WELCOME

Cisco Certified Networking Associate(CCNA)

200-301

(6th Class)

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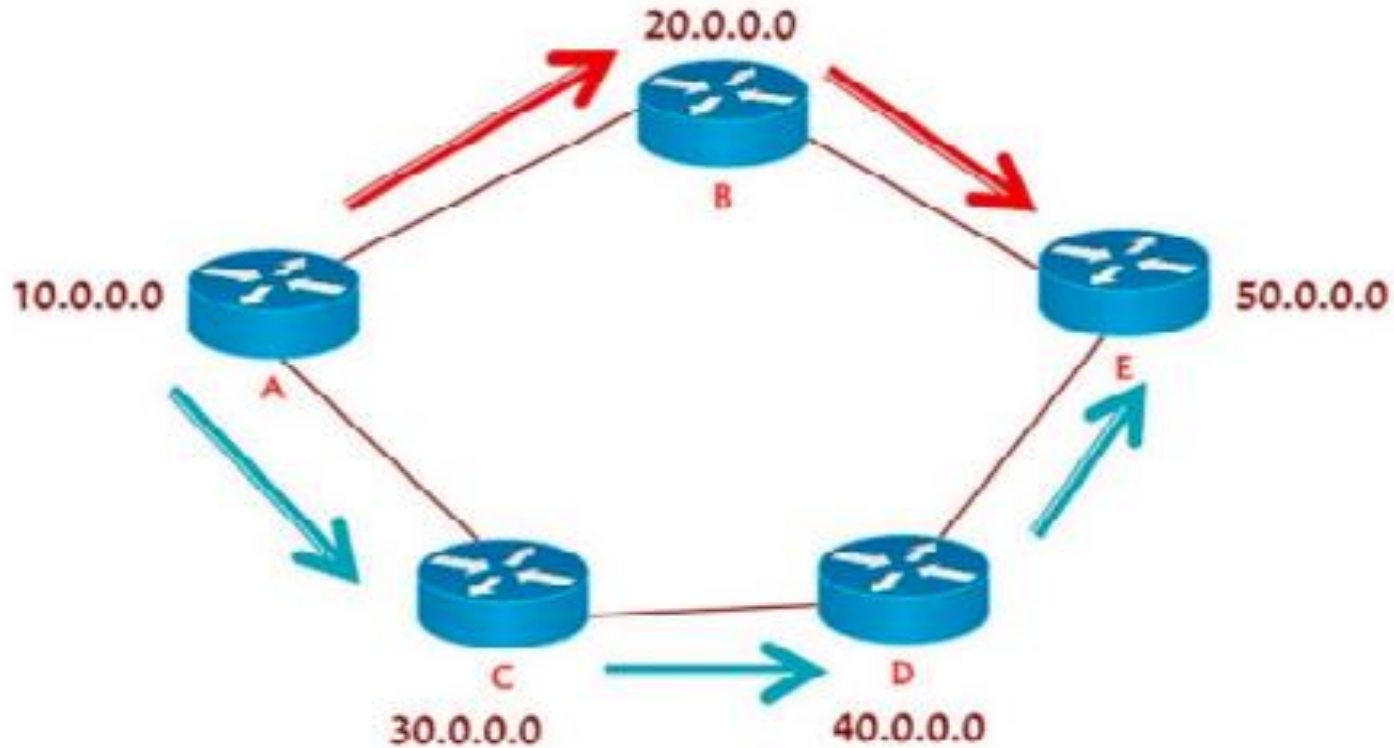
Routing

- Forwarding of packets from one network to another network .
- choosing the best path from the routing table.



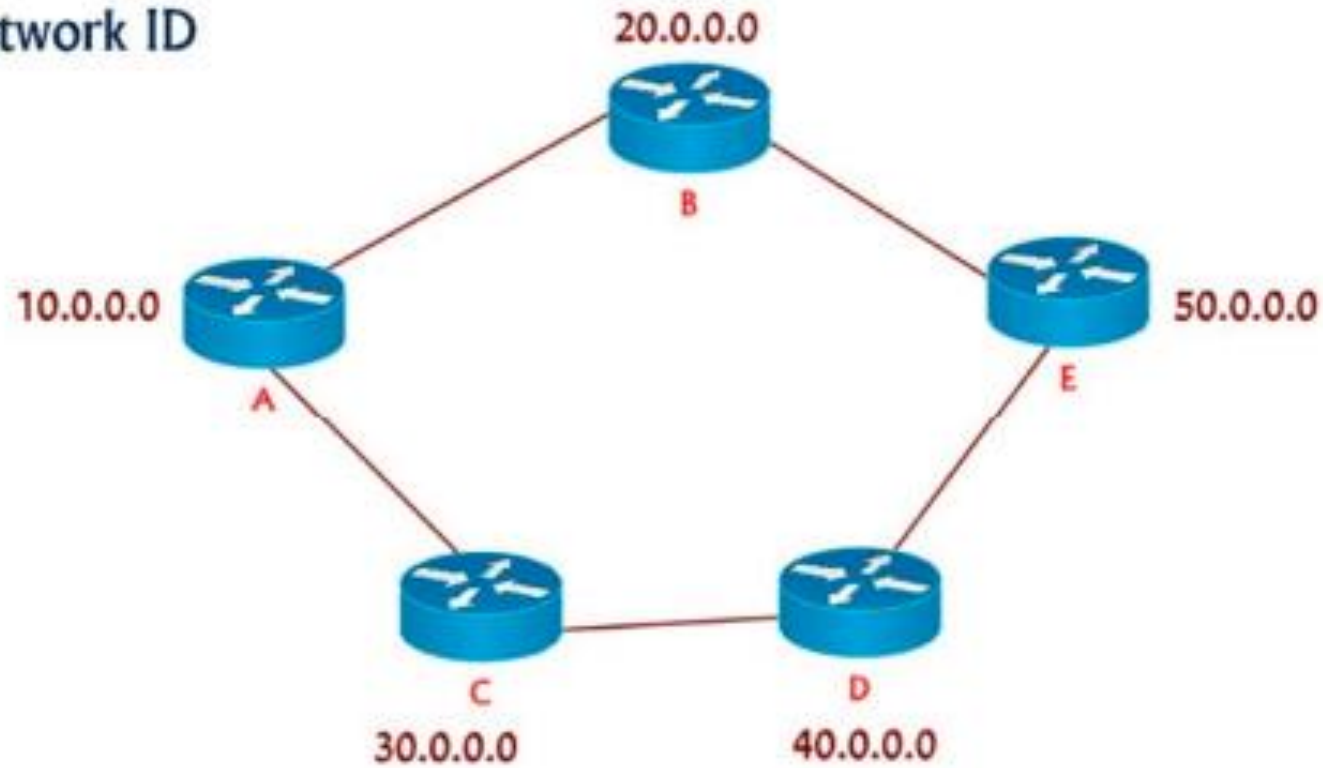
Best path selection is based on the type of routing we are using (static /Dynamic)

Types of Routing

1. Static Routing
2. Default Routing
3. Dynamic Routing

Static Routing

- Best path is configured manually by Administrator
- Mandatory need of Destination Network ID
- It is Secure & fast



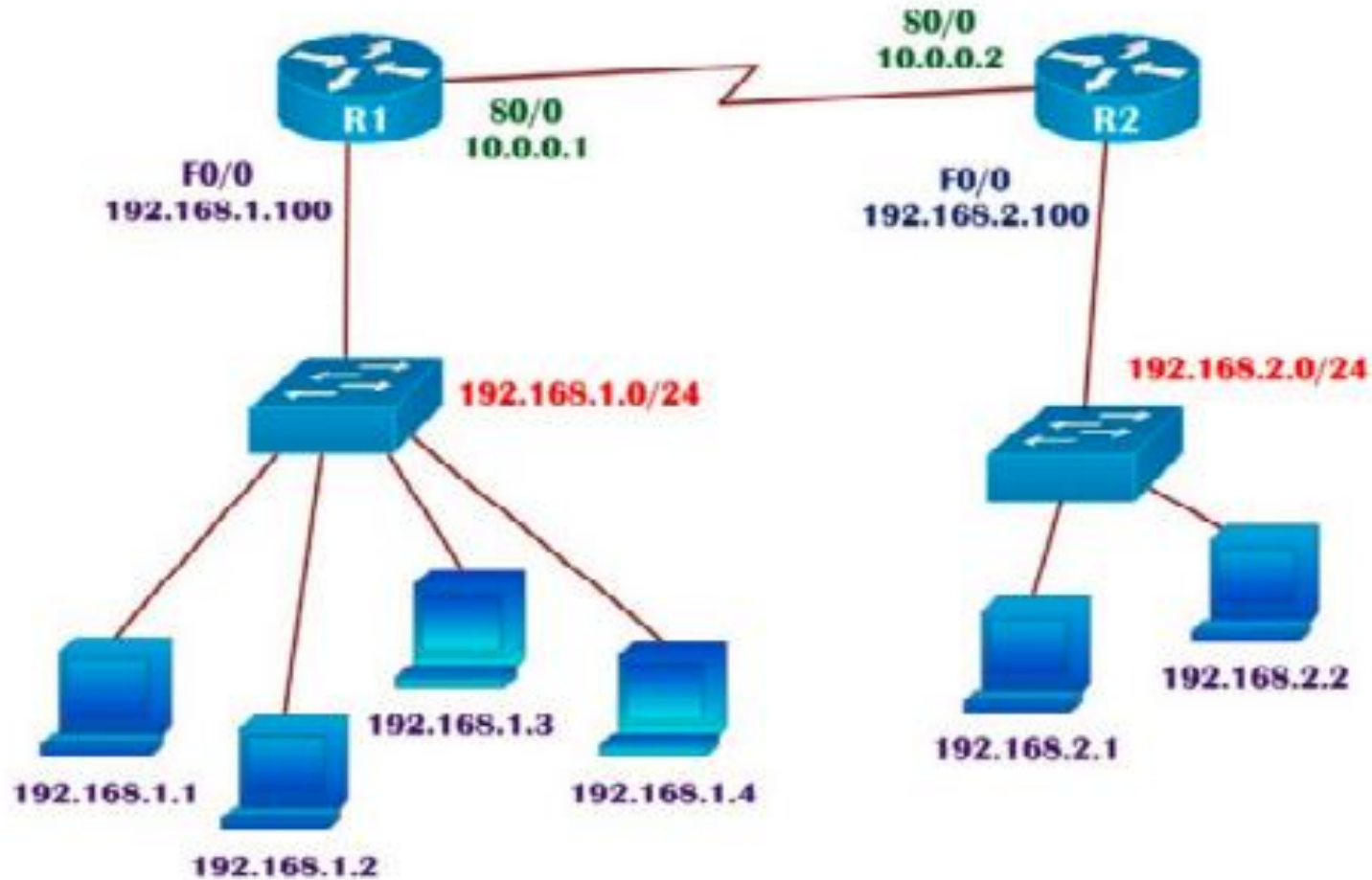
Disadvantages

- Everything to manually
- Used for small network.
- Network change effect complete network.

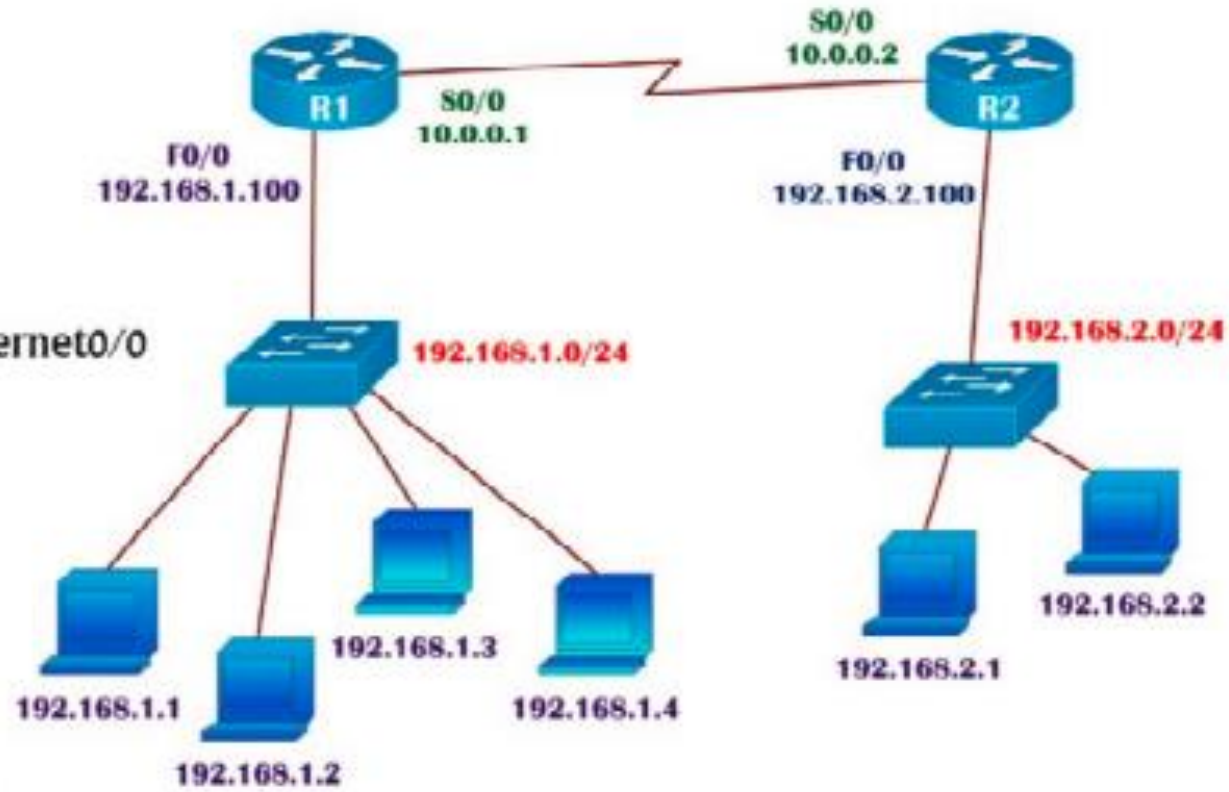
Configuring Static Route

Router(config)#

ip route <Destination Network ID> <Destination Subnet Mask> <Next-hop IP address >



Verification before static Routing



R-1#show ip route

C 10.0.0.0/8 is directly connected, Serial0/0

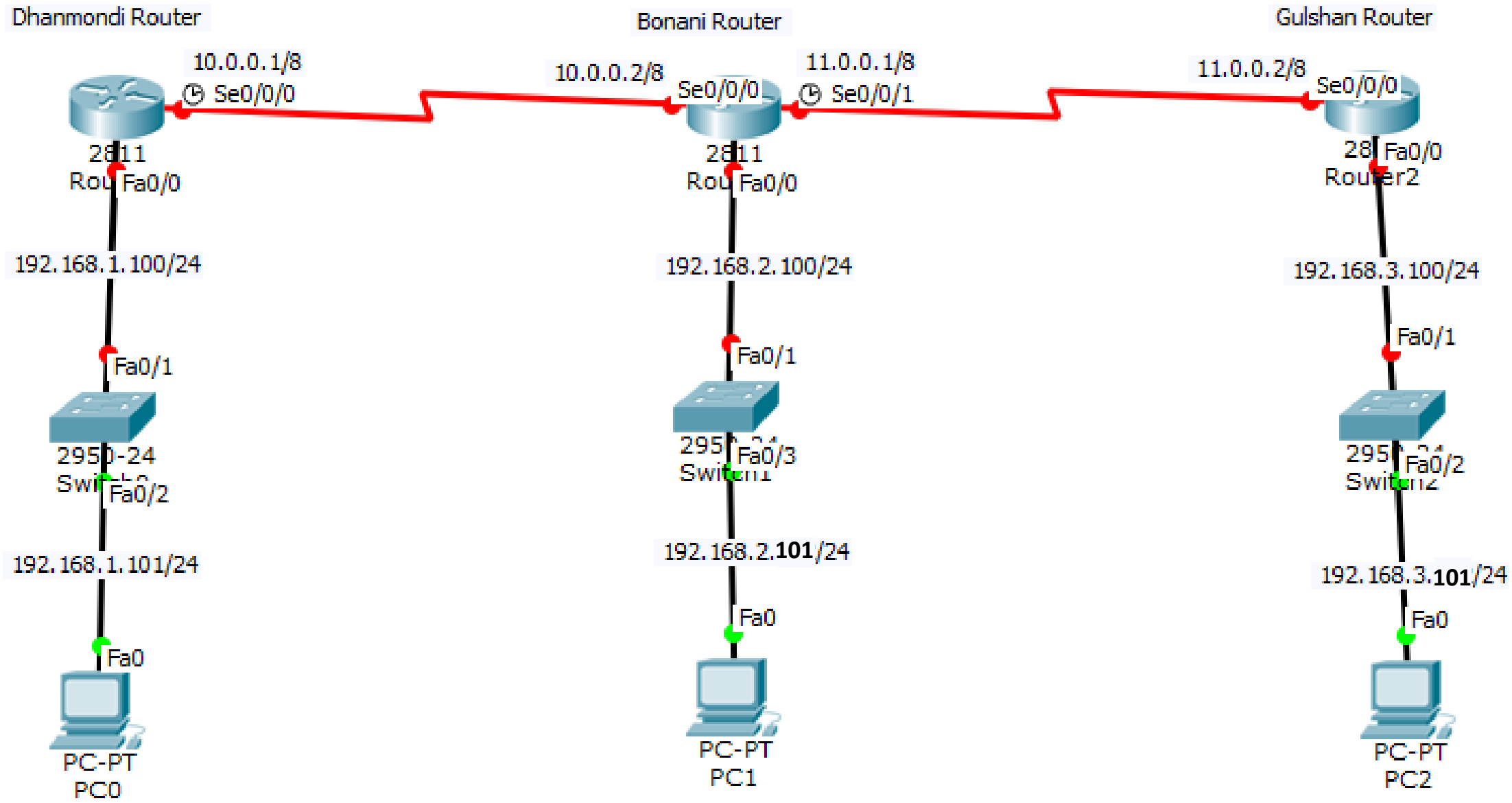
C 192.168.1.0/24 is directly connected, FastEthernet0/0

PC>ping 192.168.2.1

Pinging 192.168.2.1 with 32 bytes of data:

Reply from 192.168.1.100: Destination host unreachable.
Reply from 192.168.1.100: Destination host unreachable.
Reply from 192.168.1.100: Destination host unreachable.
Reply from 192.168.1.100: Destination host unreachable.

❖ প্রথমে প্রয়োজনীয় ডিভাইস নিয়ে ক্যাবল সংযোগ করতে হবে। তারপর প্রয়োজনীয় lapping করতে হবে।



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 Static Routing করতে হবে।

1. Dhanmondi router:

Router(config)#ip route **192.168.2.0 255.255.255.0 10.0.0.2**

Router(config)#ip route **11.0.0.0 255.0.0.0 10.0.0.2**

Router(config)#ip route **192.168.3.0 255.255.255.0 10.0.0.2**

2. Bonani router:

Router(config)#ip route **192.168.1.0 255.255.255.0 10.0.0.1**

Router(config)#ip route **192.168.3.0 255.255.255.0 11.0.0.2**

3. Gulshan router:

Router(config)#ip route **192.168.1.0 255.255.255.0 11.0.0.1**

Router(config)#ip route **10.0.0.0 255.0.0.0 11.0.0.1**

Router(config)#ip route **192.168.2.0 255.255.255.0 11.0.0.1**

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

```
C    10.0.0.0/8 is directly connected, Serial0/0
S    11.0.0.0/8 [1/0] via 10.0.0.2
C    192.168.1.0/24 is directly connected, FastEthernet0/0
S    192.168.2.0/24 [1/0] via 10.0.0.2
S    192.168.3.0/24 [1/0] via 10.0.0.2
```

এখানে দেখা যাচ্ছে যে, S দিয়ে যা দেখা যাচ্ছে তা হলো Static 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
C    11.0.0.0/8 is directly connected, Serial0/1
S    192.168.1.0/24 [1/0] via 10.0.0.1
C    192.168.2.0/24 is directly connected, FastEthernet0/0
S    192.168.3.0/24 [1/0] via 11.0.0.2
```

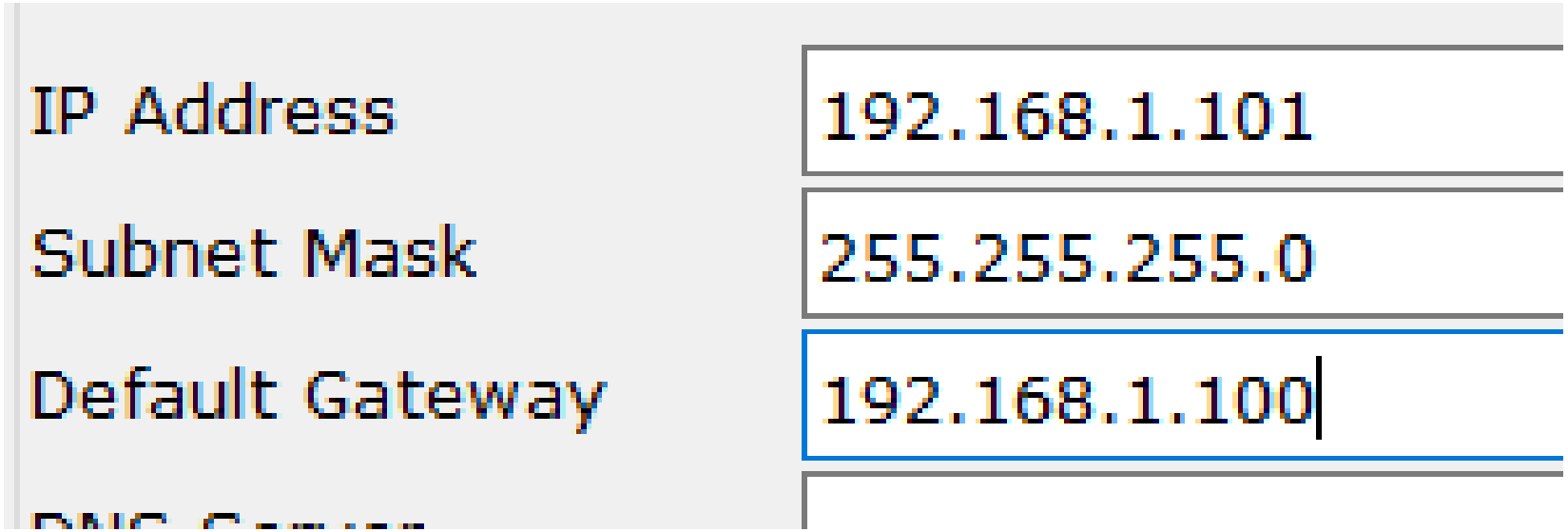
3. Gulshan router:

Router#show ip route

```
S    10.0.0.0/8 [1/0] via 11.0.0.1
C    11.0.0.0/8 is directly connected, Serial0/0
S    192.168.1.0/24 [1/0] via 11.0.0.1
S    192.168.2.0/24 [1/0] via 11.0.0.1
C    192.168.3.0/24 is directly connected, FastEthernet0/0
```

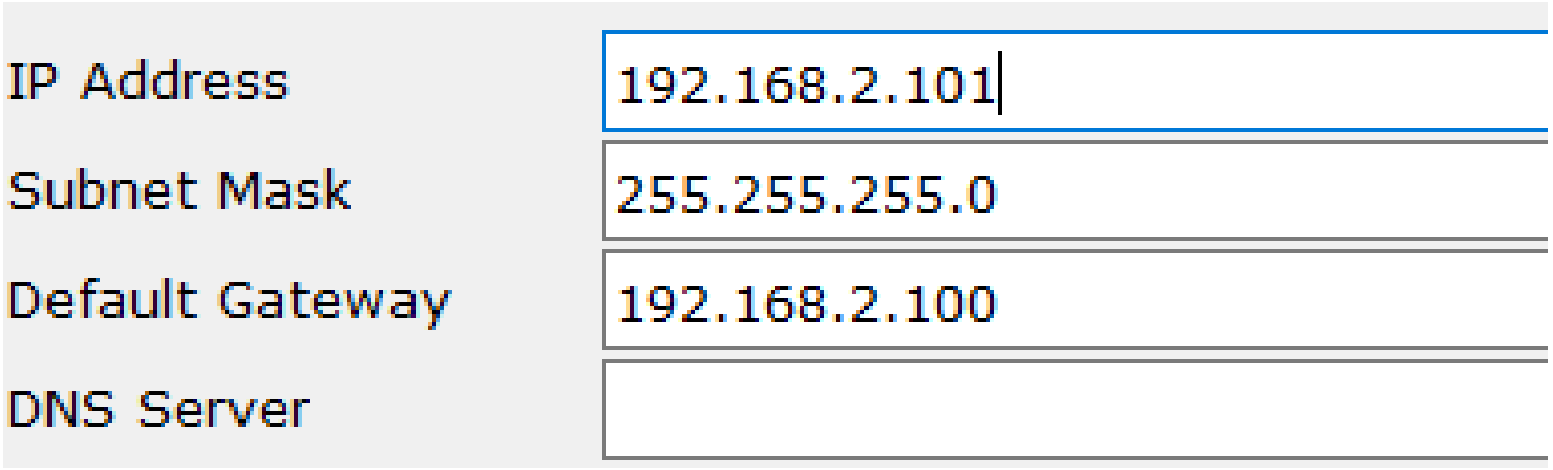
Step-4: পরবর্তীতে প্রতিটি কম্পিউটারে প্রবেশ করে IP দিতে হবে।

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

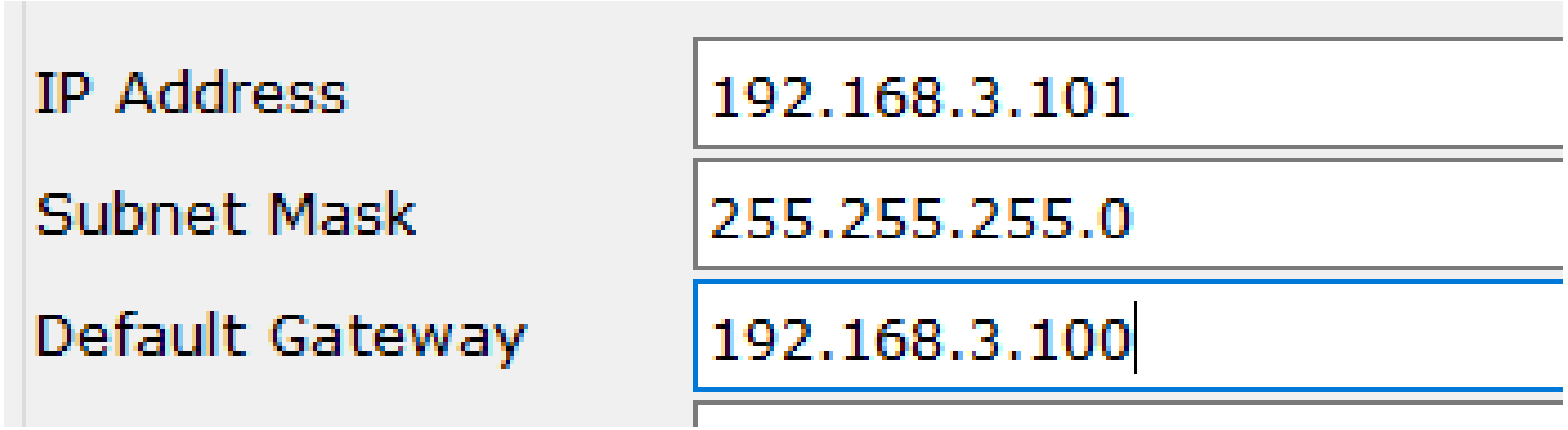


পরবর্তীতে IP Address, Subnet Mask, Default Gateway (এটি হলো মূলত কম্পিউটার যে পোর্টের মাধ্যমে রাউটারের সাথে সংযুক্ত তার IP) দিয়ে উপরে Cross এ Click দিতে হবে।

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 192.168.3.101
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 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

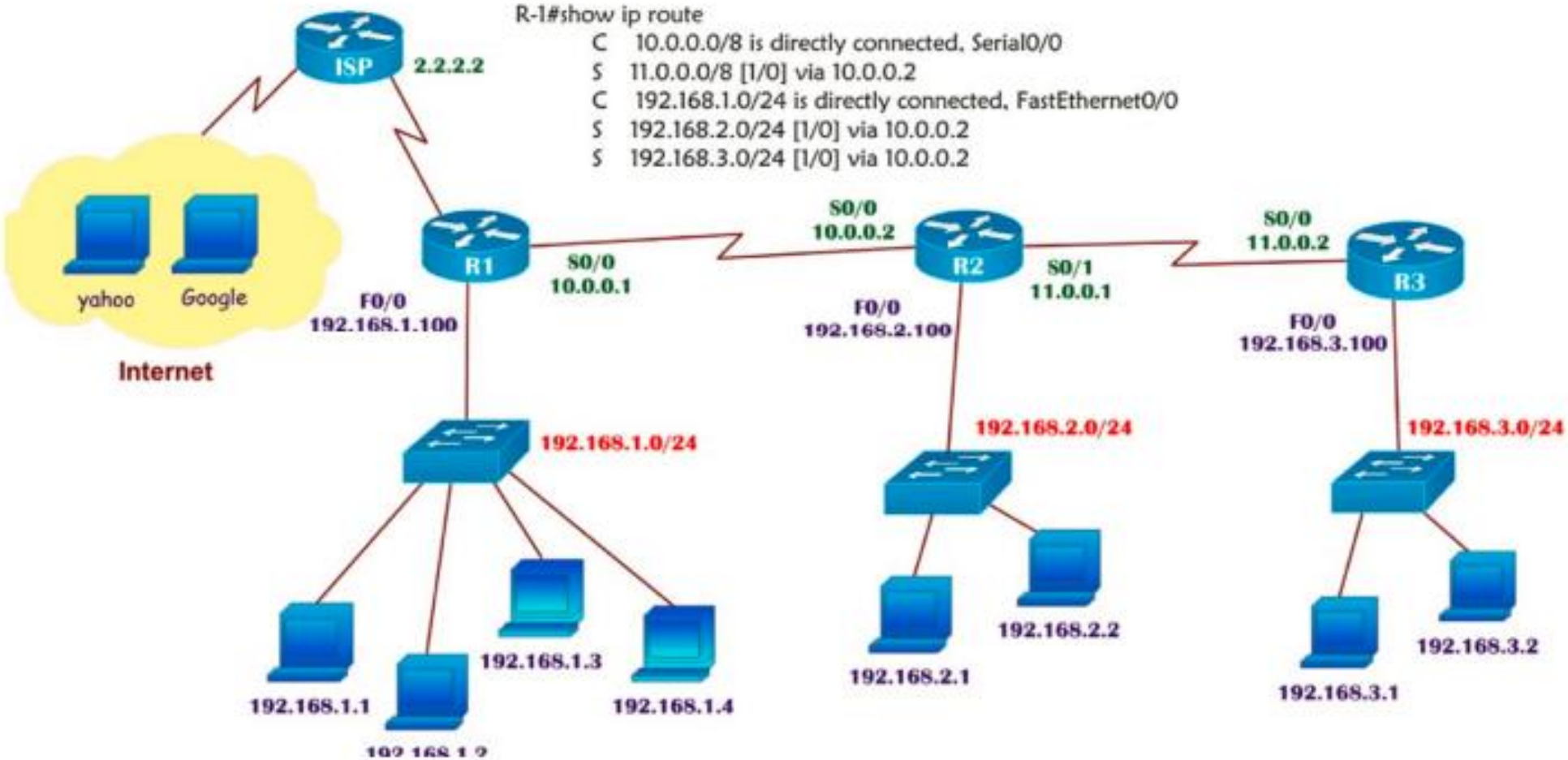
PC>ping 192.168.1.101
Pinging 192.168.1.101 with 32 bytes of data:
Reply from 192.168.1.101: bytes=32 time=11ms TTL=128
Reply from 192.168.1.101 : bytes=32 time=0ms TTL=128
Reply from 192.168.1.101 : bytes=32 time=8ms TTL=128
Reply from 192.168.1.101 : bytes=32 time=8ms TTL=128
Ping statistics for 192.168.1.101 :
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

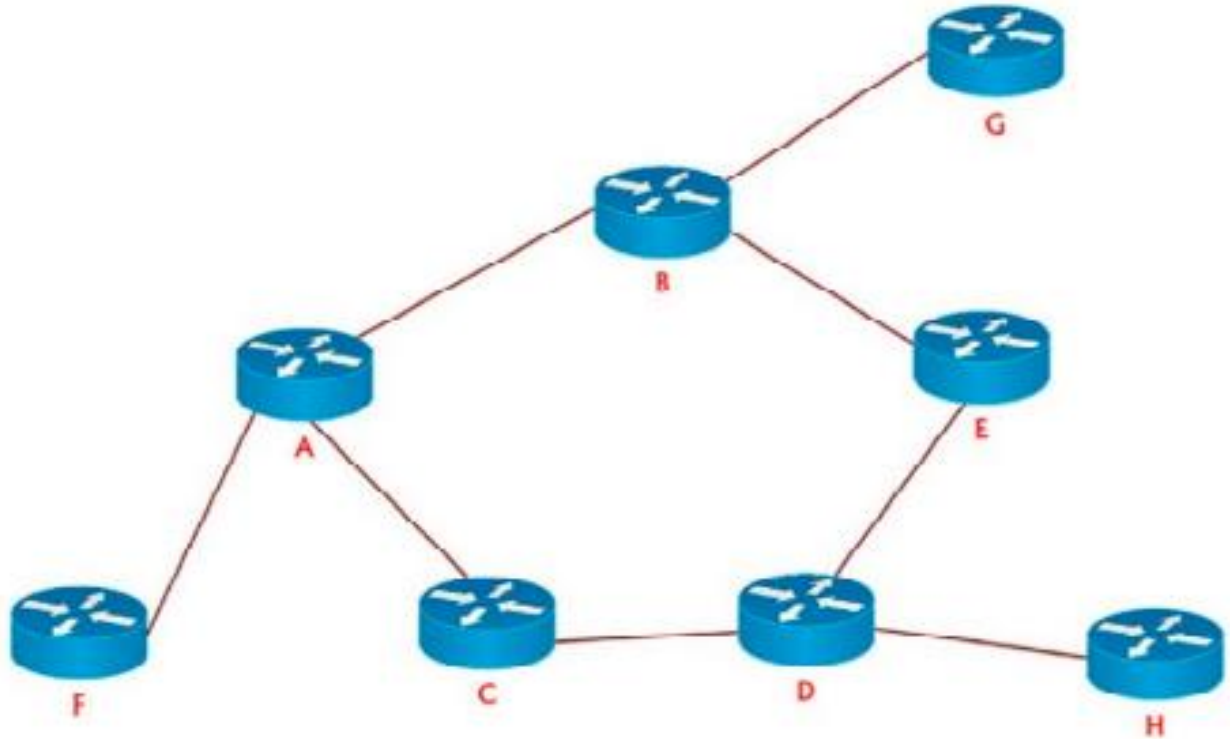
Ping statistics for 192.168.2.101 :
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 11ms, Average = 6ms.

Default Routing

Used to route traffic for unknown destinations (internet)



Also can be used at end locations.(optional)



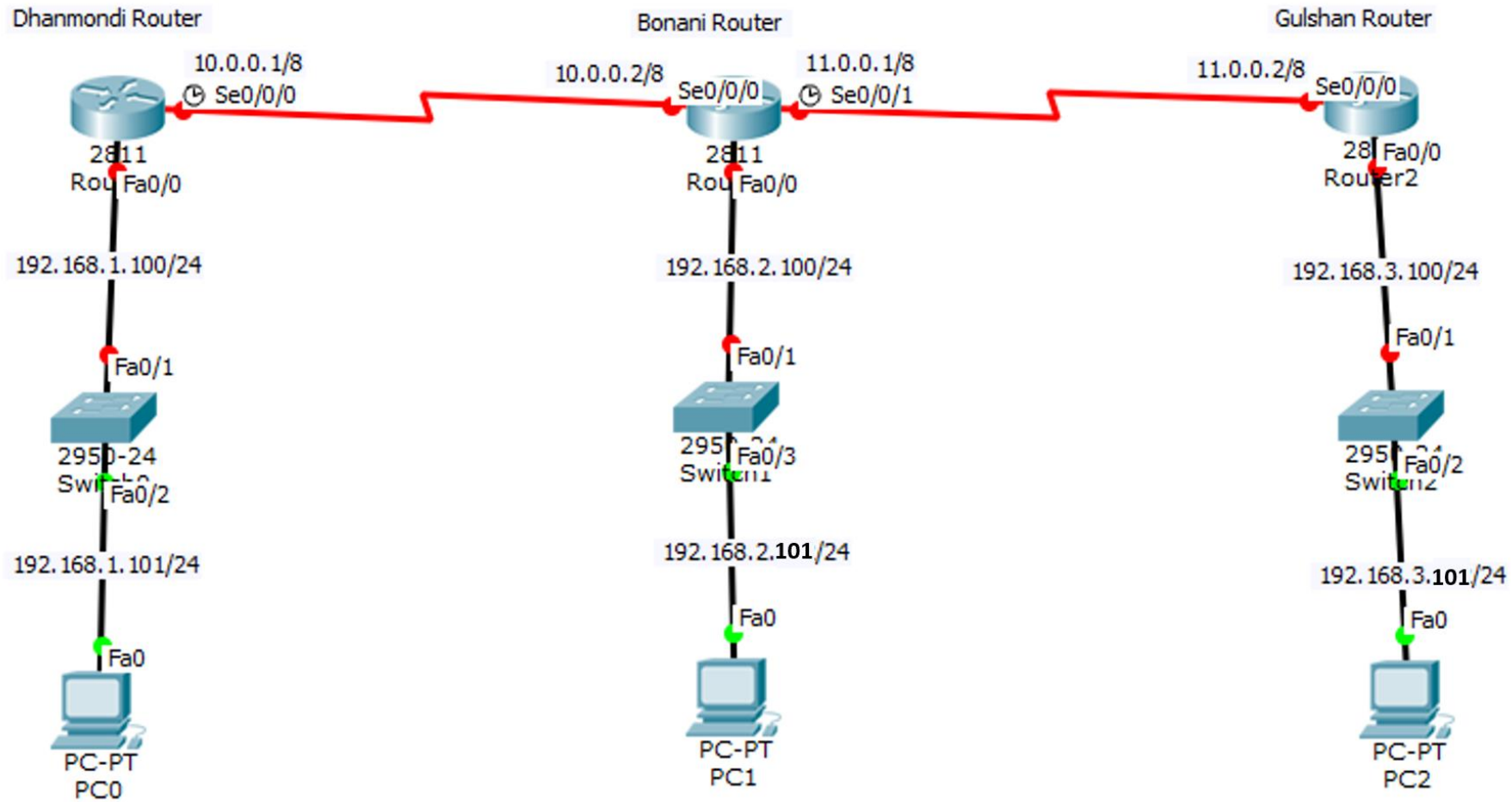
Default Routing (contd)

- It is the last preferred routing
- Default routes help in reducing the size of your routing table.
- R-1(config)#ip route 0.0.0.0 0.0.0.0 10.0.0.2

LAB: Verifying Default Route

Task:

- Design topology
- Basic IP addressing (up up)
- R1 and R3 configured with default routes (common next-hop for all destinations)
- R2 using static routing



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 Static or Dynamic Routing করতে হবে।

1. Dhanmondi router: (Dynamic Routing)

Router(config)#ip route **0.0.0.0 0.0.0.0 10.0.0.2**

2. Bonani router: (Static Routing)

Router(config)#ip route **192.168.1.0 255.255.255.0 10.0.0.1**

Router(config)#ip route **192.168.3.0 255.255.255.0 11.0.0.2**

3. Gulshan router: (Dynamic Routing)

Router(config)#ip route **0.0.0.0 0.0.0.0 11.0.0.1**

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

1. Dhanmondi router:

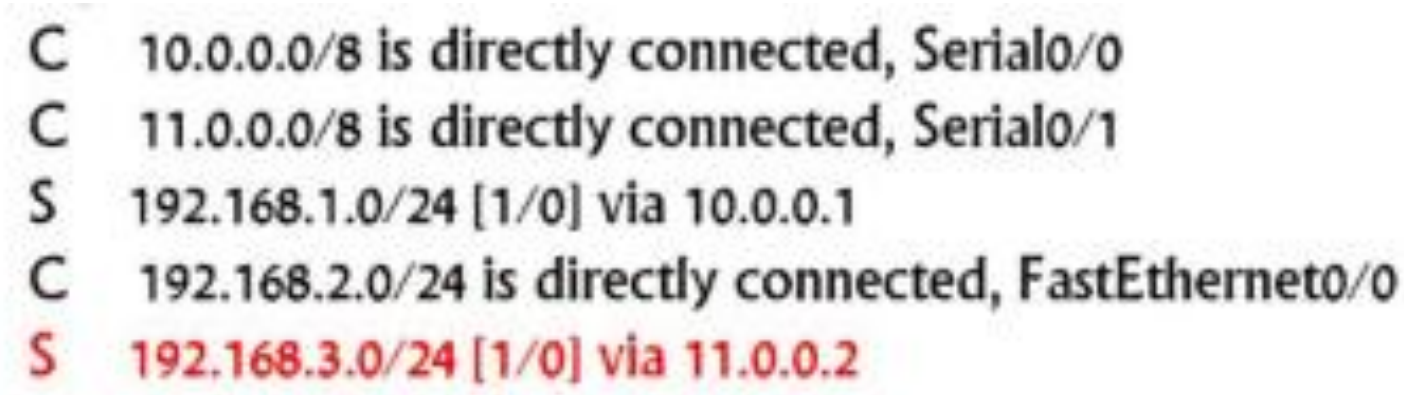
Router#show ip route

C 10.0.0.0/8 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 10.0.0.2

এখানে দেখা যাচ্ছে যে, S* দিয়ে যা দেখা যাচ্ছে তা হলো Dynamic Routing. আর C দিয়ে Interface ip গুলো দেখানো হয়েছে।

2. Bonani router:

Router#show ip route



3. Gulshan router:

Router#show ip route

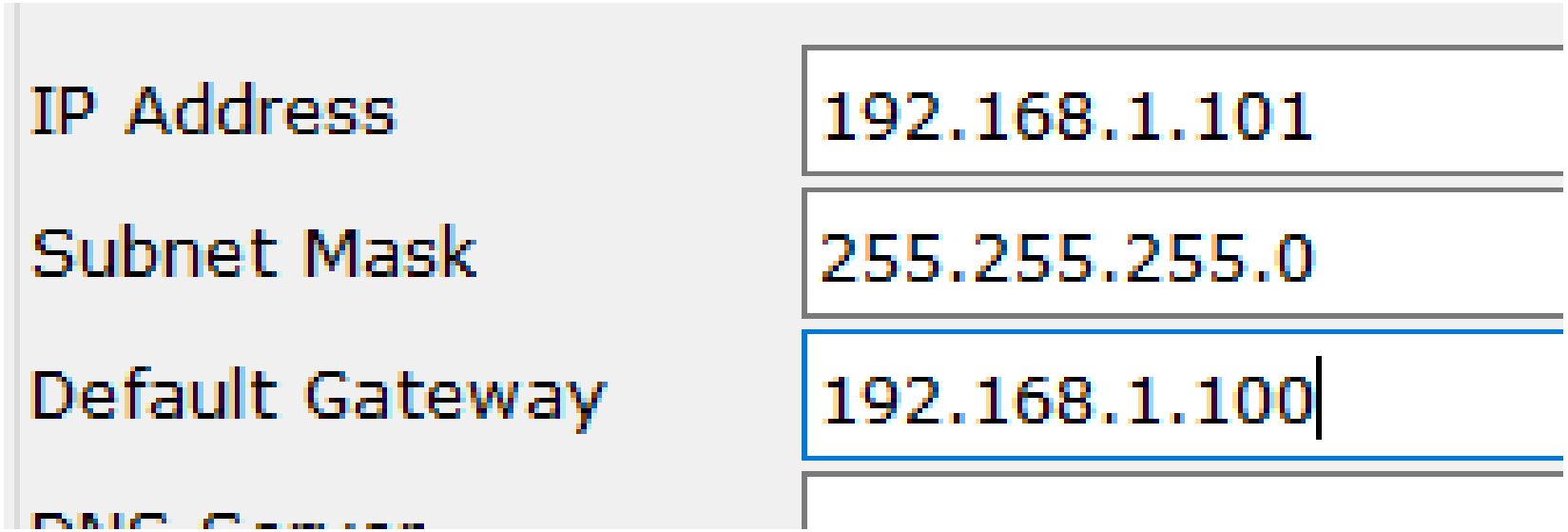
C 11.0.0.0/8 is directly connected, Serial0/0/0

C 192.168.3.0/24 is directly connected, FastEthernet0/0

S* 0.0.0.0/0 [1/0] via 11.0.0.1

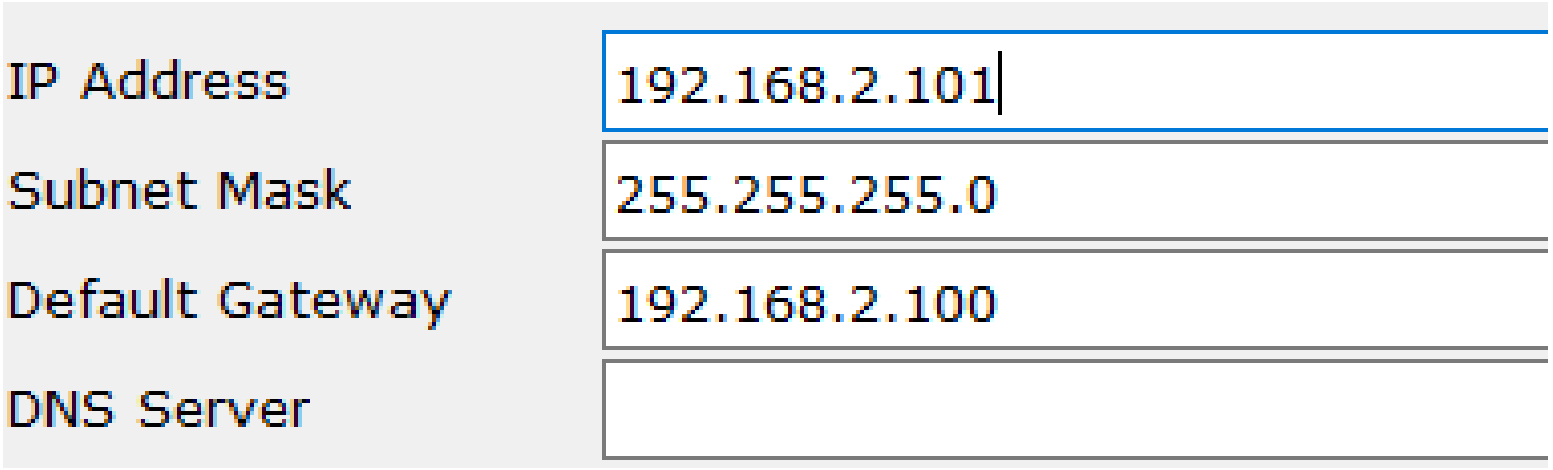
Step-4: পরবর্তীতে প্রতিটি কম্পিউটারে প্রবেশ করে IP দিতে হবে।

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

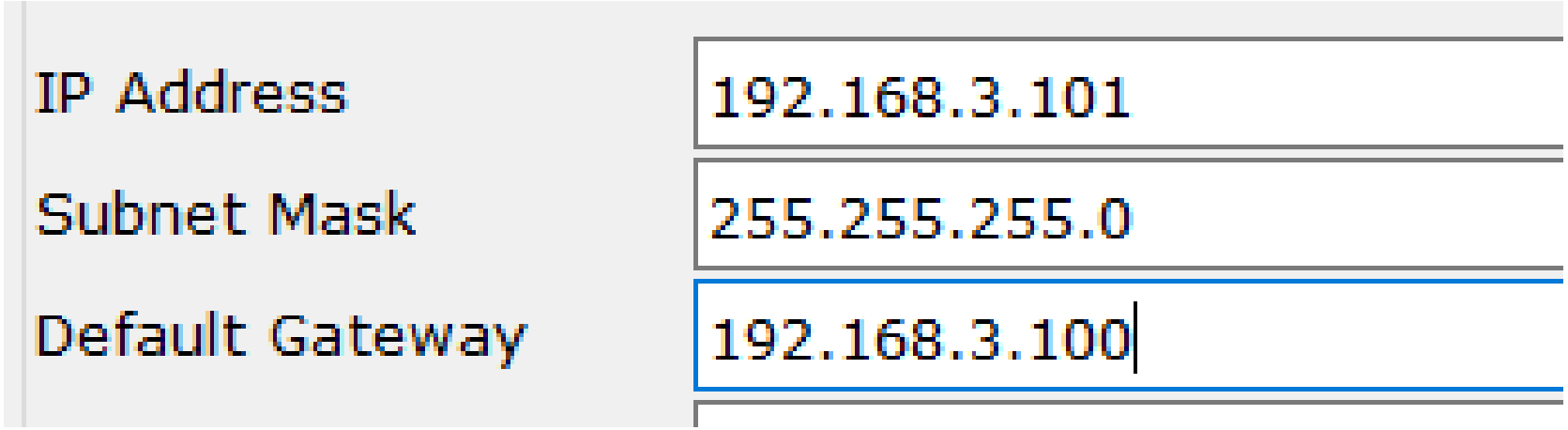


পরবর্তীতে IP Address, Subnet Mask, Default Gateway (এটি হলো মূলত কম্পিউটার যে পোর্টের মাধ্যমে রাউটারের সাথে সংযুক্ত তার IP) দিয়ে উপরে Cross এ Click দিতে হবে।

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 192.168.3.101
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 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