

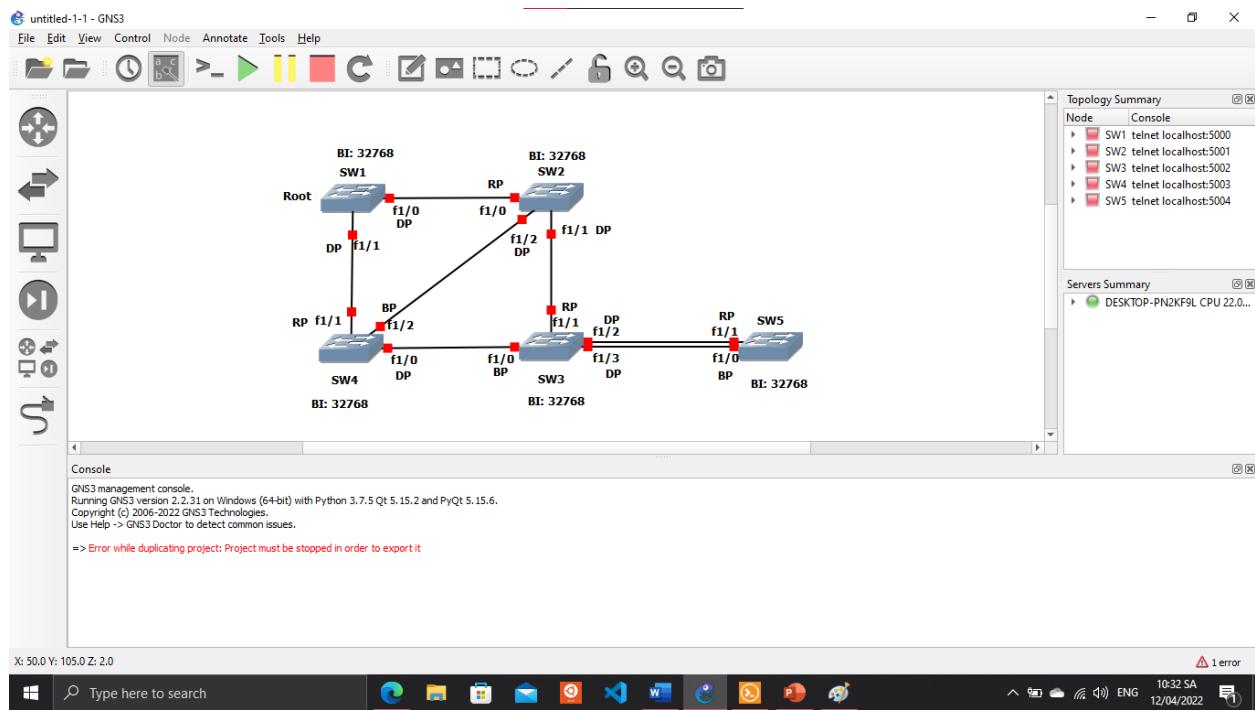
Báo cáo

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Bài 1. GNS3 version 2.2.31 windows 64-bit

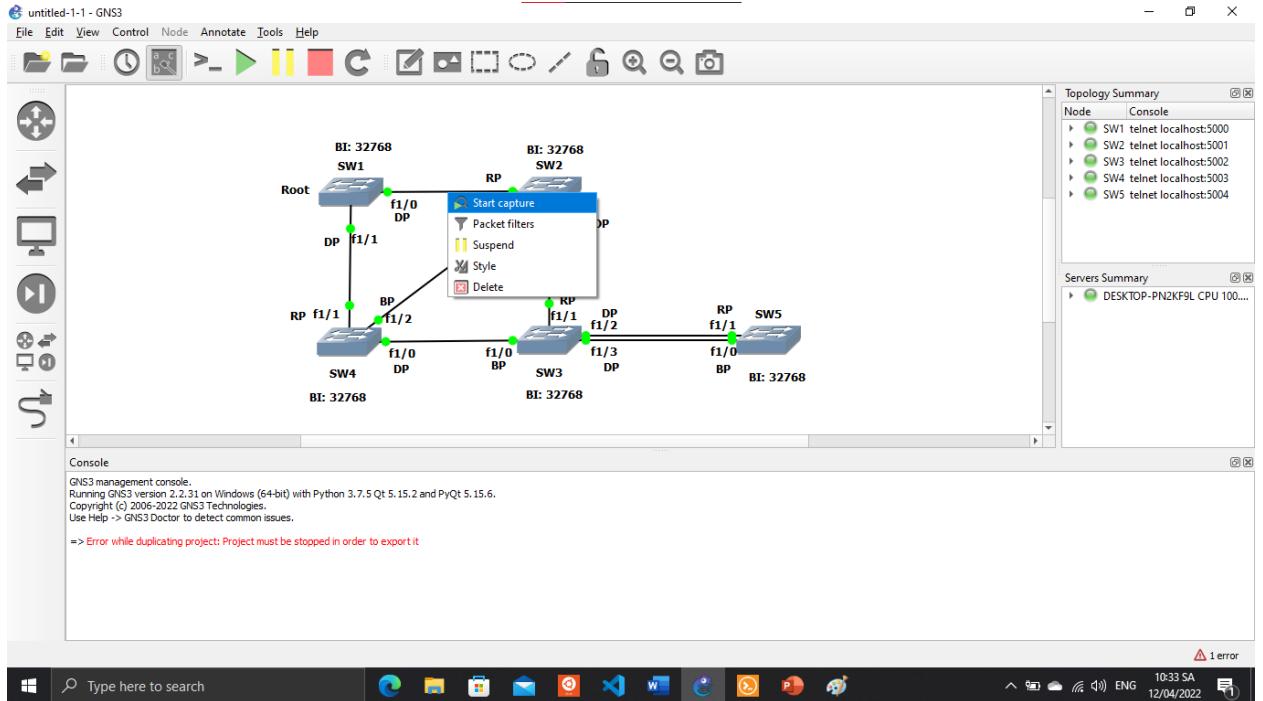
1.1

Mô hình mạng sau khi thiết lập:



1.2

- Khởi động mô hình. Nhấp chuột phải vào link kết nối giữa SW1 và SW2 → chọn start capture.



Để lọc các gói tin STP, ta điền vào ô chữ “STP”, kết quả:

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	cc:01:2e:f0:f1:00	Spanning-tree-(for-> STP	60 Conf. TC + Root = 32768/0/ccc:01:2c:10:00:00	Cost = 0 Port = 0x8029	
2	2.117081	cc:01:2e:f0:f1:00	Spanning-tree-(for-> STP	60 Conf. TC + Root = 32768/0/ccc:01:2c:10:00:00	Cost = 0 Port = 0x8029	
3	4.017001	cc:01:2e:f0:f1:00	Spanning-tree-(for-> STP	60 Conf. TC + Root = 32768/0/ccc:01:2c:10:00:00	Cost = 0 Port = 0x8029	
4	6.005001	cc:01:2e:f0:f1:00	Spanning-tree-(for-> STP	60 Conf. TC + Root = 32768/0/ccc:01:2c:10:00:00	Cost = 0 Port = 0x8029	
5	8.034002	cc:01:2e:f0:f1:00	Spanning-tree-(for-> STP	60 Conf. TC + Root = 32768/0/ccc:01:2c:10:00:00	Cost = 0 Port = 0x8029	
6	10.027997	cc:01:2e:f0:f1:00	Spanning-tree-(for-> STP	60 Conf. TC + Root = 32768/0/ccc:01:2c:10:00:00	Cost = 0 Port = 0x8029	
7	12.050001	cc:01:2e:f0:f1:00	Spanning-tree-(for-> STP	60 Conf. TC + Root = 32768/0/ccc:01:2c:10:00:00	Cost = 0 Port = 0x8029	
8	14.000999	cc:01:2e:f0:f1:00	Spanning-tree-(for-> STP	60 Conf. TC + Root = 32768/0/ccc:01:2c:10:00:00	Cost = 0 Port = 0x8029	
9	16.019001	cc:01:2e:f0:f1:00	Spanning-tree-(for-> STP	60 Conf. TC + Root = 32768/0/ccc:01:2c:10:00:00	Cost = 0 Port = 0x8029	
10	17.967997	cc:01:2e:f0:f1:00	Spanning-tree-(for-> STP	60 Conf. TC + Root = 32768/0/ccc:01:2c:10:00:00	Cost = 0 Port = 0x8029	
11	19.000001	cc:01:2e:f0:f1:00	Spanning-tree-(for-> STP	60 Conf. TC + Root = 32768/0/ccc:01:2c:10:00:00	Cost = 0 Port = 0x8029	
12	20.000001	cc:01:2e:f0:f1:00	Spanning-tree-(for-> STP	60 Conf. TC + Root = 32768/0/ccc:01:2c:10:00:00	Cost = 0 Port = 0x8029	

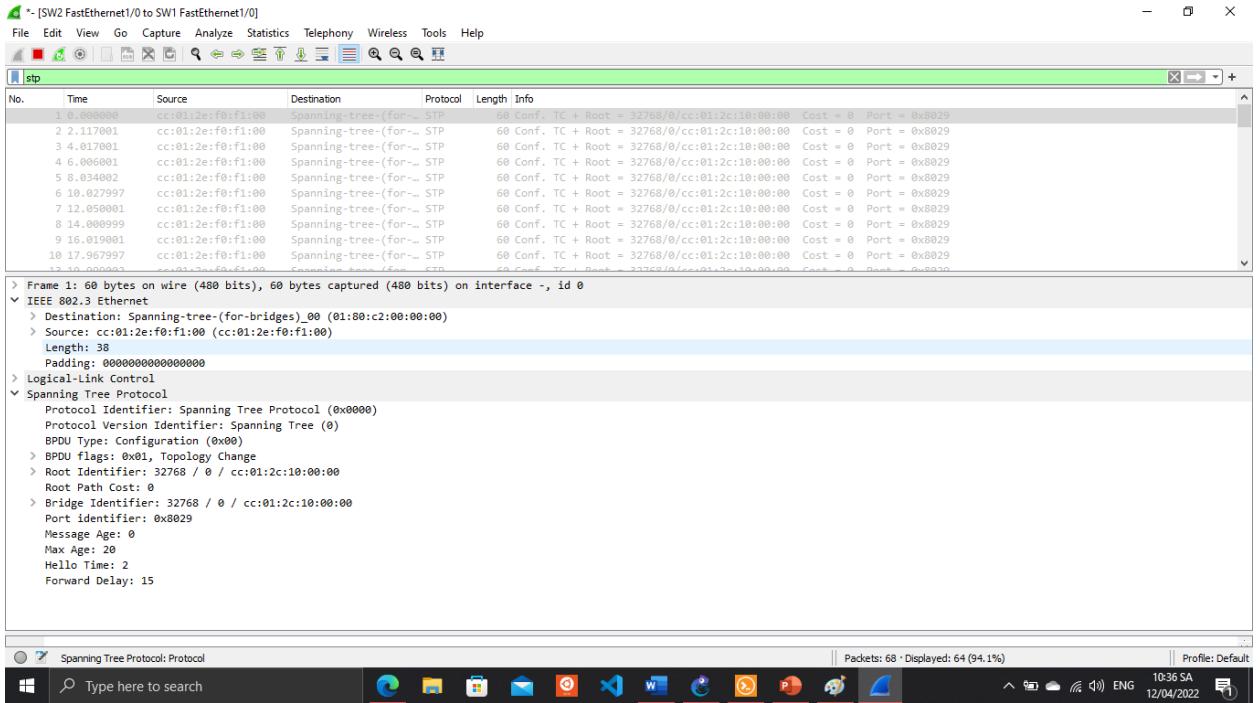
> Frame 1: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface -, id 0

> IEEE 802.3 Ethernet

> Logical-Link Control

> Spanning Tree Protocol

b) Gói tin đầu tiên bắt được:



Source mac: đây là mac của port switch.

Dest mac: đây là multicast address reserved cho giao thức STP

BPDUs Type: Đây là message chỉ type của giao thức spanning tree. Configuration được sử dụng bởi các thiết bị mạng để tính toán spanning tree.

Bridge ID: là giá trị của mỗi switch để bầu chọn ra root bridge. Mặc định là 32768. Nếu bằng nhau so sánh địa chỉ mac. Các giá trị nhỏ hơn sẽ được ưu tiên.

Port Identifier: Nếu BPDUs có cùng root path cost và bridge id thì port id sẽ được dùng cho luật tie-break để bầu chọn.

Root identifier: mọi switch đều có root id riêng biệt gồm 3 trường: bridge id, vlan id, mac address của switch.

- c) Để xác định bridge id của từng switch. Ta vào console gõ "sh spann" để xác định. Vì mô hình này các switch đang được để mặc định nên bridge id của mọi switch trong mô hình sẽ là 32768.

untitled-1-1 - GNS3

File Edit View Control Node Ann > SW1

```

ethernet1/7, changed state
to down
*Mar 1 00:00:13.215: %I
NEPROT0-5-UPDOWN: Line pr
otocol on Interface FastE
thernet1/6, changed state
to down
*Mar 1 00:00:41.631: %I
NEPROT0-5-UPDOWN: Line pr
otocol on Interface Vlan1
, changed state to up
SW1#
SW1#
SW1#sh spann

VLAN1 is executing the ieee compatible Spanning Tree protocol
Bridge Identifier has priority 32768, address cc01.2c10.0000
Configured hello time 2, max age 20, forward delay 15
We are the root of the spanning tree
Topology change flag not set, detected flag not set
Number of topology changes 1 last change occurred 00:05:06 ago
from FastEthernet1/0
Times: hold 1, topology change 35, notification 2
hello 2, max age 20, forward delay 15
Timers: hello 0, topology change 0, notification 0, aging 300

Port 41 (FastEthernet1/0) of VLAN1 is forwarding
  Port path cost 19, Port priority 128, Port Identifier 128.41.
  Designated root has priority 32768, address cc01.2c10.0000
  Designated bridge has priority 32768, address cc01.2c10.0000
  Designated port id is 128.41, designated path cost 0
  Timers: message age 0, forward delay 0, hold 0
  Number of transitions to forwarding state: 1
  BPDU: sent 168, received 1

Port 42 (FastEthernet1/1) of VLAN1 is forwarding
  Port path cost 19, Port priority 128, Port Identifier 128.42.
--More-->

```

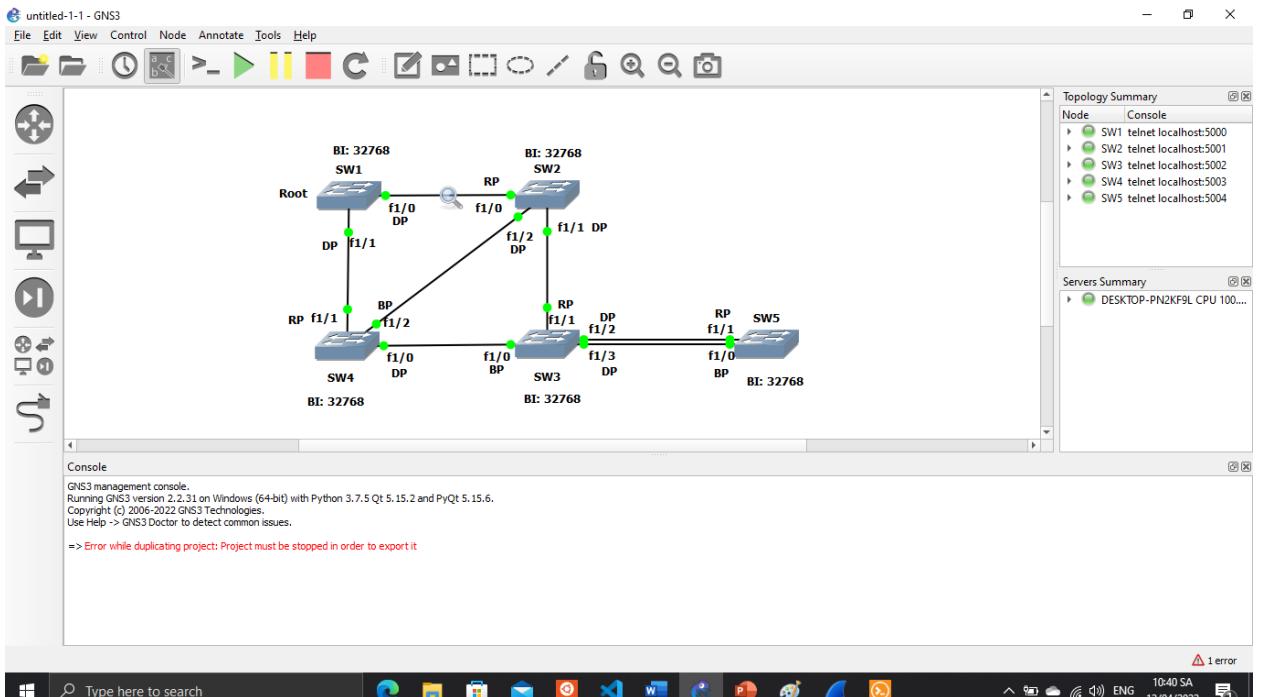
solarwinds Solar-PuTTY free tool © 2019 SolarWinds Worldwide, LLC. All rights reserved.

Topology Summary
Node Console
SW1 telnet localhost:5000
SW2 telnet localhost:5001
SW3 telnet localhost:5002
SW4 telnet localhost:5003
SW5 telnet localhost:5004

Servers Summary
DESKTOP-PN2KF9L CPU 100%

Windows Taskbar: Type here to search, Start button, File Explorer, Mail, Task View, Taskbar icons, 1 error

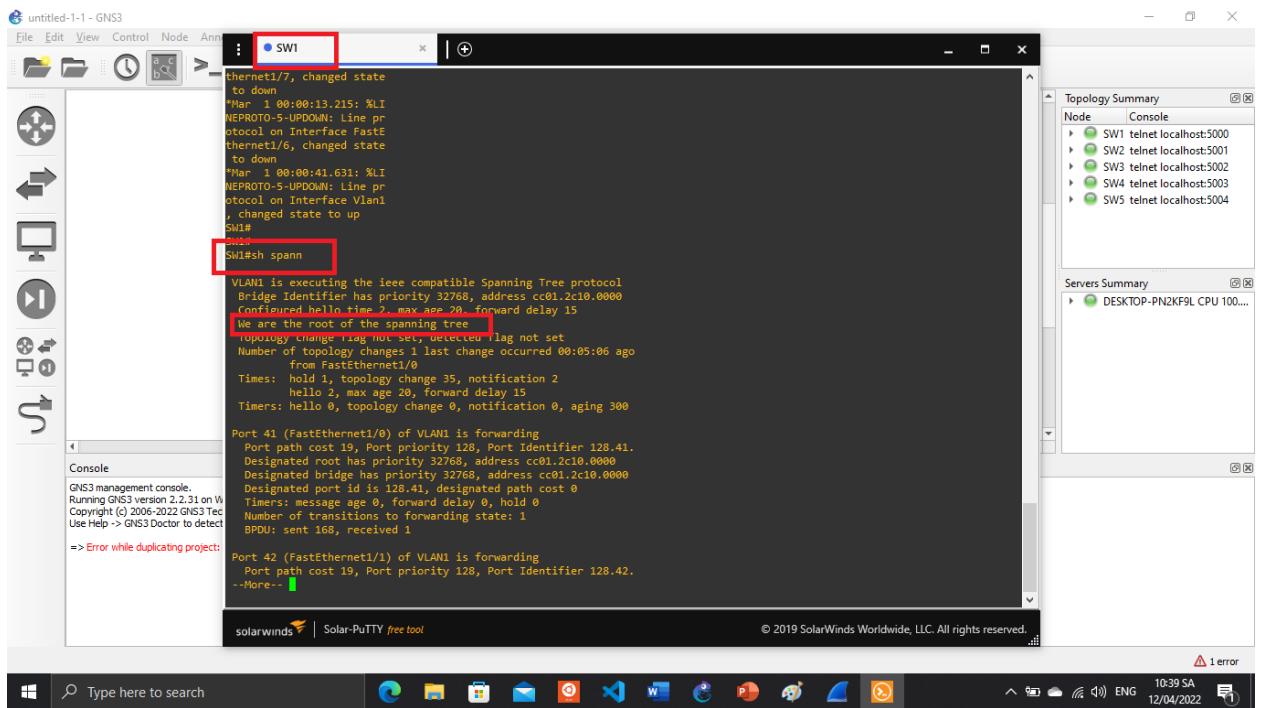
Đánh dấu vào mô hình:



1.3

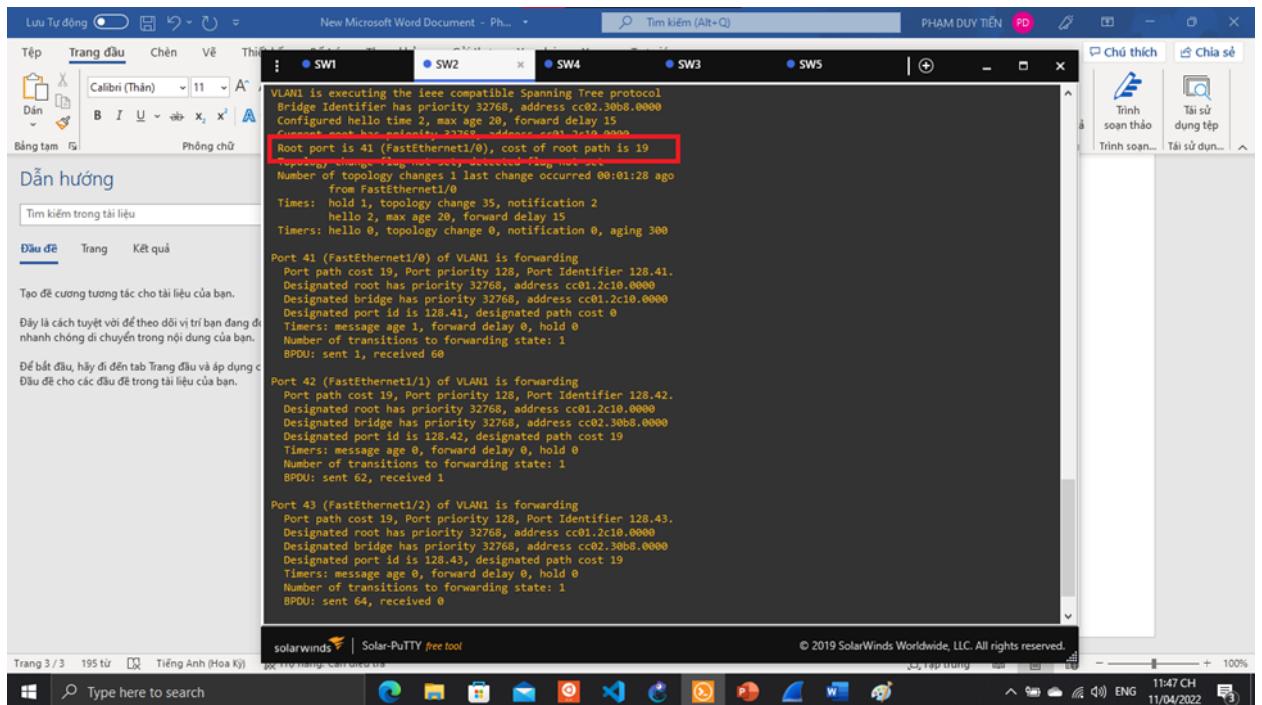
a) Xác định root switch bằng dòng lệnh:

SW1 là root switch:



- b) Xác định root port: Sử dụng lệnh “sh spann”, mỗi switch sẽ chỉ rõ root port là cổng nào để ta xác định root port trên switch đó.

SW2:



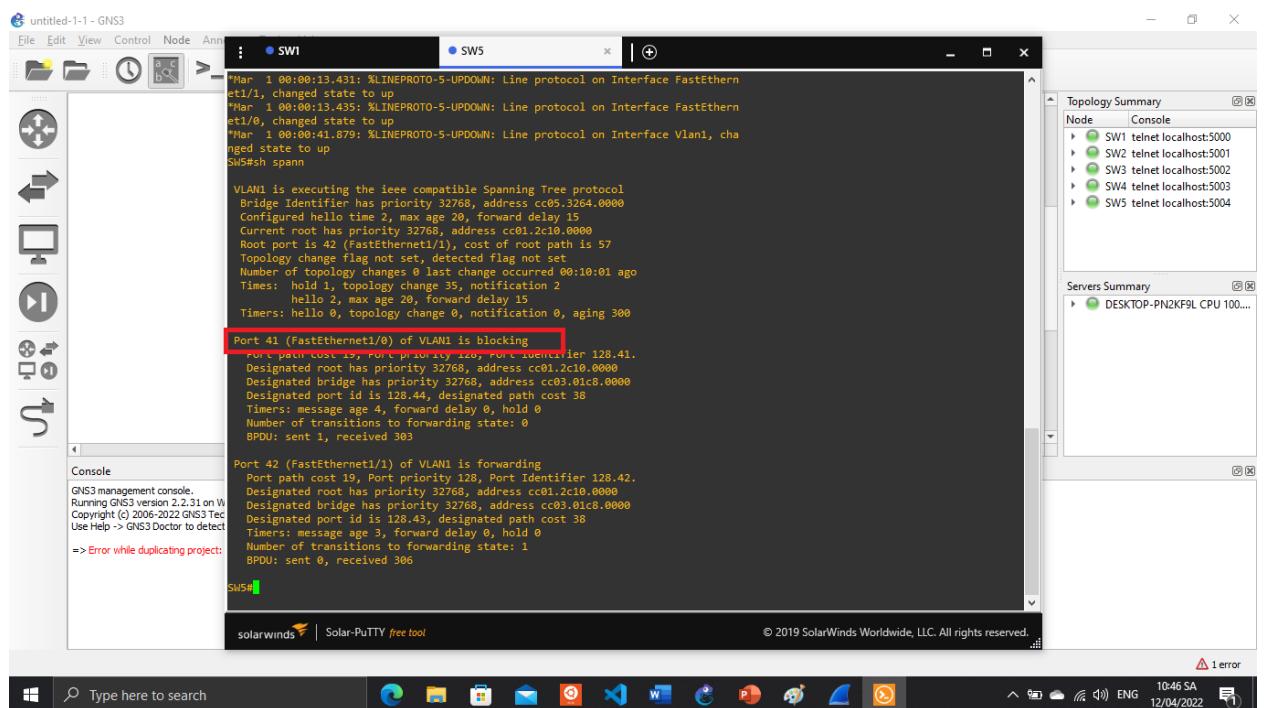
Tương tự cho các switch còn lại.

c) Xác định DP:

Cũng thực hiện các lệnh trên. Các port mà không phải root port và không phải bị “is blocking” thì sẽ là DP.

d) Xác định BP: sử dụng lệnh “sh spann”. Các port đang có status “is blocking” sẽ là BP

SW5:



```
*Mar 1 00:00:13.431: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/1, changed state to up
*Mar 1 00:00:13.435: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up
*Mar 1 00:00:41.879: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
Sw5#sh spann

VLAN1 is executing the ieee compatible Spanning Tree protocol
Bridge Identifier has priority 32768, address cc05.3264.0000
Configured hello time 2, max age 20, forward delay 15
Current root has priority 32768, address cc01.2c10.0000
Root port is 42 (FastEthernet1/1), cost of root path is 57
Topology change flag not set, detected flag not set
Number of topology changes 0 last change occurred 00:10:01 ago
Times: hold 1, topology change 35, notification 2
      hello 2, max age 20, forward delay 15
Timers: hello 0, topology change 0, notification 0, aging 300

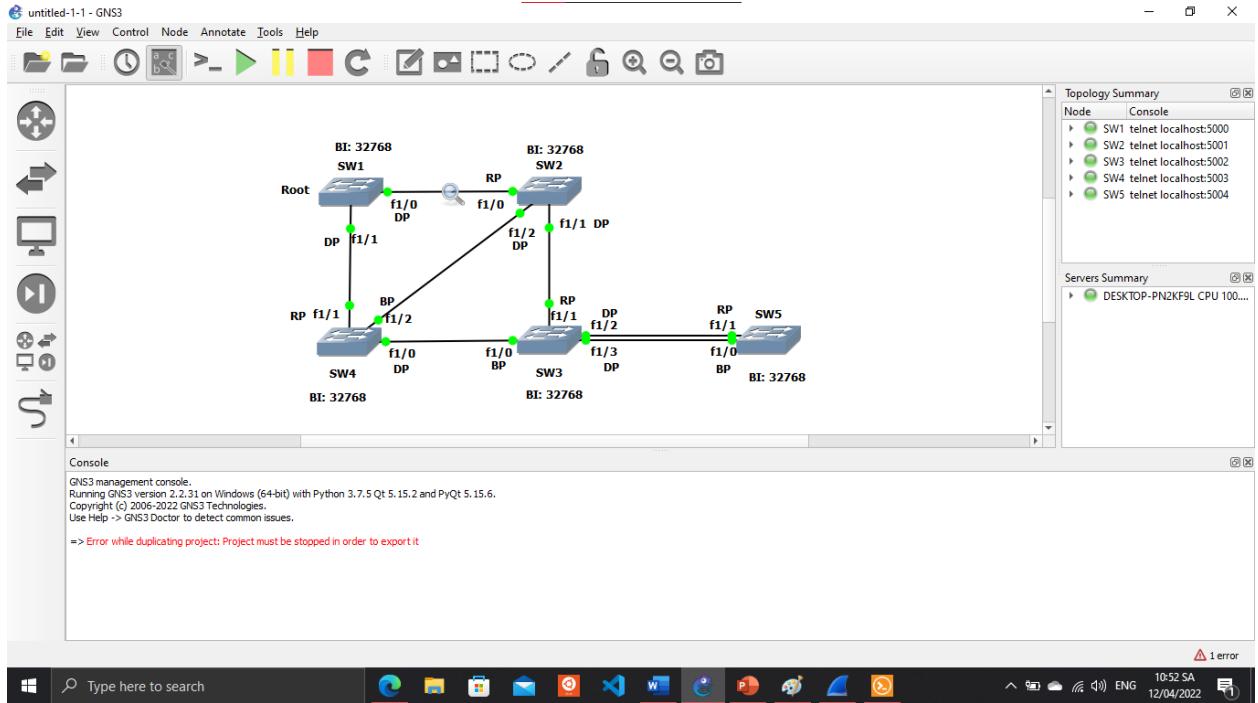
Port 41 (FastEthernet1/0) of VLAN1 is blocking
  Port path cost 19, Port priority 128, Port Identifier 128.41.
  Designated root has priority 32768, address cc01.2c10.0000
  Designated bridge has priority 32768, address cc03.01c8.0000
  Designated port Id is 128.44, designated path cost 38
  Times: message age 4, forward delay 0, hold 0
  Number of transitions to forwarding state: 0
  BPDU: sent 1, received 306

Port 42 (FastEthernet1/1) of VLAN1 is forwarding
  Port path cost 19, Port priority 128, Port Identifier 128.42.
  Designated root has priority 32768, address cc01.2c10.0000
  Designated bridge has priority 32768, address cc03.01c8.0000
  Designated port Id is 128.43, designated path cost 38
  Times: message age 3, forward delay 0, hold 0
  Number of transitions to forwarding state: 1
  BPDU: sent 0, received 306

Sw5#
```

Tương tự cho các switch còn lại

Sau khi xác định lại xong hết các root, RP, DP và BP, ta có kết quả:



Giải thích cách bầu chọn:

Bầu chọn root switch:

- Vì bridge id của các switch mặc định => đều bằng nhau nên bầu root bằng các so sánh mac value.
- Có : Sw1: cc01.2c10.0000= 224305406279680
 Sw2: cc02.30b8.0000 = 224309779365888
 Sw3: cc03.01c8.0000= 224313286852608
 Sw4: cc04.3354.0000= 224318413078528
 Sw5: cc05.3264.0000= 224322692317184
 ⇒ Sw1 có mac value nhỏ nhất nên được bầu làm root.

Bầu chọn root port:

- SW2: cổng f1/0 nối trực tiếp với root switch có root path cost nhỏ nhất là 19 ⇒ f1/0 là root port
- SW4: tương tự cổng f1/1 nối trực tiếp với root switch ⇒ f1/1 là root port
- SW3: xét cổng f1/0 và f1/1 vì cost của cả 2 cổng đều bằng nhau = 38. Nên dựa vào luật tie break ta sẽ xét đến bridge ID của switch mà port kết nối, 2 switch kết nối với port đều có priority bằng nhau nhưng SW2 có mac value nhỏ hơn SW4 nên cổng f1/1 của SW3 (kết nối với SW2) được bầu làm root port.
- SW5: cả cost và bridge id đều như nhau nên ta xét đến port id của switch kết nối với port của SW5. Vì f1/2 của sw3 có port id=128.43 nhỏ hơn f1/3 của sw3 portid=128.44 nên port f1/1 (kết nối với f1/2 SW3) sẽ được bầu làm root bridge.

Bầu chọn Designated port:

- Các port của SW11 (root switch) đều là DP.
- Trên đường link f1/2 của SW2 và SW44 đều có cùng cost nên ta xét switch bridge id nhưng SW2 có mac value nhỏ hơn nên chọn port f1/2 của SW2 làm DP.
- Trên đường link f1/0 của Sw3 và Sw4. F1/0 của Sw4 có cost về root thấp hơn f1/0 của Sw3 nên f1/0 của s4 được chọn làm DP.
- Trên đường link f1/1 của SW2 và SW3 vì f1/1 của SW3 là RP nên f1/1 của SW2 sẽ là DP.
- Trên link f1/2 SW3 nối với f1/1 SW5 vì f1/1 sw5 là RP nên f1/2 SW3 sẽ là DP.
- Trên link f1/3 SW3 nối vs f1/0 của SW5 vì cost về root của SW3 nhỏ hơn cost về root của SW5 nên port f1/3 của s3 được bầu làm DP.

Chọn Blocking port:

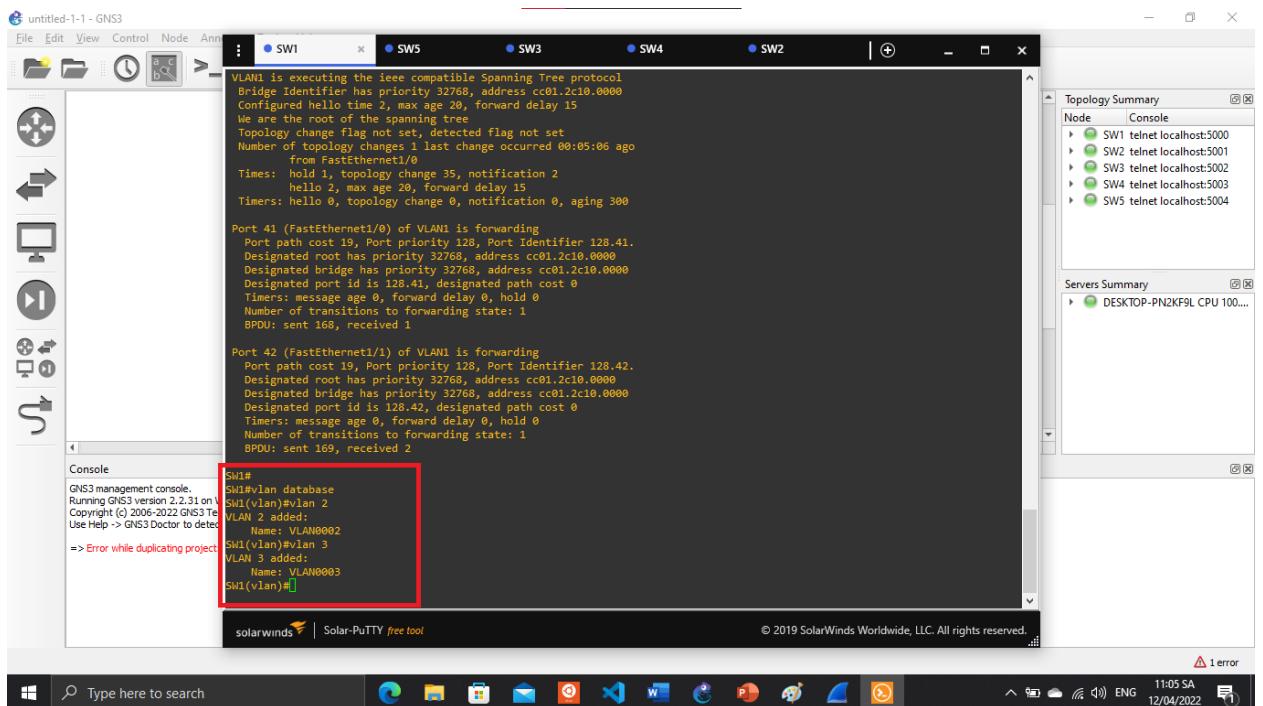
- Các port còn lại sẽ là BP.

1.4 Thêm vlan 2 và vlan 3 vào các switch:

- Câu lệnh để thêm:

```
# vlan database  
# vlan <vlan id>
```

Thực hiện trên SW1, và tương tự cho các SW khác:



a) SW4 làm root switch của VLAN 1:

The screenshot shows a Windows desktop with a terminal window open. The terminal window title is "SW4" and it displays the following configuration and status output:

```
SW4(vlan)#exit
APPLY completed.
Exiting...
SW4#conf t
Enter configuration commands, one per line. End with CNTL/Z.
SW4(config)#spanning-tree vlan 1 root primary
VLAN 1 bridge priority set to 8192
VLAN 1 bridge max aging time unchanged at 20
VLAN 1 bridge hello time unchanged at 2
VLAN 1 bridge forward delay unchanged at 15
SW4(config)#end
SW4#
*Mar 1 00:34:07.123: %SYS-5-CONFIG_I: Configured from console by console
SW4#sh spann
VLAN1 is executing the ieee compatible Spanning Tree protocol
Bridge Identifier has priority 8192, address cc04.3354.0000
Configured hello_time 2, max_age 20, forward_delay 15
We are the root of the spanning tree
Number of topology changes 2 last change occurred 00:00:08 ago
Times: hold 1, topology change 35, notification 2
    hello 2, max age 20, forward delay 15
Timers: hello 0, topology change 27, notification 0, aging 300
Port 41 (FastEthernet1/0) of VLAN1 is forwarding
    Port path cost 19, Port priority 128, Port Identifier 128.41.
    Designated root has priority 8192, address cc04.3354.0000
    Designated bridge has priority 8192, address cc04.3354.0000
    Designated port id is 128.41, designated path cost 0
    Timers: message age 0, forward delay 0, hold 0
    Number of transitions to forwarding state: 1
    BPDU: sent 1029, received 2
Port 42 (FastEthernet1/1) of VLAN1 is forwarding
    Port path cost 19, Port priority 128, Port Identifier 128.42.
    Designated root has priority 8192, address cc04.3354.0000
    -More-
```

A red box highlights the message "We are the root of the spanning tree". Another red box highlights the text "VLAN1 is executing the ieee compatible Spanning Tree protocol". To the right of the terminal window, there is a note: "set SW4 làm root của VLAN1" and "Kiểm tra SW4 có là root của VLAN1 chưa".

b) SW2 làm root switch của vlan 2:

Đầu tiên ta sẽ phải config các cổng vào vlan 2:

Thêm port vào vlan 2 ta dùng lệnh dưới đây: ví dụ cho SW1 và tương tự cho các switch khác.

SW1:

```

untitled-1-1 - GNS3
File Edit View Control Node Animate
SW1 SW5 SW3 SW4 SW2
SW1# 
SW1#vlan database
SW1(vlan)#vlan 2
VLAN 2 added:
  Name: VLAN0002
SW1(vlan)#vlan 3
VLAN 3 added:
  Name: VLAN0003
SW1(vlan)#exit
APPLY completed.
Switched to user EXEC mode.
SW1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
SW1(config)#int fa 1/0
SW1(config-if)#switchport access vlan 2
SW1(config-if)#end
SW1#
*Mar 1 00:39:46.259: %SYS-5-CONFIG_I: Configured from console by console
SW1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
SW1(config)#int fa 1/1
SW1(config-if)#switchport access vlan 2
SW1(config-if)#
*Mar 1 00:40:16.935: %SYS-5-CONFIG_I: Configured from console by console
SW1#sh vlan-switch
VLAN Name          Status    Ports
1   default        active    Fa1/2, Fa1/3, Fa1/4, Fa1/5
                                Fa1/6, Fa1/7, Fa1/8, Fa1/9
                                Fa1/10, Fa1/11, Fa1/12, Fa1/13
                                Fa1/14, Fa1/15
SW1#sh vlan-switch
VLAN Name          Status    Ports
1   default        active    Fa1/2, Fa1/3, Fa1/4, Fa1/5
                                Fa1/6, Fa1/7, Fa1/8, Fa1/9
                                Fa1/10, Fa1/11, Fa1/12, Fa1/13
                                Fa1/14, Fa1/15
2   VLAN0002       active    Fa1/0, Fa1/1
3   VLAN0003       active
1002 fddi-default  active
1003 token-ring-default  active
1004 fddinet-default  active
1005 trnet-default  active
SW1#sh vlan-switch
VLAN Type SAID MTU Parent RingNo BridgeNo Stp BrdgMode Trans1 Trans2
1   enet 100001 1500 - - - - - 1002 1003
2   enet 100002 1500 - - - - - 0 0
3   enet 100003 1500 - - - - - 0 0
1002 fddi 101002 1500 - - - - - 1 1003
1003 tr 101003 1500 1005 0 - - srb 1 1002
1004 fddinet 101004 1500 - - - 1 ibm - 0 0
1005 trnet 101005 1500 - - - 1 ibm - 0 0
SW1#

```

Để kiểm tra, ta có thể dùng “sh vlan-switch”:

```

untitled-1-1 - GNS3
File Edit View Control Node Animate
SW1 SW5 SW3 SW4 SW2
SW1# 
SW1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
SW1(config)#int fa 1/0
SW1(config-if)#switchport access vlan 2
SW1(config-if)#
*Mar 1 00:39:46.259: %SYS-5-CONFIG_I: Configured from console by console
SW1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
SW1(config)#int fa 1/1
SW1(config-if)#switchport access vlan 2
SW1(config-if)#
*Mar 1 00:40:12.879: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to down
SW1(config-if)#
*Mar 1 00:40:16.935: %SYS-5-CONFIG_I: Configured from console by console
SW1#sh vlan-switch
VLAN Name          Status    Ports
1   default        active    Fa1/2, Fa1/3, Fa1/4, Fa1/5
                                Fa1/6, Fa1/7, Fa1/8, Fa1/9
                                Fa1/10, Fa1/11, Fa1/12, Fa1/13
                                Fa1/14, Fa1/15
2   VLAN0002       active    Fa1/0, Fa1/1
3   VLAN0003       active
1002 fddi-default  active
1003 token-ring-default  active
1004 fddinet-default  active
1005 trnet-default  active
SW1#sh vlan-switch
VLAN Type SAID MTU Parent RingNo BridgeNo Stp BrdgMode Trans1 Trans2
1   enet 100001 1500 - - - - - 1002 1003
2   enet 100002 1500 - - - - - 0 0
3   enet 100003 1500 - - - - - 0 0
1002 fddi 101002 1500 - - - - - 1 1003
1003 tr 101003 1500 1005 0 - - srb 1 1002
1004 fddinet 101004 1500 - - - 1 ibm - 0 0
1005 trnet 101005 1500 - - - 1 ibm - 0 0
SW1#

```

Cấu hình để SW2 làm root switch của vlan 2, vì bridge id priority của các switch hiện tại trên vlan 2 là mặc định (32768) nên ta sẽ chỉnh priority của SW2 trong vlan 2 thấp hơn số đó để đưa SW2 làm root:

The screenshot shows a GNS3 simulation interface. In the center, there is a terminal window for switch SW2. The terminal output shows the configuration of Spanning Tree Protocol (STP) for VLAN 2. A red box highlights the command `SW2#sh spann vlan 2` and its output, which includes the message "We are the root of the spanning tree". Another red box highlights the text "Cấu hình lại priority thấp hơn để SW2 làm root". To the right of the terminal window, a sidebar titled "Topology Summary" lists the nodes and their connection status. The taskbar at the bottom shows the Windows Start button, a search bar, and several pinned application icons.

```

1 enet 100001 1500 - - - - 1002 1003
2 enet 100002 1500 - - - - 0 0
3 enet 100003 1500 - - - - 0 0
1002 fddi 101002 1500 - - - - 1 1003
1003 tr 101003 1500 1005 0 - - srb 1 1002
1004 fdnet 101004 1500 - - 1 ibm - 0 0
1005 tcnst 101005 1500 - - 1 ibm - 0 0
SW2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
SW2(config)#spanning-tree vlan 2 priority 24576
SW2(config)#end
SW2#
SW2#sh spann vlan 2
VLAN2 is executing the ieee compatible Spanning Tree protocol
Bridge Identifier has priority 24576, address cc02.30b8.0001
Configured hello time 2, max age 20, forward delay 15
We are the root of the spanning tree
Topology change flag set, detected flag set
Number of topology changes 8 last change occurred 00:00:15 ago
Times: hold 1, topology change 35, notification 2
hello 2, max age 20, forward delay 15
Timers: hello 1, topology change 20, forward delay 0, aging 300
Port 41 (FastEthernet1/0) of VLAN2 is forwarding
Port path cost 19, Port priority 128, Port Identifier 128.41.
Designated root has priority 24576, address cc02.30b8.0001
Designated bridge has priority 24576, address cc02.30b8.0001
Designated port id is 128.41, designated path cost 0
Timers: message age 0, forward delay 0, hold 0
Number of transitions to forwarding state: 1
BPDU: sent 16, received 207
--More-->

```

c) SW3 làm root của vlan 3:

Đầu tiên ta sẽ phải config các cổng vào vlan 3, tương tự thêm như câu b.

Để cấu hình SW3 là root của vlan 3 thì tương tự như câu b (vì các priority của các switch là mặc định):

Kết quả:

Cấu hình để SW3 là root của vlan 3

```

SW3#sh spann
VLAN3 is executing the ieee compatible Spanning Tree protocol
Bridge Identifier has priority 24576, address cc03.01c8.0000
Configured hello_time 2 max_age 20 forward delay 15
We are the root of the spanning tree
Times: hold 1, topology change 35, notification 2
hello 2, max age 20, forward delay 15
Timers: hello 0, topology change 29, notification 0, aging 300

Port 41 (FastEthernet1/0) of VLAN3 is listening
Port path cost 19, Port priority 128, Port Identifier 128.41.
Designated root has priority 24576, address cc03.01c8.0000
Designated bridge has priority 24576, address cc03.01c8.0000
Designated port id is 128.41, designated path cost 0
Timers: message age 0, forward delay 9, hold 0
Number of transitions to forwarding state: 0
BPDU: sent 3, received 107

Port 42 (FastEthernet1/1) of VLAN3 is Forwarding
Port path cost 19, Port priority 128, Port Identifier 128.42.
Designated root has priority 24576, address cc03.01c8.0000
--More-->

```

Kiểm tra SW3 là root vlan 3 hay chưa

1.5)

- Ta sẽ thay đổi cost ở port f1/0 thành thấp hơn cost của port f1/1 để port 1/0 của SW5 là root port.

- Trước khi config:

```

Building configuration...
[OK]
SW5#sh spann
VLAN2 is executing the ieee compatible Spanning Tree protocol
Bridge Identifier has priority 32768, address cc05.3264.0001
Configured hello_time 2 max_age 20, forward_delay 15
Current root has priority 32768, address cc04.3354.0001
Root port is 42 (FastEthernet1/1), cost of root path is 38
Topology change flag not set, detected flag not set
Number of topology changes 1 last change occurred 00:01:23 ago
from FastEthernet1/1
Times: hold 1, topology change 35, notification 2
hello 2, max age 20, forward delay 15
Timers: hello 0, topology change 0, notification 0, aging 300

Port 41 (FastEthernet1/0) of VLAN2 is blocking
Port path cost 19, Port priority 128, Port Identifier 128.41.
Designated root has priority 24576, address cc04.3354.0001
Designated bridge has priority 32768, address cc03.01c8.0001
Designated port id is 128.44, designated path cost 19
Timers: message age 3, forward delay 0, hold 0
Number of transitions to forwarding state: 0
BPDU: sent 5, received 99

Port 42 (FastEthernet1/1) of VLAN2 is Forwarding
Port path cost 19, Port priority 128, Port Identifier 128.42.
Designated root has priority 24576, address cc04.3354.0001
Designated bridge has priority 32768, address cc03.01c8.0001
Designated port id is 128.43, designated path cost 19
Timers: message age 3, forward delay 0, hold 0
Number of transitions to forwarding state: 1
BPDU: sent 5, received 99

SW5#conf t
Enter configuration commands, one per line. End with CNTL/Z.
SW5(config)#end
SW5#wr

```

- Sau khi config:

Lệnh đổi cost ở f1/0 để thấp hơn ở f1/1

```

[OK]
SW5#conf t
[Mar 1 00:29:19.799: %SYS-5-CONFIG_I: Configured from console by console
SW5#conf t
Enter configuration commands, one per line. End with CNTL/Z.
SW5(config)#int fa 1/0
SW5(config-if)#spanning-tree cost 4
SW5(config-if)#end
SW5#sh spann
[Mar 1 00:29:45.975: %SYS-5-CONFIG_I: Configured from console by console
SW5#sh spann

VLAN2 is executing the ieee compatible Spanning Tree protocol
Bridge Identifier has priority 32768, address cc05.3264.0001
Configured hello time 2, max age 20, forward delay 15
Current root has priority 32768, address cc04.3354.0001
Root port is 41 (FastEthernet1/0), cost of root path is 23
Topology change ring acy detected ring not acy
Number of topology changes 2 last change occurred 00:00:04 ago
from FastEthernet1/1
Times: hello 1, topology change 35, notification 2
hello 2, max age 20, forward delay 15
Timers: hello 0, topology change 0, notification 0, aging 300
Port 41 (FastEthernet1/0) of VLAN2 is listening
Port path cost 4, Port priority 128, Port Identifier 128.41.
Designated root has priority 24576, address cc04.3354.0001
Designated bridge has priority 32768, address cc03.01c8.0001
Designated port id is 128.44, designated path cost 19
Timers: message age 3, forward delay 11, hold 0
Number of transitions to forwarding state: 0
BPDU: sent 6, received 390

Port 42 (FastEthernet1/1) of VLAN2 is blocking
Port path cost 19, Port priority 128, Port Identifier 128.42.
Designated root has priority 24576, address cc04.3354.0001
Designated bridge has priority 32768, address cc03.01c8.0001
Designated port id is 128.43, designated path cost 19

Port 41 (FastEthernet1/0) of VLAN2 is listening
Port path cost 4, Port priority 128, Port Identifier 128.41.
Designated root has priority 24576, address cc04.3354.0001
Designated bridge has priority 32768, address cc03.01c8.0001
Designated port id is 128.44, designated path cost 19
Timers: message age 3, forward delay 11, hold 0
Number of transitions to forwarding state: 0
BPDU: sent 6, received 390

Port 42 (FastEthernet1/1) of VLAN2 is blocking
Port path cost 19, Port priority 128, Port Identifier 128.42.
Designated root has priority 24576, address cc04.3354.0001
Designated bridge has priority 32768, address cc03.01c8.0001
Designated port id is 128.43, designated path cost 19

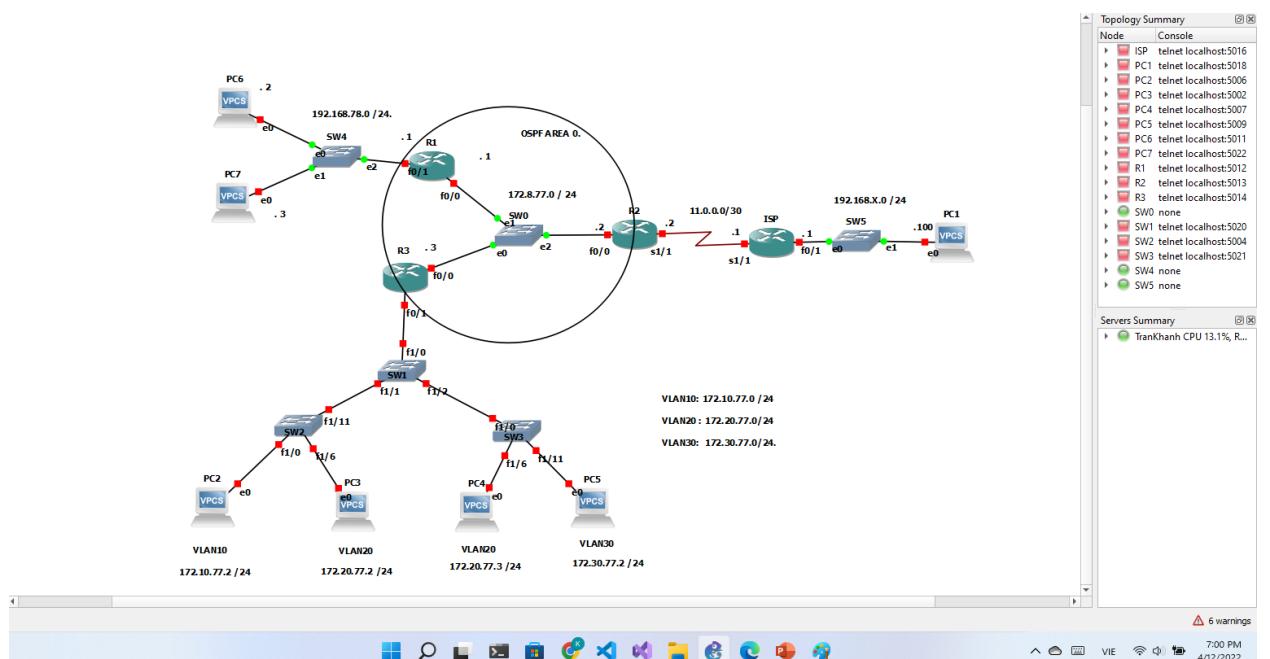
Port 41 (FastEthernet1/0) of VLAN2 is listening
Port path cost 4, Port priority 128, Port Identifier 128.41.
Designated root has priority 24576, address cc04.3354.0001
Designated bridge has priority 32768, address cc03.01c8.0001
Designated port id is 128.44, designated path cost 19
Timers: message age 3, forward delay 11, hold 0
Number of transitions to forwarding state: 0
BPDU: sent 6, received 390

```

Kết quả

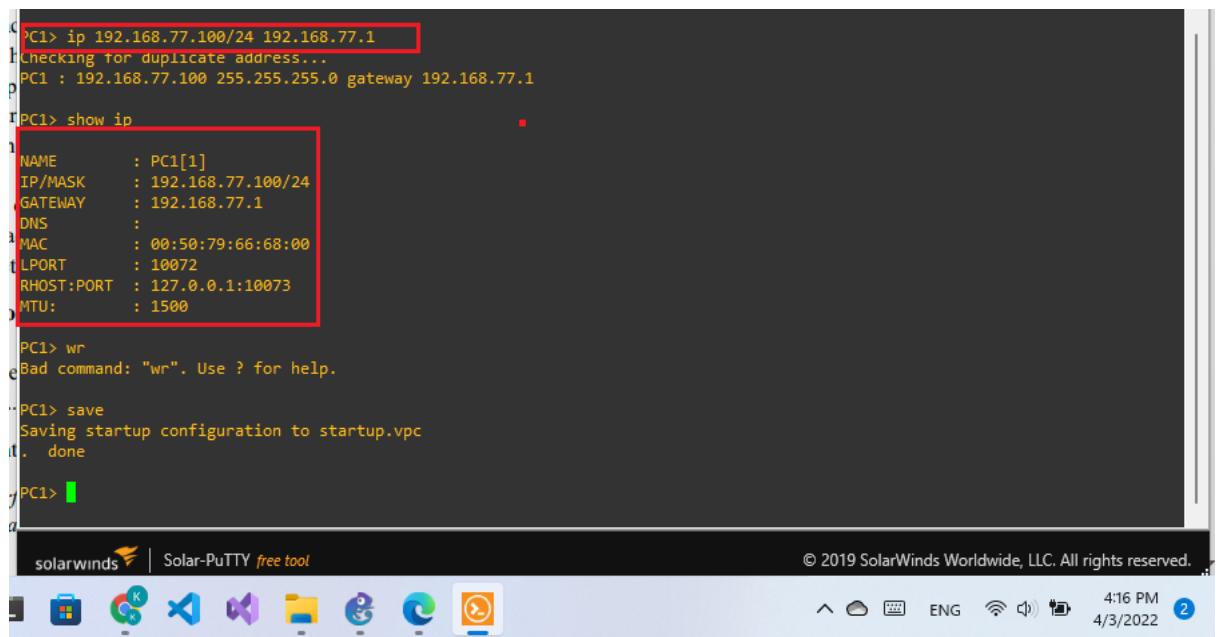
Bài 2. Sử dụng router c3600.

1. Thiết lập mô hình mạng sau đây.



2. Cấu hình tên, địa chỉ IP cho các thiết bị như hình vẽ.

- PC1.



```
PC1> ip 192.168.77.100/24 192.168.77.1
Checking for duplicate address...
PC1 : 192.168.77.100 255.255.255.0 gateway 192.168.77.1

PC1> show ip

NAME      : PC1[1]
IP/MASK   : 192.168.77.100/24
GATEWAY   :
DNS       :
MAC       : 00:50:79:66:68:00
LPORT     : 10072
RHOST:PORT: 127.0.0.1:10073
MTU:      : 1500

PC1> wr
Bad command: "wr". Use ? for help.

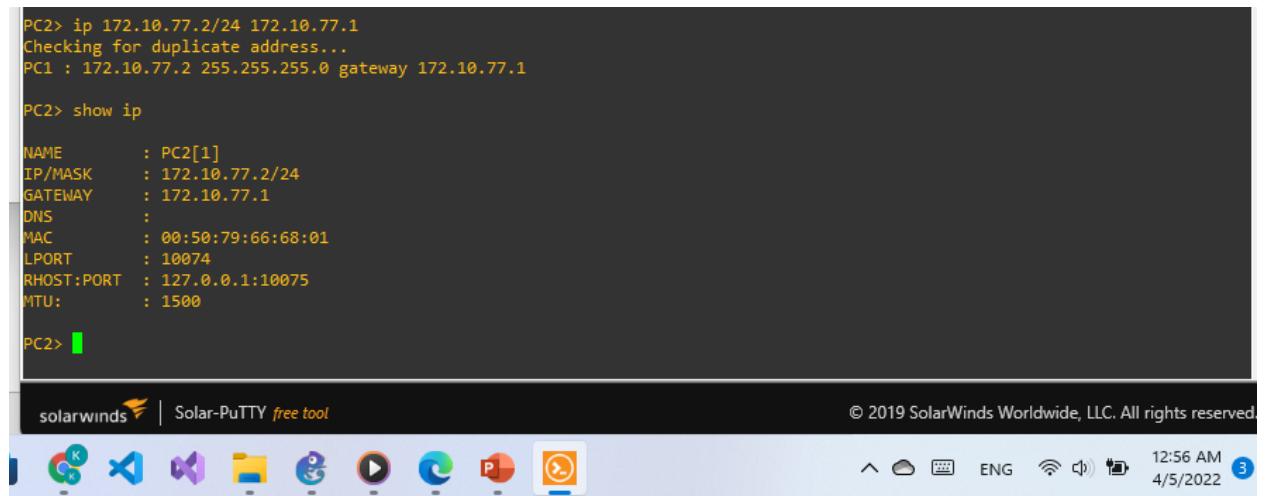
PC1> save
Saving startup configuration to startup.vpc
PC1> done

PC1>
```

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- PC2.



```
PC2> ip 172.10.77.2/24 172.10.77.1
Checking for duplicate address...
PC1 : 172.10.77.2 255.255.255.0 gateway 172.10.77.1

PC2> show ip

NAME      : PC2[1]
IP/MASK   : 172.10.77.2/24
GATEWAY   : 172.10.77.1
DNS       :
MAC       : 00:50:79:66:68:01
LPORT     : 10074
RHOST:PORT: 127.0.0.1:10075
MTU:      : 1500

PC2>
```

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- PC3

```
PC3> ip 172.20.77.2/24 172.20.77.1
/: Checking for duplicate address...
PC1 : 172.20.77.2 255.255.255.0 gateway 172.20.77.1

PC3> show ip

NAME      : PC3[1]
IP/MASK   : 172.20.77.2/24
GATEWAY   : 172.20.77.1
DNS       :
MAC       : 00:50:79:66:68:02
LPORT     : 10076
RHOST:PORT: 127.0.0.1:10077
MTU:      : 1500

PC3>
```

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- PC4

```
PC4> ip 172.20.77.3/24 172.20.77.1
/: Checking for duplicate address...
PC1 : 172.20.77.3 255.255.255.0 gateway 172.20.77.1

PC4> show ip

NAME      : PC4[1]
IP/MASK   : 172.20.77.3/24
GATEWAY   : 172.20.77.1
DNS       :
MAC       : 00:50:79:66:68:03
LPORT     : 10078
RHOST:PORT: 127.0.0.1:10079
MTU:      : 1500

PC4>
```

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1:00 AM
4/5/2022 3

- PC5

```
PC5> ip 172.30.77.2/24 172.30.77.1
2/| Checking for duplicate address...
PC1 : 172.30.77.2 255.255.255.0 gateway 172.30.77.1
-----
PC5> show ip

NAME      : PC5[1]
IP/MASK   : 172.30.77.2/24
GATEWAY   : 172.30.77.1
DNS       :
MAC       : 00:50:79:66:68:04
LPORT     : 10080
RHOST:PORT: 127.0.0.1:10081
MTU:      : 1500

PC5>
```

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- PC6

```
PC6> ip 192.168.78.2/24 192.168.78.1
Checking for duplicate address...
PC1 : 192.168.78.2 255.255.255.0 gateway 192.168.78.1

PC6> save
Saving startup configuration to startup.vpc
. done

PC6> show ip

NAME      : PC6[1]
IP/MASK   : 192.168.78.2/24
GATEWAY   : 192.168.78.1
DNS       :
MAC       : 00:50:79:66:68:05
LPORT     : 10062
RHOST:PORT: 127.0.0.1:10063
MTU:      : 1500

PC6>
```

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- PC7

```
D PC7> ip 192.168.78.3/24 192.168.78.1
Checking for duplicate address...
PC1 : 192.168.78.3 255.255.255.0 gateway 192.168.78.1

PC7> show ip

NAME      : PC7[1]
IP/MASK   : 192.168.78.3/24
GATEWAY   : 192.168.78.1
DNS       :
MAC       : 00:50:79:66:68:06
LPORT     : 10064
RHOST:PORT: 127.0.0.1:10065
MTU:      : 1500

PC7> save
Saving startup configuration to startup.vpc
. done

PC7> [green bar]
```

- Router 1

```
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#int f0/1
R1(config-if)#ip add 192.168.78.1 255.255.255.0
R1(config-if)#no shut
R1(config-if)#end
R1#
*Mar 1 00:01:17.603: %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state to up
R1#
*Mar 1 00:01:17.987: %SYS-5-CONFIG_I: Configured from console by console
*Mar 1 00:01:18.603: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
R1#23

R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#int f0/0
R1(config-if)#ip add 172.8.77.1 255.255.255.0
R1(config-if)#no shut
R1(config-if)#end
R1#23
*Mar 1 00:01:00.563: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
R1#23
*Mar 1 00:01:01.391: %SYS-5-CONFIG_I: Configured from console by console
*Mar 1 00:01:01.563: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
R1#wr
Building configuration...
[OK]
R1#
```

- #### - Cấu hình ospf 1

```
R1#show run | sect ospf
router ospf 1
log-adjacency-changes
network 172.8.77.0 0.0.0.255 area 0
network 192.168.78.0 0.0.0.255 area 0
R1#
```

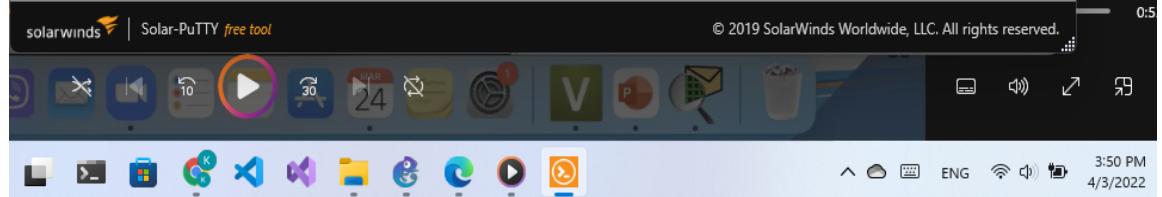
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- Router 2

```
R2(config)#int s1/1
R2(config-if)#ip add 11.0.0.2 255.255.255.252
R2(config-if)#clock rate 64000
R2(config-if)#no shut
R2(config-if)#
*Mar 1 00:03:50.311: %LINK-3-UPDOWN: Interface Serial1/1, changed state to up
R2(config-if)#
*Mar 1 00:03:51.315: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/1, changed state to up
R2(config-if)#
R2(config)#exit
R2#wr
Building configuration...

*Mar 1 00:04:04.663: %SYS-5-CONFIG_I: Configured from console by console[OK]
R2#
R2#
*Mar 1 00:04:12.387: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/1, changed state to down
R2#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R2(config)#int f0/0
R2(config-if)#ip add 172.8.77.2 255.255.255.0
R2(config-if)#no shut
R2(config-if)#ex
R2(config)#
*Mar 1 00:06:03.091: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
*Mar 1 00:06:04.091: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
R2(config)#en
% Ambiguous command: "en"
R2(config)#ex
% Ambiguous command: "ex"
```



- Cấu hình ospf và kiểm tra đường học được từ ospf

```

R2#show run | sect os
R2#show run | sect ospf
router ospf 1
  log-adjacency-changes
  network 11.0.0.0 0.0.0.3 area 0
  network 172.8.77.0 0.0.0.255 area 0
R2#
R2#show ip route
Codes: 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
      i - IS-IS, su - IS-IS summary, 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

  0    192.168.78.0/24 [110/2] via 172.8.77.3, 00:02:09, FastEthernet0/0
      172.8.0.0/24 is subnetted, 1 subnets
C      172.8.77.0 is directly connected, FastEthernet0/0
      172.10.0.0/24 is subnetted, 1 subnets
  0    172.10.77.0 [110/2] via 172.8.77.3, 00:02:09, FastEthernet0/0
      172.20.0.0/24 is subnetted, 1 subnets
  0    172.20.77.0 [110/2] via 172.8.77.3, 00:02:09, FastEthernet0/0
  0    172.30.0.0/24 is subnetted, 1 subnets
  0    172.30.77.0 [110/2] via 172.8.77.3, 00:02:09, FastEthernet0/0
R2#

```

Các 192.168.78.0 , 172.10.77.0, 172.20.77.0, 172.30.77.0 được update vào router table, tương tự như vậy với các R1 và R2.

- Router 3.

```

R3#config t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#int f0/0
R3(config-if)#ip add 172.8.77.3 255.255.255.0
R3(config-if)#no shut
R3(config-if)#end
R3#
*Mar 1 00:02:25.343: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
R3#wr
*Mar 1 00:02:25.743: %SYS-5-CONFIG_I: Configured from console by console
*Mar 1 00:02:26.343: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
R3#wr
Building configuration...
[OK]
R3#

```

- ISP.

```

Enter configuration commands, one per line. End with CNTL/Z.
ISP(config)#int s1/1
ISP(config-if)#ip add 11.0.0.1 255.255.255.252
ISP(config-if)#no shut
ISP(config-if)#ex
ISP(config)#
*Mar 1 00:01:38.559: %LINK-3-UPDOWN: Interface Serial1/1, changed state to up
ISP(config)#
*Mar 1 00:01:39.559: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/1, changed state to up
ISP(config-if)#int f0/1
ISP(config-if)#ip add 192.168.77.1 255.255.255.0
ISP(config-if)#no shut
ISP(config-if)#end
*Mar 1 00:02:44.359: %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state to up
*Mar 1 00:02:45.359: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
ISP(config-if)#end
ISP#wr
Building configuration...
[OK]
ISP#
*Mar 1 00:02:45.627: %SYS-5-CONFIG_I: Configured from console by console
ISP#

```

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3. Cấu hình VLAN cho các subnet.

- Cấu hình vtp.

- Router 3

```

R3#
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#int f0/1.10
R3(config-subif)#em
R3(config-subif)#en
R3(config-subif)#encapsulation dot1
R3(config-subif)#encapsulation dot1Q 10
R3(config-subif)#ip add 172.10.77.1 255.255.255.0
R3(config-subif)#no shut
R3(config-subif)#ex
R3(config)#int f0/1.20
R3(config-subif)#encapsulation dot1Q 20
R3(config-subif)#ip add 172.20.77.1 255.255.255.0
R3(config-subif)#no shut
R3(config-subif)#
R3(config-subif)#ex
R3(config)#int f0/1.30
R3(config-subif)#encapsulation dot1Q 30
R3(config-subif)#ip add 172.30.77.1 255.255.255.0
R3(config-subif)#no shut
R3(config-subif)#ex
R3(config)#int f0/1
R3(config-if)#no shut
R3(config-if)#
R3(config-if)#em
*Mar 1 00:08:22.639: %LINK-3-UPDOWN: Interface FastEthernet0/1, changed state to up
*Mar 1 00:08:23.639: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
R3(config-if)#end
R3#w
*Mar 1 00:08:25.943: %SYS-5-CONFIG_I: Configured from console by console
R3#wr
Building configuration...
[OK]
R3#

```

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- SW1

```

SW1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
SW1(config)#int f1/1
SW1(config-if)#switchport mode trunk
SW1(config-if)#ex
*Mar 1 00:03:38.559: %DTP-5-TRUNKPORTON: Port Fa1/1 has become dot1q trunk
SW1(config-if)#ex
SW1(config)#int f1/2
SW1(config-if)#switchport mode trunk
SW1(config-if)#ex
*Mar 1 00:04:00.823: %DTP-5-TRUNKPORTON: Port Fa1/2 has become dot1q trunk
SW1(config-if)#ex
SW1(config)#int f1/0
SW1(config-if)#switchport mode trunk
SW1(config-if)#
*Mar 1 00:04:22.235: %DTP-5-TRUNKPORTON: Port Fa1/0 has become dot1q trunk
SW1(config-if)#end
SW1#whois
*Mar 1 00:05:25.147: %SYS-5-CONFIG_I: Configured from console by console
SW1#show int trunk

Port      Mode       Encapsulation  Status      Native vlan
Fa1/0    on        802.1q         trunking    1
Fa1/1    on        802.1q         trunking    1
Fa1/2    on        802.1q         trunking    1

+ /2
Port      Vlans allowed on trunk
Fa1/0    1-1005
Fa1/1    1-1005
Fa1/2    1-1005

Port      Vlans allowed and active in management domain
Fa1/0    1
Fa1/1    1
Fa1/2    1

Port      Vlans in spanning tree forwarding state and not pruned
Fa1/0    1
Fa1/1    1
Fa1/2    1
SW1#

```



Các interface mode trunk f1/0 - 2 đã on.

- SW2

```

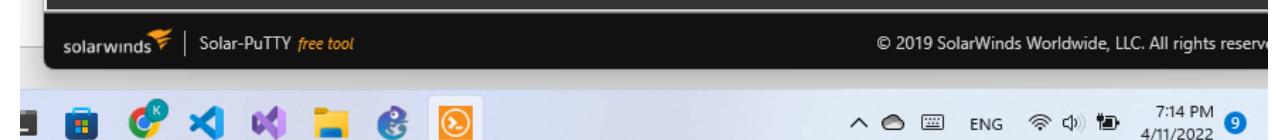
SW2#sh int trunk
Port      Mode       Encapsulation  Status      Native vlan
Fa1/11   on        802.1q         trunking    1

Port      Vlans allowed on trunk
Fa1/11  1-1005

Port      Vlans allowed and active in management domain
Fa1/11  1,10,20,30

Port      Vlans in spanning tree forwarding state and not pruned
Fa1/11  none
SW2#
*Mar 1 00:02:04.423: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
SW2#

```



- SW3

```

Enter configuration commands, one per line. End with CNTL/Z.
SW3(config)#int T1/0
SW3(config-if)#swit
SW3(config-if)#switchport mode trunk
SW3(config-if)#ex
*Mar 1 00:02:44.679: %DTP-5-TRUNKPORTON: Port Fa1/0 has become dot1q trunk
SW3(config-if)#end
SW3#conf
*Mar 1 00:02:51.863: %SYS-5-CONFIG_I: Configured from console by console
SW3#sh int trunk

Port Mode Encapsulation Status Native vlan
Fa1/0 on 802.1q trunking 1

Port Vlans allowed on trunk
Fa1/0 1-1005

Port Vlans allowed and active in management domain
Fa1/0 1,10,20,30

Port Vlans in spanning tree forwarding state and not pruned
Fa1/0 none
SW3#

```

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7:15 PM 4/11/2022 9

- Tạo vlan và thêm interface vào vlan.

- SW1.

Tạo vtp domain và server.

```

SW1#show vtp sta
VTP Version : 2
Configuration Revision : 1
Maximum VLANs supported locally : 68
Number of existing VLANs : 8
VTP Operating Mode : Server
VTP Domain Name : DOMAIN1
VTP Pruning Mode : Disabled
VTP V2 Mode : Disabled
VTP Traps Generation : Disabled
MD5 digest : 0xC6 0x87 0x21 0xE4 0xEF 0x94 0x4F 0x3E
Configuration last modified by 0.0.0.0 at 3-1-02 00:31:41
Local updater ID is 0.0.0.0 (no valid interface found)
SW1#

```

Tạo vlan SW1:

```
SW1#show vlan-s

VLAN Name          Status   Ports
----- 
1    default        active   Fa1/3, Fa1/4, Fa1/5, Fa1/6
                           Fa1/7, Fa1/8, Fa1/9, Fa1/10
                           Fa1/11, Fa1/12, Fa1/13, Fa1/14
                           Fa1/15
10   VLAN10         active
20   VLAN20         active
30   VLAN30         active
1002 fddi-default  active
1003 token-ring-default  active
1004 fddinet-default  active
1005 trnet-default  active

VLAN Type   SAID      MTU   Parent RingNo BridgeNo Stp   BrdgMode Trans1 Trans2
----- 
1   enet    100001   1500   -     -     -     -     1002   1003
10  enet    100010   1500   -     -     -     -     0       0
20  enet    100020   1500   -     -     -     -     0       0
30  enet    100030   1500   -     -     -     -     0       0
1002 fddi   101002   1500   -     -     -     -     1       1003
1003 tr    101003   1500   1005  0     -     -     srb    1       1002
--More--
```

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- SW2.

```
SW2#
SW2#show vtp sta
VTP-Version           : 2
Configuration Revision : 2
Maximum VLANs supported locally : 68
Number of existing VLANs : 8
VTP Operating Mode   : Client
VTP Domain Name      : DOMAIN1
VTP Pruning Mode     : Disabled
VTP V2 Mode           : Disabled
VTP Traps Generation : Disabled
MD5 digest            : 0xE1 0x52 0xCC 0x85 0x75 0xAA 0xFE 0xE9
Configuration last modified by 0.0.0.0 at 3-1-02 00:01:29
SW2#
*Mar 1 00:00:38.079: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan1, changed state to up
SW2#
```

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Thêm interface.

```
SW2(config)#int range fa1/0 - 5
SW2(config-if-range)#switch access vlan 10
SW2(config-if-range)#ex
SW2(config)#
SW2(config)#int range f1/6 - 10
SW2(config-if-range)#switch access vlan 20
SW2(config-if-range)#ex
SW2(config)#int range f1/11 - 15
SW2(config-if-range)#switch access vlan 30
SW2(config-if-range)#ex
SW2(config)#ex
% Ambiguous command: "ex"
SW2(config)#end
SW2#
*Mar 1 01:00:10.483: %SYS-5-CONFIG_I: Configured from console by console
SW2#wr
Building configuration...
[OK]
SW2#s
% Type "show ?" for a list of subcommands
SW2#
SW2#show vlan-s
2


| VLAN | Name         | Status | Ports                                                                                                               |
|------|--------------|--------|---------------------------------------------------------------------------------------------------------------------|
| 1    | default      | active | Fa2/1, Fa2/2, Fa2/3, Fa2/4<br>Fa2/5, Fa2/6, Fa2/7, Fa2/8<br>Fa2/9, Fa2/10, Fa2/11, Fa2/12<br>Fa2/13, Fa2/14, Fa2/15 |
| 10   | VLAN10       | active | Fa1/0, Fa1/1, Fa1/2, Fa1/3<br>Fa1/4, Fa1/5                                                                          |
| 20   | VLAN20       | active | Fa1/6, Fa1/7, Fa1/8, Fa1/9<br>Fa1/10                                                                                |
| 30   | VLAN30       | active | Fa1/11, Fa1/12, Fa1/13, Fa1/14<br>Fa1/15                                                                            |
| 1002 | ffdi-default | active |                                                                                                                     |



kết quả sau khi thêm



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⚠ 1 error 1 warning



2:05 AM  
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3


```

- SW3.

```
SW3#show vtp sta
VTP Version : 2
Configuration Revision : 1
Maximum VLANs supported locally : 68
Number of existing VLANs : 8
VTP Operating Mode : Client
VTP Domain Name : DOMAIN1
VTP Pruning Mode : Disabled
VTP V2 Mode : Disabled
VTP Traps Generation : Disabled
MD5 digest : 0xC6 0xB7 0x21 0xE4 0xEF 0x94 0x4F 0x3E
Configuration last modified by 0.0.0.0 at 3-1-02 00:31:41
SW3#
```

- Thêm interface vào vlan.

4. Cấu hình định tuyến - NAT.

Router 2: cấu hình inside f0/0 và outside s1/1.

```
!
interface FastEthernet0/0
 ip address 172.8.77.2 255.255.255.0
 ip nat inside
 ip virtual-reassembly
 duplex auto
 speed auto
!
interface FastEthernet0/1
 no ip address
 shutdown
 duplex auto
 speed auto
!
interface Serial1/0
 no ip address
 shutdown
 serial restart-delay 0
!
interface Serial1/1
 ip address 11.0.0.2 255.255.255.252
 ip nat outside
 ip virtual-reassembly
 serial restart-delay 0
 clock rate 64000
!
```

- Cấu hình nat overload tại route 2. Cho phép các đường mạng cần được từ nội bộ đi có kết nối internet.

```
ip nat inside source list 1 interface Serial1/1 overload
!
24 access-list 1 permit 172.8.77.0 0.0.0.255
access-list 1 permit 192.168.78.0 0.0.0.255
access-list 1 permit 172.10.77.0 0.0.0.255
access-list 1 permit 172.20.77.0 0.0.0.255
access-list 1 permit 172.30.77.0 0.0.0.255
no cdp log mismatch duplex
!
!
control-plane
!
!
!
```

5. Thiết lập các chính sách.

- Các host thuộc VLAN 10 không được phép truy cập internet.

```
R2(config)#acc
R2(config)#access-list 1 deny 172.10.77.0 0.0.0.255
R2(config)#accees-list 1 permit any
          ^
% Invalid input detected at '^' marker.

R2(config)#acce
R2(config)#access-list 1 permit any
          ^
% Invalid input detected at '^' marker.

R2(config)#int s1/1
R2(config-if)#ip acces
R2(config-if)#ip access-group 1 out
R2(config-if)#end
R2#un
Building configuration...

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3 Warnings
6:18 PM 4/12/2022
```

Kiểm tra cấu hình ACL.

```
Building configuration...
[OK]
R2#
*Mar 1 00:09:26.115: %SYS-5-CONFIG_I: Configured from console by console
R2#show access-list
Standard IP access list 1
  10 deny 172.10.77.0, wildcard bits 0.0.0.255 (20 matches)
  20 permit any (46 matches)

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3 Warnings
6:20 PM 4/12/2022
```

- Các host thuộc VLAN 10 không được phép truy cập các host thuộc VLAN 30

```
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#access-list 10 deny 172.10.77.0 0.0.0.255
*Mar 1 00:34:58.947: %OSPF-5-ADJCHG: Process 1, Nbr 172.8.77.2 on FastEthernet0/0 from LOADING to FULL, Loading Done
R3(config)#access-list 10 deny 172.10.77.0 0.0.0.255
R3(config)#acee
R3(config)acce
R3(config)#access-list 10 permit any
R3(config)#int f0/1.30
R3(config-subif)#ip acc
R3(config-subif)#ip acce
R3(config-subif)#ip access-group 10 out
R3(config-subif)#end
R3#
R3#s
```

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- Kiểm tra cấu hình ACL

```
R3#show acces
R3#show access-list
Standard IP access list 10
    10 deny 172.10.77.0, wildcard bits 0.0.0.255
    20 permit any
R3#
```

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6. Kiểm tra các kết quả sau khi cấu hình.

- PC7 ping đến PC1, PC2, PC3, PC4, PC5, PC6.
- pc1

```
PC7> ping 192.168.77.100
84 bytes from 192.168.77.100 icmp_seq=1 ttl=61 time=321.721 ms
84 bytes from 192.168.77.100 icmp_seq=2 ttl=61 time=321.721 ms
84 bytes from 192.168.77.100 icmp_seq=3 ttl=61 time=321.721 ms
84 bytes from 192.168.77.100 icmp_seq=4 ttl=61 time=321.721 ms
84 bytes from 192.168.77.100 icmp_seq=5 ttl=61 time=321.721 ms
PC7>
```

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- PC3

```
0 PC7> ping 172.20.77.2
84 bytes from 172.20.77.2 icmp_seq=1 ttl=62 time=154.147 ms
84 bytes from 172.20.77.2 icmp_seq=2 ttl=62 time=196.952 ms
84 bytes from 172.20.77.2 icmp_seq=3 ttl=62 time=148.101 ms
84 bytes from 172.20.77.2 icmp_seq=4 ttl=62 time=144.870 ms
84 bytes from 172.20.77.2 icmp_seq=5 ttl=62 time=168.317 ms
3 /24
PC7> [REDACTED]
```

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4/12/2022

- PC4

```
0 PC7> ping 172.20.77.3
84 bytes from 172.20.77.3 icmp_seq=1 ttl=62 time=168.762 ms
84 bytes from 172.20.77.3 icmp_seq=2 ttl=62 time=158.000 ms
84 bytes from 172.20.77.3 icmp_seq=3 ttl=62 time=150.505 ms
84 bytes from 172.20.77.3 icmp_seq=4 ttl=62 time=152.799 ms
84 bytes from 172.20.77.3 icmp_seq=5 ttl=62 time=197.558 ms
3 /24
PC7> [REDACTED]
```

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- PC5

```
0 PC7> ping 172.30.77.2
84 bytes from 172.30.77.2 icmp_seq=1 ttl=62 time=149.126 ms
84 bytes from 172.30.77.2 icmp_seq=2 ttl=62 time=193.603 ms
84 bytes from 172.30.77.2 icmp_seq=3 ttl=62 time=149.329 ms
84 bytes from 172.30.77.2 icmp_seq=4 ttl=62 time=177.063 ms
84 bytes from 172.30.77.2 icmp_seq=5 ttl=62 time=144.757 ms
4
PC7> [REDACTED]
```

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- PC6

```
0 PC7> ping 192.168.78.2
84 bytes from 192.168.78.2 icmp_seq=1 ttl=64 time=8.123 ms
84 bytes from 192.168.78.2 icmp_seq=2 ttl=64 time=7.958 ms
84 bytes from 192.168.78.2 icmp_seq=3 ttl=64 time=1.006 ms
84 bytes from 192.168.78.2 icmp_seq=4 ttl=64 time=4.063 ms
84 bytes from 192.168.78.2 icmp_seq=5 ttl=64 time=1.466 ms
24
PC7> [REDACTED]
```

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- PC6 ping đến PC1, PC2, PC3, PC4, PC5, PC7.

- PC1

PC6> ping 192.168.77.100
84 bytes from 192.168.77.100 icmp_seq=1 ttl=61 time=208.348 ms
84 bytes from 192.168.77.100 icmp_seq=2 ttl=61 time=213.476 ms
84 bytes from 192.168.77.100 icmp_seq=3 ttl=61 time=215.882 ms
84 bytes from 192.168.77.100 icmp_seq=4 ttl=61 time=213.539 ms
84 bytes from 192.168.77.100 icmp_seq=5 ttl=61 time=215.698 ms

PC6>

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- PC2

PC6> ping 172.10.77.2
84 bytes from 172.10.77.2 icmp_seq=1 ttl=62 time=302.702 ms
84 bytes from 172.10.77.2 icmp_seq=2 ttl=62 time=298.699 ms
84 bytes from 172.10.77.2 icmp_seq=3 ttl=62 time=179.875 ms
84 bytes from 172.10.77.2 icmp_seq=4 ttl=62 time=245.458 ms
84 bytes from 172.10.77.2 icmp_seq=5 ttl=62 time=280.008 ms

PC6>

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- PC5 ping đến PC1, PC2, PC3, PC4, PC6, PC7.

- PC1

PC5> ping 192.168.77.100
84 bytes from 192.168.77.100 icmp_seq=1 ttl=61 time=278.039 ms
84 bytes from 192.168.77.100 icmp_seq=2 ttl=61 time=368.847 ms
84 bytes from 192.168.77.100 icmp_seq=3 ttl=61 time=267.425 ms
84 bytes from 192.168.77.100 icmp_seq=4 ttl=61 time=259.567 ms
84 bytes from 192.168.77.100 icmp_seq=5 ttl=61 time=220.694 ms

- PC4 ping đến PC1, PC2, PC3, PC5, PC6, PC7.

- PC1

PC4> ping 192.168.77.100
84 bytes from 192.168.77.100 icmp_seq=1 ttl=61 time=303.263 ms
84 bytes from 192.168.77.100 icmp_seq=2 ttl=61 time=243.512 ms
84 bytes from 192.168.77.100 icmp_seq=3 ttl=61 time=308.742 ms
84 bytes from 192.168.77.100 icmp_seq=4 ttl=61 time=247.993 ms
84 bytes from 192.168.77.100 icmp_seq=5 ttl=61 time=373.744 ms

- PC5

```

PC4> ping 172.30.77.2
84 bytes from 172.30.77.2 icmp_seq=1 ttl=63 time=185.322 ms
84 bytes from 172.30.77.2 icmp_seq=2 ttl=63 time=90.847 ms
84 bytes from 172.30.77.2 icmp_seq=3 ttl=63 time=139.223 ms
84 bytes from 172.30.77.2 icmp_seq=4 ttl=63 time=213.948 ms
84 bytes from 172.30.77.2 icmp_seq=5 ttl=63 time=183.392 ms

```

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9 warnings 9:01 PM 4/12/2022

- PC3 ping đến PC1, PC2, PC4, PC5, PC6, PC7.
 - PC 1

```

PC3> ping 192.168.77.100
84 bytes from 192.168.77.100 icmp_seq=1 ttl=61 time=248.265 ms
84 bytes from 192.168.77.100 icmp_seq=2 ttl=61 time=350.379 ms
84 bytes from 192.168.77.100 icmp_seq=3 ttl=61 time=267.606 ms
84 bytes from 192.168.77.100 icmp_seq=4 ttl=61 time=210.410 ms
84 bytes from 192.168.77.100 icmp_seq=5 ttl=61 time=341.190 ms

```

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9 warnings 8:56 PM 4/12/2022

- PC4

```

PC3> ping 172.20.77.3
84 bytes from 172.20.77.3 icmp_seq=1 ttl=64 time=27.106 ms
84 bytes from 172.20.77.3 icmp_seq=2 ttl=64 time=14.797 ms
84 bytes from 172.20.77.3 icmp_seq=3 ttl=64 time=1.980 ms
84 bytes from 172.20.77.3 icmp_seq=4 ttl=64 time=9.536 ms
84 bytes from 172.20.77.3 icmp_seq=5 ttl=64 time=2.424 ms

```

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9 warnings 8:57 PM 4/12/2022

- PC2 ping đến PC1, PC3, PC4, PC5, PC6, PC7.
 - PC1: PC2 không thể ping đến PC1 do cấu hình ACL.

```

PC2> ping 172.168.41.100
*172.8.77.2 icmp_seq=1 ttl=254 time=131.957 ms (ICMP type:3, code:13, Communication administratively prohibited)
*172.8.77.2 icmp_seq=2 ttl=254 time=183.332 ms (ICMP type:3, code:13, Communication administratively prohibited)
*172.8.77.2 icmp_seq=3 ttl=254 time=191.612 ms (ICMP type:3, code:13, Communication administratively prohibited)
*172.8.77.2 icmp_seq=4 ttl=254 time=166.245 ms (ICMP type:3, code:13, Communication administratively prohibited)
*172.8.77.2 icmp_seq=5 ttl=254 time=129.206 ms (ICMP type:3, code:13, Communication administratively prohibited)

```

- PC3

```

PC2> ping 172.20.77.2
84 bytes from 172.20.77.2 icmp_seq=1 ttl=63 time=106.127 ms
84 bytes from 172.20.77.2 icmp_seq=2 ttl=63 time=195.566 ms
84 bytes from 172.20.77.2 icmp_seq=3 ttl=63 time=94.378 ms
84 bytes from 172.20.77.2 icmp_seq=4 ttl=63 time=183.669 ms
84 bytes from 172.20.77.2 icmp_seq=5 ttl=63 time=91.133 ms

PC2>

```

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- PC5: không ping đến được do đã cấu hình ACL ở Router 3

```

PC4> ping 172.30.77.2
*172.10.77.1 icmp_seq=1 ttl=255 time=45.972 ms (ICMP type:3, code:13, Communication administratively prohibited)
172.30.77.2 icmp_seq=2 timeout
*172.10.77.1 icmp_seq=3 ttl=255 time=58.272 ms (ICMP type:3, code:13, Communication administratively prohibited)
172.30.77.2 icmp_seq=4 timeout
*172.10.77.1 icmp_seq=5 ttl=255 time=102.655 ms (ICMP type:3, code:13, Communication administratively prohibited)

PC2>

```

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7. Sử dụng công cụ bắt gói tin/ dùng lệnh để kiểm tra và cho biết R1, R2, R3, router nào là DR, BDR, DROther. Chụp hình minh chứng và giải thích

```

*Mar 1 00:00:53.991: %OSPF-5-ADJCHG: Process 1, Nbr 172.8.77.2 on FastEthernet0/0 from LOADING to FULL, Loading Done
R1#show ip ospf neighbor

Neighbor ID      Pri  State            Dead Time   Address          Interface
172.8.77.2        1    FULL/BDR       00:00:38    172.8.77.2    FastEthernet0/0
172.30.77.1        1    INIT/DROTHER  00:00:35    172.8.77.3    FastEthernet0/0

R1#
*Mar 1 00:01:03.947: %OSPF-5-ADJCHG: Process 1, Nbr 172.30.77.1 on FastEthernet0/0 from LOADING to FULL, Loading Done
R1#
7.3

```

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```

R2#
R2#show ip ospf nei

Neighbor ID      Pri  State            Dead Time   Address          Interface
172.30.77.1        1    FULL/DROTHER  00:00:31    172.8.77.3    FastEthernet0/0
192.168.78.1        1    FULL/DR       00:00:30    172.8.77.1    FastEthernet0/0
R2#

```

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```

R3#show ip ospf nei
R3#show ip ospf neighbor

Neighbor ID      Pri  State            Dead Time   Address          Interface
172.8.77.2       1    FULL/BDR        00:00:31   172.8.77.2    FastEthernet0/0
192.168.78.1     1    FULL/DR         00:00:31   172.8.77.1    FastEthernet0/0
R3#

```

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9:34 PM
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Giải thích: Do không cấu hình priority nên các router sẽ dùng router id để bầu chọn DR. Vì các router không có cổng loopback nên giá trị router id là ip lớn nhất của interface trên router có ip theo thứ lần lượt là:

R1 là : 192.168.78.1

R2 là : 172.8.77.3

R3 là: 172.30.77.1

Do R1 có router-id cao nhất nên làm DR , tiếp theo là R3 nên R3 sẽ làm BDR , còn lại R2 sẽ làm DROTHER

Phân công công việc:

Họ tên.	Công việc.	Đánh giá.
Trần Nam Khánh - 19127441.	Báo cáo + Bài 2.	100%
Phạm Duy Tiến - 19127677.	Báo cáo + Bài 1.	100%

Tài liệu tham khảo:

<https://thegioimang.vn/dien-dan/threads/c%C3%A1c-c%C3%ADnh-nat-pat-tr%C3%AAn-thi%C3%BD-%C3%ACnh-nat-pat-tr%C3%AAn-outer-cisco.295/>

Tài liệu trong hướng dẫn thực hành.