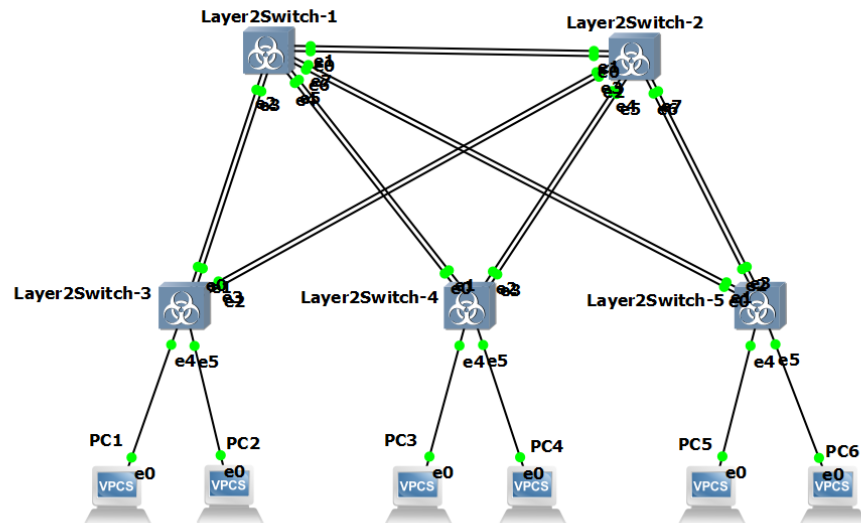


## Лабораторная работа 2

### Тема: Настройка протокола STP (IEEE 802.1D)

1. Для заданной на схеме schema-lab2 сети, состоящей из управляемых коммутаторов и персональных компьютеров, настроить протокол STP, назначив явно один из коммутаторов корневым настройкой приоритета.



Проверим настройку STP через коммутатор Layer2Switch-2  
vIOS-L2-01>sh spanning-tree

```
*****
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vIOS-L2-01>sh spanning-tree

VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    32769
             Address     0c36.4292.0000
             This bridge is the root
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    32769 (priority 32768 sys-id-ext 1)
             Address     0c36.4292.0000
             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
```

Данный коммутатор является корневым для VLAN0001.

Используется протокол ieee.

Чтобы назначить корневым коммутатор Layer2Switch-1 – уменьшим приоритет коммутатора, в который мы зашли.

vIOS-L2-01#configure terminal

vIOS-L2-01#spanning-tree vlan 1 priority 4096

```
VLAN0001
Spanning tree enabled protocol ieee
Root ID      Priority    4097
              Address     0ca7.396e.0000
              This bridge is the root
              Hello Time  2 sec    Max Age 20 sec    Forward Delay 15 sec

Bridge ID     Priority    4097    (priority 4096 sys-id-ext 1)
              Address     0ca7.396e.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          Desg  FWD  4          128.1     Shr
Gi0/1          Desg  LIS  4          128.2     Shr
Gi0/2          Desg  FWD  4          128.3     Shr
Gi0/3          Desg  FWD  4          128.4     Shr
Gi1/0          Desg  LIS  4          128.5     Shr
Gi1/1          Desg  LIS  4          128.6     Shr
Gi1/2          Desg  LIS  4          128.7     Shr
Gi1/3          Desg  LIS  4          128.8     Shr
```

2. Проверить доступность каждого с каждым всех персональных компьютеров (VPCS), результаты запротоколировать.

Настраиваем ip на каждом компьютере. Используем сеть 192.168.1.0/24

PC1>ip 192.168.1.1

PC2>ip 192.168.1.2

PC3>ip 192.168.1.3

PC4>ip 192.168.1.4

PC5>ip 192.168.1.5

PC6>ip 192.168.1.6

PC1 (192.168.1.1):

```
PC1> ping 192.168.1.2
84 bytes from 192.168.1.2 icmp_seq=1 ttl=64 time=1.130 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=1.448 ms
84 bytes from 192.168.1.2 icmp_seq=3 ttl=64 time=0.806 ms
84 bytes from 192.168.1.2 icmp_seq=4 ttl=64 time=2.567 ms
84 bytes from 192.168.1.2 icmp_seq=5 ttl=64 time=2.027 ms

PC1> ping 192.168.1.3
84 bytes from 192.168.1.3 icmp_seq=1 ttl=64 time=11.374 ms
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=14.527 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=9.609 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=14.989 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=12.747 ms

PC1> █
```

```
PC1> ping 192.168.1.4
84 bytes from 192.168.1.4 icmp_seq=1 ttl=64 time=32.011 ms
84 bytes from 192.168.1.4 icmp_seq=2 ttl=64 time=10.766 ms
84 bytes from 192.168.1.4 icmp_seq=3 ttl=64 time=13.684 ms
84 bytes from 192.168.1.4 icmp_seq=4 ttl=64 time=14.108 ms
84 bytes from 192.168.1.4 icmp_seq=5 ttl=64 time=19.892 ms

PC1> ping 192.168.1.5
84 bytes from 192.168.1.5 icmp_seq=1 ttl=64 time=22.995 ms
84 bytes from 192.168.1.5 icmp_seq=2 ttl=64 time=19.633 ms
84 bytes from 192.168.1.5 icmp_seq=3 ttl=64 time=20.618 ms
84 bytes from 192.168.1.5 icmp_seq=4 ttl=64 time=10.950 ms
84 bytes from 192.168.1.5 icmp_seq=5 ttl=64 time=35.233 ms

PC1> █
```

```
PC1> ping 192.168.1.6
84 bytes from 192.168.1.6 icmp_seq=1 ttl=64 time=14.696 ms
84 bytes from 192.168.1.6 icmp_seq=2 ttl=64 time=11.656 ms
84 bytes from 192.168.1.6 icmp_seq=3 ttl=64 time=18.243 ms
84 bytes from 192.168.1.6 icmp_seq=4 ttl=64 time=20.004 ms
84 bytes from 192.168.1.6 icmp_seq=5 ttl=64 time=28.831 ms

PC1> █
```

PC2(192.168.1.2):

```
PC2> ping 192.168.1.1

84 bytes from 192.168.1.1 icmp_seq=1 ttl=64 time=5.975 ms
84 bytes from 192.168.1.1 icmp_seq=2 ttl=64 time=4.345 ms
84 bytes from 192.168.1.1 icmp_seq=3 ttl=64 time=0.733 ms
84 bytes from 192.168.1.1 icmp_seq=4 ttl=64 time=3.458 ms
84 bytes from 192.168.1.1 icmp_seq=5 ttl=64 time=6.353 ms

PC2> ping 192.168.1.3

84 bytes from 192.168.1.3 icmp_seq=1 ttl=64 time=15.508 ms
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=16.835 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=25.619 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=11.979 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=3.155 ms

PC2> ping 192.168.1.4

84 bytes from 192.168.1.4 icmp_seq=1 ttl=64 time=8.715 ms
84 bytes from 192.168.1.4 icmp_seq=2 ttl=64 time=19.550 ms
84 bytes from 192.168.1.4 icmp_seq=3 ttl=64 time=10.338 ms
84 bytes from 192.168.1.4 icmp_seq=4 ttl=64 time=17.559 ms
84 bytes from 192.168.1.4 icmp_seq=5 ttl=64 time=13.729 ms

PC2> ping 192.168.1.5

84 bytes from 192.168.1.5 icmp_seq=1 ttl=64 time=15.959 ms
84 bytes from 192.168.1.5 icmp_seq=2 ttl=64 time=13.581 ms
84 bytes from 192.168.1.5 icmp_seq=3 ttl=64 time=12.200 ms
84 bytes from 192.168.1.5 icmp_seq=4 ttl=64 time=22.125 ms
84 bytes from 192.168.1.5 icmp_seq=5 ttl=64 time=22.500 ms

PC2> ping 192.168.1.6

84 bytes from 192.168.1.6 icmp_seq=1 ttl=64 time=21.294 ms
84 bytes from 192.168.1.6 icmp_seq=2 ttl=64 time=16.699 ms
84 bytes from 192.168.1.6 icmp_seq=3 ttl=64 time=32.065 ms
84 bytes from 192.168.1.6 icmp_seq=4 ttl=64 time=26.838 ms
84 bytes from 192.168.1.6 icmp_seq=5 ttl=64 time=27.515 ms
```

PC3(192.168.1.3):

```
PC3> ping 192.168.1.1

84 bytes from 192.168.1.1 icmp_seq=1 ttl=64 time=14.187 ms
84 bytes from 192.168.1.1 icmp_seq=2 ttl=64 time=11.063 ms
84 bytes from 192.168.1.1 icmp_seq=3 ttl=64 time=16.589 ms
84 bytes from 192.168.1.1 icmp_seq=4 ttl=64 time=13.197 ms
84 bytes from 192.168.1.1 icmp_seq=5 ttl=64 time=5.362 ms

PC3> ping 192.168.1.2

84 bytes from 192.168.1.2 icmp_seq=1 ttl=64 time=14.040 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=21.656 ms
84 bytes from 192.168.1.2 icmp_seq=3 ttl=64 time=10.257 ms
84 bytes from 192.168.1.2 icmp_seq=4 ttl=64 time=21.688 ms
84 bytes from 192.168.1.2 icmp_seq=5 ttl=64 time=13.845 ms

PC3> ping 192.168.1.4

84 bytes from 192.168.1.4 icmp_seq=1 ttl=64 time=6.122 ms
84 bytes from 192.168.1.4 icmp_seq=2 ttl=64 time=4.637 ms
84 bytes from 192.168.1.4 icmp_seq=3 ttl=64 time=0.656 ms
84 bytes from 192.168.1.4 icmp_seq=4 ttl=64 time=4.490 ms
84 bytes from 192.168.1.4 icmp_seq=5 ttl=64 time=8.252 ms

PC3> ping 192.168.1.5

84 bytes from 192.168.1.5 icmp_seq=1 ttl=64 time=11.906 ms
84 bytes from 192.168.1.5 icmp_seq=2 ttl=64 time=17.742 ms
84 bytes from 192.168.1.5 icmp_seq=3 ttl=64 time=4.496 ms
84 bytes from 192.168.1.5 icmp_seq=4 ttl=64 time=9.926 ms
84 bytes from 192.168.1.5 icmp_seq=5 ttl=64 time=5.765 ms

PC3> ping 192.168.1.6

84 bytes from 192.168.1.6 icmp_seq=1 ttl=64 time=8.854 ms
84 bytes from 192.168.1.6 icmp_seq=2 ttl=64 time=7.128 ms
84 bytes from 192.168.1.6 icmp_seq=3 ttl=64 time=28.385 ms
84 bytes from 192.168.1.6 icmp_seq=4 ttl=64 time=4.953 ms
84 bytes from 192.168.1.6 icmp_seq=5 ttl=64 time=8.088 ms
```

PC4(192.168.1.4):

```
PC4> ping 192.168.1.1
84 bytes from 192.168.1.1 icmp_seq=1 ttl=64 time=6.971 ms
84 bytes from 192.168.1.1 icmp_seq=2 ttl=64 time=10.929 ms
84 bytes from 192.168.1.1 icmp_seq=3 ttl=64 time=11.839 ms
84 bytes from 192.168.1.1 icmp_seq=4 ttl=64 time=31.641 ms
84 bytes from 192.168.1.1 icmp_seq=5 ttl=64 time=23.559 ms

PC4> ping 192.168.1.2
84 bytes from 192.168.1.2 icmp_seq=1 ttl=64 time=17.348 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=14.508 ms
84 bytes from 192.168.1.2 icmp_seq=3 ttl=64 time=20.964 ms
84 bytes from 192.168.1.2 icmp_seq=4 ttl=64 time=9.180 ms
84 bytes from 192.168.1.2 icmp_seq=5 ttl=64 time=6.929 ms

PC4> ping 192.168.1.3
84 bytes from 192.168.1.3 icmp_seq=1 ttl=64 time=6.173 ms
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=4.381 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=5.704 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=1.294 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=4.059 ms

PC4> ping 192.168.1.5
84 bytes from 192.168.1.5 icmp_seq=1 ttl=64 time=4.788 ms
84 bytes from 192.168.1.5 icmp_seq=2 ttl=64 time=3.384 ms
84 bytes from 192.168.1.5 icmp_seq=3 ttl=64 time=6.478 ms
84 bytes from 192.168.1.5 icmp_seq=4 ttl=64 time=12.004 ms
84 bytes from 192.168.1.5 icmp_seq=5 ttl=64 time=5.985 ms

PC4> ping 192.168.1.6
84 bytes from 192.168.1.6 icmp_seq=1 ttl=64 time=7.918 ms
84 bytes from 192.168.1.6 icmp_seq=2 ttl=64 time=13.647 ms
84 bytes from 192.168.1.6 icmp_seq=3 ttl=64 time=11.029 ms
84 bytes from 192.168.1.6 icmp_seq=4 ttl=64 time=16.239 ms
84 bytes from 192.168.1.6 icmp_seq=5 ttl=64 time=15.122 ms
```

PC5(192.168.1.5):

```
PC5> ping 192.168.1.1
84 bytes from 192.168.1.1 icmp_seq=1 ttl=64 time=20.529 ms
84 bytes from 192.168.1.1 icmp_seq=2 ttl=64 time=11.486 ms
84 bytes from 192.168.1.1 icmp_seq=3 ttl=64 time=22.302 ms
84 bytes from 192.168.1.1 icmp_seq=4 ttl=64 time=11.819 ms
84 bytes from 192.168.1.1 icmp_seq=5 ttl=64 time=35.928 ms

PC5> ping 192.168.1.2
84 bytes from 192.168.1.2 icmp_seq=1 ttl=64 time=17.551 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=23.187 ms
84 bytes from 192.168.1.2 icmp_seq=3 ttl=64 time=13.049 ms
84 bytes from 192.168.1.2 icmp_seq=4 ttl=64 time=15.053 ms
84 bytes from 192.168.1.2 icmp_seq=5 ttl=64 time=28.795 ms

PC5> ping 192.168.1.3
84 bytes from 192.168.1.3 icmp_seq=1 ttl=64 time=15.812 ms
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=3.774 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=18.886 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=6.054 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=3.040 ms

PC5> ping 192.168.1.4
84 bytes from 192.168.1.4 icmp_seq=1 ttl=64 time=6.201 ms
84 bytes from 192.168.1.4 icmp_seq=2 ttl=64 time=7.515 ms
84 bytes from 192.168.1.4 icmp_seq=3 ttl=64 time=6.279 ms
84 bytes from 192.168.1.4 icmp_seq=4 ttl=64 time=4.910 ms
84 bytes from 192.168.1.4 icmp_seq=5 ttl=64 time=5.726 ms

PC5> ping 192.168.1.6
84 bytes from 192.168.1.6 icmp_seq=1 ttl=64 time=3.617 ms
84 bytes from 192.168.1.6 icmp_seq=2 ttl=64 time=1.188 ms
84 bytes from 192.168.1.6 icmp_seq=3 ttl=64 time=1.529 ms
84 bytes from 192.168.1.6 icmp_seq=4 ttl=64 time=1.085 ms
84 bytes from 192.168.1.6 icmp_seq=5 ttl=64 time=4.804 ms

PC5> █
```

PC6(192.168.1.6):

```
PC6> ping 192.168.1.1
84 bytes from 192.168.1.1 icmp_seq=1 ttl=64 time=20.258 ms
84 bytes from 192.168.1.1 icmp_seq=2 ttl=64 time=19.631 ms
84 bytes from 192.168.1.1 icmp_seq=3 ttl=64 time=32.466 ms
84 bytes from 192.168.1.1 icmp_seq=4 ttl=64 time=13.950 ms
84 bytes from 192.168.1.1 icmp_seq=5 ttl=64 time=14.731 ms

PC6> ping 192.168.1.2
84 bytes from 192.168.1.2 icmp_seq=1 ttl=64 time=17.551 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=22.000 ms
84 bytes from 192.168.1.2 icmp_seq=3 ttl=64 time=17.146 ms
84 bytes from 192.168.1.2 icmp_seq=4 ttl=64 time=12.741 ms
84 bytes from 192.168.1.2 icmp_seq=5 ttl=64 time=18.018 ms

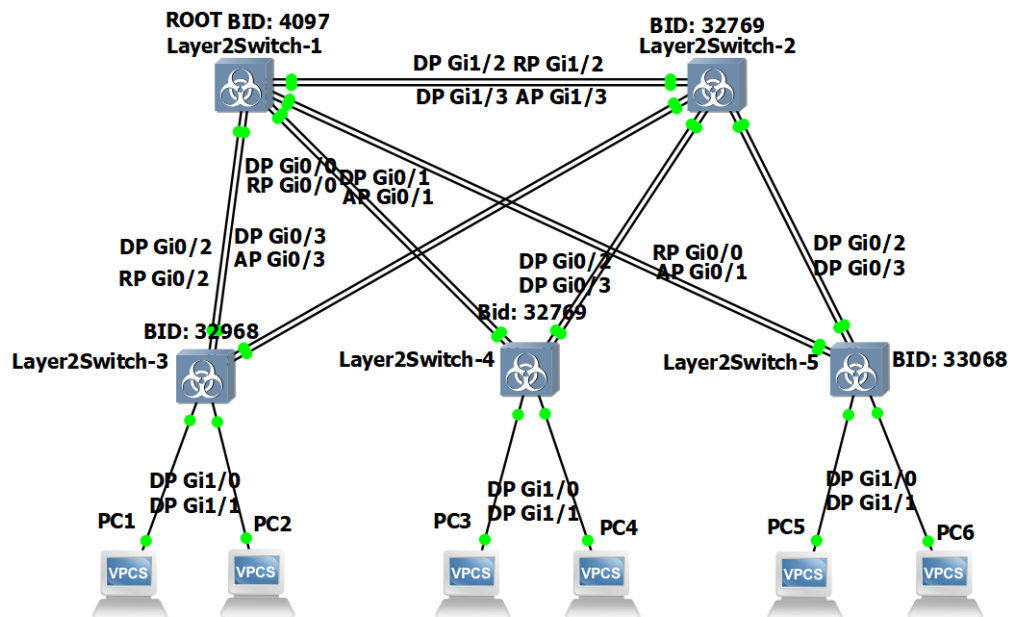
PC6> ping 192.168.1.3
84 bytes from 192.168.1.3 icmp_seq=1 ttl=64 time=19.375 ms
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=9.484 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=11.378 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=16.675 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=7.017 ms

PC6> ping 192.168.1.4
84 bytes from 192.168.1.4 icmp_seq=1 ttl=64 time=17.469 ms
84 bytes from 192.168.1.4 icmp_seq=2 ttl=64 time=10.502 ms
84 bytes from 192.168.1.4 icmp_seq=3 ttl=64 time=12.619 ms
84 bytes from 192.168.1.4 icmp_seq=4 ttl=64 time=10.513 ms
84 bytes from 192.168.1.4 icmp_seq=5 ttl=64 time=10.299 ms

PC6> ping 192.168.1.5
84 bytes from 192.168.1.5 icmp_seq=1 ttl=64 time=2.256 ms
84 bytes from 192.168.1.5 icmp_seq=2 ttl=64 time=4.850 ms
84 bytes from 192.168.1.5 icmp_seq=3 ttl=64 time=2.156 ms
84 bytes from 192.168.1.5 icmp_seq=4 ttl=64 time=5.518 ms
84 bytes from 192.168.1.5 icmp_seq=5 ttl=64 time=3.231 ms
```

3. На изображении схемы отметить VID каждого коммутатора и режимы работы портов (RP/DP/blocked) и стоимости маршрутов, результат сохранить в файл





- При помощи wireshark отследить передачу пакетов hello от корневого коммутатора на всех линках (nb!), результаты включить в отчет

Передача с корневого коммутатора на коммутатор Layer2Switch-2 (интерфейс Gi1/2):

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	0c:36:42:92:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 32768/100/0c:36:42:92:00:00 Cost = 0 Port = 0x8002
2	0.001521	0c:36:42:92:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 32768/200/0c:36:42:92:00:00 Cost = 0 Port = 0x8002
3	0.010839	0c:36:42:92:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 32768/300/0c:36:42:92:00:00 Cost = 0 Port = 0x8002
4	0.489392	0c:a7:39:6e:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8002
5	1.732395	0c:36:42:92:00:01	CDP/VTP/DTP/PagP/UDL...	DTP	62	Dynamic Trunk Protocol
6	1.755636	0c:a7:39:6e:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 32768/100/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8002
7	1.778962	0c:a7:39:6e:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 32768/200/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8002
8	1.803991	0c:a7:39:6e:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 32768/300/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8002
9	1.804314	0c:a7:39:6e:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8002
10	2.316816	0c:36:42:92:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 32768/100/0c:36:42:92:00:00 Cost = 0 Port = 0x8002
11	2.320359	0c:36:42:92:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 32768/200/0c:36:42:92:00:00 Cost = 0 Port = 0x8002
12	2.326457	0c:36:42:92:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 32768/300/0c:36:42:92:00:00 Cost = 0 Port = 0x8002
13	2.632530	0c:a7:39:6e:00:01	0c:a7:39:6e:00:01	LOOP	60	Reply
14	2.959927	0c:a7:39:6e:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8002
15	4.090326	0c:a7:39:6e:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 32768/100/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8002
16	4.108816	0c:a7:39:6e:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 32768/200/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8002
17	4.141396	0c:a7:39:6e:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 32768/300/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8002
18	4.144691	0c:a7:39:6e:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8002
19	4.678186	0c:36:42:92:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 32768/100/0c:36:42:92:00:00 Cost = 0 Port = 0x8002
20	4.683247	0c:36:42:92:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 32768/200/0c:36:42:92:00:00 Cost = 0 Port = 0x8002
21	4.691079	0c:36:42:92:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 32768/300/0c:36:42:92:00:00 Cost = 0 Port = 0x8002

```

Frame 1: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface -, id 0
Ethernet II, Src: 0c:36:42:92:00:01 (0c:36:42:92:00:01), Dst: Spanning-tree-(for-bridges)_00 (01:80:c2:00:00:00)
802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 100
Logical-Link Control
Spanning Tree Protocol
  Protocol Identifier: Spanning Tree Protocol (0x0000)
  Protocol Version Identifier: Spanning Tree (0)
  BPDU Type: Configuration (0x00)
  BPDU flags: 0x00
  Root Identifier: 32768 / 100 / 0c:36:42:92:00:00
  Root Path Cost: 0
  Bridge Identifier: 32768 / 100 / 0c:36:42:92:00:00
  Port Identifier: 0x8002
  Message Age: 0
  Max Age: 20
  Hello Time: 2
  Forward Delay: 15
  
```

Передача с корневого коммутатора на коммутатор Layer2Switch-2 (интерфейс Gi1/3):

1 0.000000	0c:a7:39:6e:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/100/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8001
2 0.031084	0c:a7:39:6e:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/200/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8001
3 0.044942	0c:a7:39:6e:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8001
4 0.048871	0c:a7:39:6e:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/300/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8001
5 1.272445	0c:a7:39:6e:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8001
6 1.749476	0c:36:42:92:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/100/0c:36:42:92:00:00 Cost = 0 Port = 0x8001
7 1.765024	0c:36:42:92:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/200/0c:36:42:92:00:00 Cost = 0 Port = 0x8001
8 1.777477	0c:36:42:92:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/300/0c:36:42:92:00:00 Cost = 0 Port = 0x8001
9 2.550713	0c:a7:39:6e:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/100/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8001
10 2.604131	0c:a7:39:6e:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/200/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8001
11 2.625383	0c:a7:39:6e:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8001
12 2.630061	0c:a7:39:6e:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/300/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8001
13 3.307382	0c:a7:39:6e:00:00	0c:a7:39:6e:00:00	LOOP	60 Reply
14 3.322141	0c:a7:39:6e:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8001
15 4.234769	0c:36:42:92:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/100/0c:36:42:92:00:00 Cost = 0 Port = 0x8001
16 4.255062	0c:36:42:92:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/200/0c:36:42:92:00:00 Cost = 0 Port = 0x8001
17 4.268042	0c:36:42:92:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/300/0c:36:42:92:00:00 Cost = 0 Port = 0x8001
18 4.755437	0c:a7:39:6e:00:00	CDP/VTP/DTP/PagP/UDL	DTP	62 Dynamic Trunk Protocol
19 5.180098	0c:a7:39:6e:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/100/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8001
20 5.223131	0c:a7:39:6e:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/200/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8001
21 5.226921	0c:36:42:92:00:00	0c:36:42:92:00:00	LOOP	60 Reply

```

> Frame 1: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface -, id 0
> Ethernet II, Src: 0c:a7:39:6e:00:00 (0c:a7:39:6e:00:00), Dst: Spanning-tree-(for-bridges)_00 (01:80:c2:00:00:00)
> 802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 100
> Logical-Link Control
> Spanning Tree Protocol
  Protocol Identifier: Spanning Tree Protocol (0x0000)
  Protocol Version Identifier: Spanning Tree (0)
  BPDU Type: Configuration (0x00)
  > BPDU Flags: 0x00
  > Root Identifier: 32768 / 100 / 0c:a7:39:6e:00:00
  Root Path Cost: 0
  > Bridge Identifier: 32768 / 100 / 0c:a7:39:6e:00:00
  Port Identifier: 0x8001
  Message Age: 0
  Max Age: 20
  Hello Time: 2
  Forward Delay: 15
  
```

```

0000  01 80 c2 00 00 00 0c a7 39 6e 00 01 81 00 00 64 .....9m...d
0010  00 26 42 42 03 00 00 00 00 80 64 0c a7 39 6e .....d...9m
0020  00 00 00 00 00 00 80 64 0c a7 39 6e 00 00 80 01 .....d...9m
0030  00 00 14 00 02 00 0f 00 00 00 00 00 .....d.....

```

## Передача с корневого коммутатора на коммутатор Layer2Switch-3 (Интерфейс DP Gi0/2):

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	0c:a7:39:6e:00:02	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/100/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8003	
2	0.076338	0c:a7:39:6e:00:02	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/200/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8003	
3	0.080022	0c:a7:39:6e:00:02	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/300/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8003	
4	0.082504	0c:a7:39:6e:00:02	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8003	
5	0.462050	0c:a1:81:18:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/100/0c:a1:81:18:00:00 Cost = 0 Port = 0x8001	
6	0.472208	0c:a1:81:18:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/200/0c:a1:81:18:00:00 Cost = 0 Port = 0x8001	
7	0.476456	0c:a1:81:18:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/300/0c:a1:81:18:00:00 Cost = 0 Port = 0x8001	
8	1.273006	0c:a7:39:6e:00:02	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8003	
9	2.512168	0c:a7:39:6e:00:02	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/100/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8003	
10	2.570700	0c:a7:39:6e:00:02	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/200/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8003	
11	2.586137	0c:a7:39:6e:00:02	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/300/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8003	
12	2.588794	0c:a7:39:6e:00:02	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8003	
13	2.641782	0c:a1:81:18:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/100/0c:a1:81:18:00:00 Cost = 0 Port = 0x8001	
14	2.652702	0c:a1:81:18:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/200/0c:a1:81:18:00:00 Cost = 0 Port = 0x8001	
15	2.657082	0c:a1:81:18:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/300/0c:a1:81:18:00:00 Cost = 0 Port = 0x8001	
16	3.671213	0c:a7:39:6e:00:02	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8003	
17	4.673360	0c:a1:81:18:00:00	CDP/VTP/DTP/PagP/UDL	DTP	62 Dynamic Trunk Protocol	
18	4.821378	0c:a1:81:18:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/100/0c:a1:81:18:00:00 Cost = 0 Port = 0x8001	
19	4.831382	0c:a1:81:18:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/200/0c:a1:81:18:00:00 Cost = 0 Port = 0x8001	
20	4.837224	0c:a1:81:18:00:00	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/300/0c:a1:81:18:00:00 Cost = 0 Port = 0x8001	
21	5.025237	0c:a7:39:6e:00:02	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/100/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8003	

> Frame 1: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface -, id 0

> Ethernet II, Src: 0c:a7:39:6e:00:02 (0c:a7:39:6e:00:02), Dst: Spanning-tree-(for-bridges)\_00 (01:80:c2:00:00:00)

> 802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 100

> Logical-Link Control

> Spanning Tree Protocol

Protocol Identifier: Spanning Tree Protocol (0x0000)

Protocol Version Identifier: Spanning Tree (0)

BPDU Type: Configuration (0x00)

BPDU Flags: 0x00

Root Identifier: 32768 / 100 / 0c:a7:39:6e:00:00

Root Path Cost: 0

Bridge Identifier: 32768 / 100 / 0c:a7:39:6e:00:00

Port Identifier: 0x8003

Message Age: 0

Max Age: 20

Hello Time: 2

Forward Delay: 15

0000 01 80 c2 00 00 00 0c a7 39 6e 00 02 81 00 00 64 .....9m...d  
0010 00 26 42 42 03 00 00 00 00 80 64 0c a7 39 6e .....d...d...9m  
0020 00 00 00 00 00 00 80 64 0c a7 39 6e 00 00 80 03 .....d...9m  
0030 00 00 14 00 02 00 0f 00 00 00 00 00 .....d.....

## Передача с корневого коммутатора на коммутатор Layer2Switch-3 (Интерфейс DP Gi0/3):

1 0.000000	0c:a1:81:18:00:01	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/100/0c:a1:81:18:00:00 Cost = 0 Port = 0x8002
2 0.008499	0c:a1:81:18:00:01	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/200/0c:a1:81:18:00:00 Cost = 0 Port = 0x8002
3 0.009099	0c:a1:81:18:00:01	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/300/0c:a1:81:18:00:00 Cost = 0 Port = 0x8002
4 0.311420	0c:a7:39:6e:00:03	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/100/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8004
5 0.181781	0c:a7:39:6e:00:03	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/200/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8004
6 0.187663	0c:a7:39:6e:00:03	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/300/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8004
7 0.190412	0c:a7:39:6e:00:03	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8004
8 1.474370	0c:a7:39:6e:00:03	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/100/0c:a1:81:18:00:00 Cost = 0 Port = 0x8002
9 2.062203	0c:a1:81:18:00:01	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/200/0c:a1:81:18:00:00 Cost = 0 Port = 0x8002
10 2.071162	0c:a1:81:18:00:01	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/300/0c:a1:81:18:00:00 Cost = 0 Port = 0x8002
11 2.072795	0c:a1:81:18:00:01	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/100/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8004
12 2.799548	0c:a7:39:6e:00:03	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/200/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8004
13 2.862900	0c:a7:39:6e:00:03	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/300/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8004
14 2.875851	0c:a7:39:6e:00:03	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8004
15 2.876506	0c:a7:39:6e:00:03	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8004
16 3.990427	0c:a1:81:18:00:01	CDP/VTP/DTP/PagP/UDL	DTP	62 Dynamic Trunk Protocol
17 4.809679	0c:a7:39:6e:00:03	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8004
18 4.717195	0c:a1:81:18:00:01	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/200/0c:a1:81:18:00:00 Cost = 0 Port = 0x8002
19 4.180730	0c:a1:81:18:00:01	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/300/0c:a1:81:18:00:00 Cost = 0 Port = 0x8002
20 4.182749	0c:a1:81:18:00:01	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/100/0c:a1:81:18:00:00 Cost = 0 Port = 0x8002
21 5.193477	0c:a7:39:6e:00:03	Spanning-tree-(for-...	STP	60 Conf. Root = 32768/200/0c:a7:39:6e:00:00 Cost = 0 Port = 0x8004

```

> Frame 1: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface -, id 0
> Ethernet II, Src: 0c:a1:81:18:00:01 (0c:a1:81:18:00:01), Dst: Spanning-tree-(for-bridges)_00 (01:80:c2:00:00:00)
> 802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 100
> Logical-Link Control
> Spanning Tree Protocol
  Protocol Identifier: Spanning Tree Protocol (0x0000)
  Protocol Version Identifier: Spanning Tree (0)
  BPDU Type: Configuration (0x00)
  > BPDU Flags: 0x00
  > Root Identifier: 32768 / 100 / 0c:a1:81:18:00:00
  Root Path Cost: 0
  > Bridge Identifier: 32768 / 100 / 0c:a1:81:18:00:00
  Port Identifier: 0x8002
  Message Age: 0
  Max Age: 20
  Hello Time: 2
  Forward Delay: 15
  
```

```

0000  01 80 c2 00 00 00 0c a1 81 18 00 01 81 00 00 64 .....d...d...d
0010  00 26 42 42 03 00 00 00 00 80 64 0c a1 81 18 .....d...d...d
0020  00 00 00 00 00 00 80 64 0c a1 81 18 00 00 80 02 .....d...d...d
0030  00 00 14 00 02 00 0f 00 00 00 00 00 .....d.....

```



# Передача с корневого коммутатора на коммутатор Layer2Switch-4 (Интерфейс DP Gi0/0):

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	0c:a7:39:6e:00:04	Spanning-tree-for-... STP	60 Conf.	Root = 4096/1/0c:a7:39:6e:00:00	Cost = 0 Port = 0x8005
2	0.167185	0c:a6:82:2b:00:00	Spanning-tree-for-... STP	60 Conf.	Root = 32768/100/0c:a6:82:2b:00:00	Cost = 0 Port = 0x8001
3	0.174847	0c:a6:82:2b:00:00	Spanning-tree-for-... STP	60 Conf.	Root = 32768/300/0c:a6:82:2b:00:00	Cost = 0 Port = 0x8001
4	0.183975	0c:a6:82:2b:00:00	Spanning-tree-for-... STP	60 Conf.	Root = 32768/300/0c:a6:82:2b:00:00	Cost = 0 Port = 0x8001
5	0.903031	0c:a6:82:2b:00:00	0c:a6:82:2b:00:00	LOOP	60 Reply	
6	1.201299	0c:a7:39:6e:00:04	Spanning-tree-for-... STP	60 Conf.	Root = 32768/100/0c:a7:39:6e:00:00	Cost = 0 Port = 0x8005
7	1.253883	0c:a7:39:6e:00:04	Spanning-tree-for-... STP	60 Conf.	Root = 32768/200/0c:a7:39:6e:00:00	Cost = 0 Port = 0x8005
8	1.274903	0c:a7:39:6e:00:04	Spanning-tree-for-... STP	60 Conf.	Root = 32768/300/0c:a7:39:6e:00:00	Cost = 0 Port = 0x8005
9	1.277038	0c:a7:39:6e:00:04	Spanning-tree-for-... STP	60 Conf.	Root = 4096/1/0c:a7:39:6e:00:00	Cost = 0 Port = 0x8005
10	2.240817	0c:a6:82:2b:00:00	Spanning-tree-for-... STP	60 Conf.	Root = 32768/100/0c:a6:82:2b:00:00	Cost = 0 Port = 0x8001
11	2.249723	0c:a6:82:2b:00:00	Spanning-tree-for-... STP	60 Conf.	Root = 32768/200/0c:a6:82:2b:00:00	Cost = 0 Port = 0x8001
12	2.260251	0c:a6:82:2b:00:00	Spanning-tree-for-... STP	60 Conf.	Root = 32768/300/0c:a6:82:2b:00:00	Cost = 0 Port = 0x8001
13	2.666199	0c:a7:39:6e:00:04	Spanning-tree-for-... STP	60 Conf.	Root = 4096/1/0c:a7:39:6e:00:00	Cost = 0 Port = 0x8005
14	2.689903	0c:a7:39:6e:00:04	CDP/VTP/OTF/PagP/UDL CDP	422 Device ID: viOS-L2-01 Port ID: GigabitEthernet1/0		
15	3.836513	0c:a7:39:6e:00:04	Spanning-tree-for-... STP	60 Conf.	Root = 32768/100/0c:a7:39:6e:00:00	Cost = 0 Port = 0x8005
16	3.876514	0c:a7:39:6e:00:04	Spanning-tree-for-... STP	60 Conf.	Root = 32768/200/0c:a7:39:6e:00:00	Cost = 0 Port = 0x8005
17	3.897456	0c:a7:39:6e:00:04	Spanning-tree-for-... STP	60 Conf.	Root = 32768/300/0c:a7:39:6e:00:00	Cost = 0 Port = 0x8005
18	3.898136	0c:a7:39:6e:00:04	Spanning-tree-for-... STP	60 Conf.	Root = 4096/1/0c:a7:39:6e:00:00	Cost = 0 Port = 0x8005
19	4.341589	0c:a6:82:2b:00:00	Spanning-tree-for-... STP	60 Conf.	Root = 32768/100/0c:a6:82:2b:00:00	Cost = 0 Port = 0x8001
20	4.345471	0c:a6:82:2b:00:00	Spanning-tree-for-... STP	60 Conf.	Root = 32768/200/0c:a6:82:2b:00:00	Cost = 0 Port = 0x8001
21	4.359669	0c:a6:82:2b:00:00	Spanning-tree-for-... STP	60 Conf.	Root = 32768/300/0c:a6:82:2b:00:00	Cost = 0 Port = 0x8001

Frame 1: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface -, id 0

IEEE 802.3 Ethernet

Logical-Link Control

Spanning Tree Protocol

Protocol Identifier: Spanning Tree Protocol (0x0000)

Protocol Version Identifier: Spanning Tree (0)

BPDU Type: Configuration (0x00)

BPDU flags: 0x00

Root Identifier: 4096 / 1 / 0c:a7:39:6e:00:00

Root Path Cost: 0

Bridge Identifier: 4096 / 1 / 0c:a7:39:6e:00:00

Port Identifier: 0x8005

Message Age: 0

Max Age: 20

Hello Time: 2

Forward Delay: 15

# Передача с корневого коммутатора на коммутатор Layer2Switch-4 (Интерфейс DP Gi0/1):

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	0c:a7:39:6e:00:05	Spanning-tree-for-... STP	60 Conf.	Root = 32768/100/0c:a7:39:6e:00:00	Cost = 0 Port = 0x8006
2	0.049591	0c:a7:39:6e:00:05	Spanning-tree-for-... STP	60 Conf.	Root = 32768/200/0c:a7:39:6e:00:00	Cost = 0 Port = 0x8006
3	0.071318	0c:a7:39:6e:00:05	Spanning-tree-for-... STP	60 Conf.	Root = 32768/300/0c:a7:39:6e:00:00	Cost = 0 Port = 0x8006
4	0.073231	0c:a7:39:6e:00:05	Spanning-tree-for-... STP	60 Conf.	Root = 4096/1/0c:a7:39:6e:00:00	Cost = 0 Port = 0x8006
5	0.176634	0c:a6:82:2b:00:01	Spanning-tree-for-... STP	60 Conf.	Root = 32768/100/0c:a6:82:2b:00:00	Cost = 0 Port = 0x8002
6	0.182626	0c:a6:82:2b:00:01	Spanning-tree-for-... STP	60 Conf.	Root = 32768/200/0c:a6:82:2b:00:00	Cost = 0 Port = 0x8002
7	0.197668	0c:a6:82:2b:00:01	Spanning-tree-for-... STP	60 Conf.	Root = 32768/300/0c:a6:82:2b:00:00	Cost = 0 Port = 0x8002
8	1.377143	0c:a7:39:6e:00:05	Spanning-tree-for-... STP	60 Conf.	Root = 4096/1/0c:a7:39:6e:00:00	Cost = 0 Port = 0x8006
9	2.287491	0c:a6:82:2b:00:01	Spanning-tree-for-... STP	60 Conf.	Root = 32768/100/0c:a6:82:2b:00:00	Cost = 0 Port = 0x8002
10	2.293352	0c:a6:82:2b:00:01	Spanning-tree-for-... STP	60 Conf.	Root = 32768/200/0c:a6:82:2b:00:00	Cost = 0 Port = 0x8002
11	2.309276	0c:a6:82:2b:00:01	Spanning-tree-for-... STP	60 Conf.	Root = 32768/300/0c:a6:82:2b:00:00	Cost = 0 Port = 0x8002
12	2.667776	0c:a7:39:6e:00:05	Spanning-tree-for-... STP	60 Conf.	Root = 32768/100/0c:a7:39:6e:00:00	Cost = 0 Port = 0x8006
13	2.738784	0c:a7:39:6e:00:05	Spanning-tree-for-... STP	60 Conf.	Root = 32768/200/0c:a7:39:6e:00:00	Cost = 0 Port = 0x8006
14	2.748152	0c:a7:39:6e:00:05	Spanning-tree-for-... STP	60 Conf.	Root = 32768/300/0c:a7:39:6e:00:00	Cost = 0 Port = 0x8006
15	2.751120	0c:a7:39:6e:00:05	Spanning-tree-for-... STP	60 Conf.	Root = 4096/1/0c:a7:39:6e:00:00	Cost = 0 Port = 0x8006
16	3.133234	0c:a6:82:2b:00:01	0c:a6:82:2b:00:01	LOOP	60 Reply	
17	3.476429	0c:a6:82:2b:00:01	DEC-MOP-Remote-Cons...	0x6002	77 DEC DNA Remote Console	
18	3.482131	0c:a6:82:2b:00:02	DEC-MOP-Remote-Cons...	0x6002	77 DEC DNA Remote Console	
19	3.482150	0c:a6:82:2b:00:03	DEC-MOP-Remote-Cons...	0x6002	77 DEC DNA Remote Console	
20	3.484770	0c:a6:82:2b:00:00	DEC-MOP-Remote-Cons...	0x6002	77 DEC DNA Remote Console	
21	4.479966	0c:a6:82:2b:00:01	Spanning-tree-for-... STP	60 Conf.	Root = 32768/100/0c:a6:82:2b:00:00	Cost = 0 Port = 0x8002

Frame 1: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface -, id 0

Ethernet II, Src: 0c:a7:39:6e:00:05 (0c:a7:39:6e:00:05), Dst: Spanning-tree-for-bridges\_00 (01:80:c2:00:00:00)

802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 100

Logical-Link Control

Spanning Tree Protocol

Protocol Identifier: Spanning Tree Protocol (0x0000)

Protocol Version Identifier: Spanning Tree (0)

BPDU Type: Configuration (0x00)

BPDU flags: 0x00

Root Identifier: 32768 / 100 / 0c:a7:39:6e:00:00

Root Path Cost: 0

Bridge Identifier: 32768 / 100 / 0c:a7:39:6e:00:00

Port Identifier: 0x8006

Message Age: 0

Max Age: 20

Hello Time: 2

Forward Delay: 15

## Передача с корневого коммутатора на коммутатор Layer2Switch-5 (Интерфейс DP Gi1/0):

1 0.000000	0c:a7:39:6e:00:06	Spanning-tree (for... STP	60 Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x0007
2 1.273525	0c:a7:39:6e:00:00	Spanning-tree (for... STP	60 Conf. Root = 32768/100/0c:a7:39:6e:00:00 Cost = 0 Port = 0x0007
3 1.324328	0c:a7:39:6e:00:06	Spanning-tree (for... STP	60 Conf. Root = 32768/100/0c:a7:39:6e:00:00 Cost = 0 Port = 0x0007
4 1.331228	0c:a7:39:6e:00:06	Spanning-tree (for... STP	60 Conf. Root = 32768/100/0c:a7:39:6e:00:00 Cost = 0 Port = 0x0007
5 1.332851	0c:a7:39:6e:00:06	Spanning-tree (for... STP	60 Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x0007
6 1.337596	0c:78:8a:0c:00:00	Spanning-tree (for... STP	60 Conf. Root = 32768/100/0c:78:8a:0c:00:00 Cost = 0 Port = 0x0001
7 1.340512	0c:78:8a:0c:00:00	Spanning-tree (for... STP	60 Conf. Root = 32768/100/0c:78:8a:0c:00:00 Cost = 0 Port = 0x0001
8 1.361662	0c:78:8a:0c:00:00	Spanning-tree (for... STP	60 Conf. Root = 32768/100/0c:78:8a:0c:00:00 Cost = 0 Port = 0x0001
9 3.000841	0c:a7:39:6e:00:06	Spanning-tree (for... STP	60 Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x0007
10 5.109937	0c:78:8a:0c:00:00	0c:78:8a:0c:00:00 LOOP	60 Reply
11 5.110000	0c:78:8a:0c:00:00	Spanning-tree (for... STP	60 Conf. Root = 32768/100/0c:78:8a:0c:00:00 Cost = 0 Port = 0x0001
12 3.400923	0c:78:8a:0c:00:00	Spanning-tree (for... STP	60 Conf. Root = 32768/100/0c:78:8a:0c:00:00 Cost = 0 Port = 0x0001
13 1.420029	0c:78:8a:0c:00:00	Spanning-tree (for... STP	60 Conf. Root = 32768/100/0c:78:8a:0c:00:00 Cost = 0 Port = 0x0001
14 1.475209	0c:a7:39:6e:00:06	Spanning-tree (for... STP	60 Conf. Root = 32768/100/0c:a7:39:6e:00:00 Cost = 0 Port = 0x0007
15 1.523549	0c:a7:39:6e:00:06	Spanning-tree (for... STP	60 Conf. Root = 32768/100/0c:a7:39:6e:00:00 Cost = 0 Port = 0x0007
16 1.531077	0c:a7:39:6e:00:06	Spanning-tree (for... STP	60 Conf. Root = 32768/100/0c:a7:39:6e:00:00 Cost = 0 Port = 0x0007
17 1.533063	0c:a7:39:6e:00:06	Spanning-tree (for... STP	60 Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x0007
18 4.288343	0c:a7:39:6e:00:06	0c:a7:39:6e:00:06 LOOP	60 Reply
19 5.471919	0c:78:8a:0c:00:00	Spanning-tree (for... STP	60 Conf. Root = 32768/100/0c:78:8a:0c:00:00 Cost = 0 Port = 0x0001
20 5.473645	0c:78:8a:0c:00:00	Spanning-tree (for... STP	60 Conf. Root = 32768/100/0c:78:8a:0c:00:00 Cost = 0 Port = 0x0001
21 5.478477	0c:a7:39:6e:00:06	Spanning-tree (for... STP	60 Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x0007

Frame 1: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface -, id 0

IEEE 802.3 Ethernet

Logical-Link Control

Spanning Tree Protocol

Protocol Identifier: Spanning Tree Protocol (0x0000)

Protocol Version Identifier: Spanning Tree (0)

BPDU Type: Configuration (0x00)

BPDU Flags: 0x00

Root Identifier: 4096 / 1 / 0c:a7:39:6e:00:00

Root Path Cost: 0

Bridge Identifier: 4096 / 1 / 0c:a7:39:6e:00:00

Port Identifier: 0x0007

Message Age: 0

Max Age: 20

Hello Time: 2

Forward Delay: 15

0000 01 80 c2 00 00 00 0c a7 39 6e 00 00 00 26 42 42 .....9n...888

0010 03 00 00 00 00 10 01 0c a7 39 6e 00 00 00 00 00 .....9n...

0020 00 00 10 01 0c a7 39 6e 00 00 00 07 00 00 14 00 .....9n...

0030 02 00 0f 00 00 00 00 00 00 00 00 00 00 00 00 .....9n...

## Передача с корневого коммутатора на коммутатор Layer2Switch-5 (Интерфейс DP Gi1/1):

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	0c:a7:39:6e:00:07	Spanning-tree (for... STP	60 Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x0008		
2	0.528664	0c:a7:39:6e:00:07	Spanning-tree (for... STP	60 Conf. Root = 32768/100/0c:a7:39:6e:00:00 Cost = 0 Port = 0x0008		
3	0.582086	0c:a7:39:6e:00:07	Spanning-tree (for... STP	60 Conf. Root = 32768/200/0c:a7:39:6e:00:00 Cost = 0 Port = 0x0008		
4	0.581458	0c:a7:39:6e:00:07	Spanning-tree (for... STP	60 Conf. Root = 32768/300/0c:a7:39:6e:00:00 Cost = 0 Port = 0x0008		
5	0.877243	0c:78:8a:0c:00:01	0c:78:8a:0c:00:01 LOOP	60 Reply		
6	1.176041	0c:78:8a:0c:00:01	Spanning-tree (for... STP	60 Conf. Root = 32768/100/0c:78:8a:0c:00:00 Cost = 0 Port = 0x0002		
7	1.182267	0c:78:8a:0c:00:01	Spanning-tree (for... STP	60 Conf. Root = 32768/200/0c:78:8a:0c:00:00 Cost = 0 Port = 0x0002		
8	1.199152	0c:78:8a:0c:00:01	Spanning-tree (for... STP	60 Conf. Root = 32768/300/0c:78:8a:0c:00:00 Cost = 0 Port = 0x0002		
9	1.250575	0c:a7:39:6e:00:07	Spanning-tree (for... STP	60 Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x0008		
10	2.973983	0c:a7:39:6e:00:07	Spanning-tree (for... STP	60 Conf. Root = 32768/100/0c:a7:39:6e:00:00 Cost = 0 Port = 0x0008		
11	3.025167	0c:a7:39:6e:00:07	Spanning-tree (for... STP	60 Conf. Root = 32768/200/0c:a7:39:6e:00:00 Cost = 0 Port = 0x0008		
12	3.043139	0c:a7:39:6e:00:07	Spanning-tree (for... STP	60 Conf. Root = 32768/300/0c:a7:39:6e:00:00 Cost = 0 Port = 0x0008		
13	3.044509	0c:a7:39:6e:00:07	Spanning-tree (for... STP	60 Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x0008		
14	3.421959	0c:78:8a:0c:00:01	Spanning-tree (for... STP	60 Conf. Root = 32768/100/0c:78:8a:0c:00:00 Cost = 0 Port = 0x0002		
15	3.425975	0c:78:8a:0c:00:01	Spanning-tree (for... STP	60 Conf. Root = 32768/200/0c:78:8a:0c:00:00 Cost = 0 Port = 0x0002		
16	3.442018	0c:78:8a:0c:00:01	Spanning-tree (for... STP	60 Conf. Root = 32768/300/0c:78:8a:0c:00:00 Cost = 0 Port = 0x0002		
17	4.255621	0c:a7:39:6e:00:07	Spanning-tree (for... STP	60 Conf. Root = 4096/1/0c:a7:39:6e:00:00 Cost = 0 Port = 0x0008		
18	5.458492	0c:a7:39:6e:00:07	Spanning-tree (for... STP	60 Conf. Root = 32768/100/0c:a7:39:6e:00:00 Cost = 0 Port = 0x0008		
19	5.499670	0c:78:8a:0c:00:01	Spanning-tree (for... STP	60 Conf. Root = 32768/100/0c:78:8a:0c:00:00 Cost = 0 Port = 0x0002		
20	5.505348	0c:78:8a:0c:00:01	Spanning-tree (for... STP	60 Conf. Root = 32768/200/0c:78:8a:0c:00:00 Cost = 0 Port = 0x0002		
21	5.519156	0c:78:8a:0c:00:01	Spanning-tree (for... STP	60 Conf. Root = 32768/300/0c:78:8a:0c:00:00 Cost = 0 Port = 0x0002		

Frame 1: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface -, id 0

IEEE 802.3 Ethernet

Logical-Link Control

Spanning Tree Protocol

Protocol Identifier: Spanning Tree Protocol (0x0000)

Protocol Version Identifier: Spanning Tree (0)

BPDU Type: Configuration (0x00)

BPDU Flags: 0x00

Root Identifier: 4096 / 1 / 0c:a7:39:6e:00:00

Root Path Cost: 0

Bridge Identifier: 4096 / 1 / 0c:a7:39:6e:00:00

Port Identifier: 0x0008

Message Age: 0

Max Age: 20

Hello Time: 2

Forward Delay: 15

0000 01 80 c2 00 00 00 0c a7 39 6e 00 00 07 00 26 42 42 .....9n...888

0010 03 00 00 00 00 10 01 0c a7 39 6e 00 00 00 00 00 .....9n...

0020 00 00 10 01 0c a7 39 6e 00 00 00 00 00 00 00 14 00 .....9n...

0030 02 00 0f 00 00 00 00 00 00 00 00 00 00 00 00 .....9n...

- Изменить стоимость маршрута для порта RP произвольного назначенного (designated) коммутатора, повторить действия из п.3, результат сохранить в отдельный файл  
vIOS-L2-01#conf t  
vIOS-L2-01(config)#int gi0/0  
vIOS-L2-01(config)#spanning-tree cost 8  
vIOS-L2-01(config)#int gi0/1  
vIOS-L2-01(config)#spanning-tree cost 8

```

VLAN0001
Spanning tree enabled protocol ieee
Root ID    Priority    4097
           Address    0ca7.396e.0000
           Cost      8
           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    0ca1.8118.0000
           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 8         128.1   Shr
Gi0/1              Altn BLK 8         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

```

Из скриншота можно понять, что изменилась только стоимость маршрута коммутатора Lawyer2Switch-3. Остальное не изменилось.