Lab 2A: Configuration of Interfaces of a Router

Use the network topology and IP addressing scheme shown below to complete this task.

Device	Interface number	IP address	Subnet mask	Default gateway
PC0	Fa0	172.16.1.10	255.255.255.0	172.16.1.1
PC1	Fa0	172.16.3.10	255.255.255.0	172.16.3.1
Router0	Fa0/0	172.16.1.1	255.255.255.0	-
Router0	Fa1/0	172.16.2.1	255.255.255.0	-
Router1	Fa0/0	172.16.2.2	255.255.255.0	-
Router1	Fa1/0	172.16.3.1	255.255.255.0	-

Activities:

1. Create the network topology shown above. Use a generic router.
2. Configure IP addresses for each pc.
3. Configure IP address for the interfaces of each router and enable them
4. Verify the interface configuration of the routers
5. Check the connectivity between the pcs and router interfaces. Which interfaces can the pcs reach? Why?
6. Save the configuration

First create the topology as shown in the diagram and configure the correct IP address, subnet mask and default gateway for each computer.

Configuration on Router0

```
Router>
Router>en
Router#conf t
Router(config)#hostname Router0
Router0(config)#int fa 0/0
Router0(config-if)#ip address 172.16.1.1 255.255.255.0
Router0(config-if)#no shut
Router0(config-if)#exit
Router0(config)#int fa 1/0
Router0(config-if)#ip add 172.16.2.1 255.255.255.0
Router0(config-if)#no shut
Router0(config-if)#exit
Router0(config)#exit
Router0#
```

Configuration on Router1

```
Router>
Router>en
```

```
Router#conf t
Router(config)#hostname Router1
Router1(config)#int fa 1/0
Router1(config-if)#ip add 172.16.2.2 255.255.255.0
Router1(config-if)#no shut
Router1(config-if)#
Router1(config-if)#int fa 0/0
Router1(config-if)#ip add 172.16.3.1 255.255.255.0
Router1(config-if)#no shut
Router1(config-if)#exit
Router1(config)#exit
Router1#exit
```

Verify the interface configurations

On Router0

```
Router0#show ip interface brief
```

```
Interface          IP-Address      OK?   Method     Status           Protocol
FastEthernet0/0    172.16.1.1      YES    manual     up                 up
FastEthernet1/0    172.16.2.1      YES    manual     up                 up
Serial2/0          unassigned      YES    unset    administratively down  down
Serial3/0          unassigned      YES    unset    administratively down  down
FastEthernet4/0    unassigned      YES    unset    administratively down  down
FastEthernet5/0    unassigned      YES    unset    administratively down  down
Route0r#
```

From the output of Router0, it can easily be seen that both interfaces are working and assigned correct IP addresses. Similarly, you can verify the this information using other verification commands like sh run.

On Router1

```
Router1#sh ip int br
```

```
Interface          IP-Address    OK? Method  Status                Protocol
FastEthernet0/0    172.16.3.1    YES manual  up                      up
FastEthernet1/0    172.16.2.2    YES manual  up                      up
Serial2/0          unassigned    YES unset  administratively down  down
Serial3/0          unassigned    YES unset  administratively down  down
FastEthernet4/0    unassigned    YES unset  administratively down  down
FastEthernet5/0    unassigned    YES unset  administratively down  down
Router1#
```

Use ping to verify the connectivity between devices. Since, we haven't yet configured any routing service on the routers, connectivity is not complete.

Use `Router0#copy running-config startup-config`

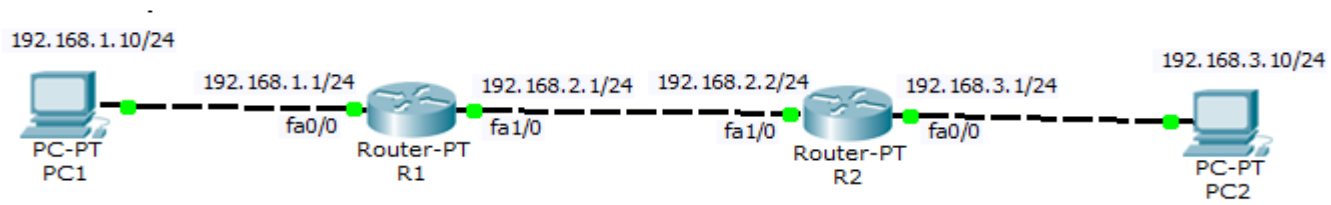
and

```
Router1#copy running-config startup-config
```

commands on each router to save your configuration.

Lab 2B: Configuration of Routing Protocols-- Static routing protocol

Use the network topology and IP address information shown below to configure static routing protocol.



Device	Interface number	IP address	Subnet mask	Default gateway
PC1	Fa0	192.168.1.10	255.255.255.0	192.168.1.1
PC2	Fa0	192.168.3.10	255.255.255.0	192.168.3.1
R1	Fa0/0	192.168.1.1	255.255.255.0	-
R1	Fa1/0	192.168.2.1	255.255.255.0	-
R2	Fa0/0	192.168.2.2	255.255.255.0	-
R2	Fa1/0	192.168.3.1	255.255.255.0	-

Activity:

5. Create the network topology shown above (use generic routers)
6. Assign the IP addresses shown to the interfaces of the routers and the hosts. The default gateways of the PCs are the IP addresses of the directly connected interfaces of the respective routers.
7. verify your configuration. Which interfaces can pc1, pc2 can ping? How about R1 and R2?
8. Configure static routes on R1 and R2
9. verify the configuration and ping the devices each other

N.B: The interfaces of a router are shutdown by default and we need to enable them before we use them.

Interface configuration of R1:

Assign ip address to the interfaces and enabling them.

```
Router>enable
Router#conf t
Router(config)#hostname R1
R1(config)#interface fastEthernet 0/0
R1(config-if)#ip address 192.168.1.1 255.255.255.0
R1(config-if)#no shutdown
R1(config-if)#exit
R1(config)#int fastEthernet 1/0
R1(config-if)#ip address 192.168.2.1 255.255.255.0
R1(config-if)#no shutdown
```

Interface configuration of R2:

```
Router>enable
Router#conf t
Router(config)#hostname R2
R2(config)#int fa 1/0
R2(config-if)#ip add 192.168.2.2 255.255.255.0
R2(config-if)#no shutdown
R2(config-if)#exit
```

```
R2(config)#int fa 0/0
R2(config-if)#ip add 192.168.3.1 255.255.255.0
R2(config-if)#no shutdown
```

Then assign IP address of 192.168.1.10 and subnet mask of 255.255.255.0 with default gateway of 192.168.1.1 for PC1. Assign IP address of 192.168.3.10 and subnet mask of 255.255.255.0 with default gateway of 192.168.3.1 for PC2.

Verify your configuration.

To verify use show commands on the routers. Use ping for testing connectivity.

For example:

```
R1#sh ip int br
Interface         IP-Address  OK?  Method  Status Protocol
FastEthernet0/0 192.168.1.1   YES  manual  up      up
FastEthernet1/0 192.168.2.1   YES  manual  up      up
```

For example, use ping 192.168.1.1, to check connectivity to fa0/0 interface of R1.

At this point PC1 and PC2 cannot communicate. Try ping 192.168.3.10 being from PC1. There is no reply!

Before we configure routing protocol, let us verify the content of the routing table of the routers. Use show ip route command.

```
R2#sh 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
----some text left----------
Gateway of last resort is not set
C 192.168.2.0/24 is directly connected, FastEthernet1/0
C 192.168.3.0/24 is directly connected, FastEthernet0/0
R2#
```

Since we haven't configured a routing protocol only the directly connected networks reside in routing table of R2. From this R2 only knows networks 192.168.2.0 and 192.168.3.0. network 192.168.1.0 is not known by R2. On R1 only 192.1681.0 and 192.168.2.0 are also displayed. When we configure static routing, we tell the routes or networks that the routers do not know. That is we add network 192.168.3.0 for R1 and network 192.168.1.0 for router R2. To configure static routing use ip route [*destination_network*] [*mask*] [*next-hop_address* or *exitinterface*] command. The next-hop address is the IP address of the next router.

Configuration of static routing on R1:

```
R1(config)#ip route 192.168.3.0 255.255.255.0 192.168.2.2
```

Configuration of static routing on R2:

```
R2(config)#ip route 192.168.1.0 255.255.255.0 192.168.2.1
```

Now we have added the networks that each router does not know. Now verify the routing table of the routers and ping the PCs each other.

```
R1(config)#exit
R1#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
===some text left=====

Gateway of last resort is not set
C 192.168.1.0/24 is directly connected, FastEthernet0/0
C 192.168.2.0/24 is directly connected, FastEthernet1/0
S 192.168.3.0/24 [1/0] via 192.168.2.2
R1#
```

And for R2,

```
R2#sh 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
---some text left-----
Gateway of last resort is not set
S 192.168.1.0/24 [1/0] via 192.168.2.1
C 192.168.2.0/24 is directly connected, FastEthernet1/0
C 192.168.3.0/24 is directly connected, FastEthernet0/0
R2#
```

Now ping PC2 from PC1. You should get replies now! That means routing protocol is configured successfully.

```
PC>ping 192.168.3.10
Pinging 192.168.3.10 with 32 bytes of data:
Reply from 192.168.3.10: bytes=32 time=1ms TTL=126
Reply from 192.168.3.10: bytes=32 time=0ms TTL=126
Reply from 192.168.3.10: bytes=32 time=0ms TTL=126
Reply from 192.168.3.10: bytes=32 time=1ms TTL=126

Ping statistics for 192.168.3.10:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 1ms, Average = 0ms
```