CNE – Tutorial Guide

Week 8

Subnetting and Dynamic Routing Configuration with OSPFv2

Assume we have a network like the following map. In this example, we used Router-PT which has 2 serial ports and 4 Ethernet ports. Connections between routers are *Serial DCE* connected to the *serial ports* of the routers.

130.10.5.0/25 is the given IP block.

Given IP block is 130.10.5.0/25. It means that we have 2^7 = 128 IPs, from 130.10.5.0 to 130.10.5.127.

1. **Subnet the given IP block for all networks:**

Network A has 20 PCs (Switch1): **130.10.5.0/27**,
subnet mask is 255.255.255.224, wild card is 0.0.0.31 (255-255.255-255.255-255.255-224)
Network B has 14 PCs (Switch2): **130.10.5.32/28**,
subnet mask is 255.255.255.240, wild card is 0.0.0.15.
Network C has 6 PCs (Switch3): **130.10.5.48/29**,
subnet mask is 255.255.255.248, wild card is 0.0.0.7.

Network connects router2 and router3: **130.10.5.56/30**,
subnet mask is 255.255.255.252, wild card is 0.0.0.3.
Network connects router4 and router2: **130.10.5.60/30**.
Network connects router3 and router4: **130.10.5.64/30**.

On each Serial Interface with DCE cable, we activate/open the interface and enable line CLOCK by entering the commands (Router 3 for example)

```
Router(config)#int se2/0
Router(config-if)#no shutdown
Router(config-if)#clock rate 1000000
Router(config-if)#ip address 130.10.5.57 255.255.255.252
```

After you have successfully configured IP address to all PCs and routers, all PCs should ping within their network. But we can not ping from network A to B or A to C. The reason is that there is no route from network A to B or A to C.

2. **Setup routing:**
In this tutorial we continue to work with OSPF.

This method means one router will dynamically find the route to others network by automatically "learning" other routers' configurations.

The most important point of OSPF routing configuration is to configure a router with each network it belongs to and we don't need to care about other routers.

First we have to access Global Configuration mode then using command with syntax:

router ospf `<id>`   (id is a number, normally 100, 200, 300...)
network `<ip of current network> <its wildcard>` **area** area_id
(if network subnet is a.b.c.d, its wild card is 255-a.255-b.255-c.255-d)

Configure Router3 as follows:

```
Router(config)#router ospf 100
Router(config-router)#network 130.10.5.0 0.0.0.31 area 0
Router(config-router)#network 130.10.5.56 0.0.0.3 area 0
Router(config-router)#network 130.10.5.64 0.0.0.3 area 0
Router(config-router)#
```

Router2 and router4 are configured similarly:

Router2

```
Router(config)#router ospf 100
Router(config-router)#network 130.10.5.32 0.0.0.15 area 0
Router(config-router)#network 130.10.5.56 0.0.0.3 area 0
Router(config-router)#network 130.10.5.60 0.0.0.3 area 0
Router(config-router)#
```
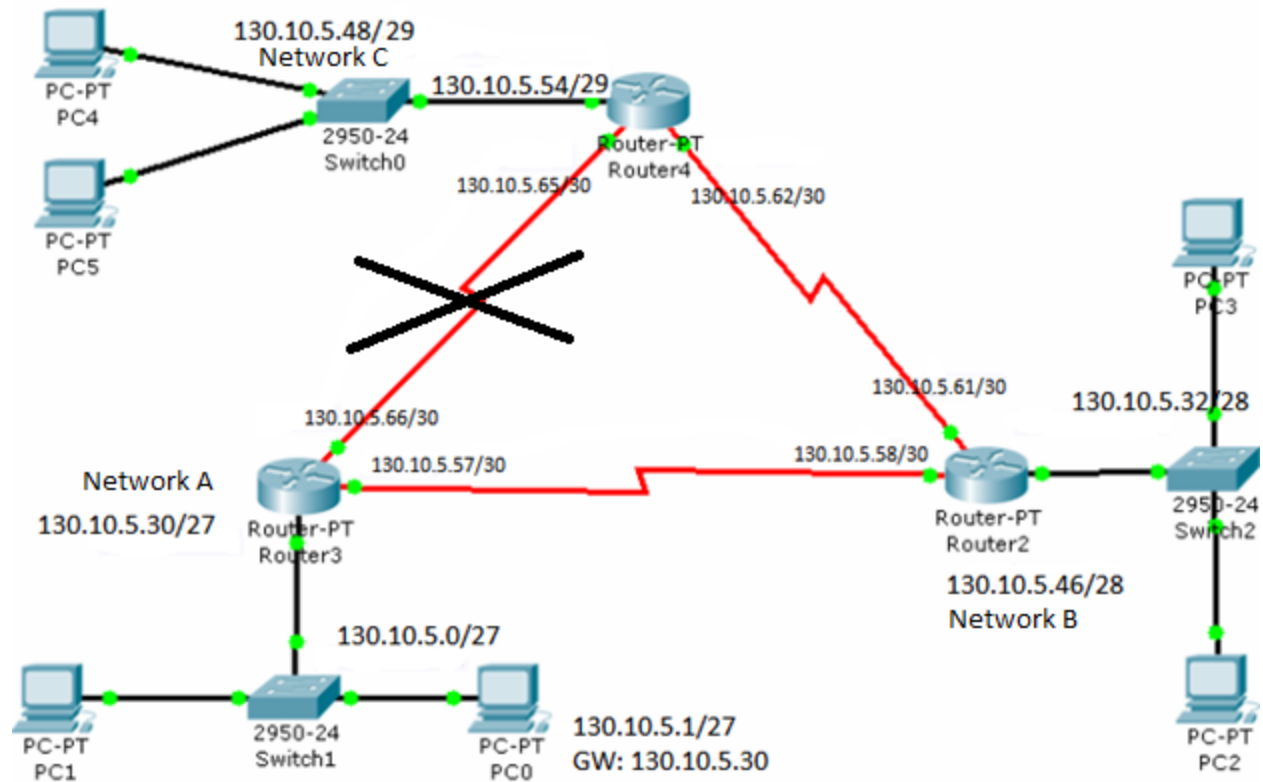
Router4

```
Router(config)#router ospf 100
Router(config-router)#network 130.10.5.48 0.0.0.7 area 0
Router(config-router)#network 130.10.5.60 0.0.0.3 area 0
Router(config-router)#network 130.10.5.64 0.0.0.3 area 0
Router(config-router)#
```

So, after each router has been configured, **routes of the networks it belongs to will automatically added to ip route table of other already-configured routers of connected networks, and vice versa**.
Please wait for 5 minutes and then you can ping successfully from any PC to another one.

3. **Trouble with a connection between 2 routers:**
If for some reason, the connection between Router3 and Router4 died:

Because we used dynamic routing (OSPF), the routing table is automatically updated.

We still can ping from PC1 to PC4:

But the route from PC1 to PC4 now is changed: PC1 to Router3, then to Router2, then to Router4, and finally to PC4.