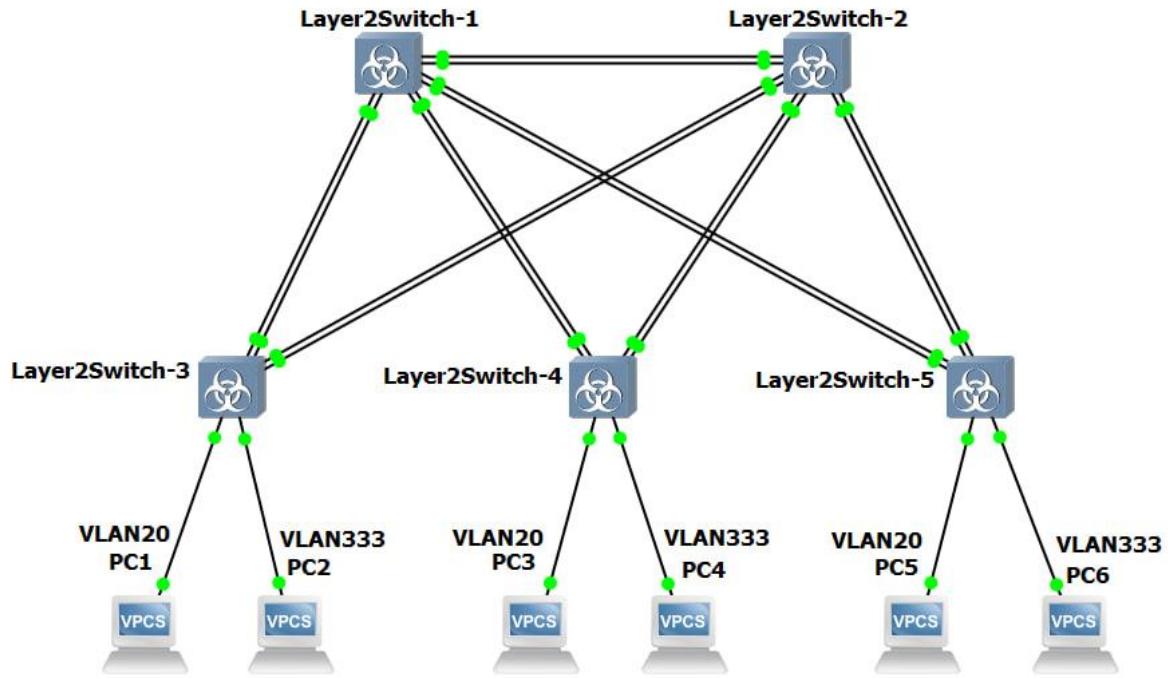


Практика №3

Тема: Настройка виртуальной локальной сети (VLAN)

- 1) Для заданной на схеме schema-lab3 сети, состоящей из управляемых коммутаторов и персональных компьютеров



настроить на коммутаторах логическую топологию используя протокол IEEE 802.1Q, для передачи пакетов VLAN333 между коммутаторами использовать Native VLAN

Команды для SW1

```
enable
configure terminal
vlan 20
name Users-VLAN20
exit
vlan 333
name Management-VLAN333
exit
interface gigabitEthernet 0/0
```

```
description Trunk-to-SW3_1
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 333
switchport trunk allowed vlan 20,333
no shutdown
exit
interface gigabitEthernet 0/1
description Trunk-to-SW3_2
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 333
switchport trunk allowed vlan 20,333
no shutdown
exit
interface gigabitEthernet 0/2
description Trunk-to-SW4_1
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 333
switchport trunk allowed vlan 20,333
no shutdown
exit
interface gigabitEthernet 0/3
description Trunk-to-SW4_2
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 333
switchport trunk allowed vlan 20,333
```

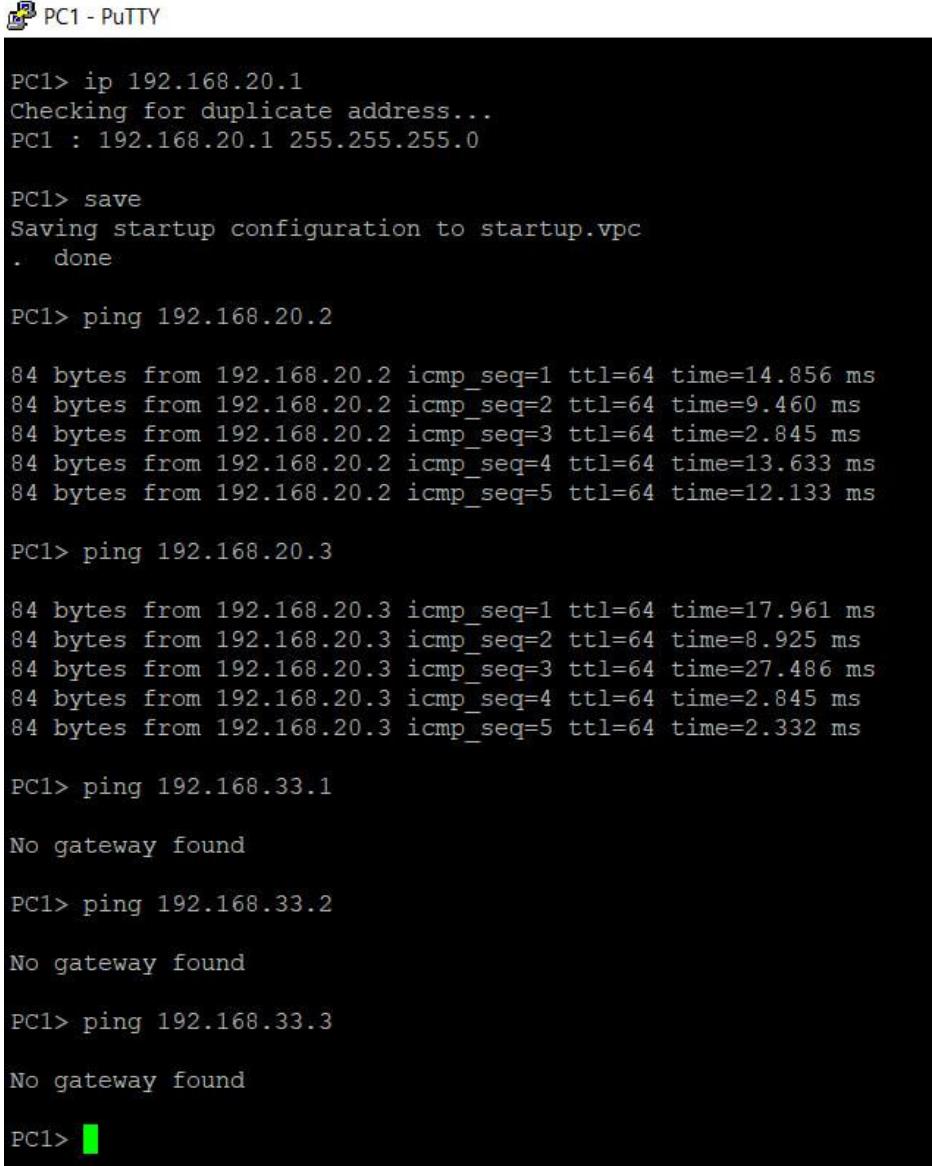
```
no shutdown
exit
interface gigabitEthernet 1/0
description Trunk-to-SW5_1
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 333
switchport trunk allowed vlan 20,333
no shutdown
exit
interface gigabitEthernet 1/1
description Trunk-to-SW5_2
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 333
switchport trunk allowed vlan 20,333
no shutdown
exit
interface gigabitEthernet 1/2
description Trunk-to-SW2_1
switchport trunk encapsulation dot1q
switchport mode trunk
switchport trunk native vlan 333
switchport trunk allowed vlan 20,333
no shutdown
exit
interface gigabitEthernet 1/3
description Trunk-to-SW2_2
switchport trunk encapsulation dot1q
```

```
switchport mode trunk  
switchport trunk native vlan 333  
switchport trunk allowed vlan 20,333  
no shutdown  
exit  
end  
write memory
```

Для остальных коммутаторов аналогично

2) Проверить доступность персональных компьютеров, находящихся в одинаковых VLAN и недоступность находящихся в различных, результаты задокументировать

Пинг с PC1 на все устройства:



```
PC1> ip 192.168.20.1
Checking for duplicate address...
PC1 : 192.168.20.1 255.255.255.0

PC1> save
Saving startup configuration to startup.vpc
. done

PC1> ping 192.168.20.2

84 bytes from 192.168.20.2 icmp_seq=1 ttl=64 time=14.856 ms
84 bytes from 192.168.20.2 icmp_seq=2 ttl=64 time=9.460 ms
84 bytes from 192.168.20.2 icmp_seq=3 ttl=64 time=2.845 ms
84 bytes from 192.168.20.2 icmp_seq=4 ttl=64 time=13.633 ms
84 bytes from 192.168.20.2 icmp_seq=5 ttl=64 time=12.133 ms

PC1> ping 192.168.20.3

84 bytes from 192.168.20.3 icmp_seq=1 ttl=64 time=17.961 ms
84 bytes from 192.168.20.3 icmp_seq=2 ttl=64 time=8.925 ms
84 bytes from 192.168.20.3 icmp_seq=3 ttl=64 time=27.486 ms
84 bytes from 192.168.20.3 icmp_seq=4 ttl=64 time=2.845 ms
84 bytes from 192.168.20.3 icmp_seq=5 ttl=64 time=2.332 ms

PC1> ping 192.168.33.1

No gateway found

PC1> ping 192.168.33.2

No gateway found

PC1> ping 192.168.33.3

No gateway found

PC1>
```

Пинг с PC2 на все устройства:

PC2 - PuTTY

```
ip 192.168.33.1
Checking for duplicate address...
PC2 : 192.168.33.1 255.255.255.0

PC2> save
Saving startup configuration to startup.vpc
. done

PC2> ping 192.168.33.2

84 bytes from 192.168.33.2 icmp_seq=1 ttl=64 time=11.547 ms
84 bytes from 192.168.33.2 icmp_seq=2 ttl=64 time=4.827 ms
84 bytes from 192.168.33.2 icmp_seq=3 ttl=64 time=13.989 ms
84 bytes from 192.168.33.2 icmp_seq=4 ttl=64 time=13.740 ms
84 bytes from 192.168.33.2 icmp_seq=5 ttl=64 time=6.402 ms

PC2> ping 192.168.33.3

84 bytes from 192.168.33.3 icmp_seq=1 ttl=64 time=6.015 ms
84 bytes from 192.168.33.3 icmp_seq=2 ttl=64 time=15.976 ms
84 bytes from 192.168.33.3 icmp_seq=3 ttl=64 time=5.633 ms
84 bytes from 192.168.33.3 icmp_seq=4 ttl=64 time=12.795 ms
84 bytes from 192.168.33.3 icmp_seq=5 ttl=64 time=8.104 ms

PC2> ping 192.168.20.1

No gateway found

PC2> ping 192.168.20.2

No gateway found

PC2> ping 192.168.20.3

No gateway found

PC2> █
```

Пинг с PC3 на все устройства:



PC3 - PuTTY

```
PC3> ip 192.168.20.2
Checking for duplicate address...
PC3 : 192.168.20.2 255.255.255.0

PC3> save
Saving startup configuration to startup.vpc
. done

PC3> ping 192.168.20.1

84 bytes from 192.168.20.1 icmp_seq=1 ttl=64 time=6.508 ms
84 bytes from 192.168.20.1 icmp_seq=2 ttl=64 time=8.441 ms
84 bytes from 192.168.20.1 icmp_seq=3 ttl=64 time=8.602 ms
84 bytes from 192.168.20.1 icmp_seq=4 ttl=64 time=16.760 ms
84 bytes from 192.168.20.1 icmp_seq=5 ttl=64 time=11.182 ms

PC3> ping 192.168.20.3

84 bytes from 192.168.20.3 icmp_seq=1 ttl=64 time=8.606 ms
84 bytes from 192.168.20.3 icmp_seq=2 ttl=64 time=8.091 ms
84 bytes from 192.168.20.3 icmp_seq=3 ttl=64 time=3.886 ms
84 bytes from 192.168.20.3 icmp_seq=4 ttl=64 time=2.442 ms
84 bytes from 192.168.20.3 icmp_seq=5 ttl=64 time=6.861 ms

PC3> ping 192.168.33.1

No gateway found

PC3> ping 192.168.33.2

No gateway found

PC3> ping 192.168.33.3

No gateway found

PC3>
```

Пинг с PC4 на все устройства:

```
PC4 - PuTTY
192.168.33.2
Bad command: "192.168.33.2". Use ? for help.

PC4> ip 192.168.33.2
Checking for duplicate address...
PC4 : 192.168.33.2 255.255.255.0

PC4> save
Saving startup configuration to startup.vpc
. done

PC4> ping 192.168.33.1

84 bytes from 192.168.33.1 icmp_seq=1 ttl=64 time=6.074 ms
84 bytes from 192.168.33.1 icmp_seq=2 ttl=64 time=16.411 ms
84 bytes from 192.168.33.1 icmp_seq=3 ttl=64 time=8.282 ms
84 bytes from 192.168.33.1 icmp_seq=4 ttl=64 time=15.593 ms
84 bytes from 192.168.33.1 icmp_seq=5 ttl=64 time=4.407 ms

PC4> ping 192.168.33.3

84 bytes from 192.168.33.3 icmp_seq=1 ttl=64 time=12.476 ms
84 bytes from 192.168.33.3 icmp_seq=2 ttl=64 time=25.368 ms
84 bytes from 192.168.33.3 icmp_seq=3 ttl=64 time=2.498 ms
84 bytes from 192.168.33.3 icmp_seq=4 ttl=64 time=4.096 ms
84 bytes from 192.168.33.3 icmp_seq=5 ttl=64 time=9.192 ms

PC4> ping 192.168.20.1

No gateway found

PC4> ping 192.168.20.2

No gateway found

PC4> ping 192.168.20.3

No gateway found

PC4> █
```

Пинг с PC5 на все устройства:

```
PC5 - PuTTY
ip 192.168.20.3
Checking for duplicate address...
PC5 : 192.168.20.3 255.255.255.0

PC5> save
Saving startup configuration to startup.vpc
. done

PC5> ping 192.168.20.1

84 bytes from 192.168.20.1 icmp_seq=1 ttl=64 time=22.442 ms
84 bytes from 192.168.20.1 icmp_seq=2 ttl=64 time=7.844 ms
84 bytes from 192.168.20.1 icmp_seq=3 ttl=64 time=12.293 ms
84 bytes from 192.168.20.1 icmp_seq=4 ttl=64 time=5.863 ms
84 bytes from 192.168.20.1 icmp_seq=5 ttl=64 time=5.894 ms

PC5> ping 192.168.20.2

84 bytes from 192.168.20.2 icmp_seq=1 ttl=64 time=9.276 ms
84 bytes from 192.168.20.2 icmp_seq=2 ttl=64 time=8.694 ms
84 bytes from 192.168.20.2 icmp_seq=3 ttl=64 time=13.483 ms
84 bytes from 192.168.20.2 icmp_seq=4 ttl=64 time=16.944 ms
84 bytes from 192.168.20.2 icmp_seq=5 ttl=64 time=13.577 ms

PC5> ping 192.168.33.1

No gateway found

PC5> ping 192.168.33.2

No gateway found

PC5> ping 192.168.33.3

No gateway found

PC5>
```

Пинг с PC6 на все устройства:

PC6 - PuTTY

```
PC6> ip 192.168.33.3
Checking for duplicate address...
PC6 : 192.168.33.3 255.255.255.0

PC6> save
Saving startup configuration to startup.vpc
. done

PC6> ping 192.168.33.1

84 bytes from 192.168.33.1 icmp_seq=1 ttl=64 time=15.751 ms
84 bytes from 192.168.33.1 icmp_seq=2 ttl=64 time=7.998 ms
84 bytes from 192.168.33.1 icmp_seq=3 ttl=64 time=8.407 ms
84 bytes from 192.168.33.1 icmp_seq=4 ttl=64 time=4.189 ms
84 bytes from 192.168.33.1 icmp_seq=5 ttl=64 time=10.970 ms

PC6> ping 192.168.33.2

84 bytes from 192.168.33.2 icmp_seq=1 ttl=64 time=5.081 ms
84 bytes from 192.168.33.2 icmp_seq=2 ttl=64 time=8.234 ms
84 bytes from 192.168.33.2 icmp_seq=3 ttl=64 time=4.672 ms
84 bytes from 192.168.33.2 icmp_seq=4 ttl=64 time=13.298 ms
84 bytes from 192.168.33.2 icmp_seq=5 ttl=64 time=9.229 ms

PC6> ping 192.168.20.1

No gateway found

PC6> ping 192.168.20.2

No gateway found

PC6> ping 192.168.20.3

No gateway found

PC6> █
```

3) Перехватить в Wireshark пакеты с тегами и без тегов (nb!), результаты задокументировать

Тегированный трафик с тегом 20:

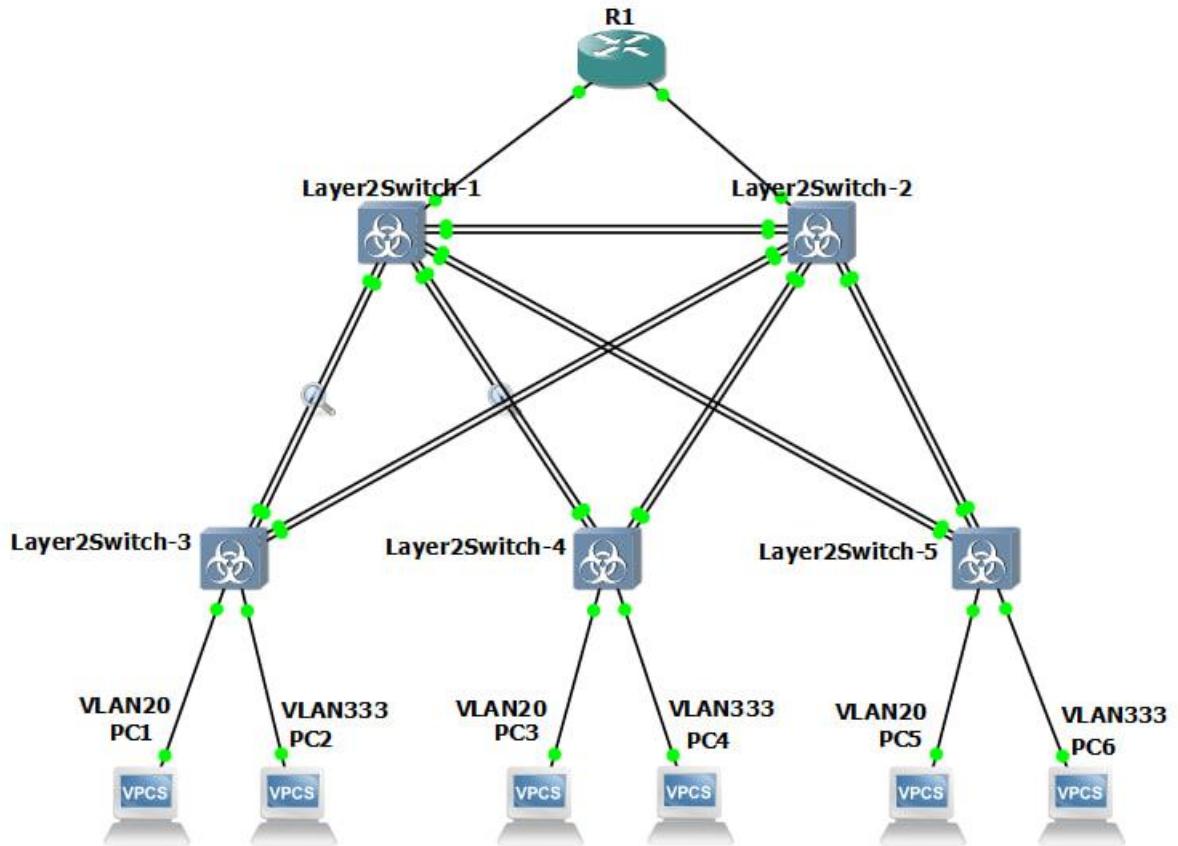
Тегированный трафик с тегом 333:

Нетегированный трафик:

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

5*) Опциональное задание: Добавить в схему маршрутизатор, подключенный к коммутаторам Layer2Switch1 и Layer2Switch2, настроить через него маршрутизацию между VLAN

Схема с добавленным маршрутизатором:



Проверка доступности:

Пинг с устройства PC1



PC1 - PuTTY

```
PC1> ping 192.168.33.1

84 bytes from 192.168.33.1 icmp_seq=1 ttl=63 time=32.950 ms
84 bytes from 192.168.33.1 icmp_seq=2 ttl=63 time=35.758 ms
84 bytes from 192.168.33.1 icmp_seq=3 ttl=63 time=24.087 ms
84 bytes from 192.168.33.1 icmp_seq=4 ttl=63 time=24.382 ms
84 bytes from 192.168.33.1 icmp_seq=5 ttl=63 time=28.672 ms

PC1> ping 192.168.33.2

84 bytes from 192.168.33.2 icmp_seq=1 ttl=63 time=21.732 ms
84 bytes from 192.168.33.2 icmp_seq=2 ttl=63 time=35.935 ms
84 bytes from 192.168.33.2 icmp_seq=3 ttl=63 time=29.334 ms
84 bytes from 192.168.33.2 icmp_seq=4 ttl=63 time=26.938 ms
84 bytes from 192.168.33.2 icmp_seq=5 ttl=63 time=24.188 ms

PC1> ping 192.168.33.3

84 bytes from 192.168.33.3 icmp_seq=1 ttl=63 time=23.148 ms
84 bytes from 192.168.33.3 icmp_seq=2 ttl=63 time=36.170 ms
84 bytes from 192.168.33.3 icmp_seq=3 ttl=63 time=23.400 ms
84 bytes from 192.168.33.3 icmp_seq=4 ttl=63 time=25.110 ms
84 bytes from 192.168.33.3 icmp_seq=5 ttl=63 time=28.221 ms

PC1> ping 192.168.20.2

84 bytes from 192.168.20.2 icmp_seq=1 ttl=64 time=5.875 ms
84 bytes from 192.168.20.2 icmp_seq=2 ttl=64 time=3.649 ms
84 bytes from 192.168.20.2 icmp_seq=3 ttl=64 time=12.656 ms
84 bytes from 192.168.20.2 icmp_seq=4 ttl=64 time=11.189 ms
84 bytes from 192.168.20.2 icmp_seq=5 ttl=64 time=9.128 ms

PC1> ping 192.168.20.3

84 bytes from 192.168.20.3 icmp_seq=1 ttl=64 time=9.881 ms
84 bytes from 192.168.20.3 icmp_seq=2 ttl=64 time=10.047 ms
84 bytes from 192.168.20.3 icmp_seq=3 ttl=64 time=3.724 ms
84 bytes from 192.168.20.3 icmp_seq=4 ttl=64 time=14.118 ms
84 bytes from 192.168.20.3 icmp_seq=5 ttl=64 time=8.195 ms

PC1>
```

Пинг с устройства PC2

```
PC2 - PuTTY
PC2> ping 192.168.20.1

84 bytes from 192.168.20.1 icmp_seq=1 ttl=63 time=25.013 ms
84 bytes from 192.168.20.1 icmp_seq=2 ttl=63 time=24.041 ms
84 bytes from 192.168.20.1 icmp_seq=3 ttl=63 time=24.081 ms
84 bytes from 192.168.20.1 icmp_seq=4 ttl=63 time=28.947 ms
84 bytes from 192.168.20.1 icmp_seq=5 ttl=63 time=25.531 ms

PC2> ping 192.168.20.2

84 bytes from 192.168.20.2 icmp_seq=1 ttl=63 time=35.191 ms
84 bytes from 192.168.20.2 icmp_seq=2 ttl=63 time=35.182 ms
84 bytes from 192.168.20.2 icmp_seq=3 ttl=63 time=25.797 ms
84 bytes from 192.168.20.2 icmp_seq=4 ttl=63 time=25.371 ms
84 bytes from 192.168.20.2 icmp_seq=5 ttl=63 time=37.719 ms

PC2> ping 192.168.20.3

84 bytes from 192.168.20.3 icmp_seq=1 ttl=63 time=37.147 ms
84 bytes from 192.168.20.3 icmp_seq=2 ttl=63 time=24.675 ms
84 bytes from 192.168.20.3 icmp_seq=3 ttl=63 time=34.158 ms
84 bytes from 192.168.20.3 icmp_seq=4 ttl=63 time=38.429 ms
84 bytes from 192.168.20.3 icmp_seq=5 ttl=63 time=26.585 ms

PC2> ping 192.168.33.2

84 bytes from 192.168.33.2 icmp_seq=1 ttl=64 time=6.630 ms
84 bytes from 192.168.33.2 icmp_seq=2 ttl=64 time=11.695 ms
84 bytes from 192.168.33.2 icmp_seq=3 ttl=64 time=5.953 ms
84 bytes from 192.168.33.2 icmp_seq=4 ttl=64 time=11.557 ms
84 bytes from 192.168.33.2 icmp_seq=5 ttl=64 time=13.694 ms

PC2> ping 192.168.33.3

84 bytes from 192.168.33.3 icmp_seq=1 ttl=64 time=25.602 ms
84 bytes from 192.168.33.3 icmp_seq=2 ttl=64 time=3.164 ms
84 bytes from 192.168.33.3 icmp_seq=3 ttl=64 time=7.742 ms
84 bytes from 192.168.33.3 icmp_seq=4 ttl=64 time=11.134 ms
84 bytes from 192.168.33.3 icmp_seq=5 ttl=64 time=5.202 ms

PC2>
```

На остальных устройствах аналогично.