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COMPUTER NETWORK ASSIGNMENT

OSPF confguration in Packet Tracer

About OSPF

Open Shortest Path First(OSPF) is one of the dynamic routing protocols amongst others such as **EIGRP**, **BGP** and and **RIP**. It is perhaps one of the most popular **link state** routing protocols. It is an open standard, so it can be run on routers from different vendors.

OSPF supports **key features** such as:

- IPv4 and IPv6 routing
- Classless routing
- Equal cost load balancing,
- Manual route summarization, etc.

OSPF has a default administrative distance of 110. It uses *cost* as the parameter for determining route metric. It uses the multicast address of 224.0.0.5 and 224.0.0.6 for communication between OSPF-enabled neighbors

Routers running OSPF need to establish a neighbor relationship before exchanging routing updates. Each OSPF router runs the SFP algorithm to calculate the best routes and adds them to the routing table.

OSPF routers store routing and topology information in three tables.:

- ***Neighbor table***-which stores information about OSPF neighbors.
- ***Topology table***-stores topology structure of the network.
- ***Routing table***-stores the best routes

OSPF neighborhood discovery

Routers running OSPF need to establish a neighbor relationship before exchanging routing updates. OSPF neighbors are dynamically discovered by sending Hello packets out each OSPF-enabled interface on a router. Hello packets are sent to the multicast address of 224.0.0.5.

OSPF areas

An area is simply a logical grouping of adjacent networks and routers. All routers in the same area have the same topology table and don't know about routers in other areas. The main benefts of using *areas* in an OSPF network are:

- Routing tables on the routers are reduced.
- Routing updates are reduced.

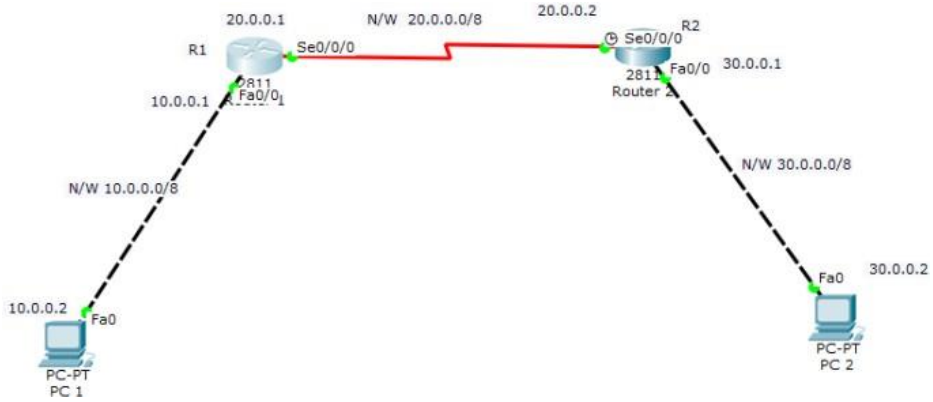
Each area in an OSPF network must be connected to the **backbone area** (also known as ***area 0***). All routers inside an area must have the **same area ID** .

A router that has interfaces in more than one area (for example area 0 and area 1) is known as an Area Border Router (**ABR**). A router that connects an OSPF network to other routing networks (for example, to an EIGRP network) is called an Autonomous System Border Router (**ASBR**).

For now we'll confgure basic OSPF. On to it then!

Basic OSPF configuration.

1. Build the network topology.



2. Confgure IP addresses on PCs and router interfaces.

Router 1

```
R1(config)#int fa  0/0
R1(config-if)#ip add 10.0.0.1 255.0.0.0
R1(config-if)#no shut
R1(config-if)#
R1(config-if)#int serial 0/0/0
R1(config-if)#ip add 20.0.0.1 255.0.0.0
R1(config-if)#no shut
```

Router 2

```
R2(config-if)#int fa0/0
R2(config-if)#ip add 30.0.0.1 255.0.0.0
R2(config-if)#no shut
R2(config-if)#
R2(config-if)#int serial0/0/0
R2(config-if)#ip address 20.0.0.2 255.0.0.0
R2(config-if)#no shut
```

Now do IP confgurations for the PCs.

PC1 IP add 10.0.0.2 Subnet mask 255.0.0.0 Default gateway 10.0.0.1

PC2 IP add 30.0.0.2 Subnet mask 255.0.0.0 Default gateway 30.0.0.1

3. **Con▮gure OSPF** on the routers.

The confguration is pretty simple and requires only two major steps:

1. Enable OSPF on a router using the *router ospf PROCESS_ID* in the global confguration mode.

2. Defne on which interfaces OSPF will run and what networks will be advertised using *network IP_ADDRESS WILCARD_MASK AREA* command in the OSPF confguration mode.

Note that the OSPF **process ID** *doesn't have to be the same* on all routers in order for the routers to establish a neighbor relationship, but the **area** parameter *has to be the same* on all neighboring routers in order for the routers to become neighbors.

Router 1

```
R1(config)#
R1(config)#router ospf 1
R1(config-router)#network  10.0.0.0   0.255.255.255   area 0
R1(config-router)#network  20.0.0.0   0.255.255.255   area 0
```

Router 2

```
R2(config)#
R2(config)#router  ospf   2
R2(config-router)#network  20.0.0.0   0.255.255.255 area 0
R2(config-router)#network  30.0.0.0   0.255.255.255 area 0
```

As you can see from the above picture,we just need to **enable OSPF** on the routers which then advertise the networks **directly connected** to each of them.

Have in mind: The **OSPF process IDs** used for the two routers have been made **optionally** different but their **area numbers must be** the same.

4. Verify OSPF configuration

First, let's verify that the routers have established a neighbor relationship by typing the *show ip ospf neighbor* command on **R1**:

```
R1#
R1#show ip ospf neighbor

Neighbor ID     Pri   State           Dead Time   Address
Interface
30.0.0.1          0   FULL/  -        00:00:30    20.0.0.2
Serial0/0/0
```

Next, to verify that R1 has learnt the route to 30.0.0.0/8 network, we'll use *show ip route ospf* command on **R1**:

```
R1#
R1#show ip route ospf
O    30.0.0.0 [110/65] via 20.0.0.2, 00:20:50, Serial0/0/0
```

Note that the letter **O** indicates OSPF routes.

Lastly, verify connectivity. Ping **PC2** from **PC1**. Ping should be successful.