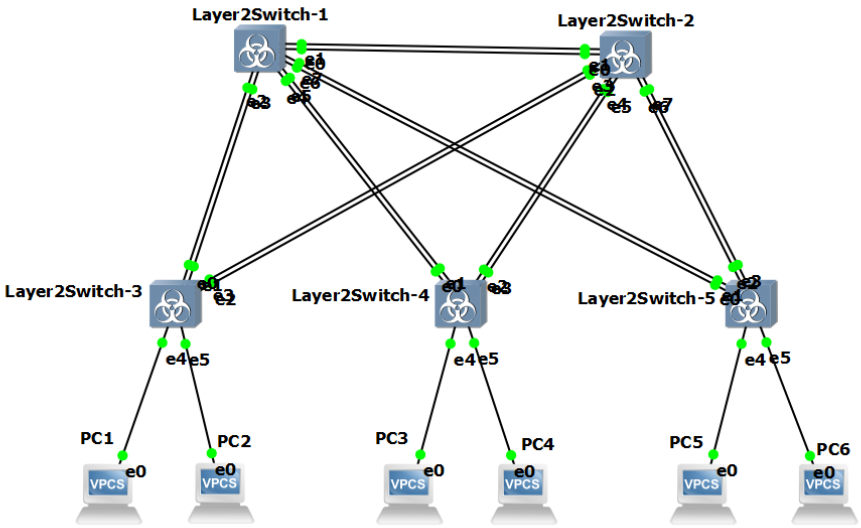
Лабораторная работа 2

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
```
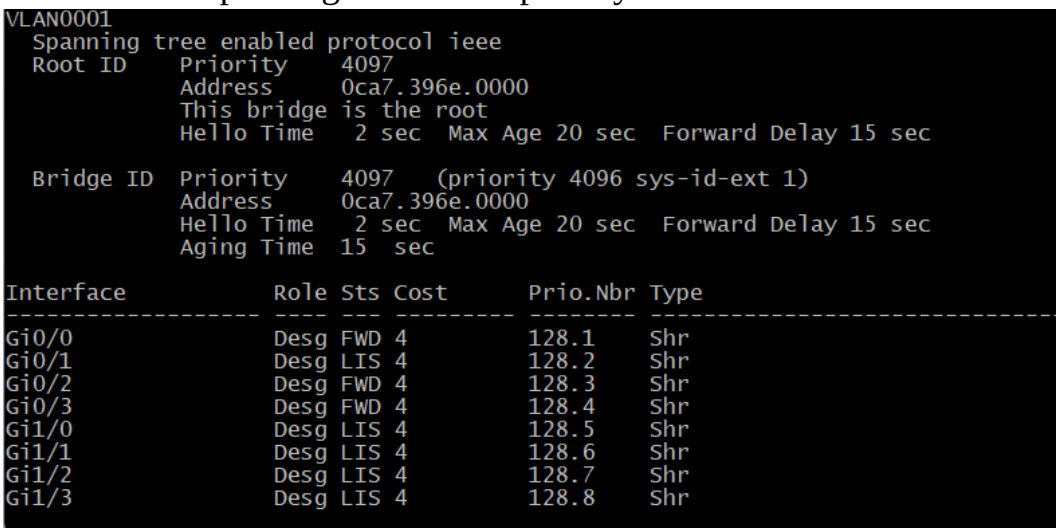

Данный коммутатор является корневым для VLAN0001.
Используется протокол ieee.
Чтобы назначить корневым коммутатор Layer2Switch-1 – уменьшим приоритет коммутатора, в который мы зашли.
vIOS-L2-01#configure terminal
vIOS-L2-01#spanning-tree vlan 1 priority 4096



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
```

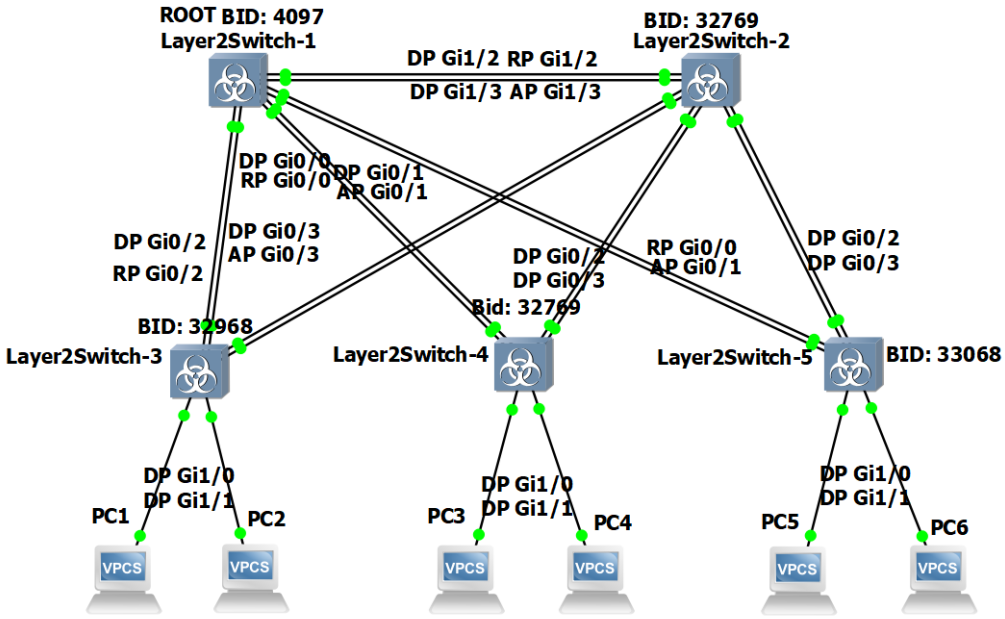
PC5(192.168.1.5):

```
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):

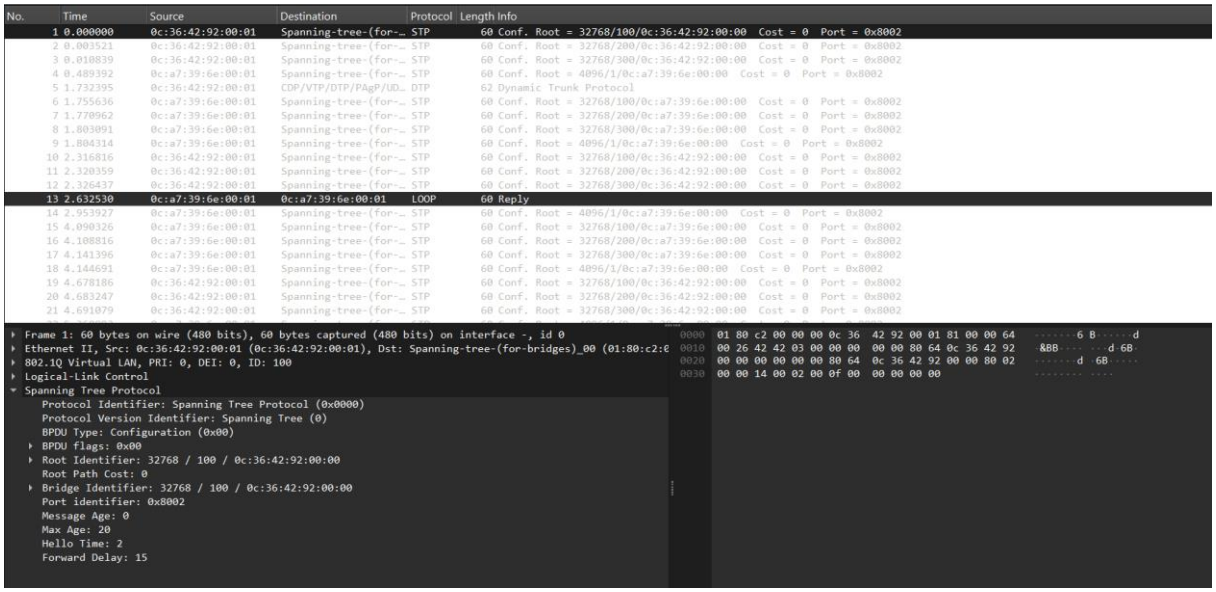
```
PC6> ping 192.168.1.1

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 BID каждого коммутатора и режимы работы портов (RP/DP/blocked) и стоимости маршрутов, результат сохранить в файл

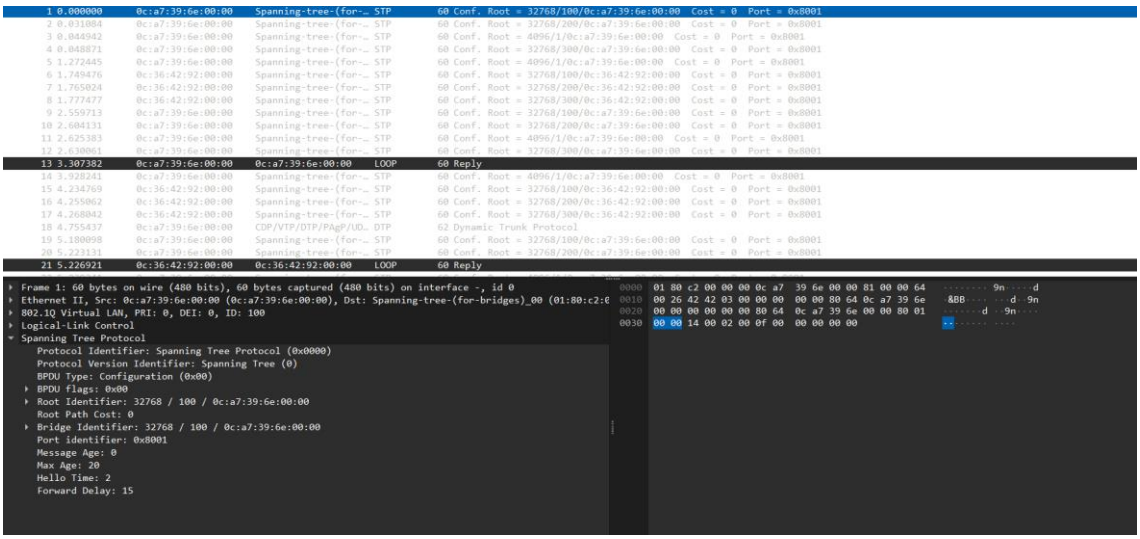


4. При помощи wireshark отследить передачу пакетов hello от корневого коммутатора на всех линках (nb!), результаты включить в отчет

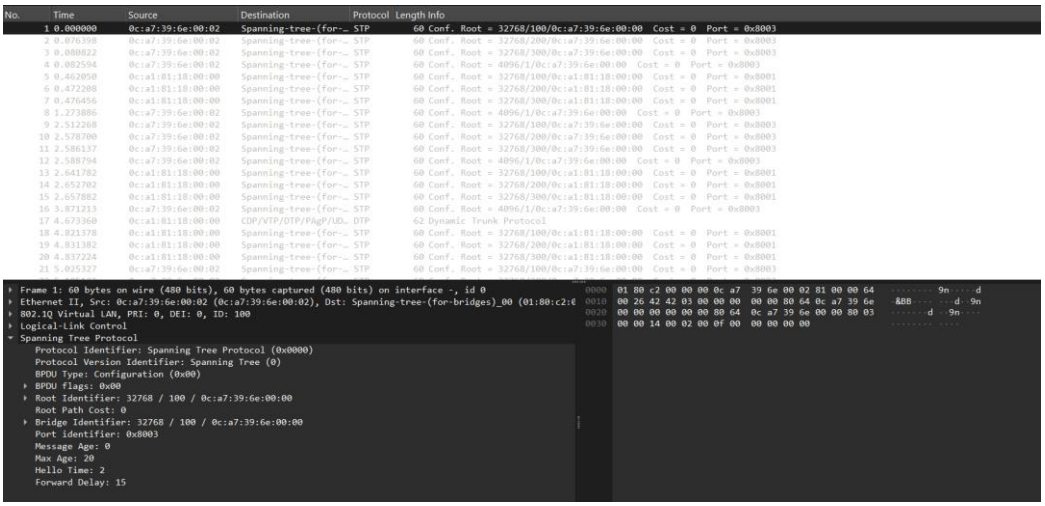
Передача с корневого коммутатора на коммутатор Layer2Switch-2 (интерфейс Gi1/2):



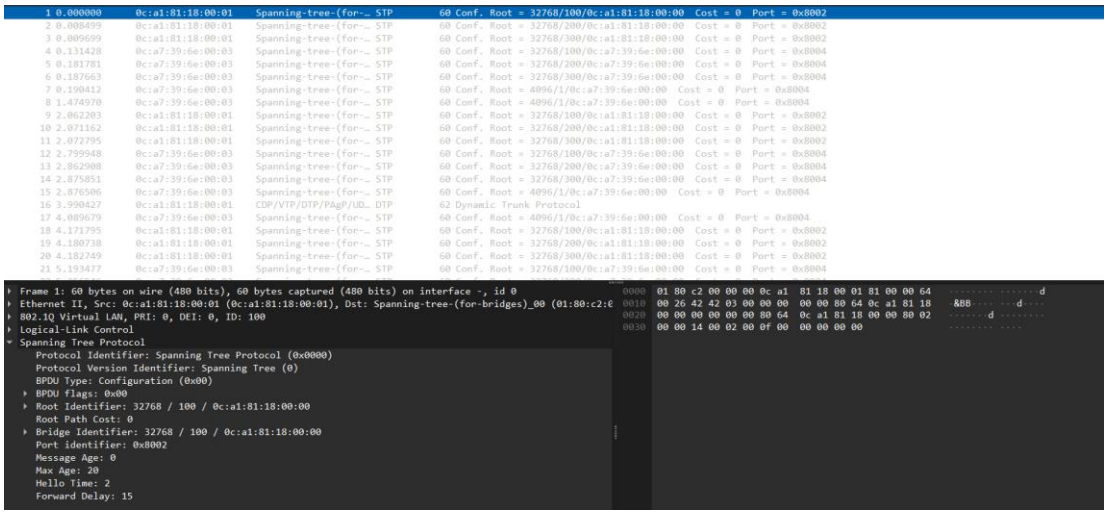
Передача с корневого коммутатора на коммутатор Layer2Switch-2 (интерфейс Gi1/3):



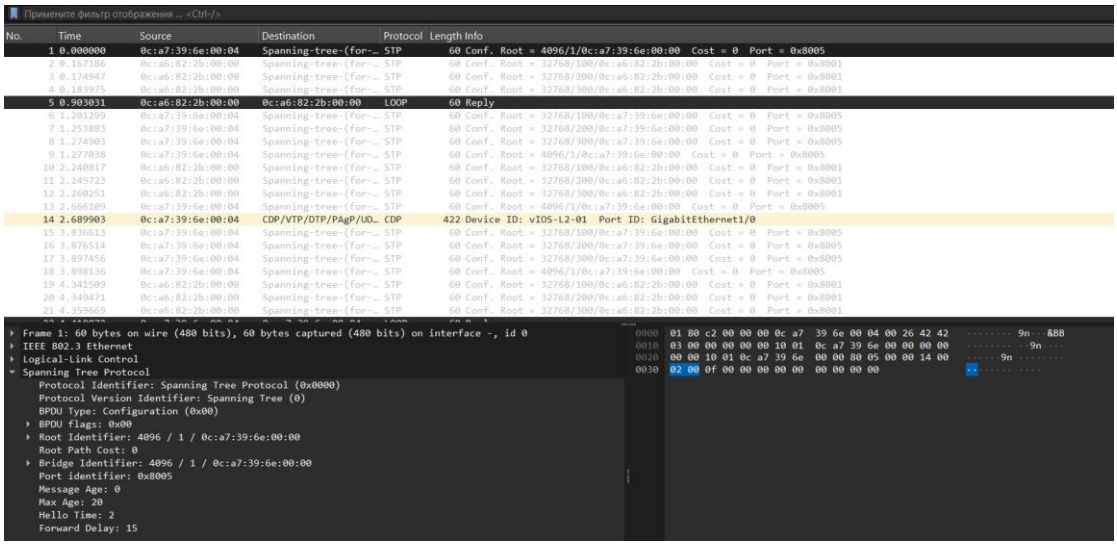
Передача с корневого коммутатора на коммутатор Layer2Switch-3 (Интерфейс DP Gi0/2):



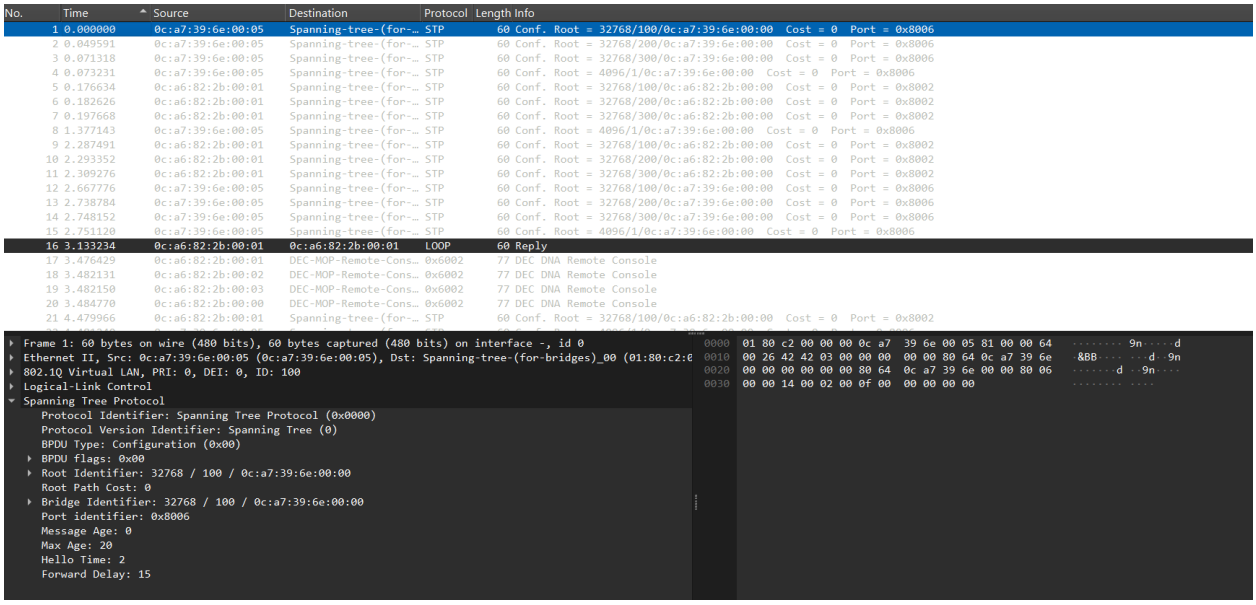
Передача с корневого коммутатора на коммутатор Layer2Switch-3 (Интерфейс DP Gi0/3):



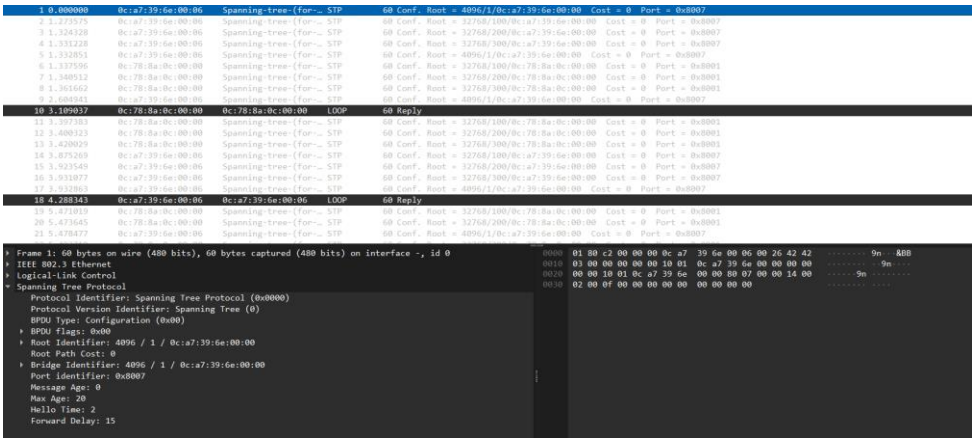
Передача с корневого коммутатора на коммутатор Layer2Switch-4 (Интерфейс DP Gi0/0):



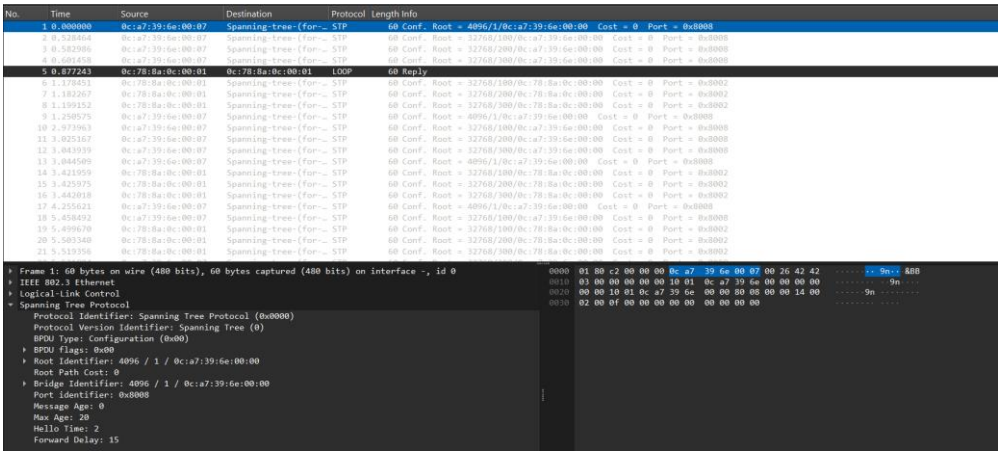
Передача с корневого коммутатора на коммутатор Layer2Switch-4 (Интерфейс DP Gi0/1):



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



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



5. 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.