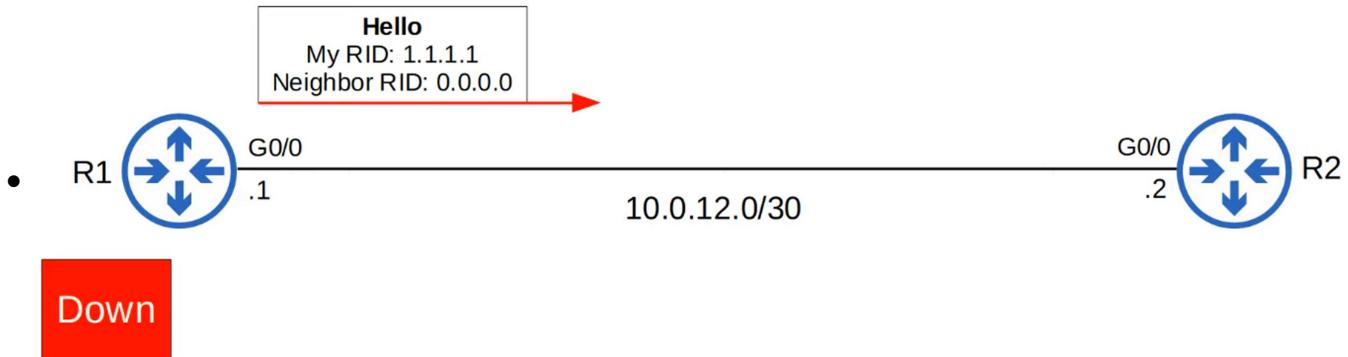


## 📊 OSPF Neighborship States (7 States)

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**.

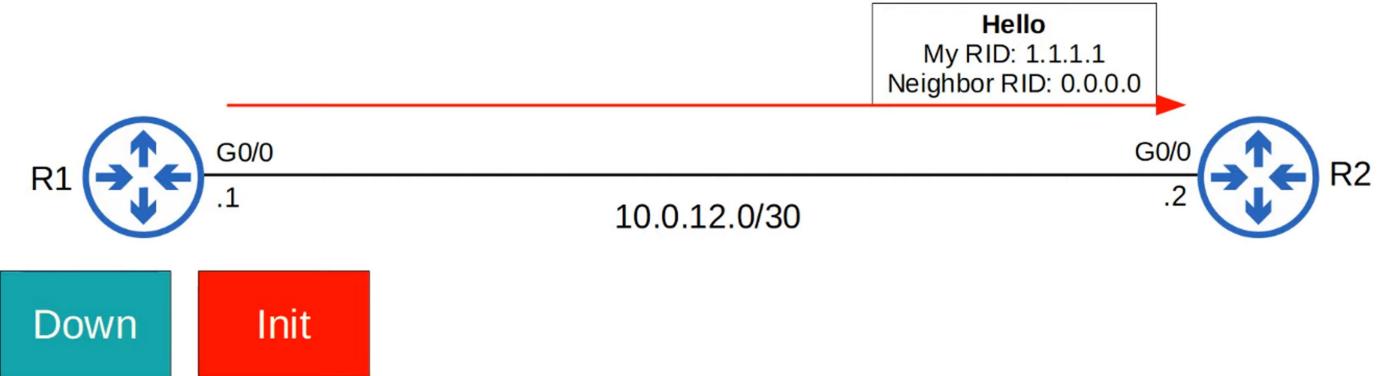
### ◆ 1. Down

- **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.

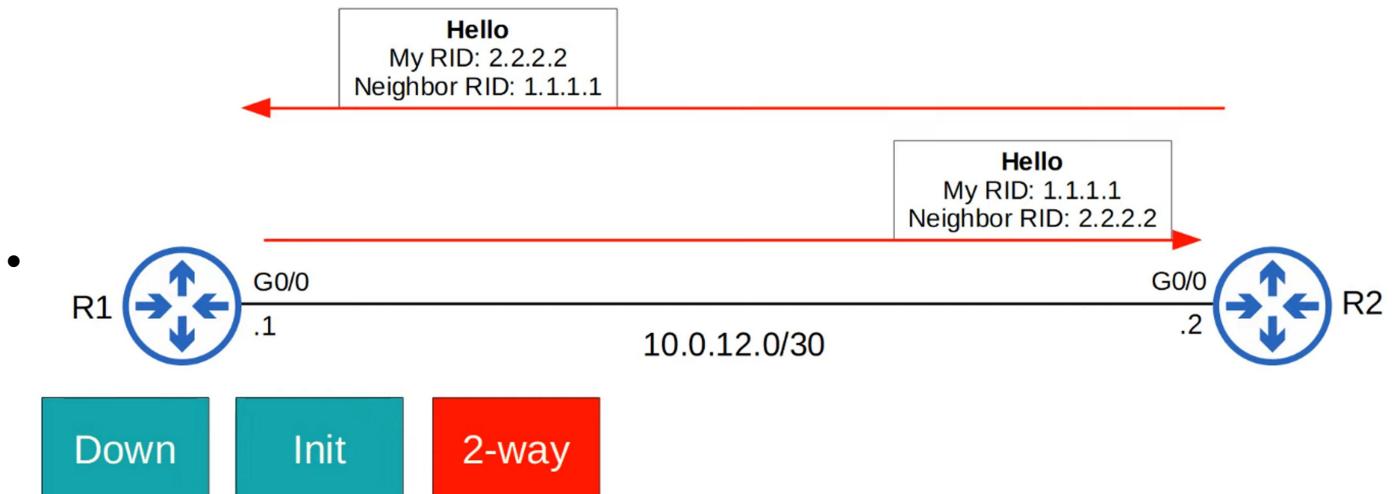


### ◆ 3. 2-Way

- **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.



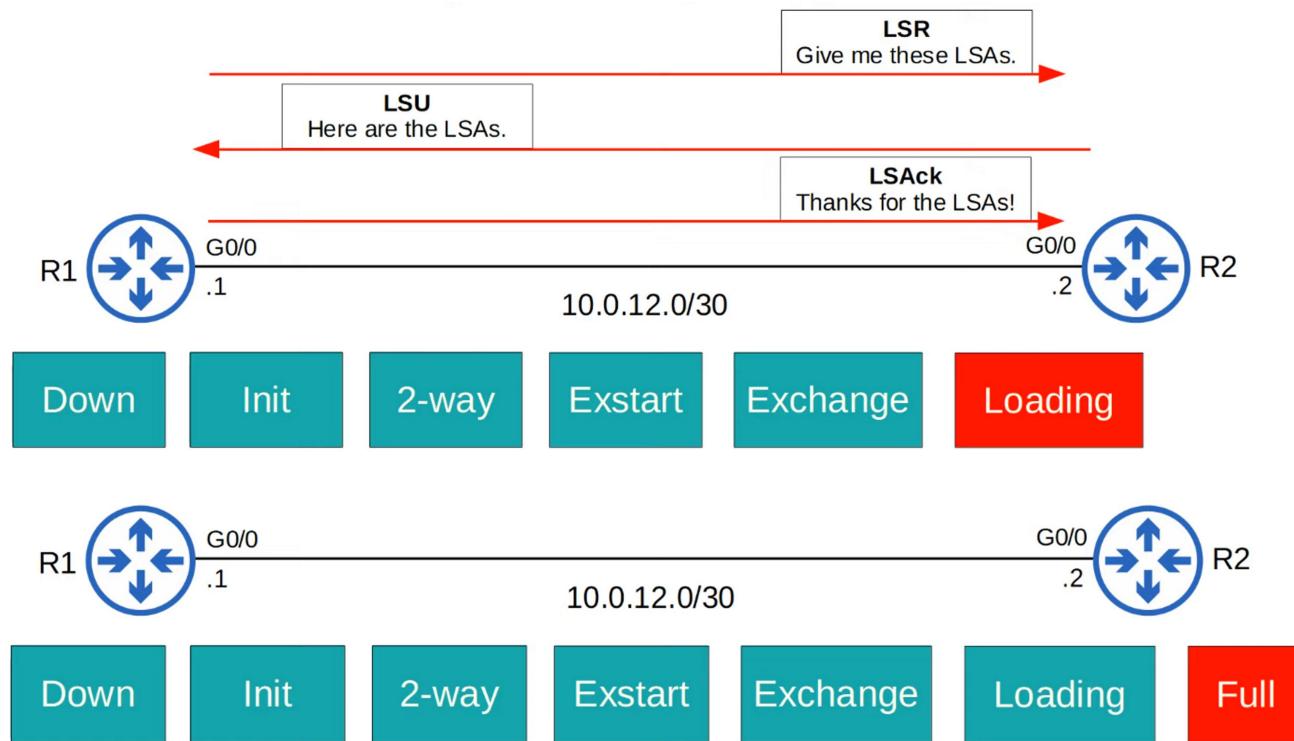
#### ◆ 5. Exchange

- **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.



## ⌚ 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

