

Dynamic routing - RIP protocol

RIP protocol - Routing Information Protocol (RIP), it is a vector algorithm used for automatic selection of packet routes leading to the destination. It is used in autonomous systems using IPv4 and IPv6. Today's open standard for RIP is described in RFC 1058 and STD 56. Currently, the second version of RIP (RIPv2) is the most widely used.

Features of the RIP protocol

- routing works based on the distance vector,
- only the number of hops (the number of consecutive routers on a given route) is used to create a metric,
- if the hop count reaches 15, packets on the next router will be dropped
- routing updates are broadcast only to neighboring routers,
- RIP sends information about routes at fixed intervals (by default, every 30 seconds) and after each network topology change,
- despite the fact that this algorithm is old, and there are more advanced protocols for exchanging information about routes, RIP is still in use.
- It is well described and easy to set up and use. the disadvantages of the RIP protocol are slow convergence time (in other words, long convergence time), inability to scale above 15 hops, as well as the selection of less than optimal paths, which makes it recommended only for small local networks.
- RIP protocol updates are transferred via UDP on port 520 (the second version uses multicast technology to the address 224.0.0.9).
- RIP in the first version is a classful routing protocol, in the second version - classless,
- the standard administrative distance for RIP is 120. The smaller the value, the more trustworthy the data source.
- Values can be in the range 0 - 255.

RIPv2 extensions

- Next hop - has the ability to broadcast a next hop other than the router that provides the routing update. This is an advantage for static routes to a silent router that does not use RIP,
- Network mask - RIPv2 adds the ability to specify a network mask with each network in the packet,
- Authentication - simple password, md5 algorithm, or HMAC-SHA1,
- Multicast - can send messages between routers to the address 224.0.0.9

Test setup

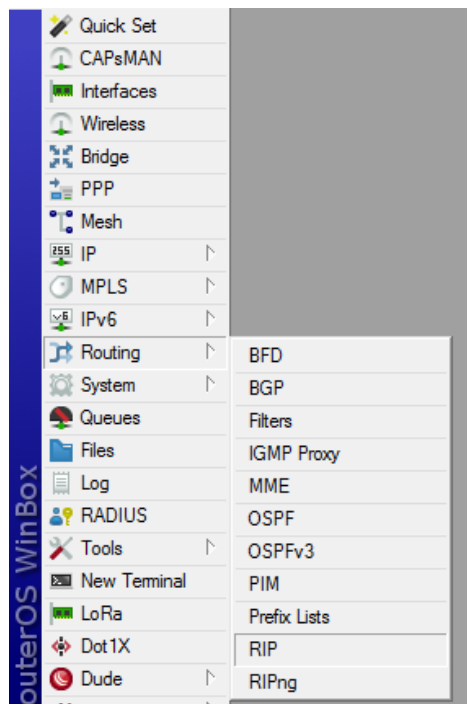
R1:

- lan1 card: - WAN interface: 192.168.1.189/24 DHCP Client
- lan2 card (r1_a) - interface: 172.22.10.1/24 - DHCP server, gateway 172.22.10.1, DNS: 192.168.1.1
- lan3(network) card - interface: 10.10.10.1/30 without DHCP server

R2:

- lan1 card: - WAN interface: 192.168.1.72/24 DHCP Client
- lan2 card (r2_a) - interface: 172.22.20.1/24 - DHCP server, gateway 172.22.20.1, DNS: 192.168.1.1
- lan3(network) card - interface: 10.10.10.2/30 without DHCP server

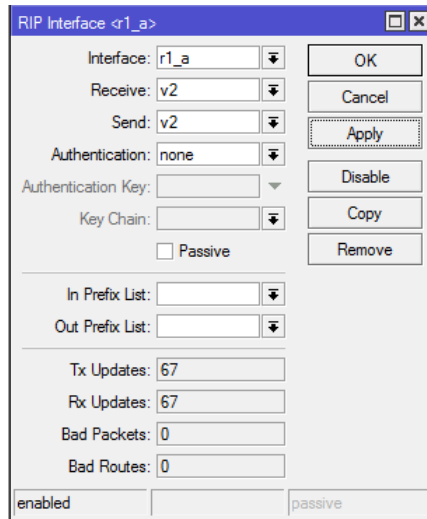
RIP configuration process



R1:

- Interfaces:
 - interface: lan1
 - Receive: v2
 - Send: v2
 - Auth: none
 - Passive: none (if other hosts are connected to the interface, we must check the passive on option)

- networks:
 - 10.10.10.0/30
 - 172.22.10.0/24



RIP Interface <r1_a>

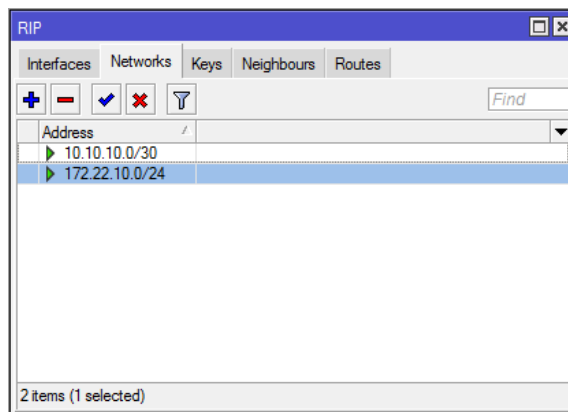
Interface: r1_a
Receive: v2
Send: v2
Authentication: none
Authentication Key:
Key Chain:
 Passive

In Prefix List:
Out Prefix List:

Tx Updates: 67
Rx Updates: 67
Bad Packets: 0
Bad Routes: 0

enabled passive

Buttons: OK, Cancel, Apply, Disable, Copy, Remove



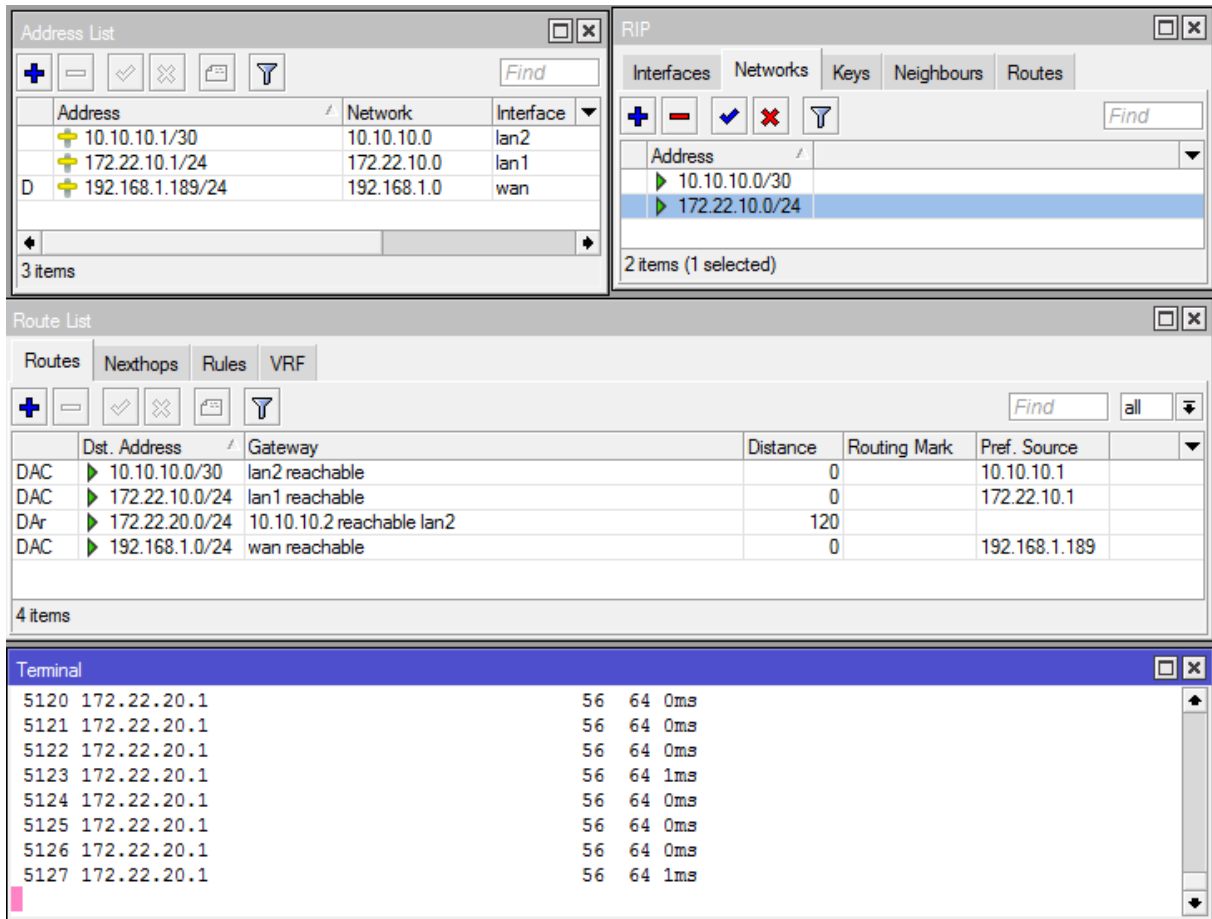
RIP

Interfaces Networks Keys Neighbours Routes

+ - ✓ ✗ ⌵ Find

Address
▶ 10.10.10.0/30
▶ 172.22.10.0/24

2 items (1 selected)



R2:

- Interfaces:
 - interface: lan1
 - Receive: v2
 - Send: v2
 - Auth: none
 - Passive: none
- networks:
 - 10.10.10.0/30
 - 172.22.20.0/24

RIP Interface <r2_a>

Interface: r2_a

Receive: v2

Send: v2

Authentication: none

Authentication Key:

Key Chain:

Passive

In Prefix List:

Out Prefix List:

Tx Updates: 79

Rx Updates: 79

Bad Packets: 0

Bad Routes: 0

enabled passive

Buttons: OK, Cancel, Apply, Disable, Copy, Remove

RIP

Interfaces Networks Keys Neighbours Routes

Address

- ▶ 10.10.10.0/30
- ▶ 172.22.20.0/24

2 items (1 selected)

Address List

Address	Network	Interface
▶ 10.10.10.2/30	10.10.10.0	lan2
▶ 172.22.20.1/24	172.22.20.0	lan1
D ▶ 192.168.1.72/24	192.168.1.0	wan

3 items (1 selected)

RIP

Interfaces Networks Keys Neighbours Routes

Address

- ▶ 10.10.10.0/30
- ▶ 172.22.20.0/24

2 items (1 selected)

Route List

Routes	Nexthops	Rules	VRF	Distance	Routing Mark	Pref. Source
DAS ▶ 0.0.0.0/0	192.168.1.1 reachable wan			1		
DAC ▶ 10.10.10.0/30	lan2 reachable			0		10.10.10.2
DAr ▶ 172.22.10.0/24	10.10.10.1 reachable lan2			120		
DAC ▶ 172.22.20.0/24	lan1 reachable			0		172.22.20.1
DAC ▶ 192.168.1.0/24	wan reachable			0		192.168.1.72

5 items

Terminal

```

107 172.22.10.1      56 64 0ms
108 172.22.10.1      56 64 1ms
109 172.22.10.1      56 64 0ms
110 172.22.10.1      56 64 0ms
111 172.22.10.1      56 64 1ms
112 172.22.10.1      56 64 0ms
113 172.22.10.1      56 64 0ms
114 172.22.10.1      56 64 0ms
115 172.22.10.1      56 64 0ms
116 172.22.10.1      56 64 1ms
117 172.22.10.1      56 64 1ms
118 172.22.10.1      56 64 0ms

```

Parameter settings for refreshing sent packets

The screenshot shows the Mikrotik WinBox interface for Router R1. The 'RIP' configuration window is open, with the 'Routes' tab selected. The following table shows the configured routes:

	Dst. Address	Gateway	From	Metric	Timeout
S	0.0.0.0/0	0.0.0.0	0.0.0.0	1	00:00:00
R	10.10.10.0/30	0.0.0.0	0.0.0.0	1	00:00:00
R	172.22.10.0/24	0.0.0.0	0.0.0.0	1	00:00:00
R	172.22.20.0/24	0.0.0.0	10.10.10.2	2	00:00:03

The 'RIP Settings' dialog is also visible, showing the following configuration:

- Distribute Default: always
- Redistribute Static Routes:
- Redistribute Connected Routes:
- Redistribute OSPF Routes:
- Redistribute BGP Routes:
- Default Route Metric: 1
- Static Routes Metric: 1
- Connected Routes Metric: 1
- OSPF Routes Metric: 1
- BGP Routes Metric: 1
- Update Timer: 00:00:01
- Timeout Timer: 00:00:04
- Garbage Timer: 00:00:10
- Routing Table: main

The 'RIP Route <172.22.20.0/24>' dialog shows the following configuration:

- Dst. Address: 172.22.20.0/24
- Gateway: 0.0.0.0
- From: 10.10.10.2
- Metric: 2
- Timeout: 00:00:03
- RTag: 0

Routing behavior with different network card settings: Lan1 networks connected to routers R1, R2 are not visible to each other, they are physically separated. Network lan2 is a network shared between routers R1, R2 - it is one physical connection. RIP - lan1 network interface settings.

The left screenshot shows Router R1 configuration. The 'Address List' window displays the following table:

Address	Network	Interface
10.10.10.0/29	10.10.10.0	lan2
172.22.10.1/24	172.22.10.0	lan1
192.168.1.189/24	192.168.1.0	wan

The right screenshot shows Router R2 configuration. The 'Address List' window displays the following table:

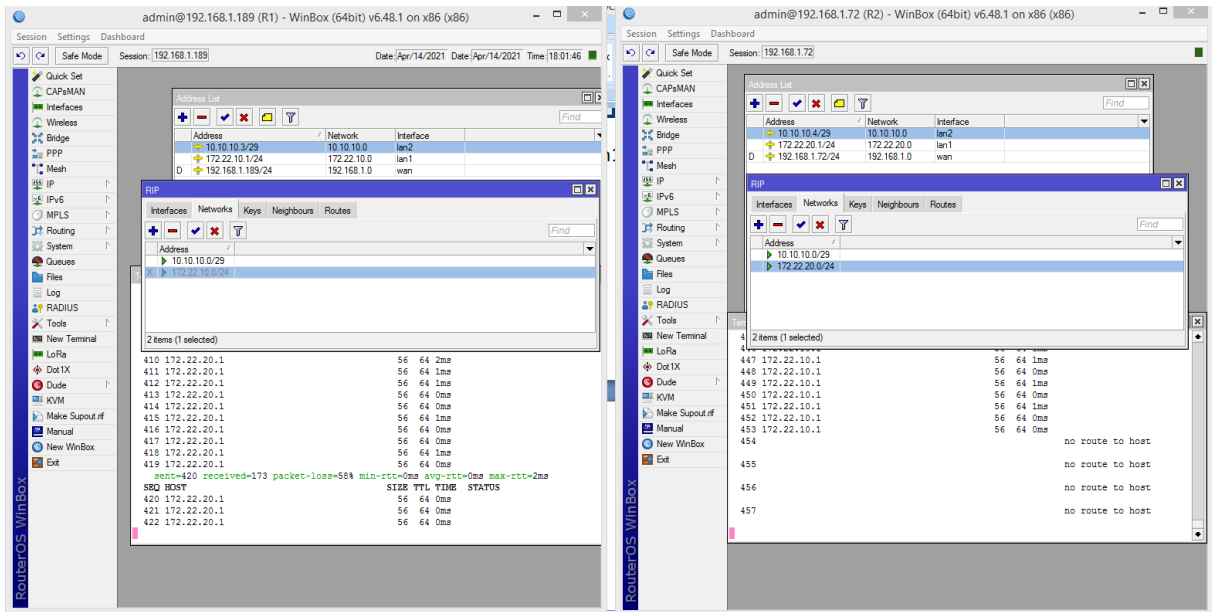
Address	Network	Interface
10.10.10.4/29	10.10.10.0	lan2
172.22.20.1/24	172.22.20.0	lan1
192.168.1.72/24	192.168.1.0	wan

The terminal window on Router R2 shows the following output:

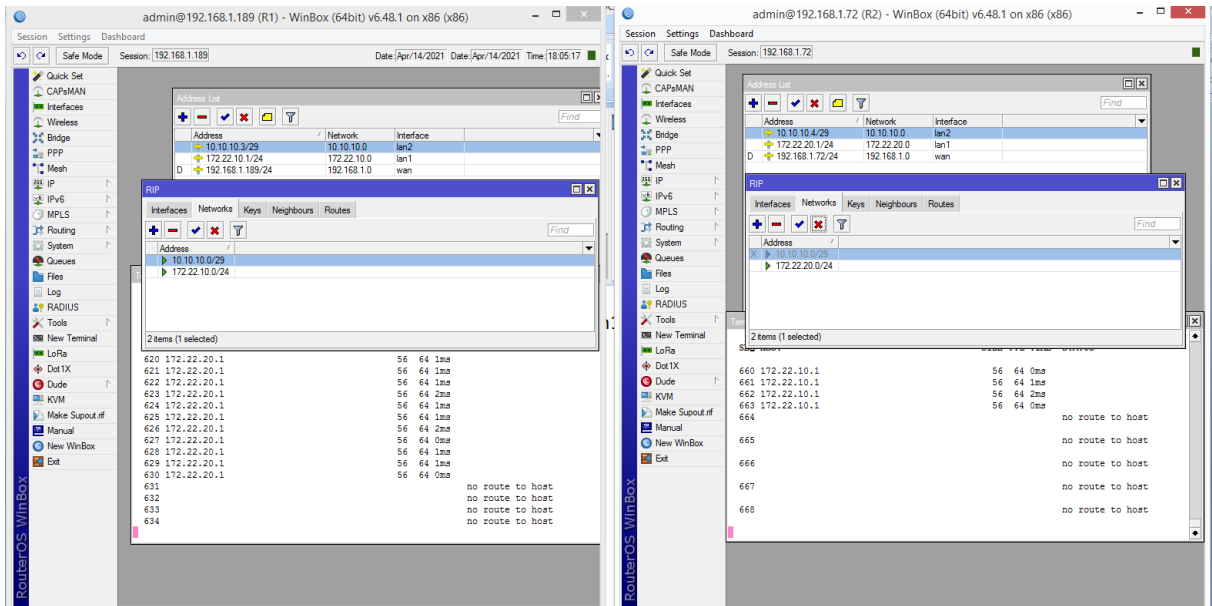
```

249 172.22.20.1          56 64 1ms
250 172.22.20.1          56 64 2ms
251 172.22.20.1          56 64 1ms
252 172.22.20.1          56 64 1ms
253 172.22.20.1          56 64 2ms
254 172.22.20.1          56 64 1ms
255 172.22.20.1          56 64 1ms
256 172.22.20.1          56 64 1ms
257 172.22.20.1          56 64 0ms
258
259
sent=260 received=150 packet-loss=428 min-rtt=0ms avg-rtt=0ms max-rtt=2ms
300 HOST                SIZES TTL TIME STATUS
260 no route to host
261 no route to host
  
```

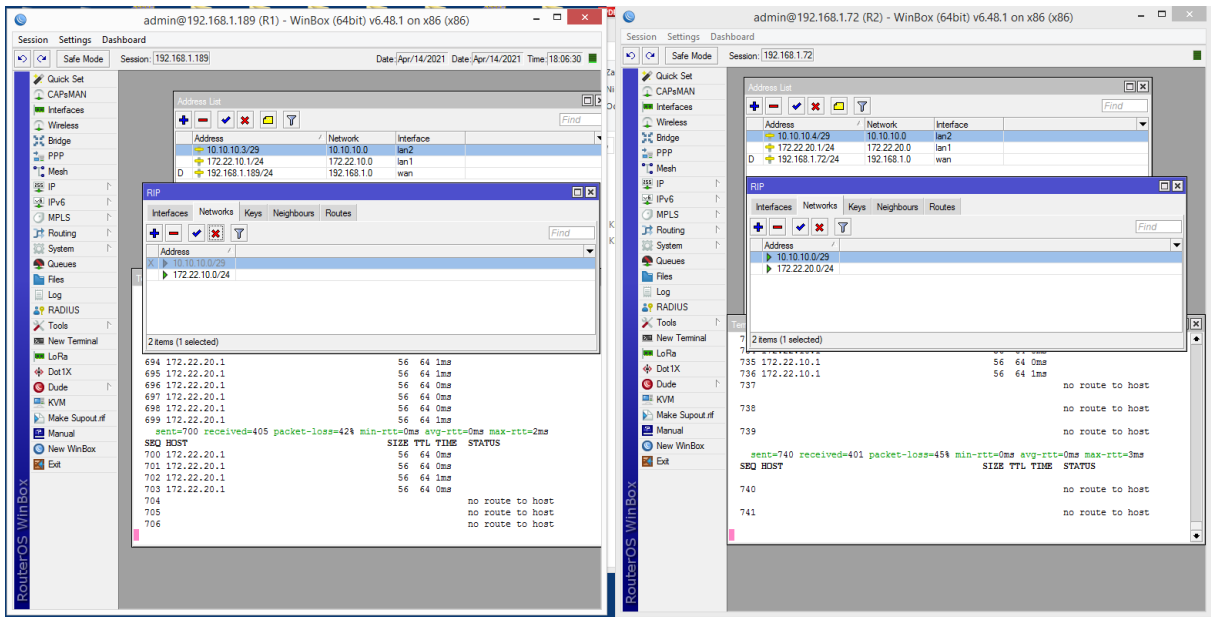
Network lan1 on R2 router disabled



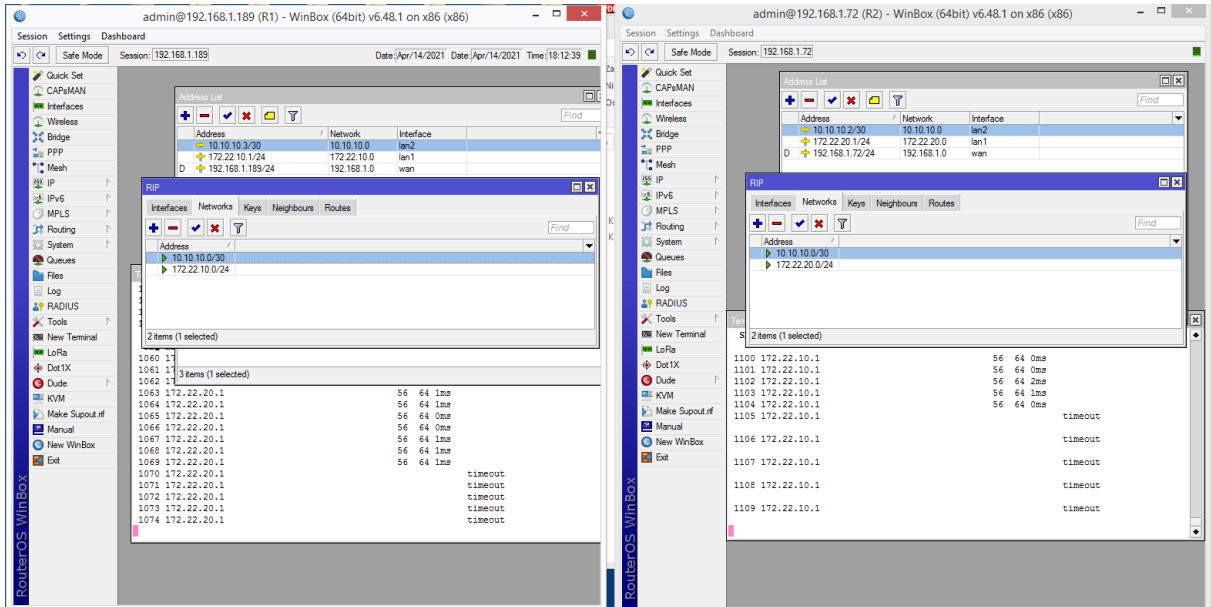
Network lan1 disabled on R1 router



LAN2 network disabled on R2 router



Network lan2 disabled on R1 router



An example of incorrect network configuration