LAB 3

VLAN - VẠCH ĐƯỜNG LIÊN VLAN - OSPF

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Nhóm học phần: CT29303

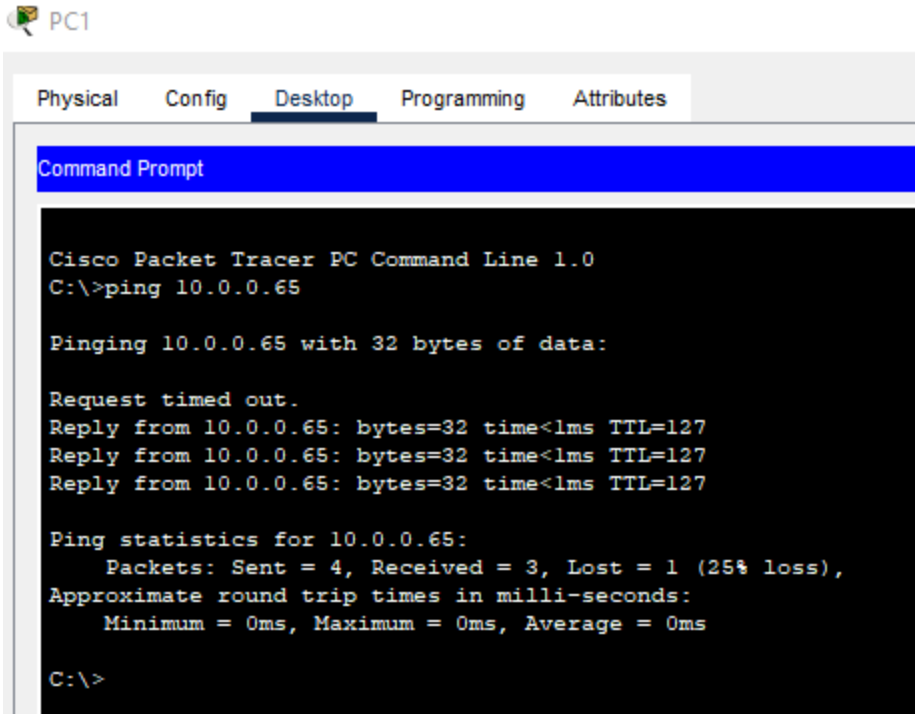
1. Cấu hình VLAN

Xem video hướng dẫn và thực hiện các yêu cầu sau:

Sử dụng file *Lab03-01 - VLANs.pkt*, thực hiện:

- Cấu hình địa chỉ IP và mặt nạ mạng cho các PC. Đặt gateway là địa chỉ khả dụng cuối cùng của subnet.
- Tạo 3 nối kết giữa R1 và SW1. Cấu hình mỗi interface của R1 là gateway của 1 VLAN (địa chỉ IP của interface là địa chỉ gateway của subnet).
- Cấu hình VLAN cho các interface của SW1 phù hợp sơ đồ mạng, kể cả interface nối kết tới R1. Đặt tên cho các VLAN (Engineering, HR, Sales).
- Ping giữa các PC để kiểm tra nối kết (chụp hình minh họa).

+ pc1 ping tới pc3



+

+ pc1 ping tới pc5

+

```
C:\>ping 10.0.0.129

Pinging 10.0.0.129 with 32 bytes of data:

Reply from 10.0.0.129: bytes=32 time<1ms TTL=127
Reply from 10.0.0.129: bytes=32 time<1ms TTL=127
Reply from 10.0.0.129: bytes=32 time<1ms TTL=127
Reply from 10.0.0.129: bytes=32 time<1ms TTL=127

Ping statistics for 10.0.0.129:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

+ Pc2 ping tới pc 4

+

PC2

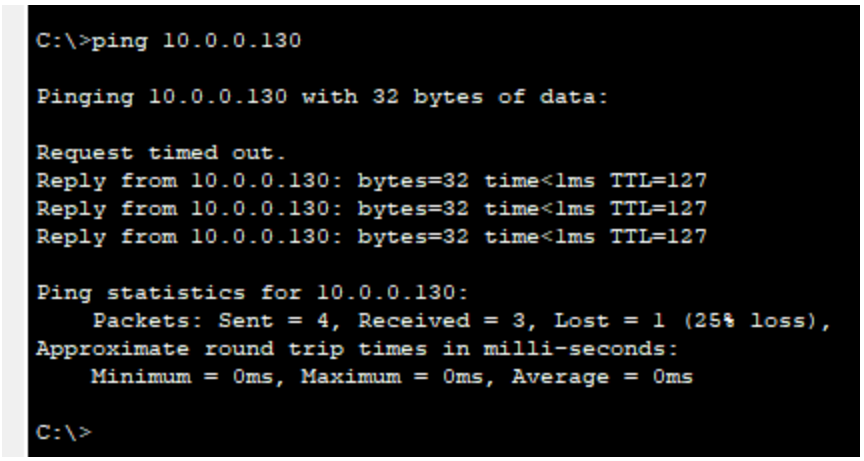
Physical | Config | Desktop | Programming | Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.0.0.66

Pinging 10.0.0.66 with 32 bytes of data:

Request timed out.
Reply from 10.0.0.66: bytes=32 time<1ms TTL=127
Reply from 10.0.0.66: bytes=32 time<1ms TTL=127
Reply from 10.0.0.66: bytes=32 time<1ms TTL=127

Ping statistics for 10.0.0.66:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

+ Pc2 ping tới pc6

+



- Hiển thị running-configuration của SW1 và R1 (chụp hình minh họa).

+ running-configuration của SW1

```
SW1#sh run
Building configuration...

Current configuration : 1089 bytes
!
version 12.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname SW1
!
!
!
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
!
interface GigabitEthernet0/1
 switchport access vlan 10
 switchport mode access
!
interface GigabitEthernet1/1
 switchport access vlan 20
 switchport mode access
!
interface GigabitEthernet2/1
 switchport access vlan 30
 switchport mode access
!
interface FastEthernet3/1
 switchport access vlan 10
 switchport mode access
!
interface FastEthernet4/1
 switchport access vlan 10
 switchport mode access
!
interface FastEthernet5/1
 switchport access vlan 20
 switchport mode access
!
```

```
!
interface FastEthernet5/1
 switchport access vlan 20
 switchport mode access
!
interface FastEthernet6/1
 switchport access vlan 20
 switchport mode access
!
interface FastEthernet7/1
 switchport access vlan 30
 switchport mode access
!
interface FastEthernet8/1
 switchport access vlan 30
 switchport mode access
!
interface FastEthernet9/1
!
interface Vlan1
 no ip address
 shutdown
!
no cdp run
!
!
!
!
line con 0
!
line vty 0 4
 login
line vty 5 15
 login
!
!
!
!
end
```

+ running-configuration của R1

```
R1#sh run
Building configuration...

Current configuration : 741 bytes
!
version 15.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R1
!
!
!
!
!
!
!
!
ip cef
no ipv6 cef
!
!
!
!
license udi pid CISCO2911/K9 sn FTX1524W961-
!
spanning-tree mode pvst
!
!
!
!
!
!
interface GigabitEthernet0/0
 ip address 10.0.0.62 255.255.255.192
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
 ip address 10.0.0.126 255.255.255.192
 duplex auto
 speed auto
!
interface GigabitEthernet0/2
 ip address 10.0.0.190 255.255.255.192
 duplex auto
 speed auto
!
interface Vlan1
 no ip address
 shutdown
!
ip classless
!
ip flow-export version 9
```

```
!
no cdp run
!
!
!
!
!
!
line con 0
!
line aux 0
!
line vty 0 4
 login
!
!
!
end
```

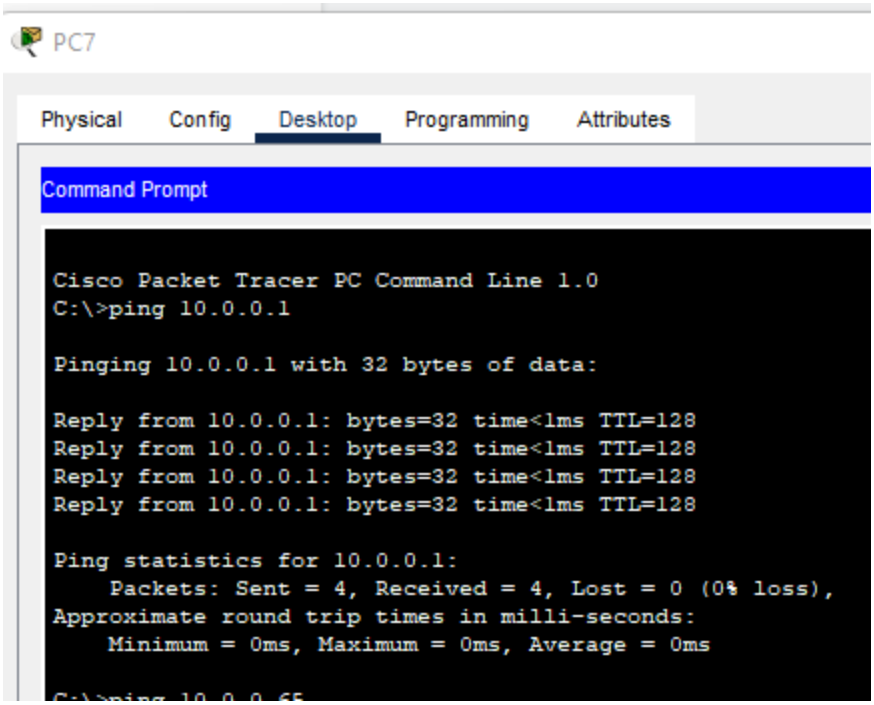
2. ROAS

Xem video hướng dẫn và thực hiện các yêu cầu sau:

Sử dụng file *Lab03-02 - ROAS.pkt*, thực hiện:

- Cấu hình VLAN cho các interface của các switch SW1, SW2 phù hợp với sơ đồ mạng.
- Cấu hình nối kết giữa SW1 và SW2 hỗ trợ trunking cho các VLAN cần thiết. Cấu hình các VLAN không dùng là native VLAN. Đảm bảo là các VLAN cần thiết đều được cấu hình.
- Cấu hình nối kết giữa SW2 và R1 sử dụng router on a stick (ROAS). Gán địa chỉ khả dụng cuối cùng của mỗi subnet cho các subinterface của R1.
- Kiểm tra nối kết giữa các PC bằng lệnh ping (chụp hình minh họa).

+ Pc7 ping tới pc1



+

+ Pc7 ping tới pc5

```
C:\>ping 10.0.0.65

Pinging 10.0.0.65 with 32 bytes of data:

Request timed out.
Reply from 10.0.0.65: bytes=32 time<1ms TTL=127
Reply from 10.0.0.65: bytes=32 time<1ms TTL=127
Reply from 10.0.0.65: bytes=32 time=4ms TTL=127

Ping statistics for 10.0.0.65:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 4ms, Average = 1ms

C:\>
```

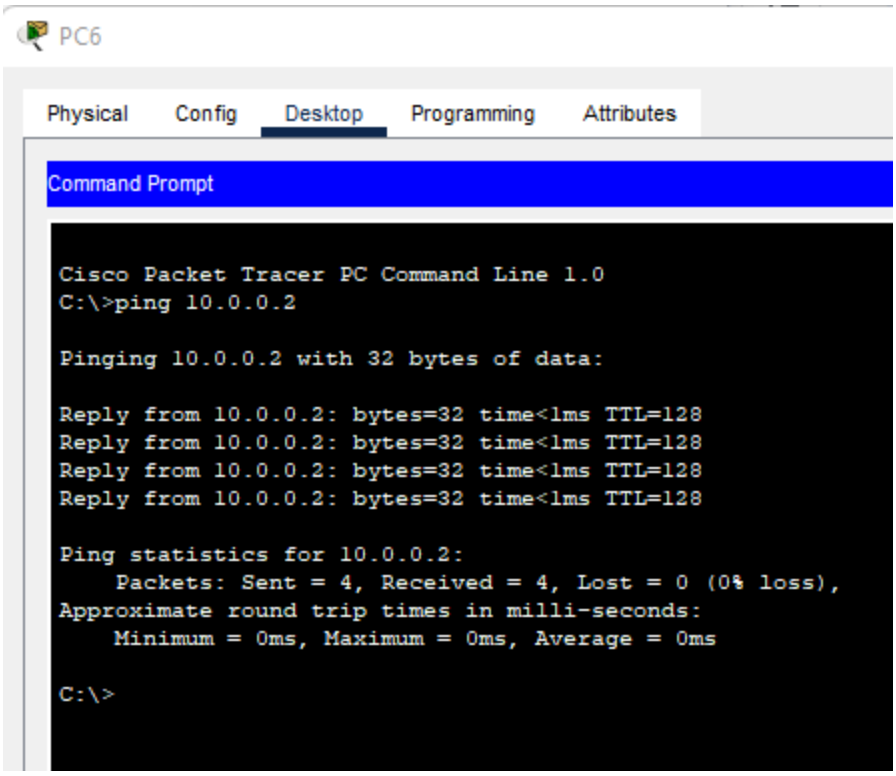
+

+ pc 7 ping tới pc3

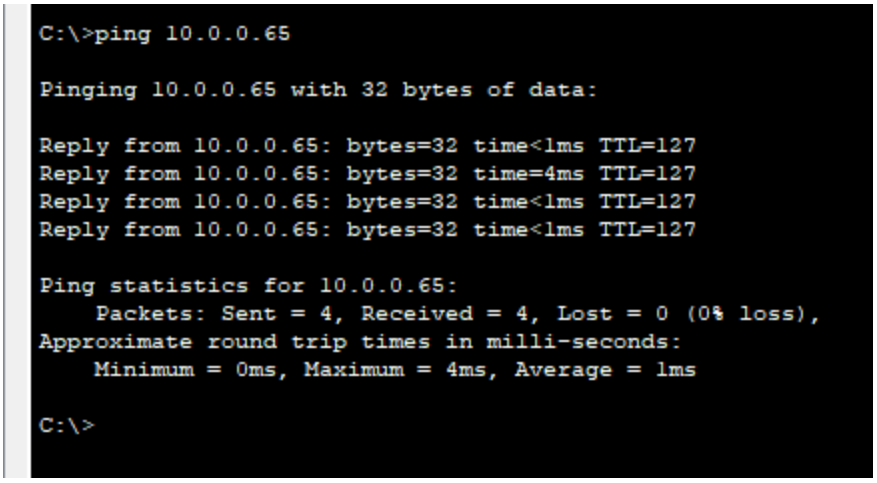
```
C:\>ping 10.0.0.129

Pinging 10.0.0.129 with 32 bytes of data:

Request timed out.
Reply from 10.0.0.129: bytes=32 time<1ms TTL=127
Reply from 10.0.0.129: bytes=32 time<1ms TTL=127
Reply from 10.0.0.129: bytes=32 time<1ms TTL=127

Ping statistics for 10.0.0.129:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

+

+ pc6 ping tới pc2



+ Pc6 ping tới pc5



+ Pc6 ping tới pc4

+

```
C:\>ping 10.0.0.130

Pinging 10.0.0.130 with 32 bytes of data:

Request timed out.
Reply from 10.0.0.130: bytes=32 time<1ms TTL=127
Reply from 10.0.0.130: bytes=32 time<1ms TTL=127
Reply from 10.0.0.130: bytes=32 time<1ms TTL=127

Ping statistics for 10.0.0.130:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

- Hiển thị running-configuration của SW1 và R1 (chụp hình minh họa).

+ running-configuration của SW1

```
SW1#sh run
Building configuration...

Current configuration : 1405 bytes
!
version 12.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname SW1
!
!
!
!
!
!
no spanning-tree vlan 1-4094
spanning-tree mode pvst
spanning-tree extend system-id
!
interface FastEthernet0/1
 switchport access vlan 10
 switchport mode access
!
interface FastEthernet0/2
 switchport access vlan 10
 switchport mode access
!
interface FastEthernet0/3
 switchport access vlan 30
 switchport mode access
!
interface FastEthernet0/4
 switchport access vlan 30
 switchport mode access
!
interface FastEthernet0/5
!
interface FastEthernet0/6
!
interface FastEthernet0/7
!
interface FastEthernet0/8
!
interface FastEthernet0/9
!
+ interface FastEthernet0/10
```

```
!
interface FastEthernet0/11
!
interface FastEthernet0/12
!
interface FastEthernet0/13
!
interface FastEthernet0/14
!
interface FastEthernet0/15
!
interface FastEthernet0/16
!
interface FastEthernet0/17
!
interface FastEthernet0/18
!
interface FastEthernet0/19
!
interface FastEthernet0/20
!
interface FastEthernet0/21
!
interface FastEthernet0/22
!
interface FastEthernet0/23
!
interface FastEthernet0/24
!
interface GigabitEthernet0/1
 switchport trunk native vlan 1001
 switchport trunk allowed vlan 10,30
 switchport mode trunk
!
interface GigabitEthernet0/2
!
interface Vlan1
 no ip address
 shutdown
!
!
!
!
line con 0
!
line vty 0 4
 login
line vty 5 15
 login
!
!
!
!
end
```

+ running-configuration của R1

```
R1#sh run
Building configuration...

Current configuration : 980 bytes
!
version 15.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R1
!
!
!
!
!
!
!
!
ip cef
no ipv6 cef
!
!
!
!
license udi pid CISCO2911/K9 sn FTX152425PG-
spanning-tree mode pvst
!
!
!
!
!
!
interface GigabitEthernet0/0
 no ip address
 duplex auto
 speed auto
!
interface GigabitEthernet0/0.10
 encapsulation dot1Q 10
 ip address 10.0.0.62 255.255.255.192
!
interface GigabitEthernet0/0.20
 encapsulation dot1Q 20
 ip address 10.0.0.126 255.255.255.192
!
interface GigabitEthernet0/0.30
 encapsulation dot1Q 30
 ip address 10.0.0.190 255.255.255.192
!
interface GigabitEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
```

```
interface GigabitEthernet0/2
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
ip classless
!
ip flow-export version 9
!
!
!
no cdp run
!
!
!
!
!
!
line con 0
!
line aux 0
!
line vty 0 4
 login
!
!
!
end
```

+

3. Multilayer Switching

Xem video hướng dẫn và thực hiện các yêu cầu sau:

Sử dụng file *Lab03-03 - Multilayer Switching.pkt*, thực hiện:

- Cấu thiết trong sơ đồ mạng đã được cấu hình giống như Câu 2 trong bài thực hành. Trong đó các PC đã được cấu hình VLAN phù hợp, nối kết giữa SW1 và SW2 đã được trunking phù hợp. R1 và SW2 được nối kết sử dụng ROAS.
- Thay thế cấu hình ROAS của nối kết R1-SW2 thành nối kết point-to-point layer 3. Cấu hình default route cho SW2 với next-hop là interface G0/0 của R1.
- Cấu hình các SVI cho mỗi VLAN trên SW2. Gán địa chỉ IP khả dụng cuối cùng của subnet cho mỗi SVI.
- Kiểm tra nối kết giữa các PC ở các VLAN bằng lệnh ping (chụp hình minh họa).

+ Pc7 (vlan 10) ping tới pc5 (vlan 20)

```
C:\>ping 10.0.0.65

Pinging 10.0.0.65 with 32 bytes of data:

Request timed out.
Reply from 10.0.0.65: bytes=32 time<1ms TTL=127
Reply from 10.0.0.65: bytes=32 time<1ms TTL=127
Reply from 10.0.0.65: bytes=32 time<1ms TTL=127

Ping statistics for 10.0.0.65:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

+ Pc7 (vlan 10) ping tới pc3 (vlan 30)

```
C:\>ping 10.0.0.129

Pinging 10.0.0.129 with 32 bytes of data:

Request timed out.
Reply from 10.0.0.129: bytes=32 time<1ms TTL=127
Reply from 10.0.0.129: bytes=32 time<1ms TTL=127
Reply from 10.0.0.129: bytes=32 time<1ms TTL=127

Ping statistics for 10.0.0.129:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

+ Pc6 (vlan 10) ping tới pc5 (vlan 20)

PC6

Physical | Config | Desktop | Programming | Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.0.0.65

Pinging 10.0.0.65 with 32 bytes of data:

Reply from 10.0.0.65: bytes=32 time<1ms TTL=127
Reply from 10.0.0.65: bytes=32 time<1ms TTL=127
Reply from 10.0.0.65: bytes=32 time=1ms TTL=127
Reply from 10.0.0.65: bytes=32 time<1ms TTL=127

Ping statistics for 10.0.0.65:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

+ Pc6 (vlan 10) ping tới pc4 (vlan 30)

```
C:\>ping 10.0.0.130

Pinging 10.0.0.130 with 32 bytes of data:

Request timed out.
Reply from 10.0.0.130: bytes=32 time<1ms TTL=127
Reply from 10.0.0.130: bytes=32 time<1ms TTL=127
Reply from 10.0.0.130: bytes=32 time<1ms TTL=127

Ping statistics for 10.0.0.130:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

+

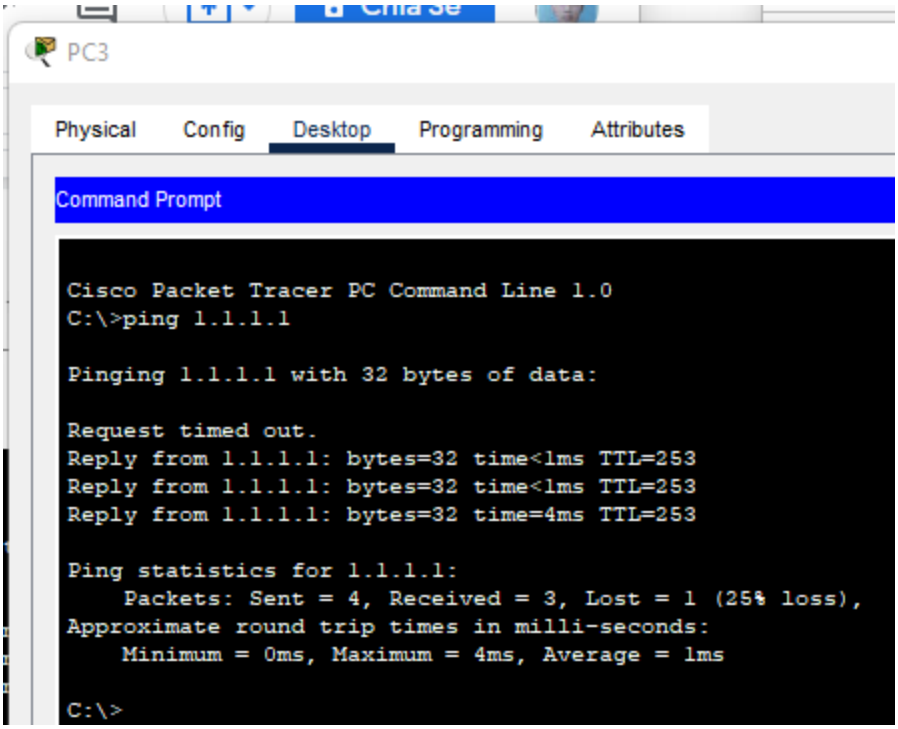
- Cấu hình sao cho các PC có thể ping tới Internet (địa chỉ 1.1.1.1) (chụp hình minh họa).

+ Pc 7 ping tới internet

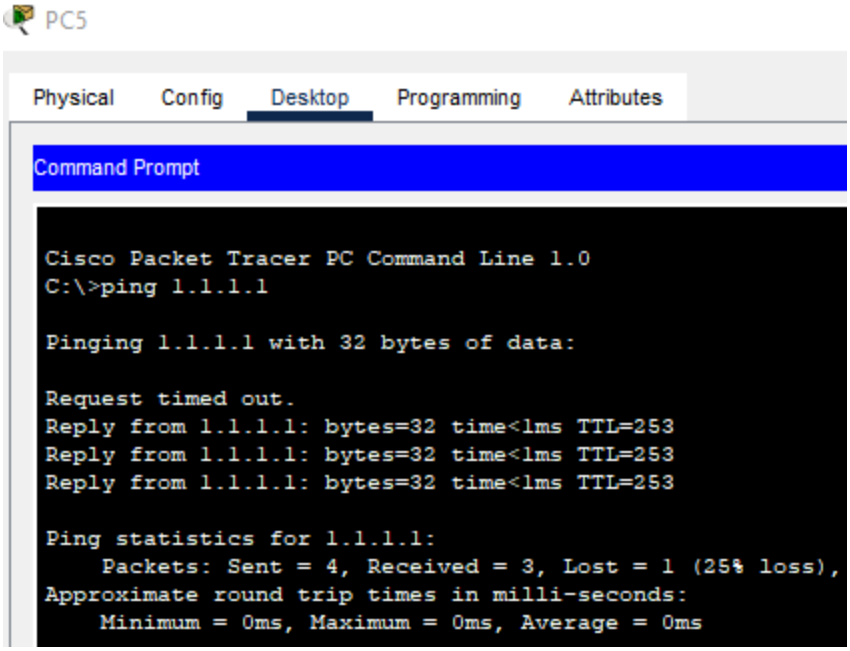
```
C:\>ping 1.1.1.1

Pinging 1.1.1.1 with 32 bytes of data:

Reply from 1.1.1.1: bytes=32 time<1ms TTL=253
Reply from 1.1.1.1: bytes=32 time<1ms TTL=253
Reply from 1.1.1.1: bytes=32 time<1ms TTL=253
Reply from 1.1.1.1: bytes=32 time=4ms TTL=253

Ping statistics for 1.1.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 4ms, Average = 1ms

C:\>
```

+

+ Pc3 ping tới internet

+ 

+ Pc5 ping tới internet

+ 

- Hiển thị running-configuration SW2 và R1 (chụp hình minh họa).

+ running-configuration SW2

```
SW2#sh run
Building configuration...

Current configuration : 2013 bytes
!
version 16.3.2
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname SW2
!
!
!
!
!
!
!
no ip cef
ip routing
!
no ipv6 cef
```

+

```
spanning-tree mode pvst
!
!
!
!
!
!
interface GigabitEthernet1/0/1
 switchport trunk allowed vlan 10,30
 switchport mode trunk
!
interface GigabitEthernet1/0/2
 no switchport
 ip address 10.0.0.193 255.255.255.252
 duplex auto
 speed auto
!
interface GigabitEthernet1/0/3
 switchport access vlan 20
 switchport mode access
 switchport nonegotiate
!
interface GigabitEthernet1/0/4
 switchport access vlan 10
 switchport mode access
 switchport nonegotiate
!
interface GigabitEthernet1/0/5
 switchport access vlan 10
 switchport mode access
 switchport nonegotiate
!
interface GigabitEthernet1/0/6
!
interface GigabitEthernet1/0/7
!
interface GigabitEthernet1/0/8
!
interface GigabitEthernet1/0/9
!
interface GigabitEthernet1/0/10
!
interface GigabitEthernet1/0/11
!
interface GigabitEthernet1/0/12
!
interface GigabitEthernet1/0/13
!
interface GigabitEthernet1/0/14
!
interface GigabitEthernet1/0/15
!
interface GigabitEthernet1/0/16
!
interface GigabitEthernet1/0/17
!
interface GigabitEthernet1/0/18
!
```

```
!
interface GigabitEthernet1/0/19
!
interface GigabitEthernet1/0/20
!
interface GigabitEthernet1/0/21
!
interface GigabitEthernet1/0/22
!
interface GigabitEthernet1/0/23
!
interface GigabitEthernet1/0/24
!
interface GigabitEthernet1/1/1
!
interface GigabitEthernet1/1/2
!
interface GigabitEthernet1/1/3
!
interface GigabitEthernet1/1/4
!
interface Vlan1
 no ip address
 shutdown
!
interface Vlan10
 mac-address 0060.5c04.5a01
 ip address 10.0.0.62 255.255.255.192
!
interface Vlan20
 mac-address 0060.5c04.5a02
 ip address 10.0.0.126 255.255.255.192
!
interface Vlan30
 mac-address 0060.5c04.5a03
 ip address 10.0.0.190 255.255.255.192
!
ip classless
ip route 0.0.0.0 0.0.0.0 10.0.0.194
!
ip flow-export version 9
!
!
!
!
!
!
!
!
line con 0
!
line aux 0
!
line vty 0 4
 login
!
!
!
!
end
```

+ running-configuration R1

```
R1#sh run
Building configuration...

Current configuration : 826 bytes
!
version 15.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R1
!
!
!
!
!
!
!
!
ip cef
no ipv6 cef
!
!
!
!
license udi pid CISCO2911/K9 sn FTX152425PG-
!
```

```
.
spanning-tree mode pvst
!
!
!
!
!
!
interface GigabitEthernet0/0
 ip address 10.0.0.194 255.255.255.252
 duplex auto
 speed auto
!
interface GigabitEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface GigabitEthernet0/2
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface GigabitEthernet0/0/0
 ip address 1.1.1.2 255.255.255.0
!
interface Vlan1
 no ip address
 shutdown
!
ip classless
ip route 0.0.0.0 0.0.0.0 GigabitEthernet0/0
!
ip flow-export version 9
!
!
!
no cdp run
!
!
!
!
!
!
line con 0
!
line aux 0
!
line vty 0 4
 login
!
!
!
end
```

+

4. Vạch đường động sử dụng giao thức OSPF

Xem video hướng dẫn (tới phút 13) và thực hiện các yêu cầu sau:

Sử dụng file *Lab03-04 - OSPF Part 1.pkt*, thực hiện:

- Cấu hình hostname và địa chỉ IP cho mỗi thiết bị trong sơ đồ mạng. Bật các interface của các router lên. (Không cần cấu hình router ISPR1)
- Cấu hình 1 loopback interface trên mỗi router (1.1.1.1/32 cho R1, 2.2.2.2/32 cho R2, v.v.)
- Cấu hình OSPF trên mỗi router:
  - Bật OSPF trên mỗi interface (bao gồm cả loopback interface), không cần cấu hình OSPF cho nối kết từ R1 đến ISPR1.
  - Cấu hình passive interface phù hợp (bao gồm cả loopback interface)
- Cấu hình R1 là (ASBR Autonomous System Boundary Router) để quảng bá default route tới các router khác.
- Hiển thị routing table của các router (chụp hình minh họa).

+ R1

```
R1#sh 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 203.0.113.2 to network 0.0.0.0

     1.0.0.0/32 is subnetted, 1 subnets
C       1.1.1.1 is directly connected, Loopback0
     3.0.0.0/32 is subnetted, 1 subnets
O       3.3.3.3 [110/2] via 10.0.13.2, 00:30:10, FastEthernet1/0
     4.0.0.0/32 is subnetted, 1 subnets
O       4.4.4.4 [110/3] via 10.0.12.2, 00:30:10, GigabitEthernet0/0
                [110/3] via 10.0.13.2, 00:30:10, FastEthernet1/0
     10.0.0.0/30 is subnetted, 4 subnets
C       10.0.12.0 is directly connected, GigabitEthernet0/0
C       10.0.13.0 is directly connected, FastEthernet1/0
O       10.0.24.0 [110/2] via 10.0.12.2, 00:30:20, GigabitEthernet0/0
O       10.0.34.0 [110/2] via 10.0.13.2, 00:30:10, FastEthernet1/0
O    192.168.4.0/24 [110/3] via 10.0.12.2, 00:07:56, GigabitEthernet0/0
                    [110/3] via 10.0.13.2, 00:07:56, FastEthernet1/0
     203.0.113.0/30 is subnetted, 1 subnets
C       203.0.113.0 is directly connected, GigabitEthernet3/0
S*   0.0.0.0/0 [1/0] via 203.0.113.2
```

+ R2

```
R2#sh 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 10.0.12.1 to network 0.0.0.0

     1.0.0.0/32 is subnetted, 1 subnets
O       1.1.1.1 [110/2] via 10.0.12.1, 00:32:42, GigabitEthernet0/0
     2.0.0.0/32 is subnetted, 1 subnets
C       2.2.2.2 is directly connected, Loopback0
     3.0.0.0/32 is subnetted, 1 subnets
O       3.3.3.3 [110/3] via 10.0.12.1, 00:32:54, GigabitEthernet0/0
                [110/3] via 10.0.24.2, 00:32:54, FastEthernet1/0
     4.0.0.0/32 is subnetted, 1 subnets
O       4.4.4.4 [110/2] via 10.0.24.2, 00:34:26, FastEthernet1/0
     10.0.0.0/30 is subnetted, 4 subnets
C       10.0.12.0 is directly connected, GigabitEthernet0/0
O       10.0.13.0 [110/2] via 10.0.12.1, 00:32:54, GigabitEthernet0/0
C       10.0.24.0 is directly connected, FastEthernet1/0
O       10.0.34.0 [110/2] via 10.0.24.2, 00:34:26, FastEthernet1/0
O    192.168.4.0/24 [110/2] via 10.0.24.2, 00:10:40, FastEthernet1/0
O*E2 0.0.0.0/0 [110/1] via 10.0.12.1, 00:26:10, GigabitEthernet0/0
```

+

+ R3

```
R3#sh 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 10.0.13.1 to network 0.0.0.0

     1.0.0.0/32 is subnetted, 1 subnets
O       1.1.1.1 [110/2] via 10.0.13.1, 00:33:12, FastEthernet1/0
     3.0.0.0/32 is subnetted, 1 subnets
C       3.3.3.3 is directly connected, Loopback0
     4.0.0.0/32 is subnetted, 1 subnets
O       4.4.4.4 [110/2] via 10.0.34.2, 00:36:29, FastEthernet2/0
     10.0.0.0/30 is subnetted, 4 subnets
O       10.0.12.0 [110/2] via 10.0.13.1, 00:33:24, FastEthernet1/0
C       10.0.13.0 is directly connected, FastEthernet1/0
O       10.0.24.0 [110/2] via 10.0.34.2, 00:34:56, FastEthernet2/0
C       10.0.34.0 is directly connected, FastEthernet2/0
O    192.168.4.0/24 [110/2] via 10.0.34.2, 00:11:10, FastEthernet2/0
O*E2 0.0.0.0/0 [110/1] via 10.0.13.1, 00:26:40, FastEthernet1/0
```

+

+ R4

```
R4#sh ip router
              ^
% Invalid input detected at '^' marker.

R4#sh 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 10.0.24.1 to network 0.0.0.0

     1.0.0.0/32 is subnetted, 1 subnets
O       1.1.1.1 [110/3] via 10.0.24.1, 00:33:52, FastEthernet1/0
                [110/3] via 10.0.34.1, 00:33:52, FastEthernet2/0
     3.0.0.0/32 is subnetted, 1 subnets
O       3.3.3.3 [110/2] via 10.0.34.1, 00:37:00, FastEthernet2/0
     4.0.0.0/32 is subnetted, 1 subnets
C       4.4.4.4 is directly connected, Loopback0
     10.0.0.0/30 is subnetted, 4 subnets
O       10.0.12.0 [110/2] via 10.0.24.1, 00:34:14, FastEthernet1/0
O       10.0.13.0 [110/2] via 10.0.34.1, 00:34:04, FastEthernet2/0
C       10.0.24.0 is directly connected, FastEthernet1/0
C       10.0.34.0 is directly connected, FastEthernet2/0
C    192.168.4.0/24 is directly connected, GigabitEthernet0/0
O*E2 0.0.0.0/0 [110/1] via 10.0.24.1, 00:27:20, FastEthernet1/0
               [110/1] via 10.0.34.1, 00:27:20, FastEthernet2/0
```

+

5. Vạch đường động sử dụng giao thức EIGRP

Xem video hướng dẫn và thực hiện các yêu cầu sau:

Sử dụng file *Lab03-05 - EIGRP Configuration.pkt*, thực hiện:

- Cấu hình hostname và địa chỉ IP cho mỗi thiết bị trong sơ đồ mạng. Bật các interface của các router lên.
- Cấu hình 1 loopback interface trên mỗi router (1.1.1.1/32 cho R1, 2.2.2.2/32 cho R2, v.v.)
- Cấu hình EIGRP trên mỗi router:
  - Tắt chức năng auto-summary
  - Bật EIGRP trên mỗi interface (bao gồm cả loopback interface)
  - Cấu hình passive interface phù hợp (bao gồm cả loopback interface)
- KHÔNG CẦN cấu hình R1 hỗ trợ unequal-cost load-balancing khi gửi dữ liệu tới địa chỉ 192.168.4.0/24
- Hiển thị routing table của các router (chụp hình minh họa).

+ R1

```
R1(config-router)#do sh 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

     1.0.0.0/32 is subnetted, 1 subnets
C       1.1.1.1 is directly connected, Loopback0
     2.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       2.0.0.0/8 is a summary, 00:13:02, Null0
D       2.2.2.2/32 [90/130816] via 10.0.12.2, 00:12:49, GigabitEthernet0/0
     3.0.0.0/32 is subnetted, 1 subnets
D       3.3.3.3 [90/156160] via 10.0.13.2, 00:02:07, FastEthernet1/0
     4.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       4.0.0.0/8 is a summary, 00:13:02, Null0
D       4.4.4.4/32 [90/156416] via 10.0.12.2, 00:12:49, GigabitEthernet0/0
     10.0.0.0/30 is subnetted, 4 subnets
C       10.0.12.0 is directly connected, GigabitEthernet0/0
C       10.0.13.0 is directly connected, FastEthernet1/0
D       10.0.24.0 [90/28416] via 10.0.12.2, 00:12:49, GigabitEthernet0/0
D       10.0.34.0 [90/30720] via 10.0.13.2, 00:02:07, FastEthernet1/0
D    192.168.4.0/24 [90/28672] via 10.0.12.2, 00:12:49, GigabitEthernet0/0
```

+

+ R2

```
Router#sh 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

     1.0.0.0/32 is subnetted, 1 subnets
D       1.1.1.1 [90/130816] via 10.0.12.1, 00:12:49, GigabitEthernet0/0
     2.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       2.0.0.0/8 [90/131072] via 10.0.12.1, 00:12:49, GigabitEthernet0/0
C       2.2.2.2/32 is directly connected, Loopback0
     3.0.0.0/32 is subnetted, 1 subnets
D       3.3.3.3 [90/156416] via 10.0.12.1, 00:02:07, GigabitEthernet0/0
     4.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       4.0.0.0/8 [90/156672] via 10.0.12.1, 00:12:49, GigabitEthernet0/0
D       4.4.4.4/32 [90/156160] via 10.0.24.2, 00:13:59, FastEthernet1/0
     10.0.0.0/30 is subnetted, 4 subnets
C       10.0.12.0 is directly connected, GigabitEthernet0/0
D       10.0.13.0 [90/28416] via 10.0.12.1, 00:12:49, GigabitEthernet0/0
C       10.0.24.0 is directly connected, FastEthernet1/0
D       10.0.34.0 [90/30720] via 10.0.24.2, 00:13:59, FastEthernet1/0
D    192.168.4.0/24 [90/28416] via 10.0.24.2, 00:13:59, FastEthernet1/0
```

+

+ R3

```
R3(config-router)#do sh 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

     1.0.0.0/32 is subnetted, 1 subnets
D       1.1.1.1 [90/156160] via 10.0.13.1, 00:02:09, FastEthernet1/0
     2.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       2.0.0.0/8 [90/156416] via 10.0.13.1, 00:02:09, FastEthernet1/0
D       2.2.2.2/32 [90/156416] via 10.0.13.1, 00:02:09, FastEthernet1/0
     3.0.0.0/32 is subnetted, 1 subnets
C       3.3.3.3 is directly connected, Loopback0
     4.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       4.0.0.0/8 [90/158976] via 10.0.13.1, 00:02:09, FastEthernet1/0
D       4.4.4.4/32 [90/156160] via 10.0.34.2, 00:02:09, FastEthernet2/0
     10.0.0.0/30 is subnetted, 4 subnets
D       10.0.12.0 [90/28416] via 10.0.13.1, 00:02:09, FastEthernet1/0
C       10.0.13.0 is directly connected, FastEthernet1/0
D       10.0.24.0 [90/30720] via 10.0.34.2, 00:02:09, FastEthernet2/0
C       10.0.34.0 is directly connected, FastEthernet2/0
D    192.168.4.0/24 [90/28416] via 10.0.34.2, 00:02:09, FastEthernet2/0
```

+

+ R4

```
R4#sh 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

     1.0.0.0/32 is subnetted, 1 subnets
D       1.1.1.1 [90/156416] via 10.0.24.1, 00:00:50, FastEthernet1/0
     2.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       2.0.0.0/8 [90/156672] via 10.0.24.1, 00:00:50, FastEthernet1/0
D       2.2.2.2/32 [90/156160] via 10.0.24.1, 00:00:50, FastEthernet1/0
     3.0.0.0/32 is subnetted, 1 subnets
D       3.3.3.3 [90/156160] via 10.0.34.1, 00:03:21, FastEthernet2/0
     4.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       4.0.0.0/8 [90/159232] via 10.0.24.1, 00:00:50, FastEthernet1/0
C       4.4.4.4/32 is directly connected, Loopback0
     10.0.0.0/30 is subnetted, 4 subnets
D       10.0.12.0 [90/28416] via 10.0.24.1, 00:00:50, FastEthernet1/0
D       10.0.13.0 [90/30720] via 10.0.34.1, 00:00:22, FastEthernet2/0
C       10.0.24.0 is directly connected, FastEthernet1/0
C       10.0.34.0 is directly connected, FastEthernet2/0
C    192.168.4.0/24 is directly connected, GigabitEthernet0/0
```

+

--- Hết —