# OSPF Cheat Sheet for Cisco Beginners



## 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!