

CCNA (200-301) Cisco Certified Network Associate

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Lecture 6

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تسعى لتكون الكيان الأول الذي يتبنى مبدأ المجتمع التعليمي
التعاوني ويقدم العلم مقابل العمل لتنمية وبناء المجتمعات.

مزيد من التفاصيل

OSPF



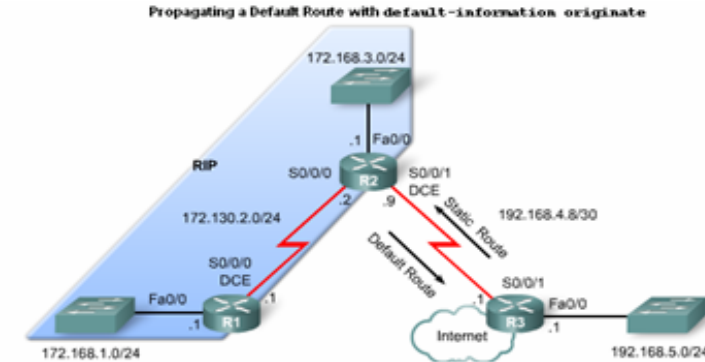
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Default Route

- Default routes
 - Packets that are not defined specifically in a routing table will go to the specified interface for the default route
 - Example: Customer routers use default routes to connect to an ISP router.
 - Command used to configure a default route is
 - *ip route 0.0.0.0 0.0.0.0 s0/0/1*

OSPF (open shortest path first)

Default Route



Propagating a Default Route with default-information originate

- Disable RIP routing on R2 for the 192.168.4.0 network only.
- Configure R2 with a default route pointing to R3.

```
R2(config)#router rip
R2(config-router)#no network 192.168.4.0
R2(config-router)#exit
R2(config)#ip route 0.0.0.0 0.0.0.0 serial 0/0/1
```

- Completely disable RIP routing on R3.
- Configure R3 with a static route pointing R2.

```
R3(config)#no router rip
R3(config)#ip route 172.30.0.0 255.255.252.0 serial 0/0/1
```

```
R1#show ip route
Gateway of last resort is not set

172.30.0.0/24 is subnetted, 3 subnets
C    172.30.1.0 is directly connected, FastEthernet0/0
C    172.30.2.0 is directly connected, Serial0/0/0
R    172.30.3.0 [120/1] via 172.30.2.2, 00:00:05, Serial0/0/0

R2#show ip route
Gateway of last resort is 0.0.0.0 to network 0.0.0.0

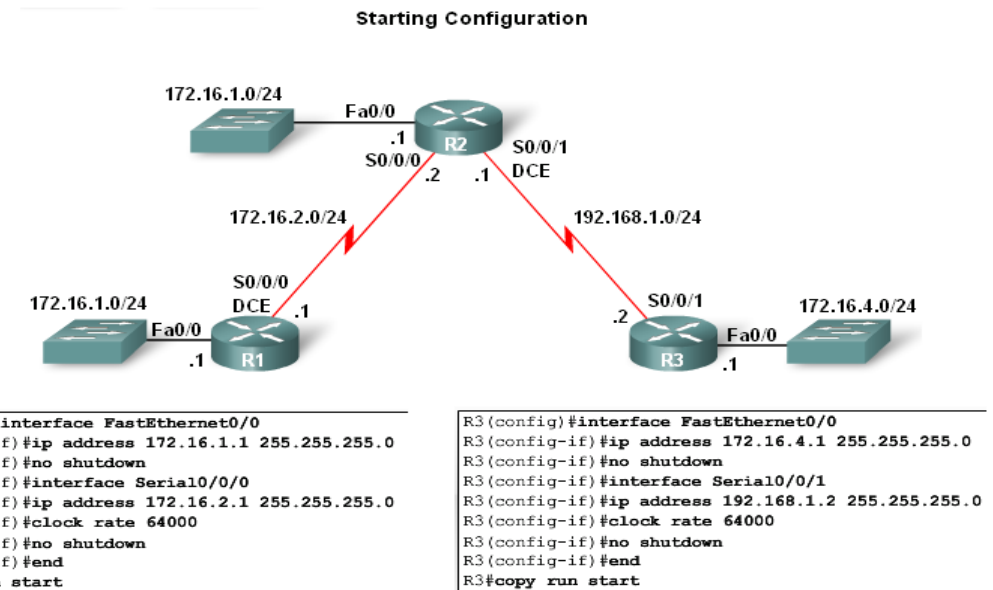
172.30.0.0/24 is subnetted, 3 subnets
R    172.30.1.0 [120/1] via 172.30.2.1, 00:00:03, Serial0/0/0
C    172.30.2.0 is directly connected, Serial0/0/0
C    172.30.3.0 is directly connected, FastEthernet0/0
192.168.4.0/30 is subnetted, 1 subnets
C    192.168.4.8 is directly connected, Serial0/0/1
S*  0.0.0.0/0 is directly connected, Serial0/0/1

R3#show ip route
Gateway of last resort is not set

172.30.0.0/22 is subnetted, 1 subnets
S    172.30.0.0 is directly connected, Serial0/0/1
192.168.4.0/30 is subnetted, 1 subnets
C    192.168.4.8 is directly connected, Serial0/0/1
C    192.168.5.0/24 is directly connected, FastEthernet0/0
```

OSPF (open shortest path first)

- Lab Topology
- 3 router setup
 - -R1 and R2 share a common 172.16.0.0/16 network with 172.16.0.0/24 subnets.
 - -R2 and R3 are connected by the 192.168.1.0/24 network.
 - -R3 also has a 172.16.4.0/24 subnet, which is disconnected, or dis contiguous, from the 172.16.0.0 network that R1 and R2 share.



OSPF (open shortest path first)

- Routing table entries come from the following sources
 - -Directly connected networks
 - -Static routes
 - -Dynamic routing protocols

Sample Routing Table

```
Router#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile,
<output omitted>

Gateway of last resort is not set

    172.16.0.0/24 is subnetted, 4 subnets
S       172.16.4.0 is directly connected, Serial0/0/1
R       172.16.1.0 [120/1] via 172.16.2.1, 00:00:08, Serial0/0/0
C       172.16.2.0 is directly connected, Serial0/0/0
C       172.16.3.0 is directly connected, FastEthernet0/0

    10.0.0.0/16 is subnetted, 1 subnets
S       10.1.0.0 is directly connected, Serial0/0/1
C       192.168.1.0/24 is directly connected, Serial0/0/1
S       192.168.100.0/24 is directly connected, Serial0/0/1
Router#
```

OSPF (open shortest path first)

Link-State Routing protocols Characteristics

- OSPF :(Open Shortest Path First)
- Integrated(IS-IS) : Intermediate system to Intermediate System

1.Use partial update

- ☐ The routers share all information with each other , then when changes occurs only the changed information sent immediately .
- ☐ Fast convergence time
- ☐ Need more hardware resources (processor &RAM)

OSPF (open shortest path first)

❑ The routers is **Link-State protocols** keep three important tables:

1. Neighbours table: contains all direct connected routers satisfy neighbors' relationship conditions.

2. Topology table: contains detailed information about all routers and routes on OSPF domains.

3. Routing table : contain all best routes calculated from topology table.

OSPF (open shortest path first)

Link-State Routing

- Link state routing protocols
 - -Also known as shortest path first algorithms
- These protocols built around Dijkstra's (SPF)
- ❖ To Calculate the best routes from **topology table** and install them into **routing table** .
- ❖ All link state protocols use Hello packets to establish neighbor relationship

Classification of Routing Protocols

	Interior Gateway Protocols				Exterior Gateway Protocols
	Distance Vector Routing Protocols		Link State Routing Protocols		Path Vector
Classful	RIP	IGRP			EGP
Classless	RIPv2	EIGRP	OSPFv2	IS-IS	BGPv4
IPv6	RIPng	EIGRP for IPv6	OSPFv3	IS-IS for IPv6	BGPv4 for IPv6

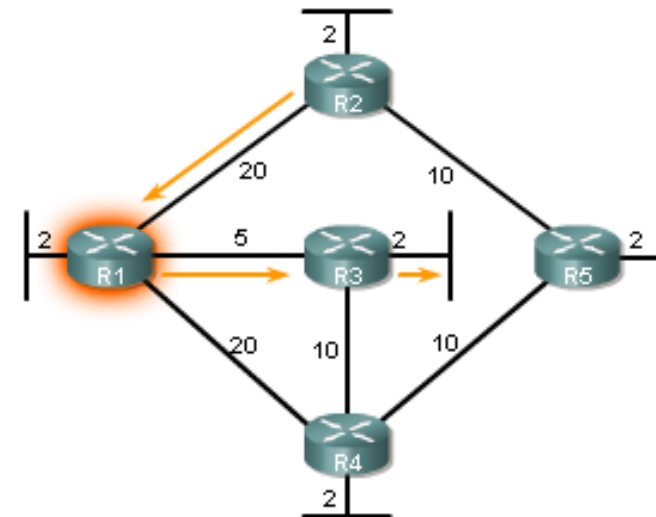
OSPF (open shortest path first)

Link-State Routing

- The shortest path to a destination is not necessarily the path with the least number of hops

Introduction to the SPF Algorithm

SPF Tree for R1



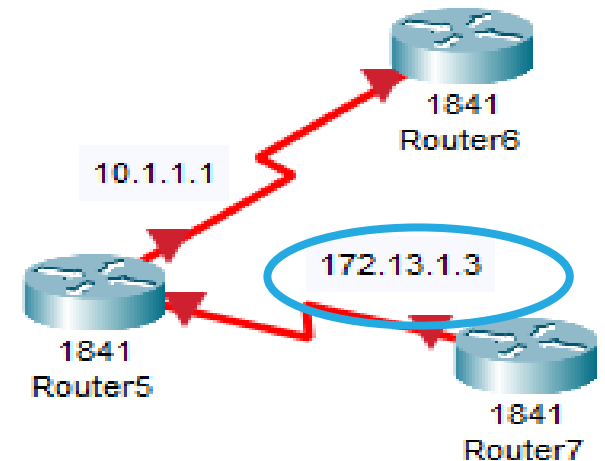
Destination	Shortest Path	Cost
R2 LAN	R1 to R2	22
R3 LAN	R1 to R3	7
R4 LAN	R1 to R3 to R4	17
R5 LAN	R1 to R3 to R4 to R5	27

OSPF (open shortest path first)

OSPF Router ID

- ❑ Router ID (identification number) is 32 bits
- ❑ Used to identify router on other router's neighbors and topology table
- ❑ Written in IPV4 format
- ❑ Electing router IP

A) Selecting the highest ip address on physical operational port.



OSPF (open shortest path first)

- ❑ This method for auto selecting router-id is not recommended because it makes OSPF domain unstable

B) Using Virtual Interface called (Loop Back) to identify router on other router's neighbors and topology table

- ❑ Loop back interface usually up so make the topology stable

```
R1 (config) #interface loopback 0  
R1 (config-if) #ip add 10.1.1.1 255.255.255.255
```

OSPF (open shortest path first)

- ❑ This method for auto selecting router-id is not recommended because it makes OSPF domain unstable

c)Configuring router- id manually , there is the most recommended way

```
Router(config-router)#router ospf 1
Router(config-router)#rou
Router(config-router)#router-id 1.1.1.1
Router(config-router)#
```

If router select id using A OR B before writing this command the router change its id by two ways :

```
Router#reload
```

```
Router#clear ip ospf processor
```



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