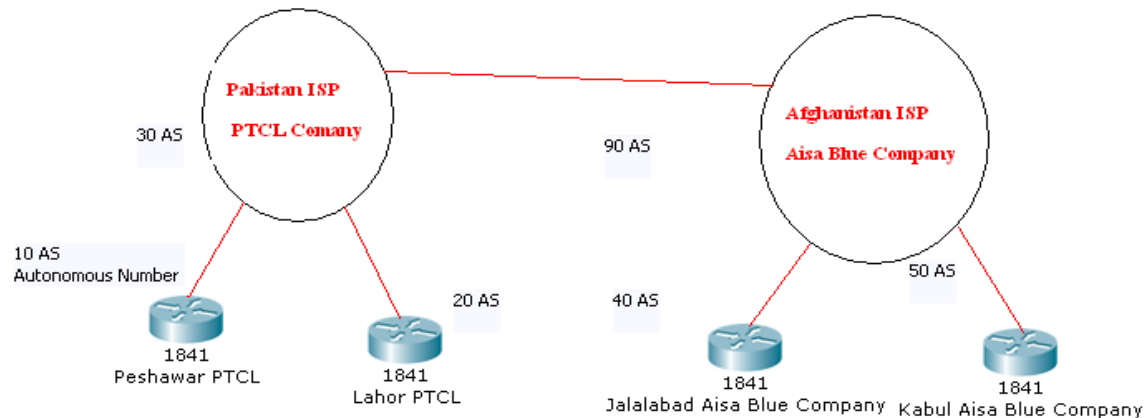
→ This Type of "IBGP" is used in Local Purpose

→ So We Can Say that all Network in Pakistan Communication with one and another by "IBGP"



## What is External BGP (EBGP)

- ISP Used it and Pass There Information with Autonomous Number System
- These Types of Protocol Used to Connect Different ISP or Different Countries ISP With one and another
- So we can Say that all Network of Pakistan Communication With one and Another Country Network by Using EBGP



## What is BGP Attribute

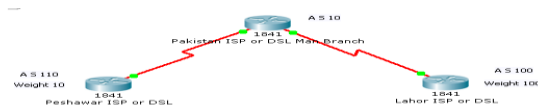
- BGP Work on Attribute (Means Metric)
- Used to Find Best Path to Destination when Multiple Ports are Available for a Specific Destination
- Attribute is a Properties of BGP

## Following of BGP Attributes

- Weight
- Local Preference
- Next Hop
- Community
- AS-Path
- MED
- Original Attributes

## What is Weight Attributes?

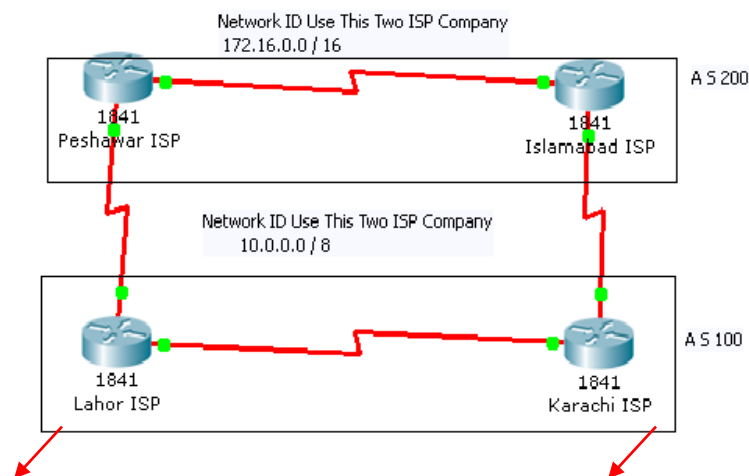
- Cisco Define
- Not Advertise Route to Neighbor Routers
- If the Router learns about more then one Router to the Same Destination the Router with Highest Weight is Preference



**Note:→ With Which Router are Connected Pc allot of that router is Weight Router and also All Routers Send Our Update Frame Top Side on that Weight Router**

### What is Local Preference?

When we have multiple Routers and want to Send Data to another Router Network by Using BGP for this Purpose BGP See on Local Preference that is used to Send Data From Exit Point and See Which Exit Point is Suitable for Send Data Let Suppose



Local Preference

Local Preference

**Note:→ All Routers Are Connected with One and Another there are Send Update To Which Other in This Time Which Router Weight are To Lease That Router are Local Preference also Send Update Frame IN Side**

### What is Original Attribute?

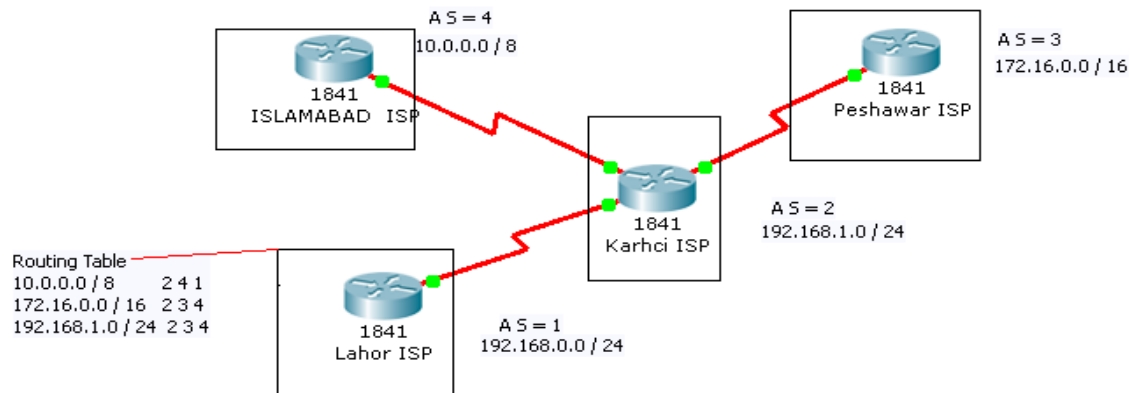
- Used For Router Selection
- Indicates That How BGP Learned about Particular Router
- Have 3 Values
- 1:→ IGP = interior Gateway Protocol
- 2:→ EGP = External Gateway Protocol
- 3:→ In Complete Router Unknown

**Note:→ By this Tape at can Say Which Router are Used BGP Protocol**

### What is AS=Path

When A Router Advertisement Pass through Autonomous System that Autonomous Number System Is added to Order list of Autonomous Number System That Router Advertisement Has Traversed

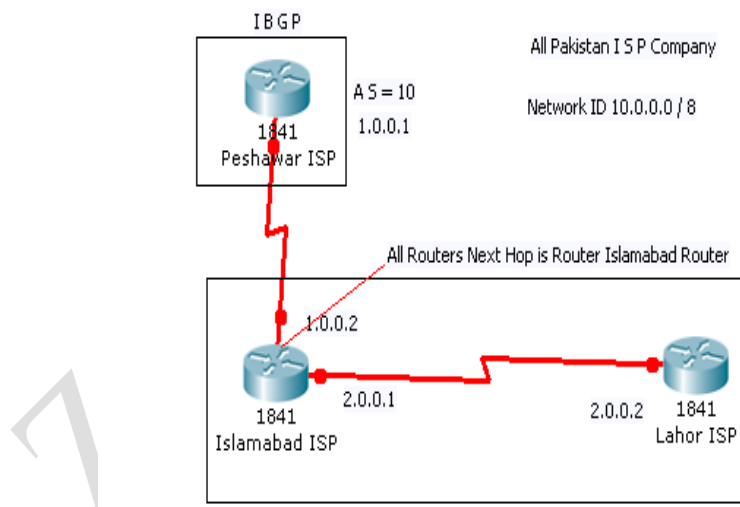
→ Present Routing Loop



**Note:**→ First Time Send All Routers Update With One and Another But the Other Router Update are Coming Our Router Update are Not go to on Other Routers

### What is Next Hop?

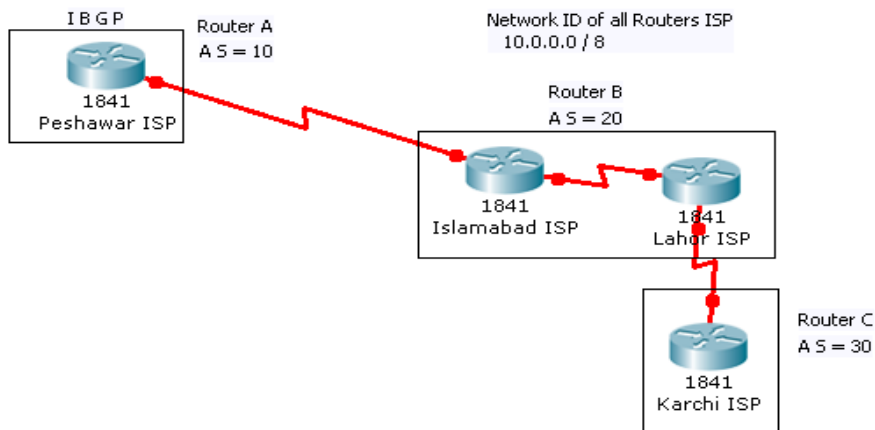
The EBGP Next Hope Attribute is the IP Address that is used to reach the Advertising Router Neighbor is all so Called Next Hop



**Note:**→ When Two Routers are Sending Update by Help of Next Hop or Neighbor Router

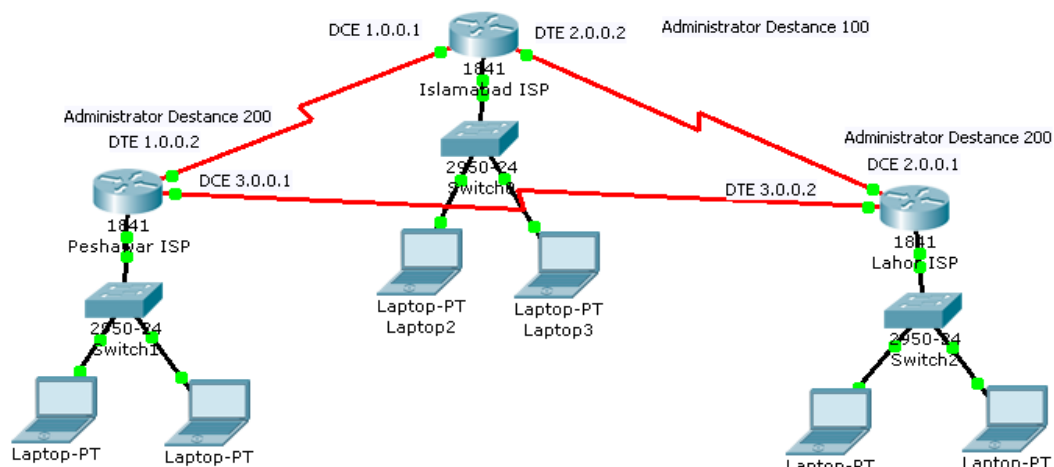
## What is Community Attribute?

- Provide Way of Grouping Destination Called Community Attribute
- To Which Router Decision Can be Applied {1} No Export {2} No Advertise {3} No Internet



**Note:** → IF Router A Send Data to Router B in Side This Data only See Router B But Not See Router C at is only Access For Routers B But Router C are Not Accessing

## Configuration of BGP



### Router 1

### Fast Ethernet 10.0.0.1

```
Router>en
Router #conf t
Router (config) # int fa0/0
Router (config-if) # Ip address 10.0.0.1 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****Serial DCE 1.0.0.1**

```
Router (config) #int S0/0
Router (config-if) #Ip address 1.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 1****Serial DTE 2.0.0.2**

```
Router (config) #int S0/1
Router (config-if) #Ip address 2.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****Fast Ethernet 172.16.0.1**

```
Router>en
Router #conf t
Router (config) #int fa0/0
Router (config-if) #Ip address 172.16.0.1 255.255.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****Serial DTE 1.0.0.2**

```
Router (config) #int S0/0
Router (config-if) #Ip address 1.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 2****Serial DCE 3.0.0.1**

```
Router (config) #int S0/1
Router (config-if) #Ip address 3.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) # exit
```

**Router 3****Fast Ethernet 192.168.1.1**

```
Router>
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-if) #exit
```

**Router 3****Serial DTE 3.0.0.2**

```
Router (config) #int s0/0
Router (config-if) #Ip address 3.0.0.2 255.0.0.0
Router (config-if) #no shut
Router (config-if) #exit
```

**Router 3****Serial DCE 2.0.0.1**

```
Router (config) #int S0/1
Router (config-if) #Ip address 2.0.0.1 255.0.0.0
Router (config-if) #clock rate 64000
Router (config-if) #no shut
Router (config-if) # exit
```

**Router 1****EIGRP ROUTE**

```
Router (config) #router Eigrp 1
Router (config-router) #network 10.0.0.0
Router (config-router) #network 1.0.0.0
Router (config-router) #network 2.0.0.0
Router (config-router) #no auto-summary
Router (config-router) #exit
```

**Router 2****EIGRP ROUTE**

```
Router (config) #router Eigrp 1
Router (config-router) #network 172.16.0.0
Router (config-router) #network 1.0.0.0
Router (config-router) #network 3.0.0.0
Router (config-router) #no auto-summary
Router (config-router) # exit
```

**Router 3****EIGRP ROUTE**

```
Router (config) #router Eigrp 1
Router (config-router) #network 192.168.1.0
Router (config-router) #network 2.0.0.0
Router (config-router) #network 3.0.0.0
Router (config-router) #no auto-summary
Router (config-router) #exit
```

**Router 1****BGP ROUTE**

```
Router (config) #router BGP 100
Router (config-router) # Neighbor 1.0.0.2 Remote-as 200
Router (config-router) # Neighbor 2.0.0.1 Remote-as 200
Router (config-router) # Neighbor 1.0.0.1
Router (config-router) # Neighbor 2.0.0.0
Router (config-router) # Neighbor 10.0.0.0
Router (config-router) #exit
```

**Router 2****BGP ROUTE**

```
Router (config) #router BGP 200
Router (config-router) # Neighbor 3.0.0.2 Remote-as 200
Router (config-router) # Neighbor 1.0.0.1 Remote-as 100
Router (config-router) # Neighbor 3.0.0.1
Router (config-router) # Neighbor 1.0.0.0
Router (config-router) # Neighbor 172.16.0.0
Router (config-router) #exit
```

**Router 3****BGP ROUTE**

```
Router (config) #router BGP 200
Router (config-router) # Neighbor 2.0.0.2 Remote-as 100
Router (config-router) # Neighbor 3.0.0.1 Remote-as 200
Router (config-router) # Neighbor 2.0.0.1
Router (config-router) # Neighbor 3.0.0.0
Router (config-router) # Neighbor 192.168.1.0
Router (config-router) #exit
```

**How to Check on Connection**

```
Router # Show IP BGP Summary
Router # Show IP Route
Router # Show IP BGP
```