

## Report

### Lab 1: Variable Length Subnet Mask và Định tuyến tĩnh

Nhóm: 11

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#### Yêu cầu 1 :

Sử dụng lớp mạng 10.x.y.0/24, với x và y là 2 số cuối của MSSV của 2 bạn trong nhóm để chia các mạng con cho mô hình của bài thực hành với số host phù hợp.

Lưu ý: trường hợp nhóm 1 người thì lấy x và y là 4 số cuối của MSSV. VD: 1456  
→ x = 14, y = 56.

#### Bài làm

- **Xét subnet có 100 host:**

$2^7 - 2 = 126 \text{ host} \geq 120 \text{ host}$ , cần 7 bit dành cho phần host, mượn  $8 - 7 = 1$  bit để làm phần net

- Dải 10.11.16.0/24 được chia thành 2 subnet:
  - 10.11.16.0/25 (cài đặt 120 host)
  - 10.11.16.128/25 (còn dư)

- **Xét subnet có 15 host:**

$2^5 - 2 = 30 \text{ host} \geq 15 \text{ host}$ , cần 5 bit dành cho phần host, mượn  $7 - 5 = 2$  bit để làm phần net.

- Dải 10.11.16.128/25 chia thành 2 subnet:

- 10.11.16.128/27 (cài đặt cho 15 host)
- 10.11.16.160/27 (còn dư)

• **Xét subnet có 10 host:**

$2^4 - 2 = 14 \text{ host} \geq 10 \text{ host}$ , cần 4 bit dành cho phần host, mượn  $5 - 4 = 1$  bit để làm phần net.

- Dải 10.11.16.160/27 chia thành 2 subnet:
  - 10.11.16.160/28 (cài đặt cho 15 host)
  - 10.11.16.176/28 (còn dư)

• **Xét subnet có 2 host:**

$2^2 - 2 = 2 \text{ host} \geq 2 \text{ host}$ , cần 2 bit dành cho phần host, mượn  $4 - 2 = 2$  bit để làm phần net.

- Dải 10.11.16.176/28 chia thành 4 subnet:
  - 10.11.16.176/30 (cài đặt cho 2 host)
  - 10.11.16.180/30 (cài đặt cho 2 host)
  - 10.11.16.184/30 (cài đặt cho 2 host)
  - 10.11.16.188/30 (cài đặt cho 2 host)

Số hosts	Network	Subnet mask	Dải IP	Broadcast
100	10.11.16.0/25	255.255.255.128	10.11.16.1 - 10.11.16.126	10.11.16.127
15	10.11.16.128/27	255.255.255.224	10.11.16.129 - 10.11.16.158	10.11.16.159
10	10.11.16.160/28	255.255.255.240	10.11.16.161 - 10.11.16.174	10.11.16.175
2	10.11.16.176/30	255.255.255.252	10.11.16.177 - 10.11.16.178	10.11.16.179

2	10.11.16.180/30	255.255.255.252	10.11.16.181 - 10.11.16.182	10.11.16.183
2	10.11.16.184/30	255.255.255.252	10.11.16.185 - 6.186	10.11.16.187
2	10.11.16.188/30	255.255.255.252	10.11.16.189 - 6.190	10.11.16.191

**Yêu cầu 2:** Sử dụng các mạng con đã chia được ở Yêu cầu 1 cho các thiết bị của mô hình, lập bảng địa chỉ IP cho các thiết bị với lưu ý bên dưới

Bài làm

Thiết bị	Interface	Địa chỉ IP	Subnet Mask	Default Gateway
R1	G0/0/1	10.11.16.1	255.255.255.128	N/A
	S0/1/0	10.11.16.177	255.255.255.252	N/A
	S0/1/1	10.11.16.181	255.255.255.252	N/A
R2	S0/1/0	10.11.16.178	255.255.255.252	N/A
	S0/1/1	10.11.16.185	255.255.255.252	N/A
R3	G0/0/0	10.11.16.161	255.255.255.240	N/A
	G0/0/1	10.11.16.129	255.255.255.224	N/A
	S0/1/0	10.11.16.186	255.255.255.252	N/A

	S0/1/1	10.11.16.190	255.255.255.252	N/A
R4	S0/1/0	10.11.16.189	255.255.255.252	N/A
	S0/1/1	10.11.16.182	255.255.255.252	N/A
PC-A	NIC	10.11.16.4	255.255.255.128	10.11.16.1
ServerB1	NIC	10.11.16.163	255.255.255.240	10.11.16.161
ServerB2	NIC	10.11.16.131	255.255.255.224	10.11.16.129

**Yêu cầu 3:** Sinh viên thực hiện cấu hình cơ bản cho các thiết bị (các router và các switch)

Bài làm

- Cấu hình cơ bản R1

```

Router>enable
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname R1
R1(config)#enable password inseclab
R1(config)#service password-encryption
R1(config)#line console 0
R1(config-line)#password inseclab
R1(config-line)#login
R1(config-line)#exit
R1(config)#line vty 0 4
R1(config-line)#password inseclab
R1(config-line)#login
R1(config-line)#exit
R1(config)#copy running-config startup-config
      ^
% Invalid input detected at '^' marker.

R1(config)#exit
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#
R1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R1#show running-config
Building configuration...

Current configuration : 816 bytes
!
version 15.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname R1
!
!
!
enable password 7 0828425D0C1A091610
!
!
!
!
!
no ip cef
no ipv6 cef

```

- Cấu hình cơ bản R2

```

Press RETURN to get started!

Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R2
R2(config)#enable password inseclab
R2(config)#service password-encryption
R2(config)#line console 0
R2(config-line)#password inseclab
R2(config-line)#login
R2(config-line)#exit
R2(config)#line vty 0 4
R2(config-line)#password inseclab
R2(config-line)#login
R2(config-line)#exit
R2(config)#exit
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R2#show running-config
Building configuration...

Current configuration : 816 bytes
!
version 15.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname R2
!
!
!
enable password 7 0828425D0C1A091610
!
!
!
!
!
no ip cef
no ipv6 cef
--More--

```

- Cấu hình cơ bản R3

```

Press RETURN to get started!

Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R3
R3(config)#enable password inseclab
R3(config)#service password-encryption
R3(config)#line console 0
R3(config-line)#password inseclab
R3(config-line)#login
R3(config-line)#exit
R3(config)#line vty 0 4
R3(config-line)#password inseclab
R3(config-line)#login
R3(config-line)#exit
R3(config)#exit
R3#
%SYS-5-CONFIG_I: Configured from console by console

R3#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R3#show running-config
Building configuration...

Current configuration : 816 bytes
!
version 15.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname R3
!
!
!
enable password 7 0828425D0C1A091610
!
!
!
!
!
no ip cef
no ipv6 cef
--More--

```

- Cấu hình cơ bản R4

```

Press RETURN to get started!

Router>enable
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname R4
R4(config)#enable password inseclab
R4(config)#service password-encryption
R4(config)#line console 0
R4(config-line)#password inseclab
R4(config-line)#login
R4(config-line)#exit
R4(config)#line vty 0 4
R4(config-line)#password inseclab
R4(config-line)#login
R4(config-line)#exit
R4(config)#exit
R4#
%SYS-5-CONFIG_I: Configured from console by console

R4#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R4#show running-config
Building configuration...

Current configuration : 816 bytes
!
version 15.4
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname R4
!
!
!
enable password 7 0828425D0C1A091610
!
!
!
!
!
no ip cef
no ipv6 cef
--More--

```

**Yêu cầu 4:** Sinh viên thực hiện cấu hình địa chỉ IP cho các Router và PC theo bảng chia địa chỉ IP ở Yêu cầu 2

### Bài làm

- Cấu hình địa chỉ IP R1



User Access Verification

Password:

R1>enable

Password:

R1#configure terminal

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

R1(config)#interface GigabitEthernet 0/0/1

R1(config-if)#no shutdown

R1(config-if)#

%LINK-5-CHANGED: Interface GigabitEthernet0/0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/1, changed state to up

R1(config-if)#ip address 10.11.16.1 255.255.255.128

R1(config-if)#interface Serial 0/1/0

R1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/1/0, changed state to down

R1(config-if)#ip address 10.11.16.177 255.255.255.252

R1(config-if)#interface Serial 0/1/1

R1(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down

R1(config-if)#ip address 10.11.16.181 255.255.255.252

R1(config-if)#^Z

R1#

%SYS-5-CONFIG\_I: Configured from console by console

R1#show ip interface brief

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0/0	unassigned	YES	unset	administratively down	down
GigabitEthernet0/0/1	10.11.16.1	YES	manual	up	up
Serial0/1/0	10.11.16.177	YES	manual	down	down
Serial0/1/1	10.11.16.181	YES	manual	down	down
Vlan1	unassigned	YES	unset	administratively down	down

R1#

- Cấu hình địa chỉ IP R2

User Access Verification

Password:

R2>enable

Password:

R2#configure terminal

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

R2(config)#interface Serial 0/1/0

R2(config-if)#no shutdown

R2(config-if)#

%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up

R2(config-if)#

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up

R2(config-if)#ip address 10.11.16.178 255.255.255.252

R2(config-if)#interface Serial 0/1/1

R2(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down

R2(config-if)#ip address 10.11.16.185 255.255.255.252

R2(config-if)#^Z

R2#

%SYS-5-CONFIG\_I: Configured from console by console

R2#show ip interface brief

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0/0	unassigned	YES	unset	administratively down	down
GigabitEthernet0/0/1	unassigned	YES	unset	administratively down	down
Serial0/1/0	10.11.16.178	YES	manual	up	up
Serial0/1/1	10.11.16.185	YES	manual	down	down
Vlan1	unassigned	YES	unset	administratively down	down

R2#

- Cấu hình địa chỉ IP R3

```

Password:
Password:
R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#interface GigabitEthernet 0/0/0
R3(config-if)#no shutdown

R3(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed state to up

R3(config-if)#ip address 10.11.16.161 255.255.255.240
R3(config-if)#interface GigabitEthernet 0/0/1
R3(config-if)#no shutdown

R3(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/1, changed state to up

R3(config-if)#ip address 10.11.16.129 255.255.255.224
R3(config-if)#interface Serial0/1/0
R3(config-if)#no shutdown

R3(config-if)#
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up

R3(config-if)#ip address 10.11.16.129 255.255.255.224
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to down
R3(config-if)#interface Serial0/1/0
R3(config-if)#no shutdown
R3(config-if)#ip address 10.11.16.186 255.255.255.252
R3(config-if)#interface Serial0/1/1
R3(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/1/1, changed state to down
R3(config-if)#ip address 10.11.16.190 255.255.255.252
R3(config-if)#^Z
R3#
%SYS-5-CONFIG_I: Configured from console by console

R3#show ip interface brief

```

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0/0	10.11.16.161	YES	manual	up	up
GigabitEthernet0/0/1	10.11.16.129	YES	manual	up	up
Serial0/1/0	10.11.16.186	YES	manual	up	up
Serial0/1/1	10.11.16.190	YES	manual	down	down
Vlan1	unassigned	YES	unset	administratively down	down

```

R3#

```

- Cấu hình địa chỉ IP R4

```

R4#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R4(config)#interface Serial 0/1/0
R4(config-if)#no shutdown
R4(config-if)#ip address 10.11.16.189 255.255.255.252
R4(config-if)#interface Serial 0/1/1
R4(config-if)#no shutdown
R4(config-if)#ip address 10.11.16.182 255.255.255.252
R4(config-if)#^Z
R4#
%SYS-5-CONFIG_I: Configured from console by console

R4#show ip interface brief

```

Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0/0	unassigned	YES	unset	administratively down	down
GigabitEthernet0/0/1	unassigned	YES	unset	administratively down	down
Serial0/1/0	10.11.16.189	YES	manual	up	up
Serial0/1/1	10.11.16.182	YES	manual	up	up
Vlan1	unassigned	YES	unset	administratively down	down

```

R4#

```

- Cấu hình địa chỉ IP PC-A

The screenshot shows the configuration window for PC-A. The 'Desktop' tab is selected. Under 'IP Configuration', the 'Interface' is set to 'FastEthernet0'. The 'DHCP' radio button is unselected, and the 'Static' radio button is selected. The 'IPv4 Address' is set to '10.11.16.4', the 'Subnet Mask' is '255.255.255.128', the 'Default Gateway' is '10.11.16.1', and the 'DNS Server' is '0.0.0.0'. Under 'IPv6 Configuration', the 'Automatic' radio button is unselected, and the 'Static' radio button is selected. The 'IPv6 Address' field is empty, the 'Link Local Address' is 'FE80::260:5CFF:FE0E:833A', and the 'Default Gateway' and 'DNS Server' fields are empty. Under '802.1X', the 'Use 802.1X Security' checkbox is unselected, the 'Authentication' dropdown is set to 'MD5', and the 'Username' and 'Password' fields are empty.

- Cấu hình địa chỉ IP Server B1

ServerB1

Physical Config Services **Desktop** Programming Attributes

IP Configuration X

IP Configuration

☐ DHCP ☒ Static

IPv4 Address 10.11.16.163

Subnet Mask 255.255.255.240

Default Gateway 10.11.16.161

DNS Server 0.0.0.0

IPv6 Configuration

☐ Automatic ☒ Static

IPv6 Address /

Link Local Address FE80::203:E4FF:FEBD:48ED

Default Gateway

DNS Server

802.1X

☐ Use 802.1X Security

Authentication MD5

Username

Password

- Cấu hình địa chỉ IP Server B2

The screenshot shows the 'ServerB2' application window with the 'Desktop' tab selected. The 'IP Configuration' section is active, displaying settings for both IPv4 and IPv6. The IPv4 configuration is set to 'Static' with an address of 10.11.16.131, subnet mask 255.255.255.224, default gateway 10.11.16.129, and DNS server 0.0.0.0. The IPv6 configuration is also set to 'Static' with a link local address of FE80::260:3EFF:FEA6:2AB7. The 802.1X section is visible but not configured, showing 'Use 802.1X Security' as unchecked, 'Authentication' as MD5, and empty fields for 'Username' and 'Password'.

IP Configuration	
<input type="radio"/> DHCP <input checked="" type="radio"/> Static	
IPv4 Address	10.11.16.131
Subnet Mask	255.255.255.224
Default Gateway	10.11.16.129
DNS Server	0.0.0.0

IPv6 Configuration	
<input type="radio"/> Automatic <input checked="" type="radio"/> Static	
IPv6 Address	/
Link Local Address	FE80::260:3EFF:FEA6:2AB7
Default Gateway	
DNS Server	

802.1X	
<input type="checkbox"/> Use 802.1X Security	
Authentication	MD5
Username	
Password	

**Yêu cầu 5:** Sinh viên thực hiện cấu hình định tuyến tĩnh cho mô hình mạng với yêu cầu bên dưới

Bài làm

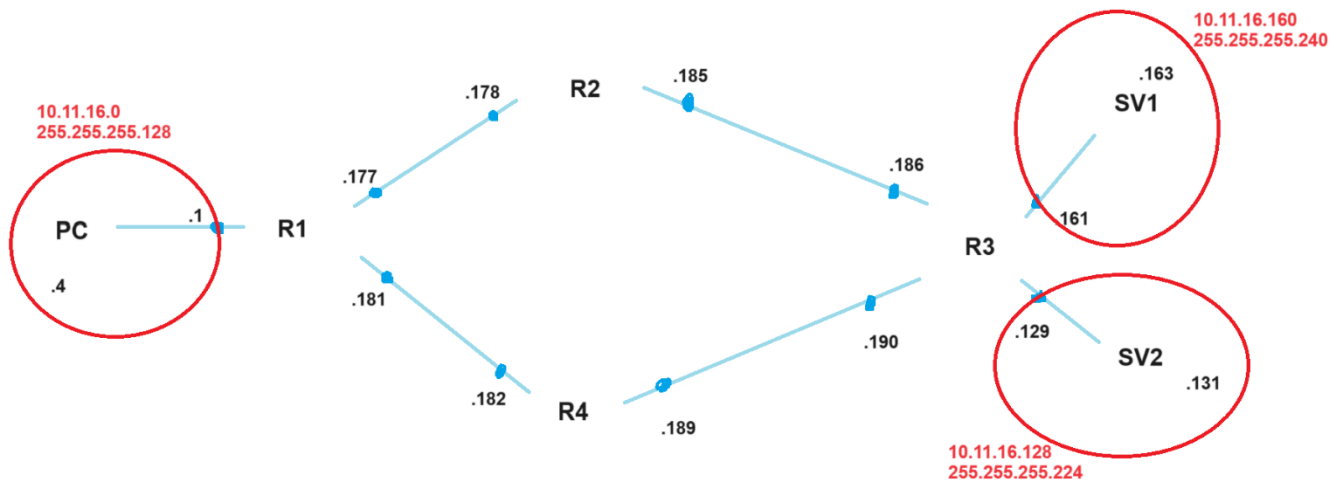
Ở đây em cấu hình 1 lần cho cả chính lẫn phụ

Với cấu trúc lệnh :

ip route <net> <mask> <next ip> distance

Thì với đường chính ta sẽ đặt chỉ số distance (trong khoảng từ 1-255) nhỏ hơn so với đường phụ, ở đây em chọn đường chính distance là 1, đường phụ distance là 2

Dưới đây là sơ đồ thể hiện tường minh hơn, dễ dàng cho việc định tuyến:



## Cấu hình

- Configure R1

```
R1>
R1>enable
Password:
R1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#ip route 10.11.16.160 255.255.255.240 10.11.16.178 1
R1(config)#ip route 10.11.16.160 255.255.255.240 10.11.16.182 2
R1(config)#ip route 10.11.16.128 255.255.255.224 10.11.16.178 1
R1(config)#ip route 10.11.16.128 255.255.255.224 10.11.16.182 2
R1(config)#^Z
R1#
%SYS-5-CONFIG_I: Configured from console by console

R1#show ip route
Codes: L - local, C - connected, S - static, 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, 8 subnets, 5 masks
C    10.11.16.0/25 is directly connected, GigabitEthernet0/0/1
L    10.11.16.1/32 is directly connected, GigabitEthernet0/0/1
S    10.11.16.128/27 [1/0] via 10.11.16.178
S    10.11.16.160/28 [1/0] via 10.11.16.178
C    10.11.16.176/30 is directly connected, Serial0/1/0
L    10.11.16.177/32 is directly connected, Serial0/1/0
C    10.11.16.180/30 is directly connected, Serial0/1/1
L    10.11.16.181/32 is directly connected, Serial0/1/1

R1#
```

- Configure R2

```
R2>enable
Password:
R2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#ip route 10.11.16.160 255.255.255.240 10.11.16.186
R2(config)#ip route 10.11.16.128 255.255.255.224 10.11.16.186
R2(config)#ip route 10.11.16.0 255.255.255.128 10.11.16.177
R2(config)#^Z
R2#
%SYS-5-CONFIG_I: Configured from console by console

R2#show ip route
Codes: L - local, C - connected, S - static, 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, 7 subnets, 5 masks
S       10.11.16.0/25 [1/0] via 10.11.16.177
S       10.11.16.128/27 [1/0] via 10.11.16.186
S       10.11.16.160/28 [1/0] via 10.11.16.186
C       10.11.16.176/30 is directly connected, Serial0/1/0
L       10.11.16.178/32 is directly connected, Serial0/1/0
C       10.11.16.184/30 is directly connected, Serial0/1/1
L       10.11.16.185/32 is directly connected, Serial0/1/1

R2#
```

- Configure R3



```

R3>enable
Password:
R3#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#ip route 10.11.16.0 255.255.255.128 10.11.16.185 1
R3(config)#ip route 10.11.16.0 255.255.255.128 10.11.16.189 2
R3(config)#^Z
R3#
%SYS-5-CONFIG_I: Configured from console by console

R3#show ip route
Codes: L - local, C - connected, S - static, 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, 9 subnets, 5 masks
S       10.11.16.0/25 [1/0] via 10.11.16.185
C       10.11.16.128/27 is directly connected, GigabitEthernet0/0/1
L       10.11.16.129/32 is directly connected, GigabitEthernet0/0/1
C       10.11.16.160/28 is directly connected, GigabitEthernet0/0/0
L       10.11.16.161/32 is directly connected, GigabitEthernet0/0/0
C       10.11.16.184/30 is directly connected, Serial0/1/0
L       10.11.16.186/32 is directly connected, Serial0/1/0
C       10.11.16.188/30 is directly connected, Serial0/1/1
L       10.11.16.190/32 is directly connected, Serial0/1/1

R3#

```

- Configure R4

```

R4>enable
Password:
R4#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R4(config)#ip route 10.11.16.160 255.255.255.240 10.11.16.190
R4(config)#ip route 10.11.16.128 255.255.255.224 10.11.16.190
R4(config)#ip route 10.11.16.0 255.255.255.128 10.11.16.181
R4(config)#^Z
R4#
%SYS-5-CONFIG_I: Configured from console by console

R4#show ip route
Codes: L - local, C - connected, S - static, 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

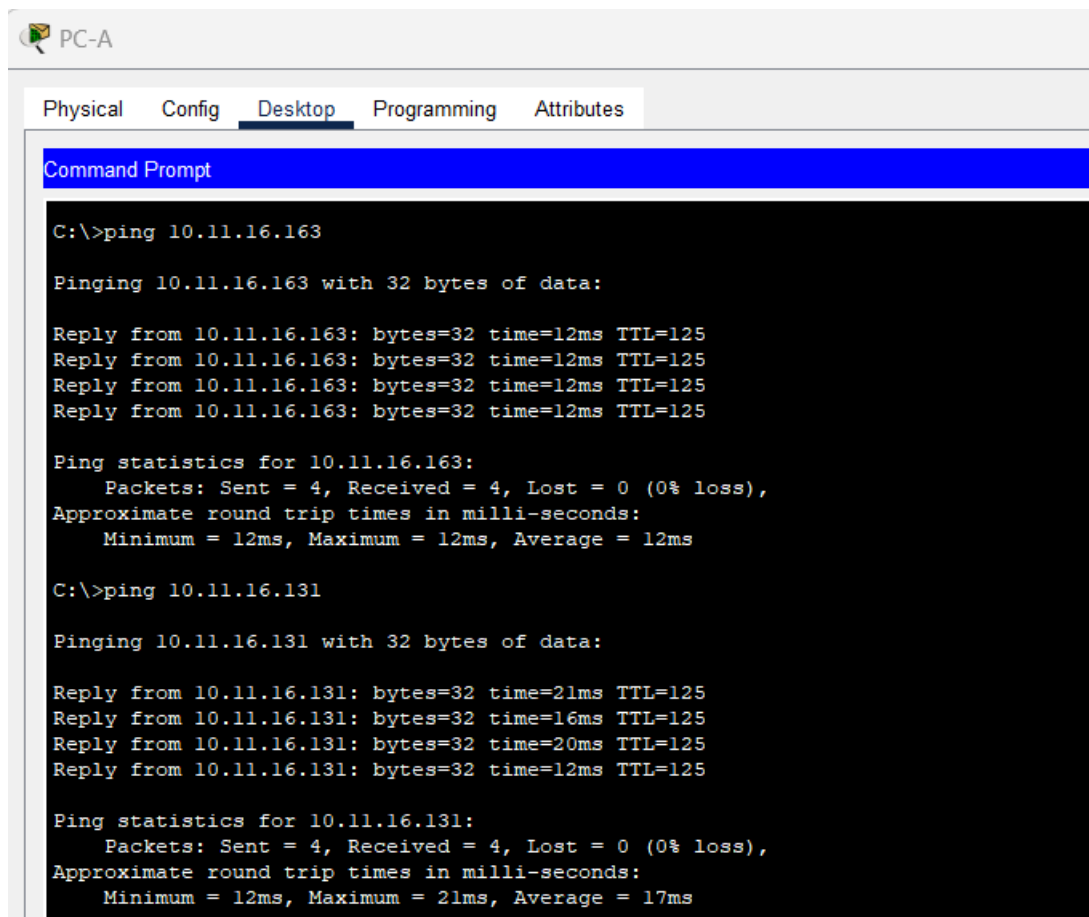
Gateway of last resort is not set

    10.0.0.0/8 is variably subnetted, 7 subnets, 5 masks
S       10.11.16.0/25 [1/0] via 10.11.16.181
S       10.11.16.128/27 [1/0] via 10.11.16.190
S       10.11.16.160/28 [1/0] via 10.11.16.190
C       10.11.16.180/30 is directly connected, Serial0/1/0
L       10.11.16.182/32 is directly connected, Serial0/1/0
C       10.11.16.188/30 is directly connected, Serial0/1/1
L       10.11.16.189/32 is directly connected, Serial0/1/1
R4#

```

## Kiểm tra cho trường hợp đường chính

- Ping từ PC đến server B1 và B2



The screenshot shows a Windows Command Prompt window titled "PC-A" with tabs for Physical, Config, Desktop, Programming, and Attributes. The "Desktop" tab is active. The Command Prompt displays the results of two ping commands. The first command is `C:\>ping 10.11.16.163`, which shows four successful replies with 32 bytes of data, a time of 12ms, and a TTL of 125. The ping statistics for 10.11.16.163 show 4 packets sent, 4 received, 0 lost (0% loss), and approximate round trip times of 12ms (Minimum, Maximum, Average). The second command is `C:\>ping 10.11.16.131`, which also shows four successful replies with 32 bytes of data, but with varying times: 21ms, 16ms, 20ms, and 12ms, all with a TTL of 125. The ping statistics for 10.11.16.131 show 4 packets sent, 4 received, 0 lost (0% loss), and approximate round trip times of 17ms (Minimum, Maximum, Average).

```
C:\>ping 10.11.16.163

Pinging 10.11.16.163 with 32 bytes of data:

Reply from 10.11.16.163: bytes=32 time=12ms TTL=125
Reply from 10.11.16.163: bytes=32 time=12ms TTL=125
Reply from 10.11.16.163: bytes=32 time=12ms TTL=125
Reply from 10.11.16.163: bytes=32 time=12ms TTL=125

Ping statistics for 10.11.16.163:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 12ms, Maximum = 12ms, Average = 12ms

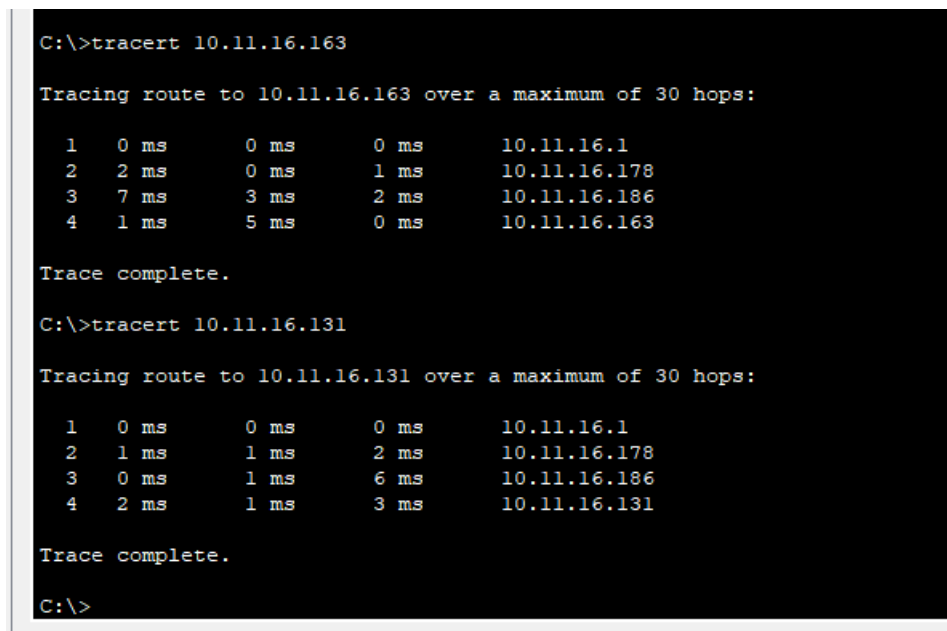
C:\>ping 10.11.16.131

Pinging 10.11.16.131 with 32 bytes of data:

Reply from 10.11.16.131: bytes=32 time=21ms TTL=125
Reply from 10.11.16.131: bytes=32 time=16ms TTL=125
Reply from 10.11.16.131: bytes=32 time=20ms TTL=125
Reply from 10.11.16.131: bytes=32 time=12ms TTL=125

Ping statistics for 10.11.16.131:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 12ms, Maximum = 21ms, Average = 17ms
```

- Tracert từ PC tới server B1 và B2



The screenshot shows a Windows Command Prompt window titled "PC-A" with tabs for Physical, Config, Desktop, Programming, and Attributes. The "Desktop" tab is active. The Command Prompt displays the results of two traceroute commands. The first command is `C:\>tracert 10.11.16.163`, which shows a path of four hops to 10.11.16.163. The first hop is 10.11.16.1 with 0ms delay. The second hop is 10.11.16.178 with 2ms delay. The third hop is 10.11.16.186 with 7ms delay. The fourth hop is 10.11.16.163 with 1ms delay. The trace is complete. The second command is `C:\>tracert 10.11.16.131`, which shows a path of four hops to 10.11.16.131. The first hop is 10.11.16.1 with 0ms delay. The second hop is 10.11.16.178 with 1ms delay. The third hop is 10.11.16.186 with 0ms delay. The fourth hop is 10.11.16.131 with 2ms delay. The trace is complete.

```
C:\>tracert 10.11.16.163

Tracing route to 10.11.16.163 over a maximum of 30 hops:

  0  0 ms    0 ms    0 ms    10.11.16.1
  1  2 ms    0 ms    1 ms    10.11.16.178
  2  7 ms    3 ms    2 ms    10.11.16.186
  3  1 ms    5 ms    0 ms    10.11.16.163

Trace complete.

C:\>tracert 10.11.16.131

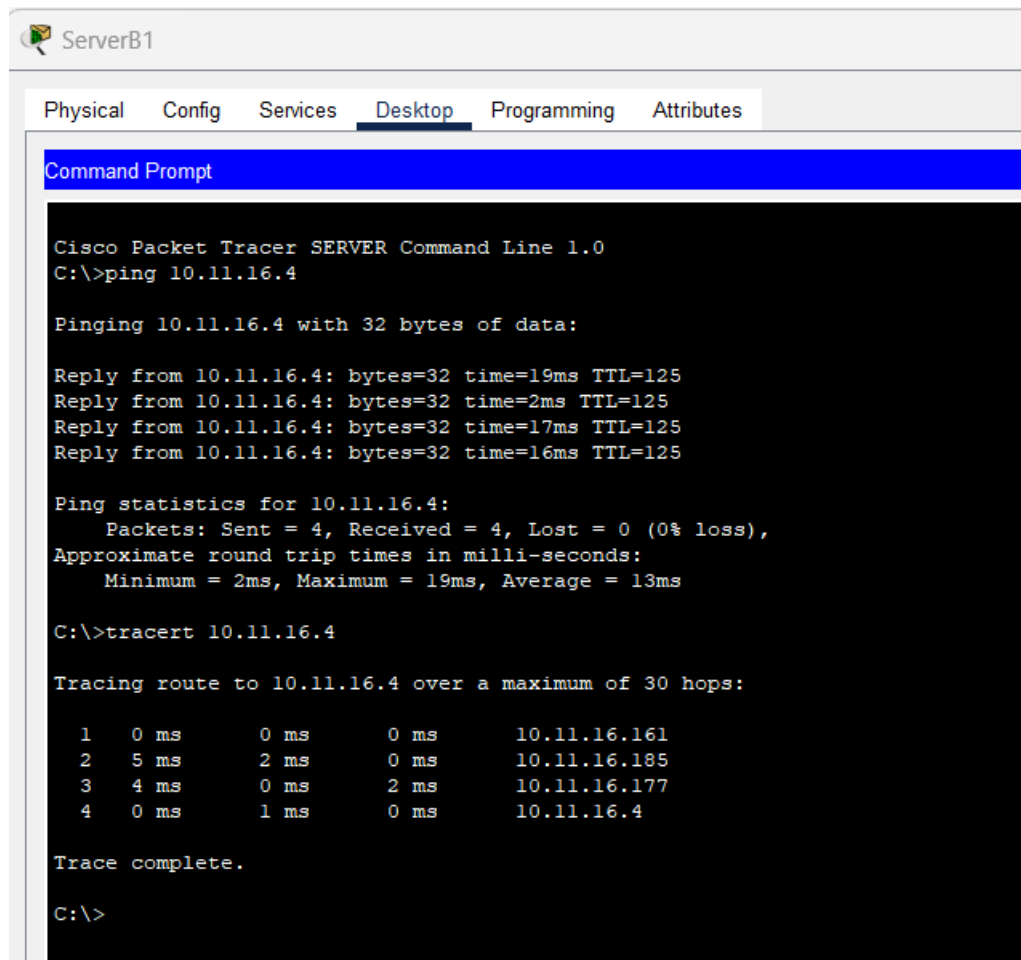
Tracing route to 10.11.16.131 over a maximum of 30 hops:

  0  0 ms    0 ms    0 ms    10.11.16.1
  1  1 ms    1 ms    2 ms    10.11.16.178
  2  0 ms    1 ms    6 ms    10.11.16.186
  3  2 ms    1 ms    3 ms    10.11.16.131

Trace complete.

C:\>
```

- Ping và tracert từ server B1 tới PC-A



ServerB1

Physical Config Services **Desktop** Programming Attributes

Command Prompt

```
Cisco Packet Tracer SERVER Command Line 1.0
C:\>ping 10.11.16.4

Pinging 10.11.16.4 with 32 bytes of data:

Reply from 10.11.16.4: bytes=32 time=19ms TTL=125
Reply from 10.11.16.4: bytes=32 time=2ms TTL=125
Reply from 10.11.16.4: bytes=32 time=17ms TTL=125
Reply from 10.11.16.4: bytes=32 time=16ms TTL=125

Ping statistics for 10.11.16.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 19ms, Average = 13ms

C:\>tracert 10.11.16.4

Tracing route to 10.11.16.4 over a maximum of 30 hops:

  0  0 ms    0 ms    0 ms    10.11.16.161
  1  5 ms    2 ms    0 ms    10.11.16.185
  2  4 ms    0 ms    2 ms    10.11.16.177
  3  0 ms    1 ms    0 ms    10.11.16.4

Trace complete.

C:\>
```

- Ping và tracert từ server B2 đến PC-A

```
ServerB2

Physical Config Services Desktop Programming Attributes

Command Prompt

Cisco Packet Tracer SERVER Command Line 1.0
C:\>ping 10.11.16.4

Pinging 10.11.16.4 with 32 bytes of data:

Reply from 10.11.16.4: bytes=32 time=17ms TTL=125
Reply from 10.11.16.4: bytes=32 time=10ms TTL=125
Reply from 10.11.16.4: bytes=32 time=15ms TTL=125
Reply from 10.11.16.4: bytes=32 time=14ms TTL=125

Ping statistics for 10.11.16.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 10ms, Maximum = 17ms, Average = 14ms

C:\>tracert 10.11.16.4

Tracing route to 10.11.16.4 over a maximum of 30 hops:

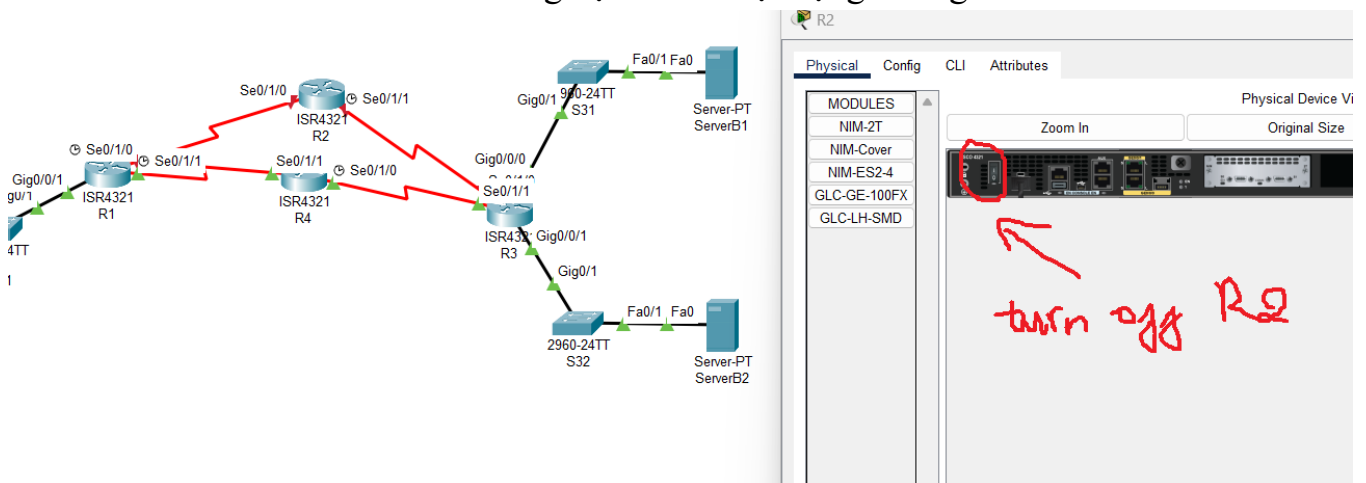
  0  0 ms    0 ms    0 ms    10.11.16.129
  1  0 ms    0 ms    0 ms    10.11.16.185
  2  1 ms   10 ms    8 ms    10.11.16.177
  3  0 ms    0 ms    0 ms    10.11.16.4

Trace complete.

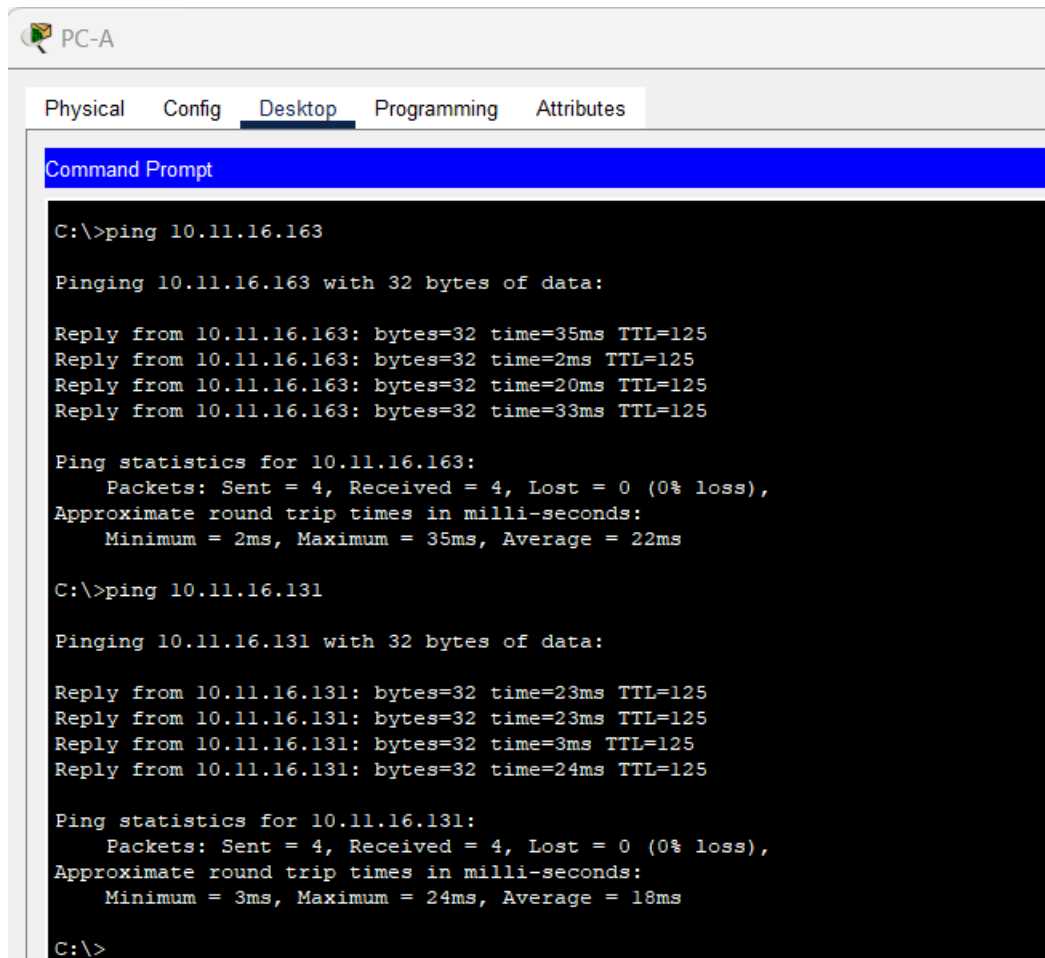
C:\>
```

## Kiểm tra cho trường hợp đường dự trữ

- Tắt R2 để kiểm tra xem đường dự trữ có hoạt động không



- Ping từ PC-A tới server B1 và B2



The screenshot shows a PC-A desktop environment with a taskbar at the top containing icons for PC-A, Physical, Config, Desktop, Programming, and Attributes. The 'Desktop' tab is active. A Command Prompt window is open, displaying the following text:

```
C:\>ping 10.11.16.163

Pinging 10.11.16.163 with 32 bytes of data:

Reply from 10.11.16.163: bytes=32 time=35ms TTL=125
Reply from 10.11.16.163: bytes=32 time=2ms TTL=125
Reply from 10.11.16.163: bytes=32 time=20ms TTL=125
Reply from 10.11.16.163: bytes=32 time=33ms TTL=125

Ping statistics for 10.11.16.163:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 2ms, Maximum = 35ms, Average = 22ms

C:\>ping 10.11.16.131

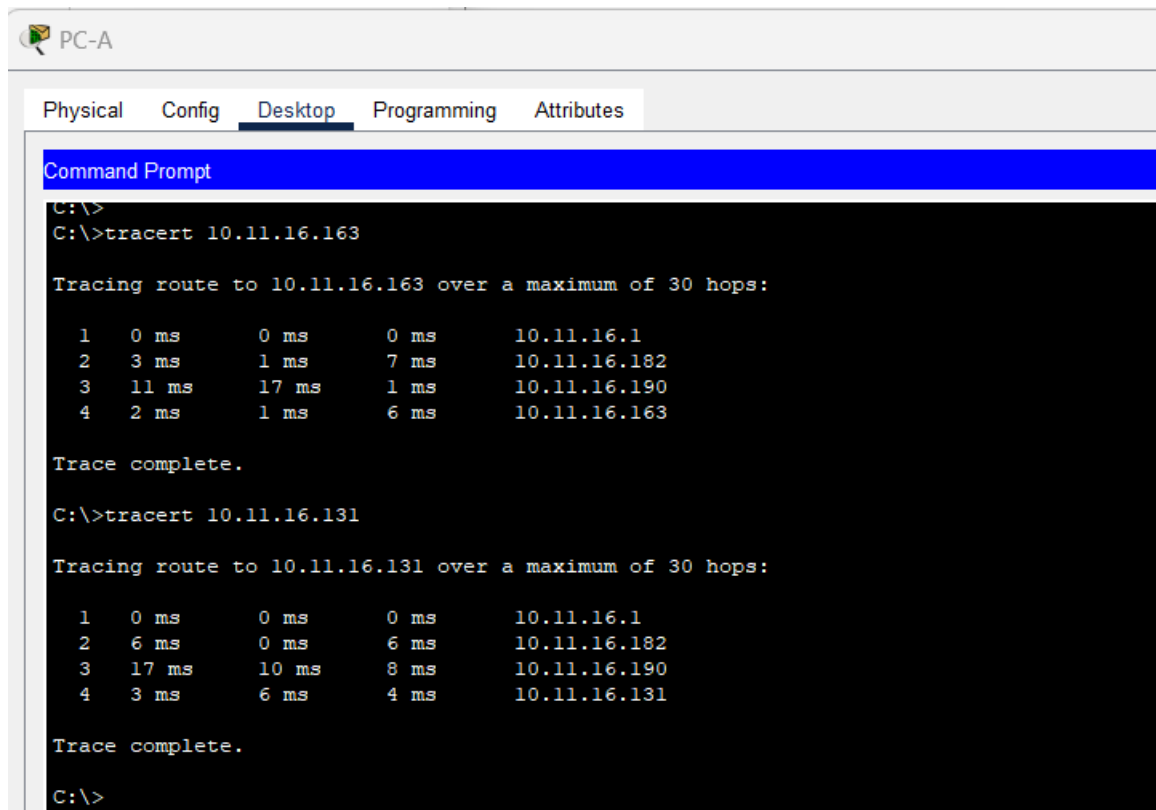
Pinging 10.11.16.131 with 32 bytes of data:

Reply from 10.11.16.131: bytes=32 time=23ms TTL=125
Reply from 10.11.16.131: bytes=32 time=23ms TTL=125
Reply from 10.11.16.131: bytes=32 time=3ms TTL=125
Reply from 10.11.16.131: bytes=32 time=24ms TTL=125

Ping statistics for 10.11.16.131:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 3ms, Maximum = 24ms, Average = 18ms

C:\>
```

- Tracert từ PC-A tới server B1 và B2



The screenshot shows a window titled "PC-A" with tabs for "Physical", "Config", "Desktop", "Programming", and "Attributes". The "Desktop" tab is active, displaying a "Command Prompt" window. The Command Prompt shows two successful traceroute commands. The first command is `tracert 10.11.16.163`, showing a path of four hops from 10.11.16.1 to 10.11.16.163. The second command is `tracert 10.11.16.131`, showing a path of four hops from 10.11.16.1 to 10.11.16.131. Both traces show round-trip times for each hop.

```
C:\>
C:\>tracert 10.11.16.163

Tracing route to 10.11.16.163 over a maximum of 30 hops:

  1  0 ms      0 ms      0 ms      10.11.16.1
  2  3 ms      1 ms      7 ms      10.11.16.182
  3 11 ms     17 ms      1 ms      10.11.16.190
  4  2 ms      1 ms      6 ms      10.11.16.163

Trace complete.

C:\>tracert 10.11.16.131

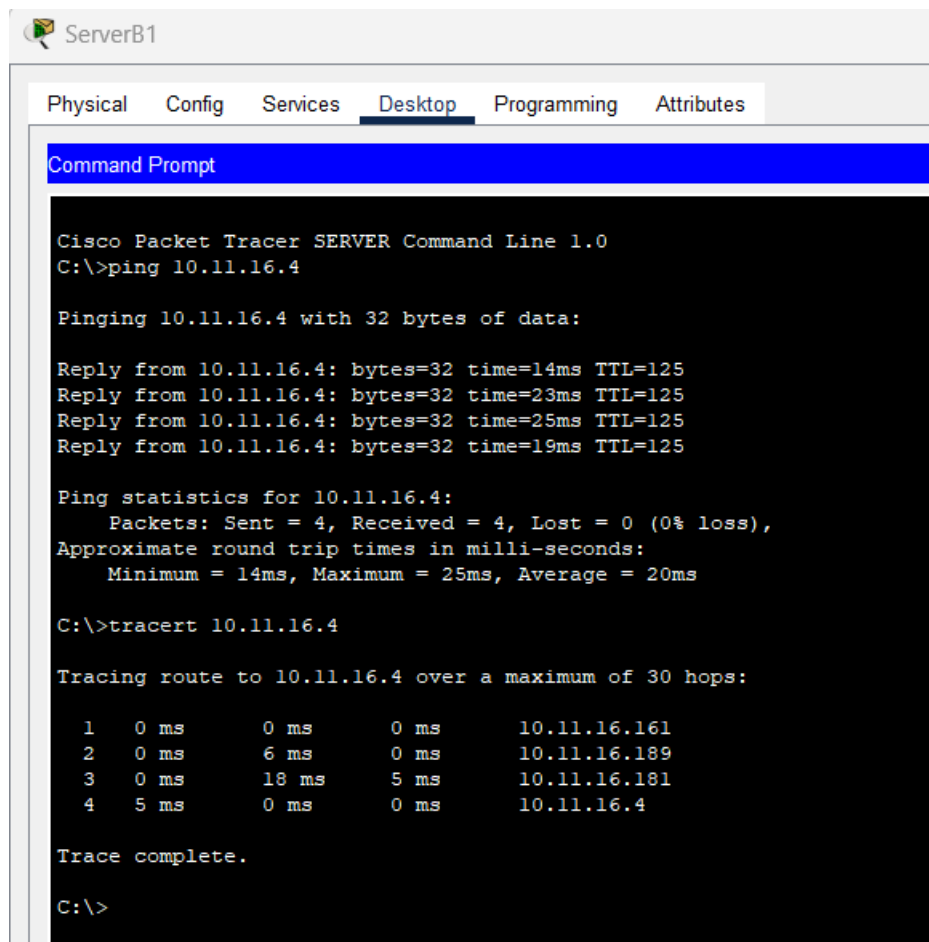
Tracing route to 10.11.16.131 over a maximum of 30 hops:

  1  0 ms      0 ms      0 ms      10.11.16.1
  2  6 ms      0 ms      6 ms      10.11.16.182
  3 17 ms     10 ms      8 ms      10.11.16.190
  4  3 ms      6 ms      4 ms      10.11.16.131

Trace complete.

C:\>
```

- Ping và tracert từ server B1 tới PC-A



The screenshot shows the Cisco Packet Tracer interface for a server named 'ServerB1'. The 'Desktop' tab is selected, displaying a 'Command Prompt' window. The window contains the output of a ping and a tracert command. The ping command shows four successful replies from 10.11.16.4 with varying times and a TTL of 125. The tracert command shows a path of four hops to 10.11.16.4, with the final hop being the destination itself.

```
Cisco Packet Tracer SERVER Command Line 1.0
C:\>ping 10.11.16.4

Pinging 10.11.16.4 with 32 bytes of data:

Reply from 10.11.16.4: bytes=32 time=14ms TTL=125
Reply from 10.11.16.4: bytes=32 time=23ms TTL=125
Reply from 10.11.16.4: bytes=32 time=25ms TTL=125
Reply from 10.11.16.4: bytes=32 time=19ms TTL=125

Ping statistics for 10.11.16.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 14ms, Maximum = 25ms, Average = 20ms

C:\>tracert 10.11.16.4

Tracing route to 10.11.16.4 over a maximum of 30 hops:

  1  0 ms    0 ms    0 ms    10.11.16.161
  2  0 ms    6 ms    0 ms    10.11.16.189
  3  0 ms    18 ms   5 ms    10.11.16.181
  4  5 ms    0 ms    0 ms    10.11.16.4

Trace complete.

C:\>
```

- Ping và tracert từ server B2 tới PC-A



Command Prompt

```
C:\>
C:\>ping 10.11.16.4

Pinging 10.11.16.4 with 32 bytes of data:

Reply from 10.11.16.4: bytes=32 time=24ms TTL=125
Reply from 10.11.16.4: bytes=32 time=18ms TTL=125
Reply from 10.11.16.4: bytes=32 time=18ms TTL=125
Reply from 10.11.16.4: bytes=32 time=22ms TTL=125

Ping statistics for 10.11.16.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 18ms, Maximum = 24ms, Average = 20ms

C:\>tracert 10.11.16.4
Invalid Command.

C:\>tracert 10.11.16.4

Tracing route to 10.11.16.4 over a maximum of 30 hops:

  1  0 ms    0 ms    0 ms    10.11.16.129
  2  6 ms    3 ms    10 ms   10.11.16.189
  3  1 ms    1 ms    15 ms   10.11.16.181
  4  0 ms    3 ms    0 ms    10.11.16.4

Trace complete.

C:\>
```