Achievable

CCNA DUMP SHEET

OSPFv2

How OSPF works

- **Link state:** routers share LSAs until every LSDB matches
- **SPF:** Dijkstra on the LSDB gives each router its best paths
- **AD 110.** The metric is cost; lowest total cost wins
- **Area 0:** the backbone. Single-area OSPF uses only Area 0
- **Equal cost:** ECMP. **Higher cost:** kept in the LSDB as a backup

Neighbor states, in order

State	What has happened
Down	No Hello received from the neighbor
Init	Hello received, own RID not in it
2-Way	Own RID in its Hello; DR/BDR elected at the end
Exstart	Set up the exchange: higher RID leads
Exchange	DBD packets describe each LSDB
Loading	Missing LSAs requested and delivered
Full	LSDBs in sync, adjacency complete

DR/BDR election

- **DR:** highest OSPF priority, then highest RID; multiaccess only
- **BDR:** second highest; takes over if the DR fails
- **Priority:** 0-255, default 1. Priority 0 is never DR or BDR
- `ip ospf priority 255`: interface command
- **Non-preemptive:** a better router waits for the next election
- **Full only** with the DR and BDR; otherwise `2WAY/DROTHER`

Network types

Type	Default on	Neighbor state
Broadcast	Ethernet, any speed	`FULL/DR`, `FULL/BDR`
Point-to-point	Serial, HDLC or PPP	`FULL/-`: no DR or BDR

- **Timers, both types:** Hello 10 s, Dead 40 s, four times Hello
- `ip ospf hello-interval 5`: interface, match the neighbor
- `ip ospf dead-interval 20`: interface, match the neighbor
- `ip ospf network point-to-point`: interface, no election

Cost

- **Formula:** reference bandwidth ÷ interface bandwidth
- **Reference:** 100 Mbps by default; same on every router
- **Trap:** 100 Mbps and 1 Gbps both cost 1. 10 Mbps costs 10
- **Path cost:** sum of the outgoing interfaces along the path
- `auto-cost reference-bandwidth 10000`: router mode, Mbps
- `ip ospf cost 10`: interface, overrides the formula

Adjacency checklist

Item	Rule
Area	Same on both ends of the link
IP network	Same subnet and mask
Hello, Dead, network type	Must match
Authentication	Same type and key
MTU	Else stuck in Exstart or Exchange
Router ID	**Must differ**
Process ID	Need not match: locally significant

Router ID (RID)

Order	Source
1	`router-id 10.1.1.1` under `router ospf 1`
2	Highest IPv4 address on a loopback
3	Highest IPv4 address on an active interface

- **Format:** 32 bits, dotted decimal, need not exist on the router
- **New RID:** applies after `clear ip ospf process` or a reload
- `interface loopback 0`: up while the router is up, usually a /32

Configure

Network statements: turn OSPF on for interfaces they match

```
R1(config)# router ospf 1
R1(config-router)# network 192.168.1.0 0.0.0.255 area 0
R1(config-router)# network 10.1.1.0 0.0.0.3 area 0
```

Or on the interface

```
R1(config)# interface g0/0
R1(config-if)# ip ospf 1 area 0
```

Router config command	What it does
`passive-interface g0/0`	No Hellos, still advertised
`default-information originate`	Advertises its default route

- **Wildcard:** 255.255.255.255 minus the mask: /24 is 0.0.0.255
- **Interface command** overrides a matching `network` statement

Verify

Command	What it shows
`show ip ospf neighbor`	RID, priority, state, Dead countdown
`show ip ospf interface`	Area, RID, type, cost, DR, timers
`show ip route`	OSPF routes: `O`, `[110/cost]`
`show ip protocols`	RID, networks, passive interfaces
`show ip ospf database`	The LSDB