

## STP的配置

### STP的配置与信息查看

STP的配置比较简单，注重理解生成树的原理

[Switch 1]stp mode stp

[Switch 1]stp root primary

[Switch 2]stp mode stp

[Switch 2]stp root secondary

查看STP信息

Switch1为根桥，端口都处于转发状态

<Switch 1>display stp brief

MSTID Port Role STP State Protection

0 GigabitEthernet0/0/9 DESI FORWARDING NONE

0 GigabitEthernet0/0/10 DESI FORWARDING NONE

Switch 2 上的Gi0/0/9为ROOT端口，Gi0/0/10端口被阻塞

<Switch 2>display stp brief

MSTID Port Role STP State Protection

0 GigabitEthernet0/0/9 ROOT FORWARDING NONE

0 GigabitEthernet0/0/10 ALTE DISCARDING NONE

查看端口的STP状态

Switch 2上Gi0/0/9端口的STP状态

<Switch 2>display stp interface GigabitEthernet 0/0/9

-------[CIST Global Info][Mode STP]-------

CIST Bridge :4096 .4c1f-cc3f-0add

Config Times :Hello 2s MaxAge 20s FwDly 15s MaxHop 20

Active Times :Hello 2s MaxAge 20s FwDly 15s MaxHop 20

CIST Root/ERPC :0 .4c1f-cc05-02f9 / 20000

CIST RegRoot/IRPC :4096 .4c1f-cc3f-0add / 0

CIST RootPortId :128.9

BPDU-Protection :Disabled

CIST Root Type :Secondary root

TC or TCN received :35

TC count per hello :0

STP Converge Mode :Normal

Time since last TC :0 days 0h:23m:1s

Number of TC :4

Last TC occurred :GigabitEthernet0/0/9

----[Port9(GigabitEthernet0/0/9)][FORWARDING]----

Port Protocol :Enabled

Port Role :Root Port

Port Priority :128

Port Cost(Dot1T ) :Config=auto / Active=20000

Designated Bridge/Port :0.4c1f-cc05-02f9 / 128.9

Port Edged :Config=default / Active=disabled

Point-to-point :Config=auto / Active=true

Transit Limit :147 packets/hello-time

Protection Type :None

Port STP Mode :STP

Port Protocol Type :Config=auto / Active=dot1s

BPDU Encapsulation :Config=stp / Active=stp

PortTimes :Hello 2s MaxAge 20s FwDly 15s RemHop 0

TC or TCN send :17

TC or TCN received :17

BPDU Sent :67

TCN: 0, Config: 67, RST: 0, MST: 0

BPDU Received :651

TCN: 0, Config: 651, RST: 0, MST: 0

Switch 2上Gi0/0/10端口的STP状态

<Switch 2>display stp interface GigabitEthernet 0/0/10

-------[CIST Global Info][Mode STP]-------

CIST Bridge :4096 .4c1f-cc3f-0add

Config Times :Hello 2s MaxAge 20s FwDly 15s MaxHop 20

Active Times :Hello 2s MaxAge 20s FwDly 15s MaxHop 20

CIST Root/ERPC :0 .4c1f-cc05-02f9 / 20000

CIST RegRoot/IRPC :4096 .4c1f-cc3f-0add / 0

CIST RootPortId :128.9

BPDU-Protection :Disabled

CIST Root Type :Secondary root

TC or TCN received :35

TC count per hello :0

STP Converge Mode :Normal

Time since last TC :0 days 0h:27m:20s

Number of TC :4

Last TC occurred :GigabitEthernet0/0/9

----[Port10(GigabitEthernet0/0/10)][DISCARDING]----

Port Protocol :Enabled

Port Role :Alternate Port

Port Priority :128

Port Cost(Dot1T ) :Config=auto / Active=20000

Designated Bridge/Port :0.4c1f-cc05-02f9 / 128.10

Port Edged :Config=default / Active=disabled

Point-to-point :Config=auto / Active=true

Transit Limit :147 packets/hello-time

Protection Type :None

Port STP Mode :STP

Port Protocol Type :Config=auto / Active=dot1s

BPDU Encapsulation :Config=stp / Active=stp

PortTimes :Hello 2s MaxAge 20s FwDly 15s RemHop 0

TC or TCN send :18

TC or TCN received :18

BPDU Sent :68

TCN: 0, Config: 68, RST: 0, MST: 0

BPDU Received :772

TCN: 1, Config: 771, RST: 0, MST: 0

### 控制根桥的选举

配置前的STP的信息查看

<Switch 1>display stp

-------[CIST Global Info][Mode STP]-------

CIST Bridge :0 .4c1f-cc05-02f9

Config Times :Hello 2s MaxAge 20s FwDly 15s MaxHop 20

Active Times :Hello 2s MaxAge 20s FwDly 15s MaxHop 20

CIST Root/ERPC :0 .4c1f-cc05-02f9 / 0

CIST RegRoot/IRPC :0 .4c1f-cc05-02f9 / 0

CIST RootPortId :0.0

BPDU-Protection :Disabled

CIST Root Type :Primary root

TC or TCN received :35

TC count per hello :0

STP Converge Mode :Normal

Time since last TC :0 days 0h:40m:55s

Number of TC :4

Last TC occurred :GigabitEthernet0/0/9

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<Switch 2>display stp

-------[CIST Global Info][Mode STP]-------

CIST Bridge :4096 .4c1f-cc3f-0add

Config Times :Hello 2s MaxAge 20s FwDly 15s MaxHop 20

Active Times :Hello 2s MaxAge 20s FwDly 15s MaxHop 20

CIST Root/ERPC :0 .4c1f-cc05-02f9 / 20000

CIST RegRoot/IRPC :4096 .4c1f-cc3f-0add / 0

CIST RootPortId :128.9

BPDU-Protection :Disabled

CIST Root Type :Secondary root

TC or TCN received :35

TC count per hello :0

STP Converge Mode :Normal

Time since last TC :0 days 0h:42m:15s

Number of TC :4

Last TC occurred :GigabitEthernet0/0/9

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修改STP的优先级

通过配置优先级，使Switch 2成为根桥，Switch成为备份根桥。

桥优先级取值越小，优先级越高

[Switch 1]stp priority 8192

[Switch 2]stp priority 4096

### 控制根端口的选举

交换机的优先级已做修改，Switch 1非根桥

Gi0/0/9为根端口，Gi0/0/10位Alternate端口

[Switch 1]display stp brief

MSTID Port Role STP State Protection

0 GigabitEthernet0/0/9 ROOT LEARNING NONE

0 GigabitEthernet0/0/10 ALTE DISCARDING NONE

端口的优先级修改很简单，但是需要注意的是需要在根桥上配置，这里的话是Switch 2

interface GigabitEthernet0/0/9

stp instance 0 port priority 32

interface GigabitEthernet0/0/10

stp instance 0 port priority 16

验证配置已生效，Gi0/0/10成为root端口

[Switch 1]display stp brief

MSTID Port Role STP State Protection

0 GigabitEthernet0/0/9 ALTE DISCARDING NONE

0 GigabitEthernet0/0/10 ROOT DISCARDING NONE

<Switch 2>display stp interface GigabitEthernet 0/0/9

-------[CIST Global Info][Mode STP]-------

CIST Bridge :4096 .4c1f-cc3f-0add

Config Times :Hello 2s MaxAge 20s FwDly 15s MaxHop 20

Active Times :Hello 2s MaxAge 20s FwDly 15s MaxHop 20

CIST Root/ERPC :4096 .4c1f-cc3f-0add / 0

CIST RegRoot/IRPC :4096 .4c1f-cc3f-0add / 0

CIST RootPortId :0.0

BPDU-Protection :Disabled

TC or TCN received :38

TC count per hello :0

STP Converge Mode :Normal

Time since last TC :0 days 0h:5m:59s

Number of TC :9

Last TC occurred :GigabitEthernet0/0/10

----[Port9(GigabitEthernet0/0/9)][FORWARDING]----

Port Protocol :Enabled

Port Role :Designated Port

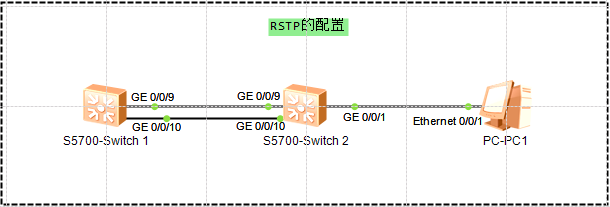
Port Priority :32

Port Cost(Dot1T ) :Config=auto / Active=20000

Designated Bridge/Port :4096.4c1f-cc3f-0add / 32.9

---- More ----

## RSTP的配置



### RSTP的开启

RSTP的开启和STP类似

[Switch 1]stp mode rstp

[Switch 2]stp mode rstp

查看信息，已经是RSTP模式

<Switch 1>display stp

-------[CIST Global Info][Mode RSTP]-------

CIST Bridge :32768.4c1f-cc20-4283

Config Times :Hello 2s MaxAge 20s FwDly 15s MaxHop 20

Active Times :Hello 2s MaxAge 20s FwDly 15s MaxHop 20

CIST Root/ERPC :32768.4c1f-cc20-4283 / 0

CIST RegRoot/IRPC :32768.4c1f-cc20-4283 / 0

CIST RootPortId :0.0

BPDU-Protection :Disabled

TC or TCN received :5

TC count per hello :0

STP Converge Mode :Normal

Time since last TC :0 days 0h:1m:42s

Number of TC :4

Last TC occurred :GigabitEthernet0/0/9

----[Port1(GigabitEthernet0/0/1)][DOWN]----

Port Protocol :Enabled

Port Role :Disabled Port

Port Priority :128

Port Cost(Dot1T ) :Config=auto / Active=200000000

Designated Bridge/Port :32768.4c1f-cc20-4283 / 128.1

---- More ----

### 配置边缘端口

配置连接用户终端的端口为边缘端口。边缘端口可以不通过的RSTP的计算直接有Discarding丢弃状态转为Forwarding转发状态。

[Switch 1]interface GigabitEthernet 0/0/1

[Switch 1-GigabitEthernet0/0/1]stp edged-port enable

[Switch 2]interface GigabitEthernet 0/0/1

[Switch 2-GigabitEthernet0/0/1]stp edged-port enable

### 配置BPDU保护功能

边缘端口直接与用户终端相连，正常情况不会收到BPDU报文。但是攻击者从交换机的边缘端口发送伪造的BPDU报文，交换机会自动将边缘端口设置为非边缘端口，重新计算生成树，引起网络震荡。

[Switch 1]stp bpdu-protection

[Switch 2]stp bpdu-protection

查看端口Gi0/0/1已开启BPDU保护

[Switch 2]display stp brief

MSTID Port Role STP State Protection

0 GigabitEthernet0/0/1 DESI FORWARDING BPDU

0 GigabitEthernet0/0/9 ROOT FORWARDING NONE

0 GigabitEthernet0/0/10 ALTE DISCARDING NONE

### 配置环路保护功能

Switch 1为根桥，无需配置环路保护。在Switch 2 开启环路保护

[Switch 2]interface GigabitEthernet 0/0/9

[Switch 2-GigabitEthernet0/0/9]stp loop-protection

[Switch 2]interface GigabitEthernet 0/0/10

[Switch 2-GigabitEthernet0/0/10]stp loop-protection

验证Switch 2上的Gi0/0/9和Gi0/0/10已经开启环路保护

[Switch 2]display stp brief

MSTID Port Role STP State Protection

0 GigabitEthernet0/0/1 DESI FORWARDING BPDU

0 GigabitEthernet0/0/9 ROOT FORWARDING LOOP

0 GigabitEthernet0/0/10 ALTE DISCARDING LOOP