
WELCOME
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200-301
(8th Class)

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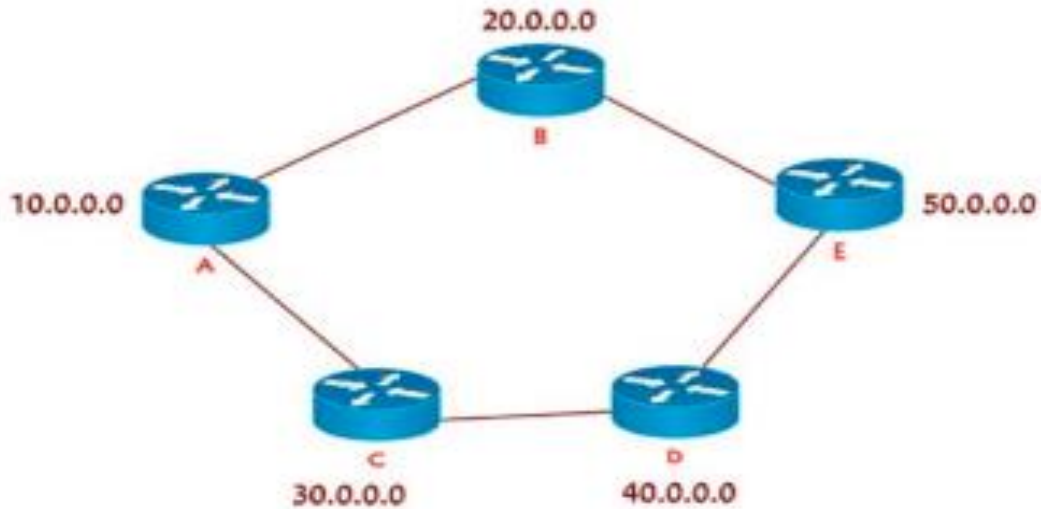
Dynamic Routing

RIP, EIGRP, OSPF

Dynamic Routing



Advantages of Dynamic over static :

- No need of manual configuration (unlike static routing)
- Learns about other networks via advertisements (of directly connected networks)
- Automatically select the best route. (builds routing table)
- Updates the topology changes dynamically.
- No need to know the destination networks. (others network)
- Administrative work is reduced
- Applicable for large organizations.

Types of Dynamic Routing Protocols

- Distance Vector Protocol
- Link State Protocol
- Hybrid Protocol

Types of Dynamic Routing Protocols

Distance Vector	Link State	Hybrid (Advance Distance vector)
Works with Bellman Ford algorithm	Works with Dijkstra algorithm	Works with DUAL algorithm
Periodic updates	Incremental updates Link state updates	Incremental updates
Full Routing tables are exchanged	Missing routes are exchanged	Missing routes are exchanged
Classful routing protocol	Classless routing protocol	Classless routing protocol
Updates are through broadcast	Updates are through multicast	Updates are through multicast
Example: RIP v1, RIPv2, IGRP	Example : OSPF, IS-IS	Example : EIGRP
Less overhead	More overhead	Less overhead
Easy to configure	Difficult to configure	Easy to configure

Types of Protocols:

1. Classfull Protocol

2. Classless Protocol

Administrative Distance

- Trust worthiness of the information received by the router.
- The Number is between 0 and 255
- Less value is more preferred routing

Default administrative distances

Directly Connected = 0

Static Route = 1

IGRP = 100

EIGRP = 90

OSPF = 110

RIP = 120

Autonomous System Number

- is a collection of networks under a common administrative domain.
- A unique number identifying the Routing domain of the routers (one organization).
- Ranges from 1- 65535
  - Public AS (in between multiple SP) 1 – 64512
  - Private AS (same SP) 64513 – 65535

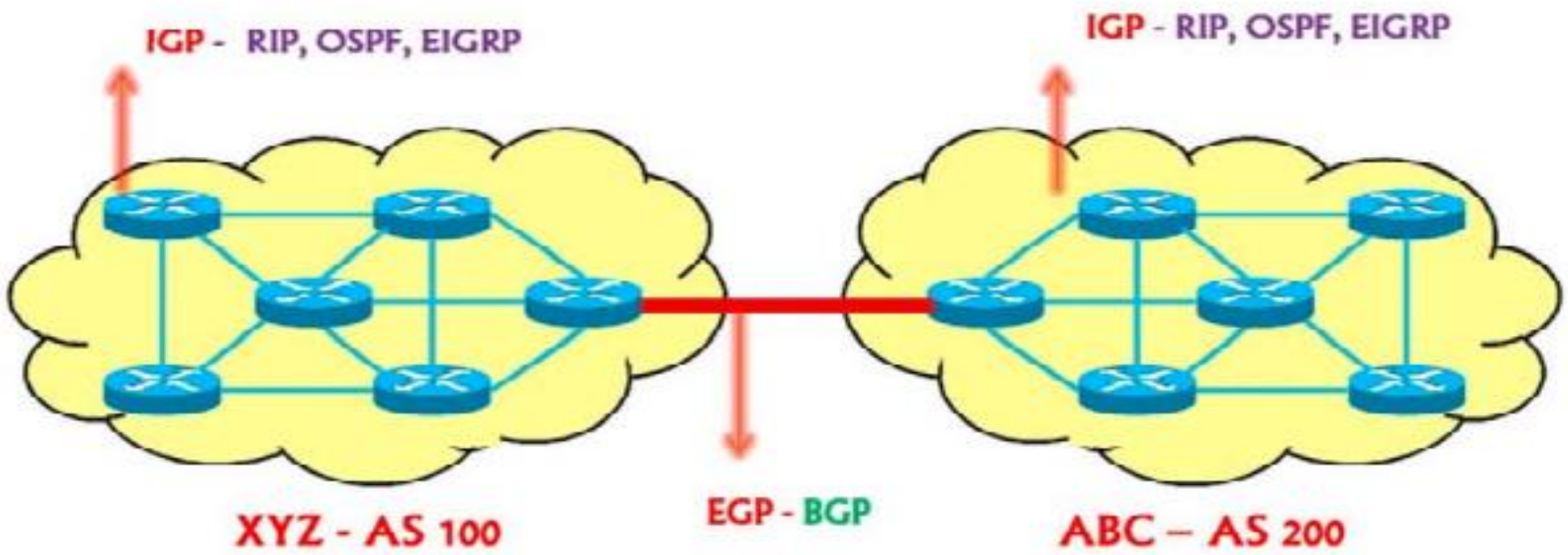
Routing Protocol Classification

IGP

- Interior Gateway Protocol
- used to communicate within same autonomous system
- RIP, IGRP, EIGRP, OSPF, IS-IS

EGP

1. Exterior Gateway Protocol
2. used to communicate between two or more autonomous system
3. Border Gateway Protocol (BGP)



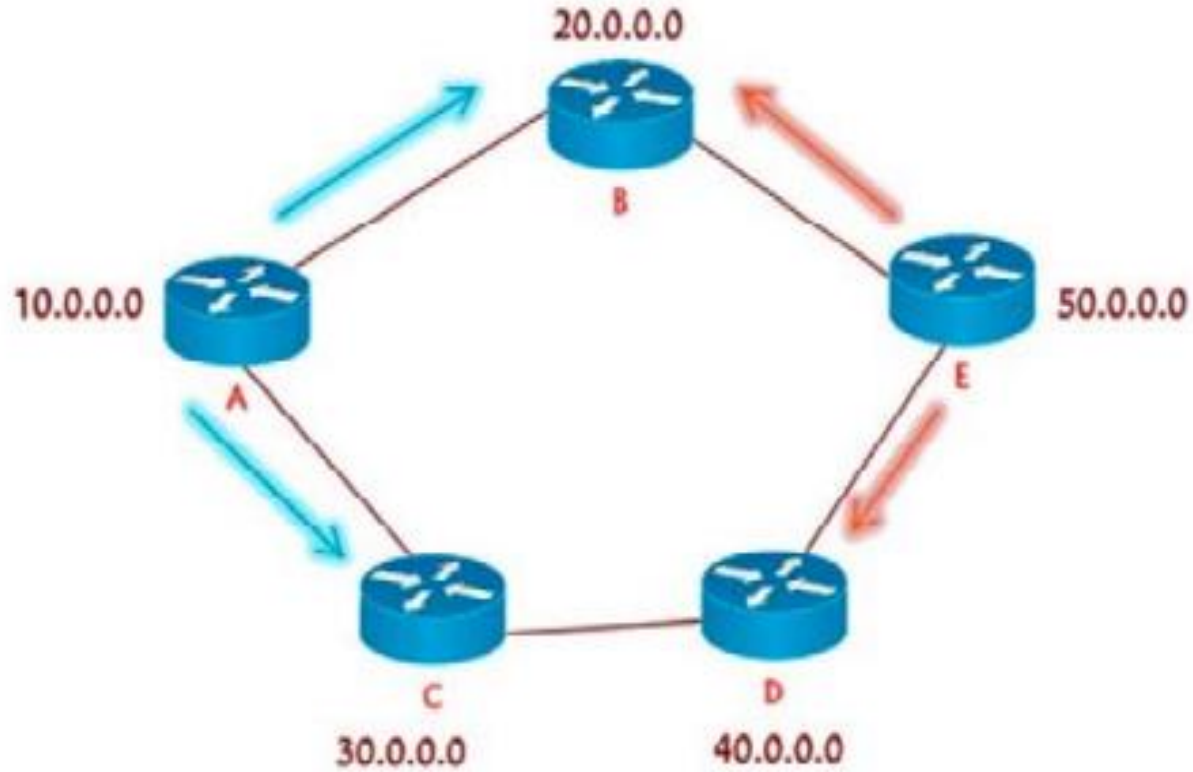
Enhanced Interior Gateway Routing Protocol

- Advanced distance vector (Hybrid protocol)
- Standard protocol (initially was cisco proprietary)
- Classless routing protocol (carry subnet-mask , support subnets/VLSM)
- Max Hop count is 255 (100 by default)
- Administrative distance is 90
- Easy and Flexible network design. (unlike OSPF)
- Uses Multicast (224.0.0.10) and unicast for initial neighbor discovery process

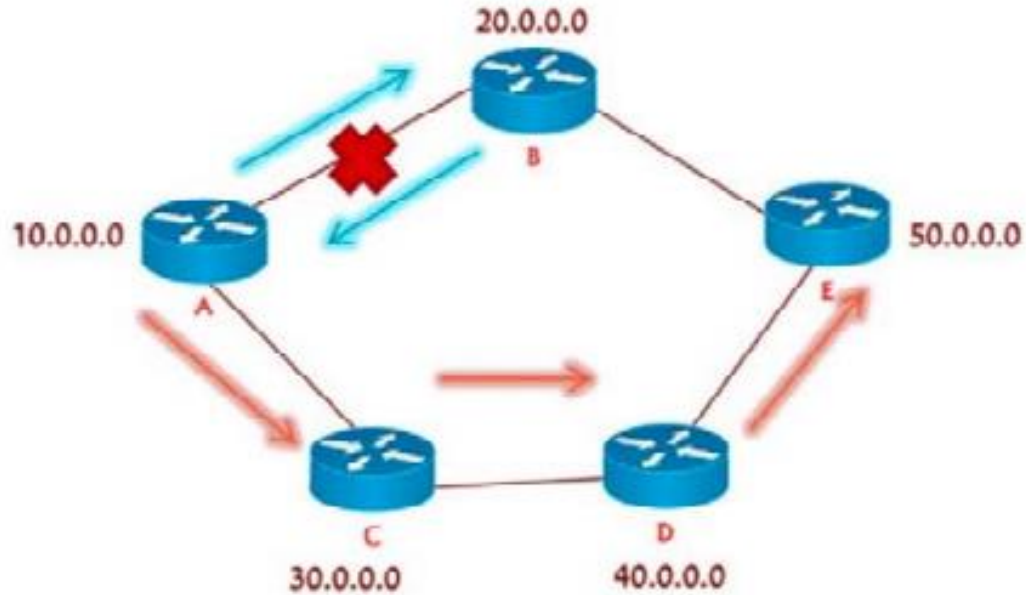
EIGRP Tables

Neighbor table

- Contains list of directly connected routers
- **# show ip eigrp neighbor**



EIGRP Convergence



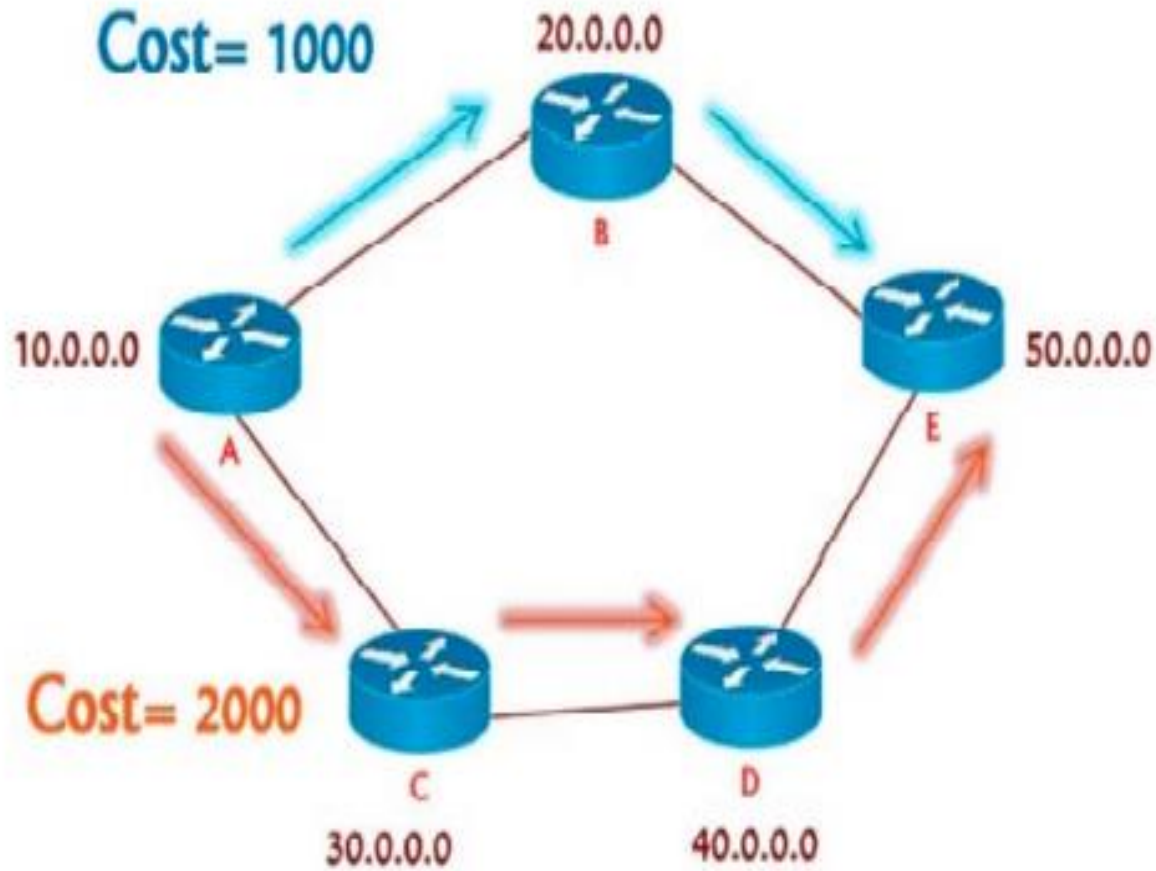
- Incremental updates
- Periodically send hello packets are sent every 5 seconds (dead – 15 sec)
- Convergence rate is fast (15 sec)

Also pre-calculates second best route

- best route = successor
- Second best route = feasible successor

EIGRP cost

Least cost = best route

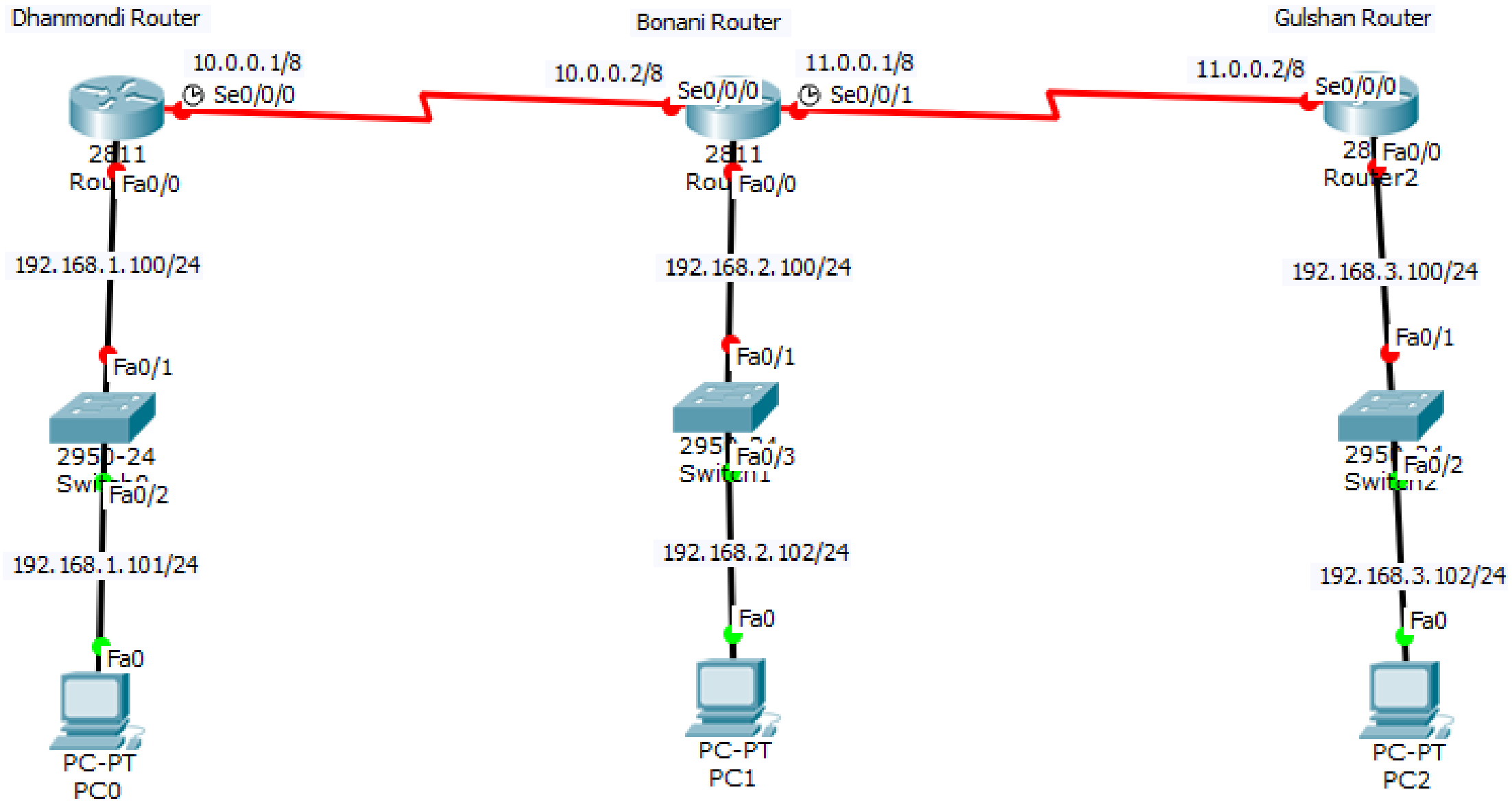


R-1#show ip route

EIGRP Configuration

```
Router(config)# router eigrp <AS NO>
Router(config-router)# network <Network ID>
```

LAB: DYNAMIC ROUTING USING EIGRP



Step-1: সবার প্রথমে সকল রাউটারের Interface UP করে নিতে হবে।

1. Dhanmondi router

```
Continue with configuration dialog? [yes/no]: no
Router>enable
Router#configure terminal
Router(config)#interface serial 0/0/0
Router(config-if)#ip address 10.0.0.1 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface fastEthernet 0/0
Router(config-if)#ip address 192.168.1.100 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
```

2.Bonani Router

Continue with configuration dialog? [yes/no]: no
Router>enable
Router#configure terminal
Router(config)#interface serial 0/0/0
Router(config-if)#ip address 10.0.0.2 255.0.0.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface fastEthernet 0/0
Router(config-if)#ip address 192.168.2.100 255.255.255.0
Router(config-if)#no shutdown
Router(config-if)#exit
Router(config)#interface serial 0/0/1
Router(config-if)#ip address 11.0.0.1 255.0.0.0
Router(config-if)#no shutdown

3.Gulshan Router

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

Router>enable

Router#configure terminal

Router(config)#interface serial 0/0/0

Router(config-if)#ip address 11.0.0.2 255.0.0.0

Router(config-if)#no shutdown

Router(config-if)#exit

Router(config-if)#interface fastEthernet 0/0

Router(config-if)#ip address 192.168.3.100 255.255.255.0

Router(config-if)#no shutdown

Router(config-if)#exit

Step-2: পরবর্তীতে প্রতিটি রাউটারে প্রবেশ করে Routing Lookup or EIGRP Routing করতে হবে।

1. Dhanmondi router:

```
Router(config)#router eigrp 100
Router(config-router)#network 192.168.1.0
Router(config-router)#network 10.0.0.0
```

2. Bonani router:

```
Router(config)#router eigrp 100
Router(config-router)#network 10.0.0.0
Router(config-router)#network 192.168.2.0
Router(config-router)#network 11.0.0.0
```

3. Gulshan router:

Router(config)#router eigrp 100

Router(config-router)#network 11.0.0.0

Router(config-router)#network 192.168.3.0

Step-3: পরবর্তীতে প্রতিটি রাউটারে প্রবেশ করে ip route করে দেখতে হবে যে, প্রতিটি রাউটারে Routing হয়েছে কীনা।

1. Dhanmondi router:

Router#show ip route

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area

C 10.0.0.0/8 is directly connected, Serial0/0/0

D 11.0.0.0/8 [90/2681856] via 10.0.0.2, 00:02:18, Serial0/0/0

C 192.168.1.0/24 is directly connected, FastEthernet0/0

D 192.168.2.0/24 [90/2172416] via 10.0.0.2, 00:02:23, Serial0/0/0

D 192.168.3.0/24 [90/2684416] via 10.0.0.2, 00:00:22, Serial0/0/0

এখানে দেখা যাচ্ছে যে, D দিয়ে যা দেখা যাচ্ছে তা হলো Eigrp Routing. আর C দিয়ে Interface ip গুলো দেখানো হয়েছে।

2. Bonani router:

Router#show ip route

C 10.0.0.0/8 is directly connected, Serial0/0/0

C 11.0.0.0/8 is directly connected, Serial0/0/1

D 192.168.1.0/24 [90/2172416] via 10.0.0.1, 00:04:16, Serial0/0/0

C 192.168.2.0/24 is directly connected, FastEthernet0/0

D 192.168.3.0/24 [90/2172416] via 11.0.0.2, 00:02:04, Serial0/0/1

3. Gulshan router:

Router#show ip route

D 10.0.0.0/8 [90/2681856] via 11.0.0.1, 00:03:48, Serial0/0/0

C 11.0.0.0/8 is directly connected, Serial0/0/0

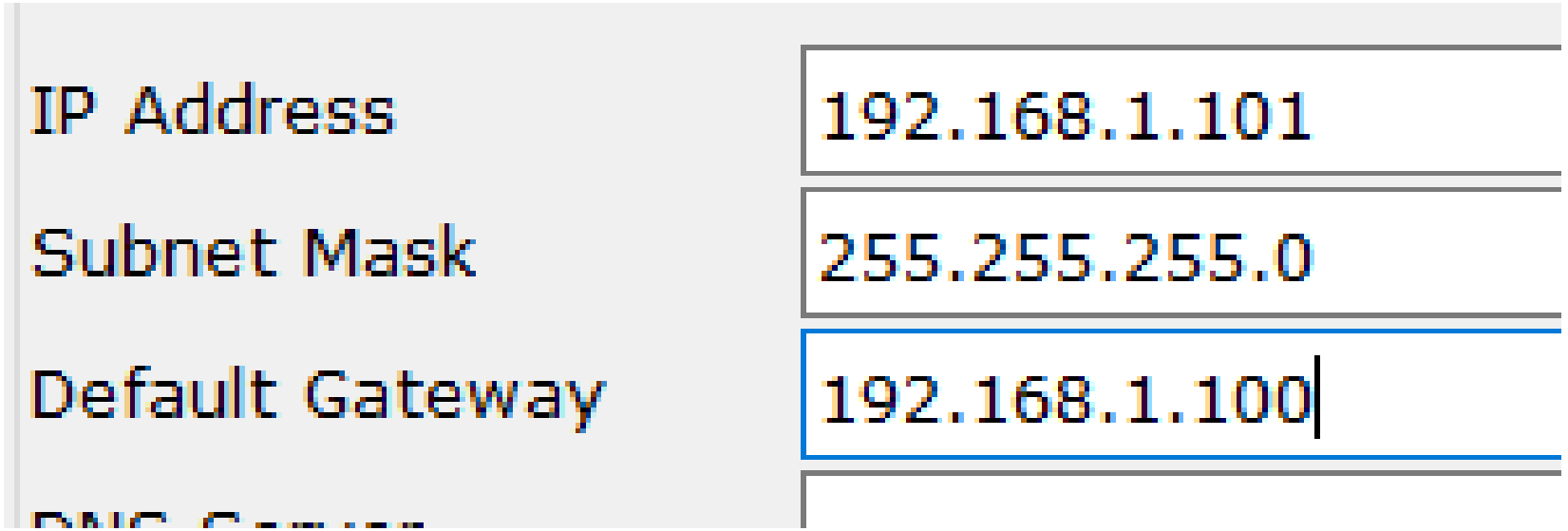
D 192.168.1.0/24 [90/2684416] via 11.0.0.1, 00:03:48, Serial0/0/0

D 192.168.2.0/24 [90/2172416] via 11.0.0.1, 00:03:48, Serial0/0/0

C 192.168.3.0/24 is directly connected, FastEthernet0/0

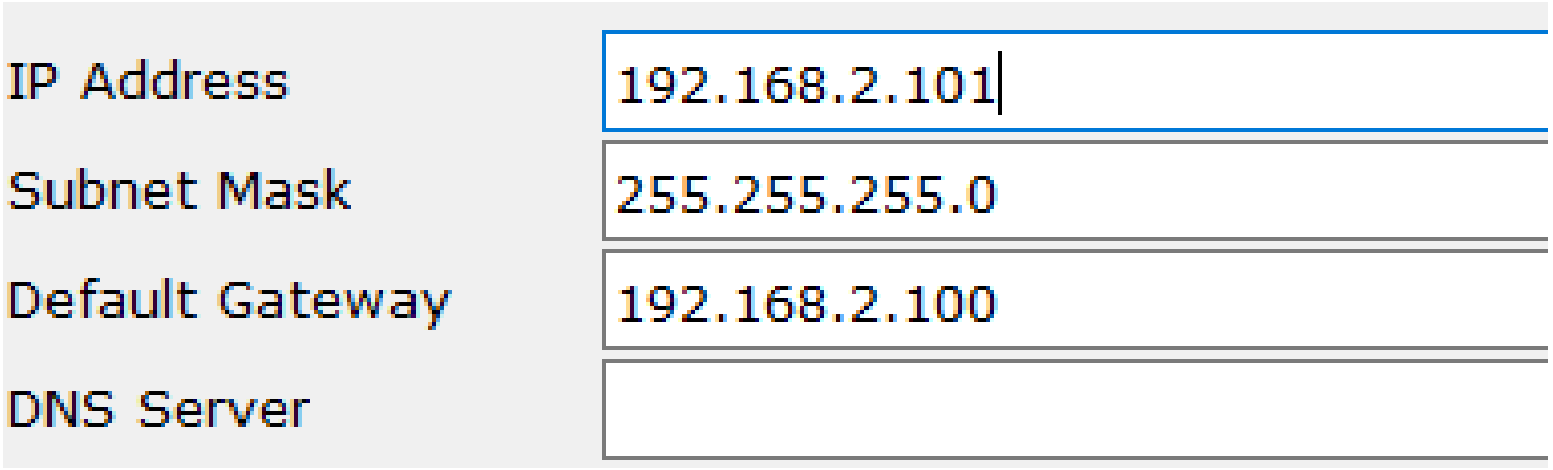
Step-4: পরবর্তীতে প্রতিটি কম্পিউটারে প্রবেশ করে IP দিতে হবে।

1. Go to PCO => Click Desktop => Click IP Configuration

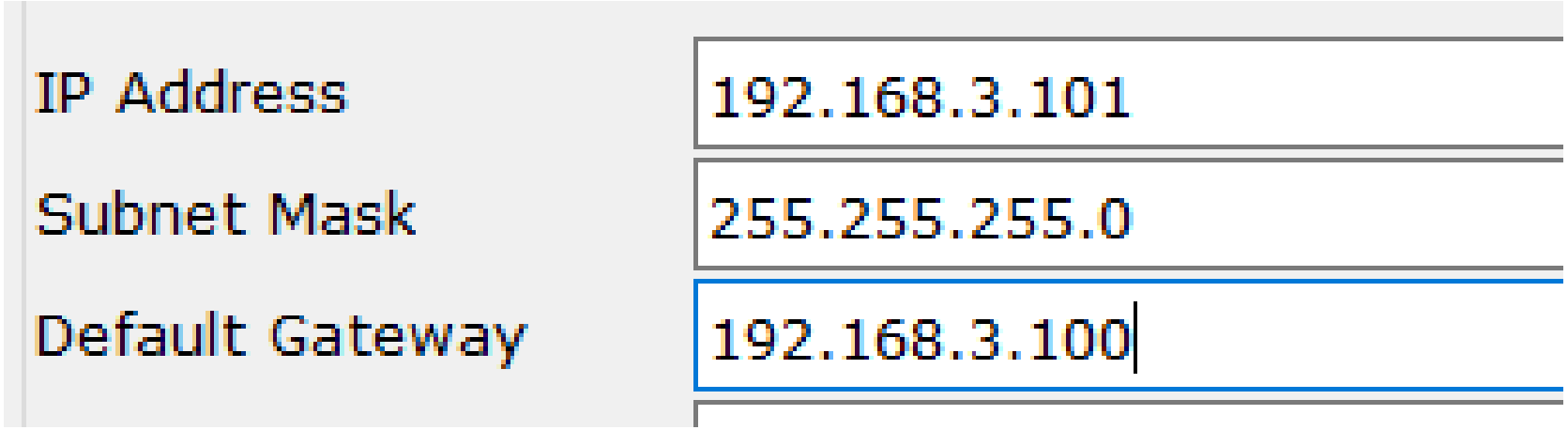


পরবর্তীতে IP Address, Subnet Mask, Default Gateway (এটি হলো মূলত কম্পিউটার যে পোর্টের মাধ্যমে রাউটারের সাথে সংযুক্ত তার IP) দিয়ে উপরে Cross এ Click দিতে হবে।

2. Go to PC1 => Click Desktop => Click IP Configuration



3. Go to PC2 => Click Desktop => Click IP Configuration



Step-5: পরবর্তীতে প্রতিটি কম্পিউটারে প্রবেশ করে ping দিয়ে Connectivity Check করতে হবে।

1. Go to PCO => Click Desktop => Click Command Prompt

PC>ping 192.168.2.101
Pinging 192.168.2.101 with 32 bytes of data:
Reply from 192.168.2.101: bytes=32 time=11ms TTL=128
Reply from 192.168.2.101 : bytes=32 time=0ms TTL=128
Reply from 192.168.2.101 : bytes=32 time=8ms TTL=128
Reply from 192.168.2.101 : bytes=32 time=8ms TTL=128

Ping statistics for 192.168.2.101 :
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 11ms, Average = 6ms.

যদি এইরকম আসে তাহলে আমি অন্য কম্পিউটারের সাথে সংযুক্ত আছি। আর সংযুক্ত না থাকলে Request Time Out আসবে।

1. Go to PCO => Click Desktop => Click Command Prompt

PC>ping 192.168.2.101

Pinging 192.168.2.101 with 32 bytes of data:
Reply from 192.168.2.101: bytes=32 time=11ms TTL=128
Reply from 192.168.2.101 : bytes=32 time=0ms TTL=128
Reply from 192.168.2.101 : bytes=32 time=8ms TTL=128
Reply from 192.168.2.101 : bytes=32 time=8ms TTL=128

Ping statistics for 192.168.2.101 :
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 11ms, Average = 6ms.

PC>ping 192.168.3.101

Pinging 192.168.3.101 with 32 bytes of data:
Reply from 192.168.3.101: bytes=32 time=11ms TTL=128
Reply from 192.168.3.101 : bytes=32 time=0ms TTL=128
Reply from 192.168.3.101 : bytes=32 time=8ms TTL=128
Reply from 192.168.3.101 : bytes=32 time=8ms TTL=128
Ping statistics for 192.168.3.101 :
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:

2. Go to PC1 => Click Desktop => Click Command Prompt

PC>ping 192.168.1.101
Pinging 192.168.1.101 with 32 bytes of data:
Reply from 192.168.1.101: bytes=32 time=11ms TTL=128
Reply from 192.168.1.101 : bytes=32 time=0ms TTL=128
Reply from 192.168.1.101 : bytes=32 time=8ms TTL=128
Reply from 192.168.1.101 : bytes=32 time=8ms TTL=128
Ping statistics for 192.168.1.101 :
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 11ms, Average = 6ms.

PC>ping 192.168.3.101
Pinging 192.168.3.101 with 32 bytes of data:
Reply from 192.168.3.101: bytes=32 time=11ms TTL=128
Reply from 192.168.3.101 : bytes=32 time=0ms TTL=128
Reply from 192.168.3.101 : bytes=32 time=8ms TTL=128
Reply from 192.168.3.101 : bytes=32 time=8ms TTL=128

Ping statistics for 192.168.3.101 :
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 11ms, Average = 6ms.

2. Go to PC2 => Click Desktop => Click Command Prompt

PC>ping 192.168.1.101
Pinging 192.168.1.101 with 32 bytes of data:
Reply from 192.168.1.101: bytes=32 time=11ms TTL=128
Reply from 192.168.1.101 : bytes=32 time=0ms TTL=128
Reply from 192.168.1.101 : bytes=32 time=8ms TTL=128
Reply from 192.168.1.101 : bytes=32 time=8ms TTL=128
Ping statistics for 192.168.1.101 :
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 11ms, Average = 6ms.

PC>ping 192.168.2.101
Pinging 192.168.2.101 with 32 bytes of data:
Reply from 192.168.2.101: bytes=32 time=11ms TTL=128
Reply from 192.168.2.101 : bytes=32 time=0ms TTL=128
Reply from 192.168.2.101 : bytes=32 time=8ms TTL=128
Reply from 192.168.2.101 : bytes=32 time=8ms TTL=128

Ping statistics for 192.168.2.101 :
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 11ms, Average = 6ms.


Thank
You