Лабораторная работа №2 (Опциональное)

- ## Настройка протокола RSTP

  - ### L2-SW-1

```
vIOS-L2-01#conf t
vIOS-L2-01(config)#int range g0/0-3
vIOS-L2-01(config-if-range)#shut
vIOS-L2-01(config-if-range)#switchport trunk encapsulation dot1q
vIOS-L2-01(config-if-range)#switchport trunk native vlan 1
vIOS-L2-01(config-if-range)#switchport mode trunk
vIOS-L2-01(config-if-range)#no shut
vIOS-L2-01(config-if-range)#exit
vIOS-L2-01(config)#int range g1/0-3
vIOS-L2-01(config-if-range)#shut
vIOS-L2-01(config-if-range)#switchport trunk encapsulation dot1q
vIOS-L2-01(config-if-range)#switchport trunk native vlan 1
vIOS-L2-01(config-if-range)#switchport mode trunk
vIOS-L2-01(config-if-range)#no shut
vIOS-L2-01(config-if-range)#exit
vIOS-L2-01(config)#hostname L2-SW-1
L2-SW-1(config)#spanning-tree vlan 1 root primary
L2-SW-1(config)#spanning-tree mode rapid-pvst

L2-SW-1#sh sp
VLAN0001
  Spanning tree enabled protocol rstp
  Root ID    Priority    24577
         Address     0c87.dc96.0000
         This bridge is the root
         Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    24577  (priority 24576 sys-id-ext 1)
         Address     0c87.dc96.0000
         Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
         Aging Time  300 sec

Interface           Role Sts Cost      Prio.Nbr Type
------------------- ---- --- --------- -------- --------------------------------
Gi0/0               Desg FWD 4         128.1    Shr
Gi0/1               Desg FWD 4         128.2    Shr
Gi0/2               Desg FWD 4         128.3    Shr
Gi0/3               Desg FWD 4         128.4    Shr
Gi1/0               Desg FWD 4         128.5    Shr
Gi1/1               Desg FWD 4         128.6    Shr
Gi1/2               Desg FWD 4         128.7    Shr
```

```
Gi1/3               Desg FWD 4         128.8    Shr
```

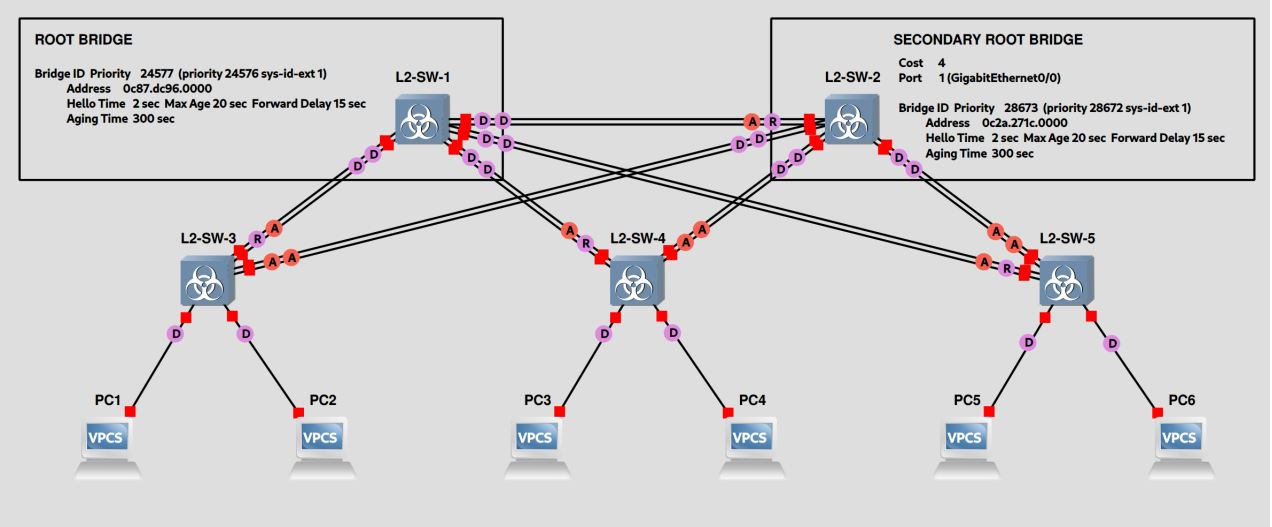
- ## L2-SW-2

```
vIOS-L2-01#conf t
vIOS-L2-01(config)#int range g0/0-3
vIOS-L2-01(config-if-range)#shut
vIOS-L2-01(config-if-range)#switchport trunk encapsulation dot1q
vIOS-L2-01(config-if-range)#switchport trunk native vlan 1
vIOS-L2-01(config-if-range)#switchport mode trunk
vIOS-L2-01(config-if-range)#no shut
vIOS-L2-01(config-if-range)#exit
vIOS-L2-01(config)#int range g1/0-3
vIOS-L2-01(config-if-range)#shut
vIOS-L2-01(config-if-range)#switchport trunk encapsulation dot1q
vIOS-L2-01(config-if-range)#switchport trunk native vlan 1
vIOS-L2-01(config-if-range)#switchport mode trunk
vIOS-L2-01(config-if-range)#no shut
vIOS-L2-01(config-if-range)#exit
vIOS-L2-01(config)#hostname L2-SW-2
L2-SW-2(config)#spanning-tree vlan 1 root secondary
L2-SW-2(config)#spanning-tree mode rapid-pvst

L2-SW-2#sh sp
VLAN0001
  Spanning tree enabled protocol rstp
  Root ID    Priority    24577
         Address     0c87.dc96.0000
         Cost        4
         Port        1 (GigabitEthernet0/0)
         Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    28673  (priority 28672 sys-id-ext 1)
         Address     0c2a.271c.0000
         Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
         Aging Time  300 sec

Interface           Role Sts Cost      Prio.Nbr Type
------------------- ---- --- --------- -------- --------------------------------
Gi0/0               Root FWD 4         128.1    Shr
Gi0/1               Altn BLK 4         128.2    Shr
Gi0/2               Desg FWD 4         128.3    Shr
Gi0/3               Desg FWD 4         128.4    Shr
Gi1/0               Desg FWD 4         128.5    Shr
Gi1/1               Desg FWD 4         128.6    Shr
Gi1/2               Desg FWD 4         128.7    Shr
Gi1/3               Desg FWD 4         128.8    Shr
```

L2-SW-3, L2-SW-4, L2-SW-5

```
vIOS-L2-01#conf t
vIOS-L2-01(config)#int range g0/0-3
vIOS-L2-01(config-if-range)#shut
vIOS-L2-01(config-if-range)#switchport trunk encapsulation dot1q
vIOS-L2-01(config-if-range)#switchport trunk native vlan 1
vIOS-L2-01(config-if-range)#switchport mode trunk
vIOS-L2-01(config-if-range)#no shut
vIOS-L2-01(config-if-range)#exit
vIOS-L2-01(config)#int range g1/0-1
vIOS-L2-01(config-if-range)#shut
vIOS-L2-01(config-if-range)#switchport mode access
vIOS-L2-01(config-if-range)#switchport access vlan 1
vIOS-L2-01(config-if-range)#no shut
vIOS-L2-01(config-if-range)#exit
vIOS-L2-01(config)#spanning-tree mode rapid-pvst
vIOS-L2-01(config)#exit
```

Схема сети



Проверка доступности персональных компьютеров

PC1

- To PC2

```
PC1> ping 192.168.1.2

84 bytes from 192.168.1.2 icmp_seq=1 ttl=64 time=13.010 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=7.136 ms
84 bytes from 192.168.1.2 icmp_seq=3 ttl=64 time=3.764 ms
```

```
84 bytes from 192.168.1.2 icmp_seq=4 ttl=64 time=2.885 ms
84 bytes from 192.168.1.2 icmp_seq=5 ttl=64 time=0.884 ms
```

- To PC3

```
PC1> ping 192.168.2.1

84 bytes from 192.168.2.1 icmp_seq=1 ttl=64 time=18.537 ms
84 bytes from 192.168.2.1 icmp_seq=2 ttl=64 time=8.552 ms
84 bytes from 192.168.2.1 icmp_seq=3 ttl=64 time=6.506 ms
84 bytes from 192.168.2.1 icmp_seq=4 ttl=64 time=7.265 ms
84 bytes from 192.168.2.1 icmp_seq=5 ttl=64 time=9.221 ms
```

- To PC4

```
PC1> ping 192.168.2.2

84 bytes from 192.168.2.2 icmp_seq=1 ttl=64 time=18.532 ms
84 bytes from 192.168.2.2 icmp_seq=2 ttl=64 time=12.040 ms
84 bytes from 192.168.2.2 icmp_seq=3 ttl=64 time=10.263 ms
84 bytes from 192.168.2.2 icmp_seq=4 ttl=64 time=5.898 ms
84 bytes from 192.168.2.2 icmp_seq=5 ttl=64 time=10.034 ms
```

- To PC5

```
PC1> ping 192.168.3.1

84 bytes from 192.168.3.1 icmp_seq=1 ttl=64 time=12.087 ms
84 bytes from 192.168.3.1 icmp_seq=2 ttl=64 time=15.016 ms
84 bytes from 192.168.3.1 icmp_seq=3 ttl=64 time=4.107 ms
84 bytes from 192.168.3.1 icmp_seq=4 ttl=64 time=3.334 ms
84 bytes from 192.168.3.1 icmp_seq=5 ttl=64 time=7.016 ms
```

- To PC6

```
PC1> ping 192.168.3.2

84 bytes from 192.168.3.2 icmp_seq=1 ttl=64 time=10.438 ms
84 bytes from 192.168.3.2 icmp_seq=2 ttl=64 time=7.377 ms
84 bytes from 192.168.3.2 icmp_seq=3 ttl=64 time=2.472 ms
84 bytes from 192.168.3.2 icmp_seq=4 ttl=64 time=9.018 ms
84 bytes from 192.168.3.2 icmp_seq=5 ttl=64 time=7.234 ms
```

- **PC2**

- To PC3

```
PC2> ping 192.168.2.1

84 bytes from 192.168.2.1 icmp_seq=1 ttl=64 time=11.325 ms
84 bytes from 192.168.2.1 icmp_seq=2 ttl=64 time=7.716 ms
84 bytes from 192.168.2.1 icmp_seq=3 ttl=64 time=3.728 ms
84 bytes from 192.168.2.1 icmp_seq=4 ttl=64 time=1.594 ms
84 bytes from 192.168.2.1 icmp_seq=5 ttl=64 time=8.062 ms
```

- To PC4

```
PC2> ping 192.168.2.2

84 bytes from 192.168.2.2 icmp_seq=1 ttl=64 time=4.704 ms
84 bytes from 192.168.2.2 icmp_seq=2 ttl=64 time=9.601 ms
84 bytes from 192.168.2.2 icmp_seq=3 ttl=64 time=6.659 ms
84 bytes from 192.168.2.2 icmp_seq=4 ttl=64 time=7.190 ms
84 bytes from 192.168.2.2 icmp_seq=5 ttl=64 time=7.174 ms
```

- To PC5

```
PC2> ping 192.168.3.1

84 bytes from 192.168.3.1 icmp_seq=1 ttl=64 time=12.247 ms
84 bytes from 192.168.3.1 icmp_seq=2 ttl=64 time=1.758 ms
84 bytes from 192.168.3.1 icmp_seq=3 ttl=64 time=5.085 ms
84 bytes from 192.168.3.1 icmp_seq=4 ttl=64 time=4.001 ms
84 bytes from 192.168.3.1 icmp_seq=5 ttl=64 time=2.898 ms
```

- To PC6

```
PC2> ping 192.168.3.2

84 bytes from 192.168.3.2 icmp_seq=1 ttl=64 time=7.911 ms
84 bytes from 192.168.3.2 icmp_seq=2 ttl=64 time=7.029 ms
84 bytes from 192.168.3.2 icmp_seq=3 ttl=64 time=6.130 ms
84 bytes from 192.168.3.2 icmp_seq=4 ttl=64 time=8.833 ms
84 bytes from 192.168.3.2 icmp_seq=5 ttl=64 time=14.157 ms
```

PC3

- To PC4

```
PC3> ping 192.168.2.2

84 bytes from 192.168.2.2 icmp_seq=1 ttl=64 time=8.504 ms
84 bytes from 192.168.2.2 icmp_seq=2 ttl=64 time=1.675 ms
84 bytes from 192.168.2.2 icmp_seq=3 ttl=64 time=4.166 ms
84 bytes from 192.168.2.2 icmp_seq=4 ttl=64 time=7.835 ms
84 bytes from 192.168.2.2 icmp_seq=5 ttl=64 time=0.848 ms
```

- To PC5

```
PC3> ping 192.168.3.1

84 bytes from 192.168.3.1 icmp_seq=1 ttl=64 time=5.344 ms
84 bytes from 192.168.3.1 icmp_seq=2 ttl=64 time=1.736 ms
84 bytes from 192.168.3.1 icmp_seq=3 ttl=64 time=4.558 ms
84 bytes from 192.168.3.1 icmp_seq=4 ttl=64 time=13.699 ms
84 bytes from 192.168.3.1 icmp_seq=5 ttl=64 time=8.661 ms
```

- To PC6

```
PC3> ping 192.168.3.2

84 bytes from 192.168.3.2 icmp_seq=1 ttl=64 time=10.599 ms
84 bytes from 192.168.3.2 icmp_seq=2 ttl=64 time=8.535 ms
84 bytes from 192.168.3.2 icmp_seq=3 ttl=64 time=2.396 ms
84 bytes from 192.168.3.2 icmp_seq=4 ttl=64 time=7.258 ms
84 bytes from 192.168.3.2 icmp_seq=5 ttl=64 time=7.573 ms
```

PC4

- To PC5

```
PC4> ping 192.168.3.1

84 bytes from 192.168.3.1 icmp_seq=1 ttl=64 time=9.569 ms
84 bytes from 192.168.3.1 icmp_seq=2 ttl=64 time=6.692 ms
84 bytes from 192.168.3.1 icmp_seq=3 ttl=64 time=5.618 ms
84 bytes from 192.168.3.1 icmp_seq=4 ttl=64 time=5.887 ms
84 bytes from 192.168.3.1 icmp_seq=5 ttl=64 time=7.450 ms
```

- To PC6

```
PC4> ping 192.168.3.2
```

```
84 bytes from 192.168.3.2 icmp_seq=1 ttl=64 time=8.311 ms
84 bytes from 192.168.3.2 icmp_seq=2 ttl=64 time=1.773 ms
84 bytes from 192.168.3.2 icmp_seq=3 ttl=64 time=3.944 ms
84 bytes from 192.168.3.2 icmp_seq=4 ttl=64 time=4.120 ms
84 bytes from 192.168.3.2 icmp_seq=5 ttl=64 time=7.876 ms
```

- **PC5**
  - To PC6

```
PC5> ping 192.168.3.2

84 bytes from 192.168.3.2 icmp_seq=1 ttl=64 time=10.119 ms
84 bytes from 192.168.3.2 icmp_seq=2 ttl=64 time=0.801 ms
84 bytes from 192.168.3.2 icmp_seq=3 ttl=64 time=6.130 ms
84 bytes from 192.168.3.2 icmp_seq=4 ttl=64 time=6.378 ms
84 bytes from 192.168.3.2 icmp_seq=5 ttl=64 time=4.893 ms
```

Изменить стоимость маршрута для порта RP

Изначальная схема с базовой конфигурацией L2-SW-4

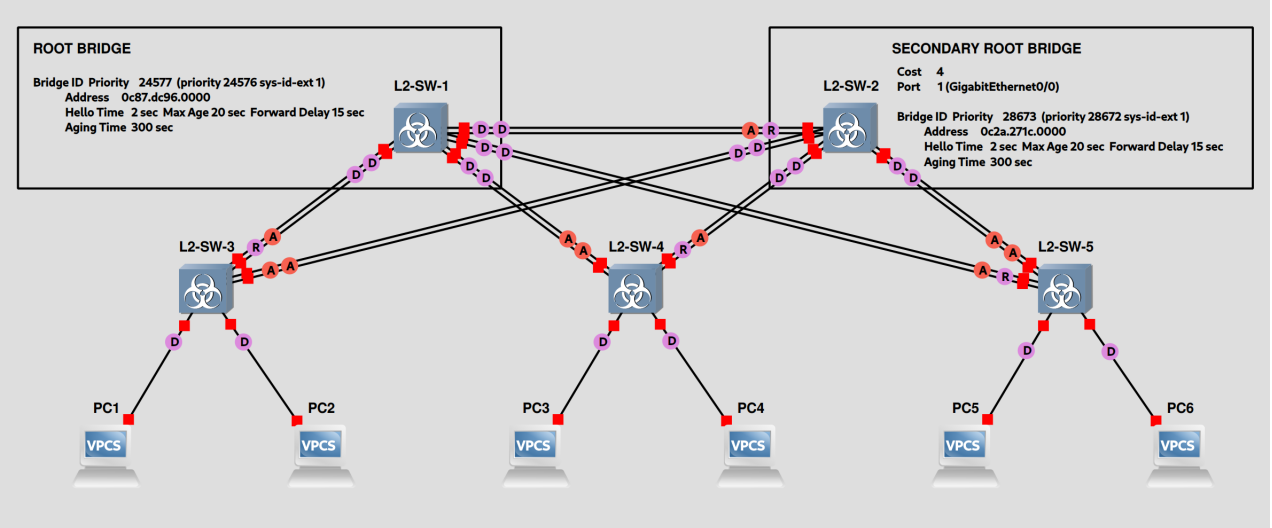
```
L2-SW-4#sh sp

VLAN0001
  Spanning tree enabled protocol rstp
  Root ID    Priority    24577
         Address     0c87.dc96.0000
         Cost        4
         Port        1 (GigabitEthernet0/0)
         Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    32769  (priority 32768 sys-id-ext 1)
         Address     0cb8.17f2.0000
         Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
         Aging Time  300 sec

Interface           Role Sts Cost      Prio.Nbr Type
------------------- ---- --- --------- -------- --------------------------------
Gi0/0               Root FWD 4         128.1    Shr
Gi0/1               Altn BLK 4         128.2    Shr
Gi0/2               Altn BLK 4         128.3    Shr
Gi0/3               Altn BLK 4         128.4    Shr
Gi1/0               Desg FWD 4         128.5    Shr
Gi1/1               Desg FWD 4         128.6    Shr
```

◦ Конфигурация L2-SW-4

```
# После изменений маршрут потока изменится с L2-SW-4 -> L2-SW-1 на L2-SW-4 -
L2-SW-4#conf t
L2-SW-4(config)#int range g0/0-1
L2-SW-4(config-if)#span vlan 1 cost 24
L2-SW-4(config-if)#no shut
L2-SW-4(config-if)#exit
```

◦ Вывод измененной схемы

```
L2-SW-4#sh sp

VLAN0001
  Spanning tree enabled protocol rstp
  Root ID    Priority    24577
         Address     0c87.dc96.0000
         Cost        8
         Port        3 (GigabitEthernet0/2)
         Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    32769  (priority 32768 sys-id-ext 1)
         Address     0cb8.17f2.0000
         Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
         Aging Time  300 sec

Interface           Role Sts Cost      Prio.Nbr Type
------------------- ---- --- --------- -------- --------------------------------
Gi0/0               Altn BLK 24        128.1    Shr
Gi0/1               Altn BLK 24        128.2    Shr
Gi0/2               Root FWD 4         128.3    Shr
Gi0/3               Altn BLK 4         128.4    Shr
Gi1/0               Desg LRN 4         128.5    Shr
Gi1/1               Desg LRN 4         128.6    Shr
```


ROOT BRIDGE
Bridge ID Priority 24577 (priority 24576 sys-id-ext 1)
Address 0c87.dc96.0000
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 300 sec
SECONDARY ROOT BRIDGE
Cost 4
Port 1 (GigabitEthernet0/0)
Bridge ID Priority 28673 (priority 28672 sys-id-ext 1)
Address 0c2a.271c.0000
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
Aging Time 300 sec
L2-SW-1
L2-SW-2
L2-SW-3
L2-SW-4
L2-SW-5
PC1
PC2
PC3
PC4
PC5
PC6
VPCS