Configurações STP e RSTP

Objetivos

Os objetivos deste laboratório são aprender e entender:

- Diferenças entre STP e RSTP

- Como alterar a prioridade do switch para controlar a eleição do switch raiz

- Como alterar a prioridade da porta para controlar a eleição da porta raiz e da porta designada

- Como configurar o RSTP e a compatibilidade entre STP e RSTP

- Como configurar o MSTP para implementar o balanceamento de carga da VLAN (exercício opcional)
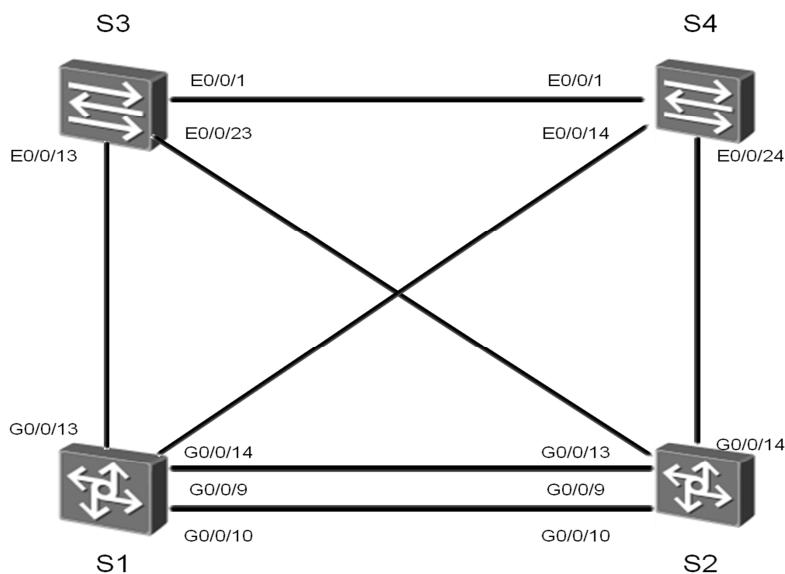
Topologia

Figura - Topologia STP, RTSP e MSTP

Cenário

Você é um administrador de rede de uma empresa. A empresa usa uma rede de backup e configura o STP para evitar loops. A convergência STP nas interfaces requer muito tempo. Para acelerar a convergência, a empresa precisa usar o RSTP. Todas as VLANs compartilham uma árvore STP. Para equilibrar o tráfego de tráfego entre VLANs, a empresa precisa usar o MSTP.

Procedimentos

Passo 1 Configure o STP e verifique a configuração do STP.

Se o STP não estiver ativado, ative-o.

```
[S1]stp enable

[S2]stp enable

[S3]stp enable

[S4]stp enable
```

Configure STP.

```
[S1]stp mode stp

[S2]stp mode stp

[S3]stp mode stp

[S4]stp mode stp
```

Verifique o status do STP.

```
[S1]display stp
-------[CIST Global Info][Mode STP]-------
CIST Bridge         :32768.4c1f-cc45-aadc
Bridge Times        :Hello 2s MaxAge 20s FwDly 15s MaxHop 20
CIST Root/ERPC      :32768.4c1f-cc45-aac1 / 20000
CIST RegRoot/IRPC   :32768.4c1f-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 é o switch raiz e todas as portas são designadas.

Os endereços MAC do switch não são fixos; portanto, o resultado real do teste de laboratório pode ser diferente.

Passo 2 Controlar a eleição do switch raiz.

Configure S1 como o switch raiz primária e S2 como o switch raiz de backup.

```
[S1]stp root primary

[S2]stp root secondary
```

Verifique a configuração do STP.

```
[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 é o switch raiz primária e S2 é o switch raiz de backup.

Um valor menor de prioridade do switch indica uma alta prioridade. Altere a prioridade do switch S1 para 8192 e a prioridade do switch S2 para 4096.

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

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

Verifique a configuração STP.

```
[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…
```

A prioridade de S1 é 8192, a prioridade de S2 é 4096 e S2 é o switch raiz.

Passo 3 Controle a eleição de porta Root.

Verifique as funções de porta no S1.

```
[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
```

GigabitEthernet0/0/9 do S1 é a porta raiz.

A prioridade padrão é 128. Um valor maior indica uma prioridade baixa.

S1 e S2 são conectados através de G0/0/9 e G0/0/10.

Em S2, defina a prioridade de G0/0/9 para 32 e a prioridade de G0/0/10 para 16.

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

Nota: As prioridades da porta são alteradas no S2, não no S1.

Verifique as funções de porta no S1.

```
[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
```

GigabitEthernet0/0/10 do S1 é a porta raiz.

Passo 4 Controlar a eleição do porta designada.

Verifique o status das interfaces conectadas diretamente entre S3 e S4.

```
[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 0/0/2
----[CIST][Port24(Ethernet0/0/2)][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
```

A Ethernet 0/0/1 do S3 é uma porta alternativa. A g0/0/1 da S4 é uma porta designada. Alterar o custo do caminho dos g0/0/2 de S4 para 2000000.

```
[S4]interface GigabitEthernet0/0/2
[S4-Ethernet0/0/2]stp cost 2000000
[S4-Ethernet0/0/2]quit
```

Verifique as funções de porta atuais.

```
[S3]display stp interface GigabitEthernet 0/0/1
----[CIST][Port1(GigabitEthernet0/0/1)][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 GigabitEthernet 0/0/2
----[CIST][Port24(GigabitEthernet0/0/2)][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
```

A GigabitEthernet 0/0/1 do S3 é uma porta designada. A GigabitEthernet 0/0/1 da S4 é uma porta alternativa.

Passo 5 Configure o RSTP e verifique a configuração do RSTP.

Configure os endereços VLANIF 1 em S1 e S2. Teste a conectividade entre S1 e S2.

```
[S1]interface Vlanif 1
[S1-Vlanif1]ip address 10.0.1.1 24
[S1-Vlanif1]quit

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

[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
```

Verifique as funções de porta no S1.

```
[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
```

O GigabitEthernet0/0/10 do S1 é a porta raiz. Faça o ping S2 do S1 20 vezes para testar a conectividade.

Nota: Depois que o S1 executar o ping, desligue o GigabitEthernet 0/0/10 do S2 imediatamente.

```
 [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(l)[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
    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
[S2-GigabitEthernet0/0/10]quit
```

Verifique as funções de porta no S1.

```
[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
```

O GigabitEthernet0 / 0/9 do S1 se torna a porta raiz e a porta entra no estado de Encaminhamento. Existem 15 pacotes de tempo limite e o tempo de convergência da rede é de 30s.

Habilite o GigabitEthernet 0/0/10 do S2.

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

Defina o modo STP para RSTP.

```
[S1]stp mode rstp


[S2]stp mode rstp


[S3]stp mode rstp


[S4]stp mode rstp
```

Verifique as funções de porta no S1.

```
[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
```

O GigabitEthernet0 / 0/10 do S1 é a porta raiz. Faça o ping S2 do S1 20 vezes para testar a conectividade.

Nota: Depois que o S1 executar o ping, desligue o GigabitEthernet 0/0/10 do S2 imediatamente.

```
[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(l)[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
[S2-GigabitEthernet0/0/10]quit
```

Verifique as funções de porta no S1.

```
[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
```

O GigabitEthernet0 / 0/9 do S1 se torna a porta raiz e entra no estado de Encaminhamento. Há um pacote de tempo limite e o tempo de convergê ncia da rede é 2s.

Habilite o GigabitEthernet 0/0/10 do S2.

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

Passo 6 Verifique a compatibilidade entre RSTP e STP.

Configure o modo STP em S1 para STP e mantenha outras configurações inalteradas.

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

Verifique as funções de porta no S1.

```
[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
```

O GigabitEthernet0 / 0/10 do S1 é a porta raiz. Faça o ping S2 do S1 20 vezes para testar a conectividade.

Nota: Depois que o S1 executar o ping, desligue o GigabitEthernet 0/0/10 do S2 imediatamente.

```
 [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(l)[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
    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
```

Verifique as funções de porta no S1.

```
[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
```

O GigabitEthernet0 / 0/9 do S1 se torna a porta raiz e entra no estado de Encaminhamento. Existem 15 pacotes de tempo limite e o tempo de convergência da rede é de 30s.

O RSTP é compatível com STP, mas o modo de convergência é STP.

Habilite o GigabitEthernet 0/0/10 do S2.

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

Passo 7 Configure o MSTP e verifique a configuração do MSTP.

Crie VLANs 2 a 20 e adicione interfaces relacionadas às VLANs.

```
[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]quit
[S1]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]quit
[S1]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]quit
[S1]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
[S1-GigabitEthernet0/0/14]quit

[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]quit
[S2]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]quit
[S2]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]quit
[S2]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
[S2-GigabitEthernet0/0/24]quit

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

[S4]vlan batch 1 to 20
Info: This operation may take a few seconds. Please wait for a moment...done.
[S4]interface GigaEthernet0/0/1
[S4-Ethernet0/0/1]port link-type trunk
[S4-Ethernet0/0/1]port trunk allow-pass vlan 1 TO 20
[S4-Ethernet0/0/1]quit
[S4]interface GigaEthernet0/0/14
[S4-Ethernet0/0/14]port link-type trunk
[S4-Ethernet0/0/14]port trunk allow-pass vlan 1 TO 20
[S4-Ethernet0/0/14]quit
[S4]interface GigaEthernet0/0/2
[S4-Ethernet0/0/2]port link-type trunk
[S4-Ethernet0/0/2]port trunk allow-pass vlan 1 TO 20
[S4-Ethernet0/0/2]quit
```

Configurar MSTP.

Adicione VLANs 1-10 à instância 1 e VLANs 11-20 à instância 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.
[S1-mst-region]quit

[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.
[S2-mst-region]quit

[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
[S3-mst-region]quit

[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
[S4-mst-region]quit
```

Verifique os mapeamentos entre instâncias MSTP e VLANs.

```
[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
```

Defina a prioridade S1 na instância 1 para 4096 e a prioridade S1 na instância 2 para 8192.

Defina a prioridade S2 na instância 2 para 4096 e a prioridade S2 na instância 1 para 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
```

Verifique o status da instância 1 e da instância 2.

```
[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 é o switch raiz da instância 1 e S2 é o switch raiz da instância 2.

Verifique as funções de porta na instância 1 do MSTP.

```
[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
```

S1 na instância 1 é o switch raiz. Os usuários na VLAN 1-10 no S3 se comunicam com os usuários na VLAN 1-10 no S1, S2 e S4 através da Ethernet0 / 0/13.

Verificar funções de porta na instância 2 do MSTP.

```
[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     GigabitEthernet0/0/1          ALTE  DISCARDING       NONE
   2     GigabitEthernet0/0/13         ALTE  DISCARDING       NONE
   2     GigabitEthernet0/0/1          ROOT  FORWARDING       NONE


[S4]display stp instance 2 brief
 MSTID  Port                          Role  STP State      Protection
   2     GigabitEthernet0/0/1          DESI  FORWARDING       NONE
   2     GigabitEthernet0/0/14         DESI  FORWARDING       NONE
   2     GigabitEthernet0/0/2          ROOT  FORWARDING       NONE
```

S2 na instância 2 é o switch raiz. Os usuários na VLAN 11-20 no S3 se comunicam com os usuários na VLAN 11-20 no S1, S2 e S4 através da Ethernet0 / 0/1.

Exercícios adicionais: Análise e verificação

Como o MSTP pode carregar dados de diferentes VLANs em várias regiões?

Qual o motivo pelo qual o RSTP é capaz de implementar o encaminhamento rápido?

Configurações

```
[S1]display current-configuration
#
!Software Version V200R008C00SPC500
 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 V200R008C00SPC500
 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 V200R008C00SPC500
 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 Ethernet0/0/1
 port link-type trunk
 port trunk allow-pass vlan 2 to 20
#
Return

[S4]display current-configuration
#
!Software Version V200R008C00SPC500
 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 Ethernet0/0/2
 port link-type trunk
 port trunk allow-pass vlan 2 to 20
 stp instance 0 cost 2000000
#
Return
```