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ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ БЮДЖЕТНОЕ
ОБРАЗОВАТЕЛЬНОЕ УЧРЕЖДЕНИЕ ВЫСШЕГО ОБРАЗОВАНИЯ

УФИМСКИЙ ГОСУДАРСТВЕННЫЙ НЕФТЯНОЙ
ТЕХНИЧЕСКИЙ УНИВЕРСИТЕТ

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ОТЧЕТ

по лабораторной работе на тему:
"Проектирование сетей STP/RSTP"

Уфа 2023

Цель работы:

1. Построить топологию «кольцо»
2. Назначить идентификаторы коммутаторам с помощью команды `sys-name` и включить протокол `stp` с помощью команды `stp mode`.
3. С помощью команды `display` определить корневой мост и роли портов всех коммутаторов. В отчете в виде произвольной таблицы свести итоговую информацию по портам коммутаторов сети.
4. Назначить в качестве корневого моста любой некорневой мост, изменив приоритет моста с помощью команды `stp priority`.
5. Проверить изменение роли всех портов коммутаторов. Результаты отразить в таблице. Листинги выполнения всех команд включить в отчет.

Ход работы:

В рабочей области строим топологию кольцо на базе коммутаторов S3700.

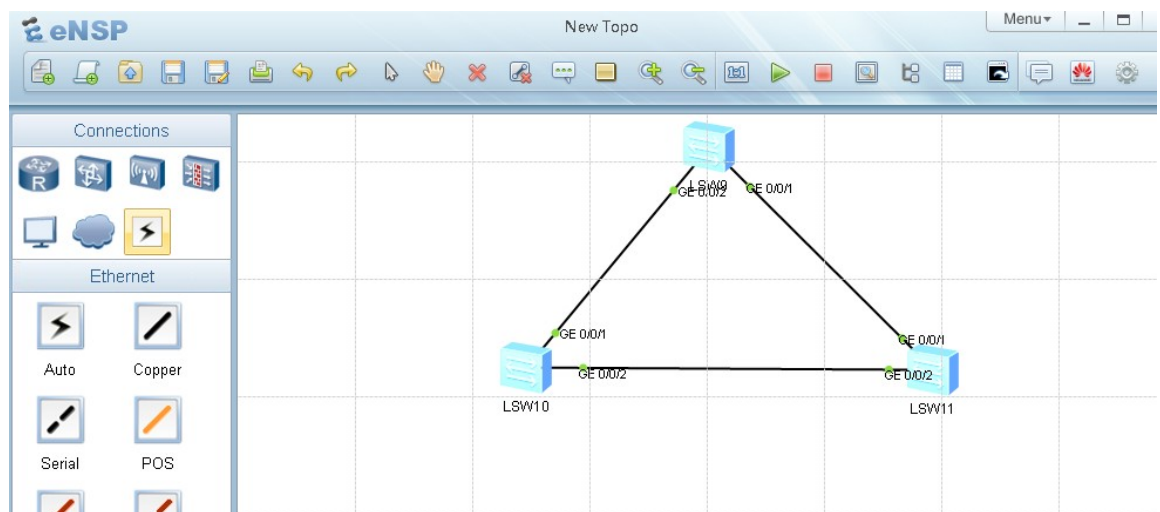


Рисунок 1. Топология «кольцо».

Назначим идентификаторы коммутаторам с помощью команды `sys-name` и включить протокол `stp` с помощью команды `stp mode`.

```
LSW9
The device is running!

<Huawei>sys
<Huawei>system-view
Enter system view, return user view with Ctrl+Z.
[Huawei]sysn
[Huawei]sysname S1
[S1]stp mode stp
Info: This operation may take a few seconds. Please wait for a moment...done.
[S1]
May 28 2023 12:38:22-08:00 S1 DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.25.191.3.1 configurations have been changed. The current change number is 5, the change loop count is 0, and the maximum number of records is 4095.
```

Рисунок 2. Устройство S1.

```
LSW11
The device is running!

<Huawei>sy
<Huawei>system-view
Enter system view, return user view with Ctrl+Z.
[Huawei]sysn
[Huawei]sysname S2
[S2]
May 28 2023 12:39:12-08:00 S2 DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.25.191.3.1 configurations have been changed. The current change number is 4, the change loop count is 0, and the maximum number of records is 4095.
[S2]stp mode stp
Info: This operation may take a few seconds. Please wait for a moment...done.
[S2]
May 28 2023 12:39:22-08:00 S2 DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.25.191.3.1 configurations have been changed. The current change number is 5, the change loop count is 0, and the maximum number of records is 4095.
```

Рисунок 3. Устройство S2.

```
LSW10
The device is running!

<Huawei>sys
<Huawei>system-view
Enter system view, return user view with Ctrl+Z.
[Huawei]sysn
[Huawei]sysname S3
[S3]
May 28 2023 12:40:12-08:00 S3 DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.25.191.3.1 configurations have been changed. The current change number is 4, the change loop count is 0, and the maximum number of records is 4095.
[S3]stp mode stp
Info: This operation may take a few seconds. Please wait for a moment...done.
[S3]
May 28 2023 12:40:32-08:00 S3 DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.25.191.3.1 configurations have been changed. The current change number is 5, the change loop count is 0, and the maximum number of records is 4095.
```

Рисунок 3. Устройство S3.

С помощью команды display определим корневой мост и роли портов всех коммутаторов.

```
LSW12
TC count per hello :2
STP Converge Mode :Normal
Time since last TC :0 days 0h:0m:24s
Number of TC :7
Last TC occurred :GigabitEthernet0/0/2
----[Port23(GigabitEthernet0/0/1)] [DISCARDING]----
Port Protocol :Enabled
Port Role :Alternate Port
Port Priority :128
Port Cost(Dot1T ) :Config=auto / Active=20000
Designated Bridge/Port :32768.4c1f-cccb-7c87 / 128.2
Port Edged :Config=default / Active=disabled
Point-to-point :Config=auto / Active=true
Transit Limit :147 packets/hello-time
Protection Type :None

<S1>display stp interface GigabitEthernet 0/0/2
-----[CIST Global Info][Mode STP]-----
CIST Bridge :32768.4c1f-ccf6-2a57
Config Times :Hello 2s MaxAge 20s FwDly 15s MaxH
Active Times :Hello 2s MaxAge 20s FwDly 15s MaxH
CIST Root/ERPC :32768.4c1f-cc77-4428 / 20000
CIST RegRoot/IRPC :32768.4c1f-ccf6-2a57 / 0
CIST RootPortId :128.24
BPDU-Protection :Disabled
TC or TCN received :75
TC count per hello :1
STP Converge Mode :Normal
Time since last TC :0 days 0h:0m:53s
Number of TC :7
Last TC occurred :GigabitEthernet0/0/2
----[Port24(GigabitEthernet0/0/2)] [FORWARDING]----
Port Protocol :Enabled
Port Role :Root Port
Port Priority :128
Port Cost(Dot1T ) :Config=auto / Active=20000
Designated Bridge/Port :32768.4c1f-cc77-4428 / 128.2
Port Edged :Config=default / Active=disabled
Point-to-point :Config=auto / Active=true
Transit Limit :147 packets/hello-time
Protection Type :None
---- More ----
```

Рисунок 4. Информация о портах устройства S1.

```
LSW13
CIST RegRoot/IRPC :32768.4c1f-cc77-4428 / 0
CIST RootPortId :0.0
BPDU-Protection :Disabled
TC or TCN received :27
TC count per hello :0
STP Converge Mode :Normal
Time since last TC :0 days 0h:2m:46s
Number of TC :10
Last TC occurred :GigabitEthernet0/0/1
----[Port23(GigabitEthernet0/0/1)] [FORWARDING]----
Port Protocol :Enabled
Port Role :Designated Port
Port Priority :128
Port Cost(Dot1T) :Config=auto / Active=20000
Designated Bridge/Port :32768.4c1f-cc77-4428 / 128.23
Port Edged :Config=default / Active=disabled
Point-to-point :Config=auto / Active=true
Transit Limit :147 packets/hello-time
Protection Type :None

<S3>display stp interface GigabitEthernet 0/0/2
-----[CIST Global Info][Mode STP]-----
CIST Bridge :32768.4c1f-cc77-4428
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-cc77-4428 / 0
CIST RegRoot/IRPC :32768.4c1f-cc77-4428 / 0
CIST RootPortId :0.0
BPDU-Protection :Disabled
TC or TCN received :27
TC count per hello :0
STP Converge Mode :Normal
Time since last TC :0 days 0h:2m:53s
Number of TC :10
Last TC occurred :GigabitEthernet0/0/1
----[Port24(GigabitEthernet0/0/2)] [FORWARDING]----
Port Protocol :Enabled
Port Role :Designated Port
Port Priority :128
Port Cost(Dot1T) :Config=auto / Active=20000
Designated Bridge/Port :32768.4c1f-cc77-4428 / 128.24
Port Edged :Config=default / Active=disabled
Point-to-point :Config=auto / Active=true
```

Рисунок 5. Информация о мостах устройства S2.

```
LSW14
TC count per hello :0
STP Converge Mode :Normal
Time since last TC :0 days 0h:2m:50s
Number of TC :10
Last TC occurred :GigabitEthernet0/0/2
----[Port23(GigabitEthernet0/0/1)][FORWARDING]----
Port Protocol :Enabled
Port Role :Designated Port
Port Priority :128
Port Cost(Dot1T ) :Config=auto / Active=20000
Designated Bridge/Port :32768.4c1f-cccb-7c87 / 128.23
Port Edged :Config=default / Active=disabled
Point-to-point :Config=auto / Active=true
Transit Limit :147 packets/hello-time
Protection Type :None

<S2>display stp interface GigabitEthernet 0/0/2
-----[CIST Global Info][Mode STP]-----
CIST Bridge :32768.4c1f-cccb-7c87
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-cc77-4428 / 20000
CIST RegRoot/IRPC :32768.4c1f-cccb-7c87 / 0
CIST RootPortId :128.24
BPDU-Protection :Disabled
TC or TCN received :51
TC count per hello :0
STP Converge Mode :Normal
Time since last TC :0 days 0h:2m:53s
Number of TC :10
Last TC occurred :GigabitEthernet0/0/2
----[Port24(GigabitEthernet0/0/2)][FORWARDING]----
Port Protocol :Enabled
Port Role :Root Port
Port Priority :128
Port Cost(Dot1T ) :Config=auto / Active=20000
Designated Bridge/Port :32768.4c1f-cc77-4428 / 128.24
Port Edged :Config=default / Active=disabled
Point-to-point :Config=auto / Active=true
Transit Limit :147 packets/hello-time
Protection Type :None
---- More ----
```

Рисунок 6. Информация о мостах устройства S3.

Назначим в качестве корневого моста любой некорневой мост (в данном случае S3), изменив приоритет моста с помощью команды `stp priority`

Рисунок 6. Информация о мостах устройства S3.

```
LSW13
<S3>system-view
Enter system view, return user view with Ctrl+Z.
[S3]undo stp root
[S3]stp pr
[S3]stp process
[S3]stp priority 8192
[S3]
May 28 2023 14:37:52-08:00 S3 DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.25.
191.3.1 configurations have been changed. The current change number is 6, the ch
ange loop count is 0, and the maximum number of records is 4095.
[S3]display stp
-----[CIST Global Info][Mode STP]-----
CIST Bridge      :8192 .4c1f-cc77-4428
Config Times     :Hello 2s MaxAge 20s FwDly 15s MaxHop 20
Active Times     :Hello 2s MaxAge 20s FwDly 15s MaxHop 20
CIST Root/ERPC   :8192 .4c1f-cc77-4428 / 0
CIST RegRoot/IRPC :8192 .4c1f-cc77-4428 / 0
CIST RootPortId  :0.0
BPDU-Protection  :Disabled
TC or TCN received :31
TC count per hello :0
STP Converge Mode :Normal
Time since last TC :0 days 0h:1m:19s
Number of TC      :13
Last TC occurred  :GigabitEthernet0/0/2
----[Port1(Ethernet0/0/1)] [DOWN]----
Port Protocol    :Enabled
Port Role        :Disabled Port
Port Priority     :128
Port Cost(Dot1T ) :Config=auto / Active=200000000
Designated Bridge/Port :8192.4c1f-cc77-4428 / 128.1
Port Edged       :Config=default / Active=disabled
Point-to-point   :Config=auto / Active=false
Transit Limit    :147 packets/hello-time
Protection Type  :None
---- More ----
```

Рисунок 7. Назначили S3 корневым.

```
LSW12
[S1]stp process
[S1]stp priority 4096
[S1]display stp
-----[CIST Global Info][Mode STP]-----
CIST Bridge      :4096 .4c1f-ccf6-2a57
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-ccf6-2a57 / 0
CIST RegRoot/IRPC :4096 .4c1f-ccf6-2a57 / 0
CIST RootPortId  :0.0
BPDU-Protection  :Disabled
TC or TCN received :236
TC count per hello :1
STP Converge Mode :Normal
Time since last TC :0 days 0h:0m:36s
Number of TC      :12
Last TC occurred  :GigabitEthernet0/0/2
----[Port1(Ethernet0/0/1)] [DOWN]----
Port Protocol    :Enabled
Port Role        :Disabled Port
Port Priority     :128
Port Cost(Dot1T ) :Config=auto / Active=200000000
Designated Bridge/Port :4096.4c1f-ccf6-2a57 / 128.1
Port Edged       :Config=default / Active=disabled
Point-to-point   :Config=auto / Active=false
```

Рисунок 8. Устройство S2.

При отключении интерфейсов GE 0/0/1 и GE 0/0/2 на устройстве S2, S3 становится корневым

```

LSW13
ge status to down
May 28 2023 14:45:12-08:00 S3 DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.25.
191.3.1 configurations have been changed. The current change number is 8, the ch
ange loop count is 0, and the maximum number of records is 4095.quit
[S3]interface GigabitEthernet 0/0/1
[S3-GigabitEthernet0/0/1]sh
[S3-GigabitEthernet0/0/1]shutdown
Info: Interface GigabitEthernet0/0/1 has already been shutdown.
[S3-GigabitEthernet0/0/1]quit
[S3]display stp
-----[CIST Global Info][Mode STP]-----
CIST Bridge          :8192 .4c1f-cc77-4428
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-ccf6-2a57 / 20000
CIST RegRoot/IRPC    :8192 .4c1f-cc77-4428 / 0
CIST RootPortId      :128.23
BPDU-Protection      :Disabled
TC or TCN received   :66
TC count per hello   :0
STP Converge Mode    :Normal
Time since last TC   :0 days 0h:1m:58s
Number of TC         :17
Last TC occurred     :GigabitEthernet0/0/1
----[Port1(Ethernet0/0/1)] [DOWN]----
Port Protocol        :Enabled
Port Role            :Disabled Port
Port Priority         :128
Port Cost(Dot1T)     :Config=auto / Active=200000000
Designated Bridge/Port :8192.4c1f-cc77-4428 / 128.1
Port Edged           :Config=default / Active=disabled
Point-to-point       :Config=auto / Active=false
Transit Limit        :147 packets/hello-time
Protection Type      :None
---- More ----

```

Рисунок 9. Устройство S3.

```

LSW13
[S3]#sh run | grep -E 'st|sh'
[S3]display stp br
[S3]display stp brief
MSTID Port Role STP State Protection
[S3]
[S3]interface g
[S3]interface GigabitEthernet 0/0/1
[S3-GigabitEthernet0/0/1]undo sh
[S3-GigabitEthernet0/0/1]undo shutdown
[S3-GigabitEthernet0/0/1]
May 28 2023 14:50:21-08:00 S3 %*01PHY/1/PHY(1)[8]: GigabitEthernet0/0/1: chan
ge status to up
May 28 2023 14:50:21-08:00 S3 %*01IFNET/4/IF_STATE(1)[9]:Interface Vlanif1 has t
urned into UP state.quit
[S3]
May 28 2023 14:50:23-08:00 S3 DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.25.
191.3.1 configurations have been changed. The current change number is 9, the ch
ange loop count is 0, and the maximum number of records is 4095.
[S3]interface GigabitEthernet 0/0/2
[S3-GigabitEthernet0/0/2]undo shutdown
[S3-GigabitEthernet0/0/2]quit
May 28 2023 14:50:33-08:00 S3 DS/4/DATASYNC_CFGCHANGE:OID 1.3.6.1.4.1.2011.5.25.
191.3.1 configurations have been changed. The current change number is 10, the c
hange loop count is 0, and the maximum number of records is 4095.
May 28 2023 14:50:33-08:00 S3 %*01PHY/1/PHY(1)[10]: GigabitEthernet0/0/2: cha
nge status to display stp brief
[S3-GigabitEthernet0/0/2]quit
[S3]display stp brief
^
Error:Too many parameters found at '^' position.
[S3]display stp b
[S3]display stp brief
MSTID Port Role STP State Protection
0 GigabitEthernet0/0/1 ROOT FORWARDING NONE
0 GigabitEthernet0/0/2 DESI LEARNING NONE
[S3]

```

Рисунок 10. Информация об интерфейсах устройства S3.


```

LSW14

Please Press ENTER.

<S2>sys
<S2>system-view
Enter system view, return user view with Ctrl+Z.
[S2]inter
[S2]interface g
[S2]interface GigabitEthernet 0/0/1
[S2-GigabitEthernet0/0/1]undo sh
[S2-GigabitEthernet0/0/1]undo shutdown
Info: Interface GigabitEthernet0/0/1 is not shutdown.
[S2-GigabitEthernet0/0/1]
May 28 2023 14:50:33-08:00 S2 %%01PHY/1/PHY(1)[0]: GigabitEthernet0/0/2:
ge status to up
[S2-GigabitEthernet0/0/1]93H5
      ^
Error: Unrecognized command found at '^' position.
[S2-GigabitEthernet0/0/1]quit
[S2]display stp b
[S2]display stp brief
MSTID Port Role STP State Protection
0 GigabitEthernet0/0/1 ROOT FORWARDING NONE
0 GigabitEthernet0/0/2 ALTE DISCARDING NONE
[S2]

```

Рисунок 11. Информация об интерфейсах устройства S2.

```

LSW12
May 28 2023 14:45:13-08:00 S1 %%01PHY/1/PHY(1)[2]: GigabitEthernet0/0/2: cha
ge status to down Port STP Mode :MSTP
Port Protocol Type :Config=auto / Active=dot1s

[S1]display stp br
[S1]display stp brief
MSTID Port Role STP State Protection
0 GigabitEthernet0/0/1 DESI FORWARDING NONE
[S1]inter
[S1]interface g
[S1]interface GigabitEthernet 0/0/1
[S1-GigabitEthernet0/0/1]undo sh
[S1-GigabitEthernet0/0/1]undo shutdown
Info: Interface GigabitEthernet0/0/1 is not shutdown.
[S1-GigabitEthernet0/0/1]
May 28 2023 14:50:21-08:00 S1 %%01PHY/1/PHY(1)[3]: GigabitEthernet0/0/2: cha
ge status to up
[S1-GigabitEthernet0/0/1]quit
[S1]display stp b
[S1]display stp brief
MSTID Port Role STP State Protection
0 GigabitEthernet0/0/1 DESI FORWARDING NONE
0 GigabitEthernet0/0/2 DESI FORWARDING NONE
[S1]

```

Рисунок 12. Информация об интерфейсах устройства S1.