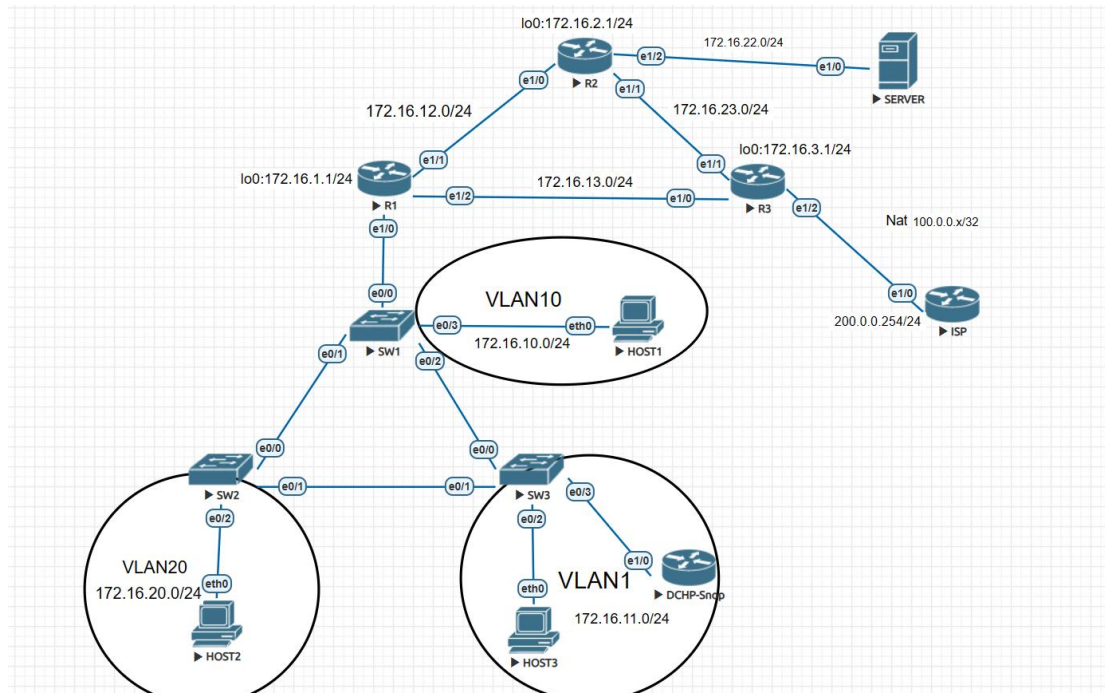


Triển khai mô hình mạng cơ bản

Mô hình



Nội dung mô phỏng

- Cấu hình các đường link đầu nối giữa các switch thành đường Trunking Dot1Q. Khai báo VLAN 10, 20 trên SW1 và các VLAN này tự động đồng bộ đến SW2, SW3.
- Cấu hình STP trên VLAN 10, 20. Đối với VLAN 10 thì cổng E0/0 của SW2 là Blocking Port còn VLAN 20 thì cổng E0/1 của SW3 là Blocking Port.
- Trên R1 thực hiện cấu hình định tuyến giữa các VLAN (Router on Stick).
- Cấu hình định tuyến OSPF trên Router R1, R2, R3 và đảm bảo các subnet thuộc dải IP 172.16.0.0/16 có thể đi đến với nhau. Đường đi giữa R1 và R3 qua mạng 172.16.13.0/24 là đường backup.
- Cấu hình DHCP của VLAN 20, VLAN 1 trên R2. Đảm bảo host của VLAN 1 nhận IP từ DHCP trên R2 chứ không phải từ DHCP giả mạo.
- ACL:
 - Cấm các ip thuộc VLAN 10 Telnet đến R2 nhưng cho phép các địa chỉ ip khác.

- R2 chỉ cho phép các user thuộc VLAN 20 truy cập web đến Server 172.16.22.2, cấm mọi lưu lượng khác. Và cho phép Server ping đến được host 1 nhưng ngược lại thì không.

- Các user thuộc VLAN 20, VLAN 1 có thể đi được đến Internet bằng IP đầu nối E1/2 của R3 và host của VLAN 10 truy cập Internet bằng địa chỉ IP public 100.0.0.x

Kết quả:

- **Kết quả cấu hình đường trunk và STP:**

SW1:

```
SuperPuTTY - SW1
File View Tools Help
R1 R2 R3 SW1 SW2 SW3 HOST1 HOST2 HOST3
n Ethernet0/0 (not full duplex), with R1 Ethernet1/0 (full duplex).
SW1#sh int trunk

Port      Mode      Encapsulation  Status      Native vlan
Et0/0     on        802.1q         trunking    1
Et0/1     on        802.1q         trunking    1
Et0/2     on        802.1q         trunking    1

Port      Vlans allowed on trunk
Et0/0     1-4094
Et0/1     1-4094
Et0/2     1-4094

Port      Vlans allowed and active in management domain
Et0/0     1,10,20
Et0/1     1,10,20
Et0/2     1,10,20

Port      Vlans in spanning tree forwarding state and not pruned
Et0/0     1,10,20
Et0/1     1,10,20
Et0/2     1,10,20
SW1#
```

SW2:

```
SuperPuTTY - SW2
File View Tools Help
R1 R2 R3 SW1 SW2 SW3 HOST1 HOST2 HOST3
SW2#sh int trunk ?
  module Limit display to interfaces on module
  |       Output modifiers
  <cr>

SW2#sh int trunk

Port      Mode      Encapsulation  Status      Native vlan
Et0/0     on        802.1q         trunking    1
Et0/1     on        802.1q         trunking    1

Port      Vlans allowed on trunk
Et0/0     1-4094
Et0/1     1-4094

Port      Vlans allowed and active in management domain
Et0/0     1,10,20
Et0/1     1,10,20

Port      Vlans in spanning tree forwarding state and not pruned
Et0/0     1,20
Et0/1     1,10,20
SW2#
```

```
SW2#sh spanning-tree vlan 10

VLAN0010
  Spanning tree enabled protocol rstp
  Root ID    Priority    24586
             Address     aabb.cc00.7000
             Cost        200
             Port        2 (Ethernet0/1)
             Hello Time   2 sec   Max Age 20 sec   Forward Delay 15 sec

  Bridge ID  Priority    32778 (priority 32768 sys-id-ext 10)
             Address     aabb.cc00.8000
             Hello Time   2 sec   Max Age 20 sec   Forward Delay 15 sec
             Aging Time   300 sec

Interface                Role Sts Cost      Prio.Nbr Type
-----
Et0/0                    Altn BLK 300      128.1   Shr
Et0/1                    Root FWD 100      128.2   Shr

SW2#
```

SW3:

```
SuperPuTTY - SW3
File View Tools Help
R1 R2 R3 SW1 SW2 SW3 HOST1 HOST2 HOST3
*May 5 18:29:22.618: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered on
n Ethernet0/3 (not full duplex), with DHCP-Snooping Ethernet1/0 (full dupl
ex) .
SW3>
SW3>en
SW3#sh int trunk

Port      Mode      Encapsulation  Status      Native vlan
Et0/0     on        802.1q         trunking    1
Et0/1     on        802.1q         trunking    1

Port      Vlans allowed on trunk
Et0/0     1-4094
Et0/1     1-4094

Port      Vlans allowed and active in management domain
Et0/0     1,10,20
Et0/1     1,10,20

Port      Vlans in spanning tree forwarding state and not pruned
Et0/0     1,10,20
Et0/1     10
SW3#
```

```
SW3#sh spanning-tree vlan 20
VLAN0020
  Spanning tree enabled protocol rstp
  Root ID    Priority    24596
             Address     aabb.cc00.8000
             Cost        200
             Port        1 (Ethernet0/0)
             Hello Time   2 sec   Max Age 20 sec   Forward Delay 15 sec

  Bridge ID  Priority    32788 (priority 32768 sys-id-ext 20)
             Address     aabb.cc00.9000
             Hello Time   2 sec   Max Age 20 sec   Forward Delay 15 sec
             Aging Time   300 sec

Interface    Role Sts Cost      Prio.Nbr Type
-----
Et0/0        Root FWD 100      128.1   Shr
Et0/1        Altn BLK 300      128.2   Shr
SW3#
```

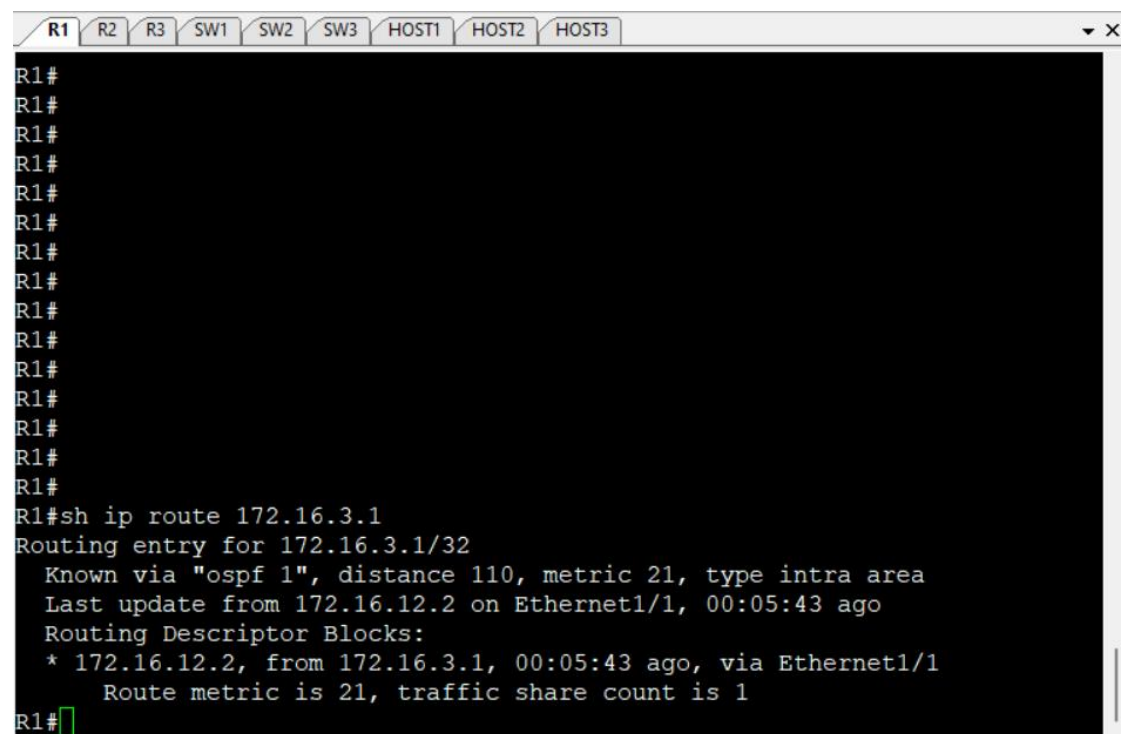
- Kết quả thực hiện Router on Stick trên R1:

```

R1>
R1>
R1>en
R1#sh ip int bri
Interface                IP-Address      OK? Method Status      Pr
otocol
FastEthernet0/0          unassigned      YES NVRAM   administratively down do
wn
Ethernet1/0              172.16.11.1     YES NVRAM   up          up
Ethernet1/0.10           172.16.10.1     YES NVRAM   up          up
Ethernet1/0.20           172.16.20.1     YES NVRAM   up          up
Ethernet1/1              172.16.12.1     YES NVRAM   up          up
Ethernet1/2              172.16.13.1     YES NVRAM   up          up
Ethernet1/3              unassigned      YES NVRAM   administratively down do
wn
Ethernet1/4              unassigned      YES NVRAM   administratively down do
wn
Ethernet1/5              unassigned      YES NVRAM   administratively down do

```

- Kết quả định tuyến Ospf, đường đi giữa R1 và R3 không đi qua đường Backup



```

R1#
R1#
R1#
R1#
R1#
R1#
R1#
R1#
R1#
R1#
R1#
R1#
R1#
R1#
R1#
R1#
R1#sh ip route 172.16.3.1
Routing entry for 172.16.3.1/32
  Known via "ospf 1", distance 110, metric 21, type intra area
  Last update from 172.16.12.2 on Ethernet1/1, 00:05:43 ago
  Routing Descriptor Blocks:
    * 172.16.12.2, from 172.16.3.1, 00:05:43 ago, via Ethernet1/1
      Route metric is 21, traffic share count is 1
R1#

```



```
R1 R2 R3 SW1 SW2 SW3 HOST1 HOST2 HOST3
R3#
R3#
R3#
R3#
R3#
R3#
R3#
R3#
R3#
R3#
R3#
R3#
R3#
R3#
R3#
R3#
R3#
R3#
R3#sh ip route 172.16.1.1
Routing entry for 172.16.1.1/32
  Known via "ospf 1", distance 110, metric 21, type intra area
  Last update from 172.16.23.2 on Ethernet1/1, 00:05:32 ago
  Routing Descriptor Blocks:
    * 172.16.23.2, from 172.16.1.1, 00:05:32 ago, via Ethernet1/1
      Route metric is 21, traffic share count is 1
R3#
```

● **Kết quả thực hiện DHCP VLAN 20 và VLAN 1:**

VLAN 20:

```
R1 R2 R3 SW1 SW2 SW3 HOST1 HOST2 HOST3
VPCS> dhcp -r
DORA IP 172.16.20.2/24 GW 172.16.20.1

VPCS> sh ip

NAME       : VPCS[1]
IP/MASK    : 172.16.20.2/24
GATEWAY    : 172.16.20.1
DNS        :
DHCP SERVER : 172.16.12.2
DHCP LEASE  : 86395, 86400/43200/75600
MAC        : 00:50:79:66:68:0b
LPORT      : 20000
RHOST:PORT : 127.0.0.1:30000
MTU        : 1500

VPCS> 
```

```
R2#sh ip dhcp
R2#sh ip dhcp bin
R2#sh ip dhcp binding
Bindings from all pools not associated with VRF:
IP address      Client-ID/      Lease expiration      Type
State           Interface
                Hardware address/
                User name
172.16.20.2     0100.5079.6668.0b  May 06 2024 06:35 PM  Automatic
Active          Unknown
R2#
```

VLAN 1:

R1R2R3SW1SW2SW3HOST1HOST2HOST3

```
VPCS> dhcp -r
DDORA IP 172.16.11.2/24 GW 172.16.11.1

VPCS> sh ip

NAME      : VPCS[1]
IP/MASK    : 172.16.11.2/24
GATEWAY    : 172.16.11.1
DNS        :
DHCP SERVER : 172.16.12.2
DHCP LEASE  : 86396, 86400/43200/75600
MAC        : 00:50:79:66:68:0c
LPORT      : 20000
RHOST:PORT  : 127.0.0.1:30000
MTU        : 1500

VPCS> █
```

```
R2#sh ip dhcp binding
Bindings from all pools not associated with VRF:
IP address      Client-ID/      Lease expiration      Type
State           Interface
Hardware address/
User name
172.16.11.2      0100.5079.6668.0c    May 06 2024 06:36 PM  Automatic
Active          Unknown
172.16.20.2      0100.5079.6668.0b    May 06 2024 06:35 PM  Automatic
Active          Unknown
R2#█
```

R1R2R3SW1SW2SW3HOST1HOST2HOST3DHCP-Snop

```
DHCP-Snooping#
DHCP-Snooping#sh ip dhcp binding
Bindings from all pools not associated with VRF:
IP address      Client-ID/      Lease expiration      Type
State           Interface
Hardware address/
User name
DHCP-Snooping#
DHCP-Snooping#
DHCP-Snooping#
DHCP-Snooping#
DHCP-Snooping#
DHCP-Snooping#
DHCP-Snooping#
```

```
R1 R2 R3 SW1 SW2 SW3 HOST1 HOST2 HOST3 DHCP-Snop
Agent Running : No
Delay Timer Expiry : Not Running
Abort Timer Expiry : Not Running

Last Succeeded Time : None
Last Failed Time : None
Last Failed Reason : No failure recorded.

Total Attempts      :      0   Startup Failures :      0
Successful Transfers :      0   Failed Transfers :      0
Successful Reads    :      0   Failed Reads   :      0
Successful Writes   :      0   Failed Writes  :      0
Media Failures      :      0

SW3#sh ip dhcp snooping st
SW3#sh ip dhcp snooping statistics
  Packets Forwarded                = 2
  Packets Dropped                  = 3
  Packets Dropped From untrusted ports = 3
SW3#sh ip dhcp snooping binding
MacAddress      IPAddress      Lease(sec)  Type           VLAN  Inter
rface
-----
00:50:79:66:68:0C  172.16.11.2    86199      dhcp-snooping   1     Eth
ernet0/2
Total number of bindings: 1
SW3#
```

● Kết quả cấu hình ACL:

```
R2#sh access-li
R2#sh access-lists
Standard IP access list 10
  10 deny 172.16.10.0, wildcard bits 0.0.0.255
  20 permit any
Extended IP access list 100
  10 permit tcp 172.16.20.0 0.0.0.255 host 172.16.22.2 eq www
  20 deny icmp host 172.16.10.2 host 172.16.22.2 echo
  30 permit icmp host 172.16.10.2 host 172.16.22.2
R2#
```

● Kết quả kết nối ISP:


```
R1 R2 R3 SW1 SW2 SW3 HOST1 HOST2 HOST3 DHCP-Snop
Welcome to Virtual PC Simulator, version 1.3 (0.8.1)
Dedicated to Daling.
Build time: May 7 2022 15:27:29
Copyright (c) 2007-2015, Paul Meng (mirnshi@gmail.com)
Copyright (c) 2021, Alain Degreffe (alain.degreffe@eve-ng.net)
All rights reserved.

VPCS is free software, distributed under the terms of the "BSD" licence.
Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freecode.com.cn.
Modified version for EVE-NG.

Press '?' to get help.

Executing the startup file

Checking for duplicate address...
VPCS : 172.16.10.2 255.255.255.0 gateway 172.16.10.1

VPCS> ping 8.8.8.8

84 bytes from 8.8.8.8 icmp_seq=1 ttl=252 time=122.431 ms
84 bytes from 8.8.8.8 icmp_seq=2 ttl=252 time=123.454 ms
84 bytes from 8.8.8.8 icmp_seq=3 ttl=252 time=107.380 ms
84 bytes from 8.8.8.8 icmp_seq=4 ttl=252 time=106.020 ms
84 bytes from 8.8.8.8 icmp_seq=5 ttl=252 time=107.800 ms

VPCS>

R3#sh ip nat trans
R3#sh ip nat translations
Pro Inside global      Inside local      Outside local      Outside globa
l
icmp 100.0.0.3:13781    172.16.10.2:13781 8.8.8.8:13781      8.8.8.8:13781
icmp 100.0.0.3:14037    172.16.10.2:14037 8.8.8.8:14037      8.8.8.8:14037
icmp 100.0.0.3:14549    172.16.10.2:14549 8.8.8.8:14549      8.8.8.8:14549
icmp 100.0.0.3:14805    172.16.10.2:14805 8.8.8.8:14805      8.8.8.8:14805
icmp 100.0.0.3:15061    172.16.10.2:15061 8.8.8.8:15061      8.8.8.8:15061
--- 100.0.0.3           172.16.10.2      ---                ---
R3#
```

```
R1 R2 R3 SW1 SW2 SW3 HOST1 HOST2 HOST3 DHCP-Snop
VPCS> dhcp -r
DORA IP 172.16.20.2/24 GW 172.16.20.1

VPCS> sh ip

NAME      : VPCS[1]
IP/MASK    : 172.16.20.2/24
GATEWAY    : 172.16.20.1
DNS        :
DHCP SERVER : 172.16.12.2
DHCP LEASE  : 86395, 86400/43200/75600
MAC        : 00:50:79:66:68:0b
LPORT      : 20000
RHOST:PORT  : 127.0.0.1:30000
MTU        : 1500

VPCS> ping 8.8.8.8

84 bytes from 8.8.8.8 icmp_seq=1 ttl=252 time=107.061 ms
84 bytes from 8.8.8.8 icmp_seq=2 ttl=252 time=108.783 ms
84 bytes from 8.8.8.8 icmp_seq=3 ttl=252 time=107.138 ms
84 bytes from 8.8.8.8 icmp_seq=4 ttl=252 time=111.340 ms
84 bytes from 8.8.8.8 icmp_seq=5 ttl=252 time=107.918 ms

VPCS> █

--- 100.0.0.3      172.16.10.2      ---      ---
R3#sh ip nat translations
Pro Inside global  Inside local      Outside local      Outside global
1
icmp 100.0.0.3:14805 172.16.10.2:14805 8.8.8.8:14805      8.8.8.8:14805
icmp 100.0.0.3:15061 172.16.10.2:15061 8.8.8.8:15061      8.8.8.8:15061
--- 100.0.0.3      172.16.10.2      ---      ---
icmp 200.0.0.3:1024 172.16.20.2:32725 8.8.8.8:32725      8.8.8.8:1024
icmp 200.0.0.3:1025 172.16.20.2:32981 8.8.8.8:32981      8.8.8.8:1025
icmp 200.0.0.3:1026 172.16.20.2:33237 8.8.8.8:33237      8.8.8.8:1026
icmp 200.0.0.3:1027 172.16.20.2:33493 8.8.8.8:33493      8.8.8.8:1027
icmp 200.0.0.3:1028 172.16.20.2:33749 8.8.8.8:33749      8.8.8.8:1028
R3#█
```

```
R1 R2 R3 SW1 SW2 SW3 HOST1 HOST2 HOST3 DHCP-Snop
VPCS> dhcp -r
DDORA IP 172.16.11.2/24 GW 172.16.11.1

VPCS> sh ip

NAME       : VPCS[1]
IP/MASK    : 172.16.11.2/24
GATEWAY    : 172.16.11.1
DNS        :
DHCP SERVER : 172.16.12.2
DHCP LEASE  : 86396, 86400/43200/75600
MAC         : 00:50:79:66:68:0c
LPORT      : 20000
RHOST:PORT  : 127.0.0.1:30000
MTU         : 1500

VPCS> ping 8.8.8.8

64 bytes from 8.8.8.8 icmp_seq=1 ttl=252 time=107.799 ms
64 bytes from 8.8.8.8 icmp_seq=2 ttl=252 time=108.298 ms
64 bytes from 8.8.8.8 icmp_seq=3 ttl=252 time=92.599 ms
64 bytes from 8.8.8.8 icmp_seq=4 ttl=252 time=106.561 ms
64 bytes from 8.8.8.8 icmp_seq=5 ttl=252 time=108.459 ms

VPCS> 
```

```
R3#sh ip nat translations
Pro Inside global      Inside local      Outside local      Outside global
--- 100.0.0.3          172.16.10.2      ---              ---
icmp 200.0.0.3:1029    172.16.11.2:45269 8.8.8.8:45269    8.8.8.8:1029
icmp 200.0.0.3:1030    172.16.11.2:45781 8.8.8.8:45781    8.8.8.8:1030
icmp 200.0.0.3:1031    172.16.11.2:46037 8.8.8.8:46037    8.8.8.8:1031
icmp 200.0.0.3:1032    172.16.11.2:46293 8.8.8.8:46293    8.8.8.8:1032
icmp 200.0.0.3:1033    172.16.11.2:46549 8.8.8.8:46549    8.8.8.8:1033
icmp 200.0.0.3:1024    172.16.20.2:32725 8.8.8.8:32725    8.8.8.8:1024
icmp 200.0.0.3:1025    172.16.20.2:32981 8.8.8.8:32981    8.8.8.8:1025
icmp 200.0.0.3:1026    172.16.20.2:33237 8.8.8.8:33237    8.8.8.8:1026
icmp 200.0.0.3:1027    172.16.20.2:33493 8.8.8.8:33493    8.8.8.8:1027
icmp 200.0.0.3:1028    172.16.20.2:33749 8.8.8.8:33749    8.8.8.8:1028
R3# 
```