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БЕЛОРУССКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ
ИНФОРМАТИКИ И РАДИОЭЛЕКТРОНИКИ

Факультет инфокоммуникаций
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Лабораторная работа №5
«МАРШРУТИЗАЦИЯ В ГЛОБАЛЬНЫХ СЕТЯХ»
Шифр 672

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Цель: изучить протоколы маршрутизации глобальных сетей, типы областей и маршрутизаторов в протоколе OSPF, назначение автономных систем, овладеть навыками конфигурации протокола OSPF для нескольких областей, протокола BGP, перераспределение маршрутов разных протоколов маршрутизации.

Исходные данные:

Таблица 5.2 – Исходные данные для конфигурации IP-адресов в подсетях

Номер первой цифры шифра	IP-адреса для подсетей				
	Branch2	Branch3	Home	коммутаторов L3	коммутаторов L3 и пограничных маршрутизаторов
6	192.168.60.0/24	192.168.61.0/24	192.168.62.0/24	129.134.131.0/24	41.79.200.0/24

Таблица 5.3 – Номера автономных систем для подсетей в смоделированной сети

Номер второй цифры шифра	Номера автономных систем для подсетей			
	Branch1	Branch2	Branch3	Home
7	6	8	10	12

Ход работы:

1. Таблицы маршрутизации на:

R4

```

5.0.0.0/32 is subnetted, 1 subnets
C    5.5.5.5 is directly connected, Loopback0
31.0.0.0/8 is variably subnetted, 10 subnets, 4 masks
O    31.200.58.0/28 [110/3] via 31.200.58.45, 00:07:17, Port-channel1
O    31.200.58.16/28 [110/2] via 31.200.58.41, 00:07:17, Port-channel2
O    31.200.58.32/30 [110/3] via 31.200.58.41, 00:07:17, Port-channel2
O    [110/3] via 31.200.58.45, 00:07:17, Port-channel1
O    31.200.58.36/30 [110/2] via 31.200.58.41, 00:07:17, Port-channel2
C    31.200.58.40/30 is directly connected, Port-channel2
C    31.200.58.44/30 is directly connected, Port-channel1
O    31.200.58.48/30 [110/2] via 31.200.58.45, 00:07:17, Port-channel1
O    31.200.58.52/30 [110/2] via 31.200.58.41, 00:07:17, Port-channel2
O    [110/2] via 31.200.58.45, 00:07:17, Port-channel1
O    31.200.58.56/29 [110/3] via 31.200.58.45, 00:07:17, Port-channel1
C    31.200.58.66/32 is directly connected, Loopback1
41.0.0.0/30 is subnetted, 1 subnets
C    41.79.200.0 is directly connected, FastEthernet0/1
172.10.0.0/16 is variably subnetted, 15 subnets, 3 masks
O    172.10.0.0/28 [110/2] via 31.200.58.45, 00:07:17, Port-channel1
O    172.10.0.16/28 [110/2] via 31.200.58.45, 00:07:17, Port-channel1
O    172.10.0.48/28 [110/3] via 31.200.58.45, 00:07:17, Port-channel1
O    172.10.0.64/28 [110/2] via 31.200.58.41, 00:07:17, Port-channel2
O    172.10.0.80/28 [110/2] via 31.200.58.41, 00:07:17, Port-channel2
O    172.10.0.96/29 [110/3] via 31.200.58.45, 00:07:17, Port-channel1
O    172.10.0.104/29 [110/3] via 31.200.58.45, 00:07:17, Port-channel1
O    172.10.0.112/29 [110/3] via 31.200.58.45, 00:07:17, Port-channel1
O    172.10.0.120/29 [110/3] via 31.200.58.45, 00:07:17, Port-channel1
O    172.10.0.136/29 [110/3] via 31.200.58.41, 00:07:17, Port-channel2
O    172.10.0.144/29 [110/2] via 31.200.58.41, 00:07:17, Port-channel2
O    172.10.0.152/29 [110/2] via 31.200.58.45, 00:07:17, Port-channel1
O    172.10.0.160/29 [110/3] via 31.200.58.45, 00:07:17, Port-channel1
C    172.10.0.168/29 is directly connected, FastEthernet0/0
O    172.10.0.200/30 [110/3] via 31.200.58.45, 00:07:17, Port-channel1
S* 0.0.0.0/0 [1/0] via 41.79.200.2

```


MS5

```
31.0.0.0/8 is variably subnetted, 10 subnets, 4 masks
O IA 31.200.58.0/28 [110/4] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 31.200.58.16/28 [110/3] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 31.200.58.32/30 [110/4] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 31.200.58.36/30 [110/3] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 31.200.58.40/30 [110/2] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 31.200.58.44/30 [110/2] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 31.200.58.48/30 [110/3] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 31.200.58.52/30 [110/3] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 31.200.58.56/29 [110/4] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 31.200.58.66/32 [110/2] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
41.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
C 41.79.200.0/30 is directly connected, GigabitEthernet1/0/1
B 41.79.200.8/30 [20/0] via 129.134.131.2, 00:00:00
B 41.79.200.12/30 [20/0] via 129.134.131.13, 00:00:00
B 41.79.200.16/29 [20/2] via 129.134.131.13, 00:00:00
129.134.0.0/30 is subnetted, 4 subnets
C 129.134.131.0 is directly connected, GigabitEthernet1/1/1
B 129.134.131.4 [20/0] via 129.134.131.2, 00:00:00
B 129.134.131.8 [20/0] via 129.134.131.13, 00:00:00
C 129.134.131.12 is directly connected, GigabitEthernet1/1/4
172.10.0.0/16 is variably subnetted, 15 subnets, 3 masks
O IA 172.10.0.0/28 [110/3] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 172.10.0.16/28 [110/3] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 172.10.0.48/28 [110/4] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 172.10.0.64/28 [110/3] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 172.10.0.80/28 [110/3] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 172.10.0.96/29 [110/4] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 172.10.0.104/29 [110/4] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 172.10.0.112/29 [110/4] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 172.10.0.120/29 [110/4] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 172.10.0.136/29 [110/4] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 172.10.0.144/29 [110/3] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 172.10.0.152/29 [110/3] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 172.10.0.160/29 [110/4] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 172.10.0.168/29 [110/2] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
O IA 172.10.0.200/30 [110/4] via 41.79.200.1, 00:06:20, GigabitEthernet1/0/1
B 192.168.60.0/24 [20/0] via 129.134.131.2, 00:00:00
B 192.168.61.0/24 [20/0] via 129.134.131.13, 00:00:00
S* 0.0.0.0/0 is directly connected, GigabitEthernet1/0/1
```

MS3

```
31.0.0.0/8 is variably subnetted, 10 subnets, 4 masks
B 31.200.58.0/28 [20/4] via 129.134.131.1, 00:00:00
B 31.200.58.16/28 [20/3] via 129.134.131.1, 00:00:00
B 31.200.58.32/30 [20/4] via 129.134.131.1, 00:00:00
B 31.200.58.36/30 [20/3] via 129.134.131.1, 00:00:00
B 31.200.58.40/30 [20/2] via 129.134.131.1, 00:00:00
B 31.200.58.44/30 [20/2] via 129.134.131.1, 00:00:00
B 31.200.58.48/30 [20/3] via 129.134.131.1, 00:00:00
B 31.200.58.52/30 [20/3] via 129.134.131.1, 00:00:00
B 31.200.58.56/29 [20/4] via 129.134.131.1, 00:00:00
B 31.200.58.66/32 [20/2] via 129.134.131.1, 00:00:00
41.0.0.0/8 is variably subnetted, 5 subnets, 2 masks
B 41.79.200.0/30 [20/0] via 129.134.131.1, 00:00:00
C 41.79.200.4/30 is directly connected, GigabitEthernet1/1/3
B 41.79.200.8/30 [20/0] via 129.134.131.6, 00:00:00
B 41.79.200.12/30 [20/0] via 129.134.131.6, 00:00:00
B 41.79.200.16/29 [20/0] via 129.134.131.6, 00:00:00
129.134.0.0/30 is subnetted, 4 subnets
C 129.134.131.0 is directly connected, GigabitEthernet1/1/1
C 129.134.131.4 is directly connected, GigabitEthernet1/1/2
B 129.134.131.8 [20/0] via 129.134.131.6, 00:00:00
B 129.134.131.12 [20/0] via 129.134.131.1, 00:00:00
172.10.0.0/16 is variably subnetted, 15 subnets, 3 masks
B 172.10.0.0/28 [20/3] via 129.134.131.1, 00:00:00
B 172.10.0.16/28 [20/3] via 129.134.131.1, 00:00:00
B 172.10.0.48/28 [20/4] via 129.134.131.1, 00:00:00
B 172.10.0.64/28 [20/3] via 129.134.131.1, 00:00:00
B 172.10.0.80/28 [20/3] via 129.134.131.1, 00:00:00
B 172.10.0.96/29 [20/4] via 129.134.131.1, 00:00:00
B 172.10.0.104/29 [20/4] via 129.134.131.1, 00:00:00
B 172.10.0.112/29 [20/4] via 129.134.131.1, 00:00:00
B 172.10.0.120/29 [20/4] via 129.134.131.1, 00:00:00
B 172.10.0.136/29 [20/4] via 129.134.131.1, 00:00:00
B 172.10.0.144/29 [20/3] via 129.134.131.1, 00:00:00
B 172.10.0.152/29 [20/3] via 129.134.131.1, 00:00:00
B 172.10.0.160/29 [20/4] via 129.134.131.1, 00:00:00
B 172.10.0.168/29 [20/2] via 129.134.131.1, 00:00:00
B 172.10.0.200/30 [20/4] via 129.134.131.1, 00:00:00
S 192.168.60.0/24 is directly connected, GigabitEthernet1/1/3
B 192.168.61.0/24 [20/28416] via 129.134.131.6, 00:00:00
```

MS4

```
31.0.0.0/8 is variably subnetted, 10 subnets, 4 masks
B   31.200.58.0/28 [20/0] via 129.134.131.5, 00:00:00
B   31.200.58.16/28 [20/0] via 129.134.131.5, 00:00:00
B   31.200.58.32/30 [20/0] via 129.134.131.5, 00:00:00
B   31.200.58.36/30 [20/0] via 129.134.131.5, 00:00:00
B   31.200.58.40/30 [20/0] via 129.134.131.5, 00:00:00
B   31.200.58.44/30 [20/0] via 129.134.131.5, 00:00:00
B   31.200.58.48/30 [20/0] via 129.134.131.5, 00:00:00
B   31.200.58.52/30 [20/0] via 129.134.131.5, 00:00:00
B   31.200.58.56/29 [20/0] via 129.134.131.5, 00:00:00
B   31.200.58.66/32 [20/0] via 129.134.131.5, 00:00:00
41.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
B   41.79.200.0/30 [20/0] via 129.134.131.5, 00:00:00
C   41.79.200.8/30 is directly connected, GigabitEthernet1/1/4
B   41.79.200.12/30 [20/0] via 129.134.131.10, 00:00:00
B   41.79.200.16/29 [20/2] via 129.134.131.10, 00:00:00
129.134.0.0/30 is subnetted, 4 subnets
B   129.134.131.0 [20/0] via 129.134.131.5, 00:00:00
C   129.134.131.4 is directly connected, GigabitEthernet1/1/2
C   129.134.131.8 is directly connected, GigabitEthernet1/1/3
B   129.134.131.12 [20/0] via 129.134.131.10, 00:00:00
172.10.0.0/16 is variably subnetted, 15 subnets, 3 masks
B   172.10.0.0/28 [20/0] via 129.134.131.5, 00:00:00
B   172.10.0.16/28 [20/0] via 129.134.131.5, 00:00:00
B   172.10.0.48/28 [20/0] via 129.134.131.5, 00:00:00
B   172.10.0.64/28 [20/0] via 129.134.131.5, 00:00:00
B   172.10.0.80/28 [20/0] via 129.134.131.5, 00:00:00
B   172.10.0.96/29 [20/0] via 129.134.131.5, 00:00:00
B   172.10.0.104/29 [20/0] via 129.134.131.5, 00:00:00
B   172.10.0.112/29 [20/0] via 129.134.131.5, 00:00:00
B   172.10.0.120/29 [20/0] via 129.134.131.5, 00:00:00
B   172.10.0.136/29 [20/0] via 129.134.131.5, 00:00:00
B   172.10.0.144/29 [20/0] via 129.134.131.5, 00:00:00
B   172.10.0.152/29 [20/0] via 129.134.131.5, 00:00:00
B   172.10.0.160/29 [20/0] via 129.134.131.5, 00:00:00
B   172.10.0.168/29 [20/0] via 129.134.131.5, 00:00:00
B   172.10.0.200/30 [20/0] via 129.134.131.5, 00:00:00
B   192.168.60.0/24 [20/0] via 129.134.131.5, 00:00:00
D   192.168.61.0/24 [90/28416] via 41.79.200.10, 00:07:42, GigabitEthernet1/1/4
```

MS6

```
31.0.0.0/8 is variably subnetted, 10 subnets, 4 masks
B   31.200.58.0/28 [20/4] via 129.134.131.14, 00:00:00
B   31.200.58.16/28 [20/3] via 129.134.131.14, 00:00:00
B   31.200.58.32/30 [20/4] via 129.134.131.14, 00:00:00
B   31.200.58.36/30 [20/3] via 129.134.131.14, 00:00:00
B   31.200.58.40/30 [20/2] via 129.134.131.14, 00:00:00
B   31.200.58.44/30 [20/2] via 129.134.131.14, 00:00:00
B   31.200.58.48/30 [20/3] via 129.134.131.14, 00:00:00
B   31.200.58.52/30 [20/3] via 129.134.131.14, 00:00:00
B   31.200.58.56/29 [20/4] via 129.134.131.14, 00:00:00
B   31.200.58.66/32 [20/2] via 129.134.131.14, 00:00:00
41.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
B   41.79.200.0/30 [20/0] via 129.134.131.14, 00:00:00
B   41.79.200.8/30 [20/0] via 129.134.131.9, 00:00:00
C   41.79.200.12/30 is directly connected, GigabitEthernet1/1/1
O   41.79.200.16/29 [110/2] via 41.79.200.14, 00:07:03, GigabitEthernet1/1/1
129.134.0.0/30 is subnetted, 4 subnets
B   129.134.131.0 [20/0] via 129.134.131.14, 00:00:00
B   129.134.131.4 [20/0] via 129.134.131.9, 00:00:00
C   129.134.131.8 is directly connected, GigabitEthernet1/1/3
C   129.134.131.12 is directly connected, GigabitEthernet1/1/4
172.10.0.0/16 is variably subnetted, 15 subnets, 3 masks
B   172.10.0.0/28 [20/3] via 129.134.131.14, 00:00:00
B   172.10.0.16/28 [20/3] via 129.134.131.14, 00:00:00
B   172.10.0.48/28 [20/4] via 129.134.131.14, 00:00:00
B   172.10.0.64/28 [20/3] via 129.134.131.14, 00:00:00
B   172.10.0.80/28 [20/3] via 129.134.131.14, 00:00:00
B   172.10.0.96/29 [20/4] via 129.134.131.14, 00:00:00
B   172.10.0.104/29 [20/4] via 129.134.131.14, 00:00:00
B   172.10.0.112/29 [20/4] via 129.134.131.14, 00:00:00
B   172.10.0.120/29 [20/4] via 129.134.131.14, 00:00:00
B   172.10.0.136/29 [20/4] via 129.134.131.14, 00:00:00
B   172.10.0.144/29 [20/3] via 129.134.131.14, 00:00:00
B   172.10.0.152/29 [20/3] via 129.134.131.14, 00:00:00
B   172.10.0.160/29 [20/4] via 129.134.131.14, 00:00:00
B   172.10.0.168/29 [20/2] via 129.134.131.14, 00:00:00
B   172.10.0.200/30 [20/4] via 129.134.131.14, 00:00:00
B   192.168.60.0/24 [20/0] via 129.134.131.9, 00:00:00
B   192.168.61.0/24 [20/28416] via 129.134.131.9, 00:00:00
```

Реализация команды sh ip bgp neighbors MS3:

```
Switch#sh ip bgp neighb
BGP neighbor is 129.134.131.6, remote AS 10, external link
BGP version 4, remote router ID 129.134.131.9
BGP state = Established, up for 00:01:41
Last read 00:01:41, last write 00:01:41, hold time is 180, keepalive interval is 60 seconds
Neighbor capabilities:
  Route refresh: advertised and received(new)
  Address family IPv4 Unicast: advertised and received
Message statistics:
  InQ depth is 0
  OutQ depth is 0

      Sent      Rcvd
Opens:          1          1
Notifications:  0          0
Updates:        40         38
Keepalives:     2          2
Route Refresh:  0          3
Total:          43         44
Default minimum time between advertisements runs is 30 seconds

For address family: IPv4 Unicast
BGP table version 73, neighbor version 6/0
Output queue size : 0
Index 1, Offset 0, Mask 0x2
1 update-group member

Prefix activity:
      Sent      Rcvd
Prefixes Current:  40         35 (Consumes 1725 bytes)
Prefixes total:    40         35
Implicit Withdraw:  0          0
Explicit Withdraw:  0          0
Used as bestpath:  n/a         1
Used as multipath:  n/a         0

      Outbound   Inbound
Local Policy Denied Prefixes:  -----
Total:                          0          0
Number of NLRI in the update sent: max 3, min 1

Address tracking is enabled, the RIB does have a route to 129.134.131.6
Connections established 1; dropped 0
Last reset never
Transport(tcp) path-mtu-discovery is enabled
Connection state is ESTAB, I/O status: 1, unread input bytes: 0
Connection is ECN Disabled, Minimum incoming TTL 0, Outgoing TTL 1
Local host: 129.134.131.2, Local port: 1026
Foreign host: 129.134.131.1, Foreign port: 179
Connection tableid (VRF): 0

Enqueued packets for retransmit: 0, input: 0 mis-ordered: 0 (0 bytes)

Event Timers (current time is 0xC69F4):
Timer      Starts      Wakeups      Next
Retrans     0          0          0x0
TimeWait    0          0          0x0
AckHold     42         0          0x0
SendWnd     0          0          0x0
KeepAlive   2          0          0x0
GiveUp      0          0          0x0
PmtuAger    0          0          0x0
DeadWait    0          0          0x0
Linger      0          0          0x0
ProcessQ    0          0          0x0

iss: 2057115318  snduna: 2057115748  sndnxt: 2057115748  sndwnd: 15955
irs: 3480424370  rcvnxt: 3480424751  rcvwnd: 16004  delrcvwnd: 380

SRTT: 259 ms, RTTO: 579 ms, RTV: 320 ms, KRTT: 0 ms
minRTT: 16 ms, maxRTT: 300 ms, ACK hold: 200 ms
Status Flags: passive open, gen tcbs
Option Flags: nagle, path mtu capable
IP Precedence value : 6

Datagrams (max data segment is 1460 bytes):
Rcvd: 41 (out of order: 0), with data: 3, total data bytes: 72
Sent: 3 (retransmit: 0, fastretransmit: 0, partialack: 0, Second Congestion: 0), with data: 40, total data bytes: 960
Packets received in fast path: 0, fast processed: 0, slow path: 0
fast lock acquisition failures: 0, slow path: 0

BGP neighbor is 129.134.131.1, remote AS 6, external link
BGP version 4, remote router ID 129.134.131.14
BGP state = Established, up for 00:01:41
Last read 00:01:41, last write 00:01:41, hold time is 180, keepalive interval is 60 seconds
Neighbor capabilities:
  Route refresh: advertised and received(new)
  Address family IPv4 Unicast: advertised and received
Message statistics:
  InQ depth is 0
  OutQ depth is 0

      Sent      Rcvd
Opens:          1          1
Notifications:  0          0
Updates:        40         40
Keepalives:     2          2
Route Refresh:  0          5
Total:          43         48
Default minimum time between advertisements runs is 30 seconds

For address family: IPv4 Unicast
BGP table version 73, neighbor version 6/0
Output queue size : 0
Index 1, Offset 0, Mask 0x2
1 update-group member

Prefix activity:
      Sent      Rcvd
Prefixes Current:  40         35 (Consumes 1725 bytes)
Prefixes total:    40         35
Implicit Withdraw:  0          0
Explicit Withdraw:  0          0
Used as bestpath:  n/a         1
Used as multipath:  n/a         0

      Outbound   Inbound
Local Policy Denied Prefixes:  -----
Total:                          0          0
Number of NLRI in the update sent: max 3, min 1

Address tracking is enabled, the RIB does have a route to 129.134.131.1
Connections established 1; dropped 0
Last reset never
Transport(tcp) path-mtu-discovery is enabled
Connection state is ESTAB, I/O status: 1, unread input bytes: 0
Connection is ECN Disabled, Minimum incoming TTL 0, Outgoing TTL 1
Local host: 129.134.131.5, Local port: 179
Foreign host: 129.134.131.6, Foreign port: 1026
Connection tableid (VRF): 0

Enqueued packets for retransmit: 0, input: 0 mis-ordered: 0 (0 bytes)

Event Timers (current time is 0xC69F4):
Timer      Starts      Wakeups      Next
Retrans     0          0          0x0
TimeWait    0          0          0x0
AckHold     42         0          0x0
SendWnd     0          0          0x0
KeepAlive   2          0          0x0
GiveUp      0          0          0x0
PmtuAger    0          0          0x0
DeadWait    0          0          0x0
Linger      0          0          0x0
ProcessQ    0          0          0x0

iss: 2057115318  snduna: 2057115748  sndnxt: 2057115748  sndwnd: 15955
irs: 3480424370  rcvnxt: 3480424751  rcvwnd: 16004  delrcvwnd: 380

SRTT: 259 ms, RTTO: 579 ms, RTV: 320 ms, KRTT: 0 ms
minRTT: 16 ms, maxRTT: 300 ms, ACK hold: 200 ms
Status Flags: passive open, gen tcbs
Option Flags: nagle, path mtu capable
IP Precedence value : 6

Datagrams (max data segment is 1460 bytes):
Rcvd: 41 (out of order: 0), with data: 3, total data bytes: 72
Sent: 3 (retransmit: 0, fastretransmit: 0, partialack: 0, Second Congestion: 0), with data: 40, total data bytes: 960
Packets received in fast path: 0, fast processed: 0, slow path: 0
fast lock acquisition failures: 0, slow path: 0
```

Реализация команды sh ip bgp summary:

```
Switch#sh ip bgp summary
BGP router identifier 129.134.131.5, local AS number 8
BGP table version is 73, main routing table version 6
72 network entries using 9504 bytes of memory
72 path entries using 3744 bytes of memory
68/65 BGP path/bestpath attribute entries using 12236 bytes of memory
4 BGP AS-PATH entries using 96 bytes of memory
0 BGP route-map cache entries using 0 bytes of memory
0 BGP filter-list cache entries using 0 bytes of memory
Bitfield cache entries: current 1 (at peak 1) using 32 bytes of memory
BGP using 25612 total bytes of memory
BGP activity 35/0 prefixes, 72/0 paths, scan interval 60 secs

Neighbor      V      AS MsgRcvd MsgSent  TblVer  InQ OutQ Up/Down  State/PfxRcd
129.134.131.6  4      10      45      7        73    0    0 00:05:19      4
129.134.131.1  4       6      47      7        73    0    0 00:05:19      4
```

6. Реализация команды nslookup для доменных имен а также конфигурация всех днс-серверов Laptop4

```
C:\>nslookup

Server: [41.79.200.19]
Address: 41.79.200.19

>|

C:\>nslookup iot.by

Server: [41.79.200.19]
Address: 41.79.200.19

Non-authoritative answer:
Name: iot.by
Address: 31.200.58.58

C:\>nslookup security.by

Server: [41.79.200.19]
Address: 41.79.200.19

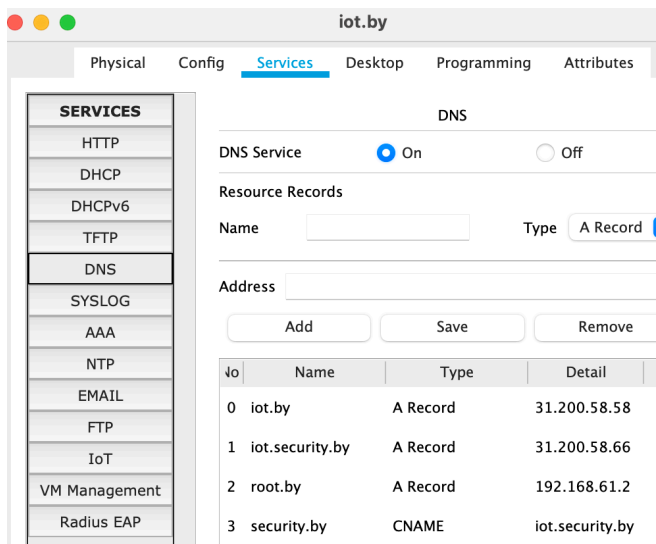
Non-authoritative answer:
Name: iot.security.by
Address: 31.200.58.66

Aliases: iot.security.by

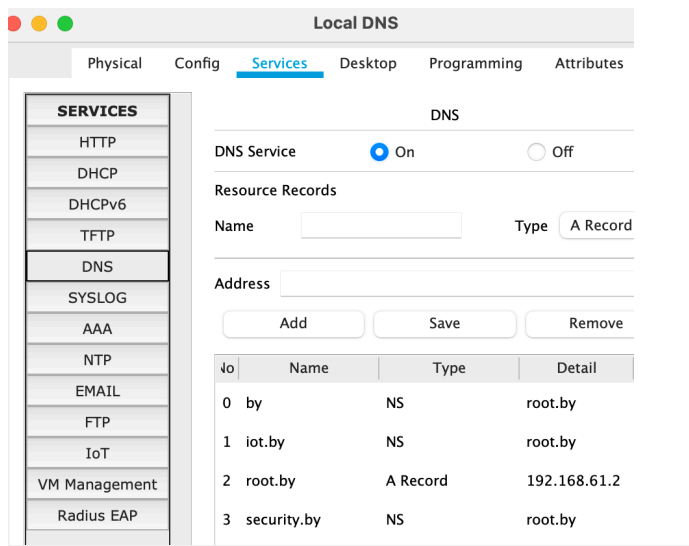
C:\>nslookup root.by

Server: [41.79.200.19]
Address: 41.79.200.19

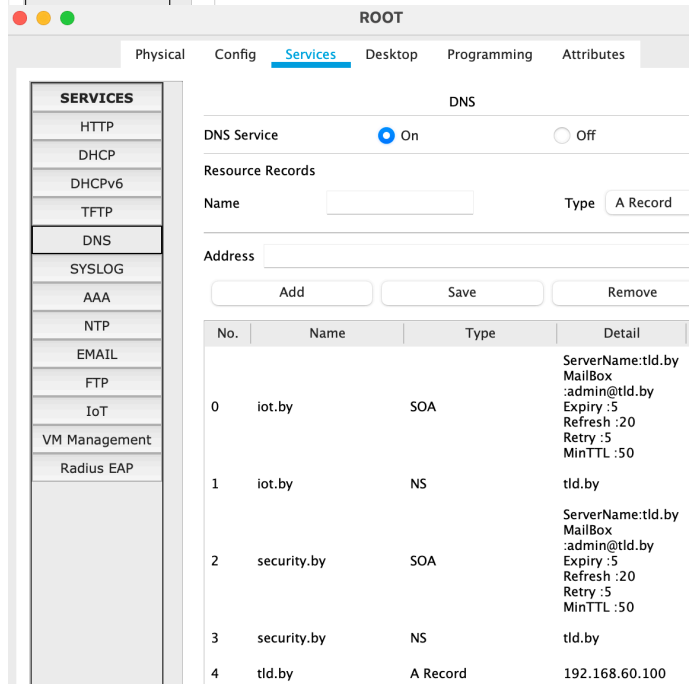
Non-authoritative answer:
Name: root.by
Address: 192.168.61.2
```



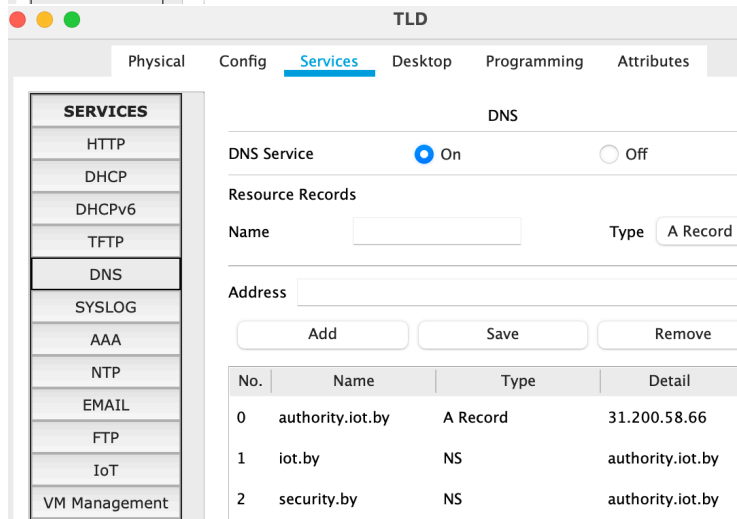
No.	Name	Type	Detail
0	iot.by	A Record	31.200.58.58
1	iot.security.by	A Record	31.200.58.66
2	root.by	A Record	192.168.61.2
3	security.by	CNAME	iot.security.by



No.	Name	Type	Detail
0	by	NS	root.by
1	iot.by	NS	root.by
2	root.by	A Record	192.168.61.2
3	security.by	NS	root.by



No.	Name	Type	Detail
0	iot.by	SOA	ServerName:tld.by MailBox :admin@tld.by Expiry :5 Refresh :20 Retry :5 MinTTL :50
1	iot.by	NS	tld.by
2	security.by	SOA	ServerName:tld.by MailBox :admin@tld.by Expiry :5 Refresh :20 Retry :5 MinTTL :50
3	security.by	NS	tld.by
4	tld.by	A Record	192.168.60.100



No.	Name	Type	Detail
0	authority.iot.by	A Record	31.200.58.66
1	iot.by	NS	authority.iot.by
2	security.by	NS	authority.iot.by

7. Реализация успешной передачи ключей аутентификации OSPF MS5

```
00:00:10: OSPF: Send with youngest Key 72
00:00:10: OSPF: Interface GigabitEthernet1/0/1 going Up
00:00:10: OSPF: Rcv hello from 45.45.45.49 area 0 from GigabitEthernet1/0/1 41.79.200.1
00:00:20: OSPF: Send with youngest Key 72
00:00:20: OSPF: Rcv hello from 45.45.45.49 area 0 from GigabitEthernet1/0/1 41.79.200.1
00:00:20: OSPF: 2 Way Communication to 45.45.45.49 on GigabitEthernet1/0/1, state 2WAY
00:00:20: OSPF: End of hello processing
00:00:20: OSPF: Neighbor change Event on interface GigabitEthernet1/0/1
00:00:30: OSPF: Send with youngest Key 72
```

Реализация успешной передачи ключей аутентификации EIGRP MS4

```
EIGRP: Received HELLO on GigabitEthernet1/1/4 nbr 41.79.200.10
      AS 10, Flags 0x0, Seq 68/0 idbQ 0/0
EIGRP: Sending HELLO on GigabitEthernet1/1/4
      AS 10, Flags 0x0, Seq 39/0 idbQ 0/0 iidbQ un/rely 0/0
EIGRP: Received packet with MD5 authentication, key id = 10
EIGRP: Received HELLO on GigabitEthernet1/1/4 nbr 41.79.200.10
      AS 10, Flags 0x0, Seq 68/0 idbQ 0/0
EIGRP: Sending HELLO on GigabitEthernet1/1/4
      AS 10, Flags 0x0, Seq 39/0 idbQ 0/0 iidbQ un/rely 0/0
EIGRP: Received packet with MD5 authentication, key id = 10
EIGRP: Received HELLO on GigabitEthernet1/1/4 nbr 41.79.200.10
      AS 10, Flags 0x0, Seq 68/0 idbQ 0/0
```

Вывод: организовала сеть с несколькими областями с использованием протоколов OSPF, RIP, EIGRP, BGP; настроила аутентификацию на коммутаторах третьего уровня.

