

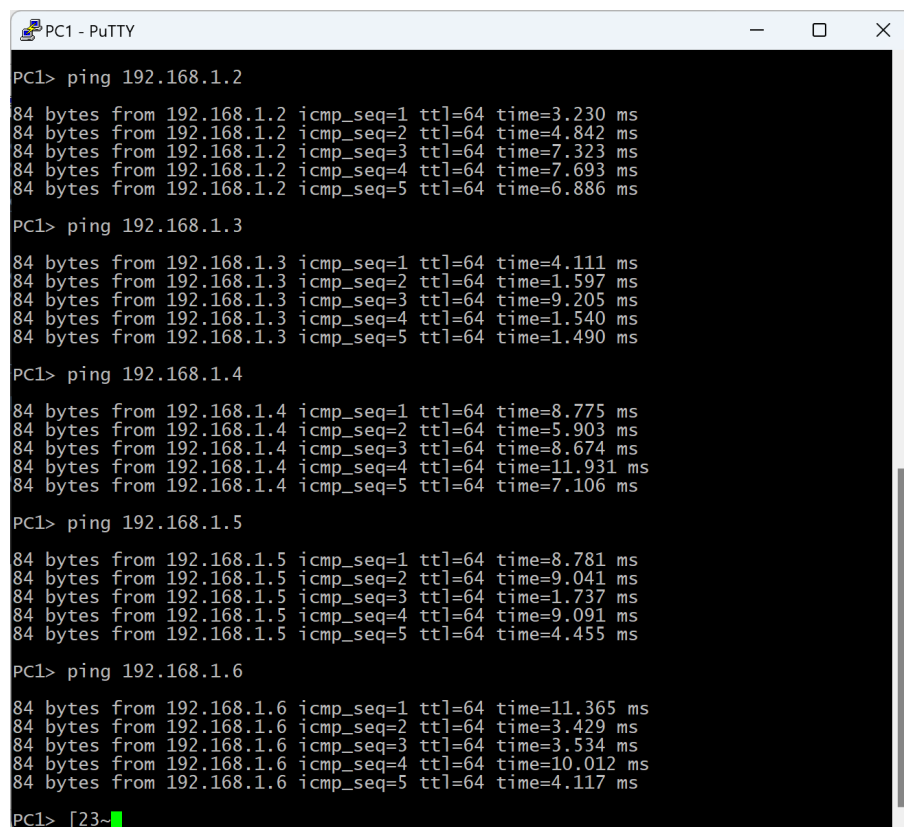
Для заданной на схеме schema-lab2 сети, состоящей из управляемых коммутаторов и персональных компьютеров настроить протокол STP, назначив явно один из коммутаторов корневым настройкой приоритета.

Настройка приоритета производилась для коммутатора Layer2Switch-6

```
enable
configure terminal
spanning-tree vlan 1 priority 4096
^Z
write
```

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

Ниже приведены скриншоты выполнения команды ping для каждого компьютера сети, проверяются все остальные компьютеры.



```
PC1 - PuTTY
PC1> ping 192.168.1.2
84 bytes from 192.168.1.2 icmp_seq=1 ttl=64 time=3.230 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=4.842 ms
84 bytes from 192.168.1.2 icmp_seq=3 ttl=64 time=7.323 ms
84 bytes from 192.168.1.2 icmp_seq=4 ttl=64 time=7.693 ms
84 bytes from 192.168.1.2 icmp_seq=5 ttl=64 time=6.886 ms

PC1> ping 192.168.1.3
84 bytes from 192.168.1.3 icmp_seq=1 ttl=64 time=4.111 ms
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=1.597 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=9.205 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=1.540 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=1.490 ms

PC1> ping 192.168.1.4
84 bytes from 192.168.1.4 icmp_seq=1 ttl=64 time=8.775 ms
84 bytes from 192.168.1.4 icmp_seq=2 ttl=64 time=5.903 ms
84 bytes from 192.168.1.4 icmp_seq=3 ttl=64 time=8.674 ms
84 bytes from 192.168.1.4 icmp_seq=4 ttl=64 time=11.931 ms
84 bytes from 192.168.1.4 icmp_seq=5 ttl=64 time=7.106 ms

PC1> ping 192.168.1.5
84 bytes from 192.168.1.5 icmp_seq=1 ttl=64 time=8.781 ms
84 bytes from 192.168.1.5 icmp_seq=2 ttl=64 time=9.041 ms
84 bytes from 192.168.1.5 icmp_seq=3 ttl=64 time=1.737 ms
84 bytes from 192.168.1.5 icmp_seq=4 ttl=64 time=9.091 ms
84 bytes from 192.168.1.5 icmp_seq=5 ttl=64 time=4.455 ms

PC1> ping 192.168.1.6
84 bytes from 192.168.1.6 icmp_seq=1 ttl=64 time=11.365 ms
84 bytes from 192.168.1.6 icmp_seq=2 ttl=64 time=3.429 ms
84 bytes from 192.168.1.6 icmp_seq=3 ttl=64 time=3.534 ms
84 bytes from 192.168.1.6 icmp_seq=4 ttl=64 time=10.012 ms
84 bytes from 192.168.1.6 icmp_seq=5 ttl=64 time=4.117 ms

PC1> [23-█
```

```
PC2 - PuTTY
VPCS : 192.168.1.2 255.255.255.0

PC2> ping 192.168.1.1
84 bytes from 192.168.1.1 icmp_seq=1 ttl=64 time=6.833 ms
84 bytes from 192.168.1.1 icmp_seq=2 ttl=64 time=6.925 ms
84 bytes from 192.168.1.1 icmp_seq=3 ttl=64 time=7.353 ms
84 bytes from 192.168.1.1 icmp_seq=4 ttl=64 time=0.679 ms
84 bytes from 192.168.1.1 icmp_seq=5 ttl=64 time=6.431 ms

PC2> ping 192.168.1.3
84 bytes from 192.168.1.3 icmp_seq=1 ttl=64 time=7.977 ms
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=7.184 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=6.595 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=11.296 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=10.755 ms

PC2> ping 192.168.1.4
84 bytes from 192.168.1.4 icmp_seq=1 ttl=64 time=12.308 ms
84 bytes from 192.168.1.4 icmp_seq=2 ttl=64 time=15.291 ms
84 bytes from 192.168.1.4 icmp_seq=3 ttl=64 time=7.455 ms
84 bytes from 192.168.1.4 icmp_seq=4 ttl=64 time=6.592 ms
84 bytes from 192.168.1.4 icmp_seq=5 ttl=64 time=7.198 ms

PC2> ping 192.168.1.5
84 bytes from 192.168.1.5 icmp_seq=1 ttl=64 time=9.414 ms
84 bytes from 192.168.1.5 icmp_seq=2 ttl=64 time=7.116 ms
84 bytes from 192.168.1.5 icmp_seq=3 ttl=64 time=1.852 ms
84 bytes from 192.168.1.5 icmp_seq=4 ttl=64 time=5.302 ms
84 bytes from 192.168.1.5 icmp_seq=5 ttl=64 time=1.578 ms

PC2> ping 192.168.1.6
84 bytes from 192.168.1.6 icmp_seq=1 ttl=64 time=12.163 ms
84 bytes from 192.168.1.6 icmp_seq=2 ttl=64 time=3.784 ms
84 bytes from 192.168.1.6 icmp_seq=3 ttl=64 time=7.324 ms
84 bytes from 192.168.1.6 icmp_seq=4 ttl=64 time=7.364 ms
84 bytes from 192.168.1.6 icmp_seq=5 ttl=64 time=15.718 ms

PC2> █
```

```
PC3 - PuTTY
VPCS : 192.168.1.3 255.255.255.0

PC3> ping 192.168.1.1
84 bytes from 192.168.1.1 icmp_seq=1 ttl=64 time=10.422 ms
84 bytes from 192.168.1.1 icmp_seq=2 ttl=64 time=10.053 ms
84 bytes from 192.168.1.1 icmp_seq=3 ttl=64 time=9.854 ms
84 bytes from 192.168.1.1 icmp_seq=4 ttl=64 time=6.027 ms
84 bytes from 192.168.1.1 icmp_seq=5 ttl=64 time=4.880 ms

PC3> ping 192.168.1.2
84 bytes from 192.168.1.2 icmp_seq=1 ttl=64 time=5.291 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=13.015 ms
84 bytes from 192.168.1.2 icmp_seq=3 ttl=64 time=14.735 ms
84 bytes from 192.168.1.2 icmp_seq=4 ttl=64 time=8.106 ms
84 bytes from 192.168.1.2 icmp_seq=5 ttl=64 time=14.924 ms

PC3> ping 192.168.1.4
84 bytes from 192.168.1.4 icmp_seq=1 ttl=64 time=14.099 ms
84 bytes from 192.168.1.4 icmp_seq=2 ttl=64 time=0.668 ms
84 bytes from 192.168.1.4 icmp_seq=3 ttl=64 time=6.840 ms
84 bytes from 192.168.1.4 icmp_seq=4 ttl=64 time=0.789 ms
84 bytes from 192.168.1.4 icmp_seq=5 ttl=64 time=0.874 ms

PC3> ping 192.168.1.5
84 bytes from 192.168.1.5 icmp_seq=1 ttl=64 time=5.644 ms
84 bytes from 192.168.1.5 icmp_seq=2 ttl=64 time=8.027 ms
84 bytes from 192.168.1.5 icmp_seq=3 ttl=64 time=7.460 ms
84 bytes from 192.168.1.5 icmp_seq=4 ttl=64 time=1.822 ms
84 bytes from 192.168.1.5 icmp_seq=5 ttl=64 time=4.523 ms

PC3> ping 192.168.1.6
84 bytes from 192.168.1.6 icmp_seq=1 ttl=64 time=5.290 ms
84 bytes from 192.168.1.6 icmp_seq=2 ttl=64 time=8.173 ms
84 bytes from 192.168.1.6 icmp_seq=3 ttl=64 time=2.932 ms
84 bytes from 192.168.1.6 icmp_seq=4 ttl=64 time=1.822 ms
84 bytes from 192.168.1.6 icmp_seq=5 ttl=64 time=5.476 ms

PC3> █
```

```
PC4 - PuTTY
PC4 : 192.168.1.4 255.255.255.0

PC4> ping 192.168.1.1
84 bytes from 192.168.1.1 icmp_seq=1 ttl=64 time=9.394 ms
84 bytes from 192.168.1.1 icmp_seq=2 ttl=64 time=7.468 ms
84 bytes from 192.168.1.1 icmp_seq=3 ttl=64 time=2.825 ms
84 bytes from 192.168.1.1 icmp_seq=4 ttl=64 time=6.612 ms
84 bytes from 192.168.1.1 icmp_seq=5 ttl=64 time=5.849 ms

PC4> ping 192.168.1.2
84 bytes from 192.168.1.2 icmp_seq=1 ttl=64 time=13.965 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=7.539 ms
84 bytes from 192.168.1.2 icmp_seq=3 ttl=64 time=6.864 ms
84 bytes from 192.168.1.2 icmp_seq=4 ttl=64 time=6.359 ms
84 bytes from 192.168.1.2 icmp_seq=5 ttl=64 time=7.664 ms

PC4> ping 192.168.1.3
84 bytes from 192.168.1.3 icmp_seq=1 ttl=64 time=7.732 ms
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=1.996 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=3.478 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=3.207 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=3.538 ms

PC4> ping 192.168.1.5
84 bytes from 192.168.1.5 icmp_seq=1 ttl=64 time=6.411 ms
84 bytes from 192.168.1.5 icmp_seq=2 ttl=64 time=6.825 ms
84 bytes from 192.168.1.5 icmp_seq=3 ttl=64 time=6.808 ms
84 bytes from 192.168.1.5 icmp_seq=4 ttl=64 time=3.534 ms
84 bytes from 192.168.1.5 icmp_seq=5 ttl=64 time=1.308 ms

PC4> ping 192.168.1.6
84 bytes from 192.168.1.6 icmp_seq=1 ttl=64 time=11.030 ms
84 bytes from 192.168.1.6 icmp_seq=2 ttl=64 time=2.807 ms
84 bytes from 192.168.1.6 icmp_seq=3 ttl=64 time=3.949 ms
84 bytes from 192.168.1.6 icmp_seq=4 ttl=64 time=3.565 ms
84 bytes from 192.168.1.6 icmp_seq=5 ttl=64 time=2.930 ms

PC4>
```

```
PC5 - PuTTY
VPCS : 192.168.1.5 255.255.255.0

PC5> ping 192.168.1.1
84 bytes from 192.168.1.1 icmp_seq=1 ttl=64 time=15.701 ms
84 bytes from 192.168.1.1 icmp_seq=2 ttl=64 time=7.718 ms
84 bytes from 192.168.1.1 icmp_seq=3 ttl=64 time=10.588 ms
84 bytes from 192.168.1.1 icmp_seq=4 ttl=64 time=7.175 ms
84 bytes from 192.168.1.1 icmp_seq=5 ttl=64 time=8.170 ms

PC5> ping 192.168.1.2
84 bytes from 192.168.1.2 icmp_seq=1 ttl=64 time=11.005 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=7.028 ms
84 bytes from 192.168.1.2 icmp_seq=3 ttl=64 time=11.751 ms
84 bytes from 192.168.1.2 icmp_seq=4 ttl=64 time=6.726 ms
84 bytes from 192.168.1.2 icmp_seq=5 ttl=64 time=2.799 ms

PC5> ping 192.168.1.3
84 bytes from 192.168.1.3 icmp_seq=1 ttl=64 time=8.018 ms
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=9.511 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=5.519 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=9.388 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=10.003 ms

PC5> ping 192.168.1.4
84 bytes from 192.168.1.4 icmp_seq=1 ttl=64 time=6.198 ms
84 bytes from 192.168.1.4 icmp_seq=2 ttl=64 time=8.425 ms
84 bytes from 192.168.1.4 icmp_seq=3 ttl=64 time=7.879 ms
84 bytes from 192.168.1.4 icmp_seq=4 ttl=64 time=7.360 ms
84 bytes from 192.168.1.4 icmp_seq=5 ttl=64 time=7.357 ms

PC5> ping 192.168.1.6
84 bytes from 192.168.1.6 icmp_seq=1 ttl=64 time=4.133 ms
84 bytes from 192.168.1.6 icmp_seq=2 ttl=64 time=0.843 ms
84 bytes from 192.168.1.6 icmp_seq=3 ttl=64 time=14.728 ms
84 bytes from 192.168.1.6 icmp_seq=4 ttl=64 time=0.855 ms
84 bytes from 192.168.1.6 icmp_seq=5 ttl=64 time=2.883 ms

PC5>
```

```
PC6 - PuTTY
VPCS : 192.168.1.6 255.255.255.0

PC6> ping 192.168.1.1
84 bytes from 192.168.1.1 icmp_seq=1 ttl=64 time=15.212 ms
84 bytes from 192.168.1.1 icmp_seq=2 ttl=64 time=9.741 ms
84 bytes from 192.168.1.1 icmp_seq=3 ttl=64 time=7.212 ms
84 bytes from 192.168.1.1 icmp_seq=4 ttl=64 time=5.183 ms
84 bytes from 192.168.1.1 icmp_seq=5 ttl=64 time=1.458 ms

PC6> ping 192.168.1.2
84 bytes from 192.168.1.2 icmp_seq=1 ttl=64 time=7.021 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=7.481 ms
84 bytes from 192.168.1.2 icmp_seq=3 ttl=64 time=3.949 ms
84 bytes from 192.168.1.2 icmp_seq=4 ttl=64 time=4.575 ms
84 bytes from 192.168.1.2 icmp_seq=5 ttl=64 time=4.911 ms

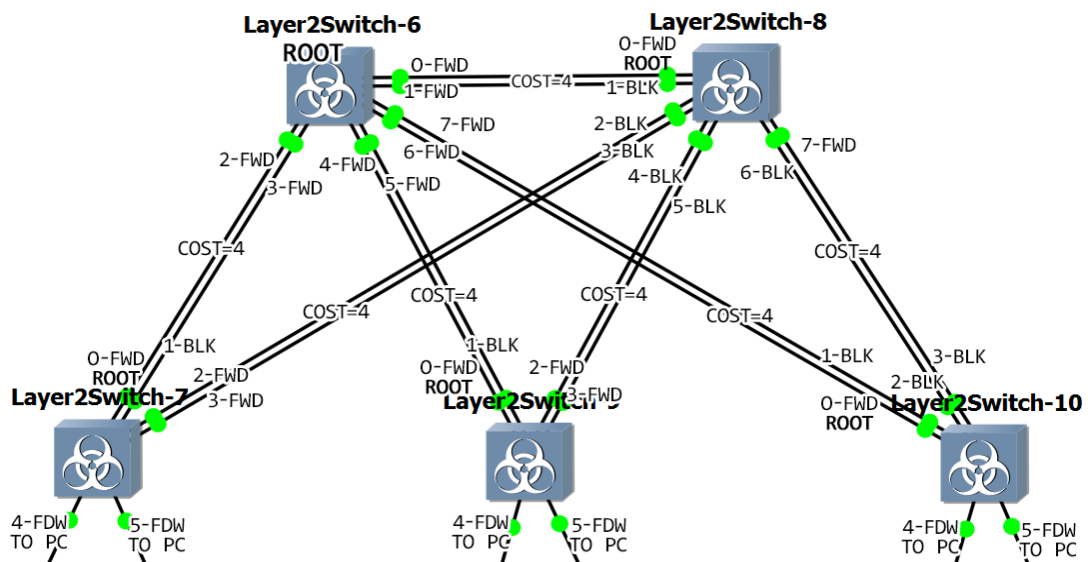
PC6> ping 192.168.1.3
84 bytes from 192.168.1.3 icmp_seq=1 ttl=64 time=5.258 ms
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=10.022 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=7.173 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=7.397 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=7.827 ms

PC6> ping 192.168.1.4
84 bytes from 192.168.1.4 icmp_seq=1 ttl=64 time=14.559 ms
84 bytes from 192.168.1.4 icmp_seq=2 ttl=64 time=9.464 ms
84 bytes from 192.168.1.4 icmp_seq=3 ttl=64 time=16.203 ms
84 bytes from 192.168.1.4 icmp_seq=4 ttl=64 time=12.640 ms
84 bytes from 192.168.1.4 icmp_seq=5 ttl=64 time=7.675 ms

PC6> ping 192.168.1.5
84 bytes from 192.168.1.5 icmp_seq=1 ttl=64 time=1.816 ms
84 bytes from 192.168.1.5 icmp_seq=2 ttl=64 time=4.496 ms
84 bytes from 192.168.1.5 icmp_seq=3 ttl=64 time=6.946 ms
84 bytes from 192.168.1.5 icmp_seq=4 ttl=64 time=7.216 ms
84 bytes from 192.168.1.5 icmp_seq=5 ttl=64 time=1.629 ms

PC6> █
```

На изображении схемы отметить BID каждого коммутатора и режимы работы портов (RP/DP/blocked) и стоимости маршрутов



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

```
91 73.682963 0c:42:37:53:00:05 Spanning-tree-(for-bridges)_00 STP 60 Conf. TC + Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8006
92 76.041978 0c:42:37:53:00:05 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8006
93 78.423482 0c:42:37:53:00:05 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8006
95 81.038102 0c:42:37:53:00:05 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8006
97 84.263090 0c:42:37:53:00:05 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8006
98 87.443445 0c:42:37:53:00:05 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8006
99 89.698677 0c:42:37:53:00:05 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8006
101 91.698557 0c:42:37:53:00:05 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8006
103 93.700301 0c:42:37:53:00:05 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8006
104 95.699894 0c:42:37:53:00:05 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8006
105 97.699815 0c:42:37:53:00:05 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8006
108 99.700174 0c:42:37:53:00:05 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8006
```

Protocol Identifier: Spanning Tree Protocol (0x0000)

Protocol Version Identifier: Spanning Tree (0)

BPDU Type: Configuration (0x00)

➤ BPDU flags: 0x00

➤ Root Identifier: 32768 / 1 / 0c:75:9e:ea:00:00

Root Path Cost: 0

➤ Bridge Identifier: 32768 / 1 / 0c:75:9e:ea:00:00

Port identifier: 0x8002

Message Age: 0

Max Age: 20

Hello Time: 2

Forward Delay: 15

```
61 73.990728 0c:42:37:53:00:02 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8003
63 75.990491 0c:42:37:53:00:02 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8003
65 77.990138 0c:42:37:53:00:02 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8003
66 79.998929 0c:42:37:53:00:02 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8003
68 81.990563 0c:42:37:53:00:02 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8003
70 83.990185 0c:42:37:53:00:02 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8003
72 85.989921 0c:42:37:53:00:02 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8003
73 87.989600 0c:42:37:53:00:02 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8003
78 89.989306 0c:42:37:53:00:02 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8003
79 91.988984 0c:42:37:53:00:02 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8003
81 93.988782 0c:42:37:53:00:02 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8003
83 95.988384 0c:42:37:53:00:02 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8003
84 97.988116 0c:42:37:53:00:02 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8003
85 99.987764 0c:42:37:53:00:02 Spanning-tree-(for-bridges)_00 STP 60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8003
```

Protocol Identifier: Spanning Tree Protocol (0x0000)

Protocol Version Identifier: Spanning Tree (0)

BPDU Type: Configuration (0x00)

➤ BPDU flags: 0x00

➤ Root Identifier: 4096 / 1 / 0c:42:37:53:00:00

Root Path Cost: 0

➤ Bridge Identifier: 4096 / 1 / 0c:42:37:53:00:00

Port identifier: 0x8003

Message Age: 0

Max Age: 20

Hello Time: 2

Forward Delay: 15

92 73.681815	0c:42:37:53:00:00	Spanning-tree-(for-bridges)_00	STP	60 Conf. TC + Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8001
94 76.041195	0c:42:37:53:00:00	Spanning-tree-(for-bridges)_00	STP	60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8001
95 78.422754	0c:42:37:53:00:00	Spanning-tree-(for-bridges)_00	STP	60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8001
96 81.037443	0c:42:37:53:00:00	Spanning-tree-(for-bridges)_00	STP	60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8001
99 84.262276	0c:42:37:53:00:00	Spanning-tree-(for-bridges)_00	STP	60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8001
100 87.442844	0c:42:37:53:00:00	Spanning-tree-(for-bridges)_00	STP	60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8001
101 89.697985	0c:42:37:53:00:00	Spanning-tree-(for-bridges)_00	STP	60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8001
102 91.697852	0c:42:37:53:00:00	Spanning-tree-(for-bridges)_00	STP	60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8001
104 93.699620	0c:42:37:53:00:00	Spanning-tree-(for-bridges)_00	STP	60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8001
106 95.699230	0c:42:37:53:00:00	Spanning-tree-(for-bridges)_00	STP	60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8001

▼ 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:42:37:53:00:00

Root Path Cost: 0

▼ Bridge Identifier: 4096 / 1 / 0c:42:37:53:00:00

Bridge Priority: 4096

Bridge System ID Extension: 1

Bridge System ID: 0c:42:37:53:00:00 (0c:42:37:53:00:00)

Port identifier: 0x8001

Message Age: 0

Max Age: 20

Hello Time: 2

Forward Delay: 15

92 73.683221	0c:42:37:53:00:07	Spanning-tree-(for-...	STP	60 Conf. TC + Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8008
93 76.042218	0c:42:37:53:00:07	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8008
94 78.423720	0c:42:37:53:00:07	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8008
95 81.038341	0c:42:37:53:00:07	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8008
98 84.263310	0c:42:37:53:00:07	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8008
99 87.443694	0c:42:37:53:00:07	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8008
100 89.698854	0c:42:37:53:00:07	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8008
102 91.698752	0c:42:37:53:00:07	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8008
103 93.700510	0c:42:37:53:00:07	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8008
105 95.700097	0c:42:37:53:00:07	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8008
106 97.700047	0c:42:37:53:00:07	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8008
109 99.700386	0c:42:37:53:00:07	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8008
111 101.700063	0c:42:37:53:00:07	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8008
117 103.600874	0c:42:37:53:00:07	Spanning-tree-(for-...	STP	60 Conf. Root = 4096/1/0c:42:37:53:00:00 Cost = 0 Port = 0x8008

➤ Frame 95: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface

➤ 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:42:37:53:00:00

Root Path Cost: 0

➤ Bridge Identifier: 4096 / 1 / 0c:42:37:53:00:00

Port identifier: 0x8008

Message Age: 0

Max Age: 20

Hello Time: 2

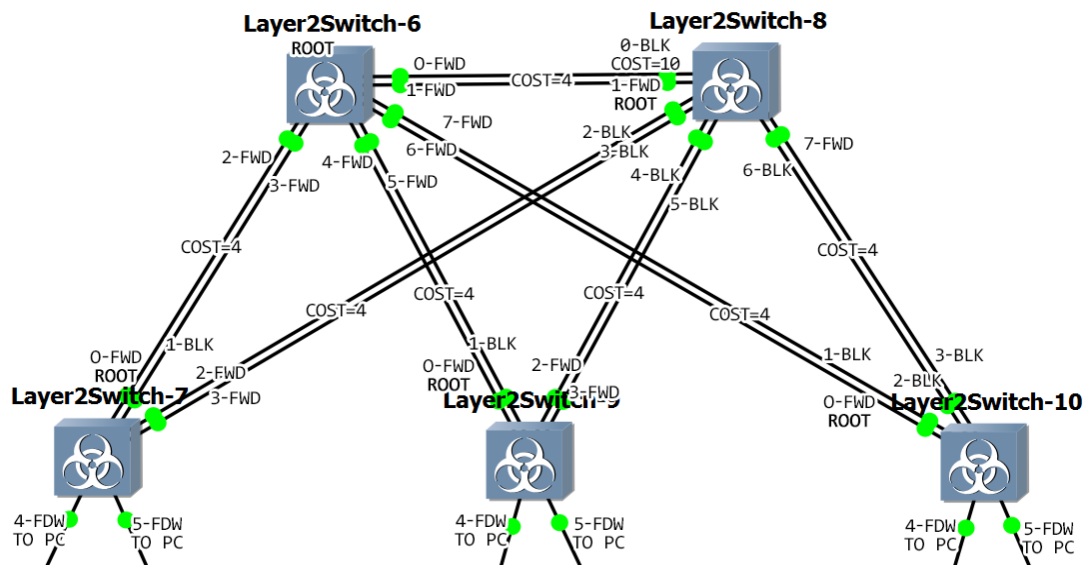
Forward Delay: 15

Как можно заметить, hello пакеты, передаваемые разным коммутаторам практически идентичны, за исключением **идентификатора порта**, который очевидно для каждого коммутатора разный.

Изменить стоимость маршрута для порта RP произвольного назначенного (designated) коммутатора, повторить действия из п.3 (На изображении схемы отметить BID каждого коммутатора и режимы работы портов (RP/DP/blocked) и стоимости маршрутов)

Изменение стоимости маршрута выполнялось для коммутатора Layer2Switch-8, стоимость маршрута для порта 0 изменена со значения 4 на 10.

```
enable
configure t
interface Gi0/0
spanning-tree cost 10
^Z
write
```



Далее, была получена информация о spanning tree каждого коммутатора.

```
Layer2Switch-6 - PuTTY
vIOS-L2-01>show spanning-tree

VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    4097
            Address     0c42.3753.0000
            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     0c42.3753.0000
            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
Gi2/0                    Desg FWD 4          128.9 Shr

vIOS-L2-01>
```

```
Layer2Switch-8 - PuTTY
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    4097
            Address     0c42.3753.0000
            Cost         4
            Port        2 (GigabitEthernet0/1)
            Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    32769 (priority 32768 sys-id-ext 1)
            Address     0cab.86c8.0000
            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 10          128.1 Shr
Gi0/1                    Root FWD 4          128.2 Shr
Gi0/2                    Altn BLK 4          128.3 Shr
Gi0/3                    Altn BLK 4          128.4 Shr
Gi1/0                    Altn BLK 4          128.5 Shr
Gi1/1                    Altn BLK 4          128.6 Shr
Gi1/2                    Desg FWD 4          128.7 Shr
Gi1/3                    Desg FWD 4          128.8 Shr
Gi2/0                    Desg FWD 4          128.9 Shr

vIOS-L2-01>
```



```
Layer2Switch-7 - PuTTY
vIOS-L2-01>show spanning-tree

VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    4097
            Address    0c42.3753.0000
            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    0c90.32d4.0000
            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

vIOS-L2-01>
vIOS-L2-01>
```

```
Layer2Switch-10 - PuTTY
vIOS-L2-01>show spanning-tree

VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    4097
            Address    0c42.3753.0000
            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    0cab.955e.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

vIOS-L2-01>
vIOS-L2-01>
```

```
Layer2Switch-9 - PuTTY
vIOS-L2-01>show spanning-tree

VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    4097
            Address    0c42.3753.0000
            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    0c75.9eea.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

vIOS-L2-01>
```

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

Все файлы конфигураций приведены в текущем репозитории.