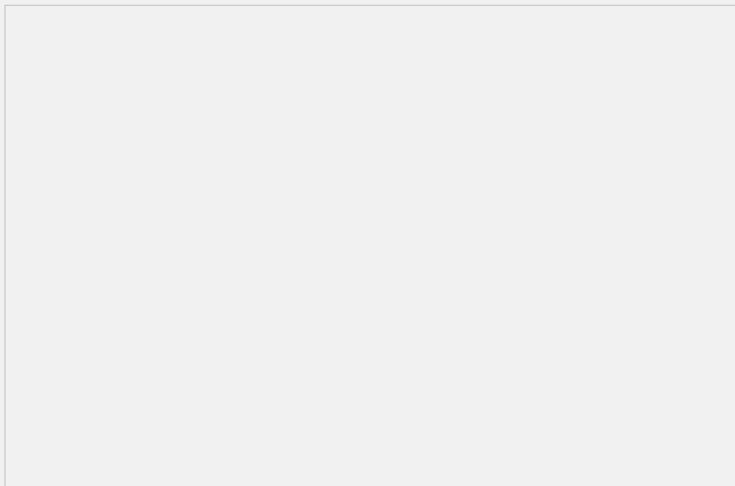


## S8500交换机 STP技术说明

### 一、简单介绍

通过在交换机之间传递一种特殊的协议报文——BPDU（在IEEE 802.1D中这种协议报文被称为“配置消息”）来确定网络的拓扑结构。配置消息中包含了足够的信息来保证交换机完成生成树计算。（注：此BPDU被称为配置BPDU，另外STP还有TCN BPDU。）



#### BPDU的报文格式

注意看BPDU数据报文的最后8个字段，分别是：

- 根桥ID：由树根的优先级（0-65535，默认32768）和MAC地址组合而成；
- 到树根的最短路径开销（实际由PortPathCost叠加而成），有两个标准——dot1d-1998，默认值为100和dot1t，默认值为200000；
- 指定桥的ID：由指定交换机的优先级和MAC地址组合而成；
- 指定端口的ID：由指定端口的优先级（0-256，默认128）和端口编号组成；
- 配置消息的生存期：MessageAge；
- 配置消息的最大生存期：MaxAge；
- 配置消息发送的周期：HelloTime；
- 端口状态迁移的延时：ForwardDelay。

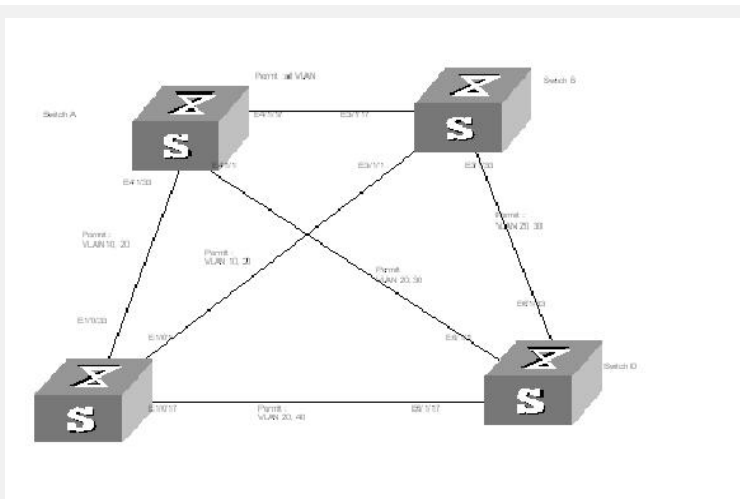
启动了STP的交换机互相之间通过发送配置BPDU来完成根桥，指定桥的选举，各端口状态的选择和整个网络拓扑结构的确定。比较的关键部分在于这八个字段中的前四个字段，即：根桥ID、路径开销、指定桥ID和指定端口的ID。其实还有一个接收端口的ID，用于本地比较（当交换机的2个端口都收到相同的BPDU时——比如上连一个stp disabled的交换机或hub）。比较的原则：从上到下、从左到右数值小者优先。STP协议使用的所有BPDU都是组播报文，目的MAC是01-80-c2-00-00-00。

### 二、S8500设备配置实例

#### 1. 组网需求

使用MSTP使组网图中不同VLAN的报文按照不同的生成树转发。具体配置为：网络中所有交换机属于同一个MST域，VLAN 10的报文沿着实例1转发，VLAN 30沿着实例3转发，VLAN 40沿着实例4转发，VLAN 20沿着实例0转发。组网图中，Switch A和Switch B为汇聚层设备，Switch C和Switch D为接入层设备。VLAN 10、VLAN 30在汇聚层设备终结，VLAN 40在接入层设备终结，因此可以配置实例1和实例3的树根分别为Switch A和Switch B，实例4的树根为Switch C。

#### 2. 组网图



MSTP典型组网图

### 3. 配置步骤:

#### 配置Switch A

# MST域

```
<Quidway> system-view
```

```
[Quidway] stp region-configuration
```

```
[Quidway-mst-region] region-name example
```

```
[Quidway-mst-region] instance 1 vlan 10
```

```
[Quidway-mst-region] instance 3 vlan 30
```

```
[Quidway-mst-region] instance 4 vlan 40
```

```
[Quidway-mst-region] revision-level 0
```

# 手工激活MST域的配置。

```
[Quidway-mst-region] active region-configuration
```

# 定义Switch A为实例1的树根

```
[Quidway] stp instance 1 root primary
```

#### 配置Switch B

# MST域

```
[Quidway] stp region-configuration
```

```
[Quidway-mst-region] region-name example
```

```
[Quidway-mst-region] instance 1 vlan 10
```

```
[Quidway-mst-region] instance 3 vlan 30
```

```
[Quidway-mst-region] instance 4 vlan 40
```

```
[Quidway-mst-region] revision-level 0
```

# 手工激活MST域的配置。

```
[Quidway-mst-region] active region-configuration
```

# 定义Switch B为实例3的树根

```
[Quidway] stp instance 3 root primary
```

#### 配置Switch C

# MST域

```
[Quidway] stp region-configuration
```

```
[Quidway-mst-region] region-name example
```

```
[Quidway-mst-region] instance 1 vlan 10
```

```
[Quidway-mst-region] instance 3 vlan 30
```

```
[Quidway-mst-region] instance 4 vlan 40
```

```
[Quidway-mst-region] revision-level 0
```

# 手工激活MST域的配置。

```
[Quidway-mst-region] active region-configuration
```

# 定义Switch C为实例4的树根

```
[Quidway] stp instance 4 root primary
```

#### 配置Switch D

# MST域

```
[Quidway] stp region-configuration
```

```
[Quidway-mst-region] region-name example
```

```
[Quidway-mst-region] instance 1 vlan 10
```

```
[Quidway-mst-region] instance 3 vlan 30
```

```
[Quidway-mst-region] instance 4 vlan 40
```

```
[Quidway-mst-region] revision-level 0
```

# 手工激活MST域的配置。

[Quidway-mst-region] active region-configuration

### 三、正确配置状态显示

#### [SA]dis stp brief

MSTID	Port	Role	STP State	Protection
0	Ethernet4/1/1	DESI	FORWARDING	NONE
0	Ethernet4/1/17	ROOT	FORWARDING	NONE
0	Ethernet4/1/33	ALTE	DISCARDING	NONE

#### [SA]dis stp instance 1

-----[MSTI 1 Global Info]-----

MSTI Bridge ID :0.00e0-fc36-45b1  
MSTI RegRoot/IRPC :0.00e0-fc36-45b1 / 0  
MSTI RootPortId :0.0  
MSTI Root Type :PRIMARY root  
Master Bridge :32768.00e0-fc00-0001  
Cost to Master :200  
TC received :0

#### [SA] dis stp int e4/1/1

----[CIST][Port209(Ethernet4/1/1)][FORWARDING]----

Port Protocol :enabled  
Port Role :CIST Designated Port  
Port Priority :128  
Port Cost(Legacy) :COnfig=auto / Active=200  
Desg. Bridge/Port :32768.00e0-fc36-45b1 / 128.209  
Port Edged(Admin) :disabled  
Point-to-point :COnfig=auto / Active=true  
Transmission Limit :3 packets/hello-time  
Protection Type :None  
Port Config  
Digest Snooping :disabled  
Num of Vlans Mapped :1  
PortTimes :Hello 2s MaxAge 20s FwDly 15s RemHop 0  
BPDU Sent :6445  
TCN: 0, Config: 0, RST: 0, MST: 6445  
BPDU Received :2  
TCN: 0, Config: 0, RST: 0, MST: 2

#### [SA]dis stp int e4/1/17

----[CIST][Port225(Ethernet4/1/17)][FORWARDING]----

Port Protocol :enabled  
Port Role :CIST Root Port  
Port Priority :128  
Port Cost(Legacy) :COnfig=auto / Active=200  
Desg. Bridge/Port :32768.00e0-fc00-0001 / 128.173  
Port Edged(Admin) :disabled  
Point-to-point :COnfig=auto / Active=true  
Transmission Limit :3 packets/hello-time  
Protection Type :None  
Port Config  
Digest Snooping :disabled  
Num of Vlans Mapped :1  
PortTimes :Hello 2s MaxAge 20s FwDly 15s RemHop 0  
BPDU Sent :8  
TCN: 0, Config: 0, RST: 0, MST: 8  
BPDU Received :9334  
TCN: 0, Config: 0, RST: 0, MST: 9334

#### [SA]dis stp int e4/1/33

----[CIST][Port241(Ethernet4/1/33)][DISCARDING]----

Port Protocol :enabled  
Port Role :CIST Alternate Port  
Port Priority :128  
Port Cost(Legacy) :COnfig=auto / Active=200  
Desg. Bridge/Port :32768.00e0-fc24-02a8 / 128.81

```

Port Edged(Admin) :disabled
Point-to-point :COnfig=auto / Active=true
Transmission Limit :3 packets/hello-time
Protection Type :None
Port Config
Digest Snooping :disabled
Num of Vlans Mapped :1
PortTimes :Hello 2s MaxAge 20s FwDly 15s RemHop 0
BPDU Sent :8
TCN: 0, Config: 0, RST: 0, MST: 8
BPDU Received :8964
TCN: 0, Config: 0, RST: 0, MST: 8964

```

**[SA]dis stp region-configuration**

```

Oper configuration
Format selector :0
Region name :example
Revision level :0

```

```

Instance Vlans Mapped
0 1, 20
1 10
3 30

```

**[SA]dis stp tc all**

```

----- Stp Instance 0 tc or tcn received count -----
Port Ethernet4/1/1 0
Port Ethernet4/1/17 5
Port Ethernet4/1/33 3
----- Stp Instance 1 tc or tcn received count -----
----- Stp Instance 3 tc or tcn received count -----
----- Stp Instance 4 tc or tcn received count -----
----- Stp Instance 0 tc or tcn detected count -----
Port Ethernet4/1/1 1
Port Ethernet4/1/17 1
Port Ethernet4/1/33 0
----- Stp Instance 1 tc or tcn detected count -----
----- Stp Instance 3 tc or tcn detected count -----
----- Stp Instance 4 tc or tcn detected count -----
----- Stp Instance 0 tc or tcn sent count -----
Port Ethernet4/1/1 5
Port Ethernet4/1/17 2
Port Ethernet4/1/33 0
----- Stp Instance 1 tc or tcn sent count -----
----- Stp Instance 3 tc or tcn sent count -----
----- Stp Instance 4 tc or tcn sent count -----

```

**[SB]dis stp brief**

MSTID	Port	Role	STP State	Protection
0	Ethernet3/1/1	DESI	FORWARDING	NONE
0	Ethernet3/1/17	DESI	FORWARDING	NONE
0	Ethernet3/1/33	DESI	FORWARDING	NONE

**[SB]dis stp ins 3**

```

-----[MSTI 3 Global Info]-----
MSTI Bridge ID :0.00e0-fc00-0001
MSTI RegRoot/IRPC :0.00e0-fc00-0001 / 0
MSTI RootPortId :0.0
MSTI Root Type :PRIMARY root
Master Bridge :32768.00e0-fc00-0001
Cost to Master :0
TC received :0

```

**[SB]dis stp int e3/1/1**

```

----[CIST][Port157(Ethernet3/1/1)][FORWARDING]----
Port Protocol :enabled
Port Role :CIST Designated Port
Port Priority :128

```

```
Port Cost(Legacy) :COnfig=auto / Active=200
Desg. Bridge/Port :32768.00e0-fc00-0001 / 128.157
Port Edged(Admin) :disabled
Point-to-point :COnfig=auto / Active=true
Transmission Limit :3 packets/hello-time
Protection Type :None
Port Config
Digest Snooping :disabled
Num of Vlans Mapped :1
PortTimes :Hello 2s MaxAge 20s FwDly 15s RemHop 0
BPDU Sent :10513
TCN: 0, Config: 0, RST: 0, MST: 10513
BPDU Received :2
TCN: 0, Config: 0, RST: 0, MST: 2
```

**[SB]dis stp int e3/1/17**

```
----[CIST][Port173(Ethernet3/1/17)][FORWARDING]----
Port Protocol :enabled
Port Role :CIST Designated Port
Port Priority :128
Port Cost(Legacy) :COnfig=auto / Active=200
Desg. Bridge/Port :32768.00e0-fc00-0001 / 128.173
Port Edged(Admin) :disabled
Point-to-point :COnfig=auto / Active=true
Transmission Limit :3 packets/hello-time
Protection Type :None
Port Config
Digest Snooping :disabled
Num of Vlans Mapped :1
PortTimes :Hello 2s MaxAge 20s FwDly 15s RemHop 0
BPDU Sent :10565
TCN: 0, Config: 0, RST: 0, MST: 10565
BPDU Received :2
TCN: 0, Config: 0, RST: 0, MST: 2
```

**[SB]dis stp int e3/1/33**

```
----[CIST][Port189(Ethernet3/1/33)][FORWARDING]----
Port Protocol :enabled
Port Role :CIST Designated Port
Port Priority :128
Port Cost(Legacy) :COnfig=auto / Active=200
Desg. Bridge/Port :32768.00e0-fc00-0001 / 128.189
Port Edged(Admin) :disabled
Point-to-point :COnfig=auto / Active=true
Transmission Limit :3 packets/hello-time
Protection Type :None
Port Config
Digest Snooping :disabled
Num of Vlans Mapped :1
PortTimes :Hello 2s MaxAge 20s FwDly 15s RemHop 0
BPDU Sent :10600
TCN: 0, Config: 0, RST: 0, MST: 10600
BPDU Received :2
TCN: 0, Config: 0, RST: 0, MST: 2
```

**[SB]dis stp region-configuration**

```
Oper configuration
Format selector :0
Region name :example
Revision level :0
```

```
Instance Vlans Mapped
0 1
```

**[SB]dis stp tc all**

```
----- Stp Instance 0 tc or tcn received count -----
```

```

Port Ethernet3/1/1      0
Port Ethernet3/1/17    0
Port Ethernet3/1/33    0
----- Stp Instance 1 tc or tcn received count -----
----- Stp Instance 3 tc or tcn received count -----
----- Stp Instance 4 tc or tcn received count -----
----- Stp Instance 0 tc or tcn detected count -----
Port Ethernet3/1/1      1
Port Ethernet3/1/17    1
Port Ethernet3/1/33    1
----- Stp Instance 1 tc or tcn detected count -----
----- Stp Instance 3 tc or tcn detected count -----
----- Stp Instance 4 tc or tcn detected count -----
----- Stp Instance 0 tc or tcn sent count -----
Port Ethernet3/1/1      2
Port Ethernet3/1/17    2
Port Ethernet3/1/33    2
----- Stp Instance 1 tc or tcn sent count -----
----- Stp Instance 3 tc or tcn sent count -----
----- Stp Instance 4 tc or tcn sent count -----

```

**[SD]dis stp brief**

MSTID	Port	Role	STP State	Protection
0	Ethernet6/1/1	ALTE	DISCARDING	NONE
0	Ethernet6/1/17	ALTE	DISCARDING	NONE
0	Ethernet6/1/33	ROOT	FORWARDING	NONE

**[SD]dis stp int e6/1/1**

```

---[CIST][Port313(Ethernet6/1/1)][DISCARDING]---
Port Protocol      :enabled
Port Role          :CIST Alternate Port
Port Priority       :128
Port Cost(Legacy)  :COnfig=auto / Active=200
Desg. Bridge/Port  :32768.00e0-fc36-45b1 / 128.209
Port Edged(Admin)  :disabled
Point-to-point     :COnfig=auto / Active=true
Transmission Limit :3 packets/hello-time
Protection Type     :None
Port Config
Digest Snooping    :disabled
Num of Vlans Mapped :1
PortTimes          :Hello 2s MaxAge 20s FwDly 15s RemHop 0
BPDU Sent          :7
                   TCN: 0, Config: 0, RST: 0, MST: 7
BPDU Received      :10862
                   TCN: 0, Config: 0, RST: 0, MST: 10862

```

**[SD]dis stp int e6/1/17**

```

---[CIST][Port329(Ethernet6/1/17)][DISCARDING]---
Port Protocol      :enabled
Port Role          :CIST Alternate Port
Port Priority       :128
Port Cost(Legacy)  :COnfig=auto / Active=200
Desg. Bridge/Port  :32768.00e0-fc24-02a8 / 128.65
Port Edged(Admin)  :disabled
Point-to-point     :COnfig=auto / Active=true
Transmission Limit :3 packets/hello-time
Protection Type     :None
Port Config
Digest Snooping    :disabled
Num of Vlans Mapped :1
PortTimes          :Hello 2s MaxAge 20s FwDly 15s RemHop 0
BPDU Sent          :7
                   TCN: 0, Config: 0, RST: 0, MST: 7
BPDU Received      :10404

```

TCN: 0, Config: 0, RST: 0, MST: 10404

**[SD]dis stp int e6/1/33**

```
----[CIST][Port345(Ethernet6/1/33)][FORWARDING]----
Port Protocol      :enabled
Port Role          :CIST Root Port
Port Priority       :128
Port Cost(Legacy)  :COnfig=auto / Active=200
Desg. Bridge/Port  :32768.00e0-fc00-0001 / 128.189
Port Edged(Admin)  :disabled
Point-to-point     :COnfig=auto / Active=true
Transmission Limit :3 packets/hello-time
Protection Type    :None
Port Config
Digest Snooping    :disabled
Num of Vlans Mapped :1
PortTimes          :Hello 2s MaxAge 20s FwDly 15s RemHop 0
BPDU Sent          :7
                  TCN: 0, Config: 0, RST: 0, MST: 7
BPDU Received      :10852
                  TCN: 0, Config: 0, RST: 0, MST: 10852
```

**[SD]dis stp region-configuration**

```
Oper configuration
Format selector    :0
Region name        :example
Revision level     :0
```

```
Instance  Vlans Mapped
0          1
```

**[SD]dis stp tc all**

```
----- Stp Instance 0 tc or tcn received count -----
Port Ethernet6/1/1      7
Port Ethernet6/1/17     7
Port Ethernet6/1/33     9
----- Stp Instance 1 tc or tcn received count -----
----- Stp Instance 3 tc or tcn received count -----
----- Stp Instance 4 tc or tcn received count -----
----- Stp Instance 0 tc or tcn detected count -----
Port Ethernet6/1/1      1
Port Ethernet6/1/17     0
Port Ethernet6/1/33     2
----- Stp Instance 1 tc or tcn detected count -----
----- Stp Instance 3 tc or tcn detected count -----
----- Stp Instance 4 tc or tcn detected count -----
----- Stp Instance 0 tc or tcn sent count -----
Port Ethernet6/1/1      1
Port Ethernet6/1/17     0
Port Ethernet6/1/33     1
----- Stp Instance 1 tc or tcn sent count -----
----- Stp Instance 3 tc or tcn sent count -----
----- Stp Instance 4 tc or tcn sent count -----
```

**[SC]dis stp brief**

MSTID	Port	Role	STP State	Protection
0	Ethernet1/0/1	ROOT	FORWARDING	NONE
0	Ethernet1/0/17	DESI	FORWARDING	NONE
0	Ethernet1/0/33	DESI	FORWARDING	NONE

**[SC]dis stp ins 4**

```
-----[MSTI 4 Global Info]-----
MSTI Bridge ID      :0.00e0-fc24-02a8
MSTI RegRoot/IRPC   :0.00e0-fc24-02a8 / 0
MSTI RootPortId     :0.0
MSTI Root Type       :PRIMARY root
Master Bridge        :32768.00e0-fc00-0001
Cost to Master       :200
```

TC received :0

**[SC]dis stp int e1/0/1**

----[CIST][Port49(Ethernet1/0/1)][FORWARDING]----

Port Protocol :enabled  
Port Role :CIST Root Port  
Port Priority :128  
Port Cost(Legacy) :COnfig=auto / Active=200  
Desg. Bridge/Port :32768.00e0-fc00-0001 / 128.157  
Port Edged(Admin) :disabled  
Point-to-point :COnfig=auto / Active=true  
Transit Limit :3 packets/hello-time  
Protection Type :None  
Port Config  
Digest Snooping :disabled  
Num of Vlans Mapped :1  
PortTimes :Hello 2s MaxAge 20s FwDly 15s RemHop 0  
BPDU Sent :129  
TCN: 0, Config: 0, RST: 0, MST: 129  
BPDU Received :11207  
TCN: 0, Config: 0, RST: 0, MST: 11207

**[SC]dis stp int e1/0/17**

----[CIST][Port65(Ethernet1/0/17)][FORWARDING]----

Port Protocol :enabled  
Port Role :CIST Designated Port  
Port Priority :128  
Port Cost(Legacy) :COnfig=auto / Active=200  
Desg. Bridge/Port :32768.00e0-fc24-02a8 / 128.65  
Port Edged(Admin) :disabled  
Point-to-point :COnfig=auto / Active=true  
Transit Limit :3 packets/hello-time  
Protection Type :None  
Port Config  
Digest Snooping :disabled  
Num of Vlans Mapped :1  
PortTimes :Hello 2s MaxAge 20s FwDly 15s RemHop 0  
BPDU Sent :10630  
TCN: 0, Config: 0, RST: 0, MST: 10630  
BPDU Received :3517  
TCN: 0, Config: 0, RST: 0, MST: 3517

**[SC]dis stp int e1/0/33**

----[CIST][Port81(Ethernet1/0/33)][FORWARDING]----

Port Protocol :enabled  
Port Role :CIST Designated Port  
Port Priority :128  
Port Cost(Legacy) :COnfig=auto / Active=200  
Desg. Bridge/Port :32768.00e0-fc24-02a8 / 128.81  
Port Edged(Admin) :disabled  
Point-to-point :COnfig=auto / Active=true  
Transit Limit :3 packets/hello-time  
Protection Type :None  
Port Config  
Digest Snooping :disabled  
Num of Vlans Mapped :1  
PortTimes :Hello 2s MaxAge 20s FwDly 15s RemHop 0  
BPDU Sent :10589  
TCN: 0, Config: 0, RST: 0, MST: 10589  
BPDU Received :7350  
TCN: 0, Config: 0, RST: 0, MST: 7350

**[SC]dis stp region-configuration**

Oper configuration  
Format selector :0



Region name :example

Revision level :0

Instance Vlans Mapped

0 1 to 9, 11 to 29, 31 to 39, 41 to 4094

1 10

3 30

4 40