

Рисунок 1 – Топология сети

IP-адреса ПК:

PC1 – 192.168.1.1  
 PC2 – 192.168.1.2  
 PC3 – 192.168.1.3  
 PC4 – 192.168.1.4  
 PC5 – 192.168.1.5  
 PC6 – 192.168.1.6

Для корректного функционирования STP необходимо использовать следующую команду в режиме конфигурации:

`spanning-tree mode pvst`

Для установления приоритета используется команда:

`spanning-tree vlan 1 priority x`

Приоритеты расставлены следующим образом:

SW1 – 4096, SW2 – 8192, SW3-SW5 - 32768

```
PC1> ping 192.168.1.2

84 bytes from 192.168.1.2 icmp_seq=1 ttl=64 time=4.270 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=5.059 ms
^C
PC1> ping 192.168.1.3

84 bytes from 192.168.1.3 icmp_seq=1 ttl=64 time=10.107 ms
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=12.453 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=11.414 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=16.567 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=7.482 ms

PC1> ping 192.168.1.4

84 bytes from 192.168.1.4 icmp_seq=1 ttl=64 time=12.686 ms
84 bytes from 192.168.1.4 icmp_seq=2 ttl=64 time=6.810 ms
84 bytes from 192.168.1.4 icmp_seq=3 ttl=64 time=3.085 ms
84 bytes from 192.168.1.4 icmp_seq=4 ttl=64 time=9.750 ms
84 bytes from 192.168.1.4 icmp_seq=5 ttl=64 time=6.296 ms

PC1> ping 192.168.1.5

84 bytes from 192.168.1.5 icmp_seq=1 ttl=64 time=7.345 ms
84 bytes from 192.168.1.5 icmp_seq=2 ttl=64 time=6.926 ms
84 bytes from 192.168.1.5 icmp_seq=3 ttl=64 time=10.692 ms
84 bytes from 192.168.1.5 icmp_seq=4 ttl=64 time=4.981 ms
84 bytes from 192.168.1.5 icmp_seq=5 ttl=64 time=11.980 ms

PC1> ping 192.168.1.6

84 bytes from 192.168.1.6 icmp_seq=1 ttl=64 time=19.066 ms
84 bytes from 192.168.1.6 icmp_seq=2 ttl=64 time=6.612 ms
84 bytes from 192.168.1.6 icmp_seq=3 ttl=64 time=10.425 ms
84 bytes from 192.168.1.6 icmp_seq=4 ttl=64 time=6.540 ms
84 bytes from 192.168.1.6 icmp_seq=5 ttl=64 time=9.632 ms
```

Рисунок 2 – Проверка достижимости других устройств для PC1

```
Layer2Switch-1 - PuTTY

VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    4097
              Address     0cb2.5e73.0000
              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     0cb2.5e73.0000
              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
  Gil/0          Desg FWD 4        128.5    Shr
  Gil/1          Desg FWD 4        128.6    Shr
  Gil/2          Desg FWD 4        128.7    Shr
  Gil/3          Desg FWD 4        128.8    Shr
  --More-- □
```

Рисунок 3 – Результат show spanning-tree для SW1

```
Layer2Switch-2 - PuTTY

VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    4097
              Address     0cb2.5e73.0000
              Cost        4
              Port        1 (GigabitEthernet0/0)
  Hello Time  2 sec     Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    8193  (priority 8192 sys-id-ext 1)
              Address     0ca7.6e7a.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
  Gil/0          Desg FWD 4       128.5    Shr
  Gil/1          Desg FWD 4       128.6    Shr
  Gil/2          Desg FWD 4       128.7    Shr
  --More-- □
```

Рисунок 4 – Результат show spanning-tree для SW2

```
Layer2Switch-3 - PuTTY

VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    4097
              Address     0cb2.5e73.0000
              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     0c9c.e188.0000
              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
  Gil/0          Desg FWD 4      128.5    Shr
  Gil/1          Desg FWD 4      128.6    Shr

--More-- □
```

Рисунок 5 – Результат show spanning-tree для SW3

```
Layer2Switch-4 - PuTTY

VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    4097
              Address     0cb2.5e73.0000
              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     0ca0.59be.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
  Gil/0          Desg FWD 4      128.5    Shr
  Gil/1          Desg FWD 4      128.6    Shr
```

Рисунок 6 – Результат show spanning-tree для SW4

```

VLAN0001
  Spanning tree enabled protocol ieee
  Root ID      Priority    4097
                Address     0cb2.5e73.0000
                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     0c64.cale.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

--More--

```

Рисунок 7 – Результат show spanning-tree для SW5

No.	Time	Source	Destination	Protocol	Length	Info
351	85.929631	0:c:b2:5e:73:00:01	Nearest-Customer-BR_ STP	60 Conf.	Root = 4096/300:0:c:b2:5e:73:00:00 Cost = 0 Port = 0x8002	
352	86.632081	0:c:a7:6e:7a:00:01	Nearest-Customer-BR_ STP	60 Conf.	Root = 8192/100:0:c:a7:6e:7a:00:00 Cost = 0 Port = 0x8002	
353	86.640429	0:c:a7:6e:7a:00:01	Nearest-Customer-BR_ STP	60 Conf.	Root = 8192/200:0:c:a7:6e:7a:00:00 Cost = 0 Port = 0x8002	
354	86.673447	0:c:a7:6e:7a:00:01	Nearest-Customer-BR_ STP	60 Conf.	Root = 8192/300:0:c:a7:6e:7a:00:00 Cost = 0 Port = 0x8002	
355	86.970775	0:c:b2:5e:73:00:01	Nearest-Customer-BR_ STP	60 Conf.	Root = 4096/1:0:c:b2:5e:73:00:00 Cost = 0 Port = 0x8002	
356	88.069654	0:c:b2:5e:73:00:01	Nearest-Customer-BR_ STP	60 Conf.	Root = 4096/1:0:c:b2:5e:73:00:00 Cost = 0 Port = 0x8002	
357	88.130134	0:c:b2:5e:73:00:01	Nearest-Customer-BR_ STP	60 Conf.	Root = 4096/100:0:c:b2:5e:73:00:00 Cost = 0 Port = 0x8002	
358	88.131075	0:c:b2:5e:73:00:01	Nearest-Customer-BR_ STP	60 Conf.	Root = 4096/200:0:c:b2:5e:73:00:00 Cost = 0 Port = 0x8002	
359	88.141673	0:c:b2:5e:73:00:01	Nearest-Customer-BR_ STP	60 Conf.	Root = 4096/300:0:c:b2:5e:73:00:00 Cost = 0 Port = 0x8002	
360	88.813056	0:c:a7:6e:7a:00:01	Nearest-Customer-BR_ STP	60 Conf.	Root = 8192/100:0:c:a7:6e:7a:00:00 Cost = 0 Port = 0x8002	
361	88.819704	0:c:a7:6e:7a:00:01	Nearest-Customer-BR_ STP	60 Conf.	Root = 8192/200:0:c:a7:6e:7a:00:00 Cost = 0 Port = 0x8002	
362	88.851835	0:c:a7:6e:7a:00:01	Nearest-Customer-BR_ STP	60 Conf.	Root = 8192/300:0:c:a7:6e:7a:00:00 Cost = 0 Port = 0x8002	
363	89.110066	0:c:b2:5e:73:00:01	Nearest-Customer-BR_ STP	60 Conf.	Root = 4096/1:0:c:b2:5e:73:00:00 Cost = 0 Port = 0x8002	
364	90.169164	0:c:b2:5e:73:00:01	Nearest-Customer-BR_ STP	60 Conf.	Root = 4096/1:0:c:b2:5e:73:00:00 Cost = 0 Port = 0x8002	
365	90.230434	0:c:b2:5e:73:00:01	Nearest-Customer-BR_ STP	60 Conf.	Root = 4096/100:0:c:b2:5e:73:00:00 Cost = 0 Port = 0x8002	
366	90.233421	0:c:b2:5e:73:00:01	Nearest-Customer-BR_ STP	60 Conf.	Root = 4096/200:0:c:b2:5e:73:00:00 Cost = 0 Port = 0x8002	
367	90.249215	0:c:b2:5e:73:00:01	Nearest-Customer-BR_ STP	60 Conf.	Root = 4096/300:0:c:b2:5e:73:00:00 Cost = 0 Port = 0x8002	
368	90.645819	0:c:a7:6e:7a:00:01	0:c:a7:6e:7a:00:01	LOOP	60 Reply	

[Frame is marked: False]  
[Frame is ignored: False]  
[Protocols in frame: eth:etherType:vlan:llc:stp]  
Character encoding: ASCII (0)  
[Coloring Rule Name: Broadcast]  
[Coloring Rule String: eth[0] & 1]  
> Ethernet II, Src: Layer2Switch-1 (0:c:b2:5e:73:00:01), Dst: Nearest-Custo  
> 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 / 0:c:b2:5e:73:00:00  
Root Path Cost: 0  
> Bridge Identifier: 4096 / 100 / 0:c:b2:5e:73:00:00  
Port identifier: 0x8002  
Message Age: 0  
Max Age: 20  
Hello Time: 2  
Forward Delay: 15

Рисунок 8 – Hello-кадры между SW1 и SW2

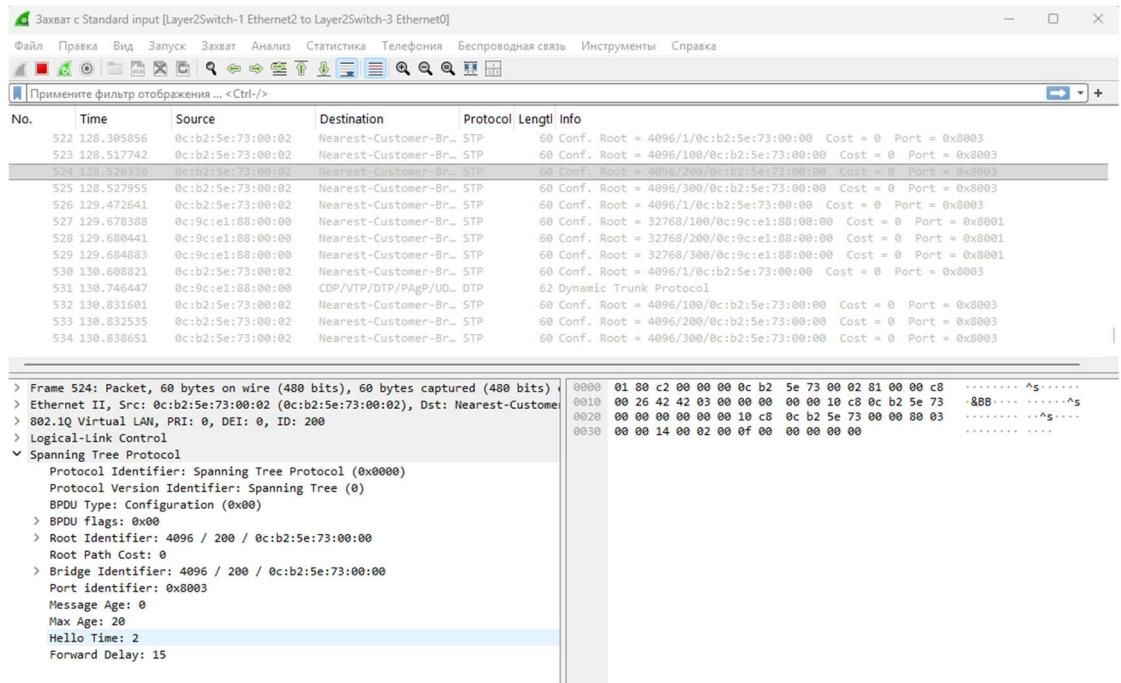


Рисунок 9 – Hello-кадры между SW1 и SW3

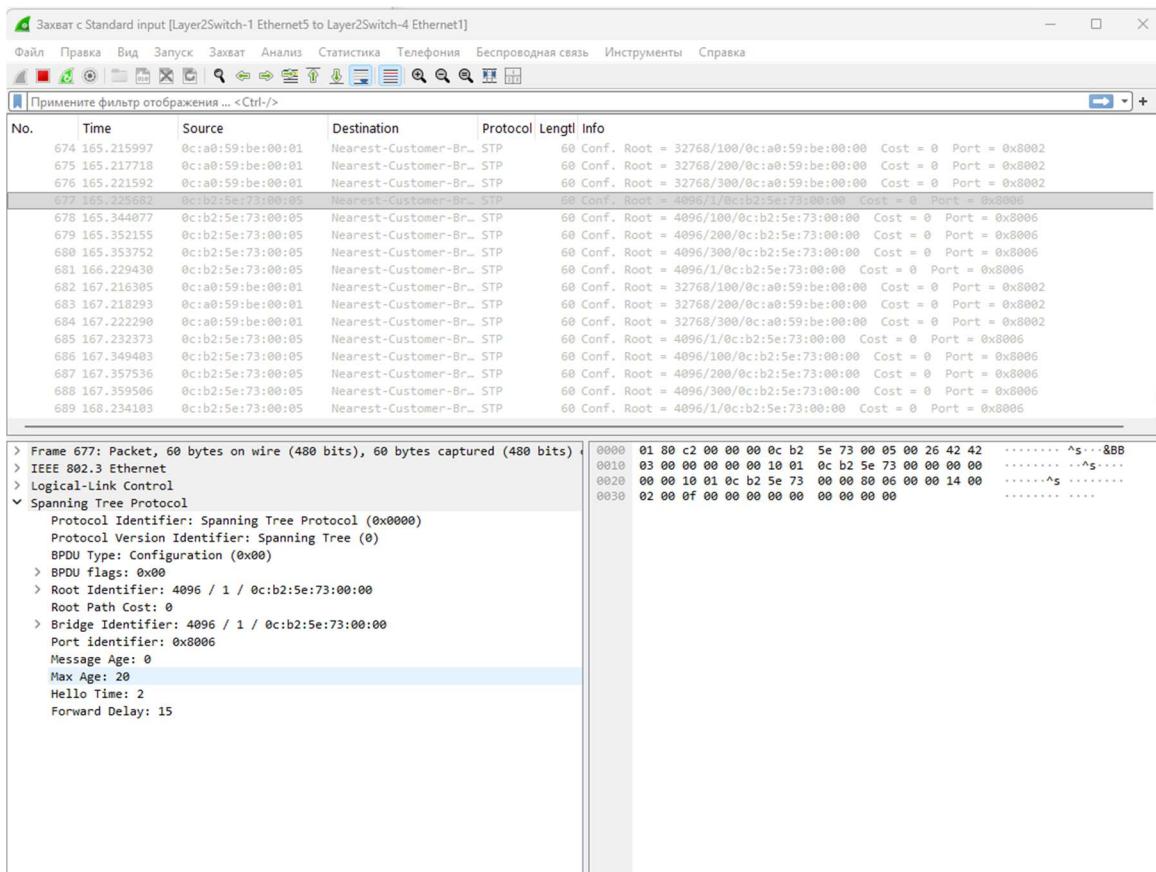


Рисунок 10 – Hello-кадры между SW1 и SW4

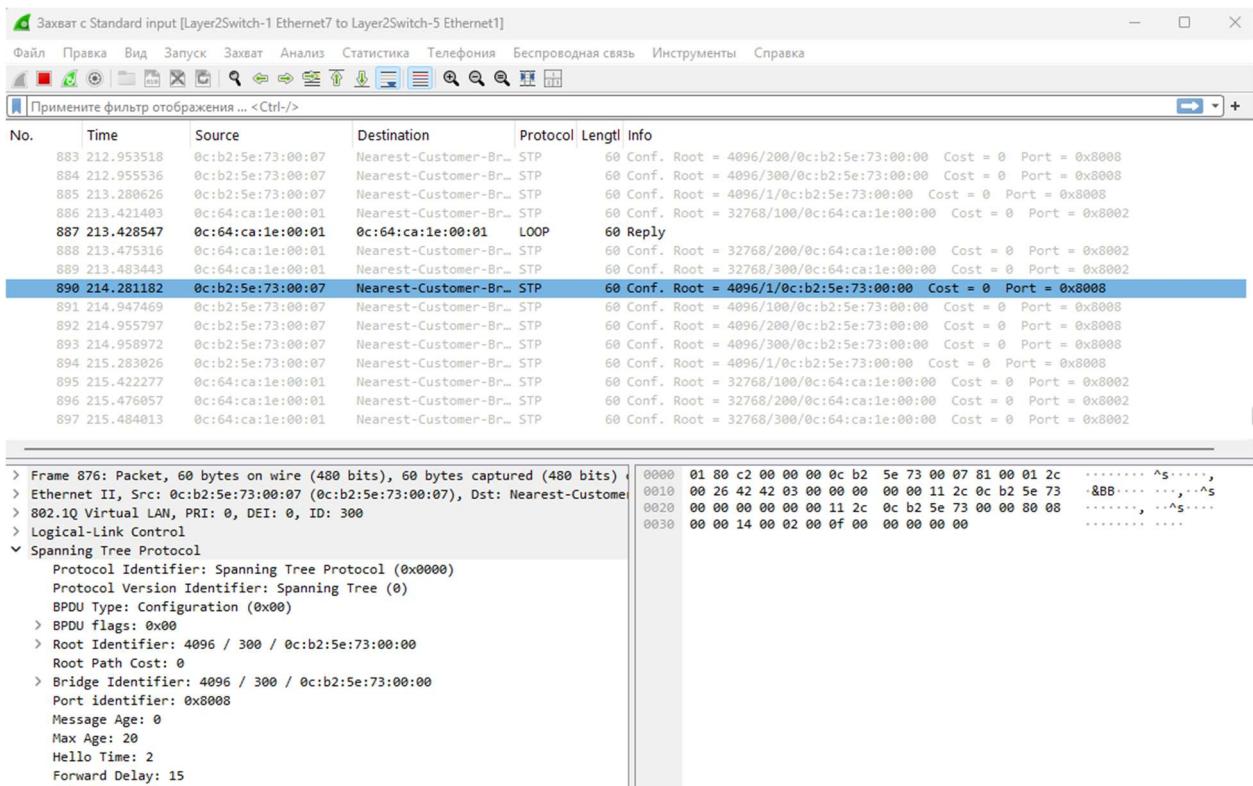


Рисунок 11 – Hello-кадры между SW1 и SW5

```

Layer2Switch-2 - PuTTY

VLAN0001
  Spanning tree enabled protocol ieee
    Root ID      Priority    4097
                  Address     0cb2.5e73.0000
                  Cost        4
                  Port        2 (GigabitEthernet0/1)
                  Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec

    Bridge ID    Priority    8193  (priority 8192 sys-id-ext 1)
                  Address     0ca7.6e7a.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          Altn BLK 20      128.1    Shr
  Gi0/1          Root LRN 4       128.2    Shr
  Gi0/2          Desg FWD 4       128.3    Shr
  Gi0/3          Desg FWD 4       128.4    Shr
  Gil/0          Desg FWD 4       128.5    Shr
  Gil/1          Desg FWD 4       128.6    Shr
  Gil/2          Desg FWD 4       128.7    Shr
  --More-- □

```

Рисунок 12 – Стоимость маршрута SW1-SW2