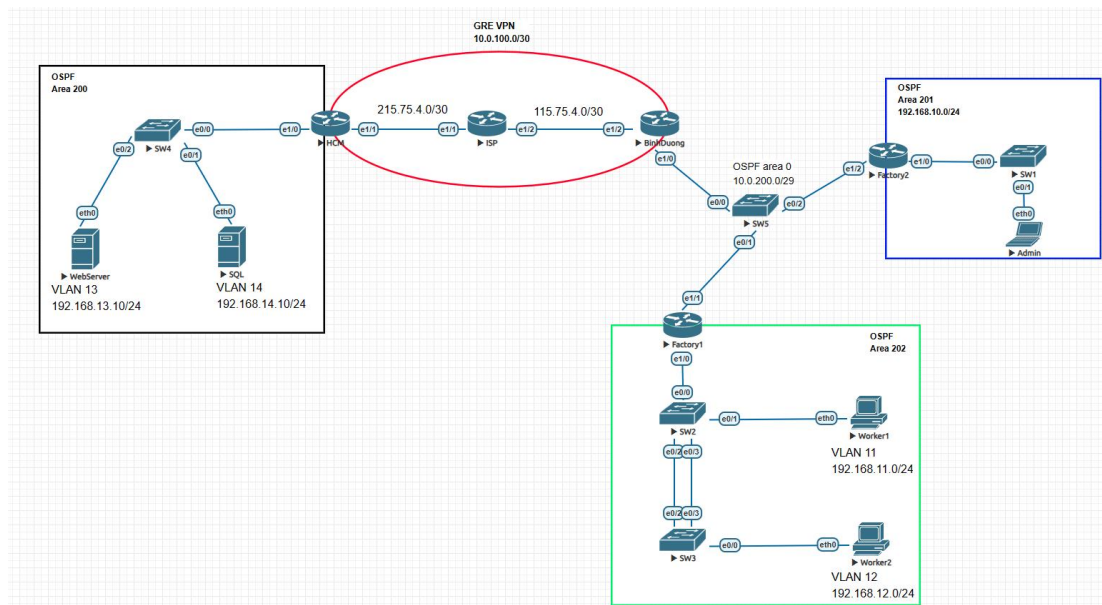


# Triển khai mô hình mạng kết nối 2 chi nhánh

## Mô hình:



## Yêu cầu:

- Cấu hình và chia VLAN cho các chi nhánh:
  - HCM: VLAN 13, VLAN 14
  - Binh Dương: VLAN 11, VLAN 12
- Thực hiện Etherchannel với protocol LACP trên SW2 VÀ SW3.
- Định tuyến đảm bảo các subnet có thể giao tiếp được với nhau.
- Router BinhDương đảm nhận nhiệm vụ làm DHCP server cấp ip cho các user thuộc VLAN 11, VLAN 12.
- Kết nối 2 chi nhánh với nhau qua ISP bằng GRE VPN.

## Kết quả:

### ● Cấu hình VLAN:

- Chi nhánh HCM:

```
HC... BinhDuong Factory2 Factory1 SW1 SW2 SW3 SW4 SW5 Worker2 Worker1 Admin SQL ▼ X
SW4>
SW4>
SW4>en
SW4#sh vlan bri
```

VLAN	Name	Status	Ports
1	default	active	Et0/3
13	VLAN0013	active	Et0/2
14	VLAN0014	active	Et0/1
1002	fddi-default	act/unsup	
1003	token-ring-default	act/unsup	
1004	fddinet-default	act/unsup	
1005	trnet-default	act/unsup	

- Chi nhánh Bình Dương:

```
HC... BinhDuong Factory2 Factory1 SW1 SW2 SW3 SW4 SW5 Worker2 Worker1 Admin SQL ▼ X
SW3#
SW3#
SW3#sh vlan bri
```

VLAN	Name	Status	Ports
1	default	active	Et0/1
11	VLAN0011	active	
12	VLAN0012	active	Et0/0
1002	fddi-default	act/unsup	
1003	token-ring-default	act/unsup	
1004	fddinet-default	act/unsup	
1005	trnet-default	act/unsup	

```
HC... BinhDuong Factory2 Factory1 SW1 SW2 SW3 SW4 SW5 Worker2 Worker1 Admin SQL X
SW3#
SW3#
SW3#
SW3#sh vtp status
VTP Version capable      : 1 to 3
VTP version running      : 1
VTP Domain Name          : vnpro
VTP Pruning Mode          : Disabled
VTP Traps Generation     : Disabled
Device ID                 : aabb.cc80.9000
Configuration last modified by 0.0.0.0 at 5-6-24 11:15:52

Feature VLAN:
-----
VTP Operating Mode        : Client
Maximum VLANs supported locally : 1005
Number of existing VLANs   : 7
Configuration Revision     : 2
MD5 digest                : 0x18 0x4A 0xB9 0x8F 0x93 0x7C 0x9E 0xB
0
                           0xAF 0x87 0xD7 0xA8 0xD5 0xF2 0x3C 0x7
D
SW3#
```

```
HC... BinhDuong Factory2 Factory1 SW1 SW2 SW3 SW4 SW5 Worker2 Worker1 Admin SQL X
SW2#sh vlan bri

VLAN Name                Status    Ports
-----
1    default              active
11   VLAN0011              active    Et0/1
12   VLAN0012              active
1002 fddi-default          act/unsup
1003 token-ring-default   act/unsup
1004 fddinet-default       act/unsup
1005 trnet-default         act/unsup
SW2#
```

```
HC... BinhDuong Factory2 Factory1 SW1 SW2 SW3 SW4 SW5 Worker2 Worker1 Admin SQL ▼ X
SW2#sh vtp sta
SW2#sh vtp status
VTP Version capable          : 1 to 3
VTP version running          : 1
VTP Domain Name              : vnpro
VTP Pruning Mode             : Disabled
VTP Traps Generation         : Disabled
Device ID                    : aabb.cc80.8000
Configuration last modified by 0.0.0.0 at 5-6-24 11:15:52
Local updater ID is 0.0.0.0 (no valid interface found)

Feature VLAN:
-----
VTP Operating Mode           : Server
Maximum VLANs supported locally : 1005
Number of existing VLANs     : 7
Configuration Revision       : 2
MD5 digest                   : 0x18 0x4A 0xB9 0x8F 0x93 0x7C 0x9E 0xB
0                             0xAF 0x87 0xD7 0xA8 0xD5 0xF2 0x3C 0x7
D
SW2#
```

## ● Etherchannel:

```
HC... BinhDuong Factory2 Factory1 SW1 SW2 SW3 SW4 SW5 Worker2 Worker1 Admin SQL ▼ X
SW2#sh etherch
SW2#sh etherchannel sum
SW2#sh etherchannel summary
Flags:  D - down          P - bundled in port-channel
        I - stand-alone  s - suspended
        H - Hot-standby (LACP only)
        R - Layer3       S - Layer2
        U - in use       N - not in use, no aggregation
        f - failed to allocate aggregator

        M - not in use, minimum links not met
        m - not in use, port not aggregated due to minimum links not met
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port

        A - formed by Auto LAG

Number of channel-groups in use: 1
Number of aggregators:          1

Group  Port-channel  Protocol    Ports
-----+-----+-----+-----
1      Po1 (SU)      LACP       Et0/2 (P)  Et0/3 (P)
```

```
HC... BinhDuong Factory2 Factory1 SW1 SW2 SW3 SW4 SW5 Worker2 Worker1 Admin SQL ▼ X
SW3#sh ethercha
SW3#sh etherchannel sum
SW3#sh etherchannel summary
Flags:  D - down          P - bundled in port-channel
        I - stand-alone  s - suspended
        H - Hot-standby (LACP only)
        R - Layer3       S - Layer2
        U - in use       N - not in use, no aggregation
        f - failed to allocate aggregator

        M - not in use, minimum links not met
        m - not in use, port not aggregated due to minimum links not met
        u - unsuitable for bundling
        w - waiting to be aggregated
        d - default port

        A - formed by Auto LAG

Number of channel-groups in use: 1
Number of aggregators:           1

Group  Port-channel  Protocol    Ports
-----+-----+-----+-----
1      Po1 (SU)      LACP        Et0/2 (P)  Et0/3 (P)

SW3#
```

- Định tuyến:



```
HCM BinhDuong Factory2 Factory1 SW1 SW2 SW3 SW4 SW5 Worker2 Worker1 Admin SQL X
HCM#sh 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
       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 r
oute
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is 215.75.4.2 to network 0.0.0.0

S*    0.0.0.0/0 [1/0] via 215.75.4.2
      10.0.0.0/8 is variably subnetted, 3 subnets, 3 masks
C      10.0.100.0/30 is directly connected, Tunnel0
L      10.0.100.1/32 is directly connected, Tunnel0
O      10.0.200.0/29 [110/1010] via 10.0.100.2, 00:39:46, Tunnel0
O IA   192.168.10.0/24 [110/1020] via 10.0.100.2, 00:39:46, Tunnel0
O IA   192.168.11.0/24 [110/1020] via 10.0.100.2, 00:39:46, Tunnel0
O IA   192.168.12.0/24 [110/1020] via 10.0.100.2, 00:39:46, Tunnel0
      192.168.13.0/24 is variably subnetted, 2 subnets, 2 masks
C      192.168.13.0/24 is directly connected, Ethernet1/0.13
L      192.168.13.1/32 is directly connected, Ethernet1/0.13
      192.168.14.0/24 is variably subnetted, 2 subnets, 2 masks
C      192.168.14.0/24 is directly connected, Ethernet1/0.14
L      192.168.14.1/32 is directly connected, Ethernet1/0.14
      215.75.4.0/24 is variably subnetted, 2 subnets, 2 masks
C      215.75.4.0/30 is directly connected, Ethernet1/1
L      215.75.4.1/32 is directly connected, Ethernet1/1
HCM#
```

```
HC... BinhDuong Factory2 Factory1 SW1 SW2 SW3 SW4 SW5 Worker2 Worker1 Admin SQL X
BinhDuong#sh 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
       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 r
oute
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is 115.75.4.2 to network 0.0.0.0

S*    0.0.0.0/0 [1/0] via 115.75.4.2
      10.0.0.0/8 is variably subnetted, 4 subnets, 3 masks
C      10.0.100.0/30 is directly connected, Tunnel0
L      10.0.100.2/32 is directly connected, Tunnel0
C      10.0.200.0/29 is directly connected, Ethernet1/0
L      10.0.200.3/32 is directly connected, Ethernet1/0
      115.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C      115.75.4.0/30 is directly connected, Ethernet1/2
L      115.75.4.1/32 is directly connected, Ethernet1/2
O IA   192.168.10.0/24 [110/20] via 10.0.200.1, 00:38:11, Ethernet1/0
O IA   192.168.11.0/24 [110/20] via 10.0.200.2, 00:38:11, Ethernet1/0
BinhDuong#
```

```
HC... BinhDuong Factory2 Factory1 SW1 SW2 SW3 SW4 SW5 Worker2 Worker1 Admin SQL ▼ x
Factory2>en
Factory2#sh 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
       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 r
oute
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is 10.0.200.3 to network 0.0.0.0

O*E2  0.0.0.0/0 [110/1] via 10.0.200.3, 00:37:44, Ethernet1/2
      10.0.0.0/8 is variably subnetted, 3 subnets, 3 masks
O      10.0.100.0/30 [110/1010] via 10.0.200.3, 00:38:29, Ethernet1/2
C      10.0.200.0/29 is directly connected, Ethernet1/2
L      10.0.200.1/32 is directly connected, Ethernet1/2
      192.168.10.0/24 is variably subnetted, 2 subnets, 2 masks
C      192.168.10.0/24 is directly connected, Ethernet1/0
L      192.168.10.1/32 is directly connected, Ethernet1/0
O IA  192.168.11.0/24 [110/20] via 10.0.200.2, 00:46:17, Ethernet1/2
O IA  192.168.12.0/24 [110/20] via 10.0.200.2, 00:46:17, Ethernet1/2
O IA  192.168.13.0/24 [110/1020] via 10.0.200.3, 00:38:29, Ethernet1/2
O IA  192.168.14.0/24 [110/1020] via 10.0.200.3, 00:38:29, Ethernet1/2
```



```
HC... BinhDuong Factory2 Factory1 SW1 SW2 SW3 SW4 SW5 Worker2 Worker1 Admin SQL ▼ X

Factory1#
*May 6 12:45:30.983: %CDP-4-DUPLEX_MISMATCH: duplex mismatch discovered o
n Ethernet1/0 (not half duplex), with SW2 Ethernet0/0 (half duplex).
Factory1#sh 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
       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 r
oute
       o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is 10.0.200.3 to network 0.0.0.0

O*E2 0.0.0.0/0 [110/1] via 10.0.200.3, 00:38:38, Ethernet1/1
      10.0.0.0/8 is variably subnetted, 3 subnets, 3 masks
O      10.0.100.0/30 [110/1010] via 10.0.200.3, 00:39:20, Ethernet1/1
C      10.0.200.0/29 is directly connected, Ethernet1/1
L      10.0.200.2/32 is directly connected, Ethernet1/1
O IA  192.168.10.0/24 [110/20] via 10.0.200.1, 00:47:23, Ethernet1/1
C      192.168.11.0/24 is variably subnetted, 2 subnets, 2 masks
C      192.168.11.0/24 is directly connected, Ethernet1/0.11
L      192.168.11.1/32 is directly connected, Ethernet1/0.11
C      192.168.12.0/24 is variably subnetted, 2 subnets, 2 masks
C      192.168.12.0/24 is directly connected, Ethernet1/0.12
L      192.168.12.1/32 is directly connected, Ethernet1/0.12
O IA  192.168.13.0/24 [110/1020] via 10.0.200.3, 00:39:20, Ethernet1/1
O IA  192.168.14.0/24 [110/1020] via 10.0.200.3, 00:39:20, Ethernet1/1
Factory1#
```

## ● DHCP:

```
HC... BinhDuong Factory2 Factory1 SW1 SW2 SW3 SW4 SW5 Worker2 Worker1 Admin SQL ▼ X

BinhDuong#
BinhDuong#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
192.168.11.11    0100.5079.6668.0c    May 07 2024 12:19 PM    Automatic
Active          Unknown
192.168.12.11    0100.5079.6668.0d    May 07 2024 12:18 PM    Automatic
Active          Unknown
BinhDuong#

!
ip dhcp excluded-address 192.168.11.1 192.168.11.10
ip dhcp excluded-address 192.168.12.1 192.168.12.10
!
```



```
HC... BinhDuong Factory2 Factory1 SW1 SW2 SW3 SW4 SW5 Worker2 Worker1 Admin SQL ▾ X
VPCS>
VPCS> sh ip

NAME       : VPCS[1]
IP/MASK    : 192.168.11.11/24
GATEWAY    : 192.168.11.1
DNS        : 192.168.13.10
DHCP SERVER : 10.0.200.3
DHCP LEASE  : 83986, 86400/43200/75600
MAC        : 00:50:79:66:68:0c
LPORT      : 20000
RHOST:PORT  : 127.0.0.1:30000
MTU        : 1500

VPCS>
```

```
HC... BinhDuong Factory2 Factory1 SW1 SW2 SW3 SW4 SW5 Worker2 Worker1 Admin SQL ▾ X
VPCS>
VPCS> sh ip

NAME       : VPCS[1]
IP/MASK    : 192.168.12.11/24
GATEWAY    : 192.168.12.1
DNS        : 192.168.13.10
DHCP SERVER : 10.0.200.3
DHCP LEASE  : 83934, 86400/43200/75600
MAC        : 00:50:79:66:68:0d
LPORT      : 20000
RHOST:PORT  : 127.0.0.1:30000
MTU        : 1500

VPCS>
```

## ● VPN:

```
HCM BinhDuong ▾ X
HCM#sh int tunnel 0
Tunnel0 is up, line protocol is up
  Hardware is Tunnel
  Internet address is 10.0.100.1/30
  MTU 17916 bytes, BW 100 Kbit/sec, DLY 50000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation TUNNEL, loopback not set
  Keepalive not set
  Tunnel source 215.75.4.1 (Ethernet1/1), destination 115.75.4.1
  Tunnel Subblocks:
    src-track:
      Tunnel0 source tracking subblock associated with Ethernet1/1
      Set of tunnels with source Ethernet1/1, 1 member (includes iterations), on interface <OK>
  Tunnel protocol/transport GRE/IP
```

```
HC... BinhDuong
BinhDuong#sh int tunnel 0
Tunnel0 is up, line protocol is up
  Hardware is Tunnel
  Internet address is 10.0.100.2/30
  MTU 17916 bytes, BW 100 Kbit/sec, DLY 50000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation TUNNEL, loopback not set
  Keepalive not set
  Tunnel source 115.75.4.1 (Ethernet1/2), destination 215.75.4.1
  Tunnel Subblocks:
    src-track:
      Tunnel0 source tracking subblock associated with Ethernet1/2
      Set of tunnels with source Ethernet1/2, 1 member (includes iterations), on interface <OK>
  Tunnel protocol/transport GRE/IP
```

```
HC... BinhDuong Factory2 Factory1 SW1 SW2 SW3 SW4 SW5 Worker2
VPCS>
VPCS> trace 192.168.14.10
trace to 192.168.14.10, 8 hops max, press Ctrl+C to stop
 1  192.168.12.1   10.450 ms  9.012 ms  9.218 ms
 2  10.0.200.3    30.203 ms  19.829 ms  19.996 ms
 3  10.0.100.1    61.101 ms  41.217 ms  42.139 ms
 4  *192.168.14.10 62.725 ms (ICMP type:3, code:3, De
```