Лабораторная работа №2

- Настройка протокола STP
  - L2-SW-1

```
L2-SW-1(config)#spanning-tree vlan 1 root primary

This bridge is the root

Bridge ID  Priority    24577  (priority 24576 sys-id-ext 1)
           Address     0c71.d551.0000
           Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
           Aging Time  300 sec
```

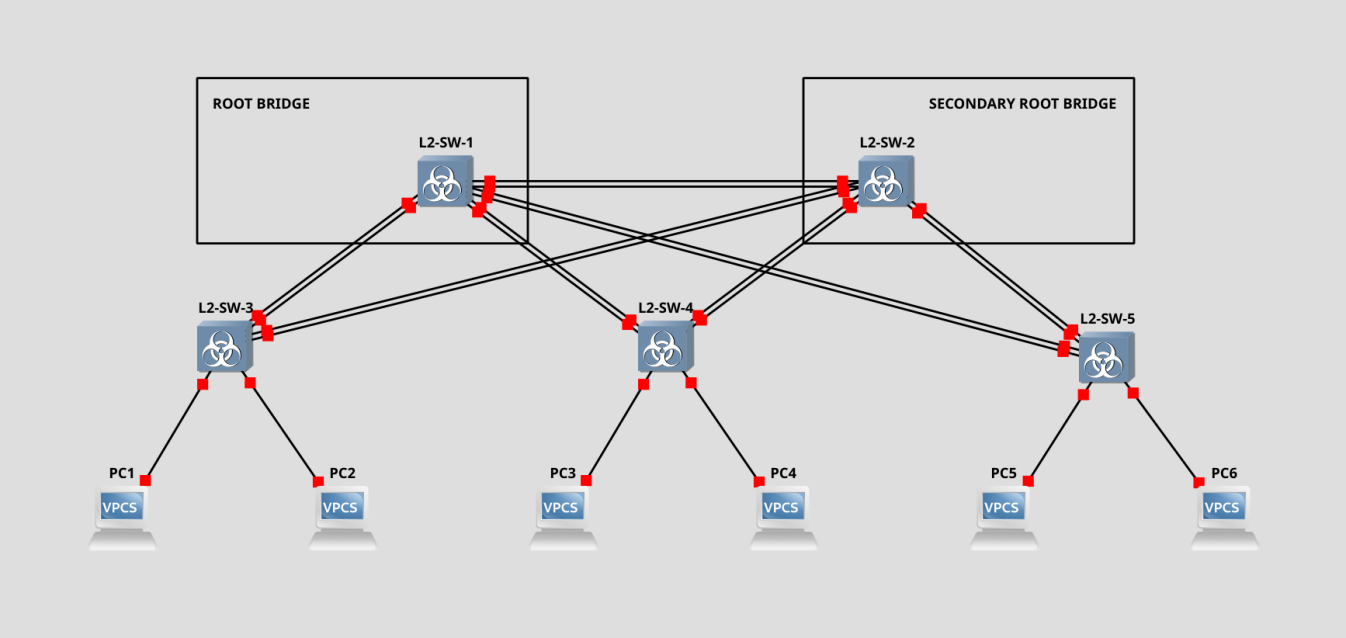
  - L2-SW-2

```
L2-SW-2(config)#spanning-tree vlan 1 root secondary

Cost       4
Port       1 (GigabitEthernet0/0)

Bridge ID  Priority    28673  (priority 28672 sys-id-ext 1)
           Address     0c7e.48ca.0000
           Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
           Aging Time  300 sec
```

  - 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=0.637 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=0.418 ms
84 bytes from 192.168.1.2 icmp_seq=3 ttl=64 time=0.920 ms
84 bytes from 192.168.1.2 icmp_seq=4 ttl=64 time=0.580 ms
84 bytes from 192.168.1.2 icmp_seq=5 ttl=64 time=0.981 ms
```

    - To PC3

```
PC1> ping 192.168.2.1

84 bytes from 192.168.2.1 icmp_seq=1 ttl=64 time=9.333 ms
84 bytes from 192.168.2.1 icmp_seq=2 ttl=64 time=2.423 ms
84 bytes from 192.168.2.1 icmp_seq=3 ttl=64 time=11.989 ms
84 bytes from 192.168.2.1 icmp_seq=4 ttl=64 time=3.975 ms
84 bytes from 192.168.2.1 icmp_seq=5 ttl=64 time=5.666 ms
```

- To PC4

```
PC1> ping 192.168.2.2

84 bytes from 192.168.2.2 icmp_seq=1 ttl=64 time=11.144 ms
84 bytes from 192.168.2.2 icmp_seq=2 ttl=64 time=7.366 ms
84 bytes from 192.168.2.2 icmp_seq=3 ttl=64 time=6.732 ms
84 bytes from 192.168.2.2 icmp_seq=4 ttl=64 time=8.019 ms
84 bytes from 192.168.2.2 icmp_seq=5 ttl=64 time=7.309 ms
```

- To PC5

```
PC1> ping 192.168.3.1

84 bytes from 192.168.3.1 icmp_seq=1 ttl=64 time=2.549 ms
84 bytes from 192.168.3.1 icmp_seq=2 ttl=64 time=2.088 ms
84 bytes from 192.168.3.1 icmp_seq=3 ttl=64 time=7.229 ms
84 bytes from 192.168.3.1 icmp_seq=4 ttl=64 time=7.482 ms
84 bytes from 192.168.3.1 icmp_seq=5 ttl=64 time=14.778 ms
```

- To PC6

```
PC1> ping 192.168.3.2

84 bytes from 192.168.3.2 icmp_seq=1 ttl=64 time=9.611 ms
84 bytes from 192.168.3.2 icmp_seq=2 ttl=64 time=3.815 ms
84 bytes from 192.168.3.2 icmp_seq=3 ttl=64 time=4.567 ms
84 bytes from 192.168.3.2 icmp_seq=4 ttl=64 time=6.477 ms
84 bytes from 192.168.3.2 icmp_seq=5 ttl=64 time=6.627 ms
```

- PC2

- To PC3

```
PC2> ping 192.168.2.1

84 bytes from 192.168.2.1 icmp_seq=1 ttl=64 time=18.684 ms
84 bytes from 192.168.2.1 icmp_seq=2 ttl=64 time=14.516 ms
84 bytes from 192.168.2.1 icmp_seq=3 ttl=64 time=15.761 ms
84 bytes from 192.168.2.1 icmp_seq=4 ttl=64 time=15.579 ms
84 bytes from 192.168.2.1 icmp_seq=5 ttl=64 time=15.927 ms
```

- To PC4

```
PC2> ping 192.168.2.2

84 bytes from 192.168.2.2 icmp_seq=1 ttl=64 time=13.109 ms
84 bytes from 192.168.2.2 icmp_seq=2 ttl=64 time=7.428 ms
84 bytes from 192.168.2.2 icmp_seq=3 ttl=64 time=6.474 ms
84 bytes from 192.168.2.2 icmp_seq=4 ttl=64 time=5.760 ms
84 bytes from 192.168.2.2 icmp_seq=5 ttl=64 time=9.032 ms
```

- To PC5

```
PC2> ping 192.168.3.1

84 bytes from 192.168.3.1 icmp_seq=1 ttl=64 time=28.926 ms
84 bytes from 192.168.3.1 icmp_seq=2 ttl=64 time=1.431 ms
84 bytes from 192.168.3.1 icmp_seq=3 ttl=64 time=4.684 ms
84 bytes from 192.168.3.1 icmp_seq=4 ttl=64 time=1.948 ms
84 bytes from 192.168.3.1 icmp_seq=5 ttl=64 time=5.895 ms
```

- To PC6

```
PC2> ping 192.168.3.2

84 bytes from 192.168.3.2 icmp_seq=1 ttl=64 time=21.236 ms
84 bytes from 192.168.3.2 icmp_seq=2 ttl=64 time=1.329 ms
84 bytes from 192.168.3.2 icmp_seq=3 ttl=64 time=5.296 ms
84 bytes from 192.168.3.2 icmp_seq=4 ttl=64 time=1.666 ms
84 bytes from 192.168.3.2 icmp_seq=5 ttl=64 time=9.738 ms
```

- PC3
  - To PC4

```
PC3> ping 192.168.2.2

84 bytes from 192.168.2.2 icmp_seq=1 ttl=64 time=0.669 ms
84 bytes from 192.168.2.2 icmp_seq=2 ttl=64 time=2.806 ms
84 bytes from 192.168.2.2 icmp_seq=3 ttl=64 time=7.177 ms
84 bytes from 192.168.2.2 icmp_seq=4 ttl=64 time=0.680 ms
84 bytes from 192.168.2.2 icmp_seq=5 ttl=64 time=6.789 ms
```

  - To PC5

```
PC3> ping 192.168.3.1

84 bytes from 192.168.3.1 icmp_seq=1 ttl=64 time=13.787 ms
84 bytes from 192.168.3.1 icmp_seq=2 ttl=64 time=2.895 ms
84 bytes from 192.168.3.1 icmp_seq=3 ttl=64 time=7.819 ms
84 bytes from 192.168.3.1 icmp_seq=4 ttl=64 time=2.381 ms
84 bytes from 192.168.3.1 icmp_seq=5 ttl=64 time=7.184 ms
```

  - To PC6

```
PC3> ping 192.168.3.2

84 bytes from 192.168.3.2 icmp_seq=1 ttl=64 time=10.929 ms
84 bytes from 192.168.3.2 icmp_seq=2 ttl=64 time=6.957 ms
84 bytes from 192.168.3.2 icmp_seq=3 ttl=64 time=7.512 ms
84 bytes from 192.168.3.2 icmp_seq=4 ttl=64 time=1.966 ms
84 bytes from 192.168.3.2 icmp_seq=5 ttl=64 time=12.268 ms
```

- PC4
  - To PC5

```
PC4> ping 192.168.3.1

84 bytes from 192.168.3.1 icmp_seq=1 ttl=64 time=15.582 ms
84 bytes from 192.168.3.1 icmp_seq=2 ttl=64 time=7.798 ms
84 bytes from 192.168.3.1 icmp_seq=3 ttl=64 time=12.691 ms
84 bytes from 192.168.3.1 icmp_seq=4 ttl=64 time=2.948 ms
84 bytes from 192.168.3.1 icmp_seq=5 ttl=64 time=1.350 ms
```

  - To PC6

```
PC4> ping 192.168.3.2

84 bytes from 192.168.3.2 icmp_seq=1 ttl=64 time=14.132 ms
84 bytes from 192.168.3.2 icmp_seq=2 ttl=64 time=3.531 ms
84 bytes from 192.168.3.2 icmp_seq=3 ttl=64 time=6.322 ms
84 bytes from 192.168.3.2 icmp_seq=4 ttl=64 time=13.398 ms
84 bytes from 192.168.3.2 icmp_seq=5 ttl=64 time=6.513 ms
```

- PC5
  - To PC6

```
PC5> ping 192.168.3.2

84 bytes from 192.168.3.2 icmp_seq=1 ttl=64 time=2.193 ms
84 bytes from 192.168.3.2 icmp_seq=2 ttl=64 time=7.757 ms
84 bytes from 192.168.3.2 icmp_seq=3 ttl=64 time=4.090 ms
84 bytes from 192.168.3.2 icmp_seq=4 ttl=64 time=2.572 ms
84 bytes from 192.168.3.2 icmp_seq=5 ttl=64 time=7.265 ms
```

- ## Изменить стоимость маршрута для порта RP

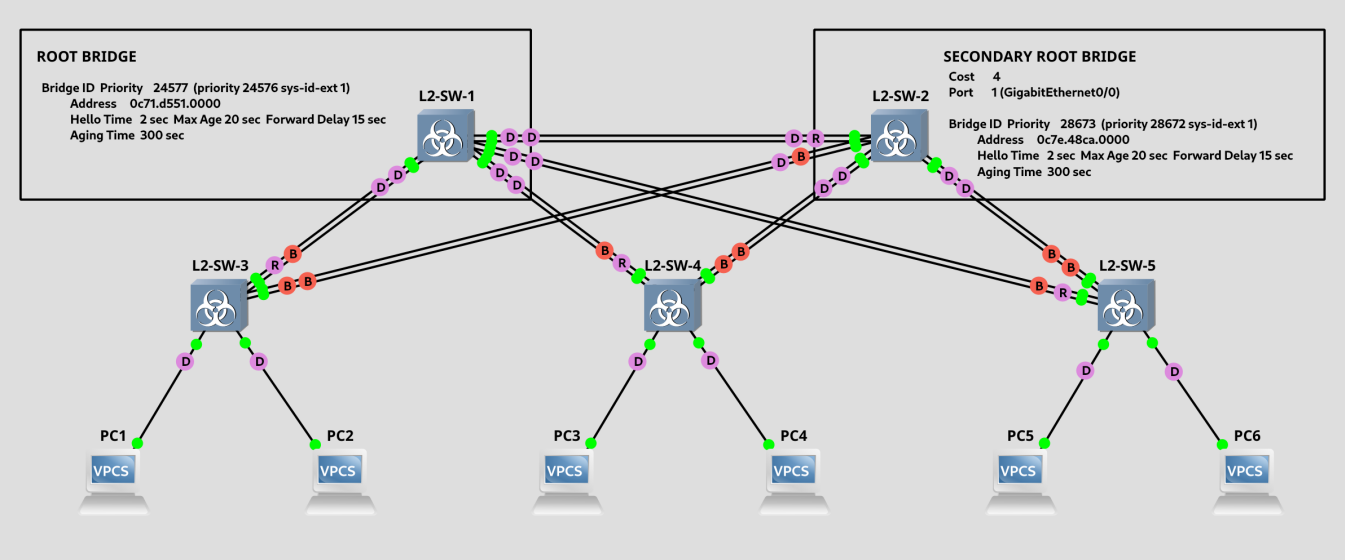
  - ### Изначальная схема с базовой конфигурацией L2-SW-4

```
L2-SW-4#show spanning-tree

VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    24577
             Address     0c71.d551.0000
             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     0c51.c113.0000
             Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time  15  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-2 -> L2-SW-1
L2-SW-4#conf t
L2-SW-4(config)#int Gi0/0
L2-SW-4(config-if)#span vlan 1 cost 24
L2-SW-4(config-if)#no shut
L2-SW-4(config-if)#exit
L2-SW-4(config)#int Gi0/1
L2-SW-4(config-if)#span vlan 1 cost 24
L2-SW-4(config-if)#no shut
L2-SW-4(config-if)#exit
```

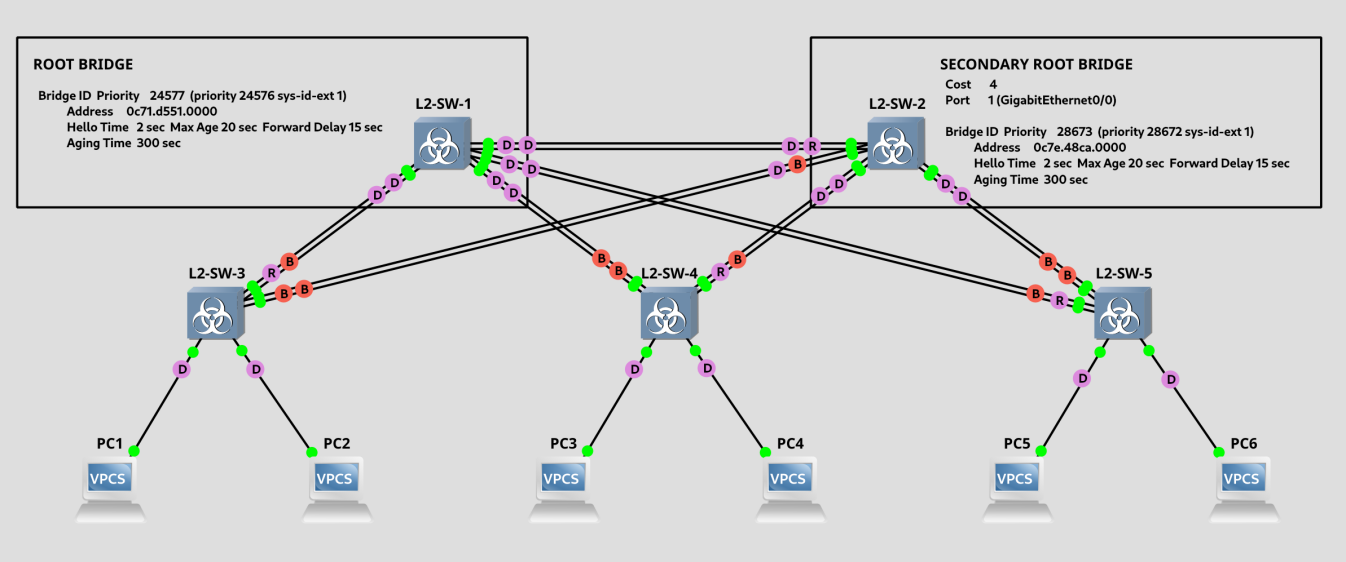
  - ### Вывод измененной схемы

```
L2-SW-4#show spanning-tree

VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    24577
             Address     0c71.d551.0000
             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     0c51.c113.0000
             Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time  15  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 LIS 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
```



- ## Show Running Command Outputs

  - ### L2-SW-1

```
Current configuration : 5209 bytes
!
! Last configuration change at 15:48:07 UTC Thu Aug 15 2024
!
version 15.0
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
service compress-config
!
hostname L2-SW-1
!
boot-start-marker
boot-end-marker
!
!
!
no aaa new-model
!
!
!
vtp domain CISCO-vIOS
vtp mode transparent
!
!
```

```
!
ip cef
no ipv6 cef
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
spanning-tree vlan 1 priority 24576
!
vlan internal allocation policy ascending
!
vlan 100
  name VLAN100
!
vlan 200,300
!
!
!
interface GigabitEthernet0/0
  media-type rj45
  negotiation auto
!
interface GigabitEthernet0/1
  media-type rj45
  negotiation auto
!
interface GigabitEthernet0/2
  media-type rj45
  negotiation auto
!
interface GigabitEthernet0/3
  media-type rj45
  negotiation auto
!
interface GigabitEthernet1/0
  media-type rj45
  negotiation auto
!
interface GigabitEthernet1/1
  media-type rj45
  negotiation auto
!
interface GigabitEthernet1/2
  media-type rj45
  negotiation auto
!
interface GigabitEthernet1/3
  media-type rj45
  negotiation auto
!
ip forward-protocol nd
!
no ip http server
no ip http secure-server
!
!
!
line con 0
line aux 0
line vty 0 4
line vty 5 15
!
!
end
```

- L2-SW-2

```
Current configuration : 5209 bytes
!
! Last configuration change at 15:48:54 UTC Thu Aug 15 2024
!
version 15.0
service timestamps debug datetime msec
service timestamps log datetime msec
```

```
no service password-encryption
service compress-config
!
hostname L2-SW-2
!
boot-start-marker
boot-end-marker
!
!
!
no aaa new-model
!
!
!
vtp domain CISCO-vIOS
vtp mode transparent
!
!
!
ip cef
no ipv6 cef
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
spanning-tree vlan 1 priority 28672
!
vlan internal allocation policy ascending
!
vlan 100
  name VLAN100
!
vlan 200,300
!
!
!
interface GigabitEthernet0/0
  media-type rj45
  negotiation auto
!
interface GigabitEthernet0/1
  media-type rj45
  negotiation auto
!
interface GigabitEthernet0/2
  media-type rj45
  negotiation auto
!
interface GigabitEthernet0/3
  media-type rj45
  negotiation auto
!
interface GigabitEthernet1/0
  media-type rj45
  negotiation auto
!
interface GigabitEthernet1/1
  media-type rj45
  negotiation auto
!
interface GigabitEthernet1/2
  media-type rj45
  negotiation auto
!
interface GigabitEthernet1/3
  media-type rj45
  negotiation auto
!
ip forward-protocol nd
!
no ip http server
no ip http secure-server
!
!
!
line con 0
```

```
line aux 0
line vty 0 4
line vty 5 15
!
!
end
```