РОССИЙСКИЙ УНИВЕРСИТЕТ ДРУЖБЫ НАРОДОВ

Факультет физико-математических и естественных наук

Кафедра прикладной информатики и теории вероятностей

ОТЧЕТ

ПО ЛАБОРАТОРНОЙ РАБОТЕ № 15

Динамическая маршрутизация

дисциплина: Администрирование локальных сетей

Студент: Ким Реачна

Группа: НПИбд 02-20

Студенческий билет: 1032205204

МОСКВА

2022 г.

Цель работы

Настроить динамическую маршрутизацию между территориями организации.

Выполнение работы

1. Настройка маршрутизатора msk-donskaya-kim-gw-1(рис. 1)

```
msk-donskaya-kim-gw-1>en
Password:
msk-donskaya-kim-gw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
msk-donskaya-kim-gw-1(config)#router ospf 1
msk-donskaya-kim-gw-1(config-router)#router-id 10.128.254.1
msk-donskaya-kim-gw-1(config-router)#network 10.0.0.0 0.255.255.255 area 0
msk-donskaya-kim-gw-1(config-router)#exit
msk-donskaya-kim-gw-1(config)#exit
msk-donskaya-kim-gw-1#
%SYS-5-CONFIG_I: Configured from console by console

msk-donskaya-kim-gw-1#wr m
Building configuration...
[OK]
msk-donskaya-kim-gw-1#
```

Рисунок 1

2. Проверка состояния протокола OSPF на маршрутизаторе msk-donskaya-kim-gw-1 (рис. 2-3)

```
msk-donskaya-kim-gw-1#sh ip ospf
 Routing Process "ospf 1" with ID 10.128.254.1
 Supports only single TOS(TOS0) routes
 Supports opaque LSA
 SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
 Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs
 Number of external LSA 0. Checksum Sum 0x000000
 Number of opaque AS LSA 0. Checksum Sum 0x000000
 Number of DCbitless external and opaque AS LSA 0
 Number of DoNotAge external and opaque AS LSA 0
 Number of areas in this router is 1. 1 normal 0 stub 0 nssa
 External flood list length 0
    Area BACKBONE(0)
        Number of interfaces in this area is 8
        Area has no authentication
        SPF algorithm executed 1 times
        Area ranges are
        Number of LSA 1. Checksum Sum 0x00312a
        Number of opaque link LSA 0. Checksum Sum 0x000000
        Number of DCbitless LSA 0
        Number of indication LSA 0
        Number of DoNotAge LSA 0
        Flood list length 0
```

Рисунок 2

```
msk-donskaya-kim-gw-1#sh ip ospf neighbor

msk-donskaya-kim-gw-1#sh ip route
Codes: L - local, C - connected, S - static, 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 198.51.100.1 to network 0.0.0.0

     10.0.0.0/8 is variably subnetted, 18 subnets, 4 masks
C       10.128.0.0/24 is directly connected, FastEthernet0/0.3
L       10.128.0.1/32 is directly connected, FastEthernet0/0.3
C       10.128.1.0/24 is directly connected, FastEthernet0/0.2
L       10.128.1.1/32 is directly connected, FastEthernet0/0.2
C       10.128.3.0/24 is directly connected, FastEthernet0/0.101
L       10.128.3.1/32 is directly connected, FastEthernet0/0.101
C       10.128.4.0/24 is directly connected, FastEthernet0/0.102
L       10.128.4.1/32 is directly connected, FastEthernet0/0.102
C       10.128.5.0/24 is directly connected, FastEthernet0/0.103
L       10.128.5.1/32 is directly connected, FastEthernet0/0.103
C       10.128.6.0/24 is directly connected, FastEthernet0/0.104
L       10.128.6.1/32 is directly connected, FastEthernet0/0.104
C       10.128.255.0/30 is directly connected, FastEthernet0/1.5
L       10.128.255.1/32 is directly connected, FastEthernet0/1.5
C       10.128.255.4/30 is directly connected, FastEthernet0/1.6
L       10.128.255.5/32 is directly connected, FastEthernet0/1.6
S       10.129.0.0/16 [1/0] via 10.128.255.2
S       10.130.0.0/16 [1/0] via 10.128.255.6
     198.51.100.0/24 is variably subnetted, 2 subnets, 2 masks
C       198.51.100.0/28 is directly connected, FastEthernet0/1.4
L       198.51.100.2/32 is directly connected, FastEthernet0/1.4
S*   0.0.0.0/0 [1/0] via 198.51.100.1

msk-donskaya-kim-gw-1#
```

Рисунок 3

3. Настройка маршрутизатора msk-q42-kim-gw-1(рис. 4)

```
msk-q42-kim-gw-1>en
Password:
msk-q42-kim-gw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
msk-q42-kim-gw-1(config)#router ospf 1
msk-q42-kim-gw-1(config-router)#router-id 10.128.254.2
msk-q42-kim-gw-1(config-router)#network 10.0.0.0 0.255.255.255 area 0
msk-q42-kim-gw-1(config-router)#exit
msk-q42-kim-gw-1(config)#exit
msk-q42-kim-gw-1#
%SYS-5-CONFIG_I: Configured from console by console

msk-q42-kim-gw-1#wr m
Building configuration...
[OK]
msk-q42-kim-gw-1#
```

Рисунок 4

```
msk-q42-kim-gw-1#
00:06:18: %OSPF-5-ADJCHG: Process 1, Nbr 10.128.254.1 on FastEthernet0/1.5 from LOADING to
FULL, Loading Done

msk-q42-kim-gw-1#sh ip ospf neighbor


Neighbor ID     Pri   State           Dead Time   Address         Interface
10.128.254.1      1   FULL/DR         00:00:32    10.128.255.1    FastEthernet0/1.5
msk-q42-kim-gw-1#sh ip route
Codes: L - local, C - connected, S - static, 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 10.128.255.1 to network 0.0.0.0

     10.0.0.0/8 is variably subnetted, 14 subnets, 4 masks
O       10.128.0.0/24 [110/2] via 10.128.255.1, 00:00:45, FastEthernet0/1.5
O       10.128.1.0/24 [110/2] via 10.128.255.1, 00:00:45, FastEthernet0/1.5
O       10.128.3.0/24 [110/2] via 10.128.255.1, 00:00:45, FastEthernet0/1.5
O       10.128.4.0/24 [110/2] via 10.128.255.1, 00:00:45, FastEthernet0/1.5
O       10.128.5.0/24 [110/2] via 10.128.255.1, 00:00:45, FastEthernet0/1.5
O       10.128.6.0/24 [110/2] via 10.128.255.1, 00:00:45, FastEthernet0/1.5
C       10.128.255.0/30 is directly connected, FastEthernet0/1.5
L       10.128.255.2/32 is directly connected, FastEthernet0/1.5
O       10.128.255.4/30 [110/2] via 10.128.255.1, 00:00:45, FastEthernet0/1.5
C       10.129.0.0/24 is directly connected, FastEthernet0/0.201
L       10.129.0.1/32 is directly connected, FastEthernet0/0.201
C       10.129.1.0/24 is directly connected, FastEthernet1/0.202
L       10.129.1.1/32 is directly connected, FastEthernet1/0.202
S       10.129.128.0/17 [1/0] via 10.129.1.2
S*   0.0.0.0/0 [1/0] via 10.128.255.1

msk-q42-kim-gw-1#
```

Рисунок 5. Проверка состояния протокола OSPF на msk-q42-kim-gw-1

4. Настройка маршрутизирующего коммутатора msk-hostel-kim-gw-1 (рис. 6)

```
msk-hostel-kim-gw-1>en
Password:
msk-hostel-kim-gw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
msk-hostel-kim-gw-1(config)#router ospf 1
msk-hostel-kim-gw-1(config-router)#router-id 10.128.254.3
msk-hostel-kim-gw-1(config-router)#network 10.0.0.0 0.255.255.255 area 0
msk-hostel-kim-gw-1(config-router)#exit
msk-hostel-kim-gw-1(config)#exit
msk-hostel-kim-gw-1#
%SYS-5-CONFIG_I: Configured from console by console

msk-hostel-kim-gw-1#wr m
Building configuration...
[OK]
msk-hostel-kim-gw-1#
00:09:11: %OSPF-5-ADJCHG: Process 1, Nbr 10.128.254.2 on Vlan202 from LOADING to FULL,
Loading Done

msk-hostel-kim-gw-1#
```

Рисунок 6

```
msk-hostel-kim-gw-1#sh ip ospf
 Routing Process "ospf 1" with ID 10.128.254.3
 Supports only single TOS(TOS0) routes
 Supports opaque LSA
 SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
 Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs
 Number of external LSA 0. Checksum Sum 0x000000
 Number of opaque AS LSA 0. Checksum Sum 0x000000
 Number of DCbitless external and opaque AS LSA 0
 Number of DoNotAge external and opaque AS LSA 0
 Number of areas in this router is 1. 1 normal 0 stub 0 nssa
 External flood list length 0
    Area BACKBONE(0)
        Number of interfaces in this area is 2
        Area has no authentication
        SPF algorithm executed 2 times
        Area ranges are
        Number of LSA 5. Checksum Sum 0x03daa8
        Number of opaque link LSA 0. Checksum Sum 0x000000
        Number of DCbitless LSA 0
        Number of indication LSA 0
        Number of DoNotAge LSA 0
        Flood list length 0

msk-hostel-kim-gw-1#sh ip ospf neighbor


Neighbor ID     Pri   State          Dead Time   Address         Interface
10.128.254.2     1    FULL/DR        00:00:37    10.129.1.1      Vlan202
msk-hostel-kim-gw-1#sh ip route
Codes: C - connected, S - static, I - IGRP, 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 10.129.1.1 to network 0.0.0.0

     10.0.0.0/8 is variably subnetted, 11 subnets, 2 masks
O       10.128.0.0/24 [110/3] via 10.129.1.1, 00:00:36, Vlan202
O       10.128.1.0/24 [110/3] via 10.129.1.1, 00:00:36, Vlan202
O       10.128.3.0/24 [110/3] via 10.129.1.1, 00:00:36, Vlan202
O       10.128.4.0/24 [110/3] via 10.129.1.1, 00:00:36, Vlan202
O       10.128.5.0/24 [110/3] via 10.129.1.1, 00:00:36, Vlan202
O       10.128.6.0/24 [110/3] via 10.129.1.1, 00:00:36, Vlan202
O       10.128.255.0/30 [110/2] via 10.129.1.1, 00:00:36, Vlan202
O       10.128.255.4/30 [110/3] via 10.129.1.1, 00:00:36, Vlan202
O       10.129.0.0/24 [110/2] via 10.129.1.1, 00:00:36, Vlan202
C       10.129.1.0/24 is directly connected, Vlan202
C       10.129.128.0/24 is directly connected, Vlan301
S*   0.0.0.0/0 [1/0] via 10.129.1.1
```

Рисунок 7. Проверка состояния протокола OSPF на msk-hostel-kim-gw-1

5.   Настройка маршрутизатора sch-sochi-kim-gw-1 (рис. 8)

```
sch-sochi-kim-gw-1>en
Password:
sch-sochi-kim-gw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
sch-sochi-kim-gw-1(config)#router ospf 1
sch-sochi-kim-gw-1(config-router)#router-id 10.128.254.4
sch-sochi-kim-gw-1(config-router)#network 10.0.0.0 0.255.255.255 area 0
sch-sochi-kim-gw-1(config-router)#exit
sch-sochi-kim-gw-1(config)#exit
sch-sochi-kim-gw-1#
%SYS-5-CONFIG_I: Configured from console by console

sch-sochi-kim-gw-1#wr m
Building configuration...
[OK]
sch-sochi-kim-gw-1#
00:11:48: %OSPF-5-ADJCHG: Process 1, Nbr 10.128.254.1 on FastEthernet0/0.6 from LOADING
to FULL, Loading Done
```

Рисунок 8

```
sch-sochi-kim-gw-1#sh ip ospf neighbor


Neighbor ID     Pri    State          Dead Time    Address         Interface
10.128.254.1     1     FULL/DR        00:00:36     10.128.255.5    FastEthernet0/0.6
sch-sochi-kim-gw-1#sh ip route
Codes: L - local, C - connected, S - static, 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 10.128.255.5 to network 0.0.0.0

     10.0.0.0/8 is variably subnetted, 16 subnets, 3 masks
O       10.128.0.0/24 [110/2] via 10.128.255.5, 00:00:23, FastEthernet0/0.6
O       10.128.1.0/24 [110/2] via 10.128.255.5, 00:00:23, FastEthernet0/0.6
O       10.128.3.0/24 [110/2] via 10.128.255.5, 00:00:23, FastEthernet0/0.6
O       10.128.4.0/24 [110/2] via 10.128.255.5, 00:00:23, FastEthernet0/0.6
O       10.128.5.0/24 [110/2] via 10.128.255.5, 00:00:23, FastEthernet0/0.6
O       10.128.6.0/24 [110/2] via 10.128.255.5, 00:00:23, FastEthernet0/0.6
O       10.128.255.0/30 [110/2] via 10.128.255.5, 00:00:23, FastEthernet0/0.6
C       10.128.255.4/30 is directly connected, FastEthernet0/0.6
L       10.128.255.6/32 is directly connected, FastEthernet0/0.6
O       10.129.0.0/24 [110/3] via 10.128.255.5, 00:00:23, FastEthernet0/0.6
O       10.129.1.0/24 [110/3] via 10.128.255.5, 00:00:23, FastEthernet0/0.6
O       10.129.128.0/24 [110/4] via 10.128.255.5, 00:00:23, FastEthernet0/0.6
C       10.130.0.0/24 is directly connected, FastEthernet0/0.401
L       10.130.0.1/32 is directly connected, FastEthernet0/0.401
C       10.130.1.0/24 is directly connected, FastEthernet0/0.402
L       10.130.1.1/32 is directly connected, FastEthernet0/0.402
S*   0.0.0.0/0 [1/0] via 10.128.255.5

sch-sochi-kim-gw-1#
```

Рисунок 9. Проверка состояния протокола OSPF на sch-sochi-kim-gw-1

6. Настройка интерфейсов коммутатора provider-kim-sw-1 (рис. 10)

```
provider-kim-sw-1>en
Password:
provider-kim-sw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
provider-kim-sw-1(config)#vlan 7
provider-kim-sw-1(config-vlan)#name q42-sochi
provider-kim-sw-1(config-vlan)#exit
provider-kim-sw-1(config)#int vlan7
provider-kim-sw-1(config-if)#
%LINK-5-CHANGED: Interface Vlan7, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan7, changed state to up

provider-kim-sw-1(config-if)#no shutdown
provider-kim-sw-1(config-if)#exit
provider-kim-sw-1(config)#exit
provider-kim-sw-1#
%SYS-5-CONFIG_I: Configured from console by console

provider-kim-sw-1#wr m
```

Рисунок 10

7. Настройка маршрутизатора msk-q42-kim-gw-1 (рис. 11)

```
msk-q42-kim-gw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
msk-q42-kim-gw-1(config)#int f0/1.7
msk-q42-kim-gw-1(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/1.7, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1.7, changed state to up

msk-q42-kim-gw-1(config-subif)#encapsulation dot1Q 7
msk-q42-kim-gw-1(config-subif)#ip address 10.128.255.9 255.255.255.252
msk-q42-kim-gw-1(config-subif)#description sochi
msk-q42-kim-gw-1(config-subif)#exit
msk-q42-kim-gw-1(config)#exit
msk-q42-kim-gw-1#
%SYS-5-CONFIG_I: Configured from console by console

msk-q42-kim-gw-1#wr m
Building configuration...
....
```

Рисунок 11

8. Настройка коммутатора sch-sochi-kim-sw-1 (рис. 12)

```
sch-sochi-kim-sw-1>en
Password:
sch-sochi-kim-sw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
sch-sochi-kim-sw-1(config)#vlan 7
sch-sochi-kim-sw-1(config-vlan)#name q42-sochi
sch-sochi-kim-sw-1(config-vlan)#exit
sch-sochi-kim-sw-1(config)#int vlan7
sch-sochi-kim-sw-1(config-if)#
%LINK-5-CHANGED: Interface Vlan7, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan7, changed state to up

sch-sochi-kim-sw-1(config-if)#no shutdown
sch-sochi-kim-sw-1(config-if)#exit
sch-sochi-kim-sw-1(config)#exit
sch-sochi-kim-sw-1#
%SYS-5-CONFIG_I: Configured from console by console

sch-sochi-kim-sw-1#wr m
```

Рисунок 12

9. Настройка маршрутизатора sch-sochi-kim-gw-1 (рис. 13)

```
sch-sochi-kim-gw-1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
sch-sochi-kim-gw-1(config)#int f0/0.7
sch-sochi-kim-gw-1(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.7, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.7, changed state to up

sch-sochi-kim-gw-1(config-subif)#encapsulation dot1Q 7
sch-sochi-kim-gw-1(config-subif)#ip address 10.128.255.10 255.255.255.252
sch-sochi-kim-gw-1(config-subif)#description q42
sch-sochi-kim-gw-1(config-subif)#exit
sch-sochi-kim-gw-1(config)#exit
sch-sochi-kim-gw-1#
%SYS-5-CONFIG_I: Configured from console by console

sch-sochi-kim-gw-1#wr m
Building configuration...
[OK]
sch-sochi-kim-gw-1#
```

Рисунок 13

10. В режиме симуляции отследить движение пакета ICMP с ноутбука администратора сети на Донской в Москве (Laptop-PT admin) до компьютера пользователя в филиале в г. Сочи pc-sochi-1 (рис. 14).
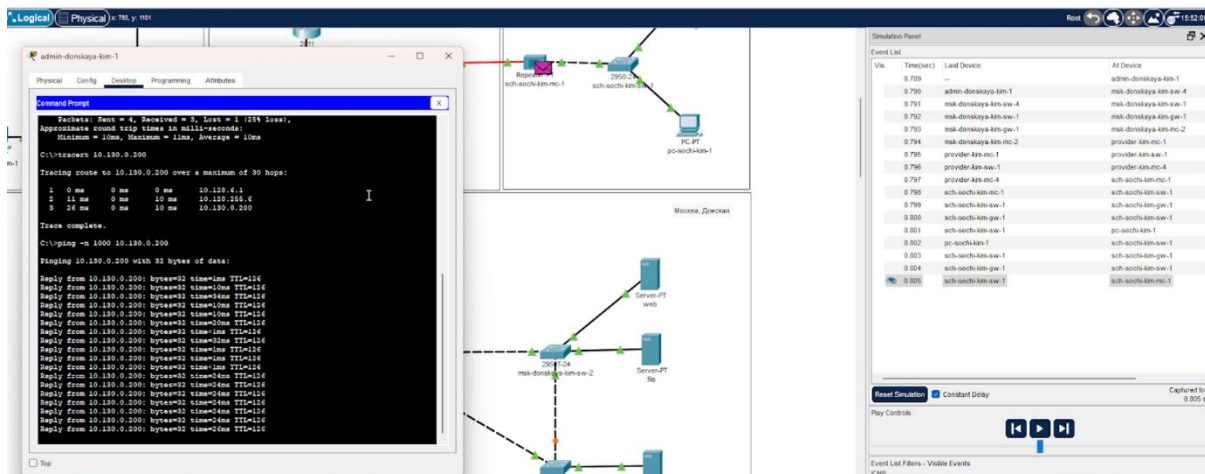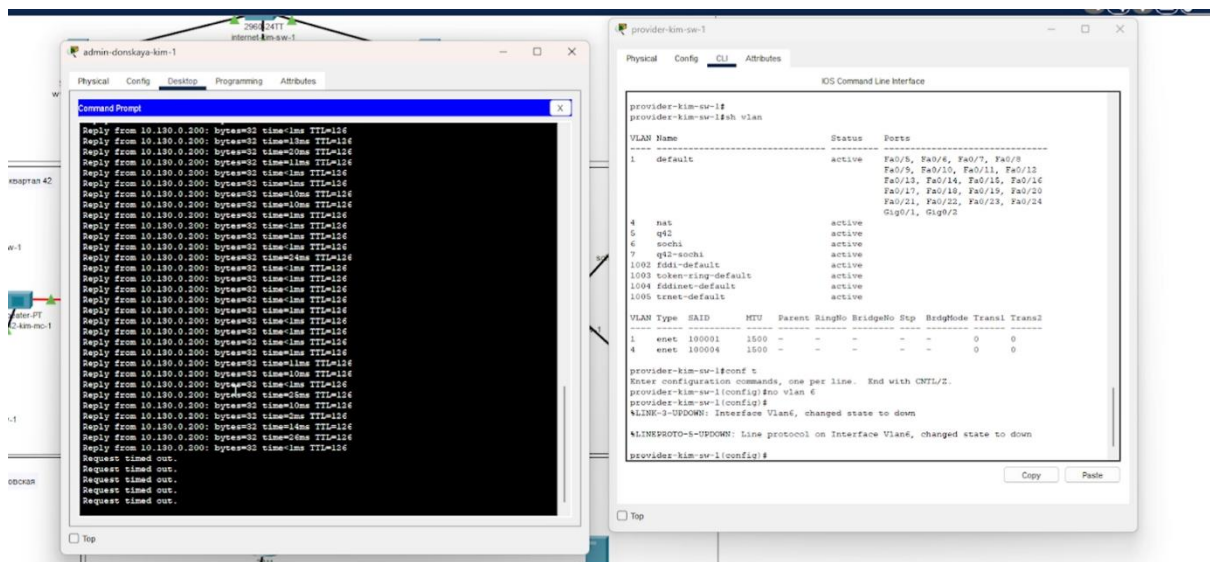

Рисунок 14

11. На коммутаторе провайдера отключить временно vlan 6 (рис. 15) и в режиме симуляции убедиться в изменении маршрута прохождения пакета ICMP с ноутбука администратора сети на Донской в Москве (Laptop-PT admin) до компьютера пользователя в филиале в г. Сочи pc-sochi-1 (рис. 16).
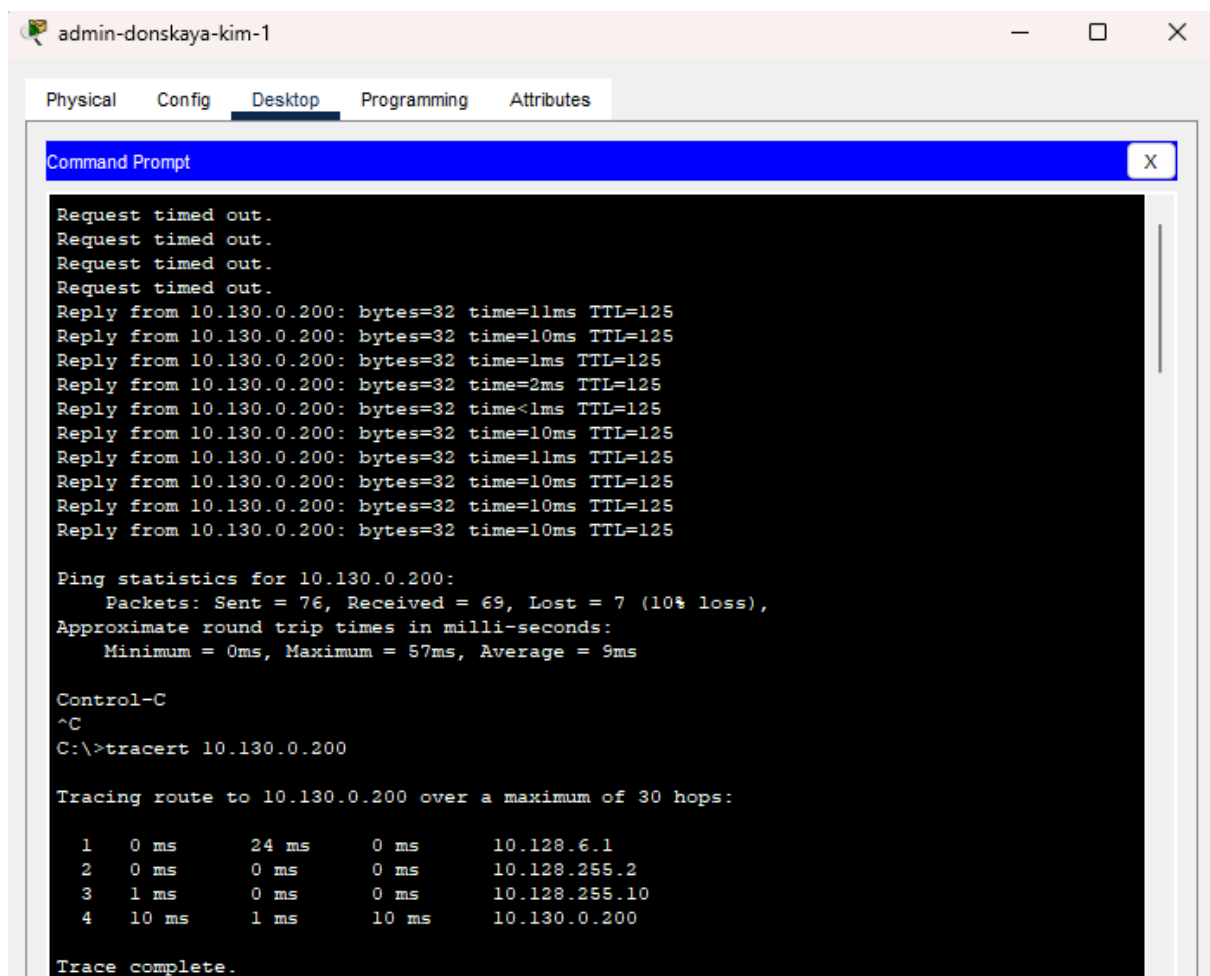
Рисунок 15

Рисунок 16

12. На коммутаторе провайдера восстановить vlan 6 (рис.17) и в режиме симуляции убедиться в изменении маршрута прохождения пакета ICMP с ноутбука администратора сети на Донской в Москве (Laptop-PT admin) до компьютера

пользователя в филиале в г. Сочи pc-sochi-1 (рис. 18).

```
provider-kim-sw-1(config)#vlan 6
provider-kim-sw-1(config-vlan)#
%LINK-5-CHANGED: Interface Vlan6, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan6, changed state to up

provider-kim-sw-1(config-vlan)#name sochi
provider-kim-sw-1(config-vlan)#^Z
provider-kim-sw-1#
%SYS-5-CONFIG_I: Configured from console by console

provider-kim-sw-1#wr m
Building configuration...
[OK]
```

Рисунок 17

```
Reply from 10.130.0.200: bytes=32 time<1ms TTL=125
Reply from 10.130.0.200: bytes=32 time<1ms TTL=125
Reply from 10.130.0.200: bytes=32 time=10ms TTL=125

Ping statistics for 10.130.0.200:
    Packets: Sent = 11, Received = 11, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 10ms, Average = 2ms

Control-C
^C
C:\>tracert 10.130.0.200

Tracing route to 10.130.0.200 over a maximum of 30 hops:

  1   1 ms      0 ms      0 ms      10.128.6.1
  2  11 ms      1 ms      0 ms      10.128.255.10
  3   0 ms      5 ms     10 ms      10.130.0.200

Trace complete.
```

Рисунок 18

Конфигурации оборудования

- **msk-donskaya-kim-gw-1**

!

version 15.1

no service timestamps log datetime msec

no service timestamps debug datetime msec

service password-encryption

!

hostname msk-donskaya-kim-gw-1

!

!

!

enable secret 5 1mERr$hx5rVt7rPNoS4wqbXKX7m0

```
!
!
ip dhcp excluded-address 10.128.3.1 10.128.3.29
ip dhcp excluded-address 10.128.3.200 10.128.3.254
ip dhcp excluded-address 10.128.4.1 10.128.4.29
ip dhcp excluded-address 10.128.4.200 10.128.4.254
ip dhcp excluded-address 10.128.5.1 10.128.5.29
ip dhcp excluded-address 10.128.5.200 10.128.5.254
ip dhcp excluded-address 10.128.6.1 10.128.6.29
ip dhcp excluded-address 10.128.6.200 10.128.6.254
!
ip dhcp pool dk
 network 10.128.3.0 255.255.255.0
 default-router 10.128.3.1
 dns-server 10.128.0.5
ip dhcp pool departments
 network 10.128.4.0 255.255.255.0
 default-router 10.128.4.1
 dns-server 10.128.0.5
ip dhcp pool adm
 network 10.128.5.0 255.255.255.0
 default-router 10.128.5.1
 dns-server 10.128.0.5
ip dhcp pool other
 network 10.128.6.0 255.255.255.0
 default-router 10.128.6.1
 dns-server 10.128.0.5
!
!
!
ip cef
no ipv6 cef
!
!
```

```
!
username admin secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
!
!
license udi pid CISCO2811/K9 sn FTX1017LG55-
!
!
!
!
!
!
!
!
!
ip domain-name donskaya.rudn.edu
ip name-server 10.128.0.5
!
!
spanning-tree mode pvst
!
!
!
!
!
!
interface FastEthernet0/0
 no ip address
 duplex auto
 speed auto
!
interface FastEthernet0/0.2
 description management
 encapsulation dot1Q 2
 ip address 10.128.1.1 255.255.255.0
```

```
 ip access-group management-out out
!
interface FastEthernet0/0.3
 description servers
 encapsulation dot1Q 3
 ip address 10.128.0.1 255.255.255.0
 ip access-group servers-out out
 ip nat inside
!
interface FastEthernet0/0.101
 description dk
 encapsulation dot1Q 101
 ip address 10.128.3.1 255.255.255.0
 ip nat inside
!
interface FastEthernet0/0.102
 description departments
 encapsulation dot1Q 102
 ip address 10.128.4.1 255.255.255.0
 ip nat inside
!
interface FastEthernet0/0.103
 description adm
 encapsulation dot1Q 103
 ip address 10.128.5.1 255.255.255.0
 ip nat inside
!
interface FastEthernet0/0.104
 description other
 encapsulation dot1Q 104
 ip address 10.128.6.1 255.255.255.0
 ip access-group other-in in
 ip nat inside
!
```

```
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
!
interface FastEthernet0/1.4
 description internet
 encapsulation dot1Q 4
 ip address 198.51.100.2 255.255.255.240
 ip nat outside
!
interface FastEthernet0/1.5
 description q42
 encapsulation dot1Q 5
 ip address 10.128.255.1 255.255.255.252
 ip nat inside
!
interface FastEthernet0/1.6
 description sochi
 encapsulation dot1Q 6
 ip address 10.128.255.5 255.255.255.252
 ip nat inside
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 1
 router-id 10.128.254.1
 log-adjacency-changes
 network 10.0.0.0 0.255.255.255 area 0
!
ip nat pool main-pool 198.51.100.2 198.51.100.14 netmask 255.255.255.240
ip nat inside source list nat-inet pool main-pool overload
```

```
ip nat inside source static tcp 10.128.0.2 80 198.51.100.2 80
ip nat inside source static tcp 10.128.0.3 20 198.51.100.3 20
ip nat inside source static tcp 10.128.0.3 21 198.51.100.3 21
ip nat inside source static tcp 10.128.0.4 25 198.51.100.4 25
ip nat inside source static tcp 10.128.0.4 110 198.51.100.4 110
ip nat inside source static tcp 10.128.6.200 3389 198.51.100.10 3389
ip classless
ip route 0.0.0.0 0.0.0.0 198.51.100.1
ip route 10.129.0.0 255.255.0.0 10.128.255.2
ip route 10.130.0.0 255.255.0.0 10.128.255.6
!
ip flow-export version 9
!
!
ip access-list extended servers-out
 remark web
 permit icmp any any
 permit tcp any host 10.128.0.2 eq www
 permit tcp host 10.128.6.200 host 10.128.0.2 range 20 ftp
 permit tcp host 10.128.6.200 host 10.128.0.2 eq telnet
 remark file
 permit tcp 10.128.0.0 0.0.255.255 host 10.128.0.3 eq 445
 permit tcp any host 10.128.0.3 range 20 ftp
 remark mail
 permit tcp any host 10.128.0.4 eq smtp
 permit tcp any host 10.128.0.4 eq pop3
 remark dns
 permit udp 10.128.0.0 0.0.255.255 host 10.128.0.5 eq domain
ip access-list extended other-in
 remark admin
 permit ip host 10.128.6.200 any
ip access-list extended management-out
 remark admin
 permit ip host 10.128.6.200 10.128.1.0 0.0.0.255
```

```
ip access-list extended nat-inet
 remark dk
 permit tcp 10.128.3.0 0.0.0.255 host 192.0.2.11 eq www
 permit tcp 10.128.3.0 0.0.0.255 host 192.0.2.12 eq www
 remark departments
 permit tcp 10.128.4.0 0.0.0.255 host 192.0.2.13 eq www
 remark adm
 permit tcp 10.128.5.0 0.0.0.255 host 192.0.2.14 eq www
 remark admin
 permit ip host 10.128.6.200 any
 remark q42
 permit ip host 10.129.0.200 any
 permit ip host 10.129.128.200 any
 remark sochi
 permit ip host 10.130.0.200 any
!
!
!
!
!
line con 0
 password 7 0822455D0A16
 login
!
line aux 0
!
line vty 0 4
 password 7 0822455D0A16
 login
 transport input ssh
!
!
!
end
```

- **msk-q42-kim-gw-1**

```
!
version 15.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
service password-encryption
!
hostname msk-q42-kim-gw-1
!
!
!
enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
!
!
!
!
!
!
no ip cef
no ipv6 cef
!
!
!
username admin secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
!
!
license udi pid CISCO2811/K9 sn FTX101776DY-
!
!
!
!
!
!
!
```

```
!
!
ip domain-name q42.rudn.edu
!
!
spanning-tree mode pvst
!
!
!
!
!
!
interface FastEthernet0/0
 no ip address
 duplex auto
 speed auto
!
interface FastEthernet0/0.201
 description q42-main
 encapsulation dot1Q 201
 ip address 10.129.0.1 255.255.255.0
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
!
interface FastEthernet0/1.5
 description donskaya
 encapsulation dot1Q 5
 ip address 10.128.255.2 255.255.255.252
!
interface FastEthernet0/1.7
 description sochi
```

```
  encapsulation dot1Q 7
  ip address 10.128.255.9 255.255.255.252
 !
 interface FastEthernet1/0
  no ip address
  duplex auto
  speed auto
 !
 interface FastEthernet1/0.202
  description q42-management
  encapsulation dot1Q 202
  ip address 10.129.1.1 255.255.255.0
 !
 interface FastEthernet1/1
  no ip address
  duplex auto
  speed auto
  shutdown
 !
 interface Vlan1
  no ip address
  shutdown
 !
 router ospf 1
  router-id 10.128.254.2
  log-adjacency-changes
  network 10.0.0.0 0.255.255.255 area 0
 !
 ip classless
 ip route 0.0.0.0 0.0.0.0 10.128.255.1
 ip route 10.129.128.0 255.255.128.0 10.129.1.2
 !
 ip flow-export version 9
 !
```

!

!

!

!

!

!

line con 0

 password 7 0822455D0A16

 login

!

line aux 0

!

line vty 0 4

 password 7 0822455D0A16

 login

 transport input ssh

!

!

!

end

- **msk-hostel-kim-gw-1**

!

version 12.2(37)SE1

no service timestamps log datetime msec

no service timestamps debug datetime msec

service password-encryption

!

hostname msk-hostel-kim-gw-1

!

!

enable secret 5 1mERr$hx5rVt7rPNoS4wqbXKX7m0

!

!

!

!

!

ip routing

!

!

!

!

username admin secret 5 1mERr$hx5rVt7rPNoS4wqbXKX7m0

!

!

!

!

!

!

!

!

!

!

ip ssh version 2

ip domain-name hostel.rudn.edu

!

!

spanning-tree mode pvst

!

!

!

!

!

!

interface FastEthernet0/1

 switchport trunk encapsulation dot1q

 switchport mode trunk

!

interface FastEthernet0/2

```
!
interface FastEthernet0/3
!
interface FastEthernet0/4
!
interface FastEthernet0/5
!
interface FastEthernet0/6
!
interface FastEthernet0/7
!
interface FastEthernet0/8
!
interface FastEthernet0/9
!
interface FastEthernet0/10
!
interface FastEthernet0/11
!
interface FastEthernet0/12
!
interface FastEthernet0/13
!
interface FastEthernet0/14
!
interface FastEthernet0/15
!
interface FastEthernet0/16
!
interface FastEthernet0/17
!
interface FastEthernet0/18
!
interface FastEthernet0/19
```

```
!
interface FastEthernet0/20
!
interface FastEthernet0/21
!
interface FastEthernet0/22
!
interface FastEthernet0/23
!
interface FastEthernet0/24
!
interface GigabitEthernet0/1
 switchport trunk encapsulation dot1q
 switchport mode trunk
!
interface GigabitEthernet0/2
!
interface Vlan1
 no ip address
 shutdown
!
interface Vlan202
 mac-address 00d0.9754.6d01
 ip address 10.129.1.2 255.255.255.0
!
interface Vlan301
 mac-address 00d0.9754.6d02
 ip address 10.129.128.1 255.255.255.0
!
router ospf 1
 router-id 10.128.254.3
 log-adjacency-changes
 network 10.0.0.0 0.255.255.255 area 0
!
```

ip classless

ip route 0.0.0.0 0.0.0.0 10.129.1.1

!

ip flow-export version 9

!

!

!

!

!

!

!

!

line con 0

 password 7 0822455D0A16

 login

!

line aux 0

!

line vty 0 4

 password 7 0822455D0A16

 login

 transport input ssh

!

!

!

!

end

- **sch-sochi-kim-gw-1**

!

version 15.1

no service timestamps log datetime msec

no service timestamps debug datetime msec

service password-encryption

!

```
hostname sch-sochi-kim-gw-1
!
!
!
enable secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
!
!
!
!
!
!
ip cef
no ipv6 cef
!
!
!
username admin secret 5 $1$mERr$hx5rVt7rPNoS4wqbXKX7m0
!
!
license udi pid CISCO2811/K9 sn FTX1017T7K2-
!
!
!
!
!
!
!
!
!
ip domain-name sochi.rudn.edu
!
!
spanning-tree mode pvst
!
```

```
!
!
!
!
!
interface FastEthernet0/0
 no ip address
 duplex auto
 speed auto
!
interface FastEthernet0/0.6
 description donskaya
 encapsulation dot1Q 6
 ip address 10.128.255.6 255.255.255.252
!
interface FastEthernet0/0.7
 description q42
 encapsulation dot1Q 7
 ip address 10.128.255.10 255.255.255.252
!
interface FastEthernet0/0.401
 description sochi-main
 encapsulation dot1Q 401
 ip address 10.130.0.1 255.255.255.0
!
interface FastEthernet0/0.402
 description sochi-management
 encapsulation dot1Q 402
 ip address 10.130.1.1 255.255.255.0
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
```

```
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
router ospf 1
 router-id 10.128.254.4
 log-adjacency-changes
 network 10.0.0.0 0.255.255.255 area 0
!
ip classless
ip route 0.0.0.0 0.0.0.0 10.128.255.5
!
ip flow-export version 9
!
!
!
!
!
!
!
line con 0
 password 7 0822455D0A16
 login
!
line aux 0
!
line vty 0 4
 password 7 0822455D0A16
 login
 transport input ssh
!
!
```

!

end

- **sch-sochi-kim-sw-1**

!

version 12.1

no service timestamps log datetime msec

no service timestamps debug datetime msec

service password-encryption

!

hostname sch-sochi-kim-sw-1

!

enable secret 5 1mERr$hx5rVt7rPNoS4wqbXKX7m0

!

!

!

ip domain-name sochi.rudn.edu

!

username admin secret 5 1mERr$hx5rVt7rPNoS4wqbXKX7m0

!

!

!

spanning-tree mode pvst

spanning-tree extend system-id

!

interface FastEthernet0/1

 switchport access vlan 401

 switchport mode access

!

interface FastEthernet0/2

!

interface FastEthernet0/3

!

interface FastEthernet0/4

!

```
interface FastEthernet0/5
!
interface FastEthernet0/6
!
interface FastEthernet0/7
!
interface FastEthernet0/8
!
interface FastEthernet0/9
!
interface FastEthernet0/10
!
interface FastEthernet0/11
!
interface FastEthernet0/12
!
interface FastEthernet0/13
!
interface FastEthernet0/14
!
interface FastEthernet0/15
!
interface FastEthernet0/16
!
interface FastEthernet0/17
!
interface FastEthernet0/18
!
interface FastEthernet0/19
!
interface FastEthernet0/20
!
interface FastEthernet0/21
!
```

```
interface FastEthernet0/22
!
interface FastEthernet0/23
 switchport mode trunk
!
interface FastEthernet0/24
 switchport mode trunk
!
interface Vlan1
 no ip address
 shutdown
!
interface Vlan6
 no ip address
!
interface Vlan7
 no ip address
!
interface Vlan401
 no ip address
!
!
!
!
line con 0
 password 7 0822455D0A16
 login
!
line vty 0 4
 password 7 0822455D0A16
 login
 transport input ssh
line vty 5 15
 login
```

!

!

!

!

end

- **provider-kim-sw-1**

!

version 15.0

no service timestamps log datetime msec

no service timestamps debug datetime msec

service password-encryption

!

hostname provider-kim-sw-1

!

enable secret 5 1mERr$hx5rVt7rPNoS4wqbXKX7m0

!

!

!

!

username admin secret 5 1mERr$hx5rVt7rPNoS4wqbXKX7m0

!

!

!

spanning-tree mode pvst

spanning-tree extend system-id

!

interface FastEthernet0/1

 switchport mode trunk

!

interface FastEthernet0/2

 switchport mode trunk

!

interface FastEthernet0/3

 switchport mode trunk

```
!
interface FastEthernet0/4
 switchport mode trunk
!
interface FastEthernet0/5
!
interface FastEthernet0/6
!
interface FastEthernet0/7
!
interface FastEthernet0/8
!
interface FastEthernet0/9
!
interface FastEthernet0/10
!
interface FastEthernet0/11
!
interface FastEthernet0/12
!
interface FastEthernet0/13
!
interface FastEthernet0/14
!
interface FastEthernet0/15
!
interface FastEthernet0/16
!
interface FastEthernet0/17
!
interface FastEthernet0/18
!
interface FastEthernet0/19
!
```

```
interface FastEthernet0/20
!
interface FastEthernet0/21
!
interface FastEthernet0/22
!
interface FastEthernet0/23
!
interface FastEthernet0/24
!
interface GigabitEthernet0/1
!
interface GigabitEthernet0/2
!
interface Vlan1
 no ip address
 shutdown
!
interface Vlan4
 no ip address
!
interface Vlan5
 no ip address
!
interface Vlan6
 no ip address
!
interface Vlan7
 no ip address
!
!
!
!
line con 0
```

```
 password 7 0822455D0A16

 login

!

line vty 0 4

 password 7 0822455D0A16

 login

line vty 5 15

 login

!

!

!

!

end
```

Ответы на контрольные вопросы

1. Какие протоколы относятся к протоколам динамической маршрутизации?
    OSPF, RIP, EIGRP, BGP
2. Охарактеризуйте принципы работы протоколов динамической маршрутизации.
    Маршрутизаторы по протоколу делятся между собой информацией из своих таблиц маршрутизации и корректируют их в соответствии с остальными.
3. Опишите процесс обращения устройства из одной подсети к устройству из другой подсети по протоколу динамической маршрутизации.
    – Определение маршрута
    – Выбор наилучшего маршрута
    – Установление связи
    – Пересылка пакета
    – Доставка пакета получателю
4. Опишите выводимую информацию при просмотре таблицы маршрутизации
    Просмотр таблицы маршрутизации предоставляет информацию о доступных маршрутах и связанных с ними интерфейсах для доставки данных.Вот некоторая общая информация, которую можно увидеть при просмотре таблицы маршрутизации:
    – Сетевой адрес (назначение)

- Маска подсети
- Шлюз (Gateway)
- Интерфейс
- Тип маршрута
- Протокол

Вывод

Настроила динамическую маршрутизацию между территориями организации.