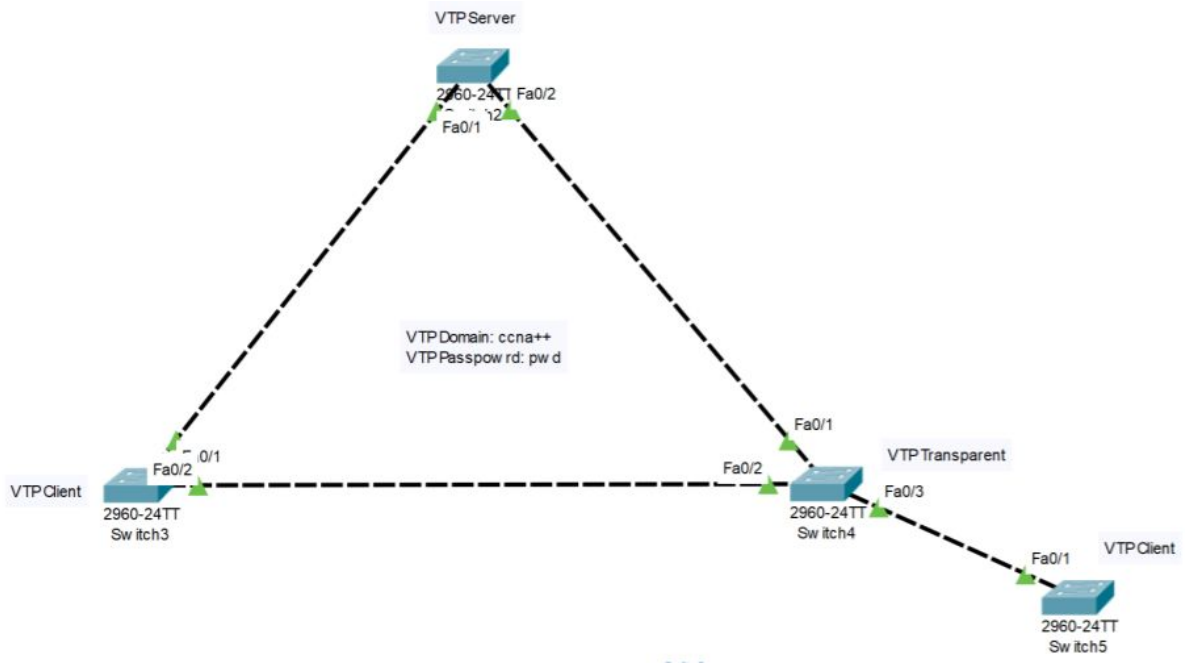
计算机网络工程

实验指导书

实验3：二层 L2 VTP



1. L2 VTP

目标：配置 VTPv2

实验过程

步骤1 – 创建 trunk port

SW1(config)#int range fa0/1-2

SW1(config-if-range)#sw mo tr

SW2(config)#int range fa0/1-2

SW2(config-if-range)#sw mo tr

SW3(config)#int range fa0/1-3

SW3(config-if-range)#sw mo tr

SW4(config)#int range fa0/1

SW4(config-if-range)#sw mo tr

步驟2 – 配置 VTP server

SW1(config)#vtp version 2

SW1(config)#vtp mode server

SW1(config)#vtp domain ccna++

SW1(config)#vtp password cisco

```
SW1(config)#do sh vtp status
VTP Version                     : 2
Configuration Revision          : 0
Maximum VLANs supported locally : 255
Number of existing VLANs        : 5
VTP Operating Mode              : Server
VTP Domain Name                 : ccna++
VTP Pruning Mode                : Disabled
VTP V2 Mode                     : Enabled
VTP Traps Generation            : Disabled
MD5 digest                      : 0xB5 0x82 0xFF 0x76 0x93 0x1B 0x09
0x96
Configuration last modified by 0.0.0.0 at 3-1-93 00:06:18
Local updater ID is 0.0.0.0 (no valid interface found)
SW1(config)#
```

步驟3 - 配置 VTP client

SW2(config)#vtp version 2

SW2(config)#vtp mode client

SW2(config)#vtp domain ccna++

SW2(config)#vtp password cisco

```
SW2(config)#do sh vtp status
VTP Version                     : 2
Configuration Revision          : 0
Maximum VLANs supported locally : 255
Number of existing VLANs        : 5
VTP Operating Mode              : Client
VTP Domain Name                 : ccna++
VTP Pruning Mode                : Disabled
VTP V2 Mode                     : Enabled
VTP Traps Generation            : Disabled
MD5 digest                      : 0xB5 0x82 0xFF 0x76 0x93 0x1B 0x09
0x96
Configuration last modified by 0.0.0.0 at 3-1-93 00:06:18
SW2(config)#
```

SW4(config)#vtp version 2

SW4(config)#vtp mode client

SW4(config)#vtp domain ccna++

SW4(config)#vtp password cisco

```
SW4(config)#do sh vtp status
VTP Version                     : 2
Configuration Revision          : 0
Maximum VLANs supported locally : 255
Number of existing VLANs        : 5
VTP Operating Mode              : Client
VTP Domain Name                 : ccna++
VTP Pruning Mode                : Disabled
VTP V2 Mode                     : Enabled
VTP Traps Generation            : Disabled
MD5 digest                      : 0x48 0x31 0x13 0xD6 0x8C 0x0D 0x71
0x14
Configuration last modified by 0.0.0.0 at 0-0-00 00:00:00
SW4(config)#
```

步骤4 - 配置 VTP transparent switch

SW3(config)#vtp version 2

SW3(config)#vtp mode transparent

```
SW3(config)#do sh vtp status
VTP Version                     : 2
Configuration Revision          : 0
Maximum VLANs supported locally : 255
Number of existing VLANs        : 5
VTP Operating Mode              : Transparent
VTP Domain Name                 : ccna++
VTP Pruning Mode                : Disabled
VTP V2 Mode                     : Enabled
VTP Traps Generation            : Disabled
MD5 digest                      : 0x74 0x2E 0x21 0x1F 0xE9 0x87 0x01
0x90
Configuration last modified by 0.0.0.0 at 0-0-00 00:00:00
SW3(config)#
```

步骤5 - 创建 VLANs

你只能在 VTP server 上创建VLAN，如果你尝试在 VTP client 上尝试创建VLAN，则会看到以下错误。

```
SW2(config)#vlan 2
VTP VLAN configuration not allowed when device is in CLIENT mode.
```

但是，你可以在 transparent switch 上创建VLAN

```
SW3(config)#vlan 2
SW3(config-vlan)#
```

现在，让我们在 VTPserver 上创建VLAN

```
SW1#sh vl bri

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/3, Fa0/4, Fa0/5, Fa0/6
                                                Fa0/7, Fa0/8, Fa0/9, Fa0/10
                                                Fa0/11, Fa0/12, Fa0/13, Fa0/14
                                                Fa0/15, Fa0/16, Fa0/17, Fa0/18
                                                Fa0/19, Fa0/20, Fa0/21, Fa0/22
                                                Fa0/23, Fa0/24, Gig0/1, Gig0/2
10   VLAN0010                         active
20   VLAN0020                         active
30   VLAN0030                         active
40   VLAN0040                         active
50   VLAN0050                         active
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
SW1#
```

VTP client 将与 VTP server 同步

```
SW2(config)#do sh vl bri

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/3, Fa0/4, Fa0/5, Fa0/6
                                                Fa0/7, Fa0/8, Fa0/9, Fa0/10
                                                Fa0/11, Fa0/12, Fa0/13, Fa0/14
                                                Fa0/15, Fa0/16, Fa0/17, Fa0/18
                                                Fa0/19, Fa0/20, Fa0/21, Fa0/22
                                                Fa0/23, Fa0/24, Gig0/1, Gig0/2
10   VLAN0010                         active
20   VLAN0020                         active
30   VLAN0030                         active
40   VLAN0040                         active
50   VLAN0050                         active
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
SW2(config)#
```

```
SW4(config)#do sh vl bri

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/2, Fa0/3, Fa0/4, Fa0/5
                                                Fa0/6, Fa0/7, Fa0/8, Fa0/9
                                                Fa0/10, Fa0/11, Fa0/12, Fa0/13
                                                Fa0/14, Fa0/15, Fa0/16, Fa0/17
                                                Fa0/18, Fa0/19, Fa0/20, Fa0/21
                                                Fa0/22, Fa0/23, Fa0/24, Gig0/1
                                                Gig0/2
10   VLAN0010                         active
20   VLAN0020                         active
30   VLAN0030                         active
40   VLAN0040                         active
50   VLAN0050                         active
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
SW4(config)#
```

transparent switch 上并无变化

```
SW3(config)#do sh vl bri

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/4, Fa0/5, Fa0/6, Fa0/7
                                                Fa0/8, Fa0/9, Fa0/10, Fa0/11
                                                Fa0/12, Fa0/13, Fa0/14, Fa0/15
                                                Fa0/16, Fa0/17, Fa0/18, Fa0/19
                                                Fa0/20, Fa0/21, Fa0/22, Fa0/23
                                                Fa0/24, Gig0/1, Gig0/2
2    VLAN0002                         active
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active
SW3(config)#
```

步骤6 - 验证 VTP server 的配置修订号 configuration revision number

当你修改VLAN后，VTP server 上的configuration revision number 会相应地增加

```
SW1#sh vtp status
VTP Version                     : 2
Configuration Revision          : 5
Maximum VLANs supported locally : 255
Number of existing VLANs        : 10
VTP Operating Mode              : Server
VTP Domain Name                 : ccna++
VTP Pruning Mode                : Disabled
VTP V2 Mode                     : Enabled
VTP Traps Generation            : Disabled
MD5 digest                      : 0x42 0x4D 0xF3 0xFB 0xC0 0xCD 0xB7 0x4D
Configuration last modified by 0.0.0.0 at 3-1-93 00:20:59
Local updater ID is 0.0.0.0 (no valid interface found)
SW1#
```

2. L2 Native VLAN

目标：

- 学习 Native Vlan 的行为
- 修改 Native Vlan使得PC_A (Vlan 10) 能够 ping 通 PC_B (Vlan 20)

实验过程

步骤1 - 在交换机上创建 VLAN 和 Access port

SW_A(config)#vlan 10

SW_A(config-vlan)#int fa0/1

SW_A(config-if)#sw mo ac

SW_A(config-if)#sw ac vl 10

SW_B(config)#vlan 20

SW_B(config-vlan)#int fa0/1

SW_B(config-if)#sw mo ac

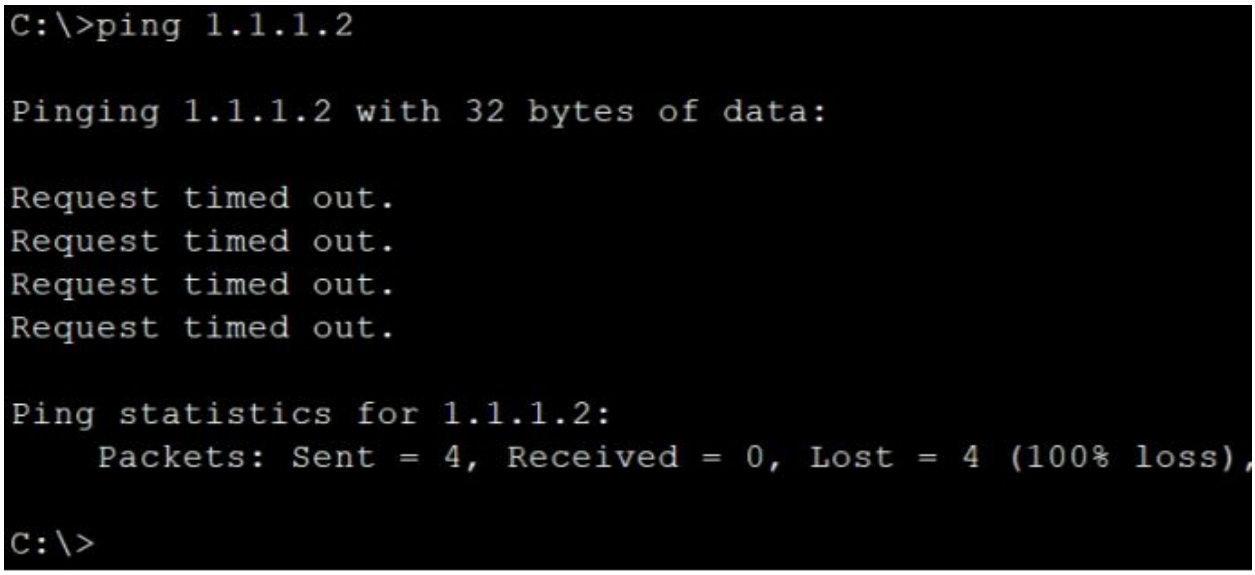
SW_B(config-if)#sw ac vl 20

步骤2 - 在交换机上配置 Trunk

SW_A(config-if)#sw mo tr

SW_B(config-if)#sw mo tr

使用PC_A ping PC_B 但失败了，因为 PC_A 和 PC_B 是在同一子网中但在不同VLAN里，ping 的数据包无法从 VLAN 10 去到 VLAN 20。



步骤3 - 在 Trunk port 上修改 Native VLAN

SW_A(config-if)#switchport trunk native vlan 10

SW_B(config-if)#switchport trunk native vlan 20

交换机将显示 VLAN 不匹配的消息：

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/2 (20), with SW_A FastEthernet0/2 (10).

PC_A 仍然无法 ping 通 PC_B，这是因为生成树协议在防止 Native VLAN 不匹配。

```
SW_A#sh spanning-tree vlan 10
VLAN0010
  Spanning tree enabled protocol ieee
  Root ID     Priority    32778
              Address     0001.6383.2401
              This bridge is the root
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID   Priority    32778  (priority 32768 sys-id-ext 10)
              Address     0001.6383.2401
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
              Aging Time  20

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Fa0/2            Desg BKN*19        128.2    P2p *PVID_Inc
Fa0/1            Desg FWD 19        128.1    P2p
```

Blocking

我们在两台交换机上禁用生成树协议（不要在现实生产环境中这样做）：

SW_A(config)#no spanning-tree vlan 10

SW_B(config)#no spanning-tree vlan 20

现在PC_A可以ping PC_B：

```
C:\>ping 1.1.1.2

Pinging 1.1.1.2 with 32 bytes of data:

Reply from 1.1.1.2: bytes=32 time<1ms TTL=128
Reply from 1.1.1.2: bytes=32 time<1ms TTL=128
Reply from 1.1.1.2: bytes=32 time<1ms TTL=128
Reply from 1.1.1.2: bytes=32 time<1ms TTL=128

Ping statistics for 1.1.1.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```