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## Routers

### Basic router configuration

*For this lab boot into windows XP. Choose other option in grub and then choose earlier version of Windows.*

Create network as shown below and try following configuration commands.

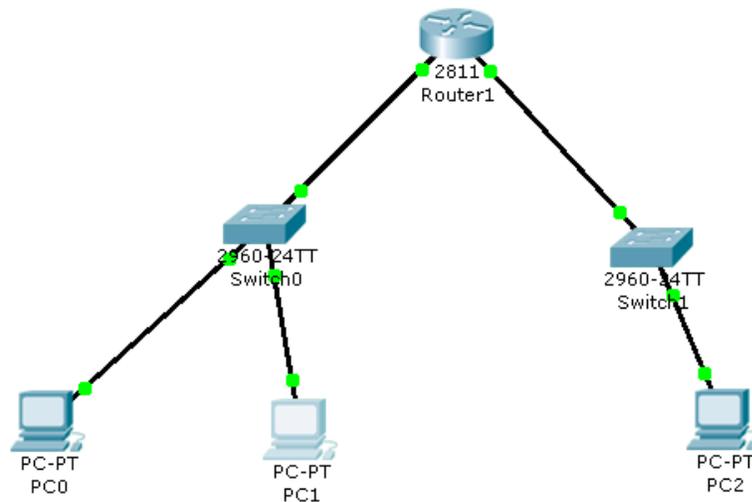


Figure 1: Lab4 setup required to practice basic router configuration

1. Configure hostname

```
hostname router1
```

2. Configure enable secret

```
enable secret iit123
```

3. Configure console line

---

```
logging synchronous
exec-timeout 5 0
password iit123
login
```

4. Configure vty lines

```
logging synchronous
exec-timeout 5 0
password iit123
```

5. Enable password encryption

```
service password-encryption
```

6. See running configuration

```
show run
```

7. See interfaces

```
show interfaces
```

8. Configure IP address for interfaces

```
int fa 0/0
ip address 172.18.1.1 255.255.255.0
no shut
```

```
int fa 0/1
ip address 172.18.3.1 255.255.255.0
no shut
```

9. Configure sub-interface

```
int fa 0/0.2
encapsulation dot1q 2
ip address 172.18.2.1 255.255.255.0
no shut
```

10. Check route

```
show ip route
```

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11. Connect two 2960 switches to ports fa0/0 and fa0/1 of router. Wait for few seconds and then again check route. Lets call switch connected to port fa0/0 switch0 and switch connected to port fa0/1 switch1.
  12. Connect three PC(s) PC0, PC1, PC2 as follows:
    - PC0 to fa0/2 of switch0
    - PC1 to fa0/3 of switch0
    - PC2 to fa0/2 of switch1
  13. Configure PC2 with IP 172.18.3.2/24 with gateway 172.18.3.1. Try to ping various interface IPs of router with PC2.
  14. Configure switch0 ports as follows:
    - fa 0/1 - Trunk - Allowed VLAN 1,2
    - fa 0/2 - Access vlan 1
    - fa 0/3 - Access vlan 2
  15. Configure PC0 with IP 172.18.1.2/24 with gateway 172.18.1.1. Configure PC1 with IP 172.18.2.2/24 with gateway 172.18.2.1. Ping between PCs and verify that all PCs are able to ping each other.
  16. Save the network as lab5\_basic\_router\_configuration.pkt

## Static routing

Create network as shown below and try following configuration commands  
Make port connections are as follows:

**router0** - fa 0/0 - switch0 - fa 0/1  
fa 0/1 - switch1 - fa 0/1

**router1** - fa 0/0 - switch0 - fa 0/2  
fa 0/1 - switch2 - fa 0/1

**router2** - fa 0/0 - switch1 - fa 0/2  
fa 0/1 - switch3 - fa 0/1

**switch0** - fa 0/3 - PC0

**switch1** - fa 0/3 - PC1

**switch2** - fa 0/2 - PC2

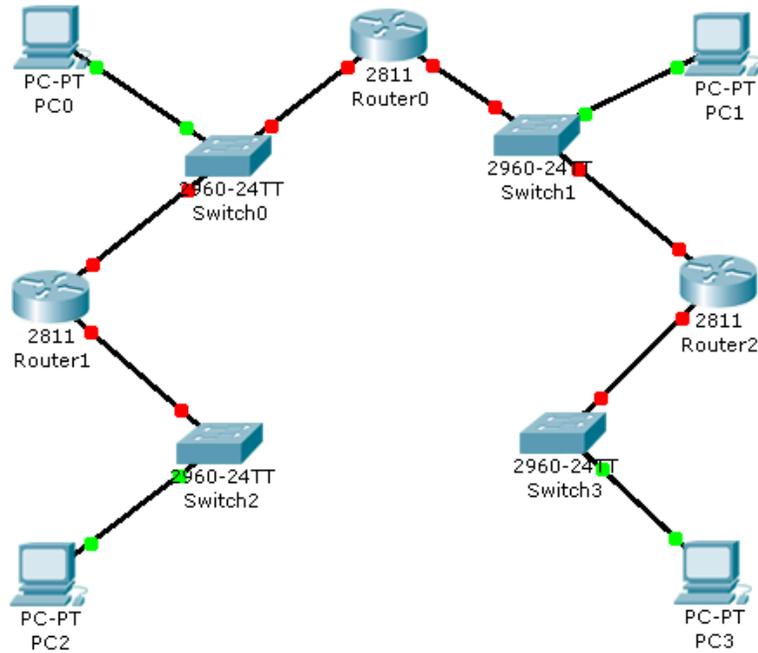


Figure 2: Lab5 setup required to practice static routing

**switch3** - fa 0/3 - PC3

1. Configure following IP addresses

- router1 - fa 0/1 - 172.18.1.1/24
- router1 - fa 0/0 - 172.18.2.1/24
- router0 - fa 0/0 - 172.18.2.2/24
- router0 - fa 0/1 - 172.18.3.1/24
- router2 - fa 0/0 - 172.18.3.2/24
- router2 - fa 0/1 - 172.18.4.1/24
- PC0 - 172.18.2.3/24
- PC1 - 172.18.3.3/24
- PC2 - 172.18.1.2/24
- PC3 - 172.18.4.2/24

2. Do appropriate static routing on routers using syntax

```
ip route <network> <mask> <gateway>
```

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so that all machines and routers can ping each other.

3. What gateways did you configure on PC0 and PC1? Why?
4. Save the network as lab5\_static\_routing.pkt

## RIPv2 routing

1. In static routing network above remove all static routes.
2. On router1 use:

```
router rip
version 2
network 172.18.1.0
network 172.18.2.0
```

Similarly on router0 advertize 172.18.2.0 and 172.18.3.0 and on router2 advertize 172.18.3.0 and 172.18.4.0.

3. Ping from PC2 to PC3. Traceroute from PC2 to PC3.
4. Save the network as lab5\_rip\_routing.pkt

## OSPF routing

1. Save the rip routing solution network as lab5\_ospf\_routing.pkt and perform the following lab tasks in lab5\_ospf\_routing.pkt file.
2. On router1 use:

```
router ospf <pid>
router-id 0.0.0.1
network 172.18.1.0 0.0.0.255 area 0
network 172.18.2.0 0.0.0.255 area 0
```

Similarly on router0 and router2 advertize other networks and use router ids 0.0.0.3 and 0.0.0.2 respectively.

3. Use

```
show ip ospf <pid>
show ip ospf neighbour
show ip ospf database
show ip route [ospf]
```

---

on all three routers

4. Use

```
show ip ospf interface
```

and notice hello and dead timer intervals on each interface

5. Use 'show ip ospf neighbour' to see that router0 with ID 0.0.0.3 is neighbour of router1. Now change hello and dead timers for interface fa0/0 for router1 to 20 and 80 respectively. Now again check neighbours and verify that since hello and dead timers do not match router0 and router1 are no longer neighbours.

Configure timers as 20 and 80 on interface fa 0/0 of router0. Now verify that router0 and router1 are again neighbours.

6. Do 'wr' on all three routers (**Very important**) and then switch of all three routers. Add one 'NM-1FE-TX' module to all three routers. Also add another router3 along with module 'NM-1FE-TX' to network so that router3 also has three fast ethernet ports. Connect fa1/0 ports of router0, router1 and router2 to ports fa0/0, fa0/1 and fa1/0 of router3 respectively. Now power on all four routers
7. Give address to new interfaces so that communication between adjacent routers works properly. Advertize newly added networks using ospf. See how the routes change due to availability of new router.
8. Traceroute from router3 to machine 172.18.2.3 and notice that packet always travels from one of the two redundant routes to PC0 from router3. Increase the cost of more preferred route so that route preference changes and other route to PC0 is preferred.

To change cost use

```
ip ospf cost <new_cost>
```

command

9. We can use

```
clear ip ospf process
```

to clear ospf process memory so that it recalculates router-id if taken from interface and re-detects neighbours etc.

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10. Enable rip v2 on router3 and stop ospf using

```
no router ospf 1
```

Verify using 'show ip ospf 1' that ospf process actually stopped.

11. Use 'show ip route' on router 3 to see that it has learned routes via RIP which has less preference than OSPF.

## Lab task

1. Follow above manual as it is.
2. Study chapter 14 on 'Routing Protocol Concepts and Configuration' from book CCENT/CCNA ICND1 Official Exam Certification Guide. Also study chapters 8, 9 and 10 on 'Routing protocol theory', 'OSPF' and 'EIGRP' from book CCENT/CCNA ICND2 Official Exam Certification Guide.
3. Learn and practice EIGRP based configuration on network of four routers that got created at the end of OSPF exercise above.

*Due to limitation of number of physical routers available in lab, it is optional for students to perform the same lab using physical routers in lab*

## Submission

Submit all the cisco packet tracer files including one for EIGRP based routing on courses portal before dead-line communicated by lab instructor using courses portal / email.