

第二章 STP与SEP配置

实验 2-1 静态路由及默认路由

学习目的

- 了解STP、RSTP与MSTP的差异
- 掌握修改网桥优先级影响根网桥选举的方法
- 掌握修改端口优先级影响根端口与指定端口选举的方法
- 掌握配置RSTP的方法以及STP与RSTP的相互兼容问题
- 掌握配置MSTP实现不同VLAN负载均衡的方法

拓扑图

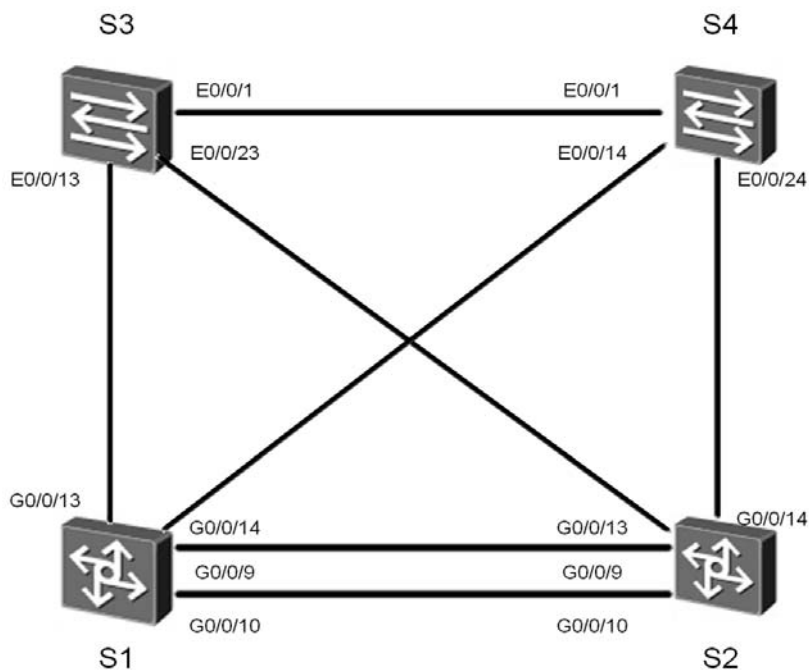


图2-1 STP、RSTP与MSTP实验拓扑图

场景

你是公司的网络管理员。公司的网络采用了备份网络，为避免环路问题，使用STP来进行环路控制。接口在STP的收敛时，所需时间较长，为了加快网络的收敛速度，可以配置RSTP来实现。所有的VLAN共享一棵STP生成树，为了实现VLAN间数据流量的负载均衡，可以配置MSTP来实现。

学习任务

步骤一. STP 配置及验证

如果设备默认生成树没有开启，使用以下命令开启。

```
[S1]stp enable
```

```
[S2]stp enable
```

```
[S3]stp enable
```

```
[S4]stp enable
```

配置使用传统生成树。

```
[S1]stp mode stp
```

```
[S2]stp mode stp
```

```
[S3]stp mode stp
```

```
[S4]stp mode stp
```

查看STP状态信息。

```
[S1]display stp
```

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

```
CIST Bridge :32768.4clf-cc45-aadc
```

```
Bridge Times :Hello 2s MaxAge 20s FwDly 15s MaxHop 20
```

```
CIST Root/ERPC :32768.4clf-cc45-aac1 / 20000
```

```
CIST RegRoot/IRPC :32768.4clf-cc45-aadc / 0
```

```
CIST RootPortId :128.9
```

```
BPDU-Protection :Disabled
```

```
TC or TCN received :36
```

```

TC count per hello :2
STP Converge Mode :Normal
Share region-configuration :Enabled
Time since last TC :0 days 0h:0m:1s
.....output omit.....

[S2]display stp
-----[CIST Global Info][Mode STP]-----
CIST Bridge :32768.4c1f-cc45-aac1
Bridge Times :Hello 2s MaxAge 20s FwDly 15s MaxHop 20
CIST Root/ERPC :32768.4c1f-cc45-aac1 / 0
CIST RegRoot/IRPC :32768.4c1f-cc45-aac1 / 0
CIST RootPortId :0.0
BPDU-Protection :Disabled
TC or TCN received :20
TC count per hello :0
STP Converge Mode :Normal
Share region-configuration :Enabled
Time since last TC :0 days 0h:1m:4s
.....output omit.....

[S1]display stp brief

```

MSTID	Port	Role	STP State	Protection
0	GigabitEthernet0/0/9	ROOT	FORWARDING	NONE
0	GigabitEthernet0/0/10	ALTE	DISCARDING	NONE
0	GigabitEthernet0/0/13	DESI	FORWARDING	NONE
0	GigabitEthernet0/0/14	DESI	FORWARDING	NONE

```

[S2]display stp brief

```

MSTID	Port	Role	STP State	Protection
0	GigabitEthernet0/0/9	DESI	FORWARDING	NONE
0	GigabitEthernet0/0/10	DESI	FORWARDING	NONE
0	GigabitEthernet0/0/23	DESI	FORWARDING	NONE
0	GigabitEthernet0/0/24	DESI	FORWARDING	NONE

S2为根网桥，所有端口都为指定端口。

实际使用中，由于交换机MAC地址的不可确定性，实际的实验结果可能与如上结果有差异。

步骤二. 根桥选举控制

配置S1为主根网桥，S2为备份根网桥。

```
[S1]stp root primary
```

```
[S2]stp root secondary
```

查看STP配置信息。

```
[S1]display stp
-----[CIST Global Info][Mode STP]-----
CIST Bridge      :0      .4c1f-cc45-aadc
Bridge Times     :Hello 2s MaxAge 20s FwDly 15s MaxHop 20
CIST Root/ERPC   :0      .4c1f-cc45-aadc / 0
CIST RegRoot/IRPC :0      .4c1f-cc45-aadc / 0
CIST RootPortId  :0.0
BPDU-Protection  :Disabled
CIST Root Type   :Primary root
TC or TCN received :67
TC count per hello :0
STP Converge Mode :Normal
Share region-configuration :Enabled
Time since last TC :0 days 0h:0m:15s
.....output omit.....
```

```
[S2]display stp
-----[CIST Global Info][Mode STP]-----
CIST Bridge      :4096 .4c1f-cc45-aac1
Bridge Times     :Hello 2s MaxAge 20s FwDly 15s MaxHop 20
CIST Root/ERPC   :0      .4c1f-cc45-aadc / 20000
CIST RegRoot/IRPC :4096 .4c1f-cc45-aac1 / 0
CIST RootPortId  :128.9
BPDU-Protection  :Disabled
CIST Root Type   :Secondary root
TC or TCN received :26
TC count per hello :0
STP Converge Mode :Normal
Share region-configuration :Enabled
Time since last TC :0 days 0h:0m:1s
.....output omit.....
```

S1为主根网桥，S2为备份根网桥。

桥优先级数值越小的优先级越高，将S1的桥优先级修改为8192，将S2的桥优先级修改为4096。

```
[S1]undo stp root
[S1]stp priority 8192
```

```
[S2]undo stp root
[S2]stp priority 4096
```

查看STP信息。

```
[S1]display stp
-----[CIST Global Info][Mode STP]-----
CIST Bridge      :8192 .4c1f-cc45-aadc
Bridge Times     :Hello 2s MaxAge 20s FwDly 15s MaxHop 20
CIST Root/ERPC   :4096 .4c1f-cc45-aac1 / 20000
CIST RegRoot/IRPC :8192 .4c1f-cc45-aadc / 0
CIST RootPortId  :128.9
BPDU-Protection  :Disabled
TC or TCN received :79
TC count per hello :1
STP Converge Mode :Normal
Share region-configuration :Enabled
Time since last TC :0 days 0h:0m:0s
.....output omit.....
```

```
[S2]display stp
-----[CIST Global Info][Mode STP]-----
CIST Bridge      :4096 .4c1f-cc45-aac1
Bridge Times     :Hello 2s MaxAge 20s FwDly 15s MaxHop 20
CIST Root/ERPC   :4096 .4c1f-cc45-aac1 / 0
CIST RegRoot/IRPC :4096 .4c1f-cc45-aac1 / 0
CIST RootPortId  :0.0
BPDU-Protection  :Disabled
TC or TCN received :88
TC count per hello :0
STP Converge Mode :Normal
Share region-configuration :Enabled
Time since last TC :0 days 0h:0m:9s
.....output omit.....
```

S1优先级为8192，S2优先级为4096，S2成为根网桥。

步骤三. 根端口选举控制

在S1上查看当前端口角色信息。

```
[S1]display stp brief
MSTID Port Role STP State Protection
```

0	GigabitEthernet0/0/9	ROOT	FORWARDING	NONE
0	GigabitEthernet0/0/10	ALTE	DISCARDING	NONE
0	GigabitEthernet0/0/13	DESI	FORWARDING	NONE
0	GigabitEthernet0/0/14	DESI	FORWARDING	NONE

S1的GigabitEthernet0/0/9为根端口。

端口优先级默认值为128，数值越大优先级越小。

S1与S2通过G0/0/9与G0/0/10接口互联。

将S2的端口G0/0/9端口优先级设置为32，G0/0/10端口优先级设置为16。

```
[S2]interface GigabitEthernet 0/0/9
[S2-GigabitEthernet0/0/9]stp port priority 32
[S2-GigabitEthernet0/0/9]interface GigabitEthernet 0/0/10
[S2-GigabitEthernet0/0/10]stp port priority 16
```

提示：此处是修改S2的端口优先级，而不是修改S1的端口优先级。

在S1上查看当前端口角色信息。

```
[S1]display stp brief
```

MSTID	Port	Role	STP State	Protection
0	GigabitEthernet0/0/9	ALTE	DISCARDING	NONE
0	GigabitEthernet0/0/10	ROOT	DISCARDING	NONE
0	GigabitEthernet0/0/13	DESI	FORWARDING	NONE
0	GigabitEthernet0/0/14	DESI	FORWARDING	NONE

S1的GigabitEthernet0/0/10成为根端口。

步骤四. 指定端口选举控制

查看S3和S4直连接口状态。

```
[S3]display stp interface Ethernet 0/0/1
---[CIST] [Port1 (Ethernet0/0/1)] [DISCARDING] ---
Port Protocol      :Enabled
Port Role          :Alternate Port
Port Priority       :128
Port Cost(Dot1T )  :Config=auto / Active=199999
Designated Bridge/Port :32768.5489-98ec-f00a / 128.1
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
PortTimes          :Hello 2s MaxAge 20s FwDly 15s RemHop 0
TC or TCN send     :17
TC or TCN received :52
BPDU Sent          :172
                   TCN: 0, Config: 172, RST: 0, MST: 0
BPDU Received      :206
                   TCN: 0, Config: 206, RST: 0, MST: 0

```

```

[S4]display stp interface Ethernet 0/0/24
----[CIST][Port24(Ethernet0/0/24)][DISCARDING]----
Port Protocol      :Enabled
Port Role          :Designated Port
Port Priority       :128
Port Cost(Dot1T )  :Config=auto / Active=199999
Designated Bridge/Port :32768.5489-98ec-f00a / 128.1
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
PortTimes          :Hello 2s MaxAge 20s FwDly 15s RemHop 20
TC or TCN send     :37
TC or TCN received :17
BPDU Sent          :181
                   TCN: 0, Config: 181, RST: 0, MST: 0
BPDU Received      :172
                   TCN: 0, Config: 172, RST: 0, MST: 0

```

S3的Ethernet 0/0/1为替代端口。S4的Ethernet 0/0/1是指定端口。修改S4端口E0/0/24路径开销为2000000。

```
[S4-Ethernet0/0/24]stp cost 2000000
```

查看当前端口角色信息。

```

[S3]display stp interface Ethernet 0/0/1
----[CIST][Port1(Ethernet0/0/1)][FORWARDING]----
Port Protocol      :Enabled
Port Role          :Designated Port
Port Priority       :128
Port Cost(Dot1T )  :Config=auto / Active=199999

```

```

Designated Bridge/Port :32768.5489-98ec-f022 / 128.1
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
PortTimes :Hello 2s MaxAge 20s FwDly 15s RemHop 20
TC or TCN send :52
TC or TCN received :52
BPDU Sent :284
        TCN: 0, Config: 284, RST: 0, MST: 0
BPDU Received :380
        TCN: 0, Config: 380, RST: 0, MST: 0

```

```

[S4]display stp interface Ethernet 0/0/24
----[CIST][Port24(Ethernet0/0/24)][DISCARDING]----
Port Protocol :Enabled
Port Role :Alternate Port
Port Priority :128
Port Cost(Dot1T ) :Config=2000000 / Active=2000000
Designated Bridge/Port :4096.4c1f-cc45-aac1 / 128.24
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
PortTimes :Hello 2s MaxAge 20s FwDly 15s RemHop 0
TC or TCN send :7
TC or TCN received :162
BPDU Sent :8
        TCN: 7, Config: 1, RST: 0, MST: 0
BPDU Received :1891
        TCN: 0, Config: 1891, RST: 0, MST: 0

```

S3的Ethernet 0/0/1是指定端口。S4的Ethernet 0/0/1为替代端口。

步骤五. RSTP 配置及验证

配置S1和S2的VLANIF 1接口地址。测试S1到S2的连通性。

```
[S1]interface Vlanif 1
```



```
[S1-Vlanif1]ip address 10.0.1.1 24

[S2]interface Vlanif 1
[S2-Vlanif1]ip address 10.0.1.2 24

[S1]ping 10.0.1.2
PING 10.0.1.2: 56 data bytes, press CTRL_C to break
  Reply from 10.0.1.2: bytes=56 Sequence=1 ttl=255 time=9 ms
  Reply from 10.0.1.2: bytes=56 Sequence=2 ttl=254 time=1 ms
  Reply from 10.0.1.2: bytes=56 Sequence=3 ttl=254 time=1 ms
  Reply from 10.0.1.2: bytes=56 Sequence=4 ttl=254 time=1 ms
  Reply from 10.0.1.2: bytes=56 Sequence=5 ttl=254 time=1 ms

--- 10.0.1.2 ping statistics ---
  5 packet(s) transmitted
  5 packet(s) received
  0.00% packet loss
  round-trip min/avg/max = 1/2/9 ms
```

查看S1端口角色信息。

```
[S1]display stp brief
```

MSTID	Port	Role	STP State	Protection
0	GigabitEthernet0/0/9	ALTE	DISCARDING	NONE
0	GigabitEthernet0/0/10	ROOT	FORWARDING	NONE
0	GigabitEthernet0/0/13	DESI	FORWARDING	NONE
0	GigabitEthernet0/0/14	DESI	FORWARDING	NONE

S1的GigabitEthernet0/0/10为根端口，用ping测试S1到S2的连通性20次。

提示：S1执行ping操作之后立刻关闭S2的GigabitEthernet 0/0/10接口。

```
[S1]ping -c 20 10.0.1.2
PING 10.0.1.2: 56 data bytes, press CTRL_C to break
  Reply from 10.0.1.2: bytes=56 Sequence=1 ttl=254 time=1 ms
  Reply from 10.0.1.2: bytes=56 Sequence=2 ttl=254 time=1 ms
Dec 21 2011 16:20:44-05:13 S1 %%01IFNET/4/IF_STATE(1)[5]:Interface
GigabitEthernet0/0/10 has turned into DOWN state.
  Request time out
  Request time out
  Request time out
  Request time out
  Request time out
  Request time out
  Request time out
```

```

Request time out
Request time out
Request time out
Request time out
Request time out
Request time out
Request time out
Request time out
Request time out
Reply from 10.0.1.2: bytes=56 Sequence=18 ttl=255 time=15 ms
Reply from 10.0.1.2: bytes=56 Sequence=19 ttl=254 time=1 ms
Reply from 10.0.1.2: bytes=56 Sequence=20 ttl=254 time=1 ms

--- 10.0.1.2 ping statistics ---
 20 packet(s) transmitted
 5 packet(s) received
 75.00% packet loss
 round-trip min/avg/max = 1/3/15 ms

[S2]interface GigabitEthernet 0/0/10
[S2-GigabitEthernet0/0/10]shutdown

```

查看S1端口角色信息。

```

[S1]display stp brief

```

MSTID	Port	Role	STP State	Protection
0	GigabitEthernet0/0/9	ROOT	FORWARDING	NONE
0	GigabitEthernet0/0/13	DESI	FORWARDING	NONE
0	GigabitEthernet0/0/14	DESI	FORWARDING	NONE

S1的GigabitEthernet0/0/9接口成为根端口,端口进入FORWARDING状态,15个包超时,网络收敛时间为30秒。

恢复S2的GigabitEthernet 0/0/10接口。

```

[S2]interface GigabitEthernet 0/0/10
[S2-GigabitEthernet0/0/10]undo shutdown

```

配置快速生成树。

```

[S1]stp mode rstp

[S2]stp mode rstp

[S3]stp mode rstp

```

```
[S4]stp mode rstp
```

查看S1端口角色信息。

```
[S1]display stp brief
```

MSTID	Port	Role	STP State	Protection
0	GigabitEthernet0/0/9	ALTE	DISCARDING	NONE
0	GigabitEthernet0/0/10	ROOT	FORWARDING	NONE
0	GigabitEthernet0/0/13	DESI	FORWARDING	NONE
0	GigabitEthernet0/0/14	DESI	FORWARDING	NONE

S1的GigabitEthernet0/0/10为根端口,用ping测试S1到S2的连通性20次。

提示：S1上执行ping之后立刻关闭S2的GigabitEthernet 0/0/10。

```
[S1]ping -c 20 10.0.1.2
```

```
PING 10.0.1.2: 56 data bytes, press CTRL_C to break
```

```
Reply from 10.0.1.2: bytes=56 Sequence=1 ttl=254 time=1 ms
```

```
Reply from 10.0.1.2: bytes=56 Sequence=2 ttl=254 time=1 ms
```

```
Reply from 10.0.1.2: bytes=56 Sequence=3 ttl=254 time=1 ms
```

```
Reply from 10.0.1.2: bytes=56 Sequence=4 ttl=254 time=1 ms
```

```
Reply from 10.0.1.2: bytes=56 Sequence=5 ttl=254 time=1 ms
```

```
Dec 21 2011 16:37:10-05:13 S1 %01IFNET/4/IF_STATE(1) [7]:Interface
```

```
GigabitEthernet0/0/10 has turned into DOWN state.
```

```
Request time out
```

```
Reply from 10.0.1.2: bytes=56 Sequence=7 ttl=255 time=10 ms
```

```
Reply from 10.0.1.2: bytes=56 Sequence=8 ttl=254 time=1 ms
```

```
Reply from 10.0.1.2: bytes=56 Sequence=9 ttl=254 time=1 ms
```

```
Reply from 10.0.1.2: bytes=56 Sequence=10 ttl=254 time=1 ms
```

```
Reply from 10.0.1.2: bytes=56 Sequence=11 ttl=254 time=1 ms
```

```
Reply from 10.0.1.2: bytes=56 Sequence=12 ttl=254 time=1 ms
```

```
Reply from 10.0.1.2: bytes=56 Sequence=13 ttl=254 time=1 ms
```

```
Reply from 10.0.1.2: bytes=56 Sequence=14 ttl=254 time=1 ms
```

```
Reply from 10.0.1.2: bytes=56 Sequence=15 ttl=254 time=1 ms
```

```
Reply from 10.0.1.2: bytes=56 Sequence=16 ttl=254 time=1 ms
```

```
Reply from 10.0.1.2: bytes=56 Sequence=17 ttl=254 time=1 ms
```

```
Reply from 10.0.1.2: bytes=56 Sequence=18 ttl=254 time=1 ms
```

```
Reply from 10.0.1.2: bytes=56 Sequence=19 ttl=254 time=1 ms
```

```
Reply from 10.0.1.2: bytes=56 Sequence=20 ttl=254 time=1 ms
```

```
--- 10.0.1.2 ping statistics ---
```

```
20 packet(s) transmitted
```

```
19 packet(s) received
```

```
5.00% packet loss
```

```
round-trip min/avg/max = 1/1/10 ms
```

```
[S2]interface GigabitEthernet 0/0/10
[S2-GigabitEthernet0/0/10]shutdown
```

查看S1端口角色信息。

```
[S1]display stp brief
```

MSTID	Port	Role	STP State	Protection
0	GigabitEthernet0/0/9	ROOT	FORWARDING	NONE
0	GigabitEthernet0/0/13	DESI	FORWARDING	NONE
0	GigabitEthernet0/0/14	DESI	FORWARDING	NONE

S1的GigabitEthernet0/0/9接口成为根端口，进入Forwarding状态。1个包超时，网络收敛时间为2秒。

开启S2的GigabitEthernet 0/0/10接口。

```
[S2]interface GigabitEthernet 0/0/10
[S2-GigabitEthernet0/0/10]undo shutdown
```

步骤六. RSTP 与 STP 的兼容

配置S1为STP生成树，其他配置保持不变。

```
[S1]stp mode stp
```

查看S1端口角色信息。

```
[S1]display stp brief
```

MSTID	Port	Role	STP State	Protection
0	GigabitEthernet0/0/9	ALTE	DISCARDING	NONE
0	GigabitEthernet0/0/10	ROOT	FORWARDING	NONE
0	GigabitEthernet0/0/13	DESI	FORWARDING	NONE
0	GigabitEthernet0/0/14	DESI	FORWARDING	NONE

S1的GigabitEthernet0/0/10为根端口，用ping测试S1到S2的连通性20次。

提示：S1上执行ping之后立刻关闭S2的GigabitEthernet 0/0/10。

```
[S1]ping -c 20 10.0.1.2
PING 10.0.1.2: 56 data bytes, press CTRL_C to break
Reply from 10.0.1.2: bytes=56 Sequence=1 ttl=254 time=1 ms
Reply from 10.0.1.2: bytes=56 Sequence=2 ttl=254 time=1 ms
Dec 21 2011 16:20:44-05:13 S1 %%01IFNET/4/IF_STATE(1) [5]:Interface
```

```
GigabitEthernet0/0/10 has turned into DOWN state.
Request time out
Request time out
Request time out
Request time out
Request time out
Request time out
Request time out
Request time out
Request time out
Request time out
Request time out
Request time out
Request time out
Request time out
Request time out
Request time out
Reply from 10.0.1.2: bytes=56 Sequence=18 ttl=255 time=15 ms
Reply from 10.0.1.2: bytes=56 Sequence=19 ttl=254 time=1 ms
Reply from 10.0.1.2: bytes=56 Sequence=20 ttl=254 time=1 ms

--- 10.0.1.2 ping statistics ---
 20 packet(s) transmitted
 5 packet(s) received
 75.00% packet loss
round-trip min/avg/max = 1/3/15 ms
```

```
[S2]interface GigabitEthernet 0/0/10
[S2-GigabitEthernet0/0/10]shutdown
```

查看S1端口角色信息。

```
[S1]display stp brief
```

MSTID	Port	Role	STP State	Protection
0	GigabitEthernet0/0/9	ROOT	FORWARDING	NONE
0	GigabitEthernet0/0/13	DESI	FORWARDING	NONE
0	GigabitEthernet0/0/14	DESI	FORWARDING	NONE

S1的GigabitEthernet0/0/9接口成为根端口，进入Forwarding状态。15个包超时，网络收敛时间为30秒。

RSTP兼容STP，但收敛方式以STP模式运行。

恢复S2的GigabitEthernet 0/0/10接口。

```
[S2]interface GigabitEthernet 0/0/10
```

```
[S2-GigabitEthernet0/0/10]undo shutdown
```

步骤七. MSTP 的配置与验证

创建VLAN 2到20，并将相应的接口加入到VLAN中。

```
[S1]vlan batch 2 to 20
Info: This operation may take a few seconds. Please wait for a moment...done.
[S1]interface GigabitEthernet 0/0/9
[S1-GigabitEthernet0/0/9]port link-type trunk
[S1-GigabitEthernet0/0/9]port trunk allow-pass vlan 1 TO 20
[S1-GigabitEthernet0/0/9]interface GigabitEthernet 0/0/10
[S1-GigabitEthernet0/0/10]port link-type trunk
[S1-GigabitEthernet0/0/10]port trunk allow-pass vlan 1 TO 20
[S1-GigabitEthernet0/0/10]interface GigabitEthernet 0/0/13
[S1-GigabitEthernet0/0/13]port link-type trunk
[S1-GigabitEthernet0/0/13]port trunk allow-pass vlan 1 TO 20
[S1-GigabitEthernet0/0/13]interface GigabitEthernet 0/0/14
[S1-GigabitEthernet0/0/14]port link-type trunk
[S1-GigabitEthernet0/0/14]port trunk allow-pass vlan 1 TO 20

[S2]vlan batch 1 to 20
Info: This operation may take a few seconds. Please wait for a moment...done.
[S2]interface GigabitEthernet 0/0/9
[S2-GigabitEthernet0/0/9]port link-type trunk
[S2-GigabitEthernet0/0/9]port trunk allow-pass vlan 1 TO 20
[S2-GigabitEthernet0/0/9]interface GigabitEthernet 0/0/10
[S2-GigabitEthernet0/0/10]port link-type trunk
[S2-GigabitEthernet0/0/10]port trunk allow-pass vlan 1 TO 20
[S2-GigabitEthernet0/0/10]interface GigabitEthernet 0/0/23
[S2-GigabitEthernet0/0/23]port link-type trunk
[S2-GigabitEthernet0/0/23]port trunk allow-pass vlan 1 TO 20
[S2-GigabitEthernet0/0/23]interface GigabitEthernet 0/0/24
[S2-GigabitEthernet0/0/24]port link-type trunk
[S2-GigabitEthernet0/0/24]port trunk allow-pass vlan 1 TO 20

[S3]vlan batch 1 to 20
Info: This operation may take a few seconds. Please wait for a moment...done.
[S3]interface Ethernet0/0/1
[S3-Ethernet0/0/1]port link-type trunk
[S3-Ethernet0/0/1]port trunk allow-pass vlan 1 TO 20
[S3-Ethernet0/0/1]interface Ethernet0/0/13
```

```
[S3-Ethernet0/0/13]port link-type trunk
[S3-Ethernet0/0/13]port trunk allow-pass vlan 1 TO 20
[S3-Ethernet0/0/13]interface Ethernet0/0/23
[S3-Ethernet0/0/23]port link-type trunk
[S3-Ethernet0/0/23]port trunk allow-pass vlan 1 TO 20

[S4]vlan batch 1 to 20
Info: This operation may take a few seconds. Please wait for a moment...done.
[S4]interface Ethernet0/0/1
[S4-Ethernet0/0/1]port link-type trunk
[S4-Ethernet0/0/1]port trunk allow-pass vlan 1 TO 20
[S4-Ethernet0/0/1]interface Ethernet0/0/14
[S4-Ethernet0/0/14]port link-type trunk
[S4-Ethernet0/0/14]port trunk allow-pass vlan 1 TO 20
[S4-Ethernet0/0/14]interface Ethernet0/0/24
[S4-Ethernet0/0/24]port link-type trunk
[S4-Ethernet0/0/24]port trunk allow-pass vlan 1 TO 20
```

配置MSTP。

定义VLAN1-10属于INSTANCE 1，VLAN11-20属于INSTANCE 2。

```
[S1]stp mode mstp
[S1]stp region-configuration
[S1-mst-region]region-name RG1
[S1-mst-region]instance 1 vlan 1 TO 10
[S1-mst-region]instance 2 vlan 11 to 20
[S1-mst-region]active region-configuration
Info: This operation may take a few seconds. Please wait for a moment....done.

[S2]stp mode mstp
[S2]stp region-configuration
[S2-mst-region]region-name RG1
[S2-mst-region]instance 1 vlan 1 TO 10
[S2-mst-region]instance 2 vlan 11 to 20
[S2-mst-region]active region-configuration
Info: This operation may take a few seconds. Please wait for a moment....done.

[S3]STP mode mstp
Info: This operation may take a few seconds. Please wait for a moment.....done.
[S3]stp region-configuration
[S3-mst-region]region-name RG1
[S3-mst-region]instance 1 vlan 1 to 10
[S3-mst-region]instance 2 vlan 11 to 20
```

```
[S4]STP mode mstp
Info: This operation may take a few seconds. Please wait for a moment.....done.
[S4]stp region-configuration
[S4-mst-region]region-name RG1
[S4-mst-region]instance 1 vlan 1 to 10
[S4-mst-region]instance 2 vlan 11 to 20
```

查看MSTP实例和VLAN的映射关系。

```
[S1]display stp region-configuration
Oper configuration
Format selector      :0
Region name          :RG1
Revision level       :0
Instance   VLANs Mapped
0           21 to 4094
1           1 to 10
2           11 to 20
```

配置S1在实例1中的优先级为4096，在实例2中的优先级为8192。

配置S2在实例2中的优先级为4096，在实例1中的优先级为8192。

```
[S1]stp instance 1 priority 4096
[S1]stp instance 2 priority 8192

[S2]stp instance 2 priority 4096
[S2]stp instance 1 priority 8192
```

查看实例1和实例2的状态信息。

```
[S1]display stp instance 1
-----[MSTI 1 Global Info]-----
MSTI Bridge ID      :4096.4c1f-cc45-aadc
MSTI RegRoot/IRPC   :4096.4c1f-cc45-aadc / 0
MSTI RootPortId     :0.0
Master Bridge        :4096.4c1f-cc45-aac1
Cost to Master       :20000
TC received          :20
TC count per hello   :0

[S2]display stp instance 2
-----[MSTI 2 Global Info]-----
MSTI Bridge ID      :4096.4c1f-cc45-aac1
```



```

MSTI RegRoot/IRPC      :4096.4c1f-cc45-aac1 / 0
MSTI RootPortId        :0.0
Master Bridge           :4096.4c1f-cc45-aac1
Cost to Master          :0
TC received             :16
TC count per hello     :0

```

S1为实例1的根桥，S2为实例2的根桥。

查看MSTP实例1端口角色。

```
[S1]display stp instance 1 brief
```

MSTID	Port	Role	STP State	Protection
1	GigabitEthernet0/0/9	DESI	FORWARDING	NONE
1	GigabitEthernet0/0/10	DESI	FORWARDING	NONE
1	GigabitEthernet0/0/13	DESI	FORWARDING	NONE
1	GigabitEthernet0/0/14	DESI	FORWARDING	NONE

```
[S2]display stp instance 1 brief
```

MSTID	Port	Role	STP State	Protection
1	GigabitEthernet0/0/9	ROOT	FORWARDING	NONE
1	GigabitEthernet0/0/10	ALTE	DISCARDING	NONE
1	GigabitEthernet0/0/23	DESI	FORWARDING	NONE
1	GigabitEthernet0/0/24	DESI	FORWARDING	NONE

```
[S3]display stp instance 1 brief
```

MSTID	Port	Role	STP State	Protection
1	Ethernet0/0/1	ALTE	DISCARDING	NONE
1	Ethernet0/0/13	ROOT	FORWARDING	NONE
1	Ethernet0/0/23	ALTE	DISCARDING	NONE

```
[S4]display stp instance 1 brief
```

MSTID	Port	Role	STP State	Protection
1	Ethernet0/0/1	DESI	FORWARDING	NONE
1	Ethernet0/0/14	ROOT	FORWARDING	NONE
1	Ethernet0/0/24	ALTE	DISCARDING	NONE

实例1中S1为根网桥，S3的VLAN 1到VLAN10的用户经过Ethernet0/0/13接口和S1、S2、S4的VLAN 1到VLAN10的用户通讯。

查看MSTP实例2端口角色。

```
[S1]display stp instance 2 brief
```

MSTID	Port	Role	STP State	Protection
2	GigabitEthernet0/0/9	ROOT	FORWARDING	NONE

```

2    GigabitEthernet0/0/10    ALTE  DISCARDING  NONE
2    GigabitEthernet0/0/13    DESI  FORWARDING  NONE

```

```
[S2]display stp instance 2 brief
```

MSTID	Port	Role	STP State	Protection
2	GigabitEthernet0/0/9	DESI	FORWARDING	NONE
2	GigabitEthernet0/0/10	DESI	FORWARDING	NONE
2	GigabitEthernet0/0/23	DESI	FORWARDING	NONE
2	GigabitEthernet0/0/24	DESI	FORWARDING	NONE

```
[S3]display stp instance 2 brief
```

MSTID	Port	Role	STP State	Protection
2	Ethernet0/0/1	ALTE	DISCARDING	NONE
2	Ethernet0/0/13	ALTE	DISCARDING	NONE
2	Ethernet0/0/23	ROOT	FORWARDING	NONE

```
[S4]display stp instance 2 brief
```

MSTID	Port	Role	STP State	Protection
2	Ethernet0/0/1	DESI	FORWARDING	NONE
2	Ethernet0/0/14	DESI	FORWARDING	NONE
2	Ethernet0/0/24	ROOT	FORWARDING	NONE

实例2中S2为根网桥，S3的VLAN 11到VLAN 20经过Ethernet0/0/23和S1、S2、S4的VLAN 11到VLAN 20通讯。

附加实验：思考并验证

MSTP如何在多个区域实现不同VLAN数据传输的均衡？

RSTP快速转发的原因是什么？

最终设备配置

```

[S1]display current-configuration
#
!Software Version V100R006C00SPC800
sysname S1
#
vlan batch 2 to 20
#

```

```
stp instance 0 priority 8192
stp instance 1 priority 4096
stp instance 2 priority 8192
#
stp region-configuration
  region-name RG1
  instance 1 vlan 1 to 10
  instance 2 vlan 11 to 20
  active region-configuration
#
interface Vlanif1
  ip address 10.0.1.1 255.255.255.0
#
interface GigabitEthernet0/0/9
  port link-type trunk
  port trunk allow-pass vlan 2 to 20
#
interface GigabitEthernet0/0/10
  port link-type trunk
  port trunk allow-pass vlan 2 to 20
#
interface GigabitEthernet0/0/13
  port link-type trunk
  port trunk allow-pass vlan 2 to 20
#
Return

[S2]display current-configuration
#
!Software Version V100R006C00SPC800
sysname S2
#
vlan batch 2 to 20
#
stp instance 0 priority 4096
stp instance 1 priority 8192
stp instance 2 priority 4096
#
stp region-configuration
  region-name RG1
  instance 1 vlan 1 to 10
  instance 2 vlan 11 to 20
  active region-configuration
```

```
#
interface Vlanif1
 ip address 10.0.1.2 255.255.255.0
#
interface GigabitEthernet0/0/9
 port link-type trunk
 port trunk allow-pass vlan 2 to 20
 stp instance 0 port priority 32
#
interface GigabitEthernet0/0/10
 port link-type trunk
 port trunk allow-pass vlan 2 to 20
 stp instance 0 port priority 16
#
interface GigabitEthernet0/0/23
 port link-type trunk
 port trunk allow-pass vlan 2 to 20
#
interface GigabitEthernet0/0/24
 port link-type trunk
 port trunk allow-pass vlan 2 to 20
#
Return

[S3]display current-configuration
#
!Software Version V100R006C00SPC800
 sysname S3
#
vlan batch 2 to 20
#
stp region-configuration
 region-name RG1
 instance 1 vlan 1 to 10
 instance 2 vlan 11 to 20
 active region-configuration
#
interface Ethernet0/0/1
 port link-type trunk
 port trunk allow-pass vlan 2 to 20
#
interface Ethernet0/0/13
 port link-type trunk
```

```
port trunk allow-pass vlan 2 to 20
#
interface Ethernet0/0/23
port link-type trunk
port trunk allow-pass vlan 2 to 20
#
Return
```

```
[S4]display current-configuration
#
!Software Version V100R006C00SPC800
sysname S4
#
vlan batch 2 to 20
#
stp region-configuration
region-name RG1
instance 1 vlan 1 to 10
instance 2 vlan 11 to 20
active region-configuration
#
interface Ethernet0/0/1
port link-type trunk
port trunk allow-pass vlan 2 to 20
#
interface Ethernet0/0/14
port link-type trunk
port trunk allow-pass vlan 2 to 20
#
interface Ethernet0/0/23
#
interface Ethernet0/0/24
port link-type trunk
port trunk allow-pass vlan 2 to 20
stp instance 0 cost 2000000
#
Return
```