

Практика 3

1) Настроим ip-адреса на ПК

На ПК1: ip 192.168.1.1/24

На ПК2: ip 192.168.1.2/24

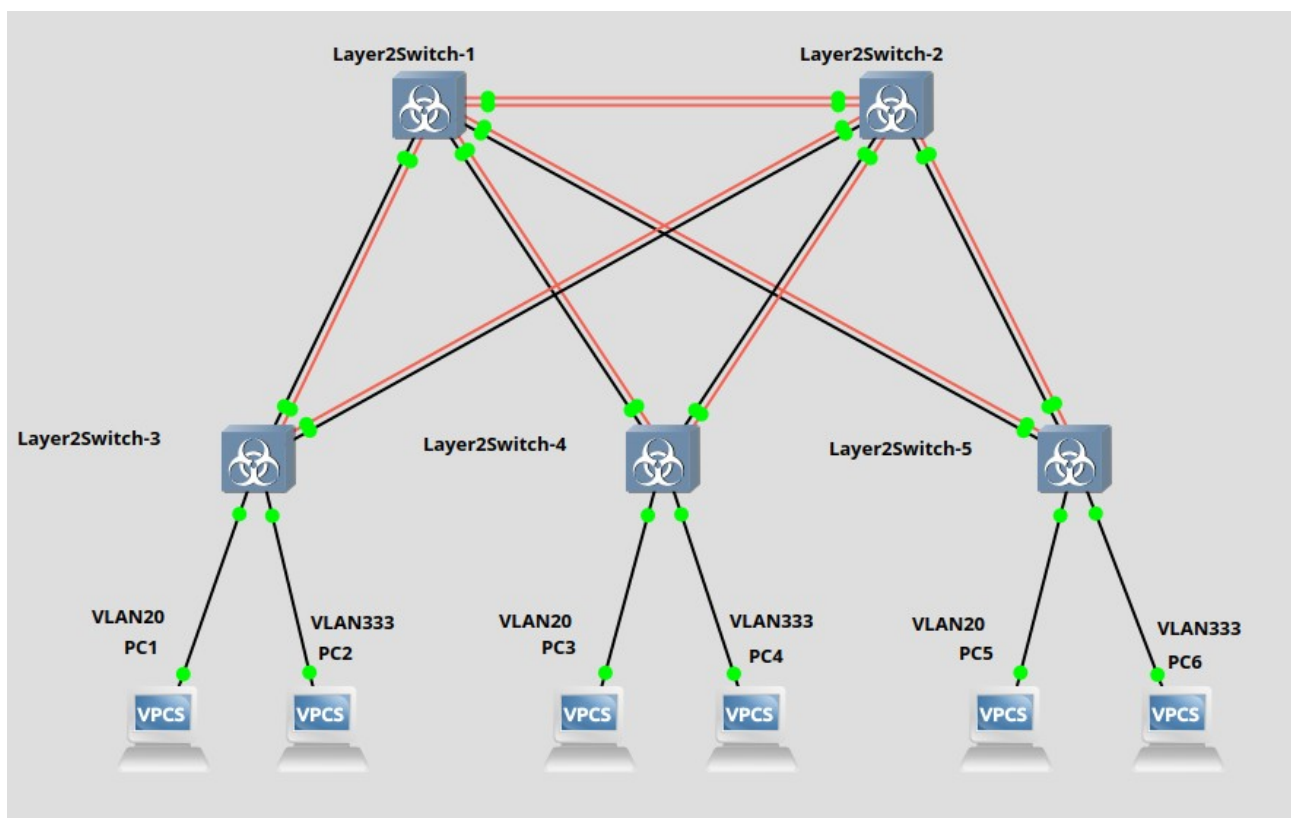
На ПК3: ip 192.168.1.3/24

На ПК4: ip 192.168.1.4/24

На ПК5: ip 192.168.1.5/24

На ПК6: ip 192.168.1.6/24

2) Настроим порты на коммутаторах, для передачи пакетов VLAN333 между коммутаторами использовал Native VLAN. Vlan 20 для ПК1,3,5, Vlan 333 для ПК2,4,6. Между коммутаторами подключил trunk порт, между коммутатором и ПК подключил access порт. Избыточные каналы поместил в Vlan 999.



Красный цветом помечены каналы, которые помещены в отдельный VLAN.

Коммутатор 1:

```
en
```

```
conf t
```

```
vlan 999
```

```
exit
no vlan 100
no vlan 200
no vlan 300
interface range Gi0/2, Gi1/0, Gi1/2
switchport mode trunk
switchport trunk encapsulation dot1q
switchport trunk native vlan 333
switchport trunk allowed vlan 20,333
no shutdown
exit
interface range Gi0/0, Gi0/1, Gi0/3, Gi1/1, Gi1/3
switchport mode trunk
switchport trunk encapsulation dot1q
switchport trunk native vlan 999
switchport trunk allowed vlan 999
no shutdown
end
```

write memory
Коммутатор 2:

```
en
conf t
vlan 999
exit
no vlan 100
no vlan 200
no vlan 300
interface range Gi0/2, Gi1/0, Gi1/2
switchport mode trunk
switchport trunk encapsulation dot1q
switchport trunk native vlan 333
switchport trunk allowed vlan 20,333
no shutdown
exit
interface range Gi0/0, Gi0/1, Gi0/3, Gi1/1, Gi1/3
switchport mode trunk
switchport trunk encapsulation dot1q
switchport trunk native vlan 999
switchport trunk allowed vlan 999
```

```
no shutdown
end
write memory
Коммутатор 3:
```

```
en
conf t
vlan 999
exit
no vlan 100
no vlan 200
no vlan 300
interface range Gi0/0, Gi0/2
switchport mode trunk
switchport trunk encapsulation dot1q
switchport trunk native vlan 333
switchport trunk allowed vlan 20,333
no shutdown
exit
interface range Gi0/1, Gi0/3
switchport mode trunk
switchport trunk encapsulation dot1q
switchport trunk native vlan 999
switchport trunk allowed vlan 999
no shutdown
exit
interface Gi1/0
switchport mode access
switchport access vlan 20
description PC1-VLAN20
no shutdown
exit
interface Gi1/1
switchport mode access
switchport access vlan 333
description PC2-VLAN333
no shutdown
end
write memory
Коммутатор 4:
```

```
en
conf t
vlan 999
exit
no vlan 100
no vlan 200
no vlan 300
interface range Gi0/0, Gi0/2
switchport mode trunk
switchport trunk encapsulation dot1q
switchport trunk native vlan 333
switchport trunk allowed vlan 20,333
no shutdown
exit
interface range Gi0/1, Gi0/3
switchport mode trunk
switchport trunk encapsulation dot1q
switchport trunk native vlan 999
switchport trunk allowed vlan 999
no shutdown
exit
interface Gi1/0
switchport mode access
switchport access vlan 20
description PC3-VLAN20
no shutdown
exit
interface Gi1/1
switchport mode access
switchport access vlan 333
description PC4-VLAN333
no shutdown
end
write memory
Коммутатор 5:
en
conf t
vlan 999
exit
```

```
no vlan 100
no vlan 200
no vlan 300
interface range Gi0/0, Gi0/2
switchport mode trunk
switchport trunk encapsulation dot1q
switchport trunk native vlan 333
switchport trunk allowed vlan 20,333
no shutdown
exit
interface range Gi0/1, Gi0/3
switchport mode trunk
switchport trunk encapsulation dot1q
switchport trunk native vlan 999
switchport trunk allowed vlan 999
no shutdown
exit
interface Gi1/0
switchport mode access
switchport access vlan 20
description PC5-VLAN20
no shutdown
exit
interface Gi1/1
switchport mode access
switchport access vlan 333
description PC6-VLAN333
no shutdown
end
write memory
```

Пример настройки 1 коммутатора

```
Switch>show interfaces trunk
```

Port	Mode	Encapsulation	Status	Native vlan
Gi0/0	desirable	802.1q	trunking	333
Gi0/1	desirable	802.1q	trunking	999
Gi0/2	desirable	802.1q	trunking	333
Gi0/3	desirable	802.1q	trunking	999
Gi1/0	desirable	802.1q	trunking	333
Gi1/1	desirable	802.1q	trunking	999
Gi1/2	desirable	802.1q	trunking	333
Gi1/3	desirable	802.1q	trunking	999

Port	Vlans allowed on trunk
Gi0/0	20,333
Gi0/1	999
Gi0/2	20,333
Gi0/3	999
Gi1/0	20,333
Gi1/1	999
Gi1/2	20,333
Gi1/3	999

Пример настройки 3 коммутатора

```
Switch>show interfaces status
```

Port	Name	Status	Vlan	Duplex	Speed	Type
Gi0/0		connected	trunk	auto	auto	unknown
Gi0/1		connected	trunk	auto	auto	unknown
Gi0/2		connected	trunk	auto	auto	unknown
Gi0/3		connected	trunk	auto	auto	unknown
Gi1/0	PC1-VLAN20	connected	20	auto	auto	unknown
Gi1/1	PC2-VLAN333	connected	333	auto	auto	unknown

3)Проверил доступность ПК находящихся в одном VLAN и недоступность в разных.

Пинг с 1ПК на 3ПК и на 5ПК (один VLAN)

ping 192.168.1.3

ping 192.168.1.5

```
PC1> ping 192.168.1.3

84 bytes from 192.168.1.3 icmp_seq=1 ttl=64 time=33.821 ms
84 bytes from 192.168.1.3 icmp_seq=2 ttl=64 time=12.500 ms
84 bytes from 192.168.1.3 icmp_seq=3 ttl=64 time=13.453 ms
84 bytes from 192.168.1.3 icmp_seq=4 ttl=64 time=4.193 ms
84 bytes from 192.168.1.3 icmp_seq=5 ttl=64 time=3.291 ms

PC1> ping 192.168.1.5

84 bytes from 192.168.1.5 icmp_seq=1 ttl=64 time=4.221 ms
84 bytes from 192.168.1.5 icmp_seq=2 ttl=64 time=5.110 ms
84 bytes from 192.168.1.5 icmp_seq=3 ttl=64 time=7.908 ms
84 bytes from 192.168.1.5 icmp_seq=4 ttl=64 time=11.123 ms
84 bytes from 192.168.1.5 icmp_seq=5 ttl=64 time=16.026 ms
```

ПК находящиеся в одном VLAN успешно пингуются

Пинг с 1ПК на 2ПК и на 4ПК (разные VLAN)

ping 192.168.1.2

ping 192.168.1.4

Пинг с 4 ПК на 2ПК и на 6ПК(один VLAN)

ping 192.168.1.2

ping 192.168.1.6

```
PC4> ping 192.168.1.2

84 bytes from 192.168.1.2 icmp_seq=1 ttl=64 time=8.117 ms
84 bytes from 192.168.1.2 icmp_seq=2 ttl=64 time=7.219 ms
84 bytes from 192.168.1.2 icmp_seq=3 ttl=64 time=5.135 ms
84 bytes from 192.168.1.2 icmp_seq=4 ttl=64 time=7.946 ms
84 bytes from 192.168.1.2 icmp_seq=5 ttl=64 time=5.824 ms

PC4> ping 192.168.1.6

84 bytes from 192.168.1.6 icmp_seq=1 ttl=64 time=13.613 ms
84 bytes from 192.168.1.6 icmp_seq=2 ttl=64 time=3.154 ms
84 bytes from 192.168.1.6 icmp_seq=3 ttl=64 time=6.475 ms
84 bytes from 192.168.1.6 icmp_seq=4 ttl=64 time=4.211 ms
84 bytes from 192.168.1.6 icmp_seq=5 ttl=64 time=3.671 ms
```

ПК в разных VLAN не пингуются, из этого можно сделать вывод, что VLAN настроен правильно.

4) Перехватил в Wireshark пакеты с тегами и без.

С тегом должен передавать vlan 20, без тега vlan 333, так как ему настроили NATIVE VLAN.

Захватил линк между 2 и 3 коммутатором.

Выполнил пинг с 1ПК на 3ПК (VLAN20) должен быть с тегом.

Анализ в wireshark:

```
▼ Ethernet II, Src: 00:50:79:66:68:00 (00:50:79:66:68:00), Dst: 00:50:79:66:68:02 (00:50:79:66:68:02)
  ▼ Destination: 00:50:79:66:68:02 (00:50:79:66:68:02)
    Address: 00:50:79:66:68:02 (00:50:79:66:68:02)
    .... 0. .... = LG bit: Globally unique address (factory default)
    .... 0. .... = IG bit: Individual address (unicast)
  ▼ Source: 00:50:79:66:68:00 (00:50:79:66:68:00)
    Address: 00:50:79:66:68:00 (00:50:79:66:68:00)
    .... 0. .... = LG bit: Globally unique address (factory default)
    .... 0. .... = IG bit: Individual address (unicast)
    Type: 802.1Q Virtual LAN (0x8100)
  ▼ 802.1Q Virtual LAN, PRI: 0, DEI: 0, ID: 20
    000. .... = Priority: Best Effort (default) (0)
    .... 0. .... = DEI: Ineligible
    .... 0000 0001 0100 = ID: 20
    Type: IPv4 (0x0800)
```

Тэг есть

Пакеты передаются с тегами. Сначала идет тег 4 байта, затем EtherType.

Выполнил пинг с 2ПК на 4ПК(VLAN333), тегов не должно быть.

```
▼ Ethernet II, Src: 00:50:79:66:68:03 (00:50:79:66:68:03), Dst: 00:50:79:66:68:01 (00:50:79:66:68:01)
  ▼ Destination: 00:50:79:66:68:01 (00:50:79:66:68:01)
    Address: 00:50:79:66:68:01 (00:50:79:66:68:01)
    .... 0. .... = LG bit: Globally unique address (factory default)
    .... 0. .... = IG bit: Individual address (unicast)
  ▼ Source: 00:50:79:66:68:03 (00:50:79:66:68:03)
    Address: 00:50:79:66:68:03 (00:50:79:66:68:03)
    .... 0. .... = LG bit: Globally unique address (factory default)
    .... 0. .... = IG bit: Individual address (unicast)
    Type: IPv4 (0x0800)
  ▼ Internet Protocol Version 4, Src: 192.168.1.4, Dst: 192.168.1.2
    0100 .... = Version: 4
    .... 0101 = Header Length: 20 bytes (5)
    ▶ Differentiated Services Field: 0x00 (DSCP: CS0, ECN: Not-ECT)
    Total Length: 84
    Identification: 0x1e88 (7816)
    ▶ 000. .... = Flags: 0x0
```

Тега нет.

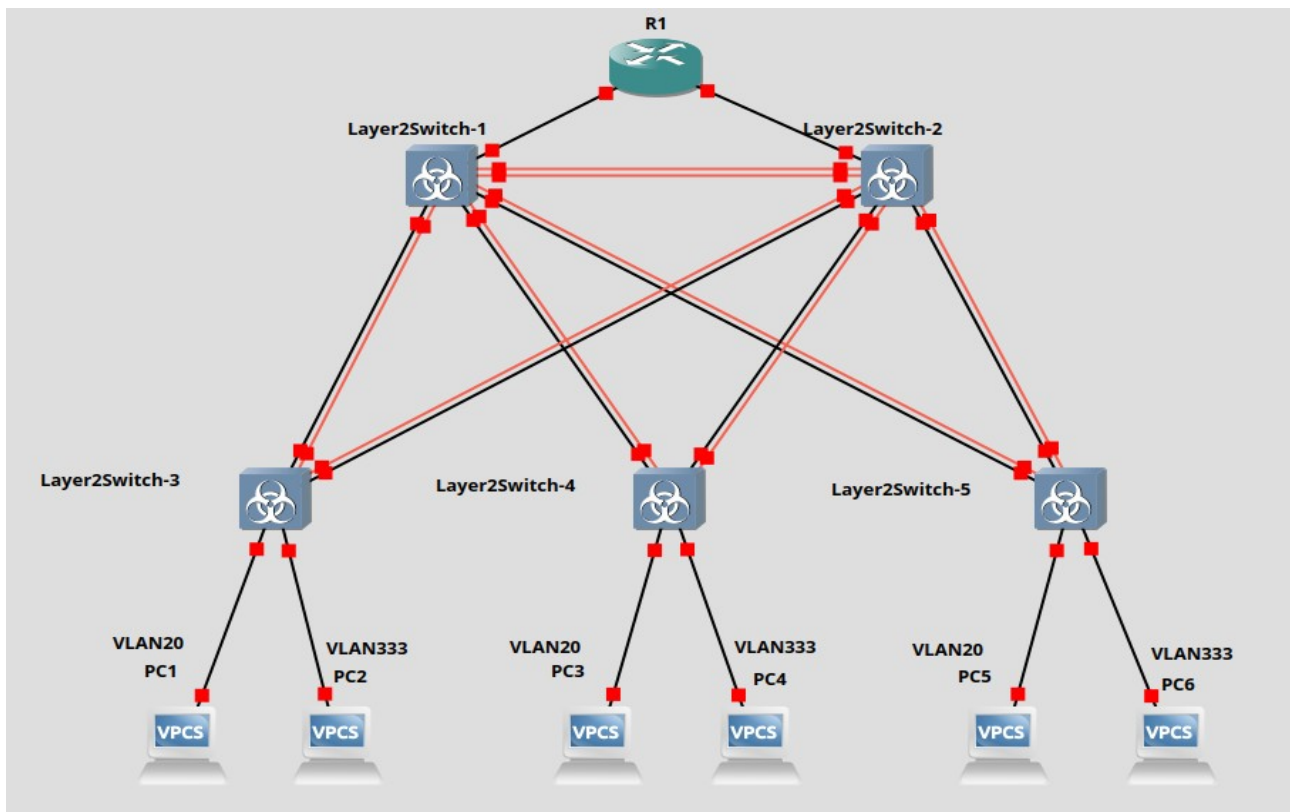
Из анализа трафика в wireshark, можно сделать вывод, что NATIVE VLAN 333, настроен правильно, пакеты передаются без тега.

5) Добавил маршрутизатор подключенный к 1 и 2 коммутатору:

1 коммутатор передает маршрутизатору пакеты с VLAN 20

2 коммутатор передает маршрутизатору пакеты с VLAN333

Схема:



Настройки:

Настроил интерфейсы портов на маршрутизаторе

en

conf t

interface FastEthernet0/0

ip address 192.168.20.1 255.255.255.0

no shutdown

exit

interface FastEthernet1/0

ip address 192.168.33.1 255.255.255.0

no shutdown

exit

ip routing

end

write memory

```
R1#show ip interface brief
Interface                               IP-Address      OK? Method Status    Protoco
l
FastEthernet0/0                         192.168.20.1    YES manual up        up
FastEthernet1/0                         192.168.33.1    YES manual up        up
FastEthernet2/0                         unassigned      YES NVRAM   administratively down down
FastEthernet3/0                         unassigned      YES NVRAM   administratively down down
```

Обновил ip у ПК:

на ПК1:

```
ip 192.168.20.2 255.255.255.0 192.168.20.1
```

```
save
```

на ПК2:

```
ip 192.168.33.2 255.255.255.0 192.168.33.1
```

```
save
```

на ПК3:

```
ip 192.168.20.3 255.255.255.0 192.168.20.1
```

```
save
```

на ПК4:

```
ip 192.168.33.3 255.255.255.0 192.168.33.1
```

```
save
```

на ПК5:

```
ip 192.168.20.4 255.255.255.0 192.168.20.1
```

```
save
```

на ПК6:

```
ip 192.168.33.4 255.255.255.0 192.168.33.1
```

```
save
```

Обновил порты на коммутаторе к которым подключен Маршрутизатор:

Коммутатор 1:

```
en
```

```
conf t
```

```
interface Gi2/0
switchport mode access
switchport access vlan 20
no shutdown
end
write memory
```

Коммутатор 2:

```
en
conf t
interface Gi2/0
switchport mode access
switchport access vlan 333
no shutdown
end
write memory
```

6) Проверил ping:

Пинг с 1ПК на 4ПК и на 6ПК(разные VLAN)

ping 192.168.33.3

ping 192.168.33.4

```
PC1> ping 192.168.33.3

84 bytes from 192.168.33.3 icmp_seq=1 ttl=63 time=33.820 ms
84 bytes from 192.168.33.3 icmp_seq=2 ttl=63 time=26.923 ms
84 bytes from 192.168.33.3 icmp_seq=3 ttl=63 time=30.151 ms
84 bytes from 192.168.33.3 icmp_seq=4 ttl=63 time=26.466 ms
84 bytes from 192.168.33.3 icmp_seq=5 ttl=63 time=17.007 ms

PC1> ping 192.168.33.4

84 bytes from 192.168.33.4 icmp_seq=1 ttl=63 time=49.017 ms
84 bytes from 192.168.33.4 icmp_seq=2 ttl=63 time=25.819 ms
84 bytes from 192.168.33.4 icmp_seq=3 ttl=63 time=29.877 ms
84 bytes from 192.168.33.4 icmp_seq=4 ttl=63 time=21.818 ms
84 bytes from 192.168.33.4 icmp_seq=5 ttl=63 time=16.954 ms
```

Пинг с 2ПК на 5ПК(разные VLAN)

ping 192.168.20.4

```
PC2> ping 192.168.20.4

192.168.20.4 icmp_seq=1 timeout
84 bytes from 192.168.20.4 icmp_seq=2 ttl=63 time=43.130 ms
84 bytes from 192.168.20.4 icmp_seq=3 ttl=63 time=25.770 ms
84 bytes from 192.168.20.4 icmp_seq=4 ttl=63 time=20.670 ms
84 bytes from 192.168.20.4 icmp_seq=5 ttl=63 time=31.853 ms
```

Пинг с 2ПК на 4ПК(один VLAN)

ping 192.168.33.3

```
PC2> ping 192.168.33.3

84 bytes from 192.168.33.3 icmp_seq=1 ttl=64 time=22.192 ms
84 bytes from 192.168.33.3 icmp_seq=2 ttl=64 time=8.931 ms
84 bytes from 192.168.33.3 icmp_seq=3 ttl=64 time=3.904 ms
84 bytes from 192.168.33.3 icmp_seq=4 ttl=64 time=11.849 ms
84 bytes from 192.168.33.3 icmp_seq=5 ttl=64 time=4.307 ms
```

Пинг между разными VLAN работают.