

OSPF Neighborship States (7 States)

OSPF routers go through **7 states** to become fully adjacent. Each state plays a role in the **hello exchange**, **database sync**, and **route learning process**.

◆ **1. Down**

- **Meaning:** No OSPF Hello packets received yet.
- **Trigger:** Initial state or after a neighbor timeout.
- **Debug Tip:** Router hasn't seen any OSPF messages from neighbor.

◆ **2. Init**

- **Meaning:** Router received a Hello packet from neighbor.
- **But** the neighbor hasn't acknowledged (your own Router ID not seen in its Hello).
- **Seen in:** Unidirectional communication.

◆ **3. 2-Way**

- **Meaning:** Bidirectional communication is established.
- **Your Router ID is visible in the neighbor's Hello packet.**
- **Elects DR/BDR** (Designated Router / Backup Designated Router) in broadcast/multi-access networks.
- **Neighborship is formed here.**
- But full adjacency **is built only in certain cases**, like:
 - With DR/BDR in broadcast
 - With point-to-point links

◆ **4. ExStart**

- **Meaning:** Routers decide who will start DBD exchange (master/slave election).
- Based on **higher Router ID becomes master**.
- They get ready to sync databases.

◆ **5. Exchange**

- **Meaning:** Routers exchange DBD (Database Description) packets.
- These packets contain **summaries of their LSDB**.
- They compare which LSAs are missing.

◆ **6. Loading**

- **Meaning:** Routers **request missing LSAs** using LSR (Link-State Request).
- The neighbor replies with LSU (Link-State Update).
- Happens only if LSDBs are not yet synced.

◆ **7. Full**

- **Final state:** Routers are **fully adjacent**, LSDBs are synchronized.
- Routers now advertise routes to each other.

- This is required for routing table population.

State Transition Summary

Down → Init → 2-Way → ExStart → Exchange → Loading → Full

Extra Notes

Network Type Full Adjacency Happens?

Point-to-Point Yes

Broadcast (Ethernet) Yes (with DR/BDR)

NBMA (Frame Relay) Yes (with DR/BDR)

Point-to-Multipoint Yes

Virtual Links Yes

Show Neighbors on Cisco

show ip ospf neighbor

This shows:

- Neighbor ID
- State (Full, 2-Way, etc.)
- Interface
- Priority
- DR/BDR info