

# CCNA (200-301) Cisco Certified Network Associate

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### Lecture 5

جامعة الجميع الذكية

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

مزيد من التفاصيل

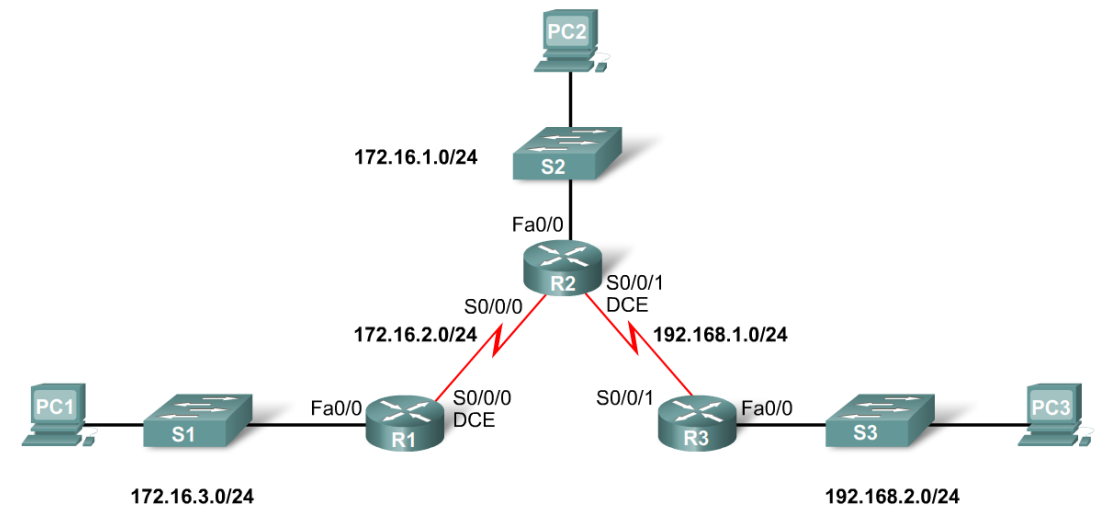
## Static Routing & Router Basic Configuration



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### General Role of the Router

- Functions of a Router
  - Best Path Selections
  - Forwarding packets to destination
- Introducing the Topology
  - 3 1800 series routers connected via WAN links
  - Each router connected to a LAN represented by a switch and a PC



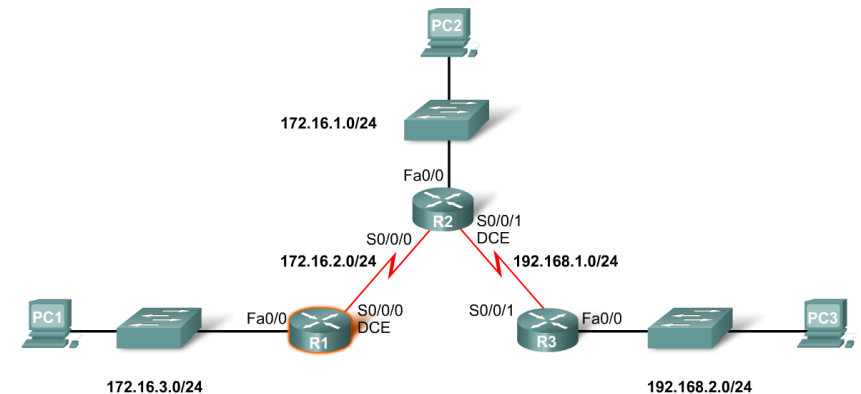
### General Role of the Router

- Connections of a Router for WAN
  - -A router has a DB-60 port that can support 5 different cabling standards
- Connections of a Router for Ethernet
  - -2 types of connectors can be used: Straight through and Cross-over
    - Straight through used to connect:
      - -Switch-to-Router, Switch-to-PC, Router-to-Server, Hub-to-PC, Hub-to-Server
    - Cross-over used to connect:
      - -Switch-to-Switch, PC-to-PC, Switch-to-Hub, Hub-to-Hub, Router-to-Router

### Interfaces

- **Examining Router Interfaces**

- -**Show IP router** command – used to view routing table
- -**Show Interfaces** command – used to show status of an interface
- -**Show IP Interface brief** command – used to show a portion of the interface information
- -**Show running-configuration** command – used to show configuration file in RAM



### Interfaces

- **Configuring a Serial interface**
  - -Enter **interface configuration mode**
  - -Enter in the ip address and subnet mask
  - -Enter in the **no shutdown** command
- Example:
  - -R1(config)#interface serial 0/0
  - -R1(config-if)#ip address 172.16.2.1 255.255.255.0
  - -R1(config-if)#no shutdown

Serial interface with down and down

```
R1#show interfaces serial 0/0/0
Serial0/0/0 is administratively down, line protocol is down
  Hardware is PowerQUICC Serial
  Internet address is 172.16.2.1/24
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
  <output omitted>
```

Serial interface is down and down even though it has an IP address and was enabled with no shutdown command.

### Interfaces

- **Examining Router Interfaces**

- -Physically connecting a WAN Interface.
- -A WAN Physical Layer connection has sides:
  - Data Circuit-terminating Equipment (DCE) – This is the service provider. CSU/DSU is a DCE device.
  - Data Terminal Equipment (DTE) – Typically the router is the DTE device.

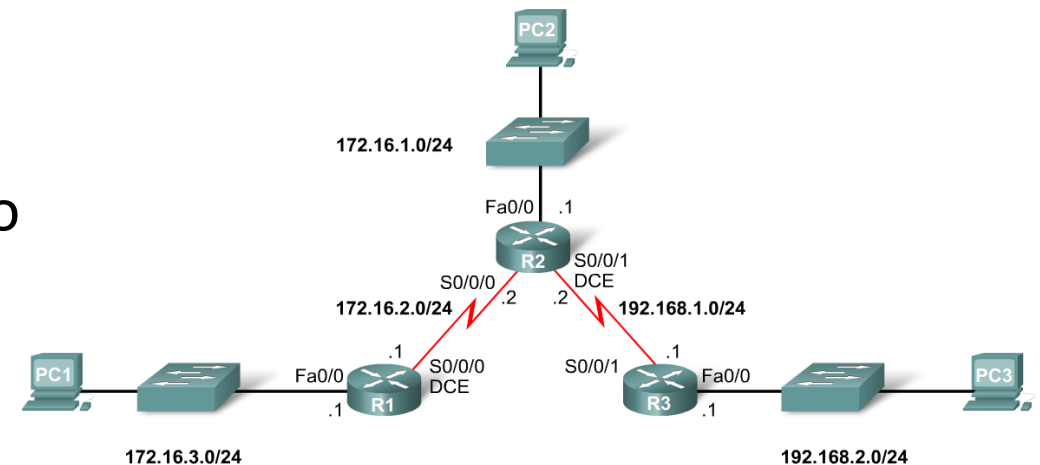
#show controller s0/0/1

### Interfaces

- **Configuring serial links in a lab environment**
  - One side of a serial connection must be considered a DCE
  - This requires placing a clocking signal – use the clock rate command.
  - Example:
    - -R1(config)#interface serial 0/0
    - -R1(config-if)#clock rate 64000
  - Serial Interfaces require a clock signal to control the timing of the communications.

# Routing Table and CDP Protocol

- When a router only has its interfaces configured & no other routing protocols are configured then:
  - -The routing table contains only the directly connected networks
  - -Only devices on the directly connected network are reachable



# Routing Table and CDP Protocol

Routing table has no routes

```
R1#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

R1#
```

```
R2(config)#interface serial 0/0/1
R2(config-if)#ip address 192.168.1.2 255.255.255.0
R2(config-if)#clock rate 64000
R2(config-if)#no shutdown
```

```
R3(config)#interface fastethernet 0/0
R3(config-if)#ip address 192.168.2.1 255.255.255.0
R3(config-if)#no shutdown
R3(config-if)#interface serial 0/0/1
R3(config-if)#ip address 192.168.1.1 255.255.255.0
R3(config-if)#no shutdown
```

Summary of interface status with show ip interface brief

```
R1#show ip interface brief
```

| Interface       | IP-Address | OK? | Method | Status                | Protocol |
|-----------------|------------|-----|--------|-----------------------|----------|
| FastEthernet0/0 | unassigned | YES | manual | administratively down | down     |
| Serial0/0/0     | unassigned | YES | unset  | administratively down | down     |
| FastEthernet0/1 | unassigned | YES | unset  | administratively down | down     |
| Serial0/0/1     | unassigned | YES | unset  | administratively down | down     |

## Routing Table and CDP Protocol

- **Purpose of CDP**

- A layer 2 cisco proprietary tool used to gather information about other **directly connected** Cisco devices.

- **Concept of neighbors**

- -2 types of neighbors
    - **Layer 3** neighbors
    - **Layer 2** neighbors

## Routing Table and CDP Protocol

- CDP(cisco discovery protocol) show commands
  - **Show cdp neighbors** command
    - -Displays the following information:
      - Neighbor device ID
      - Local interface
      - Hold time value, in seconds
      - Neighbor device capability code
      - Neighbor hardware platform
      - Neighbor remote port ID
  - **Show cdp neighbors detail** command
    - -Useful in determining if an IP address configuration error

# Routing Table and CDP Protocol

- Disabling CDP
  - To disable CDP globally use the following command
    - Router(config)#no cdp run

```
Router#show cdp neighbors
% CDP is not enabled
```

```
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#cdp ?
    run  Enable CDP
Router(config)#cdp ru
Router(config)#cdp run
Router(config)#
Router(config)#
Router(config)#
Router(config)#^Z
```

**Routing** : the process of selecting best path to forward the packets

### Routing Types

Static Routing

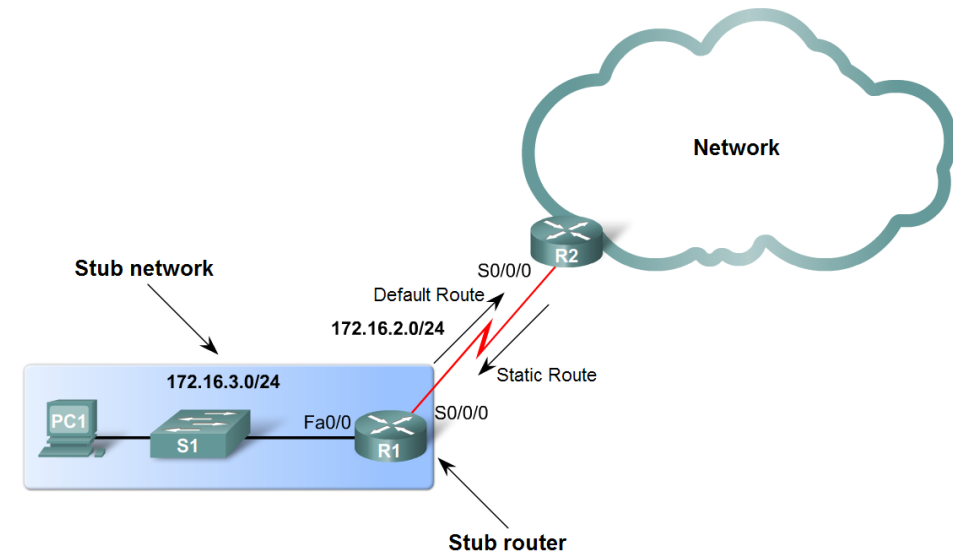
Dynamic Routing

- **Purpose of a static route**

- A manually configured route used when routing from a network to a stub network

### Static Routes with Exit Interfaces

- **Purpose of a static route**
  - A manually configured route used when routing from a network to a stub network



# Static Routes with Exit Interfaces

- **IP route command**

- To configure a static route use the following command: **ip route**
- Example:

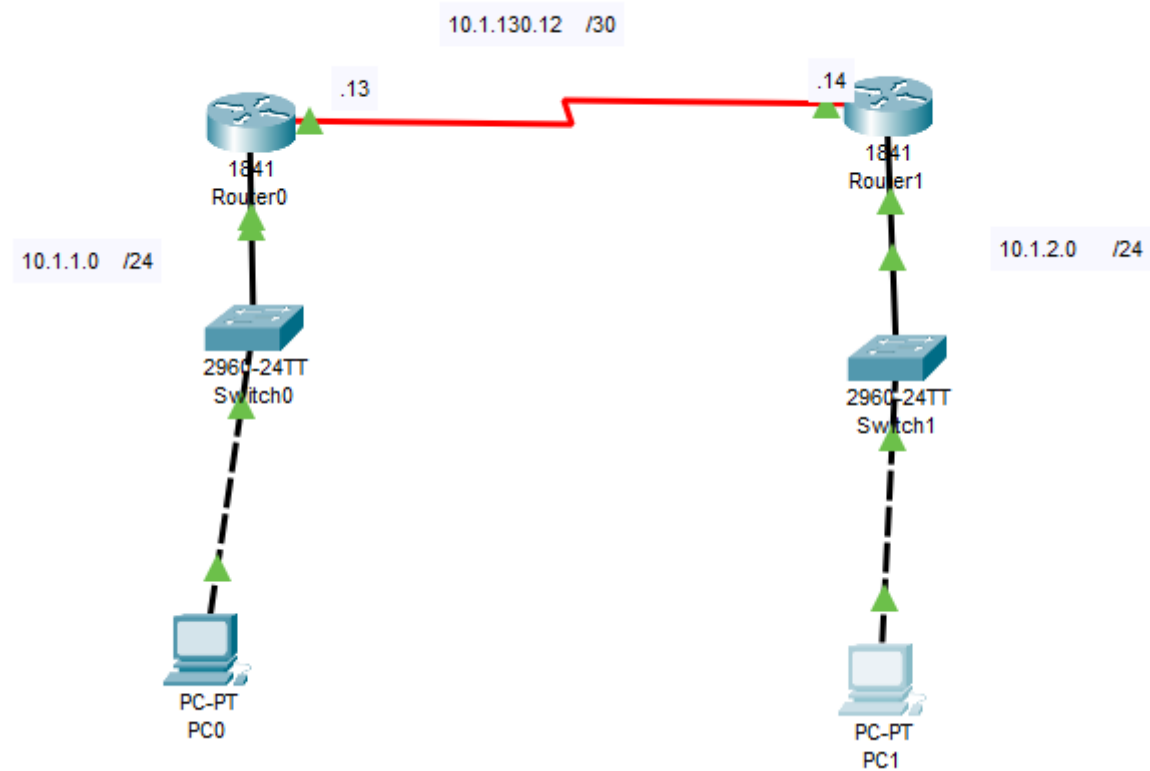
- -Router(config)# ip route network-address subnet-mask {ip-address of next hop | exit-interface }

```
Router(config)# ip route network-address subnet-mask  
{ip-address | exit-interface }
```

| Parameter              | Description                                                                                                                           |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| <b>network-address</b> | Destination network address of the remote network to be added to the routing table.                                                   |
| <b>subnet-mask</b>     | Subnet mask of the remote network to be added to the routing table. The subnet mask can be modified to summarize a group of networks. |
| <b>ip-address</b>      | Commonly referred to as the next-hop router's IP address.                                                                             |
| <b>exit-interface</b>  | Outgoing interface that is used to forward packets to the destination network.                                                        |

# Chapter 03

## Static Routing



# Chapter 03

## Static Routing

```
Router#show ip route
```

```
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
        * - candidate default, U - per-user static route, o - ODR
        P - periodic downloaded static route
```

```
Gateway of last resort is not set
```

```
10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C      10.1.1.0/24 is directly connected, FastEthernet0/0
C      10.1.130.12/30 is directly connected, Serial0/0/0
```

```
Router#conf t
```

```
Enter configuration commands, one per line. End with CNTL/Z.
```

```
Router(config)#
```

```
Router(config)#
```

```
Router(config)#ip ro
```

```
Router(config)#ip route 10.1.2.0 255.255.255.0 s0/0/0
```

```
Router(config)#^Z
```

```
Router#
```

```
%SYS-5-CONFIG_I: Configured from console by console
```

```
Router#
```

```
Router#
```

```
Router#
```

```
Router#
```

```
Router#
```

```
Router#show ip ro
```

```
Router#show ip route
```

```
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
        * - candidate default, U - per-user static route, o - ODR
        P - periodic downloaded static route
```

```
Gateway of last resort is not set
```

```
10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks
C      10.1.1.0/24 is directly connected, FastEthernet0/0
S      10.1.2.0/24 is directly connected, Serial0/0/0
C      10.1.130.12/30 is directly connected, Serial0/0/0
```



# Chapter 03

## Static Routing

```
R2#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
        * - candidate default, U - per-user static route, o - ODR
        P - periodic downloaded static route

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       10.1.2.0/24 is directly connected, FastEthernet0/0
C       10.1.130.12/30 is directly connected, Serial0/0/0
```

```
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#
R2(config)#
R2(config)#
R2(config)#
R2(config)#ip ro
R2(config)#ip route 10.1.1.0 255.255.255.0 10.1.130.13
R2(config)#
R2(config)#
R2(config)#^Z
R2#
%SYS-5-CONFIG_I: Configured from console by console
```

```
R2#
R2#
R2#
R2#
R2#show ip ro
R2#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
        D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
        N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
        E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
        i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
        * - candidate default, U - per-user static route, o - ODR
        P - periodic downloaded static route
```

```
Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks
S       10.1.1.0/24 [1/0] via 10.1.130.13
C       10.1.2.0/24 is directly connected, FastEthernet0/0
C       10.1.130.12/30 is directly connected, Serial0/0/0
```





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