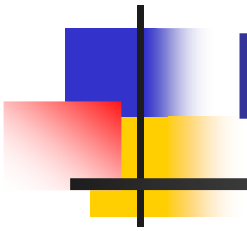
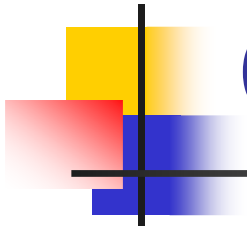


Routing and Routing Protocols

Connected routes & Routing table

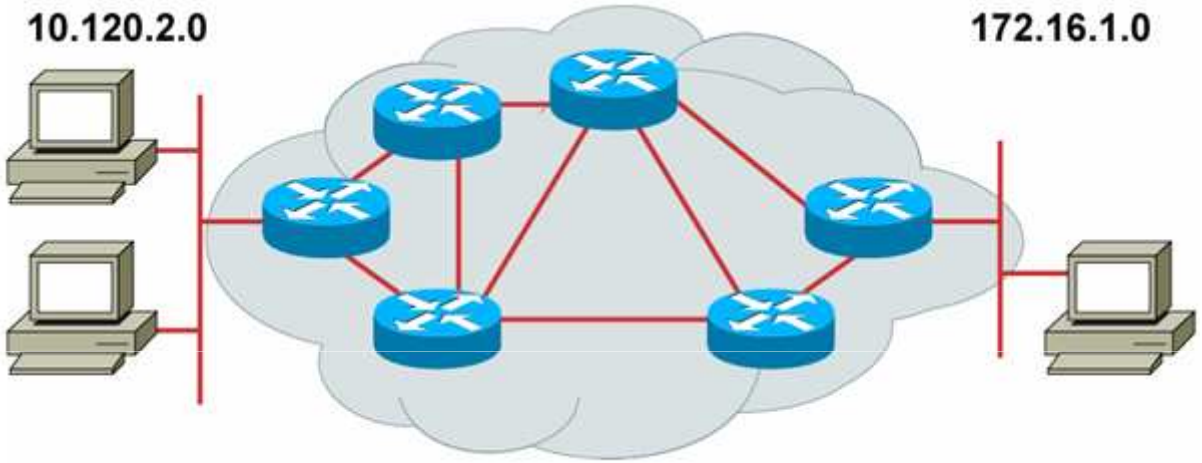
Trần Tuấn Toàn



Objective

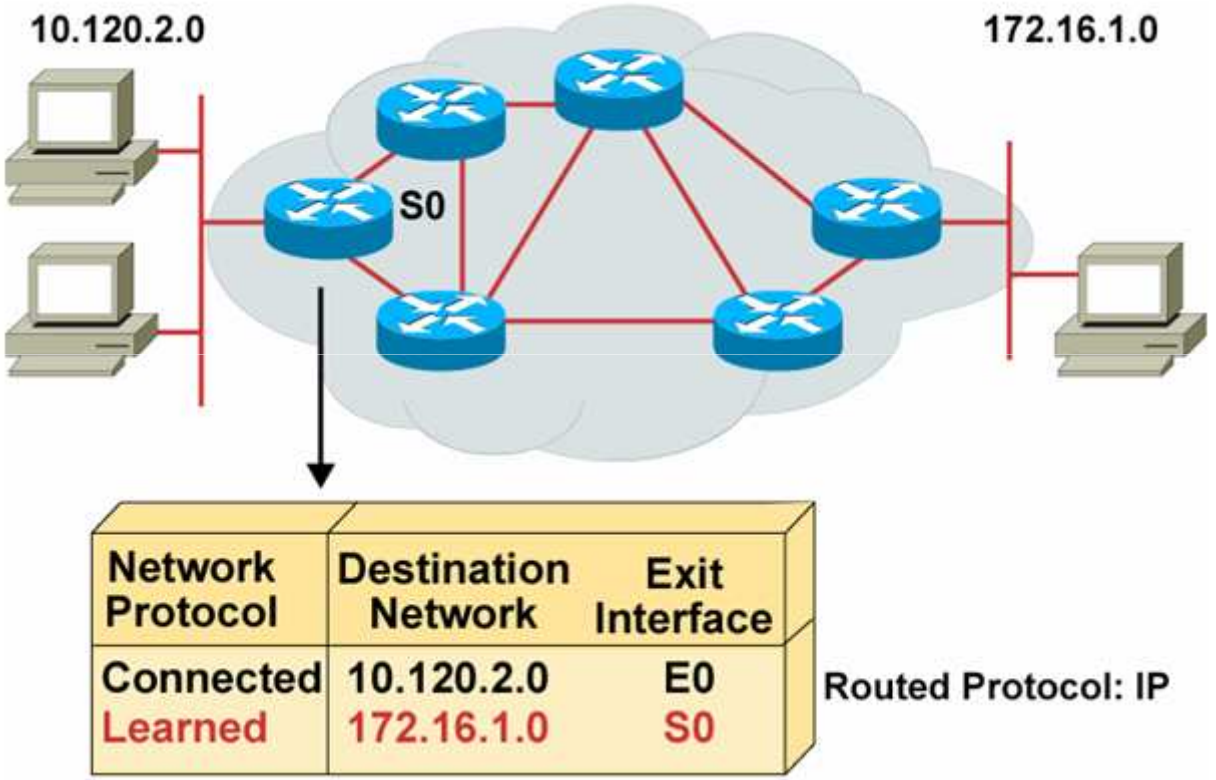
- Routing
- Routing table
- Static Routing
- Dynamic Routing
  - Routing Protocols

What is routing



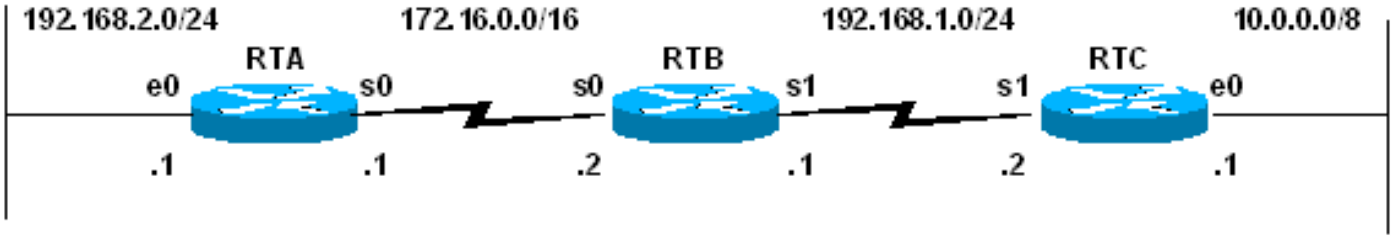
- Để dẫn đường, Router cần phải:
  - Biết được địa chỉ đích
  - Xác định được những nguồn mà có thể học được mạng từ đó
  - Xác định các đường đi có thể
  - Lựa chọn đường đi tốt nhất
  - Duy trì và kiểm tra thông tin các đường đi

What is routing



Router cần phải học những đích mà không kết nối trực tiếp với nó

Directly Connected Network & Routing table

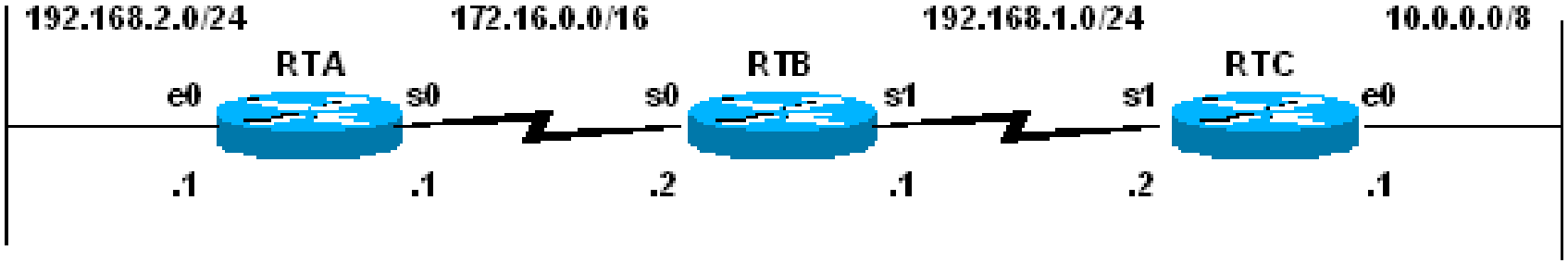



```
RTA#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP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

Gateway of last resort is not set

RTA#
```

show ip route command

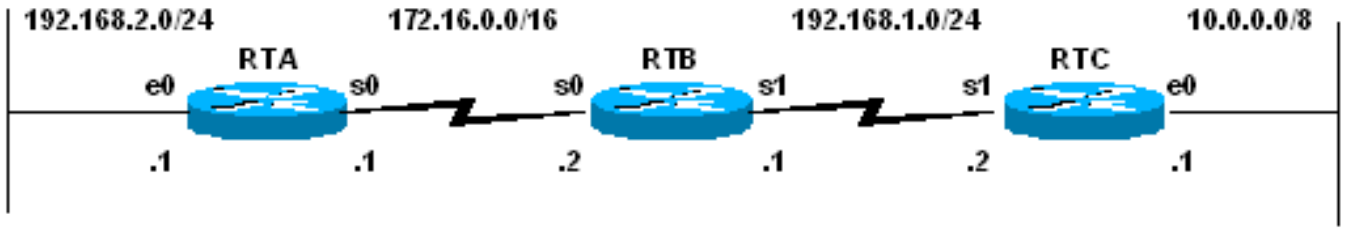
Routing table trước khi cấu hình bất kỳ Interface nào

Directly Connected Network & Routing table



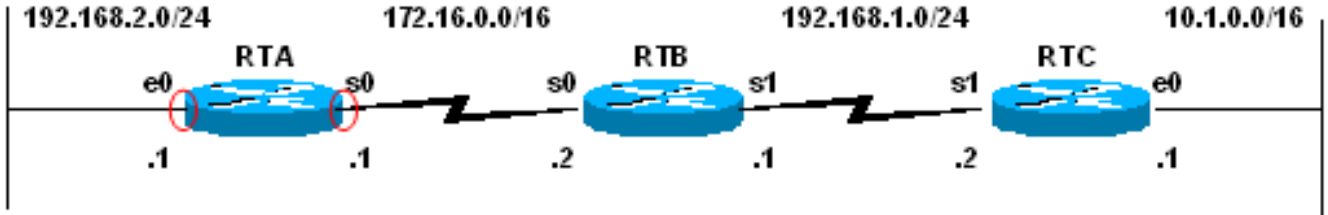

```
RTA(config)#inter e 0
RTA(config-if)#ip add 192.168.2.1 255.255.255.0
RTA(config-if)#no shutdown

RTA#show ip route
Codes: C - connected, . <Other codes and gateway information omitted>

C    192.168.2.0/24 is directly connected, Ethernet0
RTA#
```

Directly Connected Network & Routing table



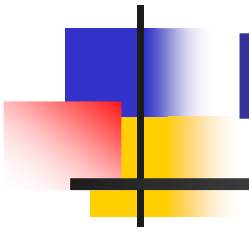

```
RTA#show ip route
Codes: C - connected,.. <Other codes and gateway information omitted>
C    172.16.0.0/16 is directly connected, Serial0
C    192.168.2.0/24 is directly connected, Ethernet0

RTB#show ip route
Codes: C - connected,.. <Other codes and gateway information omitted>
C    172.16.0.0/16 is directly connected, Serial0
C    192.168.1.0/24 is directly connected, Serial1

RTC#show ip route
Codes: C - connected,.. <Other codes and gateway information omitted>
C    10.0.0.0/8 is directly connected, Ethernet0
C    192.168.1.0/24 is directly connected, Serial1
```

Directly Connected Network & Routing table




```
RTA#show ip route
C    172.16.0.0/16 is directly connected, Serial0
C    192.168.2.0/24 is directly connected, Ethernet0
RTA#ping 172.16.0.1
!!!!!
RTA#ping 172.16.0.2
!!!!!
RTA#ping 192.168.1.1
.....
RTA#ping 192.168.1.2
.....
RTA#ping 10.1.0.1
.....
```

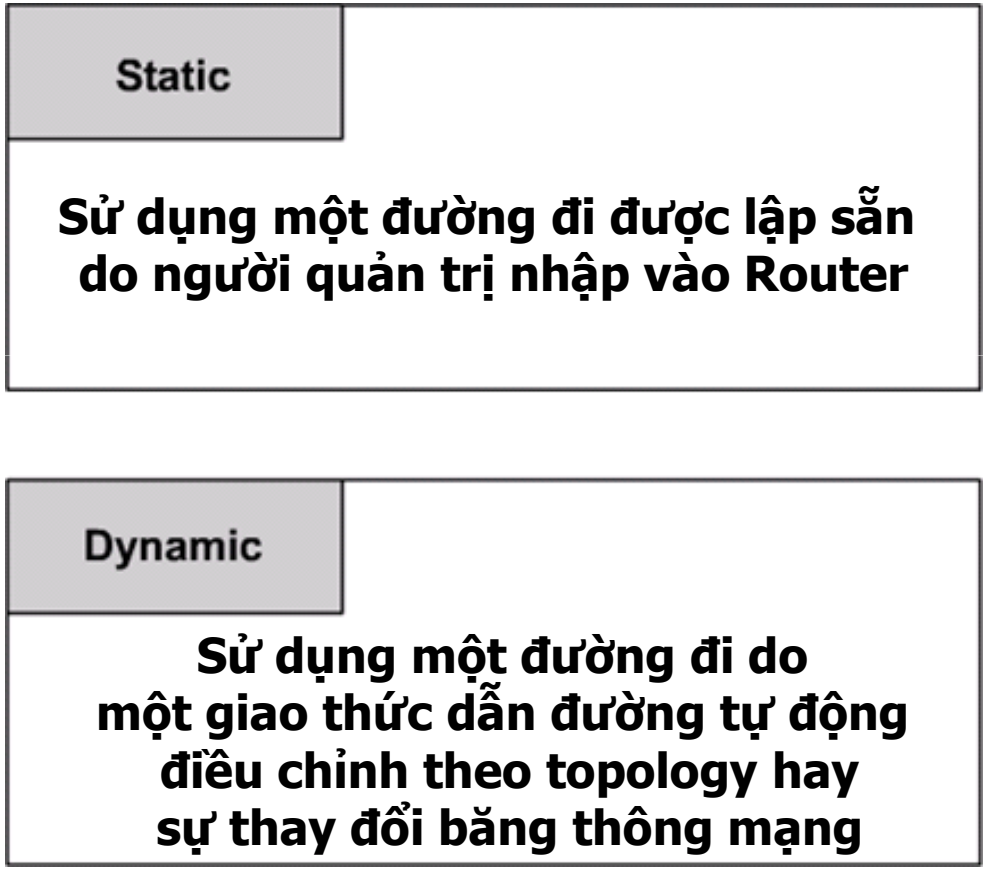
- **Q:** RTA có thể ping được đến **172.16.0.2** của RTB, tại sao không ping được đến **192.168.1.1** của RTB



Routing and Routing Protocols

Static Route

Routing Type



Static Route Operation

```
Hoboken(config)#ip route 172.16.1.0 255.255.255.0 s0
```

command | destination net | subnet mask | outgoing interface

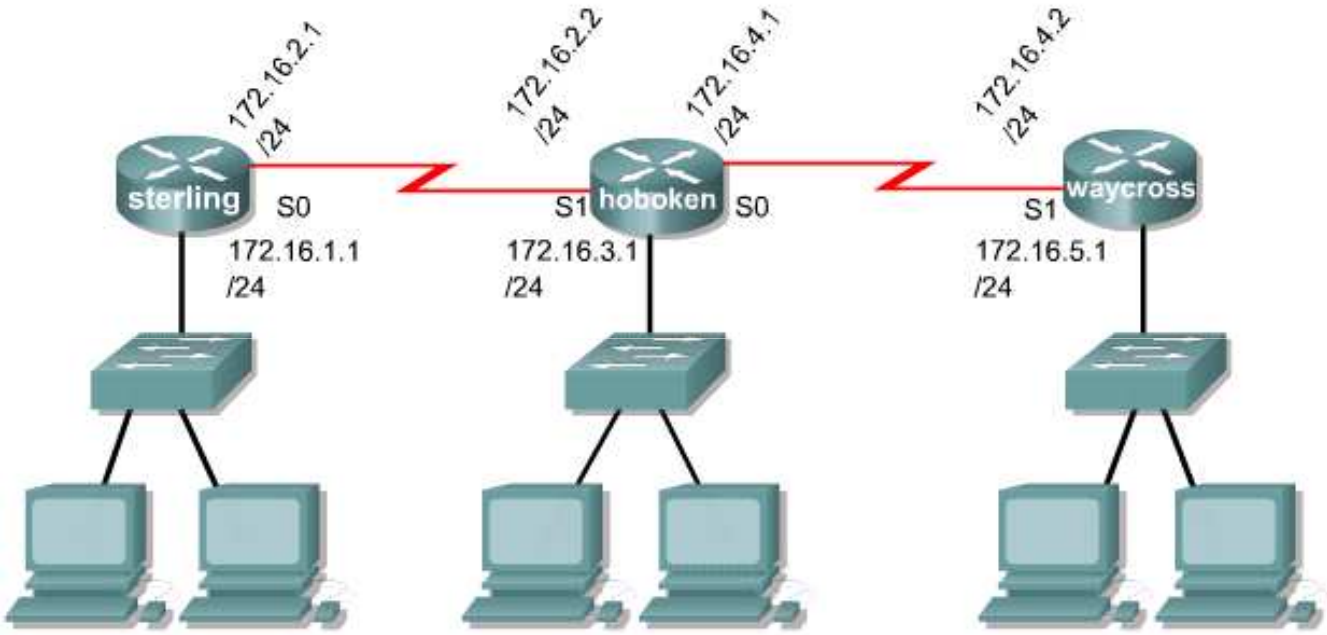
```
Hoboken#show ip route
Codes: C - connected, S - static,
S    172.16.1.0/24 [1/0] is directly connected, Serial0
C    192.168.2.0/24 is directly connected, Ethernet0
```

ip route command

- Router(config)#
  ip route *prefix mask* {address | interface} [distance]
  - *prefix/mask*: destination network & subnet mask
  - address: "*next hop*" IP address
  - interface: outgoing interface
  - distance: administrative distance

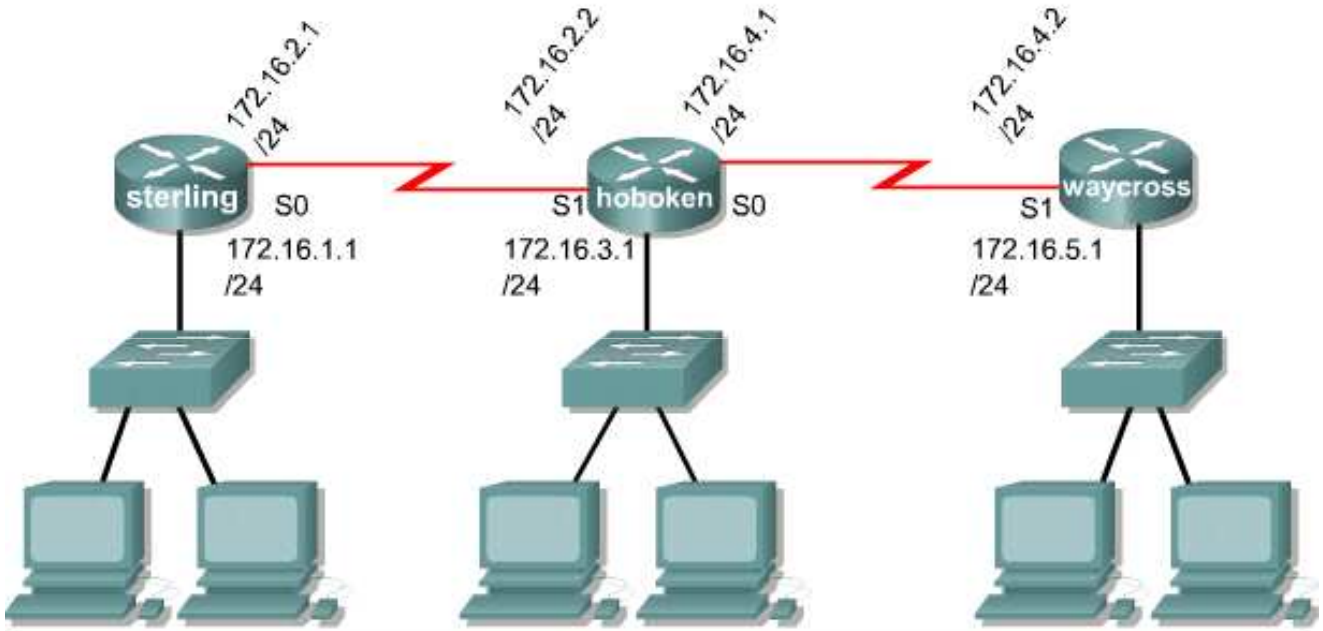
Administrative Distance Route Source	Default Distance
Connected interface	0
Static route	1
EIGRP summary route	5
External BGP	20
EIGRP internal route	90
IGRP	100
OSPF	110
IS-IS	115
RIP	120
EIGRP external route	170
Internal BGP	200
Unknown	255

Static Route Operation



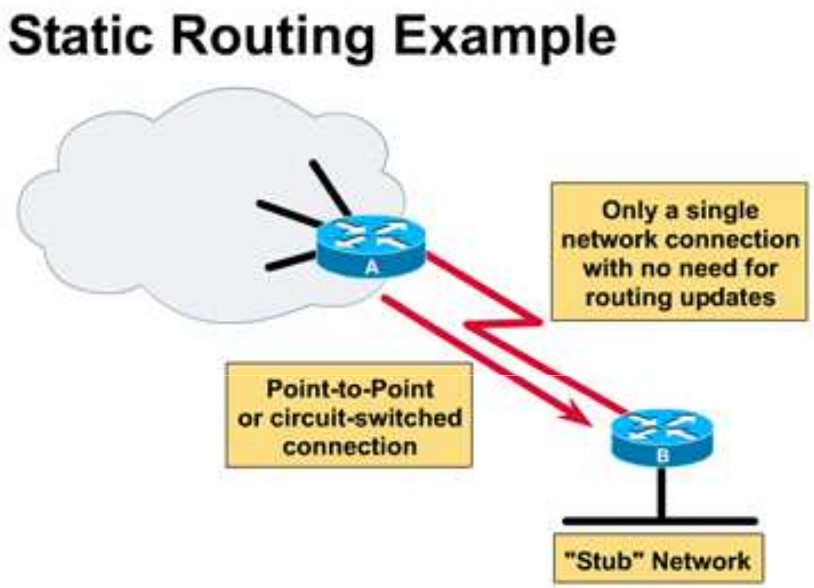

```
Hoboken(config)#ip route 172.16.1.0 255.255.255.0 s1
                    command destination   sub mask    gateway
                            network
Hoboken(config)#ip route 172.16.5.0 255.255.255.0 s0
                    command destination   sub mask    gateway
                            network
```

Static Route Operation



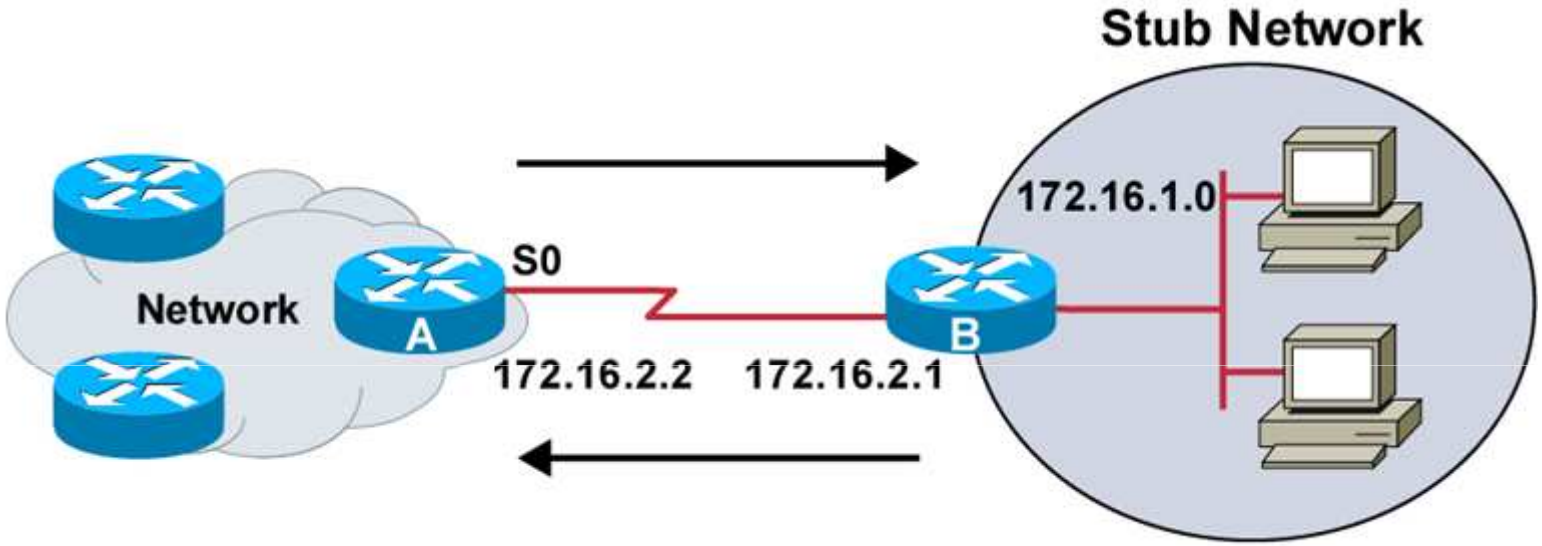

```
Hoboken(config)#ip route 172.16.1.0 255.255.255.0 172.16.2.1
                    command destination  sub mask    gateway
                            network
Hoboken(config)#ip route 172.16.5.0 255.255.255.0 172.16.4.2
                    command destination  sub mask    gateway
                            network
```

Common uses for Static Routes



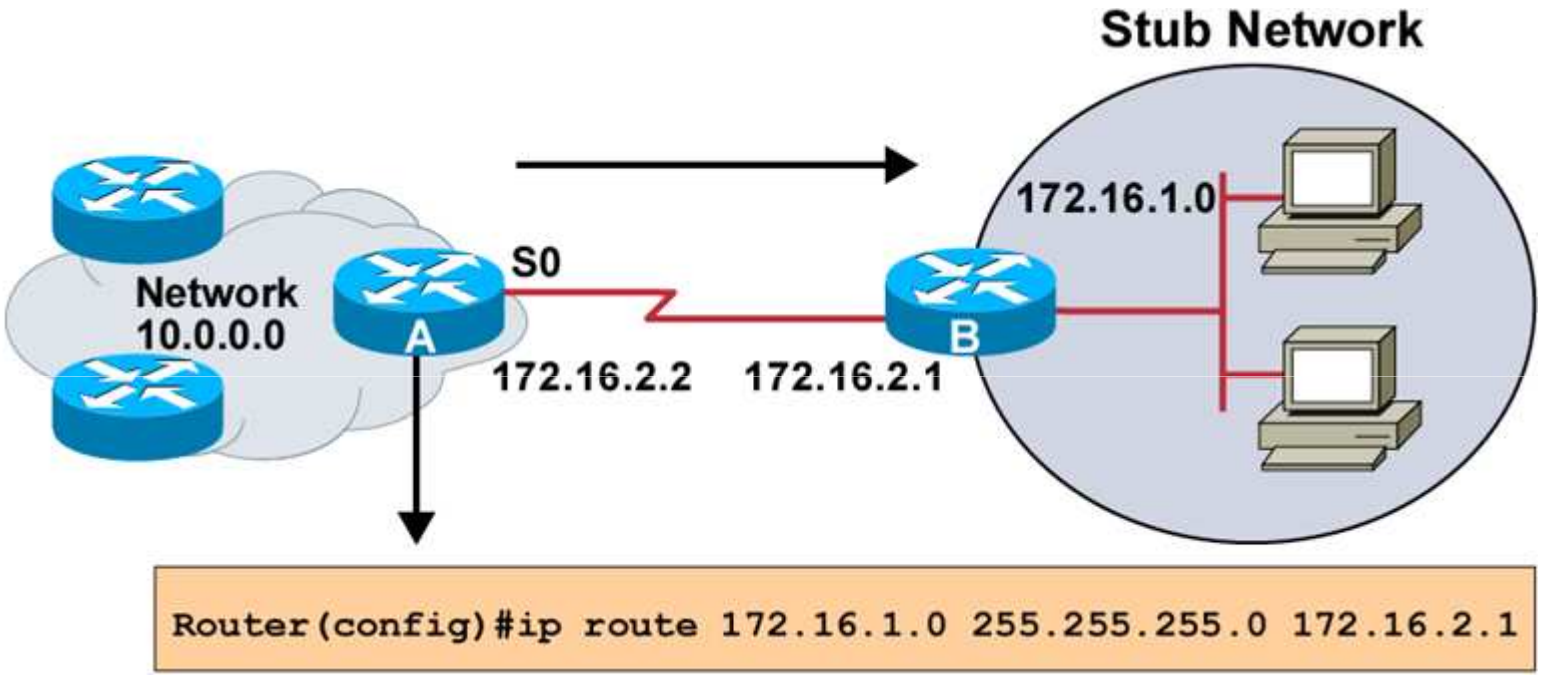
- Static Routes thường được dùng kết hợp với Dynamic Routing Protocols.
- Static Routes thường được dùng khi Dynamic Routing Protocols có những bất lợi hay không cần thiết

Static Route Example



- Một đường đi tĩnh thường được cấu hình nhằm mục đích cho phép giao tiếp từ / đến một mạng (*stub network*)

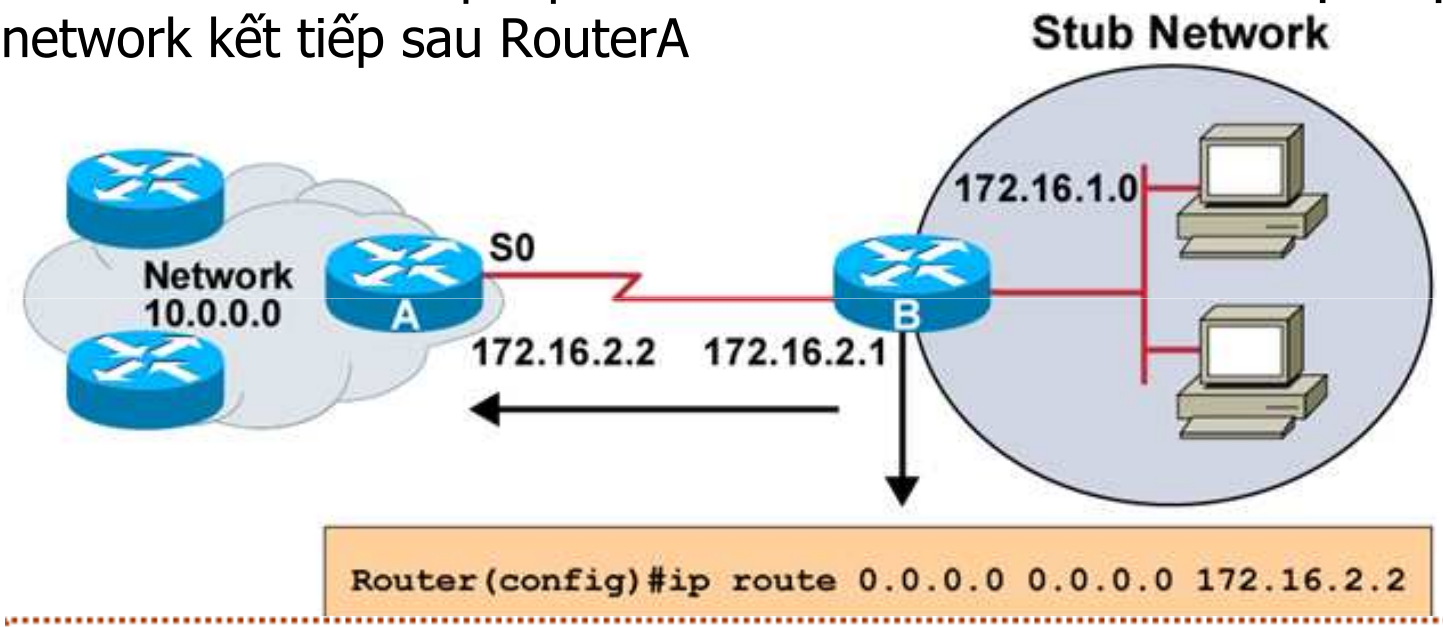
Static Route Example



- Với kiểu kết nối point-to-point bằng liên kết serial:
  - ⇨ hoàn toàn có thể dùng *outgoing interface* thay vì dùng *next-hop ip address*

Default Route

- Default Route: cho phép stub network có thể đi đến được mọi network kết tiếp sau RouterA

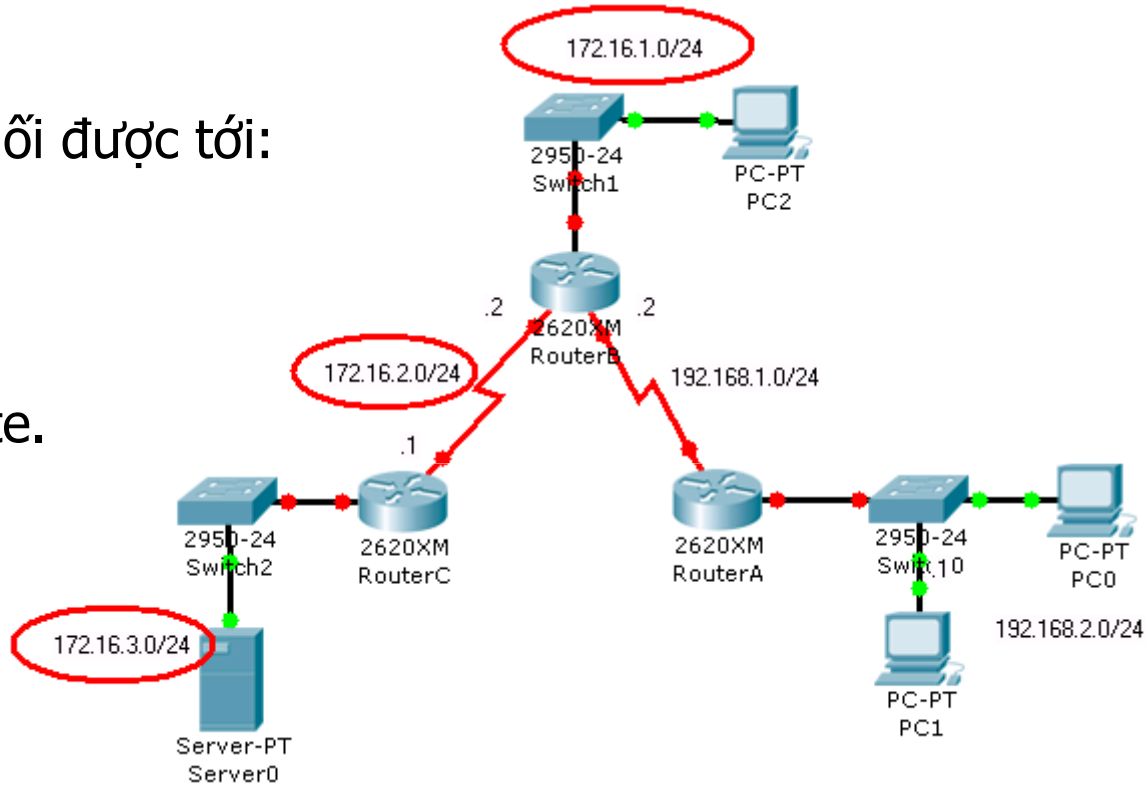



```
Router(config)#ip route 0.0.0.0 0.0.0.0 172.16.2.2
```

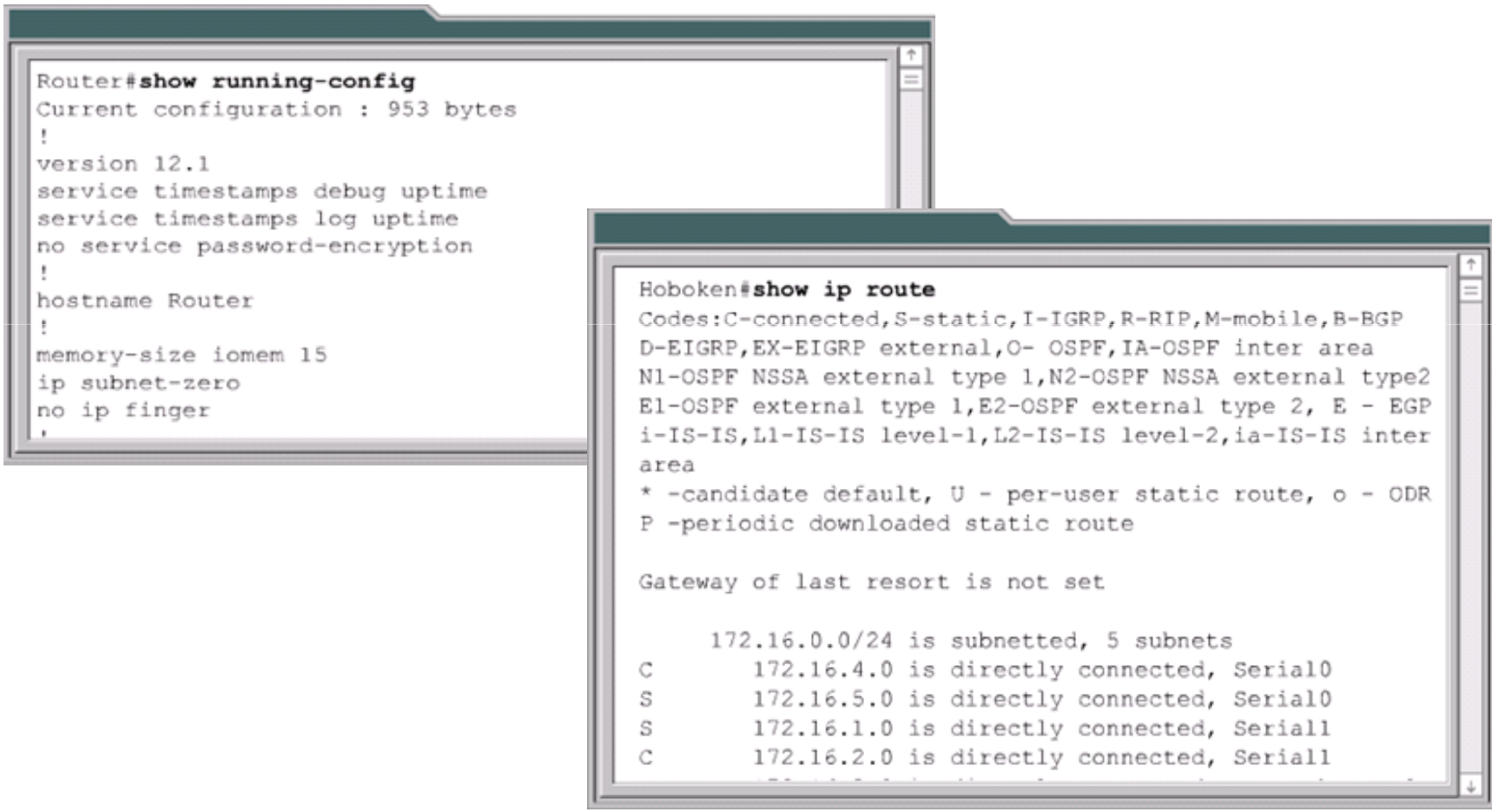
```
RTB#show ip route
Gateway of last resort is 172.16.2.2 to network 0.0.0.0
 172.16.0.0/16 is subnetted, 1 subnets
C    172.16.1.0/24 is directly connected, Ethernet0
C    172.16.2.0/24 is directly connected, Serial1
S*   0.0.0.0/0 [1/0] via 172.16.2.2
```

Static Route Example

- PC0,PC1 muốn kết nối được tới:
  - 172.16.1.0/24
  - 172.16.2.0/24
  - 172.16.3.0/24
- Cấu hình Static Route.



Verify Static Route



Ping & Traceroute