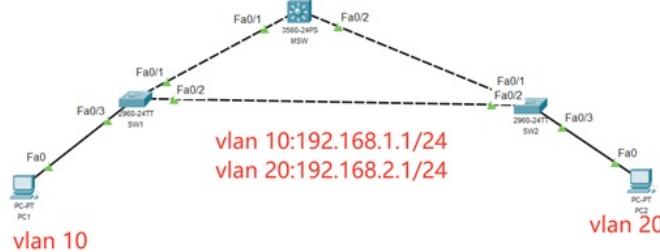




【MVS】思科交换机快速生成树典型组网配置案例

网络相关 韦家宁 2024-07-03 发表

组网及说明



本案例采用思科PT模拟器来模拟快速典型组网配置案例，其中MSW为主根，SW1为备根，断开SW2时，PC2也能正常互通。

配置步骤

- 1、按照网络拓扑图配置VLAN和IP地址。
- 2、启用MSW的快速生成树，优先级为4096.
- 3、启用SW1的快速生成树，优先级为8192
- 4、启用SW2的快速生成树，优先级为默认的32768
- 5、查看生成树的状态
- 6、关闭SW1的F0/1端口，并检查PC2的业务是否能恢复。

配置关键点

MSW:

```
Switch>ena
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hos MSW
MSW(config)#vlan 10
MSW(config-vlan)#exit
MSW(config)#vlan 20
MSW(config-vlan)#exit
MSW(config)#ip routing
MSW(config)#int vlan 10
MSW(config-if)#ip address 192.168.1.1 255.255.255.0
MSW(config-if)#no shutdown
MSW(config-if)#exit
MSW(config)#int vlan 20
MSW(config-if)#ip address 192.168.2.1 255.255.255.0
MSW(config-if)#no shutdown
MSW(config-if)#exit
MSW(config)#int range fastEthernet 0/1-2
MSW(config-if-range)#sw tr enc do
MSW(config-if-range)#sw mo tr
MSW(config-if-range)#sw tr all vlan 10,20
MSW(config-if-range)#exit
MSW(config)#spanning-tree mode rapid-pvst //配置生成树的模式为快速生成树
MSW(config)#spanning-tree vlan 10,20 priority 4096 //配置生成树的优先级为4096
```

SW1:

```
Switch>ena
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hos SW1
SW1(config)#vlan 10
```

```

SW1(config-vlan)#exit
SW1(config)#vlan 20
SW1(config-vlan)#exit
SW1(config)#int f 0/3
SW1(config-if)#sw mo acc
SW1(config-if)#sw acc vlan 10
SW1(config-if)#exit
SW1(config)#int range f 0/1-2
SW1(config-if-range)#sw mo tr
SW1(config-if-range)#sw tr all vlan 10,20
SW1(config-if-range)#exit
SW1(config)#spanning-tree mode rapid-pvst
SW1(config)#spanning-tree vlan 10,20 priority 8192

```

SW2:

```

Switch>ena
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hos SW2
SW2(config)#vlan 10
SW2(config-vlan)#exit
SW2(config)#vlan 20
SW2(config-vlan)#exit
SW2(config)#int f 0/3
SW2(config-if)#sw mo acc
SW2(config-if)#sw acc vlan 20
SW2(config-if)#exit
SW2(config)#int range f 0/1-2
SW2(config-if-range)#sw mo tr
SW2(config-if-range)#sw tr all vlan 10,20
SW2(config-if-range)#exit
SW2(config)#spanning-tree mode rapid-pvst

```

分别查看每台交换机生成树的状态显示信息：

在MSW、SW1、SW2分别使用show span summary命令查看生成树的状态

MSW为根桥，所有VLAN都是转发的，没有被生成树堵塞的。

MSW#sh spanning-tree summary					
Switch is in rapid-pvst mode					
Root bridge for: VLAN0010 VLAN0020					
Extended system ID is enabled					
Portfast Default is disabled					
PortFast BPDU Guard Default is disabled					
Portfast BPDU Filter Default is disabled					
Loopguard Default is disabled					
EtherChannel misconfig guard is disabled					
UplinkFast is disabled					
BackboneFast is disabled					
Configured Pathcost method used is short					
Name	Blocking	Listening	Learning	Forwarding	STP Active
VLAN0001	0	0	0	2	2
VLAN0010	0	0	0	2	2
VLAN0020	0	0	0	2	2
3 vlangs	0	0	0	6	6

在SW1中，VLAN20被生成树堵塞的。

SW1#sh spanning-tree summary					
Switch is in rapid-pvst mode					
Root bridge for: default					
Extended system ID is enabled					
Portfast Default is disabled					
PortFast BPDU Guard Default is disabled					
Portfast BPDU Filter Default is disabled					
Loopguard Default is disabled					
EtherChannel misconfig guard is disabled					
UplinkFast is disabled					
BackboneFast is disabled					
Configured Pathcost method used is short					
Name	Blocking	Listening	Learning	Forwarding	STP Active
VLAN0001	1	0	0	2	3
VLAN0010	0	0	0	3	3
VLAN0020	1	0	0	2	3
3 vlangs	2	0	0	7	9

SW2有VLAN10和VLAN20被生成树堵塞的。

```

SW2#sh spanning-tree summary
Switch is in rapid-pvst mode
Root bridge for:
Extended system ID           is enabled
Portfast Default              is disabled
PortFast BPDU Guard Default  is disabled
PortFast BPDU Filter Default is disabled
Loopguard Default             is disabled
EtherChannel misconfig guard is disabled
UplinkFast                   is disabled
BackboneFast                 is disabled
Configured Pathcost method used is short

Name          Blocking Listening Learning Forwarding STP Active
-----+-----+-----+-----+-----+-----+
VLAN0001      2          0          0          1          3
VLAN0010      2          0          0          1          3
VLAN0020      1          0          0          2          3
-----+-----+-----+-----+-----+
3 vlans       5          0          0          4          9

```

分别在MSW、SW1、SW2使用show span active查看生成树接口的状态：

其中MSW的所有接口状态都是转发的状态

```

MSW#show spanning-tree active
VLAN0001
Spanning tree enabled protocol rstp
Root ID  Priority 32769
          Address  0000.0C89.0931
          Cost    19
          Port    1(FastEthernet0/1)
          Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Bridge ID Priority 32769 (priority 32768 sys-id-ext 1)
          Address  0000.F2E1.98CD
          Cost    19
          Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
          Aging Time 30
Interface Role Sts Cost  Prio.Nbr Type
-----+-----+-----+-----+-----+
Fa0/2   Designated FWD 19    128.2  P2p
Fa0/1   Root     FWD 19    128.1  P2p
-----+-----+-----+-----+
VLAN0010
Spanning tree enabled protocol rstp
Root ID  Priority 4106
          Address  0000.F2E1.98CD
          This bridge is the root
          Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Bridge ID Priority 4106 (priority 4096 sys-id-ext 10)
          Address  0000.F2E1.98CD
          Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
          Aging Time 30
Interface Role Sts Cost  Prio.Nbr Type
-----+-----+-----+-----+-----+
Fa0/2   Designated FWD 19    128.2  P2p
Fa0/1   Root     FWD 19    128.1  P2p
-----+-----+
VLAN0015
Spanning tree enabled protocol rstp
Root ID  Priority 4106
          Address  0000.F2E1.98CD
          This bridge is the root
          Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Bridge ID Priority 4116 (priority 4096 sys-id-ext 20)
          Address  0000.F2E1.98CD
          Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
          Aging Time 30
Interface Role Sts Cost  Prio.Nbr Type
-----+-----+-----+-----+-----+
Fa0/2   Designated FWD 19    128.2  P2p
Fa0/1   Root     FWD 19    128.1  P2p
-----+-----+

```

SW1的所有接口状态都是转发的状态

```

SW1#show spanning-tree active
VLAN0001
Spanning tree enabled protocol rstp
Root ID  Priority 32769
          Address  0000.0C89.0931
          This bridge is the root
          Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Bridge ID Priority 32769 (priority 32768 sys-id-ext 1)
          Address  0000.0C89.0931
          Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
          Aging Time 30
Interface Role Sts Cost  Prio.Nbr Type
-----+-----+-----+-----+-----+
Fa0/0   Designated FWD 19    128.2  P2p
Fa0/1   Designated FWD 19    128.1  P2p
-----+-----+
VLAN0010
Spanning tree enabled protocol rstp
Root ID  Priority 4106
          Address  0000.F2E1.98CD
          Cost    19
          Port    1(FastEthernet0/1)
          Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Bridge ID Priority 8192 (priority 8192 sys-id-ext 10)
          Address  0000.0C89.0931
          Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
          Aging Time 30
Interface Role Sts Cost  Prio.Nbr Type
-----+-----+-----+-----+-----+
Fa0/0   Designated FWD 19    128.2  P2p
Fa0/2   Designated FWD 19    128.2  P2p
Fa0/1   Root     FWD 19    128.1  P2p
-----+-----+
VLAN0020
Spanning tree enabled protocol rstp
Root ID  Priority 4116
          Address  0000.F2E1.98CD
          Cost    19
          Port    1(FastEthernet0/1)
          Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Bridge ID Priority 8112 (priority 8192 sys-id-ext 20)
          Address  0000.0C89.0931
          Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
          Aging Time 30
Interface Role Sts Cost  Prio.Nbr Type
-----+-----+-----+-----+-----+
Fa0/2   Designated FWD 19    128.2  P2p
Fa0/1   Root     FWD 19    128.1  P2p
-----+-----+

```

SW2的Fa0/2接口已经被生成树给堵塞

```

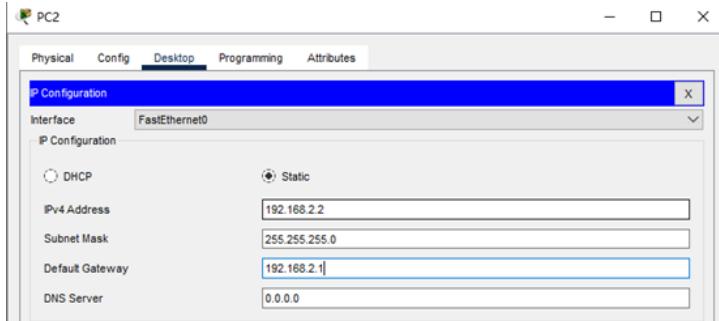
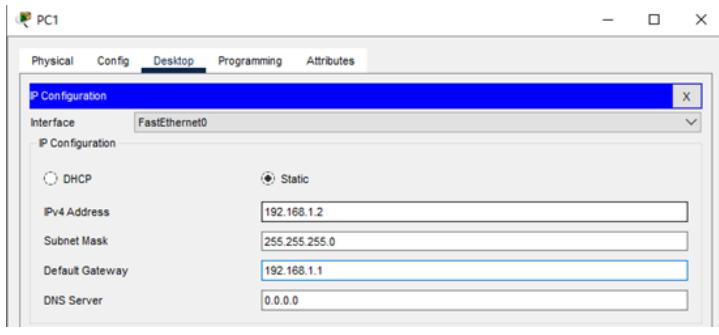
SW2#show spanning-tree active
VLAN0001
Spanning tree enabled protocol rstp
Root ID Priority 32768
    Address 0000.0C99.0931
    Cost 19
    Port 1/0/1 (FastEthernet0/1)
    Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Bridge ID Priority 32768 (priority 32768 sys-id-ext 1)
    Address 0000.BAAE.C1C1
    Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
    Aging Time 20
Interface Role Sta Cost Prio.Hnr Type
-----+
Fa0/1   Root FWD 19 19.1  P2p
Fa0/2   Root FWD 19 19.2  P2p
VLAN010
Spanning tree enabled protocol rstp
Root ID Priority 4104
    Address 0000.F2E1.96CD
    Cost 19
    Port 1/0/1 (FastEthernet0/1)
    Hello Time 3 sec Max Age 20 sec Forward Delay 15 sec
Bridge ID Priority 32778 (priority 32768 sys-id-ext 10)
    Address 0000.BAAE.C1C1
    Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
    Aging Time 20
Interface Role Sta Cost Prio.Hnr Type
-----+
Fa0/1   Root FWD 19 19.1  P2p
Fa0/2   Altn BLK 19 19.2  P2p
VLAN010
Spanning tree enabled protocol rstp
Root ID Priority 4114
    Address 0000.F2E1.96CD
    Cost 19
    Port 1/0/1 (FastEthernet0/1)
    Hello Time 3 sec Max Age 20 sec Forward Delay 15 sec
Bridge ID Priority 32768 (priority 32768 sys-id-ext 20)
    Address 0000.BAAE.C1C1
    Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
    Aging Time 20
Interface Role Sta Cost Prio.Hnr Type
-----+
Fa0/1   Root FWD 19 19.1  P2p
Fa0/2   Altn BLK 19 19.2  P2p
Fa0/3   Design FWD 19 19.3  P2p

```

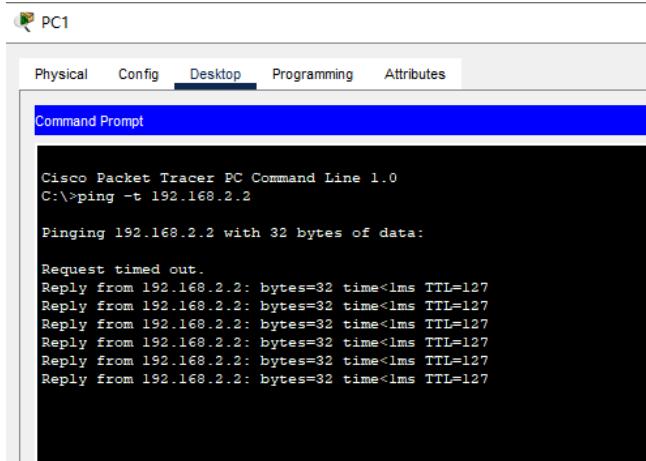
综上所述，快速生成树已经把环路给消除。

测试：

分别给PC填写IP地址。



在PC1能PING通PC2，同时开长PING



关闭SW2的F0/1端口，并观察业务情况，没有丢包。

同时查看SW2的接口生成树状态，发现F0/2端口已经切换为生成树根端口。

VLAN0001					
Spanning tree enabled protocol rstp					
Root ID	Priority	Address	Cost	Port	
	32768	0000.0C0E.0091	0	1	
	32768	0000.0C0E.0091	0	2	
	32768	0000.0C0E.0091	0	3	
	32768	0000.0C0E.0091	0	4	
Bridge ID	Priority	Address	Cost	Port	
	32768	(Priority 32768) sys-id-rev(1)	0	1	
	32768	(Priority 32768) sys-id-rev(1)	0	2	
	32768	(Priority 32768) sys-id-rev(1)	0	3	
	32768	(Priority 32768) sys-id-rev(1)	0	4	
Interfae	State	Role	Cost	Prio/Mac	Type
Feth/1	Forwarding	Root	20	128.1	Port
Feth/2	Forwarding	Root	20	128.1	Port
VLAN0010					
Spanning tree enabled protocol rstp					
Root ID	Priority	Address	Cost	Port	
	4116	0000.FE01.96CD	0	1	
	4116	0000.FE01.96CD	0	2	
	4116	0000.FE01.96CD	0	3	
	4116	0000.FE01.96CD	0	4	
Bridge ID	Priority	Address	Cost	Port	
	32778	(Priority 32778) sys-id-rev(10)	0	1	
	32778	(Priority 32778) sys-id-rev(10)	0	2	
	32778	(Priority 32778) sys-id-rev(10)	0	3	
	32778	(Priority 32778) sys-id-rev(10)	0	4	
Interfae	State	Role	Cost	Prio/Mac	Type
Feth/1	Forwarding	Root	20	128.1	Port
Feth/2	Forwarding	Root	20	128.1	Port
VLAN0020					
Spanning tree enabled protocol rstp					
Root ID	Priority	Address	Cost	Port	
	4116	0000.FE01.96CD	0	1	
	4116	0000.FE01.96CD	0	2	
	4116	0000.FE01.96CD	0	3	
	4116	0000.FE01.96CD	0	4	
Bridge ID	Priority	Address	Cost	Port	
	32789	(Priority 32789) sys-id-rev(20)	0	1	
	32789	(Priority 32789) sys-id-rev(20)	0	2	
	32789	(Priority 32789) sys-id-rev(20)	0	3	
	32789	(Priority 32789) sys-id-rev(20)	0	4	
Interfae	State	Role	Cost	Prio/Mac	Type
Feth/1	Forwarding	Root	20	128.1	Port
Feth/2	Forwarding	Root	20	128.1	Port
Feth/3	Forwarding	Root	20	128.1	Port

开启SW2的F0/1端口，并观察业务情况：

丢包1个即可恢复。

查看SW2的接口生成树状态，发现状态已经切换回来。

```

SW2#show spanning-tree active
VLAN0001
  Spanning tree enabled protocol rstp
  Root ID  Priority  32768
            Address  0000.0C99.0531
            Cost      19
            Port     1(FastEthernet0/2)
            Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
  Bridge ID Priority  32768 (priority 32768 sys-id-ext 1)
            Address  0000.BAA6.01C1
            Cost      19
            Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
            Aging Time 20
  Interface Role Sts Cost    Prio.Nbr Type
  ----- ---- --  -----
  Fa0/1   Altn BLK 19      128.1   P2p
  Fa0/2   Root FWD 19     128.2   P2p

VLAN0010
  Spanning tree enabled protocol rstp
  Root ID  Priority  4104
            Address  0030.F241.95CD
            Cost      19
            Port     1(FastEthernet0/1)
            Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
  Bridge ID Priority  32778 (priority 32768 sys-id-ext 10)
            Address  0000.BAA6.01C1
            Cost      19
            Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
            Aging Time 20
  Interface Role Sts Cost    Prio.Nbr Type
  ----- ---- --  -----
  Fa0/1   Root FWD 19     128.1   P2p
  Fa0/2   Altn BLK 19     128.2   P2p

VLAN0020
  Spanning tree enabled protocol rstp
  Root ID  Priority  4116
            Address  0030.F241.95CD
            Cost      19
            Port     1(FastEthernet0/1)
            Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
  Bridge ID Priority  32788 (priority 32768 sys-id-ext 20)
            Address  0000.BAA6.01C1
            Cost      19
            Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
            Aging Time 20
  Interface Role Sts Cost    Prio.Nbr Type
  ----- ---- --  -----
  Fa0/1   Root FWD 19     128.1   P2p
  Fa0/2   Altn BLK 19     128.2   P2p
  Fa0/3   Desg FWD 19     128.3   P2p

```

至此，思科交换机快速生成树典型组网配置案例已完成。