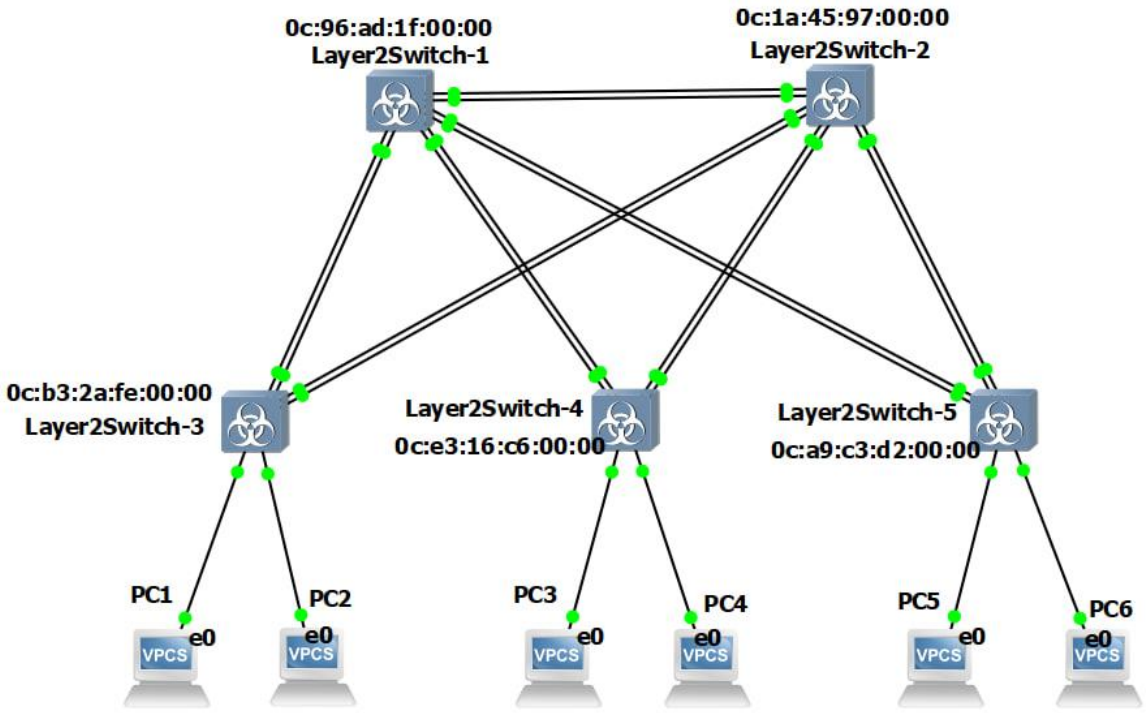
Котляров М.Р.

Практика №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



Корневым коммутатором выбран SW1, изменим его приоритет:

enable

configure terminal

spanning-tree vlan 1 priority 0

end

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

Проверка доступности на PC1:

```
PC1> ping 192.168.1.2

84 bytes from 192.168.1.2 icmp_seq=1 ttl=64 time=6.154 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=5.427 ms
84 bytes from 192.168.1.2 icmp_seq=3 ttl=64 time=0.429 ms
84 bytes from 192.168.1.2 icmp_seq=4 ttl=64 time=2.461 ms
84 bytes from 192.168.1.2 icmp_seq=5 ttl=64 time=0.651 ms

PC1> ping 192.168.1.3

84 bytes from 192.168.1.3 icmp_seq=1 ttl=64 time=8.708 ms
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=3.079 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=14.140 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=9.210 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=13.813 ms

PC1> ping 192.168.1.4

84 bytes from 192.168.1.4 icmp_seq=1 ttl=64 time=14.318 ms
84 bytes from 192.168.1.4 icmp_seq=2 ttl=64 time=22.285 ms
84 bytes from 192.168.1.4 icmp_seq=3 ttl=64 time=25.012 ms
84 bytes from 192.168.1.4 icmp_seq=4 ttl=64 time=9.192 ms
84 bytes from 192.168.1.4 icmp_seq=5 ttl=64 time=5.069 ms

PC1> ping 192.168.1.5

84 bytes from 192.168.1.5 icmp_seq=1 ttl=64 time=6.941 ms
84 bytes from 192.168.1.5 icmp_seq=2 ttl=64 time=8.533 ms
84 bytes from 192.168.1.5 icmp_seq=3 ttl=64 time=7.832 ms
84 bytes from 192.168.1.5 icmp_seq=4 ttl=64 time=4.317 ms
84 bytes from 192.168.1.5 icmp_seq=5 ttl=64 time=5.565 ms

PC1> ping 192.168.1.6

84 bytes from 192.168.1.6 icmp_seq=1 ttl=64 time=20.827 ms
84 bytes from 192.168.1.6 icmp_seq=2 ttl=64 time=3.757 ms
84 bytes from 192.168.1.6 icmp_seq=3 ttl=64 time=17.293 ms
84 bytes from 192.168.1.6 icmp_seq=4 ttl=64 time=7.735 ms
84 bytes from 192.168.1.6 icmp_seq=5 ttl=64 time=4.787 ms
```

Проверка доступности на PC2

```
PC2> ping 192.168.1.1

84 bytes from 192.168.1.1 icmp_seq=1 ttl=64 time=3.795 ms
84 bytes from 192.168.1.1 icmp_seq=2 ttl=64 time=0.700 ms
84 bytes from 192.168.1.1 icmp_seq=3 ttl=64 time=2.140 ms
84 bytes from 192.168.1.1 icmp_seq=4 ttl=64 time=3.859 ms
84 bytes from 192.168.1.1 icmp_seq=5 ttl=64 time=1.190 ms

PC2> ping 192.168.1.3

84 bytes from 192.168.1.3 icmp_seq=1 ttl=64 time=6.142 ms
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=6.805 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=10.910 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=9.461 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=9.633 ms

PC2> ping 192.168.1.4

84 bytes from 192.168.1.4 icmp_seq=1 ttl=64 time=4.697 ms
84 bytes from 192.168.1.4 icmp_seq=2 ttl=64 time=12.801 ms
84 bytes from 192.168.1.4 icmp_seq=3 ttl=64 time=2.936 ms
84 bytes from 192.168.1.4 icmp_seq=4 ttl=64 time=6.980 ms
84 bytes from 192.168.1.4 icmp_seq=5 ttl=64 time=10.777 ms

PC2> ping 192.168.1.5

84 bytes from 192.168.1.5 icmp_seq=1 ttl=64 time=10.119 ms
84 bytes from 192.168.1.5 icmp_seq=2 ttl=64 time=15.138 ms
84 bytes from 192.168.1.5 icmp_seq=3 ttl=64 time=6.481 ms
84 bytes from 192.168.1.5 icmp_seq=4 ttl=64 time=3.799 ms
84 bytes from 192.168.1.5 icmp_seq=5 ttl=64 time=11.033 ms

PC2> ping 192.168.1.6

84 bytes from 192.168.1.6 icmp_seq=1 ttl=64 time=12.075 ms
84 bytes from 192.168.1.6 icmp_seq=2 ttl=64 time=10.357 ms
84 bytes from 192.168.1.6 icmp_seq=3 ttl=64 time=2.624 ms
84 bytes from 192.168.1.6 icmp_seq=4 ttl=64 time=4.800 ms
84 bytes from 192.168.1.6 icmp_seq=5 ttl=64 time=9.127 ms
```

Проверка доступности на PC3:

```
PC3> ping 192.168.1.1

84 bytes from 192.168.1.1 icmp_seq=1 ttl=64 time=11.352 ms
84 bytes from 192.168.1.1 icmp_seq=2 ttl=64 time=10.409 ms
84 bytes from 192.168.1.1 icmp_seq=3 ttl=64 time=10.481 ms
84 bytes from 192.168.1.1 icmp_seq=4 ttl=64 time=6.603 ms
84 bytes from 192.168.1.1 icmp_seq=5 ttl=64 time=17.262 ms

PC3> ping 192.168.1.2

84 bytes from 192.168.1.2 icmp_seq=1 ttl=64 time=7.471 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=10.808 ms
84 bytes from 192.168.1.2 icmp_seq=3 ttl=64 time=2.837 ms
84 bytes from 192.168.1.2 icmp_seq=4 ttl=64 time=13.553 ms
84 bytes from 192.168.1.2 icmp_seq=5 ttl=64 time=12.494 ms

PC3> ping 192.168.1.4

84 bytes from 192.168.1.4 icmp_seq=1 ttl=64 time=3.961 ms
84 bytes from 192.168.1.4 icmp_seq=2 ttl=64 time=2.996 ms
84 bytes from 192.168.1.4 icmp_seq=3 ttl=64 time=0.389 ms
84 bytes from 192.168.1.4 icmp_seq=4 ttl=64 time=0.963 ms
84 bytes from 192.168.1.4 icmp_seq=5 ttl=64 time=5.739 ms

PC3> ping 192.168.1.5

84 bytes from 192.168.1.5 icmp_seq=1 ttl=64 time=8.190 ms
84 bytes from 192.168.1.5 icmp_seq=2 ttl=64 time=6.478 ms
84 bytes from 192.168.1.5 icmp_seq=3 ttl=64 time=14.324 ms
84 bytes from 192.168.1.5 icmp_seq=4 ttl=64 time=6.987 ms
84 bytes from 192.168.1.5 icmp_seq=5 ttl=64 time=3.200 ms

PC3> ping 192.168.1.6

84 bytes from 192.168.1.6 icmp_seq=1 ttl=64 time=6.493 ms
84 bytes from 192.168.1.6 icmp_seq=2 ttl=64 time=16.771 ms
84 bytes from 192.168.1.6 icmp_seq=3 ttl=64 time=4.989 ms
84 bytes from 192.168.1.6 icmp_seq=4 ttl=64 time=5.140 ms
84 bytes from 192.168.1.6 icmp_seq=5 ttl=64 time=8.341 ms
```

Проверка доступности на PC4

```
PC4> ping 192.168.1.1

84 bytes from 192.168.1.1 icmp_seq=1 ttl=64 time=11.305 ms
84 bytes from 192.168.1.1 icmp_seq=2 ttl=64 time=11.485 ms
84 bytes from 192.168.1.1 icmp_seq=3 ttl=64 time=7.377 ms
84 bytes from 192.168.1.1 icmp_seq=4 ttl=64 time=8.801 ms
84 bytes from 192.168.1.1 icmp_seq=5 ttl=64 time=10.373 ms

PC4> ping 192.168.1.2

84 bytes from 192.168.1.2 icmp_seq=1 ttl=64 time=22.853 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=7.106 ms
84 bytes from 192.168.1.2 icmp_seq=3 ttl=64 time=15.390 ms
84 bytes from 192.168.1.2 icmp_seq=4 ttl=64 time=14.192 ms
84 bytes from 192.168.1.2 icmp_seq=5 ttl=64 time=11.138 ms

PC4> ping 192.168.1.3

84 bytes from 192.168.1.3 icmp_seq=1 ttl=64 time=3.660 ms
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=7.275 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=4.234 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=5.414 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=2.283 ms

PC4> ping 192.168.1.5

84 bytes from 192.168.1.5 icmp_seq=1 ttl=64 time=15.097 ms
84 bytes from 192.168.1.5 icmp_seq=2 ttl=64 time=12.509 ms
84 bytes from 192.168.1.5 icmp_seq=3 ttl=64 time=7.518 ms
84 bytes from 192.168.1.5 icmp_seq=4 ttl=64 time=8.936 ms
84 bytes from 192.168.1.5 icmp_seq=5 ttl=64 time=8.907 ms

PC4> ping 192.168.1.6

84 bytes from 192.168.1.6 icmp_seq=1 ttl=64 time=7.573 ms
84 bytes from 192.168.1.6 icmp_seq=2 ttl=64 time=10.746 ms
84 bytes from 192.168.1.6 icmp_seq=3 ttl=64 time=6.241 ms
84 bytes from 192.168.1.6 icmp_seq=4 ttl=64 time=5.250 ms
84 bytes from 192.168.1.6 icmp_seq=5 ttl=64 time=4.948 ms
```

Проверка доступности на PC5:

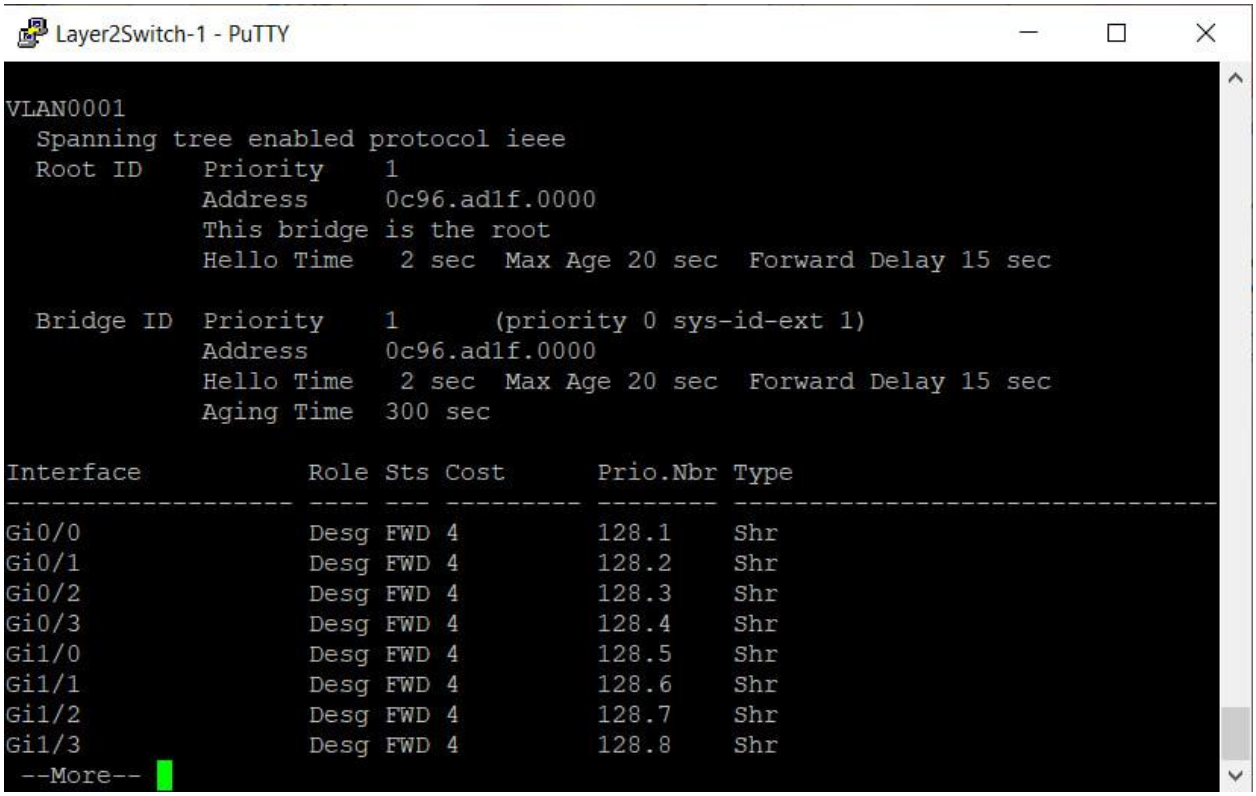
```
PC5> ping 192.168.1.1

84 bytes from 192.168.1.1 icmp_seq=1 ttl=64 time=15.699 ms
84 bytes from 192.168.1.1 icmp_seq=2 ttl=64 time=10.231 ms
84 bytes from 192.168.1.1 icmp_seq=3 ttl=64 time=9.257 ms
84 bytes from 192.168.1.1 icmp_seq=4 ttl=64 time=5.884 ms
84 bytes from 192.168.1.1 icmp_seq=5 ttl=64 time=10.291 ms

PC5> ping 192.168.1.2

84 bytes from 192.168.1.2 icmp_seq=1 ttl=64 time=16.404 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=16.638 ms
84 bytes from 192.168.1.2 icmp_seq=3 ttl=64 time=7.900 ms
84 bytes from 192.168.1.2 icmp_seq=4 ttl=64 time=7.124 ms
84 bytes from 192.168.1.2 icmp_seq=5 ttl=64 time=11.244 ms

PC5> ping 192.168.1.3

84 bytes from 192.168.1.3 icmp_seq=1 ttl=64 time=9.083 ms
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=16.864 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=11.293 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=18.801 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=6.031 ms

PC5> ping 192.168.1.4

84 bytes from 192.168.1.4 icmp_seq=1 ttl=64 time=10.294 ms
84 bytes from 192.168.1.4 icmp_seq=2 ttl=64 time=11.680 ms
84 bytes from 192.168.1.4 icmp_seq=3 ttl=64 time=6.681 ms
84 bytes from 192.168.1.4 icmp_seq=4 ttl=64 time=13.379 ms
84 bytes from 192.168.1.4 icmp_seq=5 ttl=64 time=4.953 ms

PC5> ping 192.168.1.6

84 bytes from 192.168.1.6 icmp_seq=1 ttl=64 time=7.691 ms
84 bytes from 192.168.1.6 icmp_seq=2 ttl=64 time=1.019 ms
84 bytes from 192.168.1.6 icmp_seq=3 ttl=64 time=0.620 ms
84 bytes from 192.168.1.6 icmp_seq=4 ttl=64 time=0.869 ms
84 bytes from 192.168.1.6 icmp_seq=5 ttl=64 time=3.640 ms
```

Проверка доступности на PC6

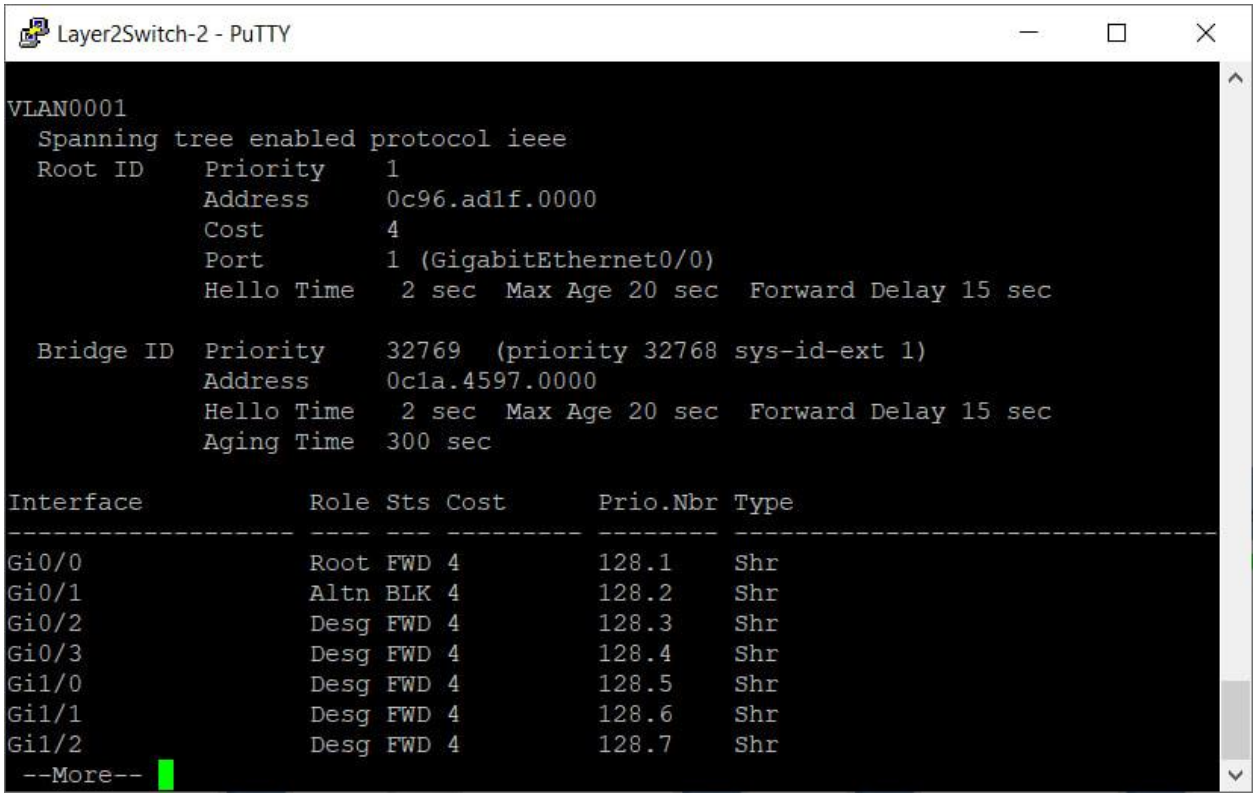
```
PC6> ping 192.168.1.1

84 bytes from 192.168.1.1 icmp_seq=1 ttl=64 time=5.740 ms
84 bytes from 192.168.1.1 icmp_seq=2 ttl=64 time=9.749 ms
84 bytes from 192.168.1.1 icmp_seq=3 ttl=64 time=12.695 ms
84 bytes from 192.168.1.1 icmp_seq=4 ttl=64 time=9.169 ms
84 bytes from 192.168.1.1 icmp_seq=5 ttl=64 time=18.518 ms

PC6> ping 192.168.1.2

84 bytes from 192.168.1.2 icmp_seq=1 ttl=64 time=15.547 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=10.723 ms
84 bytes from 192.168.1.2 icmp_seq=3 ttl=64 time=8.371 ms
84 bytes from 192.168.1.2 icmp_seq=4 ttl=64 time=9.171 ms
84 bytes from 192.168.1.2 icmp_seq=5 ttl=64 time=12.100 ms

PC6> ping 192.168.1.3

84 bytes from 192.168.1.3 icmp_seq=1 ttl=64 time=9.558 ms
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=10.053 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=7.072 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=14.828 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=18.778 ms

PC6> ping 192.168.1.4

84 bytes from 192.168.1.4 icmp_seq=1 ttl=64 time=7.722 ms
84 bytes from 192.168.1.4 icmp_seq=2 ttl=64 time=12.136 ms
84 bytes from 192.168.1.4 icmp_seq=3 ttl=64 time=4.021 ms
84 bytes from 192.168.1.4 icmp_seq=4 ttl=64 time=10.825 ms
84 bytes from 192.168.1.4 icmp_seq=5 ttl=64 time=4.914 ms

PC6> ping 192.168.1.5

84 bytes from 192.168.1.5 icmp_seq=1 ttl=64 time=4.861 ms
84 bytes from 192.168.1.5 icmp_seq=2 ttl=64 time=3.206 ms
84 bytes from 192.168.1.5 icmp_seq=3 ttl=64 time=4.937 ms
84 bytes from 192.168.1.5 icmp_seq=4 ttl=64 time=1.144 ms
84 bytes from 192.168.1.5 icmp_seq=5 ttl=64 time=1.000 ms
```

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

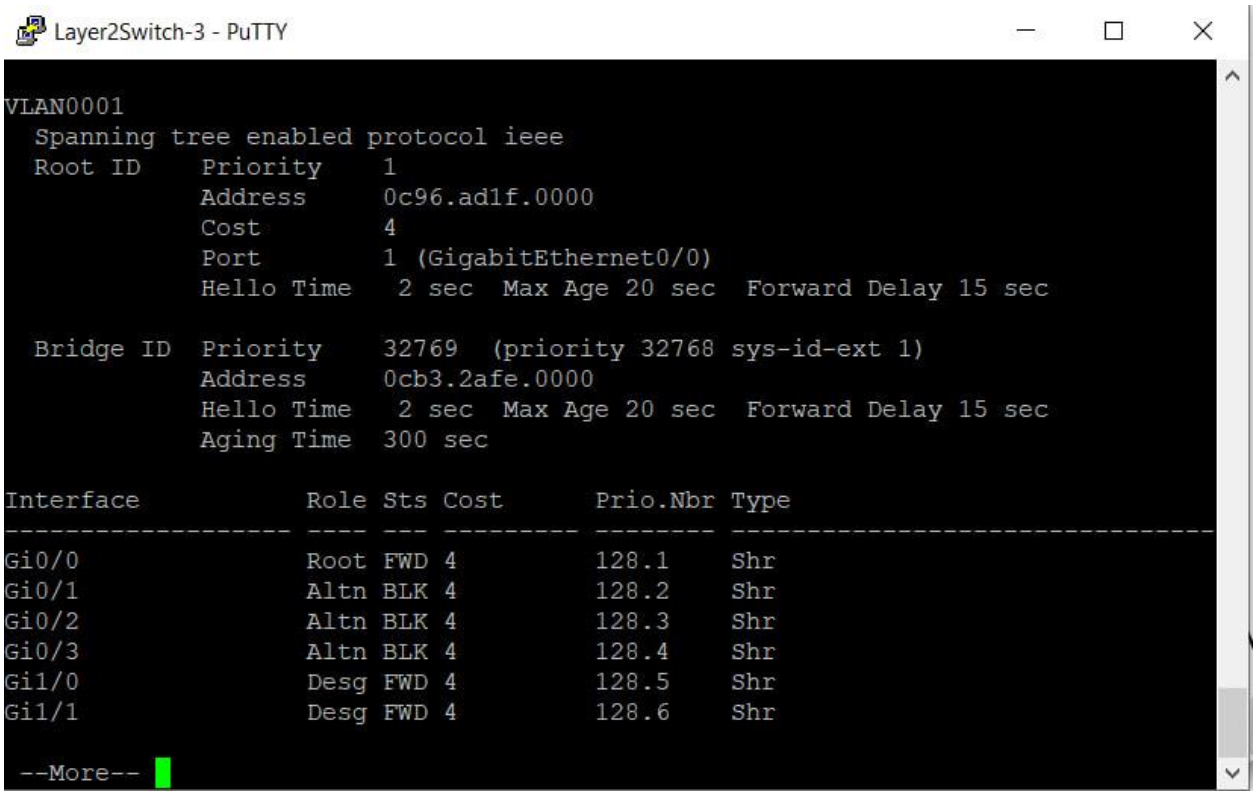
show spanning-tree для SW1



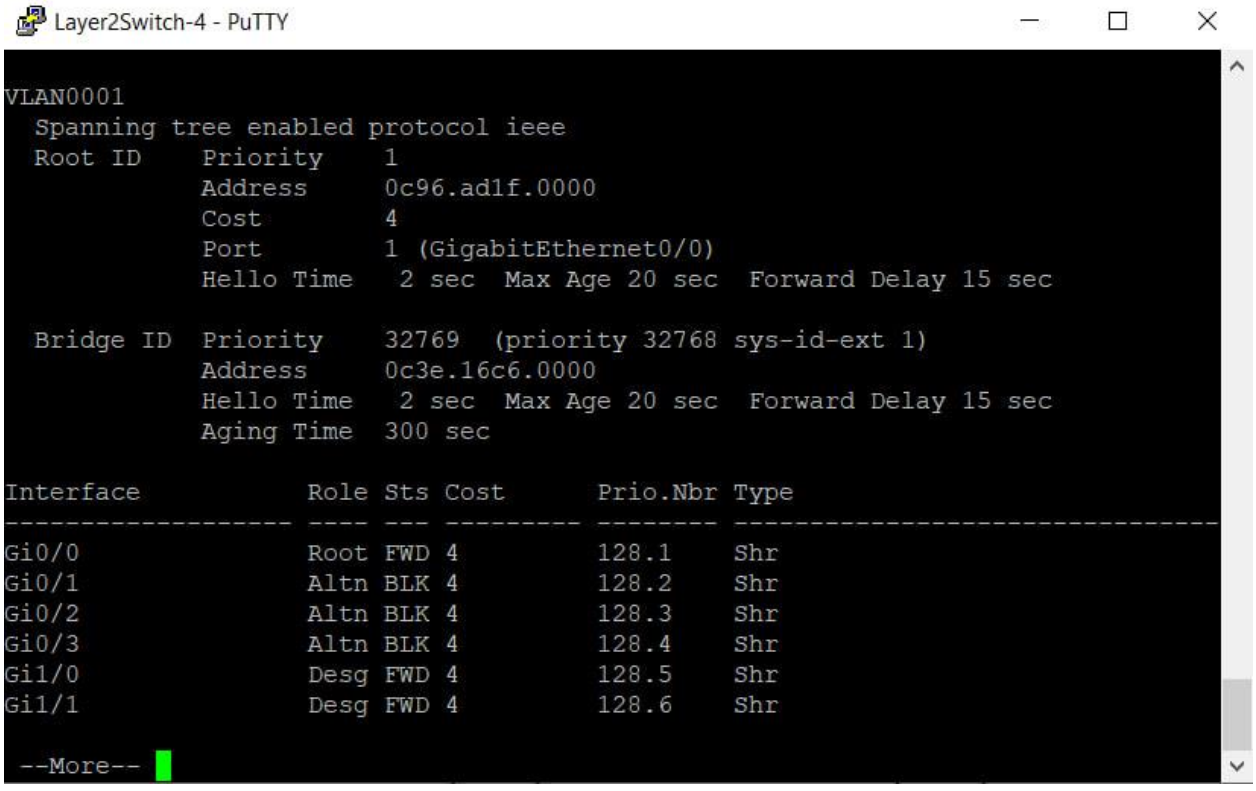
show spanning-tree для SW2



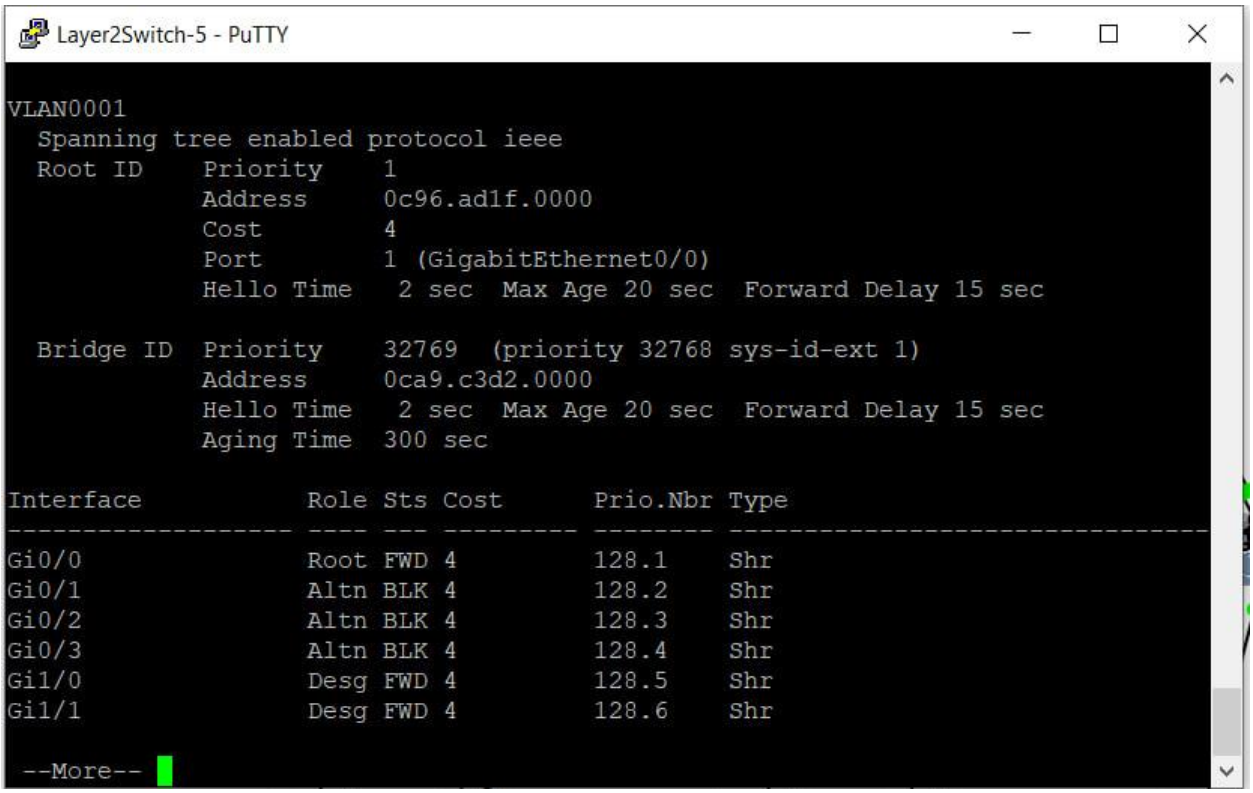
show spanning-tree для SW3

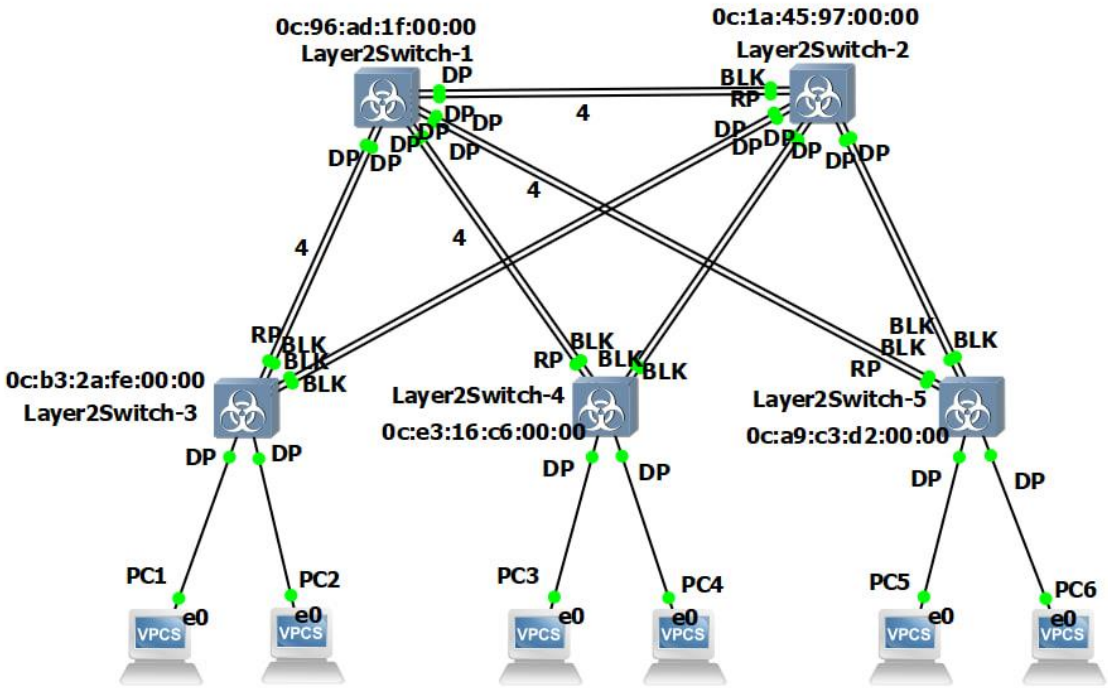


show spanning-tree для SW4



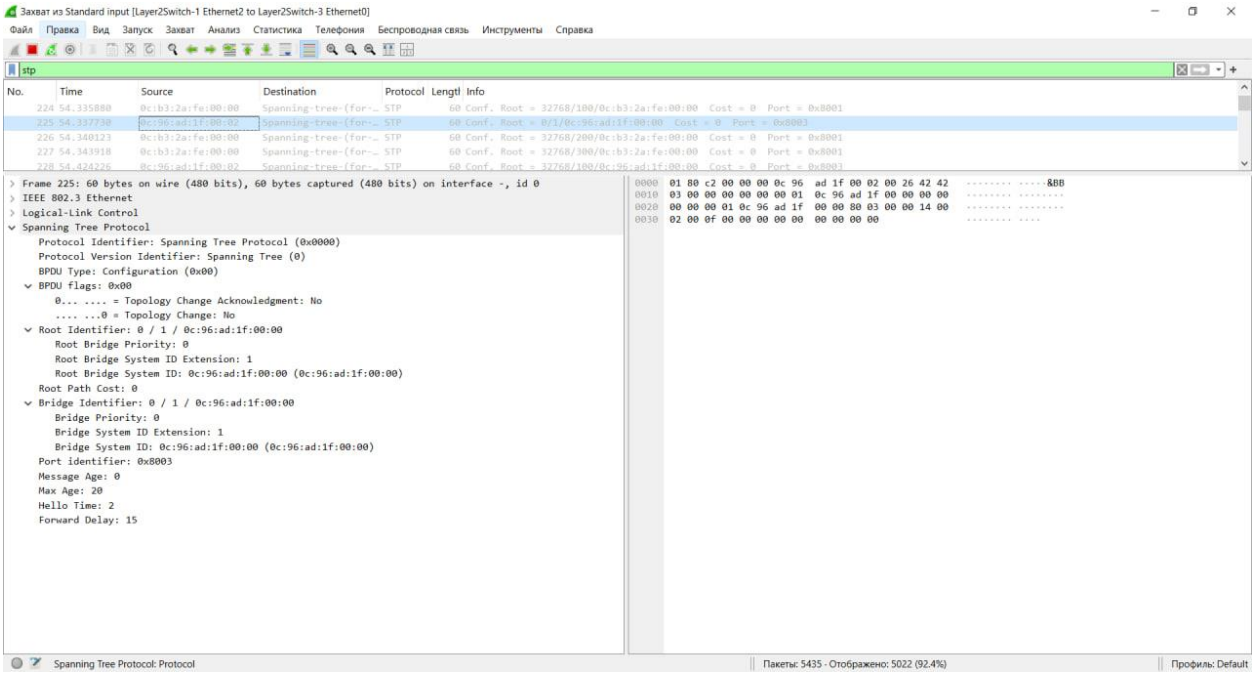
show spanning-tree для SW5



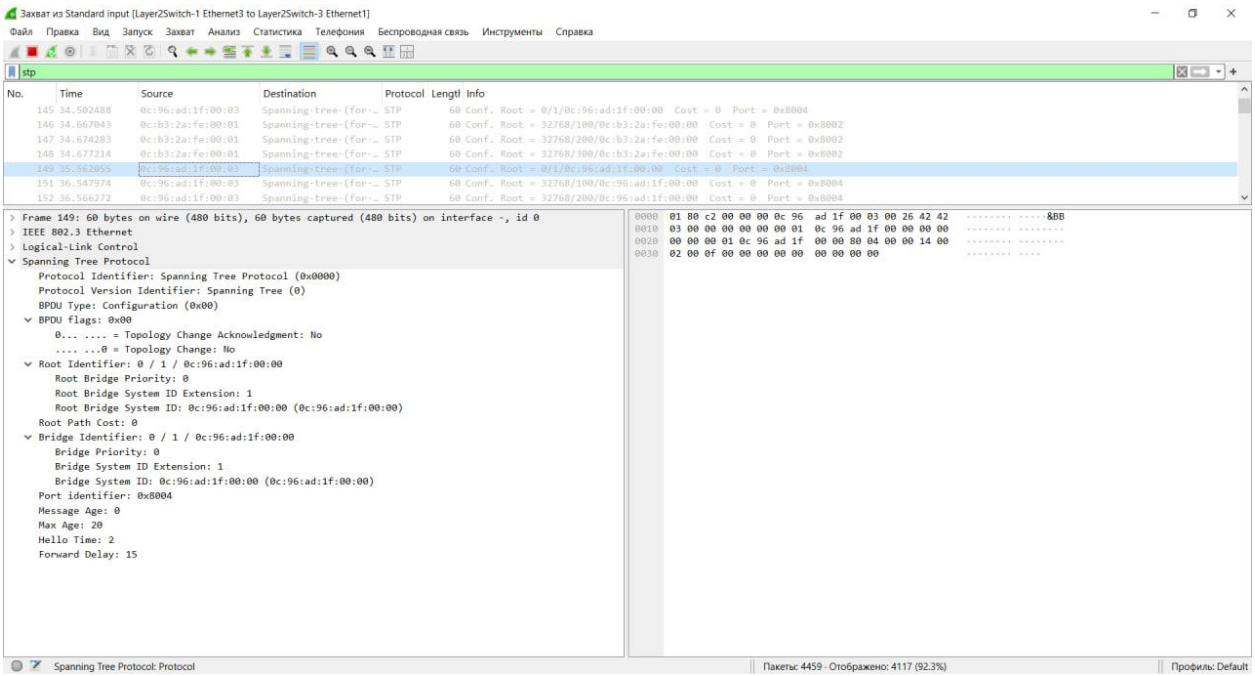


4) При помощи wireshark отследить передачу пакетов hello от корневого коммутатора на всех линках (nb!), результаты включить в отчет

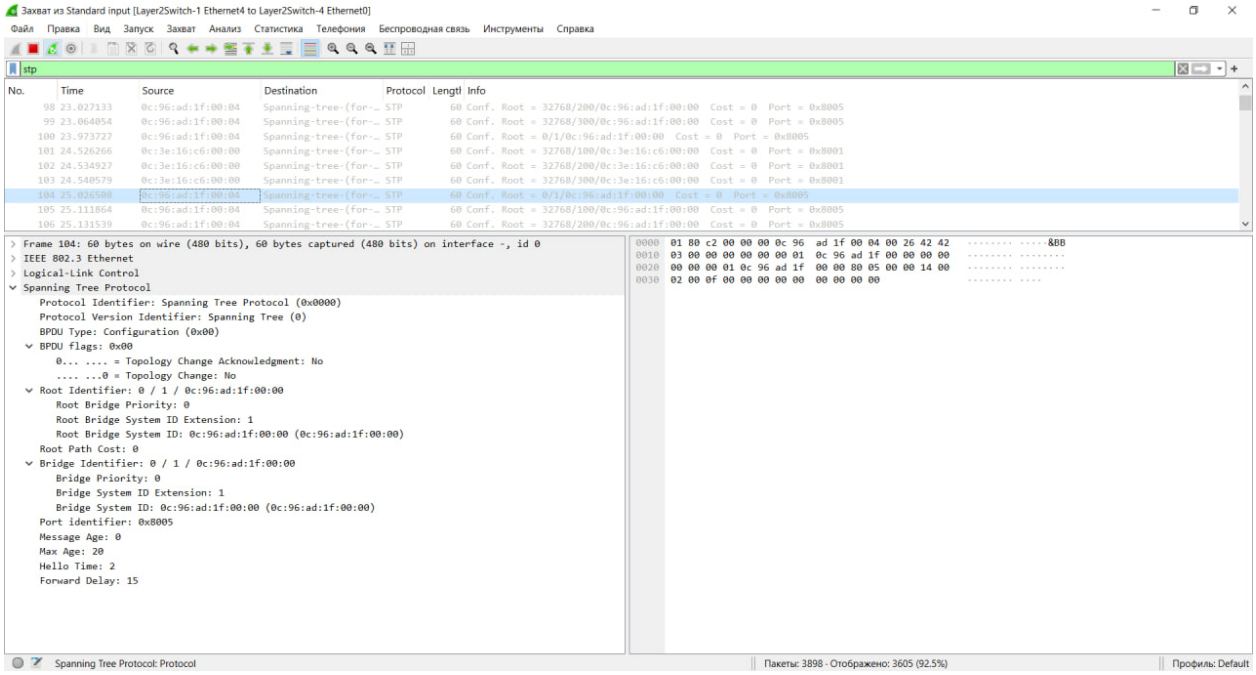
SW1 (eth2) -> SW3 (eth0)



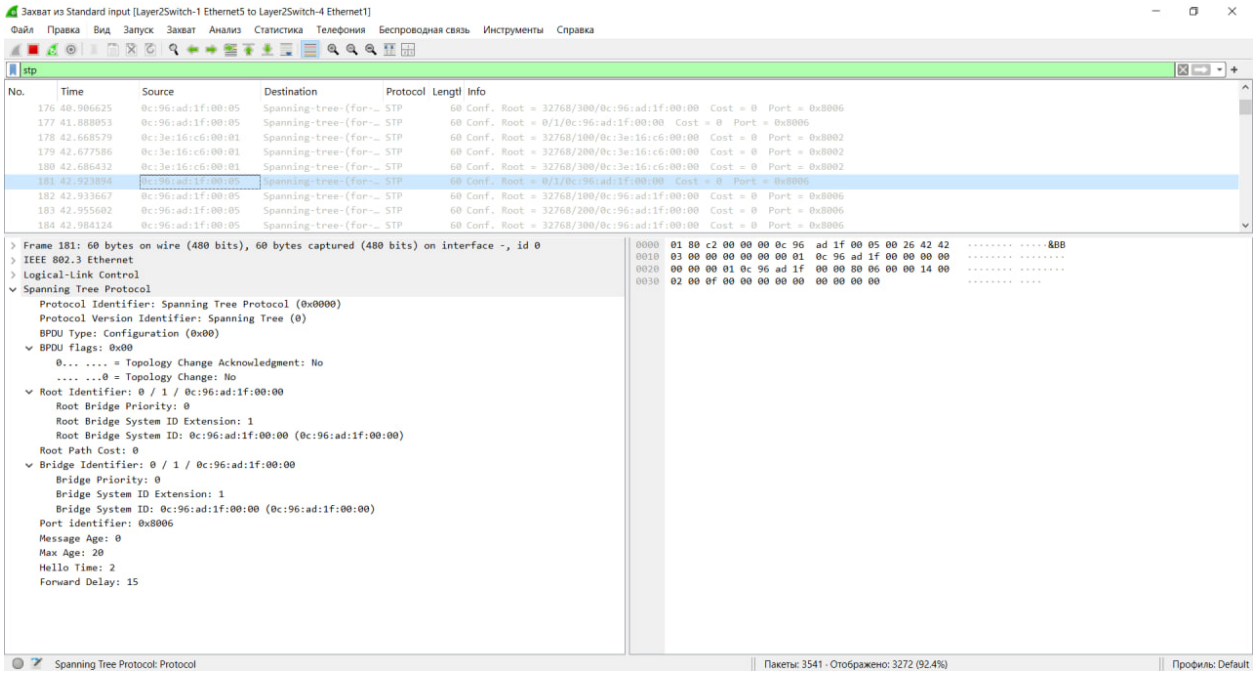
SW1 (eth3) -> SW3 (eth1)



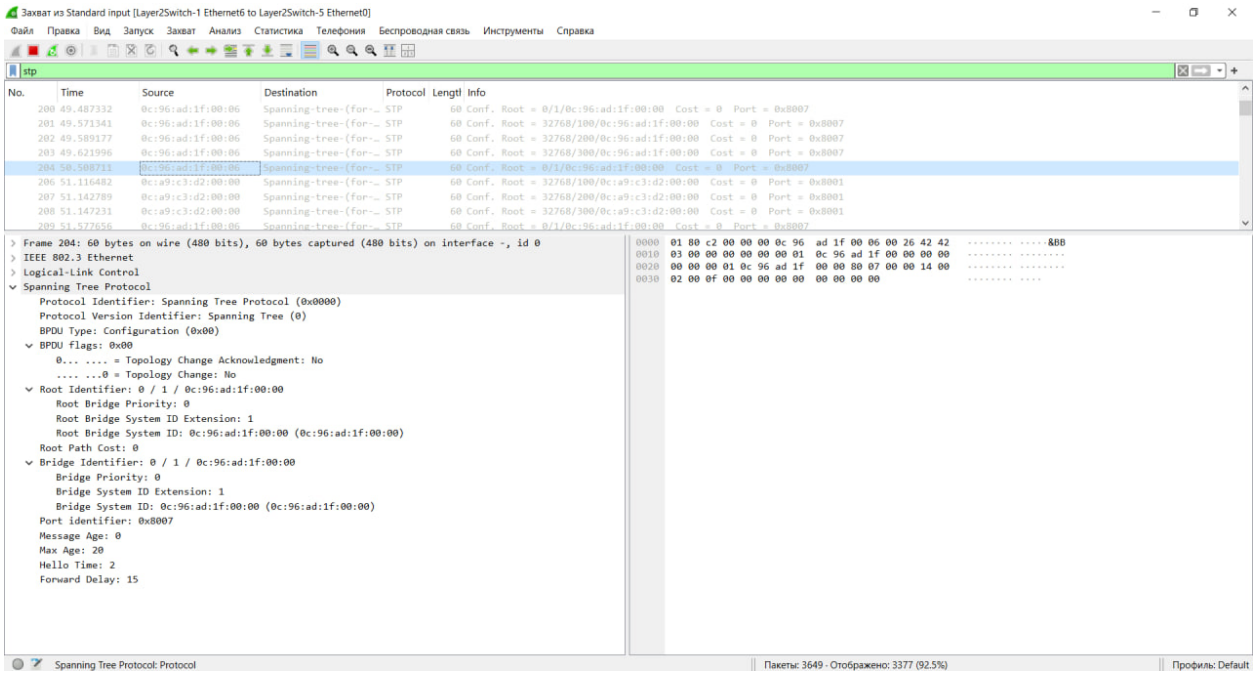
SW1 (eth4) -> SW4 (eth0)



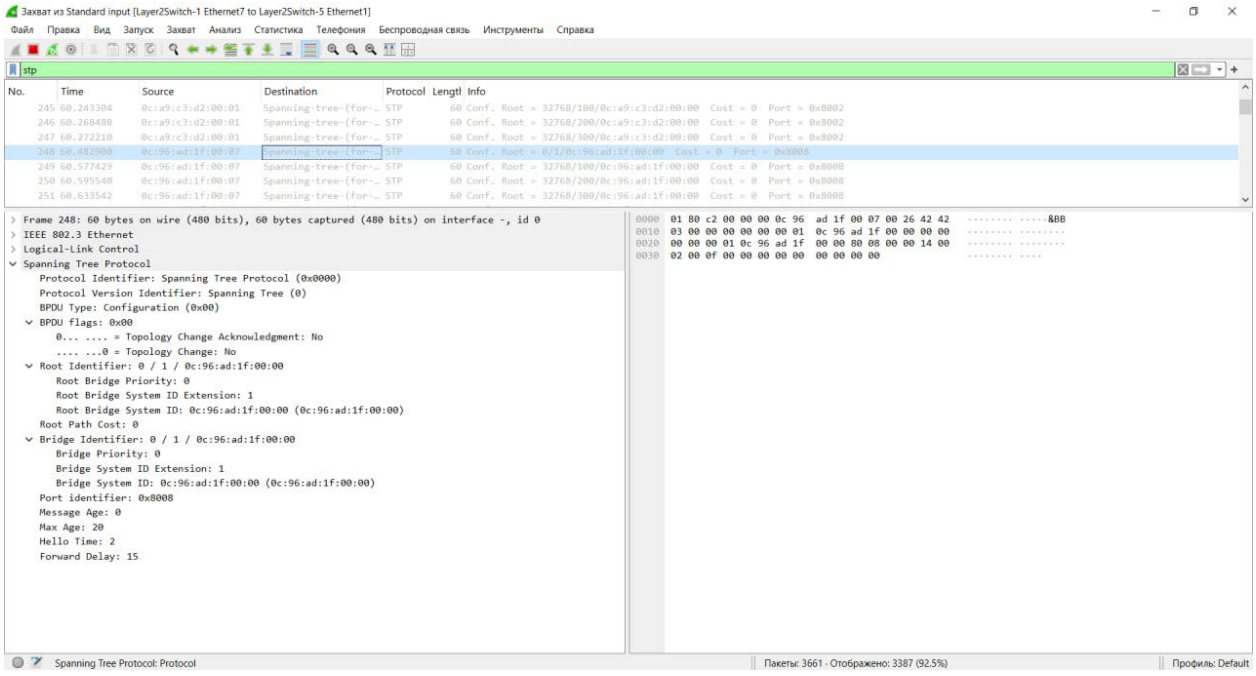
SW1 (eth5) -> SW4 (eth1)



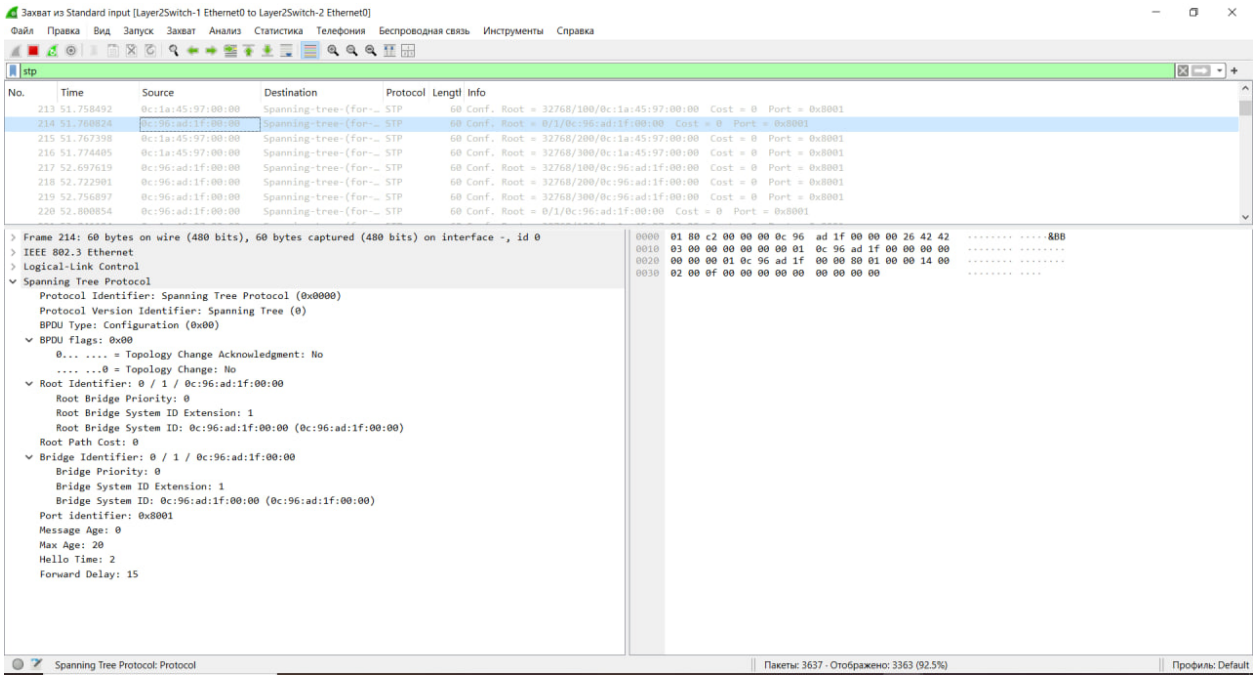
SW1 (eth6) -> SW5 (eth0)



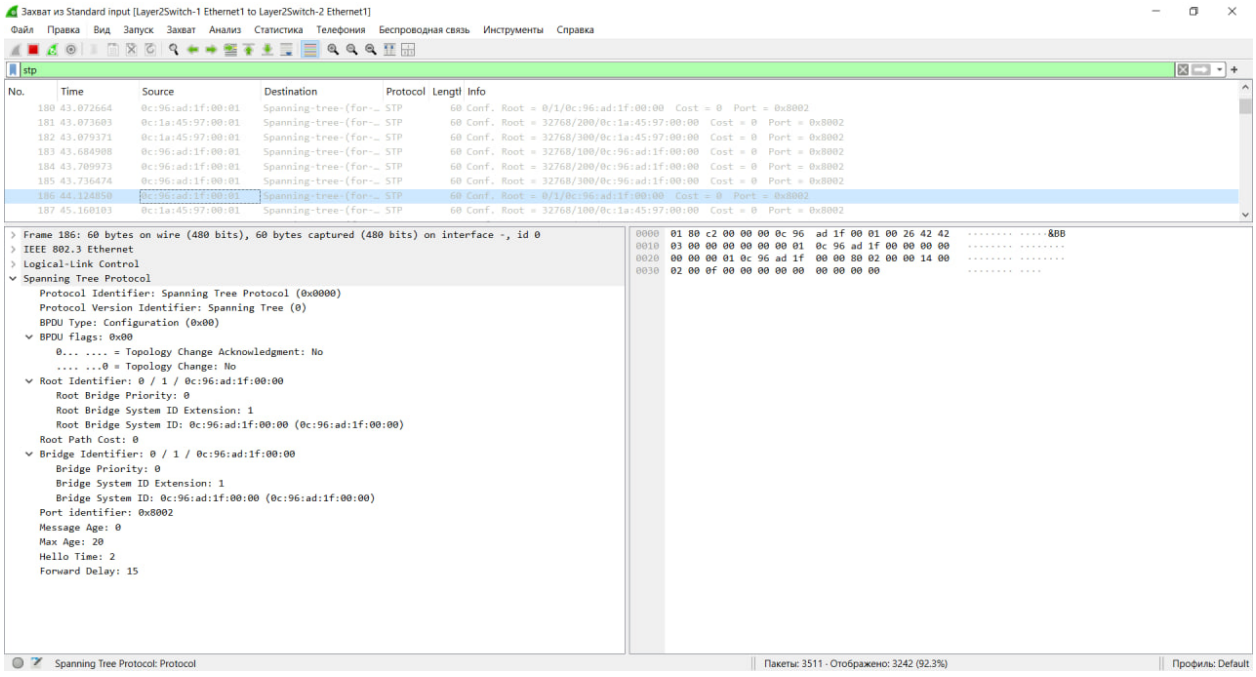
SW1 (eth7) -> SW5 (eth1)



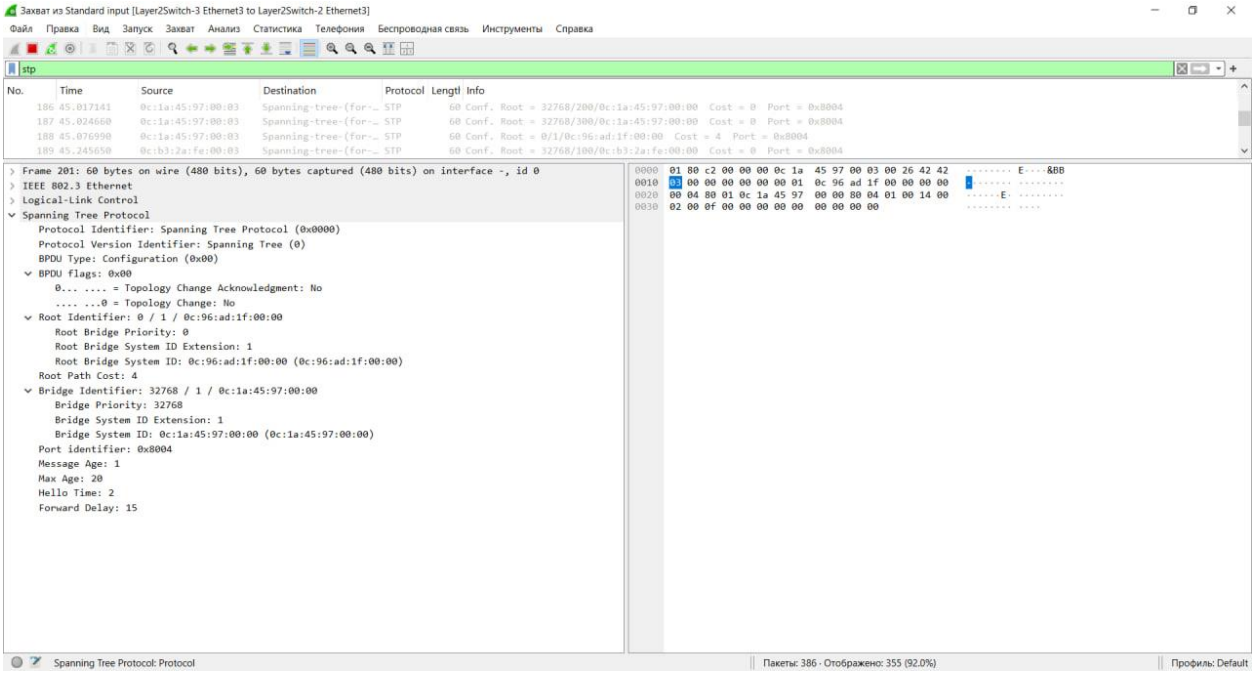
SW1 (eth0) -> SW2 (eth0)



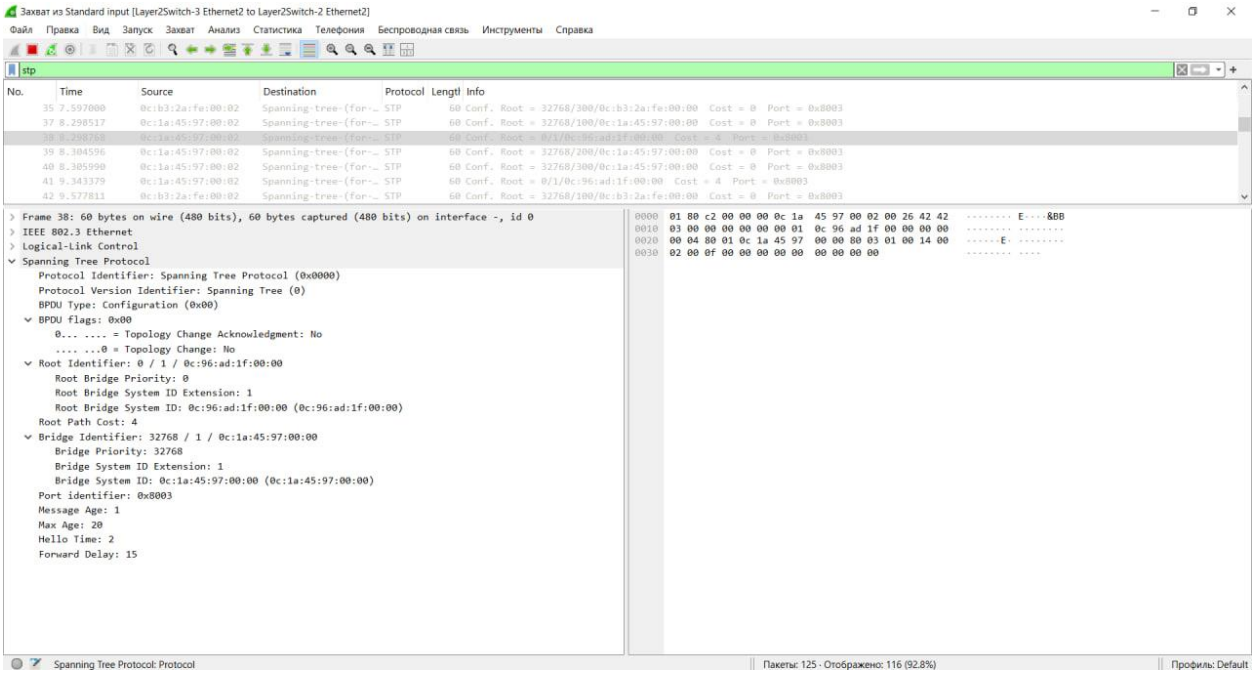
SW1 -> SW2 (eth1)



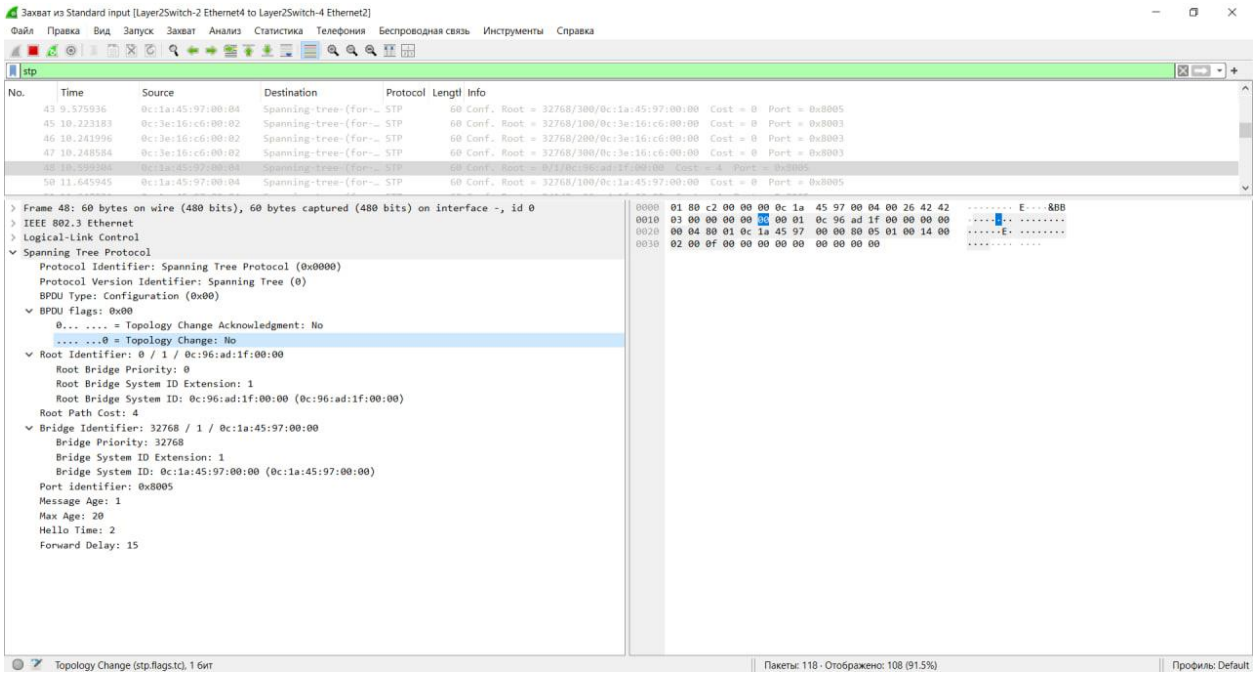
SW3 (eth3) -> SW2 (eth3)



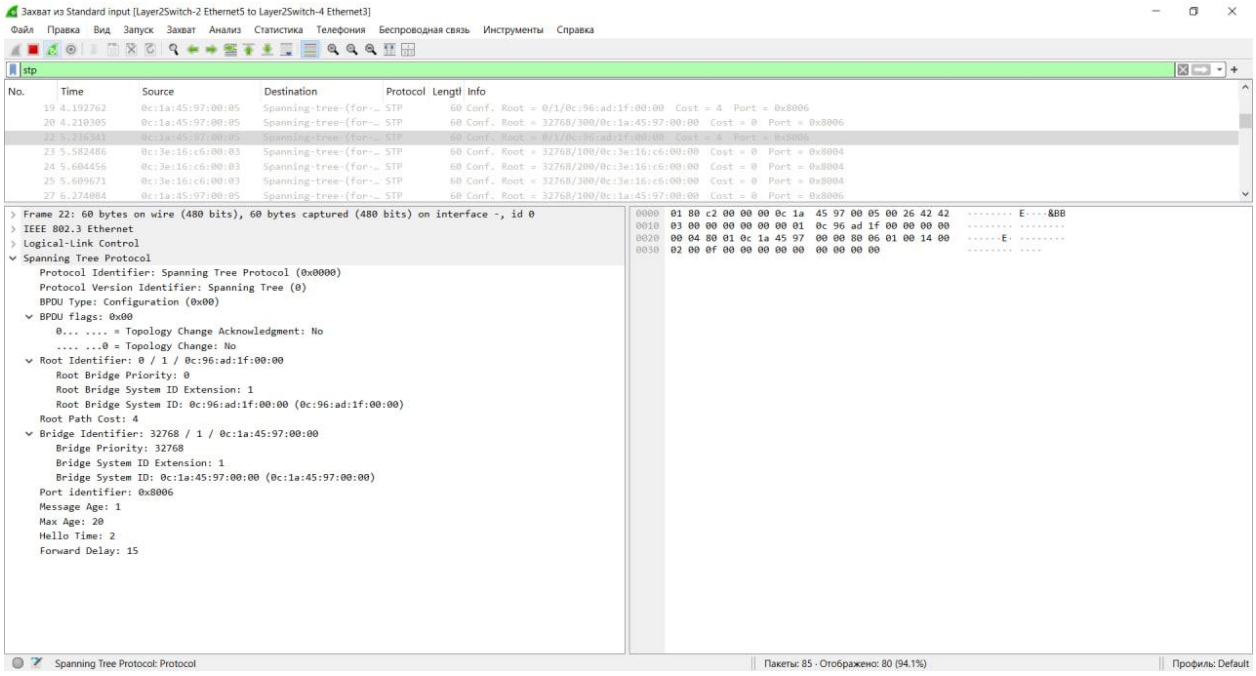
SW3 (eth2) -> SW2 (eth2)



SW2 (eth4) -> SW4 (eth2)



SW2 (eth5) -> SW4 (eth3)



5) Изменить стоимость маршрута для порта RP произвольного назначенного (designated) коммутатора, повторить действия из п.3, результат сохранить в отдельный файл

Выполняем команды чтобы изменить стоимость двух маршрутов на SW3 с 4 на 10 (от SW3 до SW1)

enable

configure terminal

interface gigabitEthernet 0/1

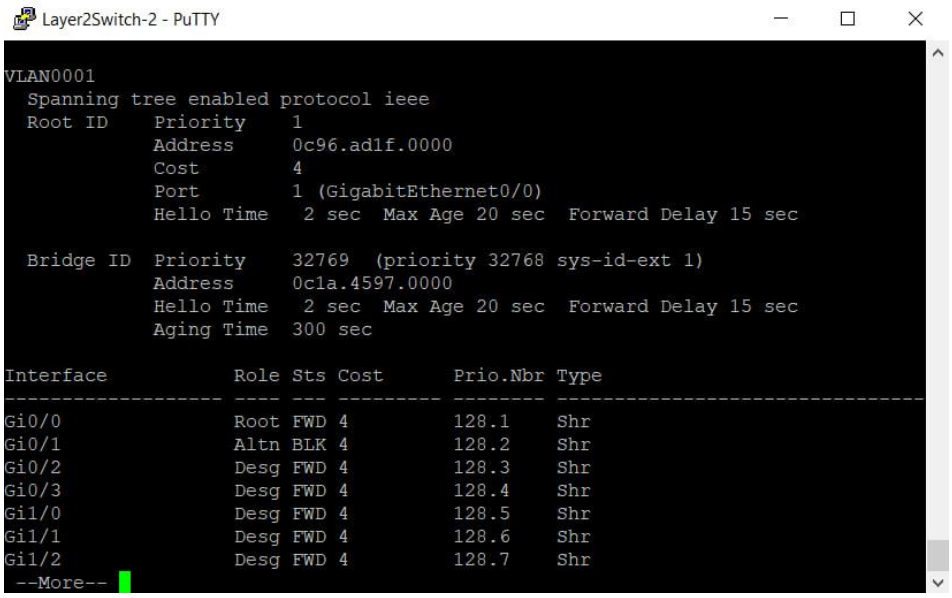
spanning-tree cost 10

interface gigabitEthernet 0/0

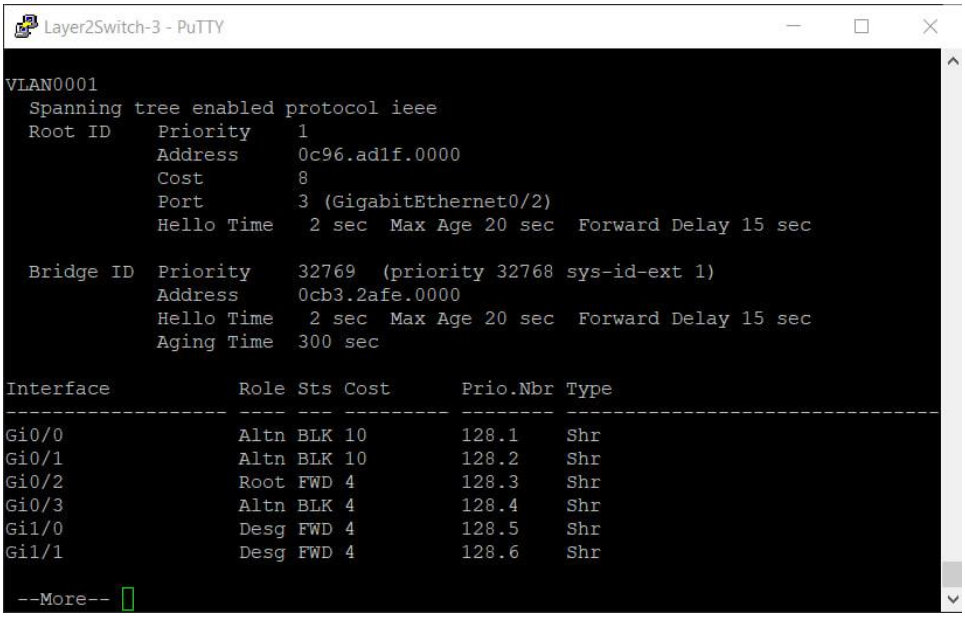
spanning-tree cost 10

end

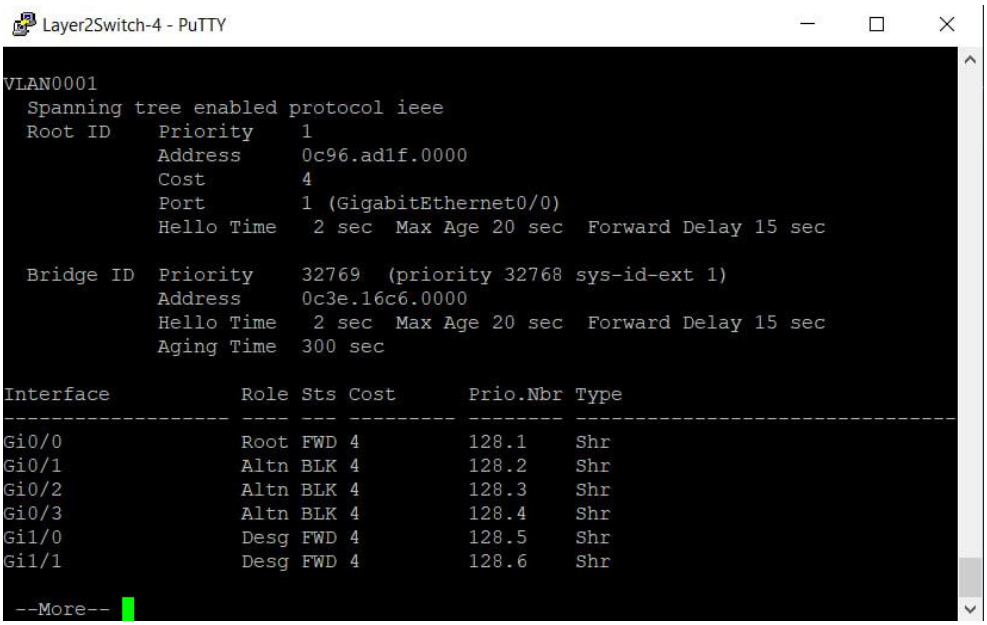
show spanning-tree для SW2 после изменений



show spanning-tree для SW3 после изменений



show spanning-tree для SW4 после изменений



show spanning-tree для SW5 после изменений

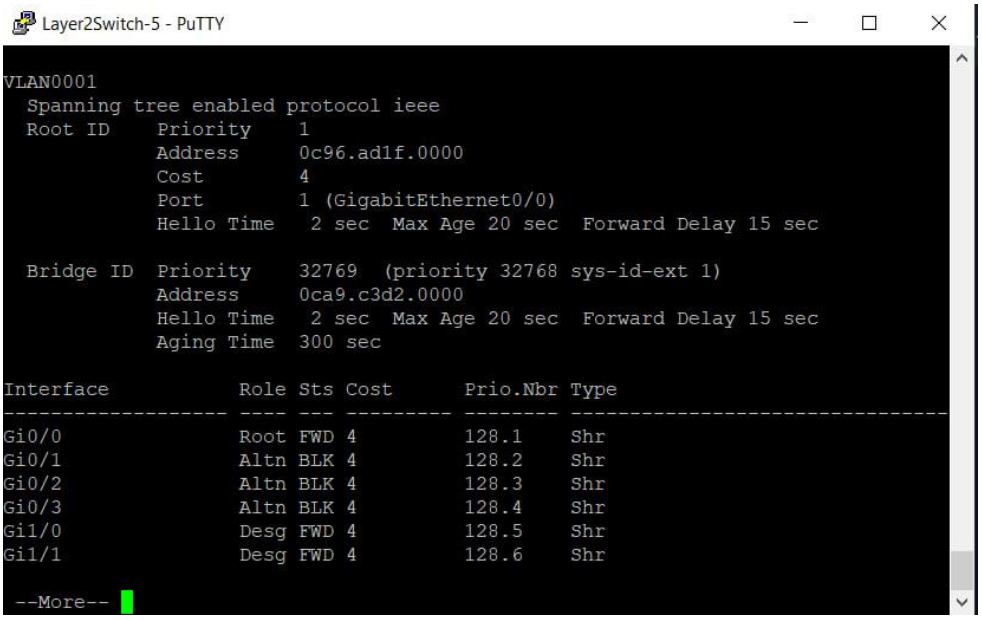
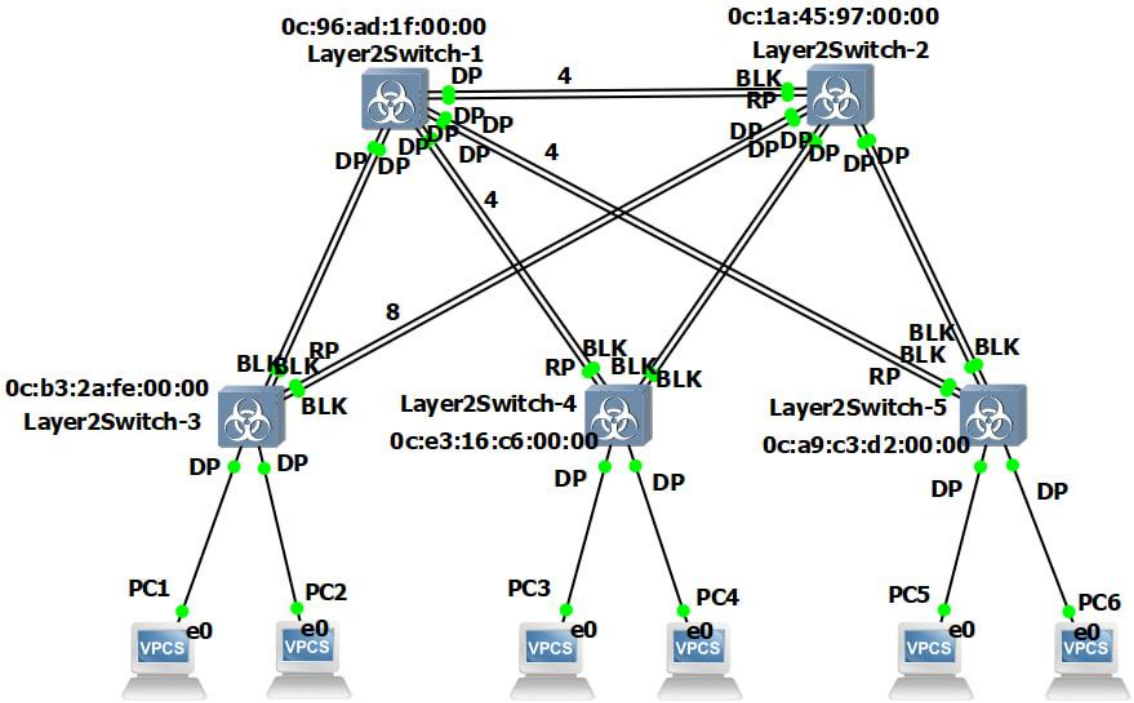


Схема после изменения стоимости двух маршрутов:



Теперь путь к корневому коммутатору от SW3 идёт через SW2, а не напрямую, как раньше.

6) Сохранить файлы конфигураций устройств в виде набора файлов с именами, соответствующими именам устройств