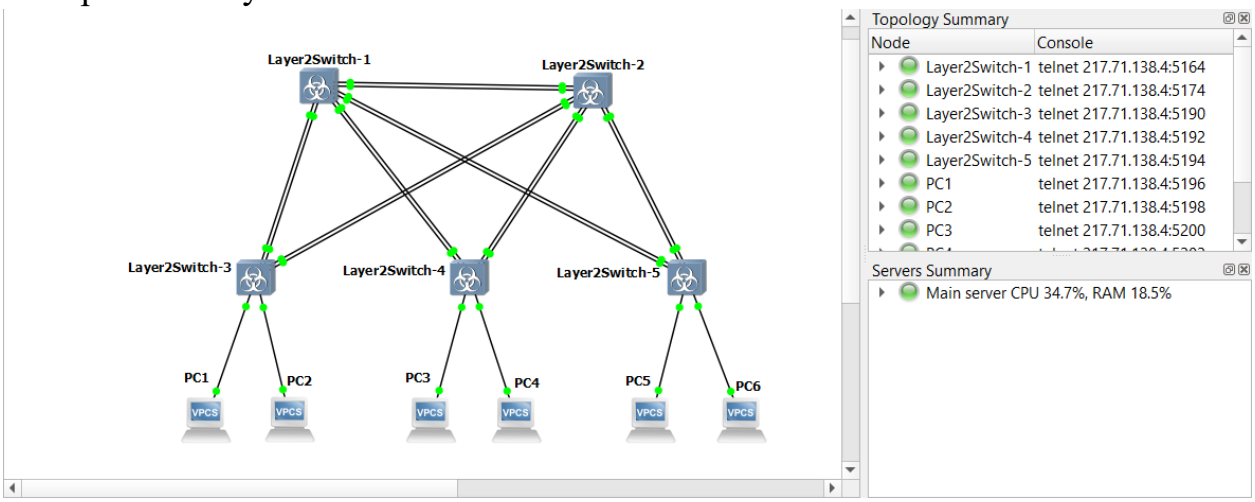
Зотов Дмитрий
Лабораторная 2

1) Построил схему



Явно назначил один из коммутаторов корневым с помощью команд:

```
vIOS-L2-01#conf ter
vIOS-L2-01(config)#spanning-tree vlan 0001 priority 0
vIOS-L2-01(config)#end
vIOS-L2-01#show spanning-tree vlan 0001
```

Layer2Switch-1 - PuTTY

```
vIOS-L2-01#show spanning-tree vlan 0001

VLAN0001
  Spanning tree enabled protocol ieee
  Root ID     Priority    1
              Address     0c58.667b.5400
              This bridge is the root
              Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID   Priority    1      (priority 0 sys-id-ext 1)
              Address     0c58.667b.5400
              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 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
```

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

```
PC1> ping 192.168.1.2
PC1> ping 192.168.1.3
PC1> ping 192.168.1.4
PC1> ping 192.168.1.5
PC1> ping 192.168.1.6
```

```
PC1> ping 192.168.1.2

84 bytes from 192.168.1.2 icmp_seq=1 ttl=64 time=1.643 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=5.861 ms
84 bytes from 192.168.1.2 icmp_seq=3 ttl=64 time=3.223 ms
84 bytes from 192.168.1.2 icmp_seq=4 ttl=64 time=6.845 ms
84 bytes from 192.168.1.2 icmp_seq=5 ttl=64 time=7.665 ms

PC1> ping 192.168.1.3

84 bytes from 192.168.1.3 icmp_seq=1 ttl=64 time=7.359 ms
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=11.997 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=3.087 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=3.888 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=6.359 ms

PC1> ping 192.168.1.4

84 bytes from 192.168.1.4 icmp_seq=1 ttl=64 time=17.383 ms
84 bytes from 192.168.1.4 icmp_seq=2 ttl=64 time=13.613 ms
84 bytes from 192.168.1.4 icmp_seq=3 ttl=64 time=16.644 ms
84 bytes from 192.168.1.4 icmp_seq=4 ttl=64 time=13.101 ms
84 bytes from 192.168.1.4 icmp_seq=5 ttl=64 time=6.465 ms

PC1> ping 192.168.1.5

84 bytes from 192.168.1.5 icmp_seq=1 ttl=64 time=6.983 ms
84 bytes from 192.168.1.5 icmp_seq=2 ttl=64 time=8.768 ms
84 bytes from 192.168.1.5 icmp_seq=3 ttl=64 time=4.225 ms
84 bytes from 192.168.1.5 icmp_seq=4 ttl=64 time=4.498 ms
84 bytes from 192.168.1.5 icmp_seq=5 ttl=64 time=10.035 ms

PC1> ping 192.168.1.6

84 bytes from 192.168.1.6 icmp_seq=1 ttl=64 time=10.215 ms
84 bytes from 192.168.1.6 icmp_seq=2 ttl=64 time=4.189 ms
84 bytes from 192.168.1.6 icmp_seq=3 ttl=64 time=9.710 ms
84 bytes from 192.168.1.6 icmp_seq=4 ttl=64 time=23.081 ms
84 bytes from 192.168.1.6 icmp_seq=5 ttl=64 time=7.869 ms

PC1>
```

PC2> ping 192.168.1.3
PC2> ping 192.168.1.4
PC2> ping 192.168.1.5
PC2> ping 192.168.1.6

```
PC2> ping 192.168.1.3

84 bytes from 192.168.1.3 icmp_seq=1 ttl=64 time=2.536 ms
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=6.495 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=6.622 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=9.814 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=6.307 ms

PC2> ping 192.168.1.4

84 bytes from 192.168.1.4 icmp_seq=1 ttl=64 time=11.341 ms
84 bytes from 192.168.1.4 icmp_seq=2 ttl=64 time=10.215 ms
84 bytes from 192.168.1.4 icmp_seq=3 ttl=64 time=5.362 ms
84 bytes from 192.168.1.4 icmp_seq=4 ttl=64 time=4.890 ms
84 bytes from 192.168.1.4 icmp_seq=5 ttl=64 time=2.695 ms

PC2> ping 192.168.1.5

84 bytes from 192.168.1.5 icmp_seq=1 ttl=64 time=10.401 ms
84 bytes from 192.168.1.5 icmp_seq=2 ttl=64 time=3.633 ms
84 bytes from 192.168.1.5 icmp_seq=3 ttl=64 time=10.410 ms
84 bytes from 192.168.1.5 icmp_seq=4 ttl=64 time=19.998 ms
84 bytes from 192.168.1.5 icmp_seq=5 ttl=64 time=3.247 ms

PC2> ping 192.168.1.6

84 bytes from 192.168.1.6 icmp_seq=1 ttl=64 time=9.932 ms
84 bytes from 192.168.1.6 icmp_seq=2 ttl=64 time=3.103 ms
84 bytes from 192.168.1.6 icmp_seq=3 ttl=64 time=7.263 ms
84 bytes from 192.168.1.6 icmp_seq=4 ttl=64 time=10.294 ms
84 bytes from 192.168.1.6 icmp_seq=5 ttl=64 time=16.055 ms

PC2>
```

PC3> ping 192.168.1.4
PC3> ping 192.168.1.5
PC3> ping 192.168.1.6

PC3 - PuTTY

```
PC3> ping 192.168.1.4

84 bytes from 192.168.1.4 icmp_seq=1 ttl=64 time=1.099 ms
84 bytes from 192.168.1.4 icmp_seq=2 ttl=64 time=8.552 ms
84 bytes from 192.168.1.4 icmp_seq=3 ttl=64 time=1.648 ms
84 bytes from 192.168.1.4 icmp_seq=4 ttl=64 time=7.565 ms
84 bytes from 192.168.1.4 icmp_seq=5 ttl=64 time=3.017 ms

PC3> ping 192.168.1.5

84 bytes from 192.168.1.5 icmp_seq=1 ttl=64 time=7.596 ms
84 bytes from 192.168.1.5 icmp_seq=2 ttl=64 time=9.895 ms
84 bytes from 192.168.1.5 icmp_seq=3 ttl=64 time=7.899 ms
84 bytes from 192.168.1.5 icmp_seq=4 ttl=64 time=8.396 ms
84 bytes from 192.168.1.5 icmp_seq=5 ttl=64 time=13.534 ms

PC3> ping 192.168.1.6

84 bytes from 192.168.1.6 icmp_seq=1 ttl=64 time=9.713 ms
84 bytes from 192.168.1.6 icmp_seq=2 ttl=64 time=4.051 ms
84 bytes from 192.168.1.6 icmp_seq=3 ttl=64 time=7.369 ms
84 bytes from 192.168.1.6 icmp_seq=4 ttl=64 time=4.006 ms
84 bytes from 192.168.1.6 icmp_seq=5 ttl=64 time=6.133 ms
```

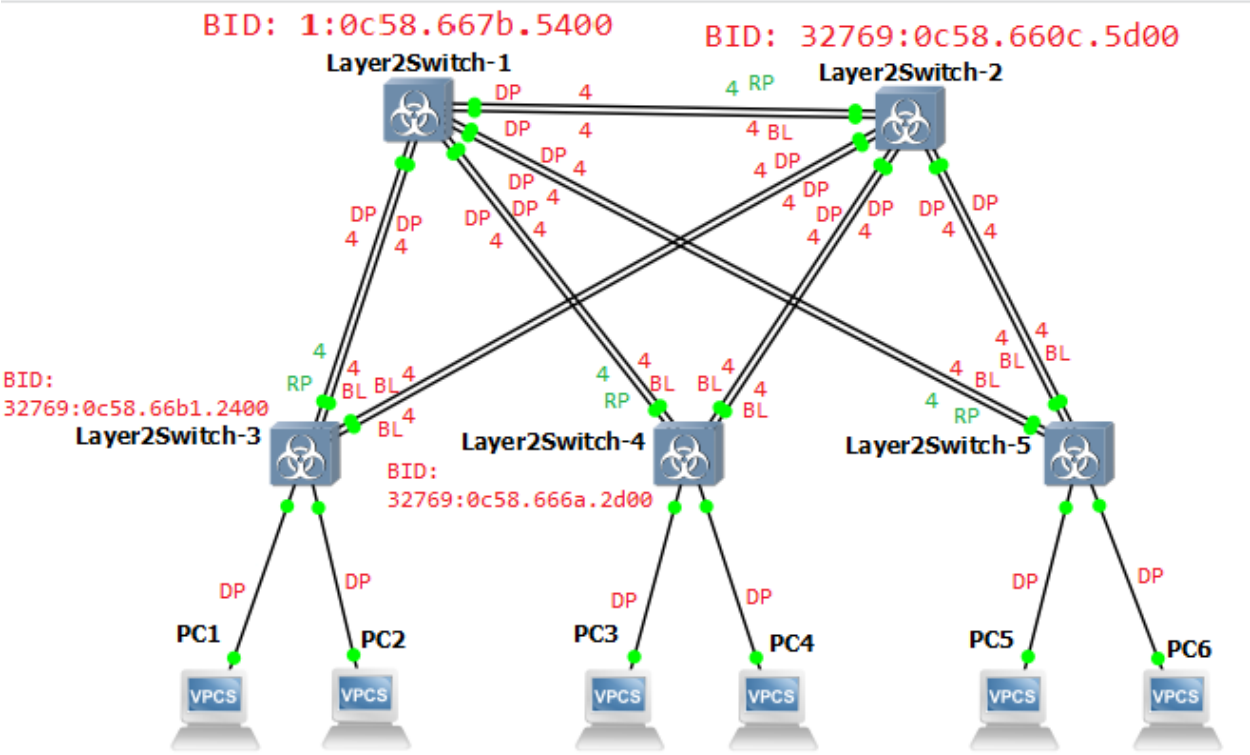
PC4> ping 192.168.1.5
PC4> ping 192.168.1.6

```
PC4> ping 192.168.1.5

84 bytes from 192.168.1.5 icmp_seq=1 ttl=64 time=12.531 ms
84 bytes from 192.168.1.5 icmp_seq=2 ttl=64 time=7.351 ms
84 bytes from 192.168.1.5 icmp_seq=3 ttl=64 time=5.898 ms
84 bytes from 192.168.1.5 icmp_seq=4 ttl=64 time=7.312 ms
84 bytes from 192.168.1.5 icmp_seq=5 ttl=64 time=10.492 ms

PC4> ping 192.168.1.6

84 bytes from 192.168.1.6 icmp_seq=1 ttl=64 time=12.538 ms
84 bytes from 192.168.1.6 icmp_seq=2 ttl=64 time=2.511 ms
84 bytes from 192.168.1.6 icmp_seq=3 ttl=64 time=3.889 ms
84 bytes from 192.168.1.6 icmp_seq=4 ttl=64 time=2.261 ms
84 bytes from 192.168.1.6 icmp_seq=5 ttl=64 time=4.370 ms

PC4>
```

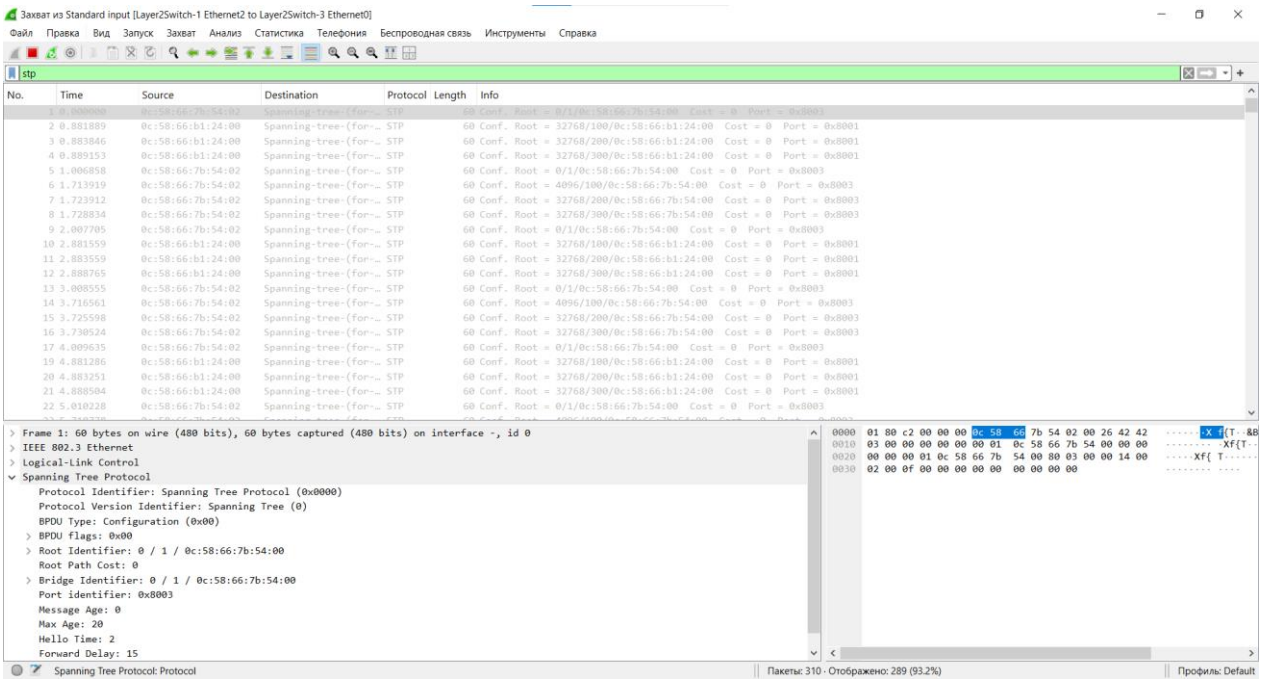
PC5> ping 192.168.1.6

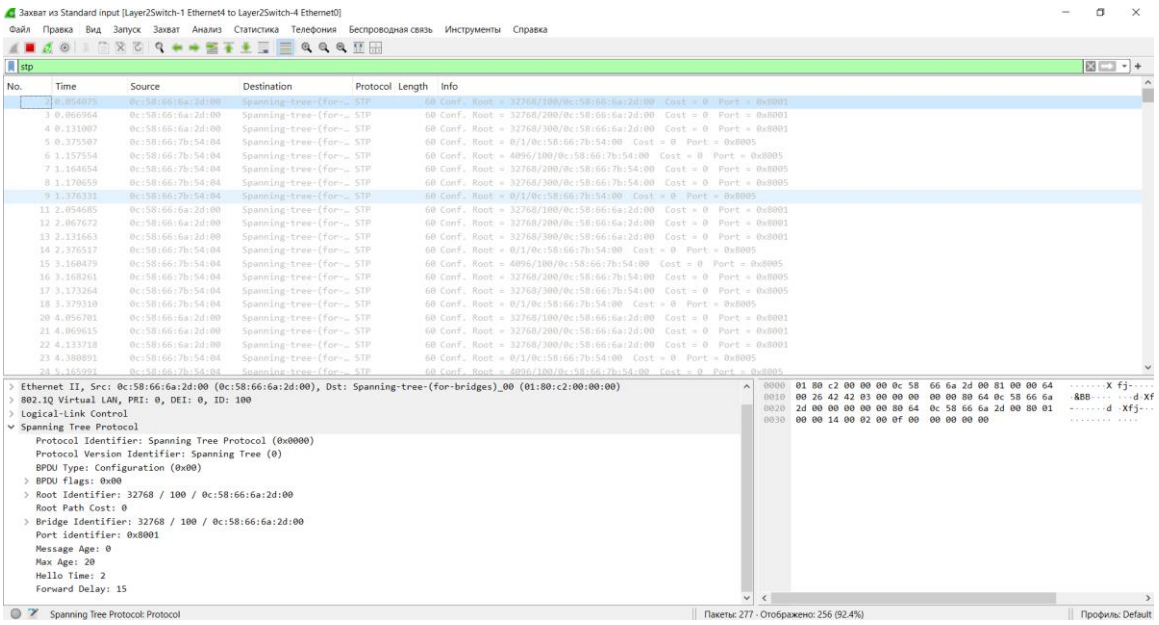
```
PC5> ping 192.168.1.6

84 bytes from 192.168.1.6 icmp_seq=1 ttl=64 time=1.280 ms
84 bytes from 192.168.1.6 icmp_seq=2 ttl=64 time=4.681 ms
84 bytes from 192.168.1.6 icmp_seq=3 ttl=64 time=0.401 ms
84 bytes from 192.168.1.6 icmp_seq=4 ttl=64 time=1.117 ms
84 bytes from 192.168.1.6 icmp_seq=5 ttl=64 time=1.505 ms

PC5>
```

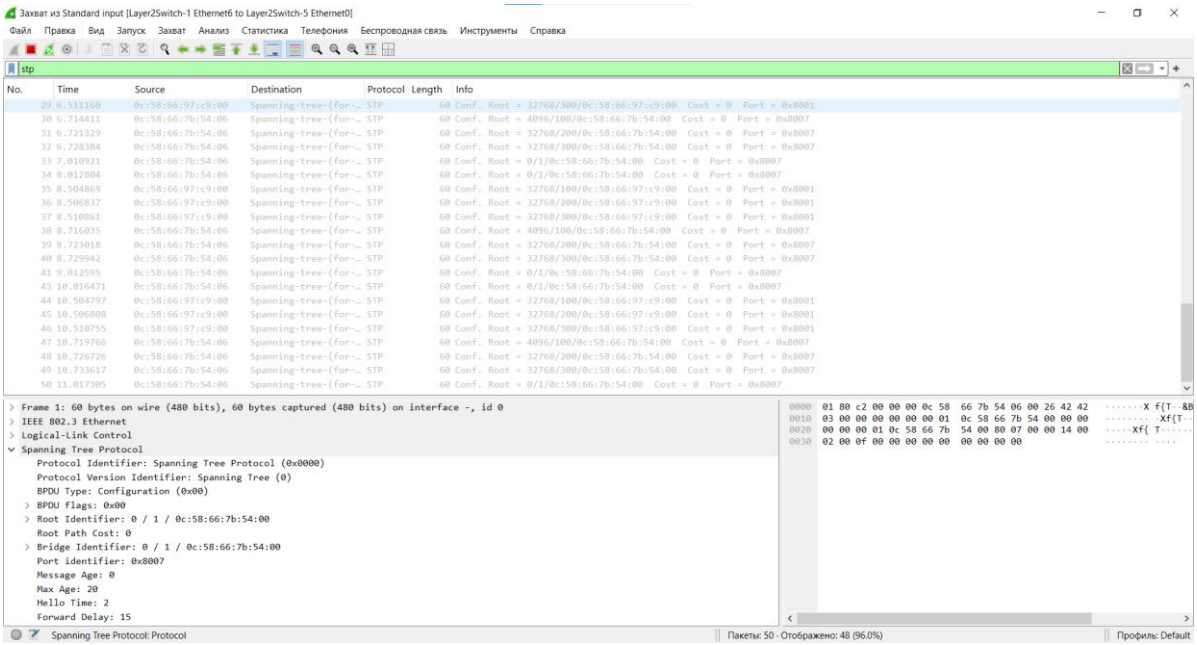
3) На изображении схемы отметить BID каждого коммутатора и режимы работы портов (RP/DP/blocked) и стоимости маршрутов, результат сохранить в файл.

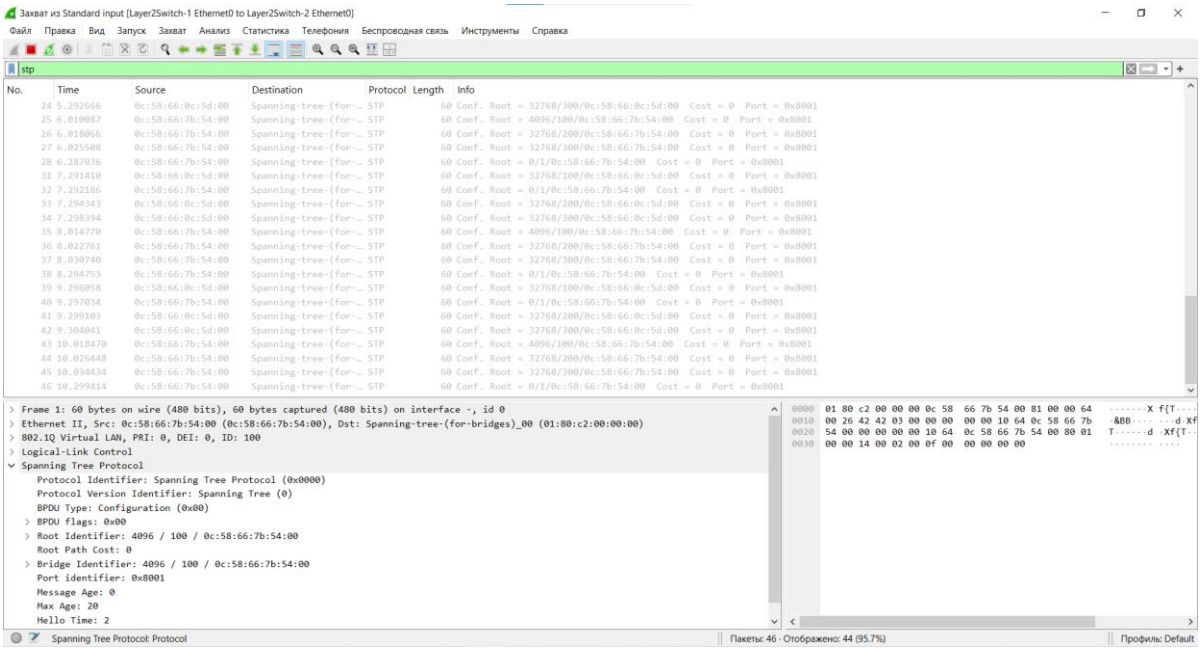


4) При помощи wireshark отследить передачу пакетов hello от корневого коммутатора на всех линках, результаты включить в отчет




Захват из Standard input [Layer2Switch-1 Ethernet4 to Layer2Switch-4 Ethernet0]
Файл Правка Вид Запуск Захват Анализ Статистика Телефония Беспроводная связь Инструменты Справка
stp
No. Time Source Destination Protocol Length Info
Ethernet II, Src: 0c:58:66:6a:2d:00 (0c:58:66:6a:2d: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:58:66:6a:2d:00
Root Path Cost: 0
Bridge Identifier: 32768 / 100 / 0c:58:66:6a:2d:00
Port identifier: 0x8001
Message Age: 0
Max Age: 20
Hello Time: 2
Forward Delay: 15
Spanning Tree Protocol: Protocol
Пакеты: 277 · Отображено: 256 (92.4%)
Профиль: Default


Захват из Standard input [Layer2Switch-1 Ethernet6 to Layer2Switch-5 Ethernet0]
Файл Правка Вид Запуск Захват Анализ Статистика Телефония Беспроводная связь Инструменты Справка
stp
No. Time Source Destination Protocol Length Info
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: 0 / 1 / 0c:58:66:7b:54:00
Root Path Cost: 0
Bridge Identifier: 0 / 1 / 0c:58:66:7b:54:00
Port identifier: 0x8007
Message Age: 0
Max Age: 20
Hello Time: 2
Forward Delay: 15
Spanning Tree Protocol: Protocol
Пакеты: 50 · Отображено: 48 (96.0%)
Профиль: Default


Захват из Standard input [Layer2Switch-1 Ethernet0 to Layer2Switch-2 Ethernet0]
Файл Правка Вид Запуск Захват Анализ Статистика Телефония Беспроводная связь Инструменты Справка
stp
No. Time Source Destination Protocol Length Info
Frame 1: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface -, id 0
Ethernet II, Src: 0c:58:66:7b:54:00 (0c:58:66:7b:54:00), 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: 4096 / 100 / 0c:58:66:7b:54:00
Root Path Cost: 0
Bridge Identifier: 4096 / 100 / 0c:58:66:7b:54:00
Port identifier: 0x8001
Message Age: 0
Max Age: 20
Hello Time: 2
Spanning Tree Protocol: Protocol
Пакеты: 46 · Отображено: 44 (95.7%)
Профиль: Default

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

```
vIOS-L2-01#show spanning-tree
vIOS-L2-01#conf ter
vIOS-L2-01(config)#interface Gi0/0
vIOS-L2-01(config)#spanning-tree cost 25
vIOS-L2-01(config)#end
```

```
Interface           Role Sts Cost      Prio.Nbr Type
------------------- ---- --- --------- -------- --------------------------------
Gi0/0               Altn BLK 25        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               Desg FWD 4         128.5    Shr
Gi1/1               Desg FWD 4         128.6    Shr
```