计算机网络实验报告

警示

1.实验报告如有雷同，雷同各方当次实验成绩均以 0 分计。
2.当次小组成员成绩只计学号、姓名登录在下表中的。
3.在规定时间内未上交实验报告的，不得以其他方式补交，当次成绩按 0 分计。
4.实验报告文件以 PDF 格式提交。

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【实验题目】生成树协议

【实验目的】理解快速生成树协议的配置及原理。使网络在有冗余链路的情况下避免环路的产生，避免广播风暴等。

【实验内容】

(1)完成实验教程实例 6-8 的实验，回答实验提出的问题及实验思考。(P204)

(2)抓取生成树协议数据包，分析桥协议数据单元（BPDU)。

(3)在实验设备上查看 VLAN 生成树，并学会查看其它相关重要信息。

【实验要求】

一些重要信息信息需给出截图。

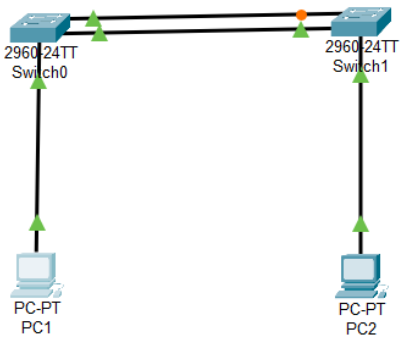
注意实验步骤的前后对比！

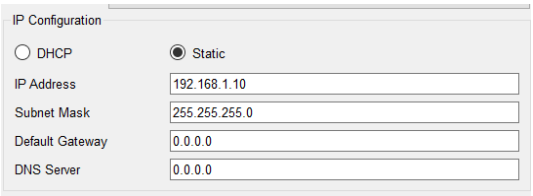
【实验记录】(如有实验拓扑请自行画出，要求自行画出拓扑图)

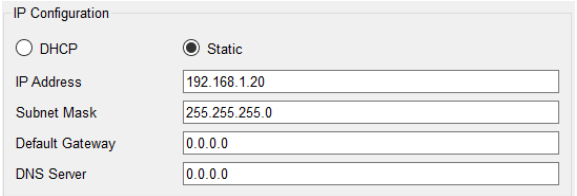
实验 6-8 快速生成树协议配置

实验步骤 1：

为 PC1、PC2 配置 IP 地址和掩码，并将设备连接起来：







上图中标记为橙色的端口处于 block 堵塞状态。(后续会将该堵塞打通(关闭生成树))

1. 查看两台交换机生成树的配置信息 show spanning-tree，并记录。

可以看到 packet tracer 自动帮我们配置了生成树

Switch0：

```
Switch#show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID     Priority    32769
              Address     0001.969C.A112
              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     0001.969C.A112
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15
sec
             Aging Time  20

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- --------
--------------------------------
Fa0/3            Desg FWD 19        128.3    P2p
Fa0/2            Desg FWD 19        128.2    P2p
Fa0/1            Desg FWD 19        128.1    P2p
```

Switch1：

```
Switch#show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID     Priority    32769
              Address     0001.969C.A112
              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     0030.F2BA.262E
             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
```

可以看到 packet tracer 中交换机已经默认启用了生成树，进行后续实验需要手动关闭生成树

使用 no sp vlan 1 关闭生成树，再次查看生成树表：

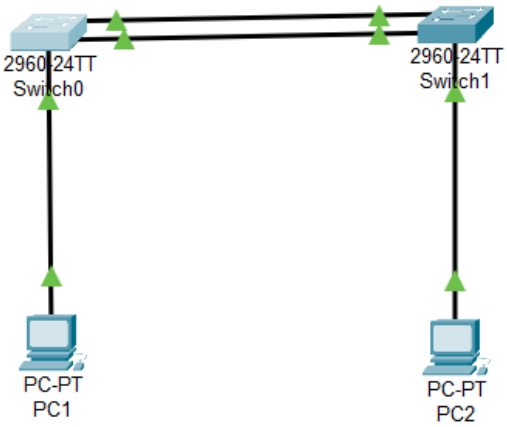
Switch0：

```
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#no sp vlan 1
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#show spanning-tree

No spanning tree instance exists.

Switch#
```

Switch1：

```
Switch#show spanning-tree

No spanning tree instance exists.
```

拓扑图变为：

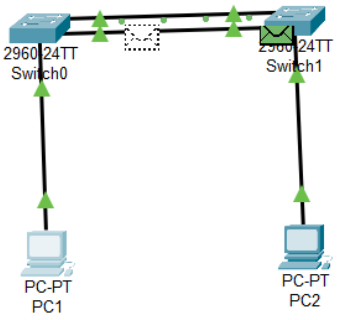


2. 除保持实验网卡连通外，切断其他网络链路，在没有主动通信的情况下，观察 1-2 分钟，会有广播风暴产生吗？

观察交换机与PC之间的连通绿点已经模拟模式的情况下,可以判断会产生广播风暴。

3. 观察下列两种情况，哪种情况下包增长得最快？

1. 用 PC1 ping PC2 （带参数-t）




```
Packet Tracer PC Command Line 1.0
C:\>ping -t 192.168.1.20

Pinging 192.168.1.20 with 32 bytes of data:
```

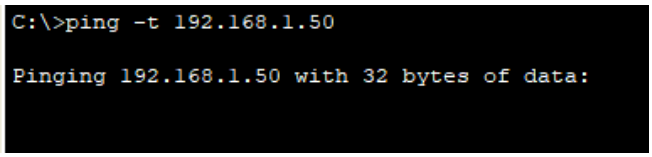
Simulation Panel

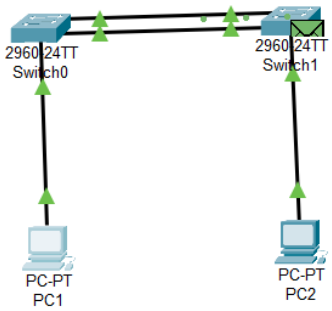
Event List

Vis.	Time(sec)	Last Device	At Device	Type
	0.033	--	Switch0	ARP
	0.034	--	Switch1	ARP
	0.034	Switch0	Switch1	ARP
	0.034	--	Switch0	ARP
	0.035	Switch1	PC2	ARP
	0.035	Switch0	Switch1	ARP
	0.036	PC2	Switch1	ARP
	0.036	Switch1	Switch0	ARP
	0.039	--	Switch1	ARP
	0.039	--	Switch0	ARP
	0.040	Switch1	PC2	ARP
	0.040	Switch0	Switch1	ARP
	0.041	PC2	Switch1	ARP
	0.041	Switch1	Switch0	ARP
	0.044	--	Switch1	ARP
	0.044	--	Switch0	ARP

形成了广播风暴，数据包只在两个交换机之间进行传播了。

2. 在 PC1 或 PC2 上 ping 一个非 PC1 与 PC2 的 IP（用参数-t）





Simulation Panel

Event List

Vis.	Time(sec)	Last Device	At Device	Type
	0.044	--	Switch1	ARP
	0.044	--	Switch1	ARP
	0.044	--	Switch0	ARP
	0.045	Switch1	PC2	ARP
	0.045	Switch1	Switch0	ARP
	0.045	Switch0	Switch1	ARP
	0.048	--	Switch1	ARP
	0.048	--	Switch0	ARP
	0.049	Switch1	Switch0	ARP
	0.049	Switch0	PC1	ARP
	0.050	--	Switch1	ARP
	0.050	--	Switch0	ARP
	0.051	Switch1	PC2	ARP
	0.051	Switch0	Switch1	ARP
	0.054	--	Switch1	ARP
	0.054	--	Switch0	ARP

同样出现了广播风暴。

判断交换机是否产生广播风暴以及有无导致计算机死锁，此时若终止 ping 命令，广播风暴仍存在吗？

交换机产生了广播风暴，有可能导致计算机死锁（或仿真软件无响应），此时终止 ping 命令，广播风暴仍然存在。

二者比较，PC1 ping PC2 包增长更快，因为此时网络中即有请求包也有回复包。

4. 在进行 3 的两种操作时，在交换机上不时查看 MAC 地址表 show mac-address-table，结果如何？这是什么现象？

MAC 地址中 1 号端口与 2 号端口不断切换，证明在回路中报文转发所使用的端口是在形成回路的端口中不断变化的。

```
Switch#show mac-address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----

   1    0001.9717.d849    DYNAMIC     Fa0/1
   1    000c.cf86.1abe    DYNAMIC     Fa0/2
   1    00e0.f710.e101    DYNAMIC     Fa0/1
   1    00e0.f710.e102    DYNAMIC     Fa0/2
Switch#show mac-address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----

   1    0001.9717.d849    DYNAMIC     Fa0/1
   1    000c.cf86.1abe    DYNAMIC     Fa0/2
   1    00e0.f710.e101    DYNAMIC     Fa0/1
   1    00e0.f710.e102    DYNAMIC     Fa0/2
Switch#show mac-address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----

   1    0001.9717.d849    DYNAMIC     Fa0/2
   1    000c.cf86.1abe    DYNAMIC     Fa0/2
   1    00e0.f710.e101    DYNAMIC     Fa0/1
   1    00e0.f710.e102    DYNAMIC     Fa0/2
```

拔下端口 2 的跳线，继续进行一下实验。

步骤 2：交换机 A 的基本配置

```
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname switchA
switchA(config)#vlan 10
switchA(config-vlan)#name sales
switchA(config-vlan)#exit
switchA(config)#interface fastethernet 0/3
switchA(config-if)#switchport access vlan 10
switchA(config-if)#exit
switchA(config)#interface range fastethernet 0/1-2
switchA(config-if-range)#switchport mode trunk
switchA(config-if-range)#
```

步骤 3：交换机 B 的基本配置

```
Switch(config)#hostname switchB
switchB(config)#vlan 10
switchB(config-vlan)#name sales
switchB(config-vlan)#exit
switchB(config)#interface fastethernet 0/3
switchB(config-if)#switchport access vlan 10
switchB(config-if)#exit
switchB(config)#interface range fastethernet 0/1-2
switchB(config-if-range)#switchport mode trunk
switchB(config-if-range)#
```

步骤 4：配置快速生成树协议

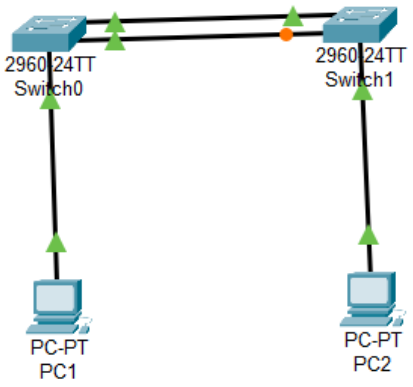
交换机 A:

```
switchA(config)#spanning-tree mode rapid-pvst
switchA(config)#
```

交换机 B:

```
switchB(config)#spanning-tree mode rapid-pvst
switchB(config)#
```

一条通路变成了堵塞状态：

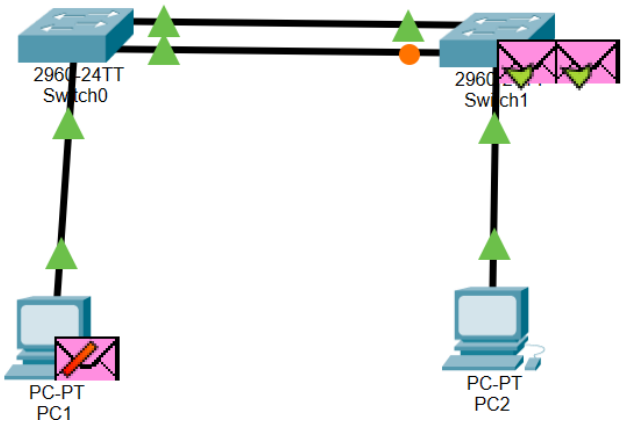


测试：将步骤 1 再做一遍，比较配置前后的实验效果，生成树协议起到什么作用？

```
C:\>ping -t 192.168.10.20

Pinging 192.168.10.20 with 32 bytes of data:

Reply from 192.168.10.20: bytes=32 time=12ms TTL=128
Reply from 192.168.10.20: bytes=32 time=6ms TTL=128
Reply from 192.168.10.20: bytes=32 time=6ms TTL=128
Reply from 192.168.10.20: bytes=32 time=6ms TTL=128
Reply from 192.168.10.20: bytes=32 time=6ms TTL=128
```

	0.006	--	PC1	ICMP
	0.007	PC1	Switch0	ICMP
	0.008	Switch0	Switch1	ICMP
	0.009	Switch1	PC2	ICMP
	0.010	PC2	Switch1	ICMP
	0.011	Switch1	Switch0	ICMP
	0.012	Switch0	PC1	ICMP
	1.016	--	PC1	ICMP
	1.017	PC1	Switch0	ICMP
	1.018	Switch0	Switch1	ICMP
	1.019	Switch1	PC2	ICMP

```
Packet Tracer PC Command Line 1.0
C:\>ping -t 192.168.10.50

Pinging 192.168.10.50 with 32 bytes of data:

Request timed out.
Request timed out.
```



	6.006	PC1	Switch0	ARP
	6.007	Switch0	Switch1	ARP
	6.007	Switch0	Switch1	ARP
	6.008	Switch1	PC2	ARP
	7.012	--	Switch0	STP
	7.013	Switch0	Switch1	STP
	7.013	Switch0	Switch1	STP
	7.013	Switch0	PC1	STP
	7.014	Switch1	PC2	STP

配置生成树之后没有产生广播风暴,生成树协议阻塞了交换机环路之间的一个端口，使得交换机之间不再短路，最后使得广播风暴消失。

步骤 5：验证测试。

在非根交换机上对于其两个端口进行检测，观察哪个端口属于丢弃状态，哪个端口属于转发状态。

交换机 A 配置：

```
Switch#show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID     Priority    32769
              Address     000A.41D6.3495
              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     0060.70C0.6851
              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

VLAN0010
  Spanning tree enabled protocol ieee
  Root ID     Priority    32778
              Address     0060.70C0.6851
              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     0060.70C0.6851
```

交换机 A 的 fa0/1 端口为 forwarding，fa0/2 为 discarding。

交换机 B 配置：

```
Switch#show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID     Priority    32769
              Address     000A.41D6.3495
              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     000A.41D6.3495
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
              Aging Time  20

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

VLAN0010
  Spanning tree enabled protocol ieee
  Root ID     Priority    32778
              Address     000A.41D6.3495
              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     000A.41D6.3495
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
```

交换机 B 的两个端口均为 forwarding。

步骤 6：设置交换机的优先级。

```
Switch(config)#spanning-tree vlan 1 priority 4096
Switch(config)#exit
```

步骤 7：验证交换机的优先级。

交换机 A 配置：

```
Switch#show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID     Priority    4097
              Address     0060.70C0.6851
              This bridge is the root
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID   Priority    4097  (priority 4096 sys-id-ext 1)
              Address     0060.70C0.6851
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
              Aging Time  20

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Fa0/1            Desg FWD 19        128.1    P2p
Fa0/2            Desg LRN 19        128.2    P2p

VLAN0010
  Spanning tree enabled protocol ieee
  Root ID     Priority    32778
              Address     0060.70C0.6851
              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     0060.70C0.6851
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
```

交换机 B 配置：

```
Switch#show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID     Priority    4097
              Address     0060.70C0.6851
              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     000A.41D6.3495
              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

VLAN0010
  Spanning tree enabled protocol ieee
  Root ID     Priority    32778
              Address     000A.41D6.3495
              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     000A.41D6.3495
```

步骤 8：验证交换机 B 的两个端口的状态。

```
Switch#show spanning-tree interface fa0/1
Vlan             Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
VLAN0001         Root FWD 19        128.1     P2p
VLAN0010         19        128.1     P2p
```

端口 fa0/1 属于根端口，用于转发。

```
Switch#show spanning-tree interface fa0/2
Vlan             Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
VLAN0001         Altn BLK 19        128.2     P2p
VLAN0010         19        128.2     P2p
```

端口 fa0/2 被阻塞，为了防止回路产生。

步骤 9：实验分析。

	交换机 A	交换机 B
Priority	4096	32768
BridgeAddr	0060.70c0.6851	0060.70c0.6851
DesignatedRoot	128.1	128.1
RootCost	19	0
RootPort	None	Fa0/1
Designed	Fa0/1	Fa0/1

```
Switch#show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID     Priority    4097
              Address     0060.70C0.6851
              This bridge is the root
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID   Priority    4097  (priority 4096 sys-id-ext 1)
              Address     0060.70C0.6851
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
              Aging Time  20

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Fa0/1            Desg FWD 19        128.1    P2p
Fa0/2            Desg LRN 19        128.2    P2p

VLAN0010
  Spanning tree enabled protocol ieee
  Root ID     Priority    32778
              Address     0060.70C0.6851
              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     0060.70C0.6851
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

Switch#show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID     Priority    4097
              Address     0060.70C0.6851
              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     000A.41D6.3495
              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

VLAN0010
  Spanning tree enabled protocol ieee
  Root ID     Priority    32778
              Address     000A.41D6.3495
              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     000A.41D6.3495
```

断开 0/1 链路后：

端口 2 状态：从 discarding 变成 forwarding，转换时间约为 2s

```
Switch#show spanning-tree interface fa0/2
Vlan             Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
VLAN0001         Root FWD 19        128.2    P2p
VLAN0010         19        128.2     P2p
```

生成树状态：

```
Switch#show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID     Priority    4097
              Address     0060.70C0.6851
              Cost        19
              Port        2(FastEthernet0/2)
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID   Priority    32769  (priority 32768 sys-id-ext 1)
              Address     000A.41D6.3495
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
              Aging Time  20

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Fa0/2            Root FWD 19        128.2    P2p

VLAN0010
  Spanning tree enabled protocol ieee
  Root ID     Priority    32778
              Address     000A.41D6.3495
              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     000A.41D6.3495

Switch#show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID     Priority    4097
              Address     0060.70C0.6851
              This bridge is the root
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID   Priority    4097  (priority 4096 sys-id-ext 1)
              Address     0060.70C0.6851
              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 FWD 19        128.2    P2p

VLAN0010
  Spanning tree enabled protocol ieee
  Root ID     Priority    32778
              Address     0060.70C0.6851
              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     0060.70C0.6851
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
```

	交换机 A	交换机 B
Priority	4096	32768
BridgeAddr	000a.41d6.3495	0060.70c0.6851
DesignatedRoot	128.2	128.2
RootCost	19	0
RootPort	None	Fa0/2
Designed	Fa0/2	Fa0/2

当 0/1 链路 down 掉时，记录丢包状态：

丢包状态：

```
C:\>ping -t 192.168.10.20

Pinging 192.168.10.20 with 32 bytes of data:

Reply from 192.168.10.20: bytes=32 time<1ms TTL=128
Reply from 192.168.10.20: bytes=32 time<1ms TTL=128
Reply from 192.168.10.20: bytes=32 time<1ms TTL=128
Reply from 192.168.10.20: bytes=32 time<1ms TTL=128
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Request timed out.
Reply from 192.168.10.20: bytes=32 time<1ms TTL=128
Reply from 192.168.10.20: bytes=32 time=1ms TTL=128
Reply from 192.168.10.20: bytes=32 time=1ms TTL=128
Reply from 192.168.10.20: bytes=32 time<1ms TTL=128
Reply from 192.168.10.20: bytes=32 time<1ms TTL=128
Reply from 192.168.10.20: bytes=32 time<1ms TTL=128
Reply from 192.168.10.20: bytes=32 time<1ms TTL=128
Reply from 192.168.10.20: bytes=32 time=1ms TTL=128
Reply from 192.168.10.20: bytes=32 time<1ms TTL=128
Reply from 192.168.10.20: bytes=32 time<1ms TTL=128
Reply from 192.168.10.20: bytes=32 time<1ms TTL=128
Reply from 192.168.10.20: bytes=32 time<1ms TTL=128
Reply from 192.168.10.20: bytes=32 time<1ms TTL=128
Reply from 192.168.10.20: bytes=32 time=1ms TTL=128
Reply from 192.168.10.20: bytes=32 time<1ms TTL=128
Reply from 192.168.10.20: bytes=32 time<1ms TTL=128
Reply from 192.168.10.20: bytes=32 time<1ms TTL=128
```

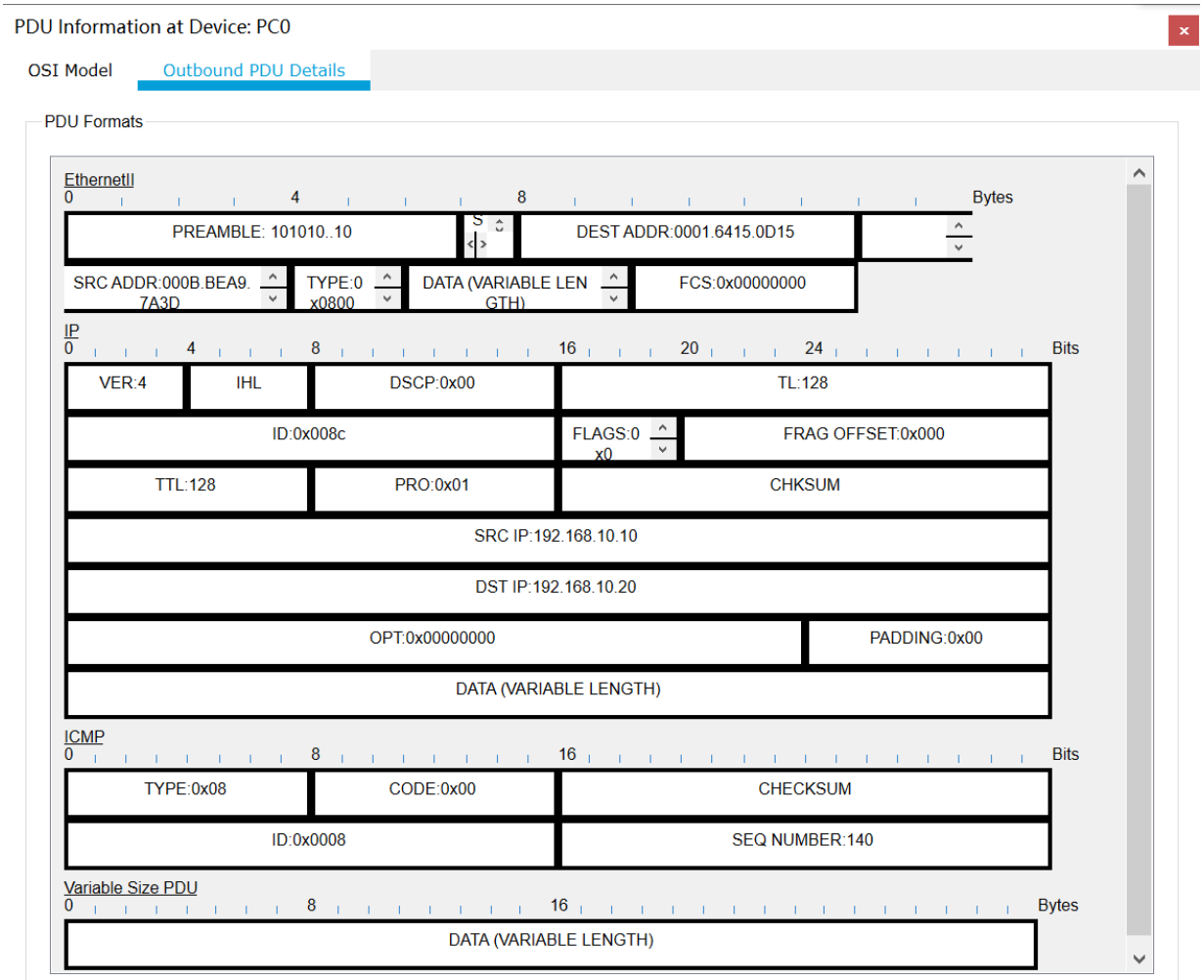
生成树状态：

```
Switch#show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID     Priority    4097
              Address     0060.70C0.6851
              This bridge is the root
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID   Priority    4097  (priority 4096 sys-id-ext 1)
              Address     0060.70C0.6851
              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 FWD 19        128.2    P2p
Fa0/3            Desg FWD 19        128.3    P2p


Switch#show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID     Priority    4097
              Address     0060.70C0.6851
              Cost        19
              Port        2(FastEthernet0/2)
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID   Priority    32769  (priority 32768 sys-id-ext 1)
              Address     000A.41D6.3495
              Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
              Aging Time  20

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Fa0/3            Desg FWD 19        128.3    P2p
Fa0/2            Root FWD 19        128.2    P2p
```

	交换机 A	交换机 B
Priority	4096	4096
BridgeAddr	000a.41d6.3495	0060.70c0.6851
DesignatedRoot	128.2	128.2
RootCost	19	0
RootPort	None	None
Designed	Fa0/2	Fa0/2

拔线后，短暂的时间内出现丢包状况，但是在生成树重构后则能够继续连接，并且再无产生丢包现象，根端口变成 fa0/2。

BPDU 包的抓取：



实验思考：

1：实验中存在环路，交换机 A 与交换机 B 之间连接了两条线，可以构成环路；交换机通过生成树协议 STP，使得其中的部分端口处于转发状态，而部分端口属于阻塞状态，这样避免环路。

2：会出现问题。冗余链路导致了广播风暴的发生，MAC 地址的不稳定以及多帧复制的问题。

4：不会产生，交换机在连接两条链路的情况下默认会进行生成树的配置，从而避免环路的产生。

计算机网络实验报告

学号	学生	自评分
郑卓民	18342138	100
南樟	18342077	100

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上传实验报告：ftp://222.200.180.109/　　截止日期（不迟于）：1 周之内

上传包括两个文件：

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（2）小组成员实验体会。每个同学单独交一份只填写了实验体会的实验报告。只需填写自己的学号和姓名。

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