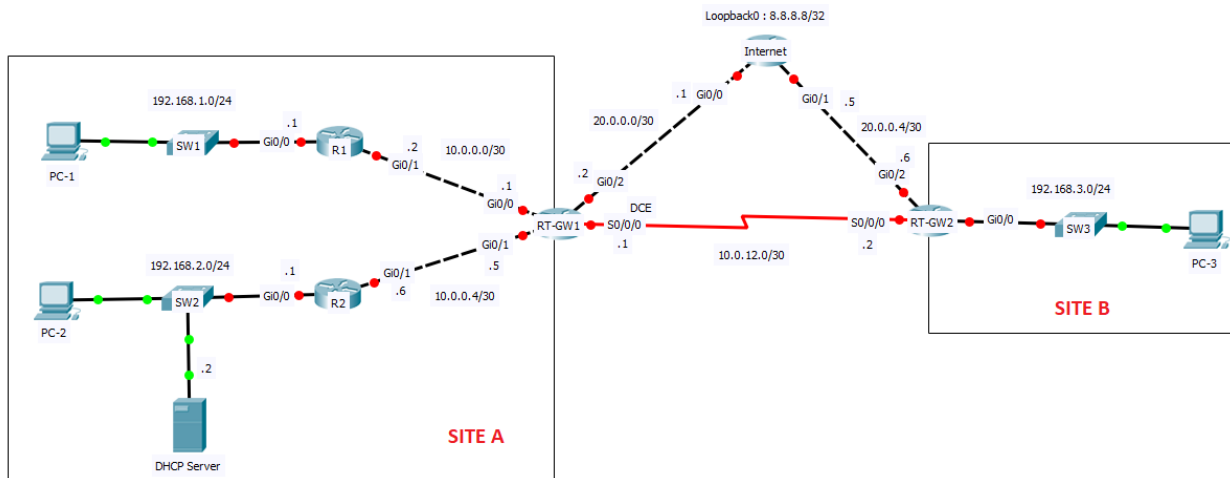


HƯỚNG DẪN LAB

LAB 4a – Định tuyến tĩnh 2

Designed by : Nguyễn Phú Thịnh

Sơ đồ LAB :



Thiết bị

Tên thiết bị	Chủng loại
R1	Router 2911
R2	Router 2911
R3	Router 2911
RT-GW1	Router 2911
RT-GW2	Router 2911
Internet	Router 2911
SW1	Switch 2960
SW2	Switch 2960
SW3	Switch 2960
PC-1	PC
PC-2	PC
PC-3	PC
DHCP Server	Server (Generic)

Quy hoạch IP

Tên thiết bị	Cổng	IP
R1	Gi0/0	192.168.1.1/24
	Gi0/1	10.0.0.2/30
R2	Gi0/0	192.168.2.1/24
	Gi0/1	10.0.0.6/30
RT-GW1	Gi0/0	10.0.0.1/30
	Gi0/1	10.0.0.5/30
	Gi0/2	20.0.0.2/30
	S0/0/0	10.0.12.1/30
RT-GW2	Gi0/0	192.168.3.1/24
	Gi0/2	20.0.0.6/30
	S0/0/0	10.0.12.2/30
Internet	Gi0/0	20.0.0.1/30
	Gi0/1	20.0.0.5/30
	Loopback 0	8.8.8.8/32
DHCP Server		192.168.2.2/24

Yêu cầu

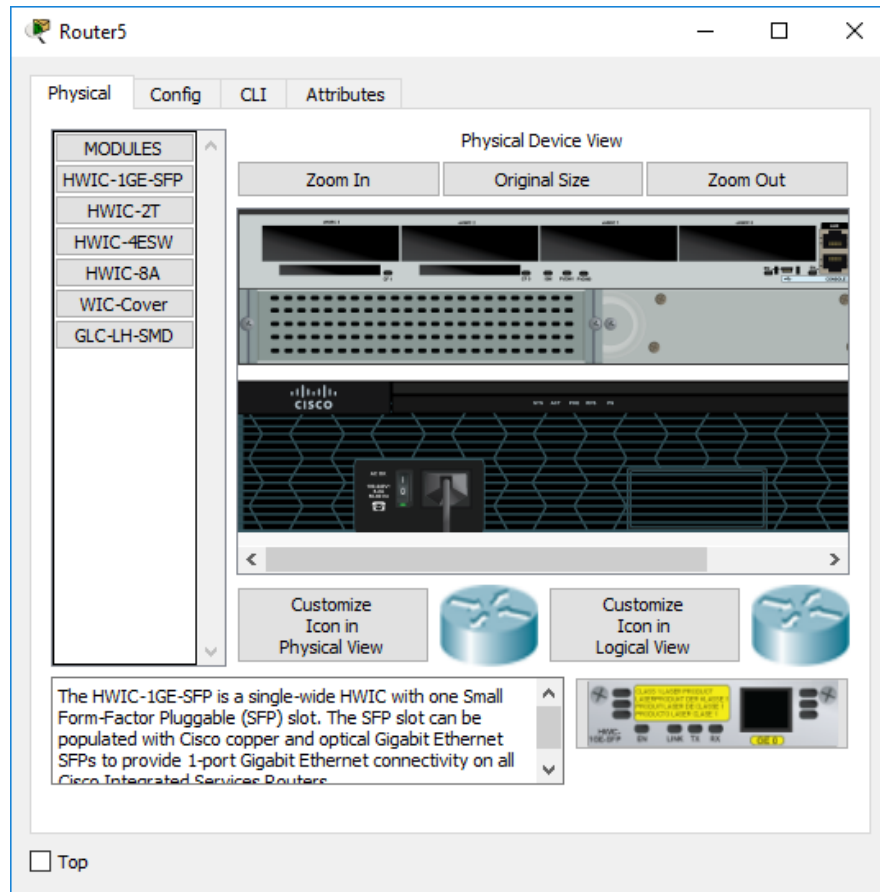
- Đấu nối và đặt IP như sơ đồ
- Cấu hình DHCP Server cấp IP cho mạng 192.168.1.0/24 và 192.168.2.0/24 : cấp 200 địa chỉ IP, bắt đầu từ địa chỉ .11 trở đi.
- Cấu hình DHCP Relay Agent trên R1 để máy tính trong mạng 192.168.1.0/24 có thể nhận IP bằng DHCP.
- Cấu hình R3 làm DHCP Server để cấp IP cho mạng 192.168.3.0/24
- Cấu hình định tuyến tĩnh để các máy tính và server trong mạng 192.168.1.0/24, 192.168.2.0/24 và 192.168.3.0/24 trao đổi dữ liệu được với nhau.
- Cấu hình Default Route và định tuyến trên router Internet để máy tính và server ping được 8.8.8.8

Các bước thực hiện :

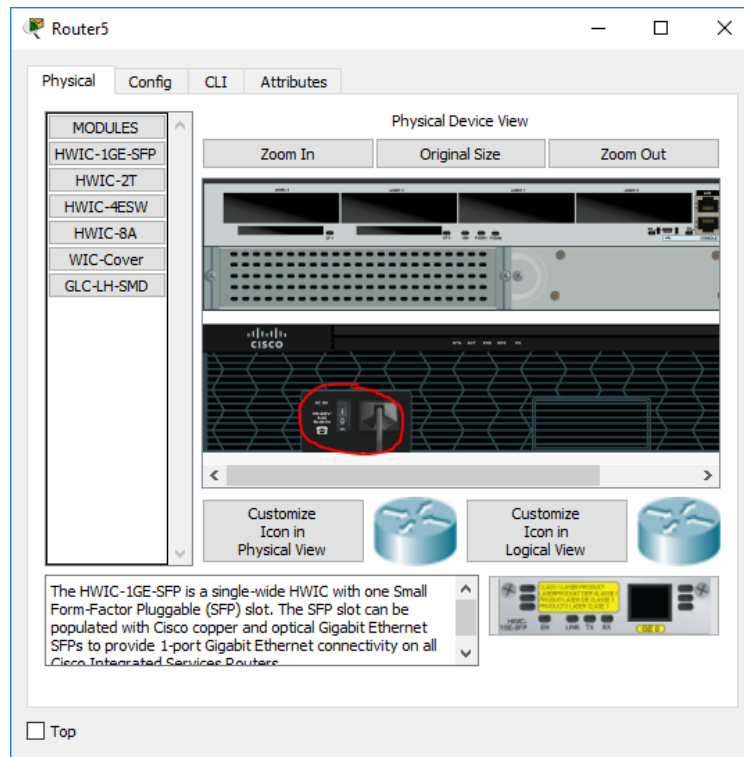
Bước 1: Đầu nối như sơ đồ

Cách lắp card Serial trên router 2911 :

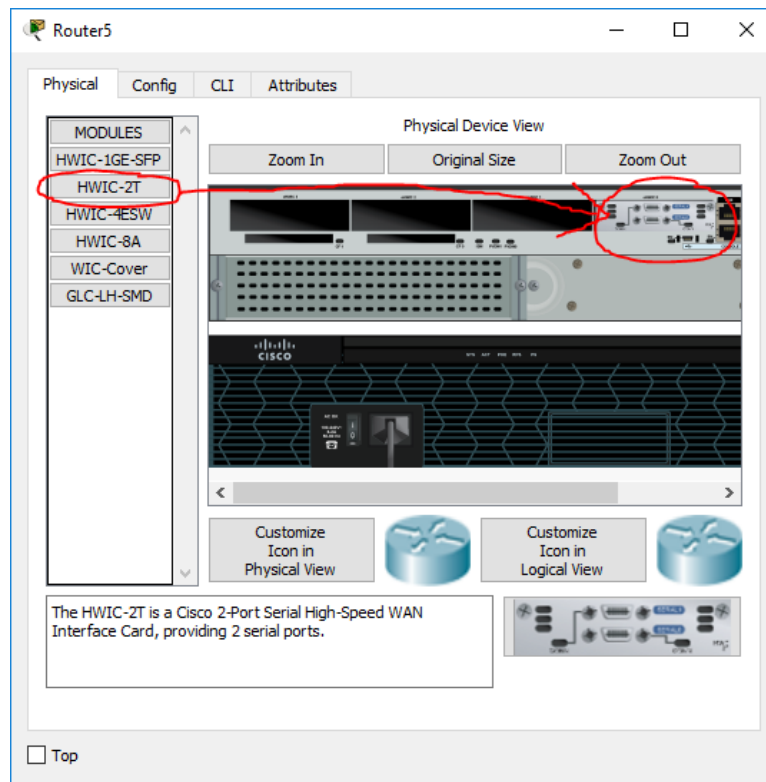
Double Click vào icon Router 2911, chọn tab **Physical**



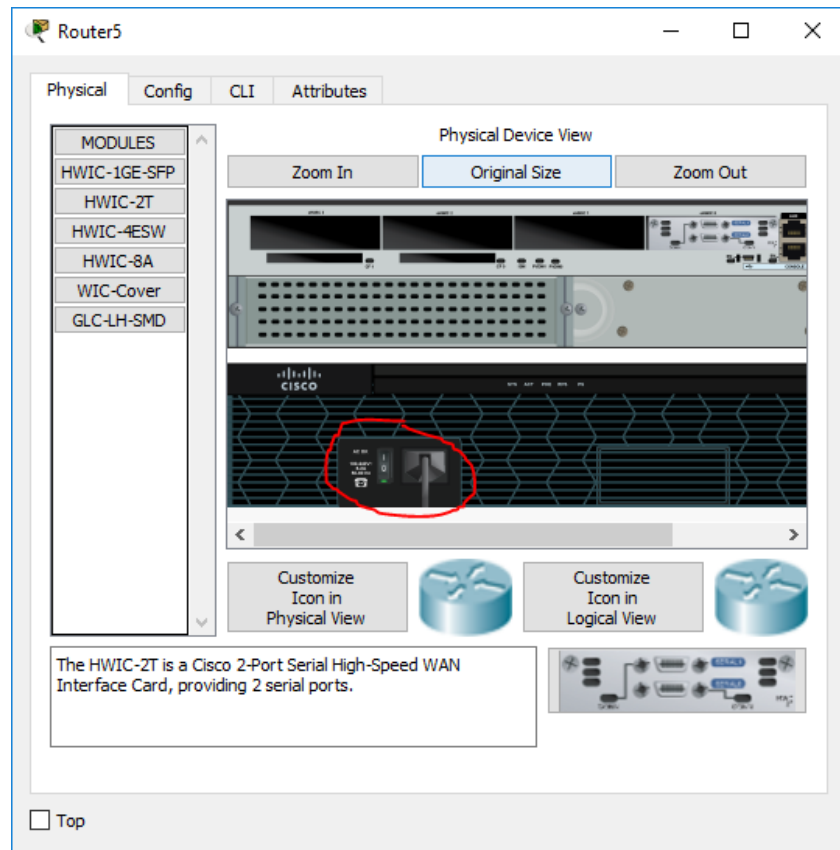
Click vào nút nguồn để tắt nguồn Router



Kéo card HWIC-2T (ở menu bên trái) và thả vào Slot 0 (slot bên phải)



Bật nguồn cho Router



Thực hiện các bước trên cho cả 2 router RT-GW1 và RT-GW2

Bước 2: Cấu hình hostname và IP cho các router

R1

```
Router(config)#hostname R1
R1(config)#interface Gi0/0
R1(config-if)#ip address 192.168.1.1 255.255.255.0
R1(config-if)#no shut
R1(config-if)#exit
R1(config)#interface Gi0/1
R1(config-if)#ip address 10.0.0.2 255.255.255.252
R1(config-if)#no shut
```

R2

```
Router(config)#hostname R2
R2(config)#interface Gi0/0
R2(config-if)#ip address 192.168.2.1 255.255.255.0
R2(config-if)#no shut
R2(config-if)#exit
R2(config)#interface Gi0/1
R2(config-if)#ip address 10.0.0.6 255.255.255.252
R2(config-if)#no shut
```

RT-GW1
Router(config)#hostname RT-GW1
RT-GW1(config)#interface Gi0/0
RT-GW1(config-if)#ip address 10.0.0.1 255.255.255.252
RT-GW1(config-if)#no shut
RT-GW1(config-if)#exit
RT-GW1(config)#interface Gi0/1
RT-GW1(config-if)#ip address 10.0.0.5 255.255.255.252
RT-GW1(config-if)#no shut
RT-GW1(config-if)#exit
RT-GW1(config)#interface Gi0/2
RT-GW1(config-if)#ip address 20.0.0.2 255.255.255.252
RT-GW1(config-if)#no shut
RT-GW1(config-if)#exit
RT-GW1(config)#interface S0/0/0
RT-GW1(config-if)#ip address 10.0.12.1 255.255.255.252
RT-GW1(config-if)#no shut

RT-GW2
Router(config)#hostname RT-GW2
RT-GW2(config)#interface Gi0/0
RT-GW2(config-if)#ip address 192.168.3.1 255.255.255.0
RT-GW2(config-if)#no shut
RT-GW2(config-if)#exit
RT-GW2(config)#interface Gi0/2
RT-GW2(config-if)#ip address 20.0.0.6 255.255.255.252
RT-GW2(config-if)#no shut
RT-GW2(config-if)#exit
RT-GW2(config)#interface S0/0/0
RT-GW2(config-if)#ip address 10.0.12.2 255.255.255.252
RT-GW2(config-if)#no shut

Internet
Router(config)#hostname Internet
Internet(config)#interface Gi0/0
Internet(config-if)#ip address 20.0.0.1 255.255.255.252
Internet(config-if)#no shut
Internet(config-if)#exit
Internet(config)#interface Gi0/1
Internet(config-if)#ip address 20.0.0.5 255.255.255.252
Internet(config-if)#no shut
Internet(config-if)#exit
Internet(config)#interface loopback0
Internet(config-if)#ip address 8.8.8.8 255.255.255.255

Bước 3: Kiểm tra lại IP trên Router

R1
R1#show ip interface brief
Interface IP-Address OK? Method Status Protocol
GigabitEthernet0/0 192.168.1.1 YES manual up up
GigabitEthernet0/1 10.0.0.2 YES manual up up
GigabitEthernet0/2 unassigned YES unset administratively down down
Vlan1 unassigned YES unset administratively down down

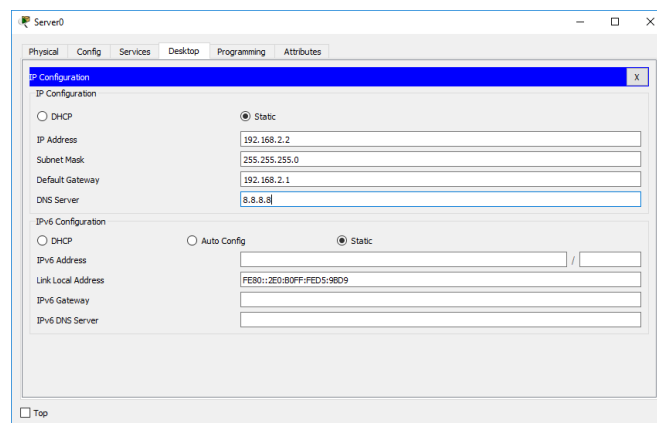
R2					
R2#show ip interface brief					
Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0	192.168.2.1	YES	manual	up	up
GigabitEthernet0/1	10.0.0.6	YES	manual	up	up
GigabitEthernet0/2	unassigned	YES	unset	administratively down	down
Vlan1	unassigned	YES	unset	administratively down	down

RT-GW1					
RT-GW1#show ip interface brief					
Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0	10.0.0.1	YES	manual	up	up
GigabitEthernet0/1	10.0.0.5	YES	manual	up	up
GigabitEthernet0/2	20.0.0.2	YES	manual	up	up
Serial0/0/0	10.0.12.1	YES	manual	up	up
Serial0/0/1	unassigned	YES	unset	administratively down	down
Vlan1	unassigned	YES	unset	administratively down	down

RT-GW2					
RT-GW2#show ip interface brief					
Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0	192.168.3.1	YES	manual	up	up
GigabitEthernet0/1	unassigned	YES	unset	administratively down	down
GigabitEthernet0/2	20.0.0.6	YES	manual	up	up
Serial0/0/0	10.0.12.2	YES	manual	up	up
Serial0/0/1	unassigned	YES	unset	administratively down	down
Vlan1	unassigned	YES	unset	administratively down	down

Internet					
Internet#show ip interface brief					
Interface	IP-Address	OK?	Method	Status	Protocol
GigabitEthernet0/0	20.0.0.1	YES	manual	up	up
GigabitEthernet0/1	20.0.0.5	YES	manual	up	up
GigabitEthernet0/2	unassigned	YES	unset	administratively down	down
Loopback0	8.8.8.8	YES	manual	up	up
Vlan1	unassigned	YES	unset	administratively down	down

Bước 4 : Đặt IP cho DHCP Server



Bước 5 : cấu hình pool IP trên DHCP Server

Server0

Physical Config **Services** Desktop Programming Attributes

SERVICES

- HTTP
- DHCP**
- DHCPv6
- TFTP
- DNS
- SYSLOG
- AAA
- NTP
- EMAIL
- FTP
- IoT
- VM Management

DHCP

Interface: FastEthernet0 Service: ☒ On ☐ Off

Pool Name: LAN-1

Default Gateway: 192.168.1.1

DNS Server: 8.8.8.8

Start IP Address : 192 168 1 11

Subnet Mask: 255 255 255 0

Maximum Number of Users : 200

TFTP Server: 0.0.0.0

WLC Address: 0.0.0.0

Add Save Remove

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
LAN-1	192.168.1.1	8.8.8.8	192.168.1.11	255.255.255.0	200	0.0.0.0	0.0.0.0
serverPool	0.0.0.0	0.0.0.0	192.168.2.0	255.255.255.0	255	0.0.0.0	0.0.0.0

☐ Top

Server0

Physical Config **Services** Desktop Programming Attributes

SERVICES

- HTTP
- DHCP**
- DHCPv6
- TFTP
- DNS
- SYSLOG
- AAA
- NTP
- EMAIL
- FTP
- IoT
- VM Management

DHCP

Interface: FastEthernet0 Service: ☒ On ☐ Off

Pool Name: LAN-2

Default Gateway: 192.168.2.1

DNS Server: 8.8.8.8

Start IP Address : 192 168 2 11

Subnet Mask: 255 255 255 0

Maximum Number of Users : 200

TFTP Server: 0.0.0.0

WLC Address: 0.0.0.0

Add Save Remove

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
LAN-2	192.168.2.1	8.8.8.8	192.168.2.11	255.255.255.0	200	0.0.0.0	0.0.0.0
LAN-1	192.168.1.1	8.8.8.8	192.168.1.11	255.255.255.0	200	0.0.0.0	0.0.0.0

☐ Top

Lưu ý : sửa lại tham số của pool serverPool để không bị trùng với Pool LAN-2

Server0

Physical Config **Services** Desktop Programming Attributes

SERVICES

- HTTP
- DHCP
- DHCPv6
- TFTP
- DNS
- SYSLOG
- AAA
- NTP
- EMAIL
- FTP
- IoT
- VM Management

DHCP

Interface: FastEthernet0 Service: ☒ On ☐ Off

Pool Name: serverPool

Default Gateway: 0.0.0.0

DNS Server: 0.0.0.0

Start IP Address: 1.1.1.1

Subnet Mask: 255.255.255.0

Maximum Number of Users: 255

TFTP Server: 0.0.0.0

WLC Address: 0.0.0.0

Add Save Remove

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
serverPool	0.0.0.0	0.0.0.0	1.1.1.1	255.255.255.0	255	0.0.0.0	0.0.0.0
LAN-2	192.168.3.1	8.8.8.8	192.168.3.11	255.255.255.0	200	0.0.0.0	0.0.0.0

☐ Top

Bước 6 : Cấu hình DHCP Relay Agent trên Router R1

R1
R1(config)# interface Gi0/0
R1(config-if)# ip helper-address 192.168.2.2

Bước 7 : Cấu hình DHCP Server trên Router RT-GW2

RT-GW2
RT-GW2(config)# ip dhcp pool LAN-3
RT-GW2(dhcp-config)# network 192.168.3.0 255.255.255.0
RT-GW2(dhcp-config)# default-router 192.168.3.1
RT-GW2(dhcp-config)# dns 8.8.8.8

Bước 8 : Cho PC-2 và PC-3 nhận IP bằng DHCP

Lưu ý : ở bước này, do chưa định tuyến nên PC-1 vẫn chưa thể nhận IP bằng DHCP

PC-2

The screenshot shows the configuration window for PC2. The 'Config' tab is selected. The 'IP Configuration' section is active, showing 'DHCP' selected and 'Static' unselected. The 'DHCP request successful.' message is displayed. The IP Address is 192.168.2.11, Subnet Mask is 255.255.255.0, Default Gateway is 192.168.2.1, and DNS Server is 8.8.8.8. The 'IPv6 Configuration' section shows 'Static' selected, with fields for IPv6 Address, Link Local Address (FE80::290:2BFF:FE9A:9EC4), IPv6 Gateway, and IPv6 DNS Server.

Field	Value
IP Address	192.168.2.11
Subnet Mask	255.255.255.0
Default Gateway	192.168.2.1
DNS Server	8.8.8.8

Field	Value
IPv6 Address	
Link Local Address	FE80::290:2BFF:FE9A:9EC4
IPv6 Gateway	
IPv6 DNS Server	

PC-3

The screenshot shows the configuration window for PC3. The 'Config' tab is selected. The 'IP Configuration' section is active, showing 'DHCP' selected and 'Static' unselected. The 'DHCP request successful.' message is displayed. The IP Address is 192.168.3.2, Subnet Mask is 255.255.255.0, Default Gateway is 192.168.3.1, and DNS Server is 8.8.8.8. The 'IPv6 Configuration' section shows 'Static' selected, with fields for IPv6 Address, Link Local Address (FE80::204:9AFF:FE65:9DBD), IPv6 Gateway, and IPv6 DNS Server.

Field	Value
IP Address	192.168.3.2
Subnet Mask	255.255.255.0
Default Gateway	192.168.3.1
DNS Server	8.8.8.8

Field	Value
IPv6 Address	
Link Local Address	FE80::204:9AFF:FE65:9DBD
IPv6 Gateway	
IPv6 DNS Server	

Bước 9 : Cấu hình định tuyến giữa hai site

R1
R1(config)# ip route 192.168.2.0 255.255.255.0 10.0.0.1 R1(config)# ip route 192.168.3.0 255.255.255.0 10.0.0.1
Kiểm tra : 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, 2 subnets, 2 masks C 10.0.0.0/30 is directly connected, GigabitEthernet0/1 L 10.0.0.2/32 is directly connected, GigabitEthernet0/1 192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.1.0/24 is directly connected, GigabitEthernet0/0 L 192.168.1.1/32 is directly connected, GigabitEthernet0/0 S 192.168.2.0/24 [1/0] via 10.0.0.1 S 192.168.3.0/24 [1/0] via 10.0.0.1

R2
R2(config)# ip route 192.168.1.0 255.255.255.0 10.0.0.5 R2(config)# ip route 192.168.3.0 255.255.255.0 10.0.0.5
Kiểm tra : 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, 2 subnets, 2 masks C 10.0.0.4/30 is directly connected, GigabitEthernet0/1 L 10.0.0.6/32 is directly connected, GigabitEthernet0/1 S 192.168.1.0/24 [1/0] via 10.0.0.5 192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.2.0/24 is directly connected, GigabitEthernet0/0 L 192.168.2.1/32 is directly connected, GigabitEthernet0/0 S 192.168.3.0/24 [1/0] via 10.0.0.5

Lưu ý : học viên có thể lựa chọn cấu hình default route trên Router R1 và R2

RT-GW1

```
RT-GW1(config)#ip route 192.168.1.0 255.255.255.0 10.0.0.2
RT-GW1(config)#ip route 192.168.2.0 255.255.255.0 10.0.0.6
RT-GW1(config)#ip route 192.168.3.0 255.255.255.0 10.0.12.2
```

Kiểm tra :

```
RT-GW1#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, 6 subnets, 2 masks
C    10.0.0.0/30 is directly connected, GigabitEthernet0/0
L    10.0.0.1/32 is directly connected, GigabitEthernet0/0
C    10.0.0.4/30 is directly connected, GigabitEthernet0/1
L    10.0.0.5/32 is directly connected, GigabitEthernet0/1
C    10.0.12.0/30 is directly connected, Serial0/0/0
L    10.0.12.1/32 is directly connected, Serial0/0/0
20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C    20.0.0.0/30 is directly connected, GigabitEthernet0/2
L    20.0.0.2/32 is directly connected, GigabitEthernet0/2
S    192.168.1.0/24 [1/0] via 10.0.0.2
S    192.168.2.0/24 [1/0] via 10.0.0.6
S    192.168.3.0/24 [1/0] via 10.0.12.2
```

RT-GW2

```
RT-GW2(config)#ip route 192.168.1.0 255.255.255.0 10.0.12.1
RT-GW2(config)#ip route 192.168.2.0 255.255.255.0 10.0.12.1
```

Kiểm tra :

```
RT-GW2#show ip route
```

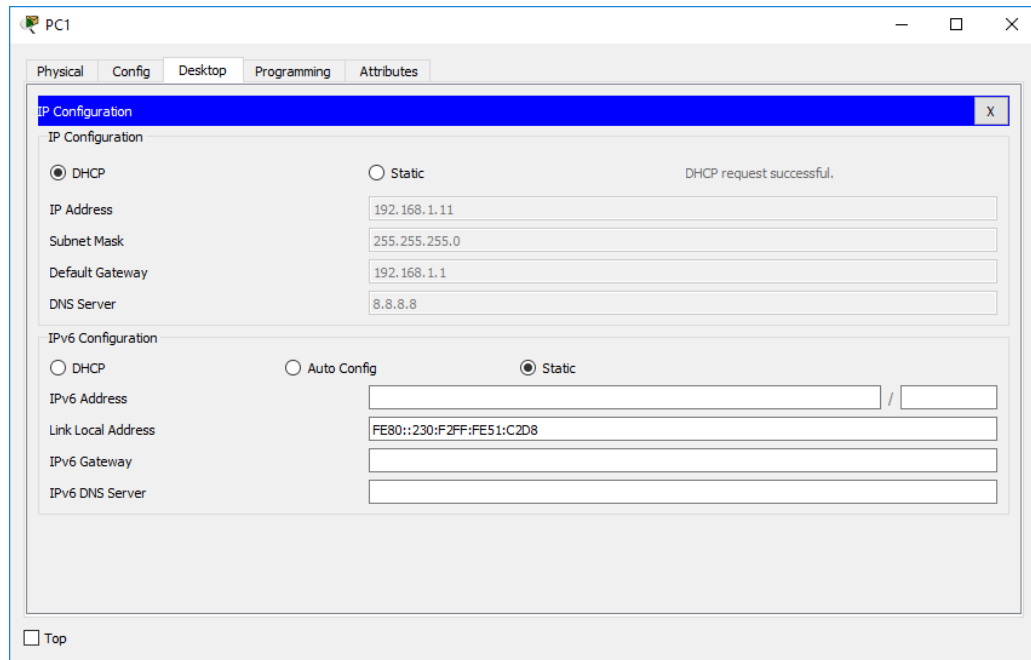
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS 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, 2 subnets, 2 masks
C    10.0.12.0/30 is directly connected, Serial0/0/0
L    10.0.12.2/32 is directly connected, Serial0/0/0
20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C    20.0.0.4/30 is directly connected, GigabitEthernet0/2
L    20.0.0.6/32 is directly connected, GigabitEthernet0/2
S    192.168.1.0/24 [1/0] via 10.0.12.1
S    192.168.2.0/24 [1/0] via 10.0.12.1
192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.3.0/24 is directly connected, GigabitEthernet0/0
L    192.168.3.1/32 is directly connected, GigabitEthernet0/0
```

Bước 10 : Kiểm tra

Cho PC-1 nhận IP bằng DHCP :



PC-1 ping PC-2 :

PC-1
C:\>ping 192.168.2.11
Pinging 192.168.2.11 with 32 bytes of data:
Request timed out.
Reply from 192.168.2.11: bytes=32 time=10ms TTL=125
Reply from 192.168.2.11: bytes=32 time=10ms TTL=125
Reply from 192.168.2.11: bytes=32 time=1ms TTL=125
Ping statistics for 192.168.2.11:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 1ms, Maximum = 10ms, Average = 7ms

PC-1 ping PC-3

PC-1
C:\>ping 192.168.3.2
Pinging 192.168.3.2 with 32 bytes of data:
Request timed out.
Reply from 192.168.3.2: bytes=32 time=12ms TTL=125
Reply from 192.168.3.2: bytes=32 time=11ms TTL=125
Reply from 192.168.3.2: bytes=32 time=1ms TTL=125
Ping statistics for 192.168.3.2:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),

```
Approximate round trip times in milli-seconds:
  Minimum = 1ms, Maximum = 12ms, Average = 8ms
```

PC-2 ping PC-3

PC-2
<pre>C:\>ping 192.168.3.2 Pinging 192.168.3.2 with 32 bytes of data: Reply from 192.168.3.2: bytes=32 time=2ms TTL=125 Reply from 192.168.3.2: bytes=32 time=12ms TTL=125 Reply from 192.168.3.2: bytes=32 time=14ms TTL=125 Reply from 192.168.3.2: bytes=32 time=12ms TTL=125 Ping statistics for 192.168.3.2: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 2ms, Maximum = 14ms, Average = 10ms</pre>

Bước 11 : Cấu hình default route và định tuyến tĩnh để kết nối Internet

Lưu ý : Nếu ở bước 9, học viên đã cấu hình default route trên R1 và R2 thì bước này không cần phải cấu hình lại cho R1 và R2

R1
<pre>R1(config)#ip route 0.0.0.0 0.0.0.0 10.0.0.1 Kiểm tra : 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 10.0.0.1 to network 0.0.0.0 10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks C 10.0.0.0/30 is directly connected, GigabitEthernet0/1 L 10.0.0.2/32 is directly connected, GigabitEthernet0/1 192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks C 192.168.1.0/24 is directly connected, GigabitEthernet0/0 L 192.168.1.1/32 is directly connected, GigabitEthernet0/0 S 192.168.2.0/24 [1/0] via 10.0.0.1 S 192.168.3.0/24 [1/0] via 10.0.0.1 S* 0.0.0.0/0 [1/0] via 10.0.0.1</pre>

R2
<pre>R2(config)#ip route 0.0.0.0 0.0.0.0 10.0.0.5 Kiểm tra : 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</pre>

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 10.0.0.5 to network 0.0.0.0

10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C 10.0.0.4/30 is directly connected, GigabitEthernet0/1
L 10.0.0.6/32 is directly connected, GigabitEthernet0/1
S 192.168.1.0/24 [1/0] via 10.0.0.5
192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.2.0/24 is directly connected, GigabitEthernet0/0
L 192.168.2.1/32 is directly connected, GigabitEthernet0/0
S 192.168.3.0/24 [1/0] via 10.0.0.5
S* 0.0.0.0/0 [1/0] via 10.0.0.5

RT-GW1

RT-GW1(config)#**ip route 0.0.0.0 0.0.0.0 20.0.0.1**

Kiểm tra :

RT-GW1#**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 20.0.0.1 to network 0.0.0.0

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks
C 10.0.0.0/30 is directly connected, GigabitEthernet0/0
L 10.0.0.1/32 is directly connected, GigabitEthernet0/0
C 10.0.0.4/30 is directly connected, GigabitEthernet0/1
L 10.0.0.5/32 is directly connected, GigabitEthernet0/1
C 10.0.12.0/30 is directly connected, Serial0/0/0
L 10.0.12.1/32 is directly connected, Serial0/0/0
20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C 20.0.0.0/30 is directly connected, GigabitEthernet0/2
L 20.0.0.2/32 is directly connected, GigabitEthernet0/2
S 192.168.1.0/24 [1/0] via 10.0.0.2
S 192.168.2.0/24 [1/0] via 10.0.0.6
S 192.168.3.0/24 [1/0] via 10.0.12.2
S* 0.0.0.0/0 [1/0] via 20.0.0.1

RT-GW2

RT-GW2(config)#**ip route 0.0.0.0 0.0.0.0 20.0.0.5**

Kiểm tra :

RT-GW2#**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 20.0.0.5 to network 0.0.0.0
```

```
10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C    10.0.12.0/30 is directly connected, Serial0/0/0
L    10.0.12.2/32 is directly connected, Serial0/0/0
20.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C    20.0.0.4/30 is directly connected, GigabitEthernet0/2
L    20.0.0.6/32 is directly connected, GigabitEthernet0/2
S    192.168.1.0/24 [1/0] via 10.0.12.1
S    192.168.2.0/24 [1/0] via 10.0.12.1
192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
C    192.168.3.0/24 is directly connected, GigabitEthernet0/0
L    192.168.3.1/32 is directly connected, GigabitEthernet0/0
S*   0.0.0.0/0 [1/0] via 20.0.0.5
```

Internet

```
Internet(config)#ip route 192.168.1.0 255.255.255.0 20.0.0.2
Internet(config)#ip route 192.168.2.0 255.255.255.0 20.0.0.2
Internet(config)#ip route 192.168.3.0 255.255.255.0 20.0.0.6
```

Kiểm tra :

```
Internet#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
```

```
8.0.0.0/32 is subnetted, 1 subnets
C    8.8.8.8/32 is directly connected, Loopback0
20.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
C    20.0.0.0/30 is directly connected, GigabitEthernet0/0
L    20.0.0.1/32 is directly connected, GigabitEthernet0/0
C    20.0.0.4/30 is directly connected, GigabitEthernet0/1
L    20.0.0.5/32 is directly connected, GigabitEthernet0/1
S    192.168.1.0/24 [1/0] via 20.0.0.2
S    192.168.2.0/24 [1/0] via 20.0.0.2
S    192.168.3.0/24 [1/0] via 20.0.0.6
```

Bước 12 : Kiểm tra :

Trên các PC-1, PC-2 và PC-3, lần lượt ping 8.8.8.8

PC-1

```
C:\>ping 8.8.8.8
```

```
Pinging 8.8.8.8 with 32 bytes of data:
```

```
Request timed out.
```

```
Reply from 8.8.8.8: bytes=32 time=12ms TTL=253
```

```
Reply from 8.8.8.8: bytes=32 time=1ms TTL=253
```

```
Reply from 8.8.8.8: bytes=32 time<1ms TTL=253
```

```
Ping statistics for 8.8.8.8:
```



```
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 12ms, Average = 4ms
```

PC-2

```
C:\>ping 8.8.8.8
```

```
Pinging 8.8.8.8 with 32 bytes of data:
```

```
Reply from 8.8.8.8: bytes=32 time=1ms TTL=253
Reply from 8.8.8.8: bytes=32 time<1ms TTL=253
Reply from 8.8.8.8: bytes=32 time=11ms TTL=253
Reply from 8.8.8.8: bytes=32 time<1ms TTL=253
```

```
Ping statistics for 8.8.8.8:
```

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

PC-3

```
C:\>ping 8.8.8.8
```

```
Pinging 8.8.8.8 with 32 bytes of data:
```

```
Request timed out.
Reply from 8.8.8.8: bytes=32 time<1ms TTL=254
Reply from 8.8.8.8: bytes=32 time=1ms TTL=254
Reply from 8.8.8.8: bytes=32 time=1ms TTL=254
```

```
Ping statistics for 8.8.8.8:
```

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