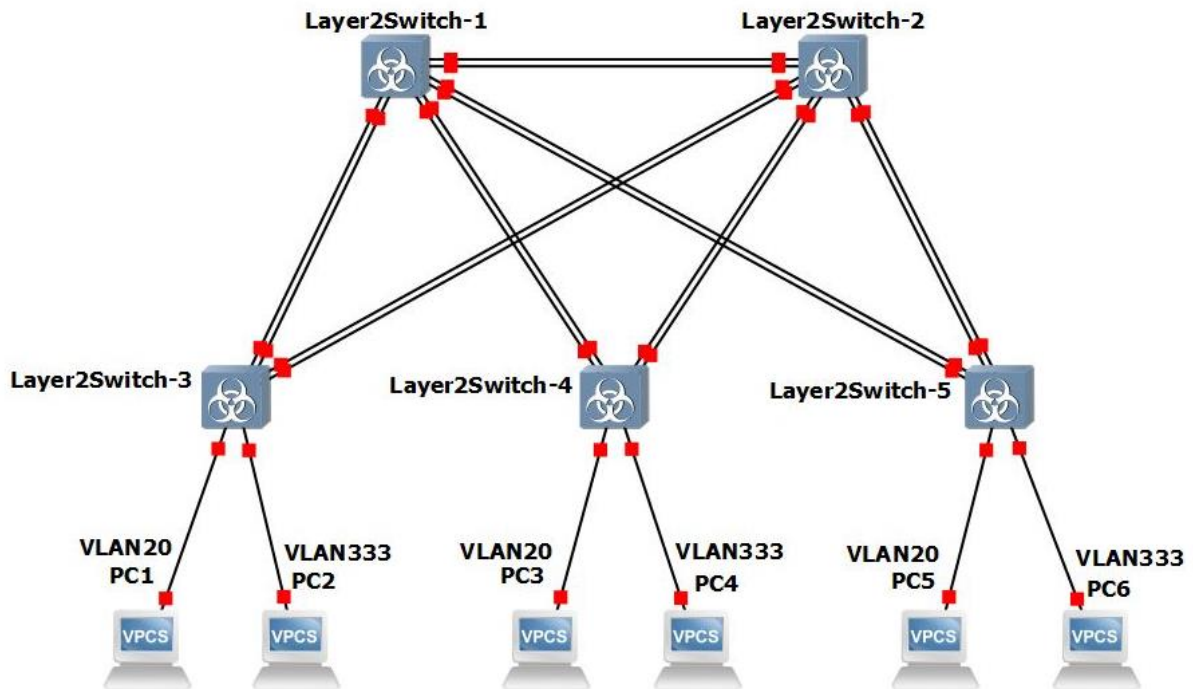


1) Для заданной на схеме schema-lab4 сети, состоящей из управляемых коммутаторов и персональных компьютеров настроить на коммутаторах логическую топологию используя протокол IEEE 802.1Q, для передачи пакетов VLAN333 между коммутаторами использовать Native VLAN

Схема:



Конфигурация для L2-SW-1 и L2-SW-2:

```
Switch>en
```

```
Switch#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
Switch(config)#vlan 20
```

```
Switch(config-vlan)#name VLAN20
```

```
Switch(config-vlan)#exit
```

```
Switch(config)#vlan 333
```

```
Switch(config-vlan)#name VLAN333
```

```
Switch(config-vlan)#exit
```

```
Switch(config)#int range g0/0-3,g1/0-3
```

```
Switch(config-if-range)#shutdown
```

```
Switch(config-if-range)#switchport trunk encapsulation dot1q
```

```
Switch(config-if-range)#switchport trunk native vlan 333
Switch(config-if-range)#switchport trunk allowed vlan 20,333
Switch(config-if-range)#switchport mode trunk
Switch(config-if-range)#no shutdown
```

Конфигурация для L2-SW-3 И L2-SW-4 и L2-SW-5:

```
Switch>en
Switch#conf t
Switch(config)#vlan 20
Switch(config-vlan)#name VLAN20
Switch(config-vlan)#exit
Switch(config)#vlan 333
Switch(config-vlan)#name VLAN333
Switch(config-vlan)#exit
Switch(config)#int range g0/0-3
Switch(config-if-range)#shu
Switch(config-if-range)#shutdown
Switch(config-if-range)#switchport trunk encapsulation dot1q
Switch(config-if-range)#switchport trunk native vlan 333
Switch(config-if-range)#switchport trunk allowed vlan 20,333
Switch(config-if-range)#switchport mode trunk
Switch(config-if-range)#no shutdown
Switch(config-if-range)#exit
Switch(config)#int g1/0
Switch(config-if)#shutdown
Switch(config-if)#switchport access vlan 20
Switch(config-if)#switchport mode access
```

```
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#int g1/1
Switch(config-if)#shutdown
Switch(config-if)#switchport access vlan 333
Switch(config-if)#switchport mode access
Switch(config-if)#no shutdown
Switch(config-if)#exit
Switch(config)#end
```

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

```
PC1 : 192.168.0.10 255.255.255.0 gateway 192.168.0.1
PC3 : 192.168.0.11 255.255.255.0 gateway 192.168.0.1
PC5 : 192.168.0.12 255.255.255.0 gateway 192.168.0.1
PC2 : 192.168.1.14 255.255.255.0 gateway 192.168.1.1
PC4 : 192.168.1.15 255.255.255.0 gateway 192.168.1.1
PC6 : 192.168.1.16 255.255.255.0 gateway 192.168.1.1
```

Проверяем доступность персональных компьютеров:

PC1:

```
PC1 - PuTTY
PC1> ping 192.168.1.14
host (192.168.0.1) not reachable

PC1> ping 192.168.0.11
84 bytes from 192.168.0.11 icmp_seq=1 ttl=64 time=7.704 ms
84 bytes from 192.168.0.11 icmp_seq=2 ttl=64 time=15.419 ms
84 bytes from 192.168.0.11 icmp_seq=3 ttl=64 time=14.436 ms
84 bytes from 192.168.0.11 icmp_seq=4 ttl=64 time=4.309 ms
84 bytes from 192.168.0.11 icmp_seq=5 ttl=64 time=10.593 ms

PC1> ping 192.168.1.15
host (192.168.0.1) not reachable

PC1> ping 192.168.0.12
84 bytes from 192.168.0.12 icmp_seq=1 ttl=64 time=16.414 ms
84 bytes from 192.168.0.12 icmp_seq=2 ttl=64 time=15.657 ms
84 bytes from 192.168.0.12 icmp_seq=3 ttl=64 time=15.139 ms
84 bytes from 192.168.0.12 icmp_seq=4 ttl=64 time=4.689 ms
84 bytes from 192.168.0.12 icmp_seq=5 ttl=64 time=10.861 ms

PC1> ping 192.168.1.16
host (192.168.0.1) not reachable
```

PC2:

```
PC2 - PuTTY
PC2> ping 192.168.0.10
host (192.168.1.1) not reachable

PC2> ping 192.168.0.11
host (192.168.1.1) not reachable

PC2> ping 192.168.0.12
host (192.168.1.1) not reachable

PC2> ping 192.168.1.15
84 bytes from 192.168.1.15 icmp_seq=1 ttl=64 time=6.048 ms
84 bytes from 192.168.1.15 icmp_seq=2 ttl=64 time=19.393 ms
84 bytes from 192.168.1.15 icmp_seq=3 ttl=64 time=14.209 ms
84 bytes from 192.168.1.15 icmp_seq=4 ttl=64 time=19.809 ms
84 bytes from 192.168.1.15 icmp_seq=5 ttl=64 time=4.736 ms

PC2> ping 192.168.1.16
84 bytes from 192.168.1.16 icmp_seq=1 ttl=64 time=11.831 ms
84 bytes from 192.168.1.16 icmp_seq=2 ttl=64 time=25.613 ms
84 bytes from 192.168.1.16 icmp_seq=3 ttl=64 time=6.089 ms
84 bytes from 192.168.1.16 icmp_seq=4 ttl=64 time=7.711 ms
84 bytes from 192.168.1.16 icmp_seq=5 ttl=64 time=13.105 ms
```

PC3:

```
PC3 - PuTTY

PC3> ping 192.168.0.10

84 bytes from 192.168.0.10 icmp_seq=1 ttl=64 time=26.530 ms
84 bytes from 192.168.0.10 icmp_seq=2 ttl=64 time=14.981 ms
84 bytes from 192.168.0.10 icmp_seq=3 ttl=64 time=4.123 ms
84 bytes from 192.168.0.10 icmp_seq=4 ttl=64 time=10.085 ms
84 bytes from 192.168.0.10 icmp_seq=5 ttl=64 time=13.875 ms

PC3> ping 192.168.0.12

84 bytes from 192.168.0.12 icmp_seq=1 ttl=64 time=14.724 ms
84 bytes from 192.168.0.12 icmp_seq=2 ttl=64 time=21.127 ms
84 bytes from 192.168.0.12 icmp_seq=3 ttl=64 time=12.801 ms
84 bytes from 192.168.0.12 icmp_seq=4 ttl=64 time=17.644 ms
84 bytes from 192.168.0.12 icmp_seq=5 ttl=64 time=11.427 ms

PC3> ping 192.168.1.14

host (192.168.0.1) not reachable

PC3> ping 192.168.1.15

host (192.168.0.1) not reachable

PC3> ping 192.168.1.16

host (192.168.0.1) not reachable
```

PC4:

```
PC4 - PuTTY

PC4> ping 192.168.0.10

host (192.168.1.1) not reachable

PC4> ping 192.168.0.11

host (192.168.1.1) not reachable

PC4> ping 192.168.0.12

host (192.168.1.1) not reachable

PC4> ping 192.168.1.14

84 bytes from 192.168.1.14 icmp_seq=1 ttl=64 time=11.764 ms
84 bytes from 192.168.1.14 icmp_seq=2 ttl=64 time=10.316 ms
84 bytes from 192.168.1.14 icmp_seq=3 ttl=64 time=9.654 ms
84 bytes from 192.168.1.14 icmp_seq=4 ttl=64 time=11.077 ms
84 bytes from 192.168.1.14 icmp_seq=5 ttl=64 time=8.888 ms

PC4> ping 192.168.1.16

84 bytes from 192.168.1.16 icmp_seq=1 ttl=64 time=10.864 ms
84 bytes from 192.168.1.16 icmp_seq=2 ttl=64 time=9.972 ms
84 bytes from 192.168.1.16 icmp_seq=3 ttl=64 time=3.830 ms
84 bytes from 192.168.1.16 icmp_seq=4 ttl=64 time=2.979 ms
84 bytes from 192.168.1.16 icmp_seq=5 ttl=64 time=8.889 ms
```

PC5:

```
PC5> ping 192.168.0.10
84 bytes from 192.168.0.10 icmp_seq=1 ttl=64 time=11.093 ms
84 bytes from 192.168.0.10 icmp_seq=2 ttl=64 time=4.203 ms
84 bytes from 192.168.0.10 icmp_seq=3 ttl=64 time=11.327 ms
84 bytes from 192.168.0.10 icmp_seq=4 ttl=64 time=10.511 ms
84 bytes from 192.168.0.10 icmp_seq=5 ttl=64 time=11.186 ms

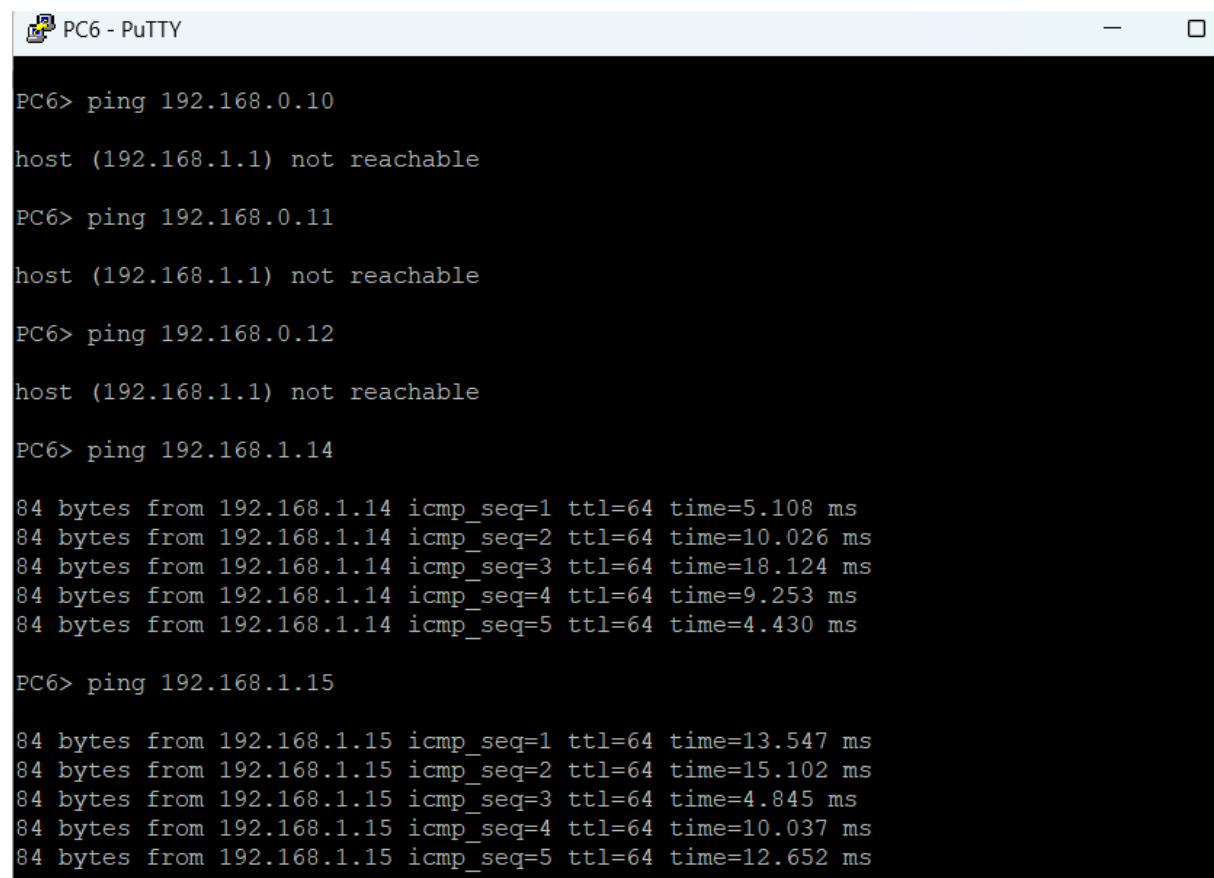
PC5> ping 192.168.0.11
84 bytes from 192.168.0.11 icmp_seq=1 ttl=64 time=16.920 ms
84 bytes from 192.168.0.11 icmp_seq=2 ttl=64 time=10.385 ms
84 bytes from 192.168.0.11 icmp_seq=3 ttl=64 time=9.048 ms
84 bytes from 192.168.0.11 icmp_seq=4 ttl=64 time=9.009 ms
84 bytes from 192.168.0.11 icmp_seq=5 ttl=64 time=13.557 ms

PC5> ping 192.168.1.14
host (192.168.0.1) not reachable

PC5> ping 192.168.1.15
host (192.168.0.1) not reachable

PC5> ping 192.168.1.16
host (192.168.0.1) not reachable
```

PC6:



```
PC6> ping 192.168.0.10
host (192.168.1.1) not reachable

PC6> ping 192.168.0.11
host (192.168.1.1) not reachable

PC6> ping 192.168.0.12
host (192.168.1.1) not reachable

PC6> ping 192.168.1.14
84 bytes from 192.168.1.14 icmp_seq=1 ttl=64 time=5.108 ms
84 bytes from 192.168.1.14 icmp_seq=2 ttl=64 time=10.026 ms
84 bytes from 192.168.1.14 icmp_seq=3 ttl=64 time=18.124 ms
84 bytes from 192.168.1.14 icmp_seq=4 ttl=64 time=9.253 ms
84 bytes from 192.168.1.14 icmp_seq=5 ttl=64 time=4.430 ms

PC6> ping 192.168.1.15
84 bytes from 192.168.1.15 icmp_seq=1 ttl=64 time=13.547 ms
84 bytes from 192.168.1.15 icmp_seq=2 ttl=64 time=15.102 ms
84 bytes from 192.168.1.15 icmp_seq=3 ttl=64 time=4.845 ms
84 bytes from 192.168.1.15 icmp_seq=4 ttl=64 time=10.037 ms
84 bytes from 192.168.1.15 icmp_seq=5 ttl=64 time=12.652 ms
```

Пинги не проходят у ПК из разных vlan. Для того что бы пинги проходили нужно использовать коммутатор 3 уровня или маршрутизатор.

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

Захват из Standard input [Layer2Switch-4 Ethernet4 to PC3 Ethernet0]

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

icmp

No.	Time	Source	Destination	Protocol	Length	Info
→ 30	37.537493	192.168.0.10	192.168.0.11	ICMP	98	Echo (ping) request id=0x6696, seq=1/256, ttl=64 (reply in 31)
← 31	37.537588	192.168.0.11	192.168.0.10	ICMP	98	Echo (ping) reply id=0x6696, seq=1/256, ttl=64 (request in 30)
→ 33	38.545686	192.168.0.10	192.168.0.11	ICMP	98	Echo (ping) request id=0x6796, seq=2/512, ttl=64 (reply in 34)
→ 34	38.545942	192.168.0.11	192.168.0.10	ICMP	98	Echo (ping) reply id=0x6796, seq=2/512, ttl=64 (request in 33)
→ 35	39.550868	192.168.0.10	192.168.0.11	ICMP	98	Echo (ping) request id=0x6896, seq=3/768, ttl=64 (reply in 36)
→ 36	39.550946	192.168.0.11	192.168.0.10	ICMP	98	Echo (ping) reply id=0x6896, seq=3/768, ttl=64 (request in 35)
→ 38	40.562917	192.168.0.10	192.168.0.11	ICMP	98	Echo (ping) request id=0x6996, seq=4/1024, ttl=64 (reply in 39)
→ 39	40.562993	192.168.0.11	192.168.0.10	ICMP	98	Echo (ping) reply id=0x6996, seq=4/1024, ttl=64 (request in 38)
→ 40	41.574661	192.168.0.10	192.168.0.11	ICMP	98	Echo (ping) request id=0x6a96, seq=5/1280, ttl=64 (reply in 41)
→ 41	41.574720	192.168.0.11	192.168.0.10	ICMP	98	Echo (ping) reply id=0x6a96, seq=5/1280, ttl=64 (request in 40)

> Interface id: 0 (-)
Encapsulation type: Ethernet (1)
Arrival Time: Jan 3, 2025 14:48:54.071630000 Новосибирское стандартное время
UTC Arrival Time: Jan 3, 2025 07:48:54.071630000 UTC
Epoch Arrival Time: 1735890534.071630000
[Time shift for this packet: 0.000000000 seconds]
[Time delta from previous captured frame: 0.018322000 seconds]
[Time delta from previous displayed frame: 0.000000000 seconds]
[Time since reference or first frame: 37.537493000 seconds]
Frame Number: 30
Frame Length: 98 bytes (784 bits)
Capture Length: 98 bytes (784 bits)
[Frame is marked: False]
[Frame is ignored: False]
[Protocols in frame: eth:ethertype:ip:icmp:data]
[Coloring Rule Name: ICMP]
[Coloring Rule String: icmp || icmpv6]
> Ethernet II, Src: Private_66:68:00 (00:50:79:66:68:00), Dst: Private_66:68:02 (00:50:79:66:68:02)
> Internet Protocol Version 4, Src: 192.168.0.10, Dst: 192.168.0.11
> Internet Control Message Protocol
Type: 8 (Echo (ping) request)
Code: 0
Checksum: 0xb974 [correct]
[Checksum Status: Good]
Identifier (BE): 26262 (0x6696)
Identifier (LE): 38502 (0x9666)
Sequence Number (BE): 1 (0x0001)
Sequence Number (LE): 256 (0x0100)
[Response frame: 31]
> Data (56 bytes)

0000 00 50 79 66 68 02 00 50 79 66 68 00 08 00 45 00 -Pyfh...P yfh...E-
0010 00 54 96 66 00 00 40 01 62 dd c0 a8 00 0a c0 a8 -T.f...@. b.....
0020 00 0b 08 00 b9 74 66 96 00 01 08 09 0a 0b 0c 0dtf.....
0030 0e 0f 10 11 12 13 14 15 16 17 18 19 1a 1b 1c 1d
0040 1e 1f 20 21 22 23 24 25 26 27 28 29 2a 2b 2c 2d!*%\$%&'()*+,-
0050 2e 2f 30 31 32 33 34 35 36 37 38 39 3a 3b 3c 3d .../012345 6789;,<=
0060 3e 3f >>

Захват из Standard input [Layer2Switch-3 Ethernet5 to PC2 Ethernet0]

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

icmp

No.	Time	Source	Destination	Protocol	Length	Info
→ 21	24.408434	192.168.1.14	192.168.1.16	ICMP	98	Echo (ping) request id=0x5897, seq=1/256, ttl=64 (reply in 22)
← 22	24.411442	192.168.1.16	192.168.1.14	ICMP	98	Echo (ping) reply id=0x5897, seq=1/256, ttl=64 (request in 21)
→ 24	25.411730	192.168.1.14	192.168.1.16	ICMP	98	Echo (ping) request id=0x5997, seq=2/512, ttl=64 (reply in 25)
→ 25	25.429589	192.168.1.16	192.168.1.14	ICMP	98	Echo (ping) reply id=0x5997, seq=2/512, ttl=64 (request in 24)
→ 26	26.430937	192.168.1.14	192.168.1.16	ICMP	98	Echo (ping) request id=0x5a97, seq=3/768, ttl=64 (reply in 27)
→ 27	26.435781	192.168.1.16	192.168.1.14	ICMP	98	Echo (ping) reply id=0x5a97, seq=3/768, ttl=64 (request in 26)
→ 29	27.436325	192.168.1.14	192.168.1.16	ICMP	98	Echo (ping) request id=0x5b97, seq=4/1024, ttl=64 (reply in 30)
→ 30	27.444930	192.168.1.16	192.168.1.14	ICMP	98	Echo (ping) reply id=0x5b97, seq=4/1024, ttl=64 (request in 29)
→ 31	28.446021	192.168.1.14	192.168.1.16	ICMP	98	Echo (ping) request id=0x5c97, seq=5/1280, ttl=64 (reply in 32)
→ 32	28.453681	192.168.1.16	192.168.1.14	ICMP	98	Echo (ping) reply id=0x5c97, seq=5/1280, ttl=64 (request in 31)

> Frame 21: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface -, id 0
Section number: 1
> Interface id: 0 (-)
Encapsulation type: Ethernet (1)
Arrival Time: Jan 3, 2025 14:52:56.962285000 Новосибирское стандартное время
UTC Arrival Time: Jan 3, 2025 07:52:56.962285000 UTC
Epoch Arrival Time: 1735890776.962285000
[Time shift for this packet: 0.000000000 seconds]
[Time delta from previous captured frame: 0.000802000 seconds]
[Time delta from previous displayed frame: 0.000000000 seconds]
[Time since reference or first frame: 24.408434000 seconds]
Frame Number: 21
Frame Length: 98 bytes (784 bits)
Capture Length: 98 bytes (784 bits)
[Frame is marked: False]
[Frame is ignored: False]
[Protocols in frame: eth:ethertype:ip:icmp:data]
[Coloring Rule Name: ICMP]
[Coloring Rule String: icmp || icmpv6]
> Ethernet II, Src: Private_66:68:01 (00:50:79:66:68:01), Dst: Private_66:68:05 (00:50:79:66:68:05)
> Internet Protocol Version 4, Src: 192.168.1.14, Dst: 192.168.1.16
> Internet Control Message Protocol
Type: 8 (Echo (ping) request)
Code: 0
Checksum: 0xc773 [correct]
[Checksum Status: Good]
Identifier (BE): 22679 (0x5897)
Identifier (LE): 38744 (0x9758)
Sequence Number (BE): 1 (0x0001)
Sequence Number (LE): 256 (0x0100)
[Response frame: 22]

0000 00 50 79 66 68 05 00 50 79 66 68 01 08 00 45 00 -Pyfh...P yfh...E-
0010 00 54 97 58 00 00 40 01 5f e2 c0 a8 01 0e c0 a8 -T.X-@. _.....
0020 01 10 08 00 c7 73 58 97 00 01 08 09 0a 0b 0c 0dx.....
0030 0e 0f 10 11 12 13 14 15 16 17 18 19 1a 1b 1c 1d
0040 1e 1f 20 21 22 23 24 25 26 27 28 29 2a 2b 2c 2d ...!*%\$%&'()*+,-
0050 2e 2f 30 31 32 33 34 35 36 37 38 39 3a 3b 3c 3d .../012345 6789;,<=
0060 3e 3f >>

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

Все конфигурации сохранены в соответствующем каталоге.