**Open Shortest Path First**

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## Terminology

Before we can discuss how to configure OSPF on a network, we need to go over some common terminology. We will only be covering the ones we require. A complete list of common terminologies related to OSPF can be found [here](https://www.ciscopress.com/articles/article.asp?p=26919).

* **Area** – An OSPF network is divided into areas, logical collections of routers and links having the same **area ID**. Each router in an area maintains the topological database for just the area it belongs to. Each area is also connected to a special area, called the **backbone area** or **area 0**, through which the areas communicate.
* **Area Border Router** (ABR) – This is a router with interfaces in two areas. It acts as the boundary between the two areas.
* **Autonomous System** (AS) – This is a collection of areas, a group of networks under a single administrative control. It controls how far the routing information should be propagated and facilitates filtering of information for sharing with other ASs. OSPF operates within a single AS.
* **Designated Router** (DR) – On a multi-access network, like LAN, in each area, one router is elected as the Designated Router (DR) and another is elected as the **Backup Designated Router** (BDR). All the other routers in the area exchange routing information with just the DR and BDR instead of exchanging information with every router in the area. The DR then distributes topology information to every other router in the area. This greatly reduces OSPF traffic. More information about how this works can be found [here](https://study-ccna.com/designated-backup-designated-router/).
* **Router ID** – Each router is assigned an ID which is unique within their AS. This is a 32-bit number that can be manually set using the router-id command. If not set manually, the highest loopback address is used. If a loopback address does not exist, the highest active IP address on any of the router’s interfaces is used. To reflect a new router ID assignment, the router must be restarted using the reload command or the command clear ip ospf process.
* **Cost** – The cost in OSPF is calculated as Reference Bandwidth / Interface Bandwidth. By default, the reference bandwidth value is . It can be set manually using the command auto-cost reference-bandwidth <value>. The value must be in . The interface bandwidth can be se with the command bandwidth <value>. The value must be in .
* **Wildcard Mask** – We can configure a network to be advertised using the command network <ip\_address> <wildcard\_mask> area <area\_id>. Unlike RIP, OSPF supports classless routing. This is where the wildcard mask comes in. A 0 bit in a wildcard mask means that the corresponding position in the IP address **must** match, while a 1 bit in a wildcard mask means that the corresponding position is **irrelevant**. Thus, for the command network 10.0.1.0 0.0.0.255 area 0, any interface with the IP address will be advertised. More details about the wildcard mask can be found [here](https://study-ccna.com/wildcard-masks/).
* **Process ID** – When enabling OSPF, a process ID must be mentioned. Thus, the command to enable OSPF is router ospf <process\_id>. All the OSPF functions are then performed under that process. It is possible to have multiple OSPF processes running on the same router, but the routers under one OSPF must have the same process ID, since each OSPF process has its own database, topology table, etc. Multiple OSPF process IDs are provided to a single router only if the router is connected to multiple ASs. More details about the process ID can be found [here](https://learningnetwork.cisco.com/s/question/0D53i00000Kt1C9CAJ/the-purpose-of-the-ospf-process-id).
* **Hello Packets** – In OSPF, each router sends a **hello packet** to its neighbours at certain intervals, called the **hello interval**. By default, this is 5 seconds. This establishes neighbour relationships and lets the other routers know about the router’s availability.
* **Dead Interval** – Another interval is called the **dead interval**, which is four times the value of the hello interval. If a router does not receive a hello packet from a neighbour within this time, that neighbour is declared non-operational and the routing table is updated accordingly.
* **Passive Interfaces** – Some interfaces however, do not send hello packets. These are called **passive interfaces**. This is usually done for local-LAN facing interfaces. Note that the network connected to a passive interface is still advertised. More information about passive interfaces can be found [here](https://ipwithease.com/ospf-passive-interface/).

## Configuration

Enable OSPF:

R1(config)# router ospf 1

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Set a network to advertise:

R1(config-router)# network 10.0.1.0 0.0.0.255 area 0

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View list of networks being advertised:

R1# show ip ospf neighbor

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