OSPF cheat sheet

Covers single-area and basic multi-area OSPFv2 for IPv4, as tested at CCNA level and used in real networks.

How OSPF works

Item	Detail
Type	Link-state IGP, open standard, AD 110
Algorithm	Each router builds the same map (LSDB) and runs SPF (Dijkstra)
Metric	Cost = reference bandwidth ÷ interface bandwidth (default ref. 100 Mb/s)
Transport	IP protocol 89; multicast 224.0.0.5 (all OSPF), 224.0.0.6 (DR/BDR)
Timers	Hello 10 s / Dead 40 s on broadcast and point-to-point links
Router ID	Manual, else highest loopback IP, else highest active interface IP

Neighbour states

Down → Init → 2-Way → ExStart → Exchange → Loading → **Full**. On Ethernet, DROTHER routers stay at **2-Way** with each other: that is normal.

Neighbour must match

- Area ID and area type
- Subnet and mask on the link
- Hello and dead timers
- Authentication
- MTU (else stuck in ExStart/Exchange)
- Network type; unique router IDs

DR and BDR

On multi-access (Ethernet) segments one Designated Router and one Backup are elected to reduce flooding. Highest interface **priority** wins (default 1, 0 = never), then highest router ID. The election is not pre-emptive.

Areas and LSA types

LSA	Name / purpose
1	Router LSA: every router, inside its area
2	Network LSA: from the DR
3	Summary: inter-area routes from ABRs
4	ASBR summary: how to reach the ASBR
5	External routes (redistributed)
7	External routes inside an NSSA

ABR joins area 0 to other areas. **ASBR** brings in external routes. All areas must touch the backbone, area 0.

Configuration

Command	What it does
`router ospf 1`	Start OSPF process 1 (local number)
`router-id 1.1.1.1`	Set a stable router ID
`network 10.0.12.0 0.0.0.255 area 0`	Enable OSPF on matching interfaces
`ip ospf 1 area 0 (interface)`	Alternative: enable per interface
`passive-interface g0/2`	Advertise the subnet but send no hellos
`passive-interface default`	Passive everywhere, then no passive-interface on links
`auto-cost reference-bandwidth 100000`	Fair costs for 10/100 Gb/s links (set on all routers)
`ip ospf cost 50`	Override cost on an interface
`ip ospf priority 0`	Never become DR on this interface
`ip ospf network point-to-point`	No DR election on a two-router link
`default-information originate`	Advertise the default route into OSPF
`clear ip ospf process`	Restart OSPF (needed after a router-ID change)

Verify and troubleshoot

Command	What it does
`show ip ospf neighbor`	Neighbours and their state
`show ip ospf interface brief`	Interfaces, area, cost, state
`show ip ospf interface g0/0`	Timers, network type, DR/BDR
`show ip route ospf`	OSPF routes (O, O IA, O E2)
`show ip ospf database`	LSDB: the LSAs this router knows
`show ip protocols`	Router ID, networks, passive interfaces
`debug ip ospf adj`	Watch adjacency problems (lab use)

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