BÁO CÁO THỰC HÀNH

Môn học: Quản trị mạng và hệ thống

Buổi báo cáo: Lab 01

Tên chủ đề: Variable Length Subnet
Mask và Định tuyến tĩnh

GVHD: Đỗ Hoàng Hiển

Ngày thực hiện: 26/9/2023

THÔNG TIN CHUNG:

(Liệt kê tất cả các thành viên trong nhóm)
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BÁO CÁO CHI TIẾT

Yêu cầu 1

Chọn 2 MSSV 21521195 và 21522240 được mạng 10.95.40.0/24

Xét dãy địa chỉ: 10.95.40.0/24 -> còn 8 bit trống (8 bit phần host)

- Xét subnet có 100 host:
  $2^7 - 2 = 126$ host > 100 host -> cần 7 bit cho phần host -> cần lấy $8 - 7 = 1$ bit làm phần net.
  ➔ 10.95.40.0/24 chia được 2 subnet:
    - 10.95.40.0/25   cấp cho 100 host
    - 10.95.40.128/25 còn dư
- Xét subnet có 15 host:

$2^5 - 2 = 30$ host > 15 host -> cần 5 bit cho phần host -> cần lấy 7 – 5 = 2 bit làm phần net.

➔ 10.95.40.128/25 chia được 4 subnet:
- 10.95.40.128/27 cấp cho 15 host
- 10.95.40.160/27
- 10.95.40.192/27
- 10.95.40.224/27 còn dư

- Xét subnet có 10 host:

$2^4 - 2 = 14$ host > 10 host -> cần 4 bit cho phần host -> cần lấy 5 – 4 = 1 bit làm phần net.

➔ 10.95.40.224/27 chia được 2 subnet:
- 10.95.40.224/28 cấp cho 10 host
- 10.95.40.240/28 còn lại

- Xét subnet có 2 host:

$2^2 - 2 = 2$ host >= 2 host -> cần 2 bit cho phần host -> cần lấy 4 – 2 = 2 bit làm phần net.

➔ 10.95.40.240/28 chia được 4 subnet:
- 10.95.40.240/30 cấp cho 2 host
- 10.95.40.244/30 cấp cho 2 host
- 10.95.40.248/30 cấp cho 2 host
- 10.95.40.252/30 cấp cho 2 host

Ta có bảng kết quả sau:

Số host	Network	Subnet Mask	Dải IP	Broadcast
100	10.95.40.0/25	255.255.255.128	.40.1 - .40.126	.40.127
15	10.95.40.128/27	255.255.255.224	.40.129 - .40.158	.40.159
10	10.95.40.224/28	255.255.255.240	.40.225 – .40.238	.40.239
2	10.95.40.240/30	255.255.255.252	.40.241 - .40.242	.40.243
2	10.95.40.244/30	255.255.255.252	.40.245 - .40.246	.40.247
2	10.95.40.248/30	255.255.255.252	.40.249 - .40.250	.40.251
2	10.95.40.252/30	255.255.255.252	.40.253 - .40.254	.40.255

Yêu cầu 2

Thiết bị	Interface	Địa chỉ IP	Subnet Mask	Default Gateway
R1	G0/0/1	10.95.40.1	255.255.255.128	N/A
	S0/1/0	10.95.40.241	255.255.255.252	N/A
	S0/1/1	10.95.40.249	255.255.255.252	N/A
R2	S0/1/0	10.95.40.242	255.255.255.252	N/A
	S0/1/1	10.95.40.245	255.255.255.252	N/A
R3	G0/0/0	10.95.40.225	255.255.255.240	N/A
	G0/0/1	10.95.40.129	255.255.255.224	N/A
	S0/1/0	10.95.40.246	255.255.255.252	N/A

	S0/1/1	10.95.40.254	255.255.255.252	N/A
R4	S0/1/0	10.95.40.253	255.255.255.252	N/A
	S0/1/1	10.95.40.250	255.255.255.252	N/A
PC-A	NIC	10.95.40.126	255.255.255.128	10.95.40.1
ServerB1	NIC	10.95.40.238	255.255.255.240	10.95.40.225
ServerB2	NIC	10.95.40.158	255.255.255.224	10.95.40.129

Yêu cầu 3

Cấu hình hostname, mật khẩu cho privileged mode, mật khẩu cho console, mật khẩu telnet cho Router R1:

R1(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 vty 0 4

R1(config-line) password inseclab

R1(config-line) login

Lưu cấu hình R1

R1# copy running-config startup-config

Kiểm tra cấu hình

R1# show running-config

```
R1# show running-config
Building configuration...

Current configuration : 1230 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
!
!
!
```

Cấu hình hostname, mật khẩu cho privileged mode, mật khẩu cho console, mật khẩu telnet cho Router R2:

R2(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 vty 0 4

R2(config-line) password inseclab

R2(config-line) login

Lưu cấu hình R2

R2# copy running-config startup-config

Kiểm tra cấu hình

R2# show running-config

```
R2# show running-config
Building configuration...

Current configuration : 982 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
!
!
!
!
'
```

Cấu hình hostname, mật khẩu cho privileged mode, mật khẩu cho console, mật khẩu telnet cho Router R3:

R3(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 vty 0 4

R3(config-line) password inseclab

R3(config-line) login

Lưu cấu hình R3

R3# copy running-config startup-config

Kiểm tra cấu hình

R3# show running-config

```
R3# show running-config
Building configuration...

Current configuration : 1046 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
!
!
!
!
```

Cấu hình hostname, mật khẩu cho privileged mode, mật khẩu cho console, mật khẩu telnet cho Router R4:

R4(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 vty 0 4

R4(config-line) password inseclab

R4(config-line) login

Lưu cấu hình R4

R4# copy running-config startup-config

Kiểm tra cấu hình

R4# show running-config

```
R4#show running-config
Building configuration...

Current configuration : 982 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
!
!
!
!
```

Cấu hình hostname, mật khẩu cho privileged mode, mật khẩu cho console, mật khẩu telnet cho Switch S1:

S1(config)# hostname S1

S1(config)# enable password inseclab

S1(config)# service password-encryption

S1(config)# line console 0

S1(config-line)# password inseclab

S1(config-line)# login

S1(config)# line vty 0 4

S1(config-line) password inseclab

S1(config-line) login

Lưu cấu hình S1

S1# copy running-config startup-config

Kiểm tra cấu hình

S1# show running-config

```
S1# show running-config
Building configuration...

Current configuration : 1181 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname S1
!
enable password 7 0828425D0C1A091610
!
!
!
!
```

Cấu hình hostname, mật khẩu cho privileged mode, mật khẩu cho console, mật khẩu telnet cho Switch S31:

S31(config)# hostname S31

S31(config)# enable password inseclab

S31(config)# service password-encryption

S31(config)# line console 0

S31(config-line)# password inseclab

S31(config-line)# login

S31(config)# line vty 0 4

S31(config-line) password inseclab

S31(config-line) login

Lưu cấu hình S31

S31# copy running-config startup-config

Kiểm tra cấu hình

S31# show running-config

```
S31# show running-config
Building configuration...

Current configuration : 1182 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname S31
!
enable password 7 0828425D0C1A091610
!
!
!
!
!
```

Cấu hình hostname, mật khẩu cho privileged mode, mật khẩu cho console, mật khẩu telnet cho Switch S32:

S32(config)# hostname S32

S32(config)# enable password inseclab

S32(config)# service password-encryption

S32(config)# line console 0

S32(config-line)# password inseclab

S32(config-line)# login

S32(config)# line vty 0 4

S32(config-line) password inseclab

S32(config-line) login

Lưu cấu hình S32

S32# copy running-config startup-config

Kiểm tra cấu hình

S32# show running-config

```
S32# show running-config
Building configuration...

Current configuration : 1182 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname S32
!
enable password 7 0828425D0C1A091610
!
!
!
!
```

Yêu cầu 4

Cấu hình IP cho router R1:

R1(config)# interface g0/0/1

R1(config-if)# no shutdown

R1(config-if)# ip address 10.95.40.1 255.255.255.128

R1(config-if)# exit

R1(config)# interface s0/1/0

R1(config-if)# no shutdown

R1(config-if)# ip address 10.95.40.241 255.255.255.252

R1(config-if)# exit

R1(config)# interface s0/1/1

R1(config-if)# no shutdown

R1(config-if)# ip address 10.95.40.249 255.255.255.252

```
R1#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0/0   unassigned      YES unset  administratively down down
GigabitEthernet0/0/1   10.95.40.1      YES manual up                    up
Serial0/1/0            10.95.40.241    YES manual up                    up
Serial0/1/1            10.95.40.249    YES manual up                    up
Vlan1                  unassigned      YES unset  administratively down down
```

Cấu hình IP cho router R2:

R2(config)# interface s0/1/0

R2(config-if)# no shutdown

R2(config-if)# ip address 10.95.40.242 255.255.255.252

R2(config-if)# exit

R2(config)# interface s0/1/1

R2(config-if)# no shutdown

R2(config-if)# ip address 10.95.40.245 255.255.255.252

```
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            10.95.40.242    YES manual up                     up
Serial0/1/1            10.95.40.245    YES manual up                     up
Vlan1                  unassigned      YES unset  administratively down down
```
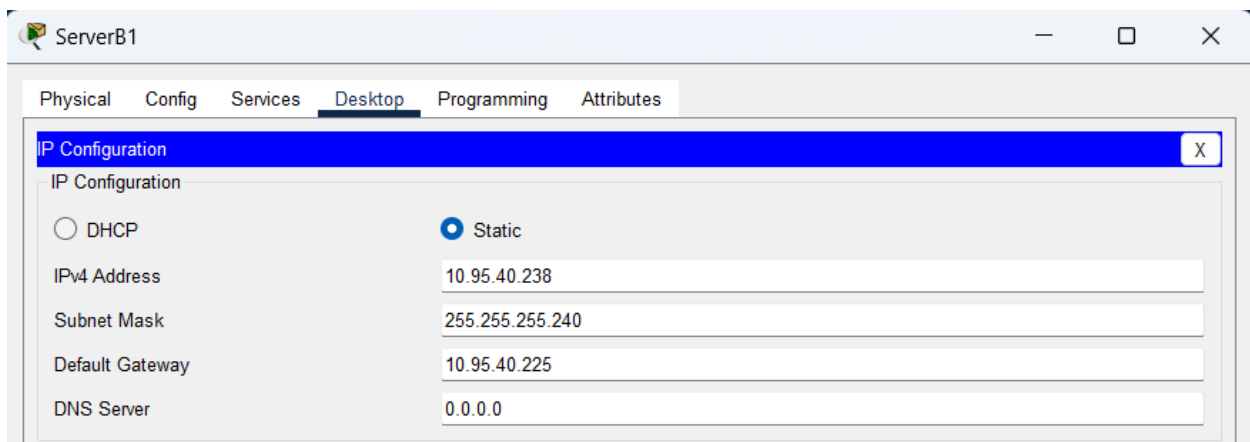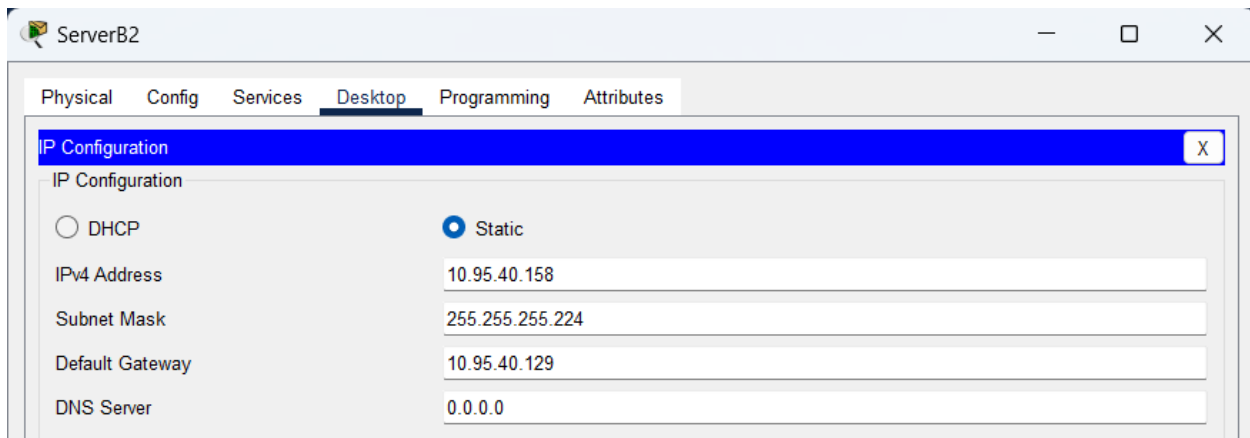
Cấu hình IP cho router R3:

R3(config)# interface g0/0/0

R3(config-if)# no shutdown

R3(config-if)# ip address 10.95.40.225 255.255.255.240

R3(config-if)# exit

R3(config)# interface g0/0/1

R3(config-if)# no shutdown

R3(config-if)# ip address 10.95.40.129 255.255.255.224

R3(config-if)# exit

R3(config)# interface s0/1/0

R3(config-if)# no shutdown

R3(config-if)# ip address 10.95.40.246 255.255.255.252

R3(config-if)# exit

R3(config)# interface s0/1/1

R3(config-if)# no shutdown

R3(config-if)# ip address 10.95.40.254 255.255.255.252

```
R3#show ip interface brief
Interface             IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0/0  10.95.40.225    YES manual up                    up
GigabitEthernet0/0/1  10.95.40.129    YES manual up                    up
Serial0/1/0           10.95.40.246    YES manual up                    up
Serial0/1/1           10.95.40.254    YES manual up                    up
Vlan1                 unassigned      YES unset  administratively down down
```

Cấu hình IP cho router R4:

R4(config)# interface s0/1/0

R4(config-if)# no shutdown

R4(config-if)# ip address 10.95.40.253 255.255.255.252

R4(config-if)# exit

R4(config)# interface s0/1/1

R4(config-if)# no shutdown

R4(config-if)# ip address 10.95.40.250 255.255.255.252

```
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           10.95.40.253    YES manual up                    up
Serial0/1/1           10.95.40.250    YES manual up                    up
Vlan1                 unassigned      YES unset  administratively down down
```

Cấu hình IP cho PC-A:

Cấu hình IP cho ServerB1:

Cấu hình IP cho ServerB2:

Yêu cầu 5

Đường chính

Cấu hình định tuyến tĩnh cho Router R1:

- R1 đi qua next-hop S0/1/0 của R2 đến lớp mạng 10.95.40.244
- R1 đi qua next-hop S0/1/0 của R3 đến lớp mạng 10.95.40.224
- R1 đi qua next-hop S0/1/0 của R3 đến lớp mạng 10.95.40.128

```
R1(config)# ip route 10.95.40.244 255.255.255.252 10.95.40.242
R1(config)# ip route 10.95.40.224 255.255.255.240 10.95.40.246
R1(config)# ip route 10.95.40.128 255.255.255.224 10.95.40.246
```

```
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, 9 subnets, 5 masks
C        10.95.40.0/25 is directly connected, GigabitEthernet0/0/1
L        10.95.40.1/32 is directly connected, GigabitEthernet0/0/1
S        10.95.40.128/27 [1/0] via 10.95.40.246
S        10.95.40.224/28 [1/0] via 10.95.40.246
C        10.95.40.240/30 is directly connected, Serial0/1/0
L        10.95.40.241/32 is directly connected, Serial0/1/0
S        10.95.40.244/30 [1/0] via 10.95.40.242
C        10.95.40.248/30 is directly connected, Serial0/1/1
L        10.95.40.249/32 is directly connected, Serial0/1/1
```

Cấu hình định tuyến tĩnh cho Router R2:

- R2 đi qua next-hop S0/1/0 của R1 đến lớp mạng 10.95.40.0
- R2 đi qua next-hop S0/1/0 của R3 đến lớp mạng 10.95.40.224
- R2 đi qua next-hop S0/1/0 của R3 đến lớp mạng 10.95.40.128

```
R2(config)# ip route 10.95.40.0 255.255.255.128 10.95.40.241
R2(config)# ip route 10.95.40.224 255.255.255.240 10.95.40.246
R2(config)# ip route 10.95.40.128 255.255.255.224 10.95.40.246
```

```
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        10.95.40.0/25 [1/0] via 10.95.40.241
S        10.95.40.128/27 [1/0] via 10.95.40.246
S        10.95.40.224/28 [1/0] via 10.95.40.246
C        10.95.40.240/30 is directly connected, Serial0/1/0
L        10.95.40.242/32 is directly connected, Serial0/1/0
C        10.95.40.244/30 is directly connected, Serial0/1/1
L        10.95.40.245/32 is directly connected, Serial0/1/1
```

Cấu hình định tuyến tĩnh cho Router R3:

- R3 đi qua next-hop S0/1/1 của R2 đến lớp mạng 10.95.40.240

- R3 đi qua next-hop S0/1/0 của R1 đến lớp mạng 10.95.40.0

R3(config)# ip route 10.95.40.240 255.255.255.252 10.95.40.245
R3(config)# ip route 10.95.40.0 255.255.255.128 10.95.40.241

```
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, 10 subnets, 5 masks
S       10.95.40.0/25 [1/0] via 10.95.40.241
C       10.95.40.128/27 is directly connected, GigabitEthernet0/0/1
L       10.95.40.129/32 is directly connected, GigabitEthernet0/0/1
C       10.95.40.224/28 is directly connected, GigabitEthernet0/0/0
L       10.95.40.225/32 is directly connected, GigabitEthernet0/0/0
S       10.95.40.240/30 [1/0] via 10.95.40.245
C       10.95.40.244/30 is directly connected, Serial0/1/0
L       10.95.40.246/32 is directly connected, Serial0/1/0
C       10.95.40.252/30 is directly connected, Serial0/1/1
L       10.95.40.254/32 is directly connected, Serial0/1/1
```

Từ PC-A đi đến ServerB1, ServerB2:

- Từ PC-A đến Router R2 (S0/1/0 10.95.40.242)

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.95.40.242

Pinging 10.95.40.242 with 32 bytes of data:

Reply from 10.95.40.242: bytes=32 time=1ms TTL=254
Reply from 10.95.40.242: bytes=32 time=5ms TTL=254
Reply from 10.95.40.242: bytes=32 time=1ms TTL=254
Reply from 10.95.40.242: bytes=32 time=3ms TTL=254

Ping statistics for 10.95.40.242:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 5ms, Average = 2ms
```

- Từ PC-A đến Router R3 (S0/1/0 10.95.40.246)

```
C:\>ping 10.95.40.246

Pinging 10.95.40.246 with 32 bytes of data:

Reply from 10.95.40.246: bytes=32 time=14ms TTL=253
Reply from 10.95.40.246: bytes=32 time=2ms TTL=253
Reply from 10.95.40.246: bytes=32 time=7ms TTL=253
Reply from 10.95.40.246: bytes=32 time=9ms TTL=253

Ping statistics for 10.95.40.246:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 14ms, Average = 8ms
```

- Từ PC-A đến ServerB1 (10.95.40.238)

```
C:\>ping 10.95.40.238

Pinging 10.95.40.238 with 32 bytes of data:

Reply from 10.95.40.238: bytes=32 time=13ms TTL=125
Reply from 10.95.40.238: bytes=32 time=7ms TTL=125
Reply from 10.95.40.238: bytes=32 time=2ms TTL=125
Reply from 10.95.40.238: bytes=32 time=2ms TTL=125

Ping statistics for 10.95.40.238:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 13ms, Average = 6ms
```

- Từ PC-A đến ServerB2 (10.95.40.158)

```
C:\>ping 10.95.40.158

Pinging 10.95.40.158 with 32 bytes of data:

Reply from 10.95.40.158: bytes=32 time=15ms TTL=125
Reply from 10.95.40.158: bytes=32 time=3ms TTL=125
Reply from 10.95.40.158: bytes=32 time=2ms TTL=125
Reply from 10.95.40.158: bytes=32 time=2ms TTL=125

Ping statistics for 10.95.40.158:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 15ms, Average = 5ms
```

- Dùng tracert để xem quảng đường đi từ PC-A đến ServerB1, ServerB2

```
C:\>tracert 10.95.40.238

Tracing route to 10.95.40.238 over a maximum of 30 hops:

  1    0 ms       0 ms       0 ms       10.95.40.1
  2    0 ms       3 ms       0 ms       10.95.40.242
  3    3 ms       1 ms       1 ms       10.95.40.246
  4    4 ms       1 ms       1 ms       10.95.40.238

Trace complete.
```

Đường đi từ PC-A đến ServerB1

```
C:\>tracert 10.95.40.158

Tracing route to 10.95.40.158 over a maximum of 30 hops:

  1    0 ms       0 ms       1 ms       10.95.40.1
  2    8 ms       1 ms       0 ms       10.95.40.242
  3    1 ms      28 ms       2 ms       10.95.40.246
  4    3 ms       3 ms       1 ms       10.95.40.158

Trace complete.
```

Đường đi từ PC-A đến ServerB2

Từ ServerB1 đến PC-A:

- Từ ServerB1 đến Router R2 (S0/1/1 10.95.40.245)

```
Cisco Packet Tracer SERVER Command Line 1.0
C:\>ping 10.95.40.245

Pinging 10.95.40.245 with 32 bytes of data:

Reply from 10.95.40.245: bytes=32 time=22ms TTL=254
Reply from 10.95.40.245: bytes=32 time=1ms TTL=254
Reply from 10.95.40.245: bytes=32 time=15ms TTL=254
Reply from 10.95.40.245: bytes=32 time=1ms TTL=254

Ping statistics for 10.95.40.245:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 22ms, Average = 9ms
```

- Từ ServerB1 đến Router R1 (S0/1/0 10.95.40.241)

```
C:\>ping 10.95.40.241

Pinging 10.95.40.241 with 32 bytes of data:

Reply from 10.95.40.241: bytes=32 time=23ms TTL=253
Reply from 10.95.40.241: bytes=32 time=13ms TTL=253
Reply from 10.95.40.241: bytes=32 time=3ms TTL=253
Reply from 10.95.40.241: bytes=32 time=7ms TTL=253

Ping statistics for 10.95.40.241:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 23ms, Average = 11ms
```

- Từ ServerB1 đến PC-A (10.95.40.126)

```
C:\>ping 10.95.40.126

Pinging 10.95.40.126 with 32 bytes of data:

Reply from 10.95.40.126: bytes=32 time=19ms TTL=125
Reply from 10.95.40.126: bytes=32 time=2ms TTL=125
Reply from 10.95.40.126: bytes=32 time=16ms TTL=125
Reply from 10.95.40.126: bytes=32 time=19ms TTL=125

Ping statistics for 10.95.40.126:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 19ms, Average = 14ms
```

- Dùng tracert để xem đường đi từ ServerB1 đến PC-A

```
C:\>tracert 10.95.40.126

Tracing route to 10.95.40.126 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms      10.95.40.225
  2    1 ms      3 ms      0 ms      10.95.40.245
  3    0 ms      1 ms      1 ms      10.95.40.241
  4    1 ms      3 ms      0 ms      10.95.40.126

Trace complete.
```

Từ ServerB2 đến PC-A (tương tự ServerB1)

- Từ ServerB2 đến PC-A

```
Cisco Packet Tracer SERVER Command Line 1.0
C:\>ping 10.95.40.245

Pinging 10.95.40.245 with 32 bytes of data:

Reply from 10.95.40.245: bytes=32 time=1ms TTL=254
Reply from 10.95.40.245: bytes=32 time=1ms TTL=254
Reply from 10.95.40.245: bytes=32 time=1ms TTL=254
Reply from 10.95.40.245: bytes=32 time=7ms TTL=254

Ping statistics for 10.95.40.245:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 7ms, Average = 2ms

C:\>ping 10.95.40.241

Pinging 10.95.40.241 with 32 bytes of data:

Reply from 10.95.40.241: bytes=32 time=21ms TTL=253
Reply from 10.95.40.241: bytes=32 time=2ms TTL=253
Reply from 10.95.40.241: bytes=32 time=16ms TTL=253
Reply from 10.95.40.241: bytes=32 time=2ms TTL=253

Ping statistics for 10.95.40.241:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 21ms, Average = 10ms
```

```
C:\>ping 10.95.40.126

Pinging 10.95.40.126 with 32 bytes of data:

Reply from 10.95.40.126: bytes=32 time=21ms TTL=125
Reply from 10.95.40.126: bytes=32 time=10ms TTL=125
Reply from 10.95.40.126: bytes=32 time=3ms TTL=125
Reply from 10.95.40.126: bytes=32 time=2ms TTL=125

Ping statistics for 10.95.40.126:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 21ms, Average = 9ms
```

- Dùng tracert để xem đường đi từ ServerB2 đến PC-A

```
C:\>tracert 10.95.40.126

Tracing route to 10.95.40.126 over a maximum of 30 hops:

  1    0 ms      0 ms      1 ms      10.95.40.129
  2    0 ms      5 ms      1 ms      10.95.40.245
  3    1 ms      1 ms      4 ms      10.95.40.241
  4    7 ms      3 ms      4 ms      10.95.40.126

Trace complete.
```

Đường dự phòng

Cấu hình định tuyến tĩnh dự phòng cho Router R1:

- R1 đi qua next-hop S0/1/1 của R4 đến lớp mạng 10.95.40.252 (distance 2)
- R1 đi qua next-hop S0/1/1 của R3 đến lớp mạng 10.95.40.224 (distance 2)
- R1 đi qua next-hop S0/1/1 của R3 đến lớp mạng 10.95.40.128 (distance 2)

```
R1(config)# ip route 10.95.40.252 255.255.255.252 10.95.40.250 2
R1(config)# ip route 10.95.40.224 255.255.255.240 10.95.40.254 2
R1(config)# ip route 10.95.40.128 255.255.255.224 10.95.40.254 2
```

```
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, 7 subnets, 5 masks
C       10.95.40.0/25 is directly connected, GigabitEthernet0/0/1
L       10.95.40.1/32 is directly connected, GigabitEthernet0/0/1
S       10.95.40.128/27 [2/0] via 10.95.40.254
S       10.95.40.224/28 [2/0] via 10.95.40.254
C       10.95.40.248/30 is directly connected, Serial0/1/1
L       10.95.40.249/32 is directly connected, Serial0/1/1
S       10.95.40.252/30 [2/0] via 10.95.40.250
```

Cấu hình định tuyến tĩnh dự phòng cho Router R3:

- R3 đi qua next-hop S0/1/0 của R4 đến lớp mạng 10.95.40.248 (distance 2)
- R3 đi qua next-hop S0/1/1 của R1 đến lớp mạng 10.95.40.0 (distance 2)

```
R3(config)# ip route 10.95.40.248 255.255.255.252 10.95.40.253 2
R3(config)# ip route 10.95.40.0 255.255.255.128 10.95.40.249 2
```

```
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, 8 subnets, 5 masks
S        10.95.40.0/25 [2/0] via 10.95.40.249
C        10.95.40.128/27 is directly connected, GigabitEthernet0/0/1
L        10.95.40.129/32 is directly connected, GigabitEthernet0/0/1
C        10.95.40.224/28 is directly connected, GigabitEthernet0/0/0
L        10.95.40.225/32 is directly connected, GigabitEthernet0/0/0
S        10.95.40.248/30 [2/0] via 10.95.40.253
C        10.95.40.252/30 is directly connected, Serial0/1/1
L        10.95.40.254/32 is directly connected, Serial0/1/1
```

Cấu hình định tuyến tĩnh cho Router R4:

- R4 đi qua next-hop S0/1/1 của R1 đến lớp mạng 10.95.40.0
- R4 đi qua next-hop S0/1/1 của R3 đến lớp mạng 10.95.40.224
- R4 đi qua next-hop S0/1/1 của R3 đến lớp mạng 10.95.40.128

```
R4(config)# ip route 10.95.40.0 255.255.255.128 10.95.40.249
R4(config)# ip route 10.95.40.224 255.255.255.240 10.95.40.254
R4(config)# ip route 10.95.40.128 255.255.255.224 10.95.40.254
```
```
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        10.95.40.0/25 [1/0] via 10.95.40.249
S        10.95.40.128/27 [1/0] via 10.95.40.254
S        10.95.40.224/28 [1/0] via 10.95.40.254
C        10.95.40.248/30 is directly connected, Serial0/1/1
L        10.95.40.250/32 is directly connected, Serial0/1/1
C        10.95.40.252/30 is directly connected, Serial0/1/0
L        10.95.40.253/32 is directly connected, Serial0/1/0
```

Từ PC-A đi đến ServerB1, ServerB2:

- Từ PC-A đến Router R4 (S0/1/1 10.95.40.250)

```
C:\>ping 10.95.40.250

Pinging 10.95.40.250 with 32 bytes of data:

Reply from 10.95.40.250: bytes=32 time=15ms TTL=254
Reply from 10.95.40.250: bytes=32 time=11ms TTL=254
Reply from 10.95.40.250: bytes=32 time=1ms TTL=254
Reply from 10.95.40.250: bytes=32 time=1ms TTL=254

Ping statistics for 10.95.40.250:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 15ms, Average = 7ms
```

- Từ PC-A đến Router R3 (S0/1/1 10.95.40.254)

```
C:\>ping 10.95.40.254

Pinging 10.95.40.254 with 32 bytes of data:

Reply from 10.95.40.254: bytes=32 time=2ms TTL=253
Reply from 10.95.40.254: bytes=32 time=2ms TTL=253
Reply from 10.95.40.254: bytes=32 time=26ms TTL=253
Reply from 10.95.40.254: bytes=32 time=21ms TTL=253

Ping statistics for 10.95.40.254:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 26ms, Average = 12ms
```

- Từ PC-A đến ServerB1 (10.95.40.238)

```
C:\>ping 10.95.40.238

Pinging 10.95.40.238 with 32 bytes of data:

Reply from 10.95.40.238: bytes=32 time=17ms TTL=125
Reply from 10.95.40.238: bytes=32 time=2ms TTL=125
Reply from 10.95.40.238: bytes=32 time=2ms TTL=125
Reply from 10.95.40.238: bytes=32 time=17ms TTL=125

Ping statistics for 10.95.40.238:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 17ms, Average = 9ms
```

- Từ PC-A đến ServerB2 (10.95.40.158)

```
C:\>ping 10.95.40.158

Pinging 10.95.40.158 with 32 bytes of data:

Reply from 10.95.40.158: bytes=32 time=18ms TTL=125
Reply from 10.95.40.158: bytes=32 time=16ms TTL=125
Reply from 10.95.40.158: bytes=32 time=2ms TTL=125
Reply from 10.95.40.158: bytes=32 time=10ms TTL=125

Ping statistics for 10.95.40.158:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 18ms, Average = 11ms
```

- Dùng tracert để xem quảng đường đi từ PC-A đến ServerB1, ServerB2

```
C:\>tracert 10.95.40.238

Tracing route to 10.95.40.238 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms       10.95.40.1
  2    4 ms      0 ms      0 ms       10.95.40.250
  3    7 ms      3 ms      7 ms       10.95.40.254
  4    3 ms      1 ms      0 ms       10.95.40.238

Trace complete.
```

Đường đi từ PC-A đến ServerB1

```
C:\>tracert 10.95.40.158

Tracing route to 10.95.40.158 over a maximum of 30 hops:

  1    0 ms      0 ms      0 ms       10.95.40.1
  2    3 ms      0 ms      0 ms       10.95.40.250
  3    1 ms      5 ms      0 ms       10.95.40.254
  4   12 ms      3 ms      1 ms       10.95.40.158

Trace complete.
```

Đường đi từ PC-A đến ServerB2

Từ ServerB1 đến PC-A:

- Từ ServerB1 đến Router R4 (S0/1/0 10.95.40.253)

```
C:\>ping 10.95.40.253

Pinging 10.95.40.253 with 32 bytes of data:

Reply from 10.95.40.253: bytes=32 time=16ms TTL=254
Reply from 10.95.40.253: bytes=32 time=1ms TTL=254
Reply from 10.95.40.253: bytes=32 time=12ms TTL=254
Reply from 10.95.40.253: bytes=32 time=10ms TTL=254

Ping statistics for 10.95.40.253:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 16ms, Average = 9ms
```

- Từ ServerB1 đến Router R1 (S0/1/1 10.95.40.249)

```
C:\>ping 10.95.40.249

Pinging 10.95.40.249 with 32 bytes of data:

Reply from 10.95.40.249: bytes=32 time=43ms TTL=253
Reply from 10.95.40.249: bytes=32 time=73ms TTL=253
Reply from 10.95.40.249: bytes=32 time=45ms TTL=253
Reply from 10.95.40.249: bytes=32 time=12ms TTL=253

Ping statistics for 10.95.40.249:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 12ms, Maximum = 73ms, Average = 43ms
```

- Từ ServerB1 đến PC-A (10.95.40.126)

```
C:\>ping 10.95.40.126

Pinging 10.95.40.126 with 32 bytes of data:

Reply from 10.95.40.126: bytes=32 time=56ms TTL=125
Reply from 10.95.40.126: bytes=32 time=2ms TTL=125
Reply from 10.95.40.126: bytes=32 time=2ms TTL=125
Reply from 10.95.40.126: bytes=32 time=11ms TTL=125

Ping statistics for 10.95.40.126:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 56ms, Average = 17ms
```

- Dùng tracert để xem đường đi từ ServerB1 đến PC-A

```
C:\>tracert 10.95.40.126

Tracing route to 10.95.40.126 over a maximum of 30 hops:

  1    0 ms       0 ms       0 ms      10.95.40.225
  2    1 ms       1 ms       1 ms      10.95.40.253
  3    0 ms      12 ms       0 ms      10.95.40.249
  4    0 ms       4 ms       8 ms      10.95.40.126

Trace complete.
```

Từ ServerB2 đến PC-A (tương tự ServerB1)

- Từ ServerB2 đến PC-A

```
C:\>ping 10.95.40.253

Pinging 10.95.40.253 with 32 bytes of data:

Reply from 10.95.40.253: bytes=32 time=19ms TTL=254
Reply from 10.95.40.253: bytes=32 time=17ms TTL=254
Reply from 10.95.40.253: bytes=32 time=19ms TTL=254
Reply from 10.95.40.253: bytes=32 time=14ms TTL=254

Ping statistics for 10.95.40.253:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 14ms, Maximum = 19ms, Average = 17ms

C:\>ping 10.95.40.249

Pinging 10.95.40.249 with 32 bytes of data:

Reply from 10.95.40.249: bytes=32 time=25ms TTL=253
Reply from 10.95.40.249: bytes=32 time=2ms TTL=253
Reply from 10.95.40.249: bytes=32 time=19ms TTL=253
Reply from 10.95.40.249: bytes=32 time=8ms TTL=253

Ping statistics for 10.95.40.249:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 25ms, Average = 13ms
```

```
C:\>ping 10.95.40.126

Pinging 10.95.40.126 with 32 bytes of data:

Reply from 10.95.40.126: bytes=32 time=21ms TTL=125
Reply from 10.95.40.126: bytes=32 time=2ms TTL=125
Reply from 10.95.40.126: bytes=32 time=2ms TTL=125
Reply from 10.95.40.126: bytes=32 time=2ms TTL=125

Ping statistics for 10.95.40.126:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 2ms, Maximum = 21ms, Average = 6ms
```

- Dùng tracert để xem đường đi từ ServerB2 đến PC-A

```
C:\>tracert 10.95.40.126

Tracing route to 10.95.40.126 over a maximum of 30 hops:

  1    0 ms        0 ms        0 ms      10.95.40.129
  2    0 ms        0 ms        1 ms      10.95.40.253
  3    1 ms        0 ms        4 ms      10.95.40.249
  4    0 ms        1 ms        0 ms      10.95.40.126

Trace complete.
```