

# OSPF Neighborhood Condition and Requirement

This explains OSPF Neighborhood Requirements Area ID, Authentication, Hello and Dead intervals, Stub Flag and MTU size in detail with examples.

OSPF routers share routing information only with neighbors. OSPF uses hello packets to discover neighbors in segments. A hello packet contains some essential configuration values that must be same on both routers who want to build an OSPF neighborhood. In this tutorial we will explain these configuration values in detail with example.

## OSPF Neighborhood Requirement

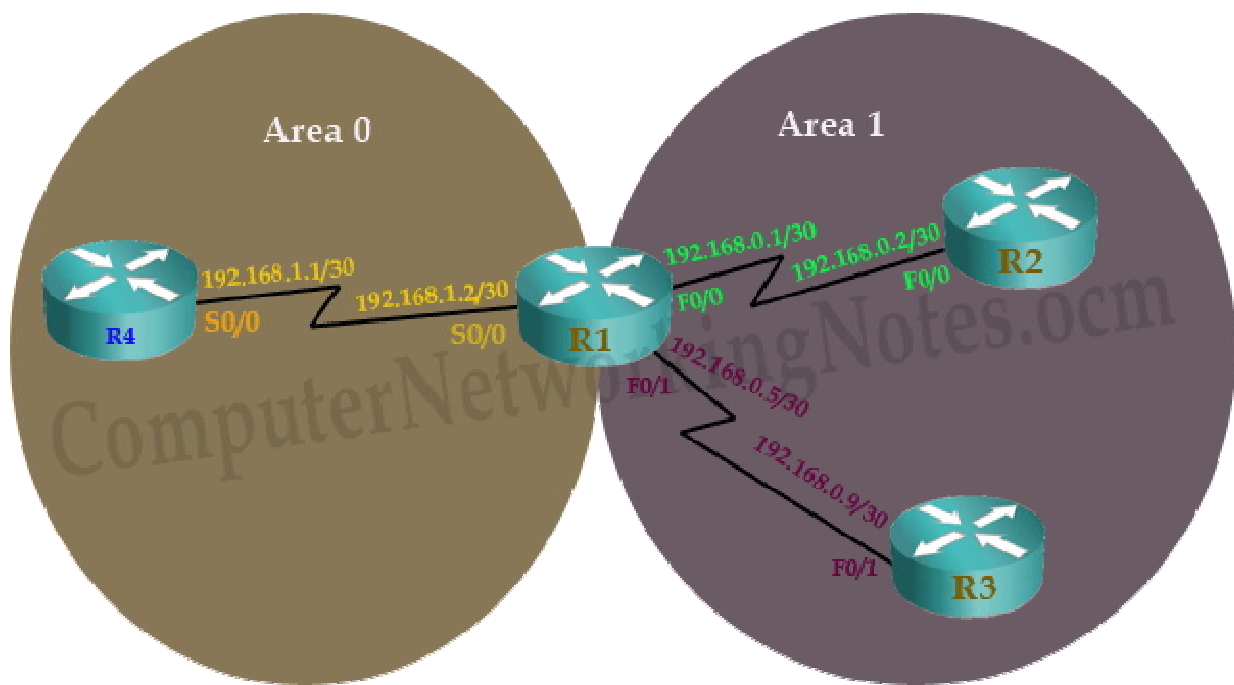
In order to become OSPF neighbor following values must be match on both routers.

- Area ID
- Authentication
- Hello and Dead Intervals
- Stub Flag
- MTU Size

## Area ID

OSPF uses area concept to scale an enterprise size network. I have explained OSPF Areas in first part of this article. Just for reference, OSPF areas create a logical boundary for routing information. By default routers do not share routing information beyond the area. So in order to become neighbor, two routers must belong to same area. Here one confusing fact needs to clear. Area is associated with specific interface, not with entire router. This allows us to configure the router in multiple areas. For example a router that has two interfaces; Serial interface and FastEthernet interface, can run Serial interface in one area and FastEthernet in another area. It means link which connects two routers need be in same area including its both ends interface. Beside this interfaces should have same network ID and subnet mask.

Following figure illustrate a simple OSPF network. In this network **R1** is eligible to form neighborhood with **R4** and **R2** respectively on **S0/0** and **F0/0**.



I have question for you. Why neighborship cannot be built between **R1** and **R3**?

Let's find out the answer step by step.

**Both interfaces should be in same area.**

Yes both interfaces ( R1's Fo/1 and R3's F0/1) are in same area.

**Both interfaces should be in same segment.**

Yes both interfaces ( R1's Fo/1 and R3's F0/1) are connected with direct link.

**Both interfaces should have same subnet mask.**

Yes both interfaces have same subnet mask /30.

**Both interfaces should have same network ID.**

No both interfaces have different network ID. **R1's F0/1** has network ID *192.168.0.4/30* while **R3's F0/1** has network ID *192.168.0.8/30*. This condition does not match. Thus these two routers on these interfaces cannot build neighborship.

## Authentication

To enhance the security of network, OSPF allows us to configure the password for specific areas. Routers who have same password will be eligible for neighborship. If you want to use this facility, you need to configure password on all routers which you want to include in network. If you skip any router, that will not be able to form an OSPF neighborship.

Suppose that our network has two routers R1 and R2. Both routers are connected with direct link and meet all criteria mentioned in first requirement. What if I configure password in R1 and leave R2 as it is? Will it form neighborhood with R2?

Well in this situation neighborhood will not take place. Because when both routers see each other's hello packet in segment, they try to match all configuration values including password field. One packet has a value in password field while other has nothing in it. In this case routers will simply ignore each other's packet.

### **Hello packets and hello interval**

Hello packets are the special type of LSAs (Link State Advertisements) which are used to discover the neighbors in same segment. And once neighborhood is built same hello packets are used to maintain the neighborhood. Hello packets contain all necessary information that is required to form a neighborhood. Hello packets are generated and distributed in hello interval via multicast. Hello interval is the length of time in seconds between the hello packets. Default hello interval is **10** seconds.

### **Dead Intervals**

As we already know once neighborhood is built, hello packets are used to maintain the neighborhood.

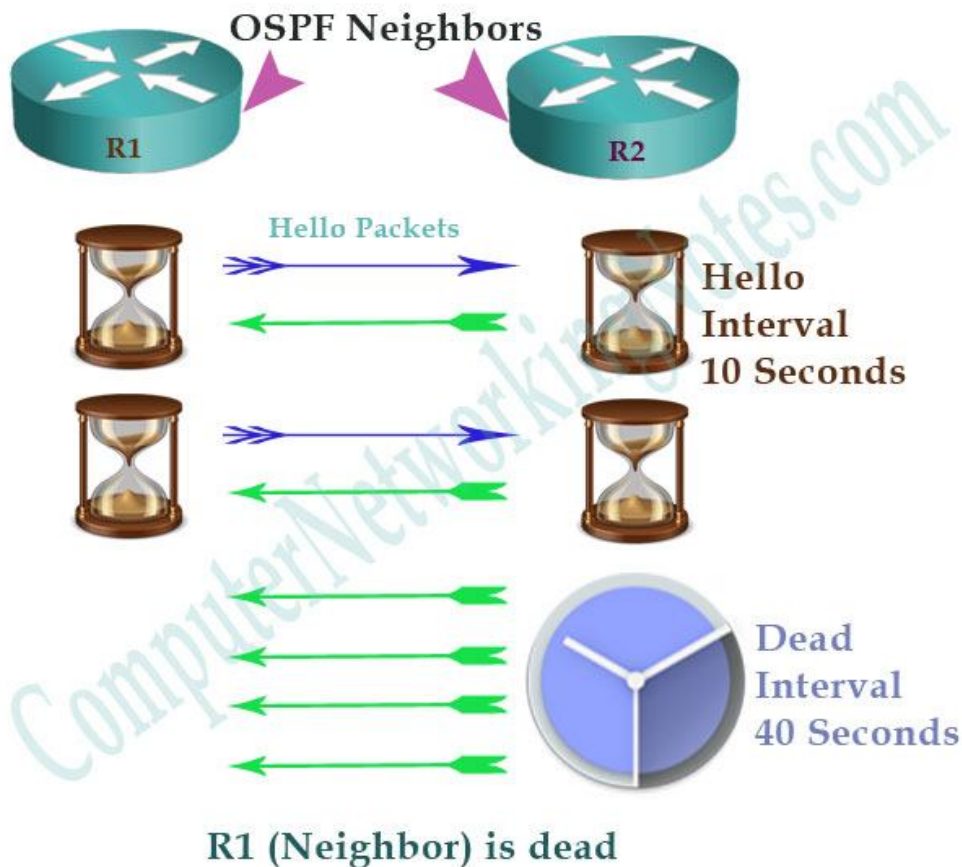
So a router must see hello packets from neighbor in particular time interval. This time interval is known as dead interval. Dead interval is the number of seconds that a router waits for hello packet from neighbor, before declaring it as dead.

Default dead interval is **40** seconds. If a router does not receive hello packet in **40** seconds from neighbor it will declare that as dead. When this happens, router will propagate this information to other OSPF neighboring router via LSA message.

Hello and dead interval must be same between two neighbors. If any of these intervals are different, neighborhood will not form.

### **Stub Area Flag**

This value indicates that whether sending router belongs to stub area or not. Routers who want to build OSPF neighborhood must have same stub area flag.



For example we have two routers R1 and R2:-

- Both routers belong to same stub area, neighborship can be built
- Both routers belong to different stub area, neighborship cannot be built
- Both routers do not belong to any stub area, neighborship can be built
- Only one router belongs to a stub area, neighborship cannot be built

Just like another areas, Stub area also has some specific meanings in OSPF hierarchal design.

A stub area has following requirements:-

- A stub area can have only single exit point from that area.
- Stub area cannot be used as a transit area for virtual links.
- Routing from stub area to outside of the area should not have to take an optimal path.
- Any external networks (redistributed from other protocols into OSPF) should not be flooded in stub area.

Configuring a stub area reduces the size of topology table inside that area. Thus routers running in this area require less memory.

## MTU

Technically MTU (Maximum Transmission Unit) is not a part of compulsory matching conditions. Still we should match this value. If this value does not match routers may stuck in Exstart/Exchange exchange stage.

Consider a situation where MTU setting between two OSPF routers does not match. If the router with the higher MTU sends a packet larger than the MTU set on the neighboring router, the neighboring router will ignore this packet. This function creates serious problem for database updates. Database updates are heavier in nature. Once an update becomes larger than the configured MTU setting, it needs to be split. In a case of mismatch MTU, database update may lose few bytes. Due to this, OSPF will ignore that update and cannot sync with database. It will be stuck in Exstart/Exchange stage.

It is always worth to spend a little extra time in matching optional values along with compulsory values. Matching configuration values will make troubleshooting easier.