

Урок 4. Основы компьютерных сетей. Сетевой уровень. Протоколы маршрутизации. VLAN.

Условие:

1. Настроить сеть согласно схеме в файле с помощью OSPF и VLAN. Починить неработающие линки.

The network diagram shows a multi-switch topology with three VLANs: VLAN 300 Admins (192.168.100.0/24), VLAN 330 Test (192.168.200.0/24), and VLAN 300 DevOps (10.0.0.0/24). The switches are interconnected, and a server is connected to the network. The CLI output for SW1 shows the configuration of the FastEthernet0/4, 0/5, and 0/1 interfaces, and the status of the VLANs.

```
IOS Command Line Interface
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/4, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/5, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/5, changed state to up
%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

Switch#show vlan

VLAN Name                Status    Ports
-----
1    default                active    Fa0/6, Fa0/7, Fa0/8, Fa0/9
                                           Fa0/10, Fa0/11, Fa0/12, Fa0/13
                                           Fa0/14, Fa0/15, Fa0/16, Fa0/17
                                           Fa0/18, Fa0/19, Fa0/20, Fa0/21
                                           Fa0/24
300  ADMIN_VLAN             active    Fa0/4, Fa0/5
320  DevOps_VLAN            active    Fa0/22, Fa0/23
330  Test_VLAN              active    Fa0/2, Fa0/3
1002 fddi-default          active
1003 tokenring-default    active
1004 fddinet-default      active
1005 trnet-default        active

VLAN Type SAID      MTU    Parent RingNo BridgeNo Stp    BrdgMode Transal Trans2
-----
1    enet  100001    1500   -        -        -        -        0        0
300  enet  100300    1500   -        -        -        -        0        0
320  enet  100320    1500   -        -        -        -        0        0
330  enet  100330    1500   -        -        -        -        0        0
1002 fddi  101002    1500   -        -        -        -        0        0
1003 tr   101003    1500   -        -        -        -        0        0
1004 fdnet 101004    1500   -        -        -        ieee    0        0
1005 trnet 101005    1500   -        -        -        ibm     0        0

VLAN Type SAID      MTU    Parent RingNo BridgeNo Stp    BrdgMode Transal Trans2
-----
Remote SPAN VLANs
-----
Primary Secondary Type      Ports
Switch#
```

The network diagram shows the same topology as the first image. The CLI output for SW1 shows the configuration of the FastEthernet0/1 interface and the status of the VLANs.

```
IOS Command Line Interface

Switch con0 is now available.

Press RETURN to get started.

Switch#en
Switch#show int fa0/1 switchport
Name: Fa0/1
Switchport: Enabled
Administrative Mode: trunk
Operational Mode: trunk
Administrative Trunking Encapsulation: dot1q
Operational Trunking Encapsulation: dot1q
Negotiation of Trunking: On
Access Mode VLAN: 1 (default)
Trunking Native Mode VLAN: 1 (default)
Voice VLAN: none
Administrative private-vlan host-association: none
Administrative private-vlan mapping: none
Administrative private-vlan trunk native VLAN: none
Administrative private-vlan trunk encapsulation: dot1q
Administrative private-vlan trunk normal VLANs: none
Administrative private-vlan trunk private VLANs: none
Operational private-vlan: none
Trunking VLANs Enabled: 300,320,330
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL
Protected: false
Appliance trust: none

Switch#
```

The network diagram shows a multi-branch topology. On the left, there are two VLANs: VLAN 300 Admins (192.168.100.0/24) with two laptops and a PC, and VLAN 330 Test (192.168.200.0/24) with three laptops. These are connected to a central switch (2621XM r1) via Fa0/23 and Fa0/24. The switch is connected to a core switch (2621XM r2) via Fa0/1. The core switch is connected to a server (172.17.255.132) via Fa0/24. The core switch is also connected to a router (2811 r5) via Fa0/0. The router is connected to a switch (2621XM r3) via Fa0/1. The switch is connected to a server (172.17.255.132) via Fa0/24. The router is also connected to a switch (2621XM r4) via Fa0/0. The switch is connected to a server (172.17.255.132) via Fa0/24. The router is also connected to a switch (2621XM r5) via Fa0/0. The switch is connected to a server (172.17.255.132) via Fa0/24.

The CLI output for router r1 shows the configuration of OSPF and the routing table. The routing table shows the following entries:

```

C 10.0.0.0/8 is directly connected, FastEthernet0/0.320
O 172.17.0.0/16 [110/4] via 192.168.61.2, 01:09:34, FastEthernet1/0
O 172.18.0.0/16 [110/2] via 172.20.0.2, 01:09:34, FastEthernet0/1
O 172.18.0.0/16 [110/2] via 172.20.0.2, 01:14:40, FastEthernet0/1
O 172.20.0.0/24 is subnetted, 1 subnets
C 172.20.0.0 is directly connected, FastEthernet0/1
O 192.168.6.0/24 [110/3] via 192.168.61.2, 01:10:26, FastEthernet1/0
O 192.168.16.0/24 [110/3] via 192.168.61.2, 01:10:26, FastEthernet0/1
O 192.168.16.0/24 [110/3] via 192.168.61.2, 01:15:31, FastEthernet1/0
O 192.168.61.0/24 is directly connected, FastEthernet1/0
O 192.168.100.0/24 is directly connected, FastEthernet0/0.300
O 192.168.200.0/24 is directly connected, FastEthernet0/0.330

```

2. Убедиться что трафик от компов до сервера ходит через два маршрута с помощью ESMR.

The network diagram is the same as in the previous image. The CLI output for laptop3 shows the results of the ESMR command. The output is as follows:

```

C:\>tracert 172.17.255.132
Tracing route to 172.17.255.132 over a maximum of 30 hops:
  0  ms  0  ms  0  ms  172.17.255.132
Trace complete.

C:\>tracert 172.17.255.132
Tracing route to 172.17.255.132 over a maximum of 30 hops:
  1  0  ms  0  ms  0  ms  192.168.200.1
  2  0  ms  0  ms  0  ms  192.168.61.2
  3  0  ms  0  ms  0  ms  192.168.16.2
  4  0  ms  0  ms  0  ms  192.168.6.2
  5  0  ms  0  ms  10  ms  172.17.255.132
Trace complete.

C:\>tracert 172.17.255.132
Tracing route to 172.17.255.132 over a maximum of 30 hops:
  1  0  ms  0  ms  0  ms  192.168.200.1
  2  0  ms  0  ms  0  ms  192.168.61.2
  3  0  ms  0  ms  0  ms  172.18.0.2
  4  0  ms  0  ms  0  ms  192.168.6.2
  5  0  ms  16  ms  0  ms  172.17.255.132
Trace complete.

C:\>tracert 172.17.255.132
Tracing route to 172.17.255.132 over a maximum of 30 hops:
  1  0  ms  0  ms  0  ms  192.168.200.1
  2  0  ms  1  ms  1  ms  192.168.61.2
  3  0  ms  0  ms  0  ms  192.168.16.2
  4  0  ms  0  ms  0  ms  192.168.6.2
  5  0  ms  12  ms  0  ms  172.17.255.132
Trace complete.

C:\>tracert 172.17.255.132
Tracing route to 172.17.255.132 over a maximum of 30 hops:
  1  0  ms  0  ms  0  ms  192.168.200.1
  2  0  ms  0  ms  0  ms  192.168.61.2
  3  0  ms  0  ms  0  ms  172.18.0.2
  4  0  ms  0  ms  0  ms  192.168.6.2
  5  11  ms  10  ms  10  ms  172.17.255.132
Trace complete.

```

3. Скинуть скриншот с таблицей маршрутизации с r1. Должны быть сети Connected для VLAN'ов.

The network diagram shows a multi-branch topology. On the left, there are two VLANs: 'VLAN 300 Admins' (192.168.100.0/24) and 'VLAN 330 Test' (192.168.200.0/24). These are connected to a central switch (2621XM r1) via Fa0/23 and Fa0/24. The central switch is connected to a core switch (2621XM r2) via Fa0/1. The core switch is connected to a server (172.17.255.132/16) via Fa0/1. The core switch is also connected to a router (2811 r5) via Fa0/1. The router is connected to a switch (2621XM r3) via Fa0/1. The switch is connected to a server (172.17.255.132/16) via Fa0/1. The router is also connected to a switch (2621XM r4) via Fa0/1. The switch is connected to a server (172.17.255.132/16) via Fa0/1. The router is also connected to a switch (2621XM r5) via Fa0/1. The switch is connected to a server (172.17.255.132/16) via Fa0/1.

```

r1
O 172.18.0.0/16 [110/2] via 172.20.0.2, 01:14:40, FastEthernet0/1
O 172.20.0.0/24 is subnetted, 1 subnets
C 172.20.0.0 is directly connected, FastEthernet0/1
O 192.168.6.0/24 [110/3] via 192.168.61.2, 01:10:26, FastEthernet0/1
O 192.168.16.0/24 [110/3] via 172.20.0.2, 01:10:26, FastEthernet0/1
O 192.168.61.0/24 is directly connected, FastEthernet0/1
O 192.168.100.0/24 is directly connected, FastEthernet0/0.300
O 192.168.200.0/24 is directly connected, FastEthernet0/0.330

Router# show ip route ospf
O 172.17.0.0 [110/4] via 192.168.61.2, 01:11:44, FastEthernet0/1
O 172.17.0.0 [110/4] via 172.20.0.2, 01:11:44, FastEthernet0/1
O 172.18.0.0 [110/2] via 172.20.0.2, 01:16:50, FastEthernet0/1
O 192.168.6.0 [110/3] via 192.168.61.2, 01:12:36, FastEthernet0/1
O 192.168.16.0 [110/3] via 172.20.0.2, 01:12:36, FastEthernet0/1
O 192.168.61.0 [110/2] via 192.168.61.2, 01:17:41, FastEthernet0/1

Router# show ip route
Codes: C - connected, S - static, I - IGMP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, l1 - IS-IS level-1, l2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

C 10.0.0.0/8 is directly connected, FastEthernet0/0.320
O 172.17.0.0/16 [110/4] via 192.168.61.2, 01:20:46, FastEthernet0/1
O 172.17.0.0/16 [110/4] via 172.20.0.2, 01:20:46, FastEthernet0/1
O 172.18.0.0/16 [110/2] via 172.20.0.2, 01:25:52, FastEthernet0/1
O 172.20.0.0/24 is subnetted, 1 subnets
C 172.20.0.0 is directly connected, FastEthernet0/1
O 192.168.6.0/24 [110/3] via 192.168.61.2, 01:21:38, FastEthernet0/1
O 192.168.16.0/24 [110/3] via 172.20.0.2, 01:21:38, FastEthernet0/1
O 192.168.61.0/24 [110/2] via 192.168.61.2, 01:26:49, FastEthernet0/1
O 192.168.100.0/24 is directly connected, FastEthernet0/0
O 192.168.200.0/24 is directly connected, FastEthernet0/0.300
O 192.168.200.0/24 is directly connected, FastEthernet0/0.330
  
```

4. Поймать трейс на любом компе, когда он пойдет через r5. Удалить один из линков на r5. Снова сделать трейс, убедиться что трафик пошел по резервному пути. Сkinуть скриншот с разными трейсами.

The network diagram is the same as the previous one. The CLI output shows the command prompt for a PC (10.0.0.10) running the 'tracert' command to reach the server (172.17.255.132). The output shows the path taken by the traffic, including the router (r5) and the switch (2621XM r3).

```

C:\>tracert 172.17.255.132

Tracing route to 172.17.255.132 over a maximum of 30 hops:
  0  ms  0  ms  0  ms  10.0.0.1
  1  ms  0  ms  0  ms  192.168.61.2
  2  ms  0  ms  0  ms  192.168.16.2
  3  ms  0  ms  0  ms  192.168.61.2
  4  ms  0  ms  0  ms  192.168.61.2
  5  ms  0  ms  0  ms  172.17.255.132

Trace complete.

C:\>tracert 172.17.255.132

Tracing route to 172.17.255.132 over a maximum of 30 hops:
  0  ms  0  ms  0  ms  10.0.0.1
  1  ms  0  ms  0  ms  172.20.0.2
  2  ms  0  ms  0  ms  172.18.0.2
  3  ms  0  ms  0  ms  192.168.61.2
  4  ms  0  ms  0  ms  192.168.61.2
  5  ms  0  ms  0  ms  172.17.255.132

Trace complete.

C:\>
  
```

* Сkinуть еще один скриншот с изменившейся таблицей маршрутизации с r1.

