

OSPF Cheat Sheet for Cisco Beginners

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What is OSPF?

Open Shortest Path First (OSPF) is a link-state routing protocol that finds the best path between networks using the Dijkstra algorithm. It's faster and more scalable than distance-vector protocols like RIP.

Key OSPF Concepts

Router ID

- Unique identifier for each OSPF router
- Highest IP address on loopback interfaces, or highest IP on active interfaces
- Can be manually set with `router-id` command

Areas

- OSPF networks are divided into areas to reduce routing table size
- **Area 0** = Backbone area (all other areas must connect to it)
- **ABR** = Area Border Router (connects multiple areas)

Basic OSPF Configuration

Enable OSPF

```
Router(config)# router ospf [process-id]
Router(config-router)# network [network] [wildcard-mask] area [area-id]
```

Example Configuration

```
Router(config)# router ospf 1
Router(config-router)# network 192.168.1.0 0.0.0.255 area 0
Router(config-router)# network 10.0.0.0 0.255.255.255 area 1
```

Set Router ID (Optional)

```
Router(config-router)# router-id 1.1.1.1
```

Interface-Specific Configuration

```
Router(config)# interface gigabit0/0
Router(config-if)# ip ospf 1 area 0
```

Essential Show Commands

View OSPF Neighbors

```
Router# show ip ospf neighbor
```

View OSPF Database

```
Router# show ip ospf database
```

View OSPF Interfaces

```
Router# show ip ospf interface
Router# show ip ospf interface brief
```

View Routing Table

```
Router# show ip route ospf
```

OSPF Process Information

```
Router# show ip ospf
```

OSPF Network Types

Broadcast (Default for Ethernet)

- Elects DR/BDR
- Hello timer: 10 seconds
- Dead timer: 40 seconds

Point-to-Point

- No DR/BDR election
- Hello timer: 10 seconds
- Dead timer: 40 seconds

Change Network Type

```
Router(config-if)# ip ospf network point-to-point
Router(config-if)# ip ospf network broadcast
```

DR/BDR Election

Priority-Based Election

- Highest priority wins (0-255)
- Priority 0 = never DR/BDR
- If tie, highest Router ID wins

Set Interface Priority

```
Router(config-if)# ip ospf priority [0-255]
```

Timers

Hello and Dead Timers

```
Router(config-if)# ip ospf hello-interval [seconds]
Router(config-if)# ip ospf dead-interval [seconds]
```

Note: Hello and dead timers must match between neighbors!

Authentication

Area Authentication

```
Router(config-router)# area [area-id] authentication
Router(config-if)# ip ospf authentication-key [password]
```

Interface Authentication

```
Router(config-if)# ip ospf authentication
Router(config-if)# ip ospf authentication-key [password]
```

Cost and Metrics

View Interface Cost

```
Router# show ip ospf interface [interface]
```

Manually Set Cost

```
Router(config-if)# ip ospf cost [1-65535]
```

Change Reference Bandwidth

```
Router(config-router)# auto-cost reference-bandwidth [Mbps]
```

Common OSPF States

1. **Down** - No hello packets received
2. **Init** - Hello received, but not bidirectional
3. **2-Way** - Bidirectional communication established
4. **ExStart** - Master/slave relationship established
5. **Exchange** - Database description packets exchanged
6. **Loading** - Link state requests sent
7. **Full** - Databases synchronized

Troubleshooting Tips

Common Issues

- **Mismatched timers** between neighbors
- **Area mismatch** on same network segment
- **Authentication mismatch**
- **Network type mismatch**
- **MTU mismatch**

Debug Commands (Use Carefully!)

```
Router# debug ip ospf hello  
Router# debug ip ospf adj  
Router# undebug all (to stop debugging)
```

Quick Verification Checklist

1. Check neighbors: `show ip ospf neighbor`
2. Verify interfaces: `show ip ospf interface brief`
3. Check routing table: `show ip route ospf`
4. Verify areas: `show ip ospf`

5. Check for errors: `show ip ospf database`

Default Values

- **Process ID:** 1-65535 (locally significant)
 - **Hello Interval:** 10 seconds (broadcast/p2p)
 - **Dead Interval:** 40 seconds (4x hello)
 - **Priority:** 1 (for DR/BDR election)
 - **Cost:** Based on bandwidth (100Mbps/interface bandwidth)
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Remember: OSPF neighbors must agree on hello/dead timers, area ID, authentication, and network type to form adjacencies!