

# Лабораторная работа 4. Устранение неполадок в работе протокола RIP

Цель работы:

Установить и устранить неисправности в работе протокола RIP.

Схема стенда:

Схема соединения маршрутизаторов в лабораторном стенде для выполнения лабораторной работы № 4 представлена на рисунке 4.

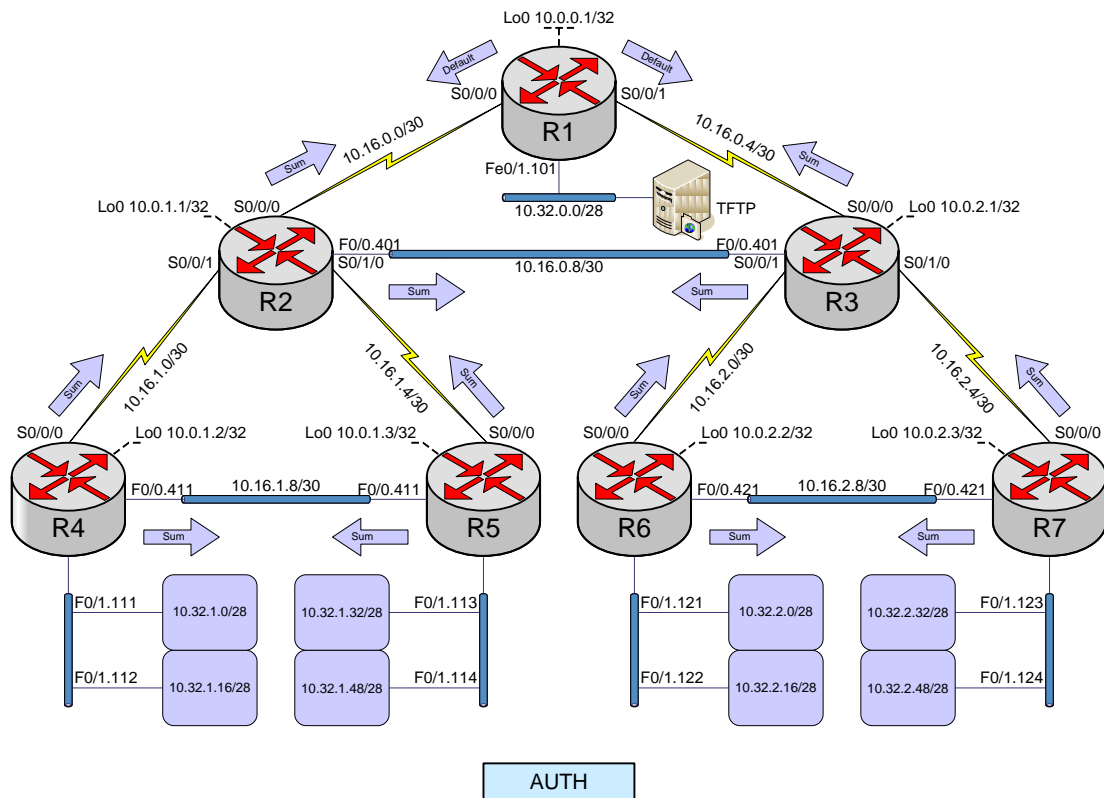


Рисунок 4 – Структурная схема стенда лабораторной работы №4

Список основных команд необходимых для выполнения лабораторной работы приводится в таблице 4.

Таблица 4 – Основные команды для лабораторной работы № 4

Команда	Описание
#clear ip route *	Отчистка таблицы маршрутизации.
#debug ip rip [event]	Включение режима отладки процесса маршрутизации RIP.
#show key chain [ <i>name-of-chain</i> ]	Вывод параметров ключевых групп настроенных на маршрутизаторе.

## Задание 1. Анализ неисправностей в работе протокола RIP

В этом задании необходимо провести анализ работы протокола RIP на маршрутизаторах лабораторного стенда, выявить и устранить неисправности, на каждом маршрутизаторе не менее пяти неисправностей. Ниже приведены параметры правильной работы маршрутизаторов стенда.

### R1

```
r1#show ip protocols
```

```
Routing Protocol is "rip"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Sending updates every 30 seconds, next due in 8 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Redistributing: rip
  Default version control: send version 2, receive version 2
  Interface          Send  Recv  Triggered RIP  Key-chain
  Serial0/0/0        2     2
  Serial0/0/1        2     2
  AUTH
  AUTH
  Automatic network summarization is not in effect
  Maximum path: 4
  Routing for Networks:
    10.0.0.0
  Passive Interface(s):
    FastEthernet0/0
    FastEthernet0/1
    FastEthernet0/1.101
    Loopback0
    VoIP-Null0
  Routing Information Sources:
    Gateway          Distance      Last Update
    10.16.0.2        120          00:00:20
    10.16.0.6        120          00:00:29
  Distance: (default is 120)
```

```
r1#show ip route
```

```
Gateway of last resort is not set
  10.0.0.0/8 is variably subnetted, 11 subnets, 4 masks
R       10.0.2.0/30 [120/1] via 10.16.0.6, 00:00:08, Serial0/0/1
R       10.0.1.0/30 [120/1] via 10.16.0.2, 00:00:27, Serial0/0/0
C       10.0.0.1/32 is directly connected, Loopback0
R       10.16.0.8/30 [120/1] via 10.16.0.6, 00:00:08, Serial0/0/1
        [120/1] via 10.16.0.2, 00:00:27, Serial0/0/0
R       10.16.2.0/28 [120/1] via 10.16.0.6, 00:00:08, Serial0/0/1
C       10.16.0.0/30 is directly connected, Serial0/0/0
R       10.16.1.0/28 [120/1] via 10.16.0.2, 00:00:27, Serial0/0/0
C       10.16.0.4/30 is directly connected, Serial0/0/1
R       10.32.2.0/26 [120/2] via 10.16.0.6, 00:00:08, Serial0/0/1
C       10.32.0.0/28 is directly connected, FastEthernet0/1.101
R       10.32.1.0/26 [120/2] via 10.16.0.2, 00:00:27, Serial0/0/0
```

```
r1#show key chain AUTH
```

```
Key-chain AUTH:
  key 1 -- text "itsapassword"
    accept lifetime (always valid) - (always valid) [valid now]
    send lifetime (always valid) - (always valid) [valid now]
```

## R2

### r2#show ip protocols

```
Routing Protocol is "rip"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Sending updates every 30 seconds, next due in 25 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Redistributing: rip
  Default version control: send version 2, receive version 2
    Interface             Send  Recv  Triggered RIP  Key-chain
  FastEthernet0/0.401    2      2
  Serial0/0/0             2      2
  Serial0/0/1             2      2
  Serial0/1/0             2      2
                          AUTH
                          AUTH
                          AUTH
                          AUTH
  Automatic network summarization is not in effect
  Address Summarization:
    10.32.1.0/26 for FastEthernet0/0.401
    10.0.1.0/30 for FastEthernet0/0.401
    10.16.1.0/28 for FastEthernet0/0.401
    10.32.1.0/26 for Serial0/0/0
    10.16.1.0/28 for Serial0/0/0
    10.0.1.0/30 for Serial0/0/0
  Maximum path: 4
  Routing for Networks:
    10.0.0.0
  Passive Interface(s):
    FastEthernet0/0
    FastEthernet0/1
    Serial0/1/1
    Serial0/3/0
    Serial0/3/1
    Loopback0
    VoIP-Null0
  Routing Information Sources:
    Gateway         Distance      Last Update
  10.16.0.10        120           00:00:21
  10.16.1.2         120           00:00:08
  10.16.0.1         120           00:00:10
  10.16.1.6         120           00:00:11
  Distance: (default is 120)
```

### r2#show ip route

```
Gateway of last resort is 10.16.0.1 to network 0.0.0.0
 10.0.0.0/8 is variably subnetted, 16 subnets, 5 masks
R    10.0.2.0/30 [120/1] via 10.16.0.10, 00:00:11, FastEthernet0/0.401
R    10.0.1.3/32 [120/1] via 10.16.1.6, 00:00:27, Serial0/1/0
R    10.0.1.2/32 [120/1] via 10.16.1.2, 00:00:01, Serial0/0/1
C    10.0.1.1/32 is directly connected, Loopback0
R    10.32.1.32/27 [120/1] via 10.16.1.6, 00:00:27, Serial0/1/0
R    10.0.0.1/32 [120/1] via 10.16.0.1, 00:00:01, Serial0/0/0
C    10.16.0.8/30 is directly connected, FastEthernet0/0.401
R    10.16.1.8/30 [120/1] via 10.16.1.6, 00:00:27, Serial0/1/0
      [120/1] via 10.16.1.2, 00:00:01, Serial0/0/1
R    10.16.2.0/28 [120/1] via 10.16.0.10, 00:00:11, FastEthernet0/0.401
C    10.16.0.0/30 is directly connected, Serial0/0/0
C    10.16.1.0/30 is directly connected, Serial0/0/1
R    10.16.0.4/30 [120/1] via 10.16.0.10, 00:00:18, FastEthernet0/0.401
      [120/1] via 10.16.0.1, 00:00:09, Serial0/0/0
C    10.16.1.4/30 is directly connected, Serial0/1/0
R    10.32.2.0/26 [120/2] via 10.16.0.10, 00:00:18, FastEthernet0/0.401
R    10.32.0.0/28 [120/1] via 10.16.0.1, 00:00:09, Serial0/0/0
R    10.32.1.0/27 [120/1] via 10.16.1.2, 00:00:08, Serial0/0/1
R*   0.0.0.0/0 [120/1] via 10.16.0.1, 00:00:09, Serial0/0/0
```

r2#show key chain AUTH

Key-chain AUTH:

key 1 -- text "itsapassword"

accept lifetime (always valid) - (always valid) [valid now]

send lifetime (always valid) - (always valid) [valid now]

## R3

r3#show ip protocols

Routing Protocol is "rip"

Outgoing update filter list for all interfaces is not set

Incoming update filter list for all interfaces is not set

Sending updates every 30 seconds, next due in 10 seconds

Invalid after 180 seconds, hold down 180, flushed after 240

Redistributing: rip

Default version control: send version 2, receive version 2

Interface	Send	Recv	Triggered RIP	Key-chain
FastEthernet0/0.401	2	2		AUTH
Serial0/0/0	2	2		AUTH
Serial0/0/1	2	2		AUTH
Serial0/1/0	2	2		AUTH

Automatic network summarization is not in effect

Address Summarization:

10.32.2.0/26 for FastEthernet0/0.401

10.16.2.0/28 for FastEthernet0/0.401

10.0.2.0/30 for FastEthernet0/0.401

10.32.2.0/26 for Serial0/0/0

10.16.2.0/28 for Serial0/0/0

10.0.2.0/30 for Serial0/0/0

Maximum path: 4

Routing for Networks:

10.0.0.0

Passive Interface(s):

FastEthernet0/0

FastEthernet0/1

Serial0/1/1

Serial0/3/0

Serial0/3/1

Loopback0

VoIP-Null0

Routing Information Sources:

Gateway	Distance	Last Update
---------	----------	-------------

10.16.0.9	120	00:00:00
-----------	-----	----------

10.16.2.2	120	00:00:05
-----------	-----	----------

10.16.2.6	120	00:00:15
-----------	-----	----------

10.16.0.5	120	00:00:15
-----------	-----	----------

Distance: (default is 120)

r3#show key chain AUTH

Key-chain AUTH:

key 1 -- text "itsapassword"

accept lifetime (always valid) - (always valid) [valid now]

send lifetime (always valid) - (always valid) [valid now]

### r3#show ip route

```
Gateway of last resort is 10.16.0.5 to network 0.0.0.0
 10.0.0.0/8 is variably subnetted, 16 subnets, 5 masks
R    10.32.2.32/27 [120/1] via 10.16.2.6, 00:00:16, Serial0/1/0
C    10.0.2.1/32 is directly connected, Loopback0
R    10.0.2.2/32 [120/1] via 10.16.2.2, 00:00:00, Serial0/0/1
R    10.0.2.3/32 [120/1] via 10.16.2.6, 00:00:16, Serial0/1/0
R    10.0.1.0/30 [120/1] via 10.16.0.9, 00:00:22, FastEthernet0/0.401
R    10.0.0.1/32 [120/1] via 10.16.0.5, 00:00:17, Serial0/0/0
R    10.16.2.8/30 [120/1] via 10.16.2.6, 00:00:16, Serial0/1/0
      [120/1] via 10.16.2.2, 00:00:00, Serial0/0/1
C    10.16.0.8/30 is directly connected, FastEthernet0/0.401
C    10.16.2.0/30 is directly connected, Serial0/0/1
R    10.16.0.0/30 [120/1] via 10.16.0.9, 00:00:22, FastEthernet0/0.401
      [120/1] via 10.16.0.5, 00:00:17, Serial0/0/0
R    10.16.1.0/28 [120/1] via 10.16.0.9, 00:00:24, FastEthernet0/0.401
C    10.16.2.4/30 is directly connected, Serial0/1/0
C    10.16.0.4/30 is directly connected, Serial0/0/0
R    10.32.2.0/27 [120/1] via 10.16.2.2, 00:00:02, Serial0/0/1
R    10.32.0.0/28 [120/1] via 10.16.0.5, 00:00:19, Serial0/0/0
R    10.32.1.0/26 [120/2] via 10.16.0.9, 00:00:24, FastEthernet0/0.401
R*   0.0.0.0/0 [120/1] via 10.16.0.5, 00:00:19, Serial0/0/0
```

### R4

#### r4#show ip protocols

```
Routing Protocol is "rip"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Sending updates every 30 seconds, next due in 14 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Redistributing: rip
  Default version control: send version 2, receive version 2
    Interface          Send  Recv  Triggered RIP  Key-chain
  FastEthernet0/0.411  2     2
                               AUTH
  Serial0/0/0         2     2
                               AUTH
  Automatic network summarization is not in effect
  Address Summarization:
    10.32.1.0/27 for FastEthernet0/0.411
    10.32.1.0/27 for Serial0/0/0
  Maximum path: 4
  Routing for Networks:
    10.0.0.0
  Passive Interface(s):
    FastEthernet0/0
    FastEthernet0/1
    FastEthernet0/1.111
    FastEthernet0/1.112
    Serial0/0/1
    Loopback0
    VoIP-Null0
  Routing Information Sources:
    Gateway          Distance    Last Update
    10.16.1.10       120        00:00:12
    10.16.1.1        120        00:00:15
  Distance: (default is 120)
```

#### r4#show key chain AUTH

```
Key-chain AUTH:
  key 1 -- text "itsapassword"
    accept lifetime (always valid) - (always valid) [valid now]
    send lifetime (always valid) - (always valid) [valid now]
```

## r4#show ip route

```
Gateway of last resort is 10.16.1.1 to network 0.0.0.0
 10.0.0.0/8 is variably subnetted, 17 subnets, 5 masks
R    10.0.2.0/30 [120/2] via 10.16.1.1, 00:00:25, Serial0/0/0
R    10.0.1.3/32 [120/1] via 10.16.1.10, 00:00:18, FastEthernet0/0.411
C    10.0.1.2/32 is directly connected, Loopback0
R    10.0.1.1/32 [120/1] via 10.16.1.1, 00:00:25, Serial0/0/0
R    10.32.1.32/27 [120/1] via 10.16.1.10, 00:00:18, FastEthernet0/0.411
R    10.0.0.1/32 [120/2] via 10.16.1.1, 00:00:25, Serial0/0/0
R    10.16.0.8/30 [120/1] via 10.16.1.1, 00:00:25, Serial0/0/0
C    10.16.1.8/30 is directly connected, FastEthernet0/0.411
R    10.16.2.0/28 [120/2] via 10.16.1.1, 00:00:25, Serial0/0/0
R    10.16.0.0/30 [120/1] via 10.16.1.1, 00:00:25, Serial0/0/0
C    10.16.1.0/30 is directly connected, Serial0/0/0
R    10.16.0.4/30 [120/2] via 10.16.1.1, 00:00:25, Serial0/0/0
R    10.16.1.4/30 [120/1] via 10.16.1.10, 00:00:19, FastEthernet0/0.411
        [120/1] via 10.16.1.1, 00:00:26, Serial0/0/0
R    10.32.2.0/26 [120/3] via 10.16.1.1, 00:00:26, Serial0/0/0
R    10.32.0.0/28 [120/2] via 10.16.1.1, 00:00:26, Serial0/0/0
C    10.32.1.0/28 is directly connected, FastEthernet0/1.111
C    10.32.1.16/28 is directly connected, FastEthernet0/1.112
R*   0.0.0.0/0 [120/2] via 10.16.1.1, 00:00:26, Serial0/0/0
```

## R5

### r5#show ip protocols

```
Routing Protocol is "rip"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Sending updates every 30 seconds, next due in 28 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Redistributing: rip
  Default version control: send version 2, receive version 2
    Interface          Send  Recv  Triggered RIP  Key-chain
  FastEthernet0/0.411  2     2           AUTH
  Serial0/0/0          2     2           AUTH
  Automatic network summarization is not in effect
  Address Summarization:
    10.32.1.32/27 for FastEthernet0/0.411
    10.32.1.32/27 for Serial0/0/0
  Maximum path: 4
  Routing for Networks:
    10.0.0.0
  Passive Interface(s):
    FastEthernet0/0
    FastEthernet0/1
    FastEthernet0/1.113
    FastEthernet0/1.114
    Serial0/0/1
    Loopback0
    VoIP-Null0
  Routing Information Sources:
    Gateway          Distance    Last Update
    10.16.1.9         120        00:00:09
    10.16.1.5         120        00:00:09
  Distance: (default is 120)
```

### r5#show key chain AUTH

```
Key-chain AUTH:
  key 1 -- text "itsapassword"
    accept lifetime (always valid) - (always valid) [valid now]
    send lifetime (always valid) - (always valid) [valid now]
```

**r5#show ip route**

```
.. .. .
Gateway of last resort is 10.16.1.5 to network 0.0.0.0
 10.0.0.0/8 is variably subnetted, 17 subnets, 5 masks
R    10.0.2.0/30 [120/2] via 10.16.1.5, 00:00:10, Serial0/0/0
C    10.0.1.3/32 is directly connected, Loopback0
R    10.0.1.2/32 [120/1] via 10.16.1.9, 00:00:10, FastEthernet0/0.411
R    10.0.1.1/32 [120/1] via 10.16.1.5, 00:00:10, Serial0/0/0
C    10.32.1.32/28 is directly connected, FastEthernet0/1.113
R    10.0.0.1/32 [120/2] via 10.16.1.5, 00:00:10, Serial0/0/0
R    10.16.0.8/30 [120/1] via 10.16.1.5, 00:00:10, Serial0/0/0
C    10.16.1.8/30 is directly connected, FastEthernet0/0.411
R    10.16.2.0/28 [120/2] via 10.16.1.5, 00:00:10, Serial0/0/0
R    10.16.0.0/30 [120/1] via 10.16.1.5, 00:00:10, Serial0/0/0
C    10.32.1.48/28 is directly connected, FastEthernet0/1.114
R    10.16.1.0/30 [120/1] via 10.16.1.9, 00:00:11, FastEthernet0/0.411
        [120/1] via 10.16.1.5, 00:00:10, Serial0/0/0
R    10.16.0.4/30 [120/2] via 10.16.1.5, 00:00:11, Serial0/0/0
C    10.16.1.4/30 is directly connected, Serial0/0/0
R    10.32.2.0/26 [120/3] via 10.16.1.5, 00:00:11, Serial0/0/0
R    10.32.0.0/28 [120/2] via 10.16.1.5, 00:00:11, Serial0/0/0
R    10.32.1.0/27 [120/1] via 10.16.1.9, 00:00:12, FastEthernet0/0.411
R*   0.0.0.0/0 [120/2] via 10.16.1.5, 00:00:11, Serial0/0/0
```

## R6

**r6#show ip protocols**

```
Routing Protocol is "rip"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Sending updates every 30 seconds, next due in 27 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Redistributing: rip
  Default version control: send version 2, receive version 2
    Interface          Send  Recv  Triggered RIP  Key-chain
  FastEthernet0/0.421  2     2
  Serial0/0/0          2     2              AUTH
  Automatic network summarization is not in effect
  Address Summarization:
    10.32.2.0/27 for FastEthernet0/0.421
    10.32.2.0/27 for Serial0/0/0
  Maximum path: 4
  Routing for Networks:
    10.0.0.0
  Passive Interface(s):
    FastEthernet0/0
    FastEthernet0/1
    FastEthernet0/1.121
    FastEthernet0/1.122
    Serial0/0/1
    Loopback0
    VoIP-Null0
  Routing Information Sources:
    Gateway          Distance    Last Update
    10.16.2.10       120         00:00:10
    10.16.2.1        120         00:00:22
  Distance: (default is 120)
```

**r6#show key chain AUTH**

```
Key-chain AUTH:
  key 1 -- text "itsapassword"
    accept lifetime (always valid) - (always valid) [valid now]
    send lifetime (always valid) - (always valid) [valid now]
```



## **r6#show ip route**

```
Gateway of last resort is 10.16.2.1 to network 0.0.0.0
 10.0.0.0/8 is variably subnetted, 17 subnets, 5 masks
R    10.32.2.32/27 [120/1] via 10.16.2.10, 00:00:14, FastEthernet0/0.421
R    10.0.2.1/32 [120/1] via 10.16.2.1, 00:00:22, Serial0/0/0
C    10.0.2.2/32 is directly connected, Loopback0
R    10.0.2.3/32 [120/1] via 10.16.2.10, 00:00:14, FastEthernet0/0.421
R    10.0.1.0/30 [120/2] via 10.16.2.1, 00:00:22, Serial0/0/0
R    10.0.0.1/32 [120/2] via 10.16.2.1, 00:00:22, Serial0/0/0
C    10.16.2.8/30 is directly connected, FastEthernet0/0.421
R    10.16.0.8/30 [120/1] via 10.16.2.1, 00:00:23, Serial0/0/0
C    10.16.2.0/30 is directly connected, Serial0/0/0
R    10.16.0.0/30 [120/2] via 10.16.2.1, 00:00:23, Serial0/0/0
R    10.16.1.0/28 [120/2] via 10.16.2.1, 00:00:23, Serial0/0/0
R    10.16.2.4/30 [120/1] via 10.16.2.10, 00:00:15, FastEthernet0/0.421
      [120/1] via 10.16.2.1, 00:00:23, Serial0/0/0
R    10.16.0.4/30 [120/1] via 10.16.2.1, 00:00:23, Serial0/0/0
C    10.32.2.0/28 is directly connected, FastEthernet0/1.121
R    10.32.0.0/28 [120/2] via 10.16.2.1, 00:00:23, Serial0/0/0
R    10.32.1.0/26 [120/3] via 10.16.2.1, 00:00:23, Serial0/0/0
C    10.32.2.16/28 is directly connected, FastEthernet0/1.122
R*   0.0.0.0/0 [120/2] via 10.16.2.1, 00:00:23, Serial0/0/0
```

## **R7**

### **r7#show ip protocols**

```
Routing Protocol is "rip"
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Sending updates every 30 seconds, next due in 18 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Redistributing: rip
  Default version control: send version 2, receive version 2
    Interface          Send  Recv  Triggered RIP  Key-chain
  FastEthernet0/0.421  2     2     0               AUTH
  Serial0/0/0          2     2     0               AUTH
  Automatic network summarization is not in effect
  Address Summarization:
    10.32.2.32/27 for FastEthernet0/0.421
    10.32.2.32/27 for Serial0/0/0
  Maximum path: 4
  Routing for Networks:
    10.0.0.0
  Passive Interface(s):
    FastEthernet0/0
    FastEthernet0/1
    FastEthernet0/1.123
    FastEthernet0/1.124
    Serial0/0/1
    Loopback0
    VoIP-Null0
  Routing Information Sources:
    Gateway          Distance    Last Update
    10.16.2.9         120         00:00:07
    10.16.2.5         120         00:00:11
  Distance: (default is 120)
```

### **r7#show key chain AUTH**

```
Key-chain AUTH:
  key 1 -- text "itsapassword"
    accept lifetime (always valid) - (always valid) [valid now]
    send lifetime (always valid) - (always valid) [valid now]
```

**r7#show ip route**

```
Gateway of last resort is 10.16.2.5 to network 0.0.0.0
 10.0.0.0/8 is variably subnetted, 17 subnets, 5 masks
C    10.32.2.32/28 is directly connected, FastEthernet0/1.123
R    10.0.2.1/32 [120/1] via 10.16.2.5, 00:00:10, Serial0/0/0
R    10.0.2.2/32 [120/1] via 10.16.2.9, 00:00:03, FastEthernet0/0.421
C    10.0.2.3/32 is directly connected, Loopback0
R    10.0.1.0/30 [120/2] via 10.16.2.5, 00:00:10, Serial0/0/0
R    10.0.0.1/32 [120/2] via 10.16.2.5, 00:00:11, Serial0/0/0
C    10.16.2.8/30 is directly connected, FastEthernet0/0.421
R    10.16.0.8/30 [120/1] via 10.16.2.5, 00:00:11, Serial0/0/0
C    10.32.2.48/28 is directly connected, FastEthernet0/1.124
R    10.16.2.0/30 [120/1] via 10.16.2.9, 00:00:03, FastEthernet0/0.421
      [120/1] via 10.16.2.5, 00:00:11, Serial0/0/0
R    10.16.0.0/30 [120/2] via 10.16.2.5, 00:00:11, Serial0/0/0
R    10.16.1.0/28 [120/2] via 10.16.2.5, 00:00:13, Serial0/0/0
C    10.16.2.4/30 is directly connected, Serial0/0/0
R    10.16.0.4/30 [120/1] via 10.16.2.5, 00:00:13, Serial0/0/0
R    10.32.2.0/27 [120/1] via 10.16.2.9, 00:00:06, FastEthernet0/0.421
R    10.32.0.0/28 [120/2] via 10.16.2.5, 00:00:13, Serial0/0/0
R    10.32.1.0/26 [120/3] via 10.16.2.5, 00:00:13, Serial0/0/0
R*   0.0.0.0/0 [120/2] via 10.16.2.5, 00:00:13, Serial0/0/0
```