

Δίκτυα Επικοινωνιών II: OSPF Configuration

Δρ. Απόστολος Γκάμας

Διδάσκων 407/80

gkamas@uop.gr



Dynamic Routing Configuration

Router (config) #

```
router protocol [ keyword ]
```

— Defines an IP routing protocol

Router (config-router) #

```
network network-number
```

- The **network** subcommand is a mandatory configuration command for each IP routing process



OSPF Basic Configuration Commands

Router (config) #

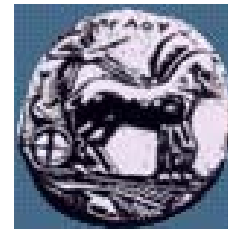
```
router ospf process-id
```

— Enables an OSPF routing process

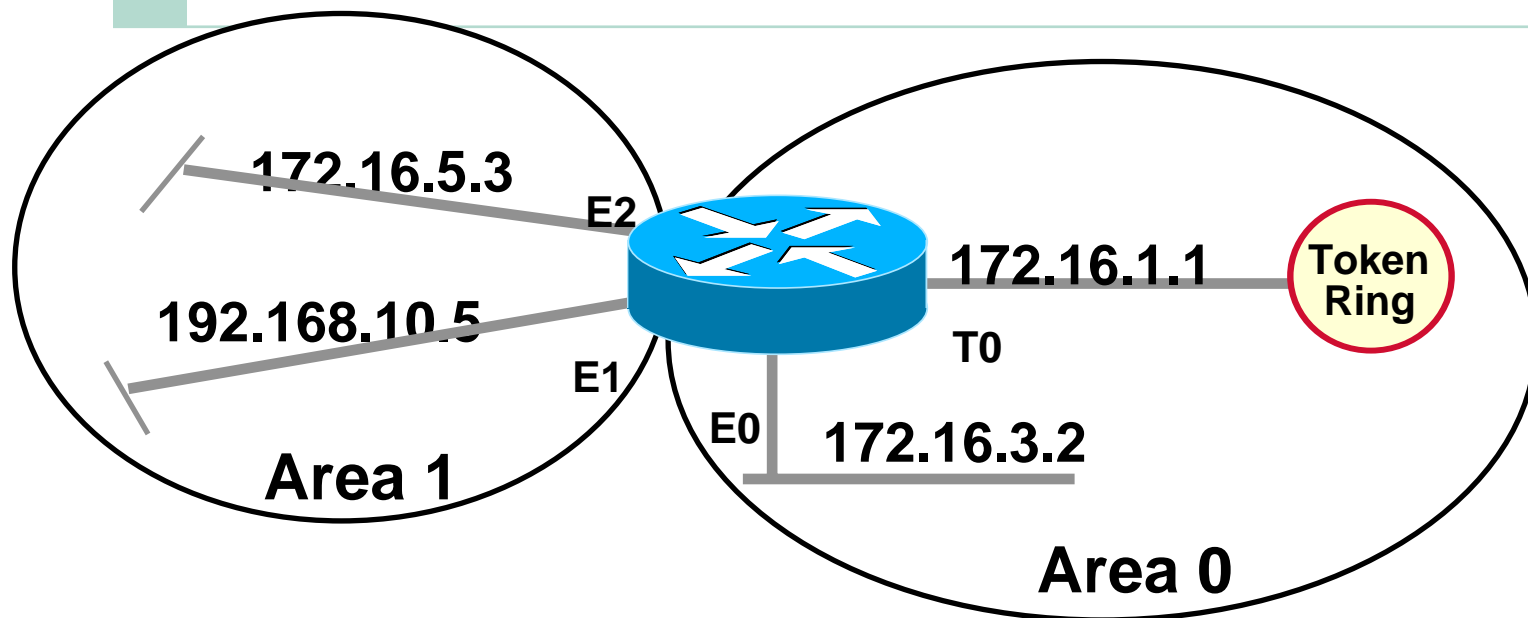
Router (config-router) #

```
network address wildcard-mask area area-id
```

- **Selects participating interfaces**

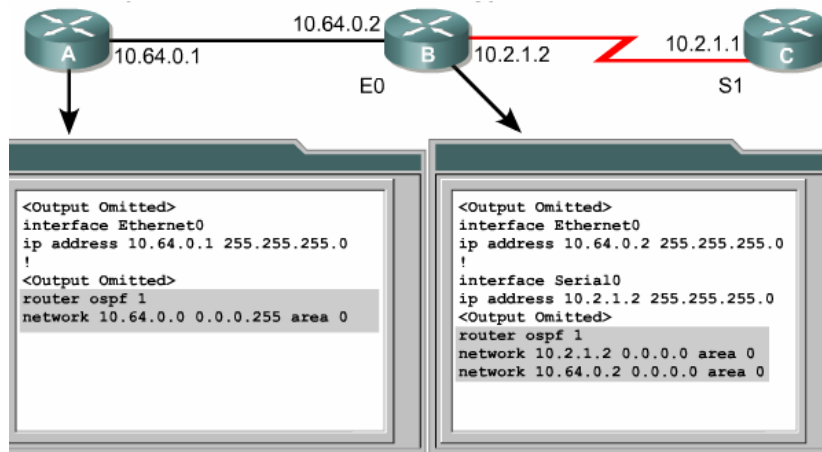


OSPF Basic Configuration Example



```
router ospf 63
network 172.16.5.3 0.0.0.0 area 1
network 172.16.0.0 0.0.255.255 area 0
network 192.168.10.5 0.0.0.0 area 1
```

Configuring the OSPF Routing Process



Network area Command	Description
address	Can be the network address, subnet, or the address of the interface. Instructs router to know which links to advertise, which links to listen to advertisements on, and what networks to advertise.
wildcard-mask	An inverse mask used to determine how to read the address. The mask has wildcard bits where 0 is a match and 1 is "do not care"; for example, 0.0.255.255 indicates a match in the first two bytes. (the equivalent REGULAR subnet mask would be a 16 bit mask of 255.255.0.0) If specifying the interface address, use mask 0.0.0.0.
area-id	Specifies the area to be associated with the address. Can be a number or can be similar to an IP address A.B.C.D. For a backbone area, the ID must equal 0.

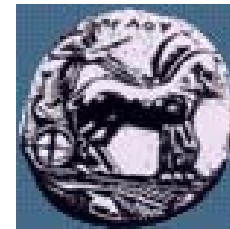


Configuring Router Priority

```
Sydney1(config)#interface fastethernet 0/0
Sydney1(config-if)#ip ospf priority 50
Sydney1(config-if)#end
Sydney1#
00:21:57: %SYS-5-CONFIG_I: Configured from console
by console
```

The Hello packet sent on the fastethernet interface will have the Router Priority Field set to 50.

The priorities can be set to any value from 0 to 255. A value of 0 prevents that router from being elected. A router with the highest OSPF priority will win the election for DR.



Modifying OSPF Cost Metric

Medium	Cost
56 kbps serial link	1785
T1 (1.544 Mbps serial link)	64
E1 (2.048 Mbps serial link)	48
4 Mbps Token Ring	25
Ethernet	10
16 Mbps Token Ring	6
100 Mbps Fast Ethernet, FDDI	1

```
Sydney2 (config-if)#ip ospf cost ?  
  <1-65535> Cost  
Sydney2 (config-if)#ip ospf cost 1
```



Configuring OSPF Timers

```
Cisco  
Sydney1(config-if)#ip ospf hello-interval 5  
Sydney1(config-if)#ip ospf dead-interval 20
```

OSPF timers are configured on the interface.

Common OSPF Configuration Issues



No Neighbor	OSPF Routes Not Shown
Do interfaces have same OSPF timers?	Do interfaces have correct IP address and subnet mask?
Do connected interfaces have same network type?	Do network statements have correct wildcard masks?
Are authentication keys and passwords the same on interfaces?	Do network statements put links into correct area?
Do the router neighbors have duplicate IP addresses?	
Is the router interface up?	



Verifying OSPF Configuration

- show ip protocol
- show ip route
- show ip ospf interface
- show ip ospf
- show ip ospf neighbor detail
- show ip ospf database

The debug and clear Commands for OSPF Verification



Command	Description
<code>clear ip route *</code>	Clear all routes in routing table
<code>clear ip route a.b.c.d</code>	Clear route to a.b.c.d in routing table
<code>debug ip ospf events</code>	Report all OSPF events
<code>debug ip ospf adj</code>	Report OSPF adjacency events



show ip ospf interface Command

```
Router# show ip ospf interface e0
Ethernet0 is up, line protocol is up
Internet Address 203.250.14.1 255.255.255.0, Area 0.0.0.0
Process ID 10, Router ID 203.250.13.41, Network Type BROADCAST,
  Cost: 10
Transmit Delay is 1 sec, State BDR, Priority 1
Designated Router (ID) 203.250.15.1, Interface address 203.250.14.2
Backup Designated router (ID) 203.250.13.41, Interface address
  203.250.14.1
Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit 5
  Hello due in 0:00:02
Neighbor Count is 3, Adjacent neighbor count is 3
  Adjacent with neighbor 203.250.15.1 (Designated Router)
Loopback0 is up, line protocol is up
Internet Address 203.250.13.41 255.255.255.255, Area 1
Process ID 10, Router ID 203.250.13.41, Network Type LOOPBACK, Cost: 1
Loopback interface is treated as a stub Host
```

— Verifies interfaces are in correct areas



show ip ospf Command

```
Router # show ip ospf
Routing Process "ospf 1" with ID 2.2.2.2
Supports only single TOS (TOS0) routes
SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
Number of areas in this router is 1
  Area 23
    Number of interfaces in this area is 3
    Area has no authentication
    SPF algorithm executed 19 times
    Area ranges are
    Link State Update Interval is 0:30:00 and due in 0:04:55
    Link State Age Interval is 0:20:00 and due in 0:04:55
```

- Displays general information about the OSPF routing process



show ip ospf database Command

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

```
OSPF Router with ID (3.3.3.3) (Process ID 1)
```

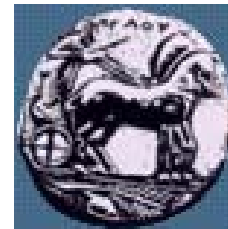
Router Link States (Area 23)

Link ID	ADV Router	Age	Seq#	Checksum	Link count
3.3.3.3	3.3.3.3	78	0x80000032	0x80B6	5
4.4.4.4	4.4.4.4	1691	0x8000002B	0xE11C	1
2.2.2.2	2.2.2.2	1693	0x80000030	0xE35E	5
1.1.1.1	1.1.1.1	1696	0x80000026	0x80A1	1

Net Link States (Area 23)

Link ID	ADV Router	Age	Seq#	Checksum
150.100.4.2	4.4.4.4	1691	0x80000030	0x2FCE
150.100.1.2	2.2.2.2	1693	0x80000024	0xFB29





show ip protocol Command

```
Router> show ip protocol
Routing Protocol is "ospf 300"
  Sending updates every 0 seconds
  Invalid after 0 seconds, hold down 0, flushed after 0
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing: ospf 300
  Routing for Networks:
    183.8.0.0/0.0.255.255
    144.253.100.0/0.0.0.255
  Routing Information Sources:
    Gateway         Distance      Last Update
    144.253.100.0   110          6d21
    183.8.128.12    110          0:17:32
    192.3.63.192    110          0:17:33
    192.3.63.194    110          0:17:33
    183.8.128.0     110          6d21
    153.50.192.0    110          0:17:33
    153.50.193.1    110          0:17:33
    183.8.64.130    110          6d19
    183.8.64.128    110          0:17:33
    133.3.4.0       110          0:17:33
    131.108.100.3   110          0:17:33
  Distance: (default is 110)
  - - More - -
```



Other OSPF *show* Commands

Router #

```
show ip ospf virtual-links
```

— Displays parameters about OSPF virtual links

Router #

```
show ip ospf neighbor detail
```

- Displays neighbor information per interface

Router #

```
show ip ospf border-routers
```

- Displays routes to the ABR and ASBR