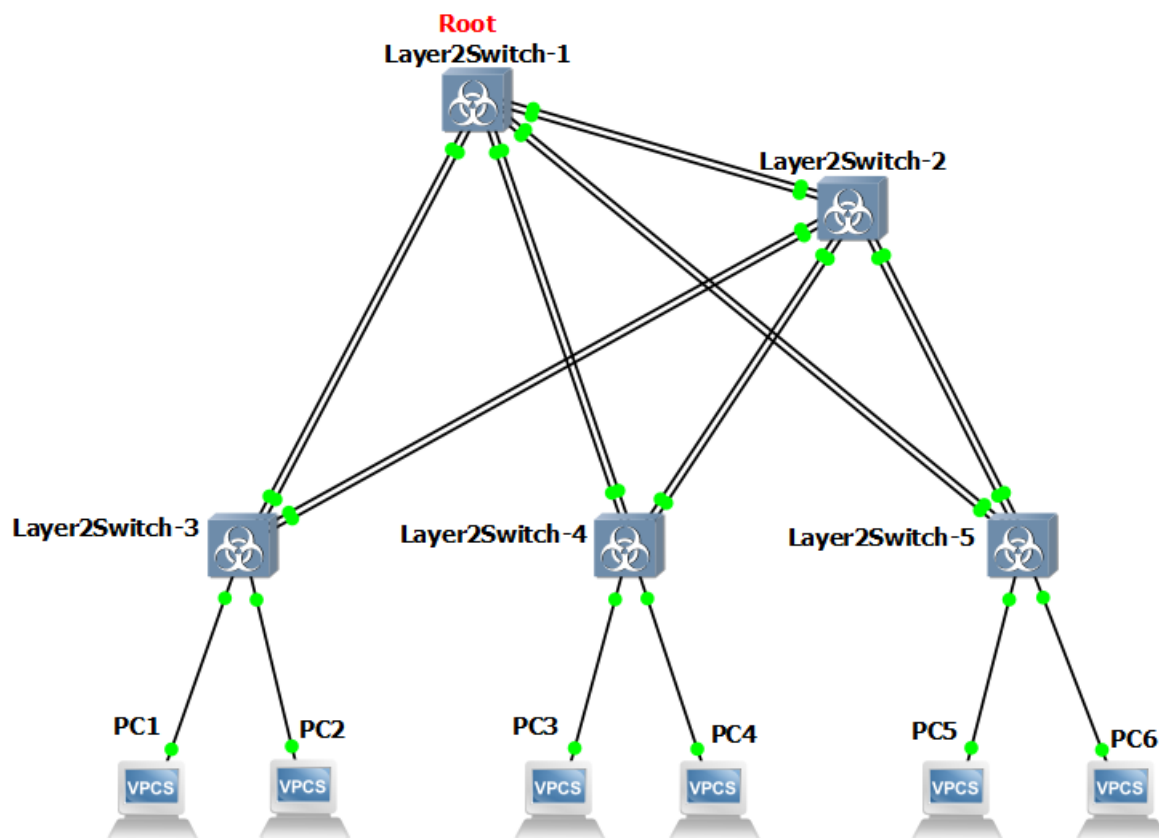


1) Для заданной на схеме schema-lab2 сети, состоящей из управляемых коммутаторов и персональных компьютеров настроить протокол STP, назначив явно один из коммутаторов корневым настройкой приоритета

Имеем схему:



1-й коммутатор сделаем корневым, для этого изменим его приоритет:

spanning-tree vlan 1-4094 priority 0 – задаём приоритет 0

Для остальных соответственно:

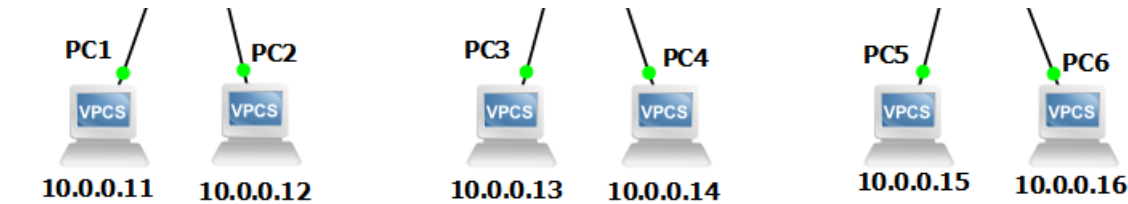
spanning-tree vlan 1-4094 priority 32768

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

Зададим ip адреса для каждого ПК:

ip 10.0.0.(11-16)/24 10.0.0.1

Получим:



Проверим, например, доступность каждого ПК с 1й машины с помощью ping, можем посмотреть arp таблицу:

```
PC1> arp
00:50:79:66:68:01 10.0.0.12 expires in 29 seconds
00:50:79:66:68:02 10.0.0.13 expires in 46 seconds
00:50:79:66:68:03 10.0.0.14 expires in 53 seconds
00:50:79:66:68:04 10.0.0.15 expires in 60 seconds
00:50:79:66:68:05 10.0.0.16 expires in 69 seconds
```

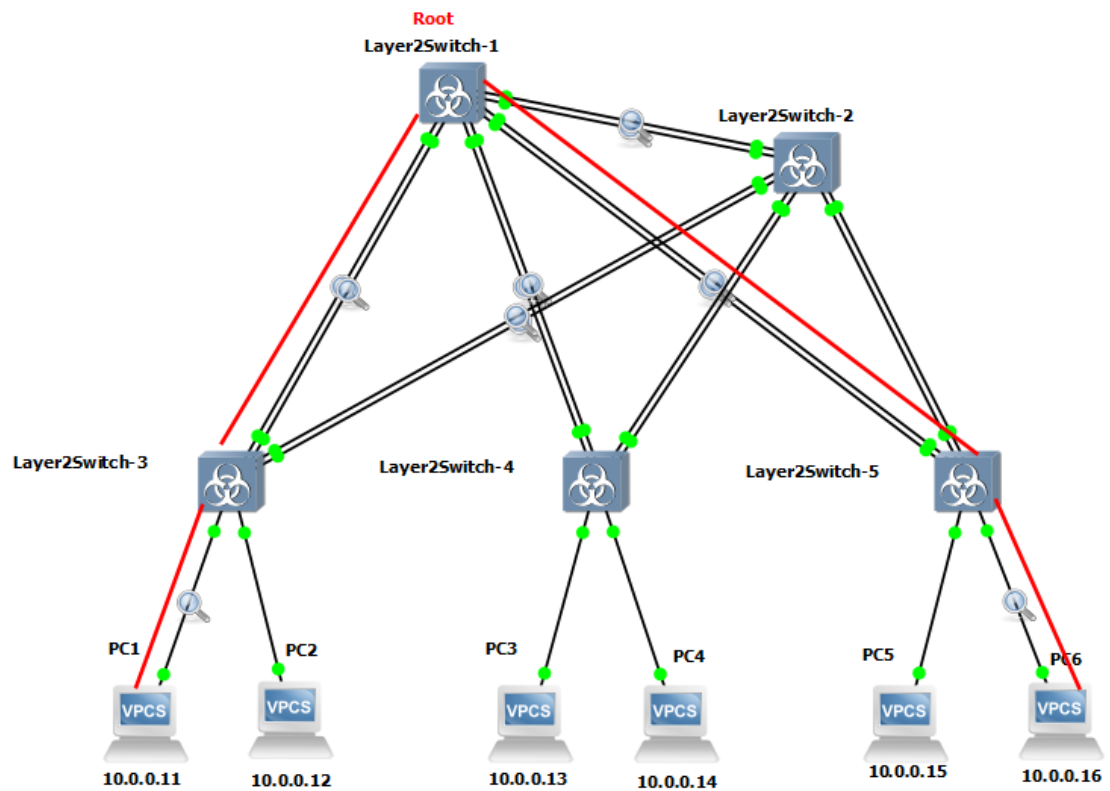
Соответственно для всех остальных.

Проверим работу STP, отправим ping с 1 машины на 6, смотрим пакеты со всех линков.

Видим, что ICMP пакеты прошли только через 4 линка:

The screenshots show four different packet captures in Wireshark, each displaying ICMP Echo (ping) requests and replies. The captures are taken on different interfaces of a switch, showing the path of the packets. The first capture shows a request from PC1 to PC6. The second capture shows a reply from PC6 to PC1. The third and fourth captures show additional requests and replies, illustrating the path of the packets through the network.

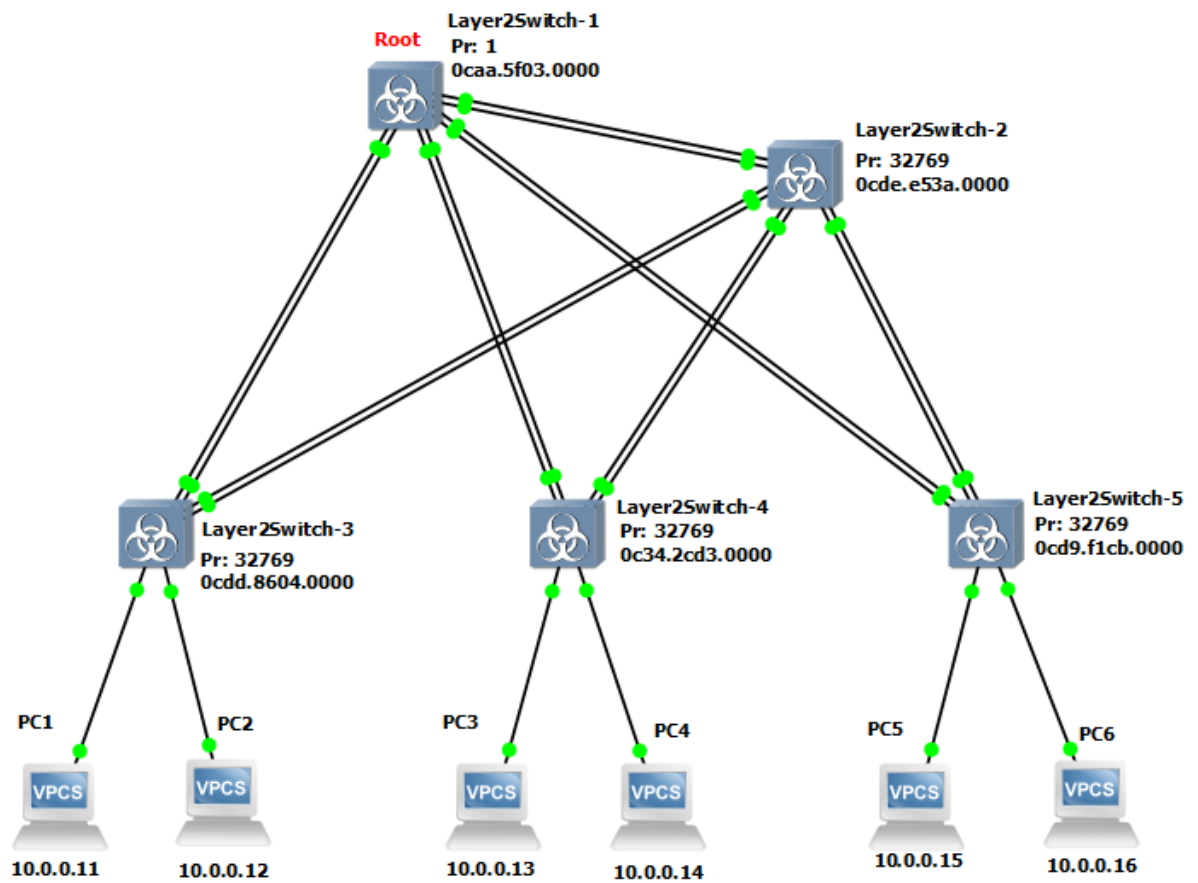
Отметим на схеме:



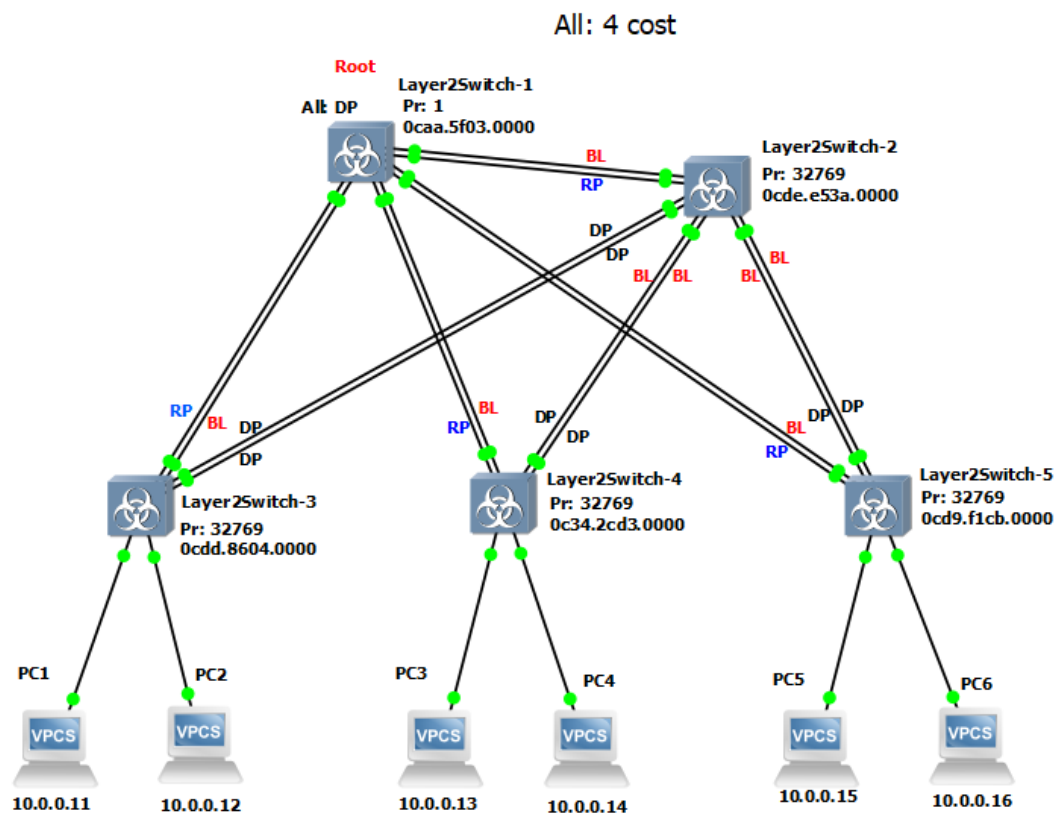
3) На изображении схемы отметить BID каждого коммутатора и режимы работы портов (RP/DP/blocked) и стоимости маршрутов, результат сохранить в файл

Определим приоритет и MAC адрес каждого коммутатора:

`show spanning-tree`



Отметим состояния портов (стоимость всех маршрутов: 4)



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

Для этого будем слушать все линки, используем такой фильтр:

eth.src contains 0c:aa:5f:03:00 && stp

Проверяем, что MAC адрес адаптера относится к корневому коммутатору и ищем пакеты STP

Всего у нас 8 линков от корневого коммутатора, результаты применения фильтра:

The screenshot shows a Wireshark capture window titled "Захват из Standard input [Layer2Switch-1 Ethernet2 to Layer2Switch-3 Ethernet0]". The filter bar contains the expression "eth.src contains 0c:aa:5f:03:00 && stp". The packet list shows several STP frames (11567 to 11585) from source 0c:aa:5f:03:00:02 to various destinations. The packet details pane for frame 11116 shows an Ethernet II frame with destination 01:80:c2:00:00:00 and source 0c:aa:5f:03:00:02, encapsulating an STP frame. The packet bytes pane shows the raw data in hexadecimal and ASCII.

No.	Time	Source	Destination	Protocol	Length	Info
11567	2673.786546	0c:aa:5f:03:00:02	Spanning-tree-(for...	STP	60	Conf. Root = 0/300/0c:aa:5f:03:00:00 Cost = 0 Port ...
11568	2674.773344	0c:aa:5f:03:00:02	Spanning-tree-(for...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port ...
11573	2675.771217	0c:aa:5f:03:00:02	Spanning-tree-(for...	STP	60	Conf. Root = 0/100/0c:aa:5f:03:00:00 Cost = 0 Port ...
11574	2675.773151	0c:aa:5f:03:00:02	Spanning-tree-(for...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port ...
11575	2675.783559	0c:aa:5f:03:00:02	Spanning-tree-(for...	STP	60	Conf. Root = 0/200/0c:aa:5f:03:00:00 Cost = 0 Port ...
11576	2675.786178	0c:aa:5f:03:00:02	Spanning-tree-(for...	STP	60	Conf. Root = 0/300/0c:aa:5f:03:00:00 Cost = 0 Port ...
11577	2676.774448	0c:aa:5f:03:00:02	Spanning-tree-(for...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port ...
11582	2677.771973	0c:aa:5f:03:00:02	Spanning-tree-(for...	STP	60	Conf. Root = 0/100/0c:aa:5f:03:00:00 Cost = 0 Port ...
11583	2677.774312	0c:aa:5f:03:00:02	Spanning-tree-(for...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port ...
11584	2677.783959	0c:aa:5f:03:00:02	Spanning-tree-(for...	STP	60	Conf. Root = 0/200/0c:aa:5f:03:00:00 Cost = 0 Port ...
11585	2677.786909	0c:aa:5f:03:00:02	Spanning-tree-(for...	STP	60	Conf. Root = 0/300/0c:aa:5f:03:00:00 Cost = 0 Port ...

Frame 11116: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface 0
Ethernet II, Src: 0c:aa:5f:03:00:02 (0c:aa:5f:03:00:02), Dst: 01:80:c2:00:00:00 (01:80:c2:00:00:00)
Type: 802.1Q Virtual LAN (0x8100)
Spanning Tree Protocol: Protocol

The screenshot shows a Wireshark capture window titled "Захват из Standard input [Layer2Switch-1 Ethernet3 to Layer2Switch-3 Ethernet1]". The filter bar contains the expression "eth.src contains 0c:aa:5f:03:00 && stp". The packet list shows several STP frames (12849 to 12862) from source 0c:aa:5f:03:00:03 to various destinations. The packet details pane for frame 1 shows an Ethernet II frame with destination 01:80:c2:00:00:00 and source 0c:aa:5f:03:00:03, encapsulating an STP frame. The packet bytes pane shows the raw data in hexadecimal and ASCII.

No.	Time	Source	Destination	Protocol	Length	Info
12849	2970.991252	0c:aa:5f:03:00:03	Spanning-tree-(for...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port ...
12850	2971.972531	0c:aa:5f:03:00:03	Spanning-tree-(for...	STP	60	Conf. Root = 0/100/0c:aa:5f:03:00:00 Cost = 0 Port ...
12851	2971.985163	0c:aa:5f:03:00:03	Spanning-tree-(for...	STP	60	Conf. Root = 0/200/0c:aa:5f:03:00:00 Cost = 0 Port ...
12852	2971.990496	0c:aa:5f:03:00:03	Spanning-tree-(for...	STP	60	Conf. Root = 0/300/0c:aa:5f:03:00:00 Cost = 0 Port ...
12853	2971.993426	0c:aa:5f:03:00:03	Spanning-tree-(for...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port ...
12858	2972.995072	0c:aa:5f:03:00:03	Spanning-tree-(for...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port ...
12859	2973.975320	0c:aa:5f:03:00:03	Spanning-tree-(for...	STP	60	Conf. Root = 0/100/0c:aa:5f:03:00:00 Cost = 0 Port ...
12860	2973.987829	0c:aa:5f:03:00:03	Spanning-tree-(for...	STP	60	Conf. Root = 0/200/0c:aa:5f:03:00:00 Cost = 0 Port ...
12861	2973.994324	0c:aa:5f:03:00:03	Spanning-tree-(for...	STP	60	Conf. Root = 0/300/0c:aa:5f:03:00:00 Cost = 0 Port ...
12862	2973.995780	0c:aa:5f:03:00:03	Spanning-tree-(for...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port ...

Frame 1: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface 0
Ethernet II, Src: 0c:aa:5f:03:00:03 (0c:aa:5f:03:00:03), Dst: 01:80:c2:00:00:00 (01:80:c2:00:00:00)
Type: 802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 100
Logical-Link Control
Spanning Tree Protocol: Protocol

Захват из Standard input [Layer2Switch-1 Ethernet4 to Layer2Switch-4 Ethernet0]

Файл Правка Вид Запуск Захват Анализ Статистика Телефония Беспроводная связь Инструменты Справка

eth.src contains 0c:aa:5f:03:00 && stp

No.	Time	Source	Destination	Protocol	Length	Info
12963	2997.989244	0c:aa:5f:03:00:04	Spanning-tree-(for...	STP	60	Conf. Root = 0/100/0c:aa:5f:03:00:00 Cost = 0 Port ...
12964	2997.999313	0c:aa:5f:03:00:04	Spanning-tree-(for...	STP	60	Conf. Root = 0/200/0c:aa:5f:03:00:00 Cost = 0 Port ...
12965	2998.004210	0c:aa:5f:03:00:04	Spanning-tree-(for...	STP	60	Conf. Root = 0/300/0c:aa:5f:03:00:00 Cost = 0 Port ...
12966	2998.008429	0c:aa:5f:03:00:04	Spanning-tree-(for...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port = ...
12970	2999.010294	0c:aa:5f:03:00:04	Spanning-tree-(for...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port = ...
12971	2999.991918	0c:aa:5f:03:00:04	Spanning-tree-(for...	STP	60	Conf. Root = 0/100/0c:aa:5f:03:00:00 Cost = 0 Port = ...
12972	3000.003048	0c:aa:5f:03:00:04	Spanning-tree-(for...	STP	60	Conf. Root = 0/200/0c:aa:5f:03:00:00 Cost = 0 Port ...
12973	3000.009236	0c:aa:5f:03:00:04	Spanning-tree-(for...	STP	60	Conf. Root = 0/300/0c:aa:5f:03:00:00 Cost = 0 Port ...
12974	3000.012139	0c:aa:5f:03:00:04	Spanning-tree-(for...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port = ...
12978	3001.012007	0c:aa:5f:03:00:04	Spanning-tree-(for...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port = ...

> Frame 12947: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on 0
> Ethernet II, Src: 0c:aa:5f:03:00:04 (0c:aa:5f:03:00:04), Dst: 01:00:5e:00:00:00
> 802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 300
> Logical-Link Control
> Spanning Tree Protocol

Spanning Tree Protocol: Protocol | Пакеты: 12978 · Отображено: 7500 (57.8%) | Профиль: Default

Захват из Standard input [Layer2Switch-1 Ethernet5 to Layer2Switch-4 Ethernet1]

Файл Правка Вид Запуск Захват Анализ Статистика Телефония Беспроводная связь Инструменты Справка

eth.src contains 0c:aa:5f:03:00 && stp

No.	Time	Source	Destination	Protocol	Length	Info
13134	3037.062480	0c:aa:5f:03:00:05	Spanning-tree-(for...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port = ...
13135	3038.044020	0c:aa:5f:03:00:05	Spanning-tree-(for...	STP	60	Conf. Root = 0/100/0c:aa:5f:03:00:00 Cost = 0 Port ...
13136	3038.054030	0c:aa:5f:03:00:05	Spanning-tree-(for...	STP	60	Conf. Root = 0/200/0c:aa:5f:03:00:00 Cost = 0 Port ...
13137	3038.060036	0c:aa:5f:03:00:05	Spanning-tree-(for...	STP	60	Conf. Root = 0/300/0c:aa:5f:03:00:00 Cost = 0 Port ...
13138	3038.062352	0c:aa:5f:03:00:05	Spanning-tree-(for...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port = ...
13143	3039.064258	0c:aa:5f:03:00:05	Spanning-tree-(for...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port = ...
13144	3040.046844	0c:aa:5f:03:00:05	Spanning-tree-(for...	STP	60	Conf. Root = 0/100/0c:aa:5f:03:00:00 Cost = 0 Port ...
13145	3040.056747	0c:aa:5f:03:00:05	Spanning-tree-(for...	STP	60	Conf. Root = 0/200/0c:aa:5f:03:00:00 Cost = 0 Port ...
13146	3040.062700	0c:aa:5f:03:00:05	Spanning-tree-(for...	STP	60	Conf. Root = 0/300/0c:aa:5f:03:00:00 Cost = 0 Port ...
13147	3040.065023	0c:aa:5f:03:00:05	Spanning-tree-(for...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port = ...

> Frame 2: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on 0
> Ethernet II, Src: 0c:aa:5f:03:00:05 (0c:aa:5f:03:00:05), Dst: 01:00:5e:00:00:00
> 802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 100
> Logical-Link Control
> Spanning Tree Protocol

Spanning Tree Protocol: Protocol | Пакеты: 13150 · Отображено: 7598 (57.8%) | 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

eth.src contains 0c:aa:5f:03:00 && stp

No.	Time	Source	Destination	Protocol	Length	Info
13188	3050.067563	0c:aa:5f:03:00:06	Spanning-tree-(for...	STP	60	Conf. Root = 0/200/0c:aa:5f:03:00:00 Cost = 0 Port ...
13189	3050.068741	0c:aa:5f:03:00:06	Spanning-tree-(for...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port = ...
13190	3050.073768	0c:aa:5f:03:00:06	Spanning-tree-(for...	STP	60	Conf. Root = 0/300/0c:aa:5f:03:00:00 Cost = 0 Port ...
13191	3051.068519	0c:aa:5f:03:00:06	Spanning-tree-(for...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port ...
13195	3052.058299	0c:aa:5f:03:00:06	Spanning-tree-(for...	STP	60	Conf. Root = 0/100/0c:aa:5f:03:00:00 Cost = 0 Port ...
13196	3052.067172	0c:aa:5f:03:00:06	Spanning-tree-(for...	STP	60	Conf. Root = 0/200/0c:aa:5f:03:00:00 Cost = 0 Port ...
13197	3052.068356	0c:aa:5f:03:00:06	Spanning-tree-(for...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port ...
13198	3052.073214	0c:aa:5f:03:00:06	Spanning-tree-(for...	STP	60	Conf. Root = 0/300/0c:aa:5f:03:00:00 Cost = 0 Port ...
13200	3052.661284	0c:aa:5f:03:00:06	0c:aa:5f:03:00:06	LOOP	60	Reply
13201	3053.071235	0c:aa:5f:03:00:06	Spanning-tree-(for...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port = ...

> Frame 1: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on 0
> IEEE 802.3 Ethernet
> Logical-Link Control
> Spanning Tree Protocol

Spanning Tree Protocol: Protocol | Пакеты: 13202 · Отображено: 8100 (61.4%) | Профиль: Default

Захват из Standard input [Layer2Switch-1 Ethernet7 to Layer2Switch-5 Ethernet1]

Файл Правка Вид Запуск Захват Анализ Статистика Телефония Беспроводная связь Инструменты Справка

eth.src contains 0c:aa:5f:03:00:00 && stp

No.	Time	Source	Destination	Protocol	Length	Info
13303	3075.835743	0c:aa:5f:03:00:07	Spanning-tree-(for-...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port = ...
13307	3076.834482	0c:aa:5f:03:00:07	Spanning-tree-(for-...	STP	60	Conf. Root = 0/100/0c:aa:5f:03:00:00 Cost = 0 Port = ...
13308	3076.835450	0c:aa:5f:03:00:07	Spanning-tree-(for-...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port = ...
13309	3076.843400	0c:aa:5f:03:00:07	Spanning-tree-(for-...	STP	60	Conf. Root = 0/200/0c:aa:5f:03:00:00 Cost = 0 Port = ...
13310	3076.850392	0c:aa:5f:03:00:07	Spanning-tree-(for-...	STP	60	Conf. Root = 0/300/0c:aa:5f:03:00:00 Cost = 0 Port = ...
13311	3077.835307	0c:aa:5f:03:00:07	Spanning-tree-(for-...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port = ...
13315	3078.835100	0c:aa:5f:03:00:07	Spanning-tree-(for-...	STP	60	Conf. Root = 0/100/0c:aa:5f:03:00:00 Cost = 0 Port = ...
13316	3078.836155	0c:aa:5f:03:00:07	Spanning-tree-(for-...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port = ...
13317	3078.844103	0c:aa:5f:03:00:07	Spanning-tree-(for-...	STP	60	Conf. Root = 0/200/0c:aa:5f:03:00:00 Cost = 0 Port = ...
13318	3078.851015	0c:aa:5f:03:00:07	Spanning-tree-(for-...	STP	60	Conf. Root = 0/300/0c:aa:5f:03:00:00 Cost = 0 Port = ...

> Frame 4: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface 0

> IEEE 802.3 Ethernet

> Logical-Link Control

> Spanning Tree Protocol

Spanning Tree Protocol: Protocol

Пакеты: 13318 · Отображено: 7693 (57.8%)

Профиль: Default

Захват из Standard input [Layer2Switch-1 Ethernet1 to Layer2Switch-2 Ethernet1]

Файл Правка Вид Запуск Захват Анализ Статистика Телефония Беспроводная связь Инструменты Справка

eth.src contains 0c:aa:5f:03:00:00 && stp

No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	0c:aa:5f:03:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 0/100/0c:aa:5f:03:00:00 Cost = 0 Port = ...
2	0.005516	0c:aa:5f:03:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 0/200/0c:aa:5f:03:00:00 Cost = 0 Port = ...
3	0.008565	0c:aa:5f:03:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 0/300/0c:aa:5f:03:00:00 Cost = 0 Port = ...
4	0.010980	0c:aa:5f:03:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port = ...
8	1.010344	0c:aa:5f:03:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port = ...
9	2.001253	0c:aa:5f:03:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 0/100/0c:aa:5f:03:00:00 Cost = 0 Port = ...
10	2.007177	0c:aa:5f:03:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 0/200/0c:aa:5f:03:00:00 Cost = 0 Port = ...
11	2.010616	0c:aa:5f:03:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 0/300/0c:aa:5f:03:00:00 Cost = 0 Port = ...
12	2.012414	0c:aa:5f:03:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port = ...
16	3.014055	0c:aa:5f:03:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 0/1/0c:aa:5f:03:00:00 Cost = 0 Port = ...
17	4.004349	0c:aa:5f:03:00:01	Spanning-tree-(for-...	STP	60	Conf. Root = 0/100/0c:aa:5f:03:00:00 Cost = 0 Port = ...

> Frame 1: 60 bytes on wire (480 bits), 60 bytes captured (480 bits) on interface 0

> Ethernet II, Src: 0c:aa:5f:03:00:01 (0c:aa:5f:03:00:01), Dst: 01:80:c2:00:00:00

> 802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 100

> Logical-Link Control

> Spanning Tree Protocol

Spanning Tree Protocol: Protocol

Пакеты: 13458 · Отображено: 7779 (57.8%)

Профиль: Default

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

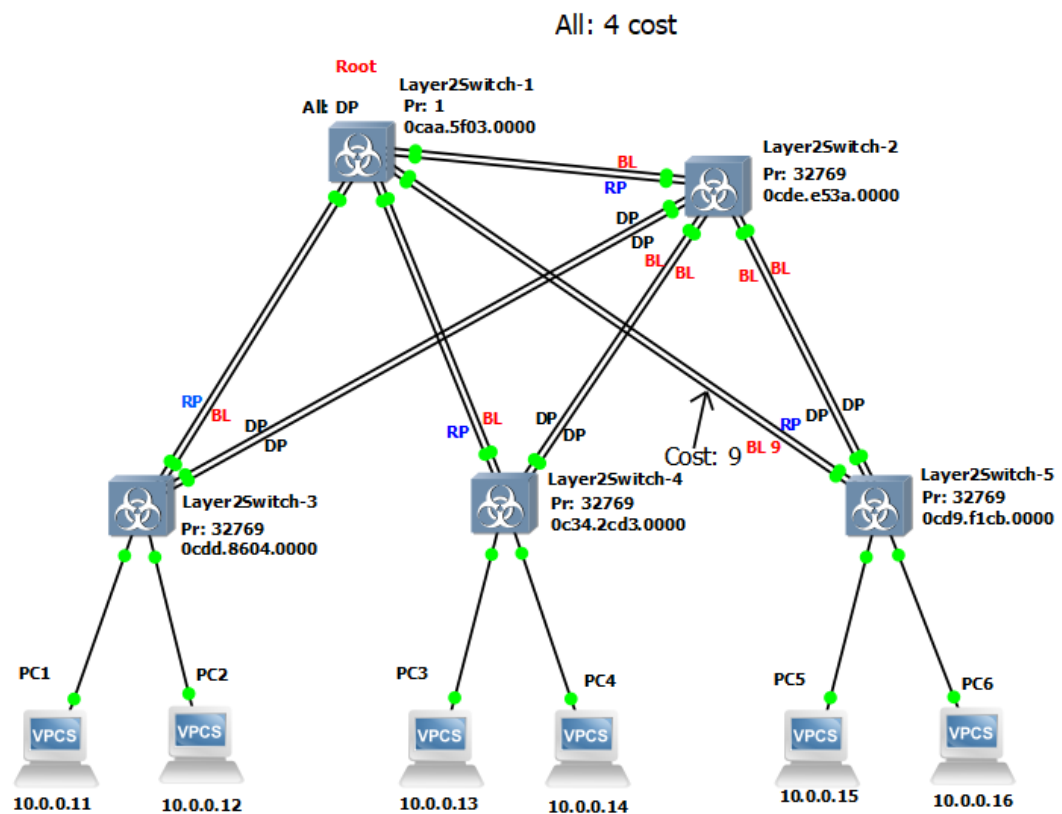
Поменяли цену на 5 коммутаторе на 9:

configure terminal

interface GigabitEthernet 0/0

spanning-tree cost 9

Так же отметим состояния портов:



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

show running-config