

Configuration of routing using the OSPF protocol

To present the operation of the OSPF protocol, a computer network will be used, the topology of which is shown in Fig. 1.

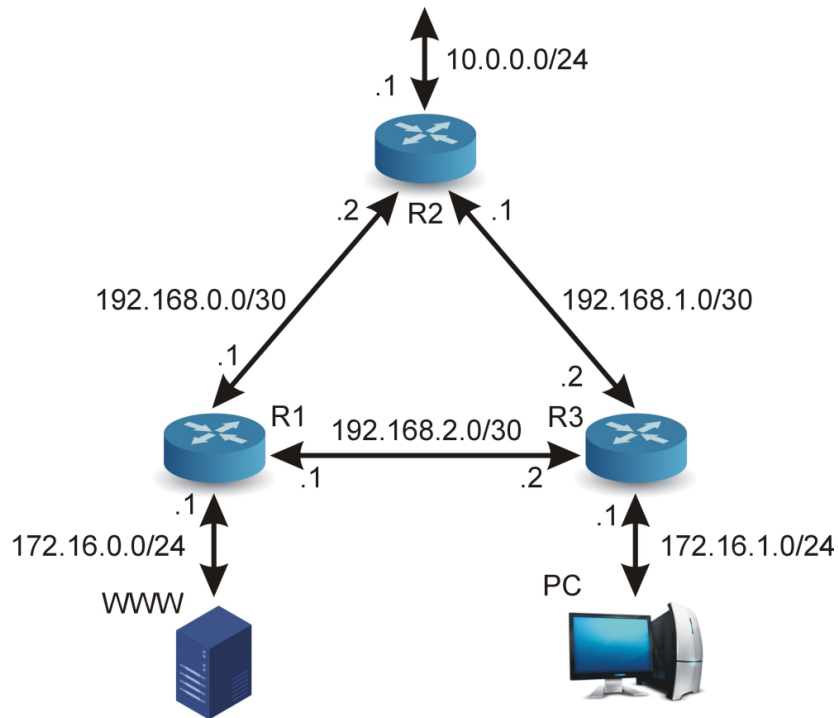


Fig. 1 Network topology

In order to facilitate the configuration process, you can add a fourth interface to each router, and the interface will be connected to our local network. This will allow you to easily manage your router using WinBox.

Configurations of individual routers:

Interface List

Interface | Interface List | Ethernet | EoIP Tunnel | IP Tunnel | GRE Tunnel | ...

+ - ✓ ✗ [icon] [icon] Detect Internet Find

| | Name | Type | Actual MTU | L2 MTU | Tx |
|-----------|--------|----------|------------|--------|----|
| ::: r1_a | | | | | |
| R | ether1 | Ethernet | 1500 | | |
| ::: siec | | | | | |
| R | ether2 | Ethernet | 1500 | | |
| ::: siec2 | | | | | |
| R | ether3 | Ethernet | 1500 | | |
| ::: wan | | | | | |
| R | ether4 | Ethernet | 1500 | | |

4 items

Address List

+ - ✓ ✗ [icon] [icon] Find

| | Address | Network | Interface |
|---|------------------|-------------|-----------|
| | 172.16.0.1/24 | 172.16.0.0 | ether1 |
| | 192.168.0.1/30 | 192.168.0.0 | ether2 |
| D | 192.168.1.213/24 | 192.168.1.0 | ether4 |
| | 192.168.2.1/30 | 192.168.2.0 | ether3 |

4 items

Fig.2. R1 router configuration

Interface List

Interface | Interface List | Ethernet | EoIP Tunnel | IP Tunnel | GRE Tunnel | ...

+ - ✓ ✗ [icon] [icon] Detect Internet Find

| | Name | Type | Actual MTU | L2 MTU | Tx |
|-----------|--------|----------|------------|--------|----|
| ... r2_a | | | | | |
| R | ether1 | Ethernet | 1500 | | |
| ... siec | | | | | |
| R | ether2 | Ethernet | 1500 | | |
| ... siec3 | | | | | |
| R | ether3 | Ethernet | 1500 | | |
| ... wan | | | | | |
| R | ether4 | Ethernet | 1500 | | |

4 items

Address List

+ - ✓ ✗ [icon] [icon] Find

| | Address | Network | Interface |
|---|------------------|-------------|-----------|
| | 10.0.0.1/24 | 10.0.0.0 | ether1 |
| | 192.168.0.2/30 | 192.168.0.0 | ether2 |
| | 192.168.1.1/30 | 192.168.1.0 | ether3 |
| D | 192.168.1.215/24 | 192.168.1.0 | ether4 |

4 items

Fig. 3. R2 router configuration

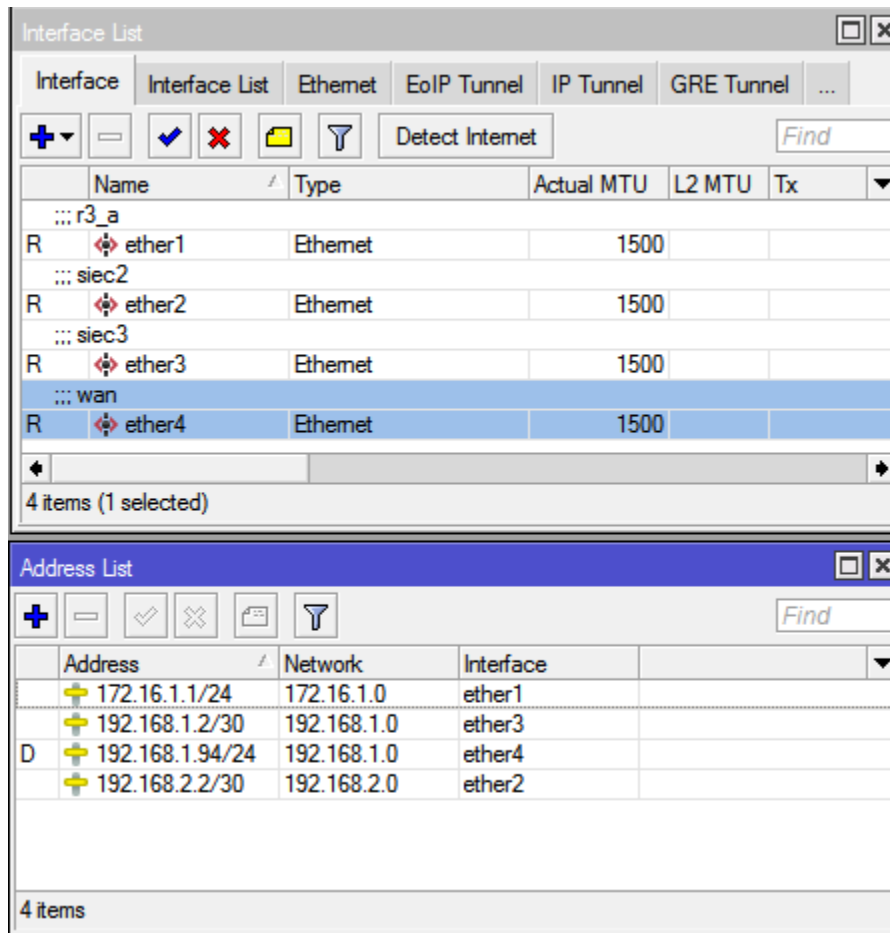


Fig. 4. R3 router configuration

A local web server is connected to R1's private network. The server address can be set statically or dynamically.

Any PC client that will be used to test the correctness and quality of the routing configuration is connected to the private network of the R3 router.

The network topology presented above, without proper routing configuration, does not allow communication between devices located in private networks. To do this, the settings of each router will be changed to achieve the desired effect.

OSPF configuration

The configuration that will allow connection between the private networks of router R1 and router R2 will be presented below. Configuration of the connection between routers R1 and R3 and R2 and R3 should be done in the same way as connection configuration between routers R1 and R2. As a first step, let's check if we have a connection between the private network interfaces of R1 and R2 routers:

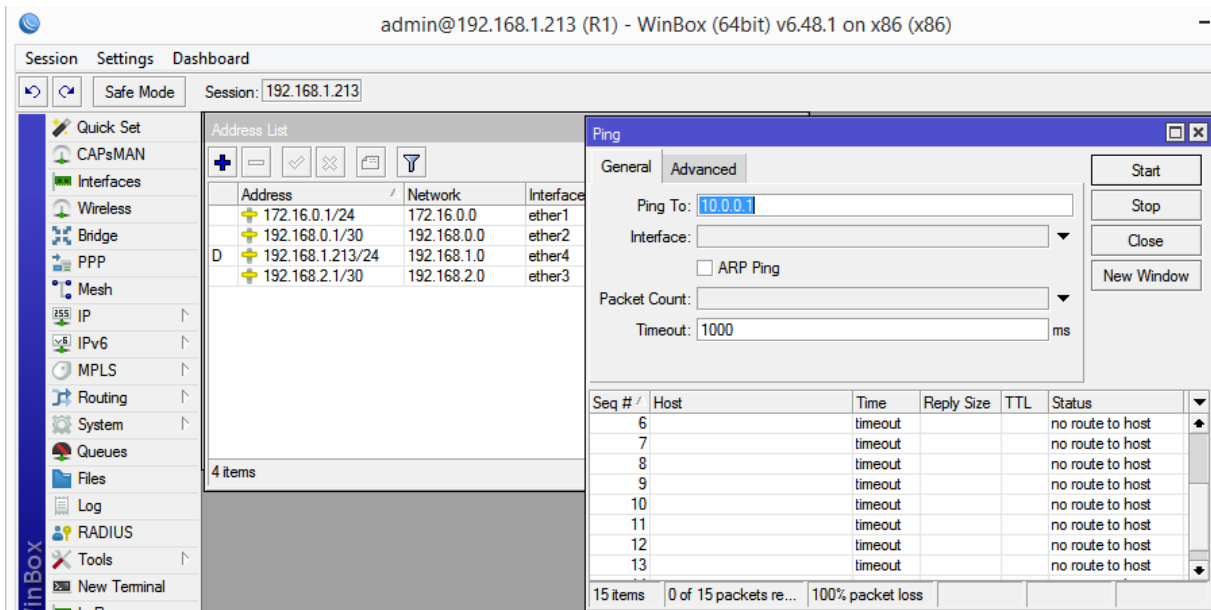


Fig.5. Attempting to connect to R2's private network

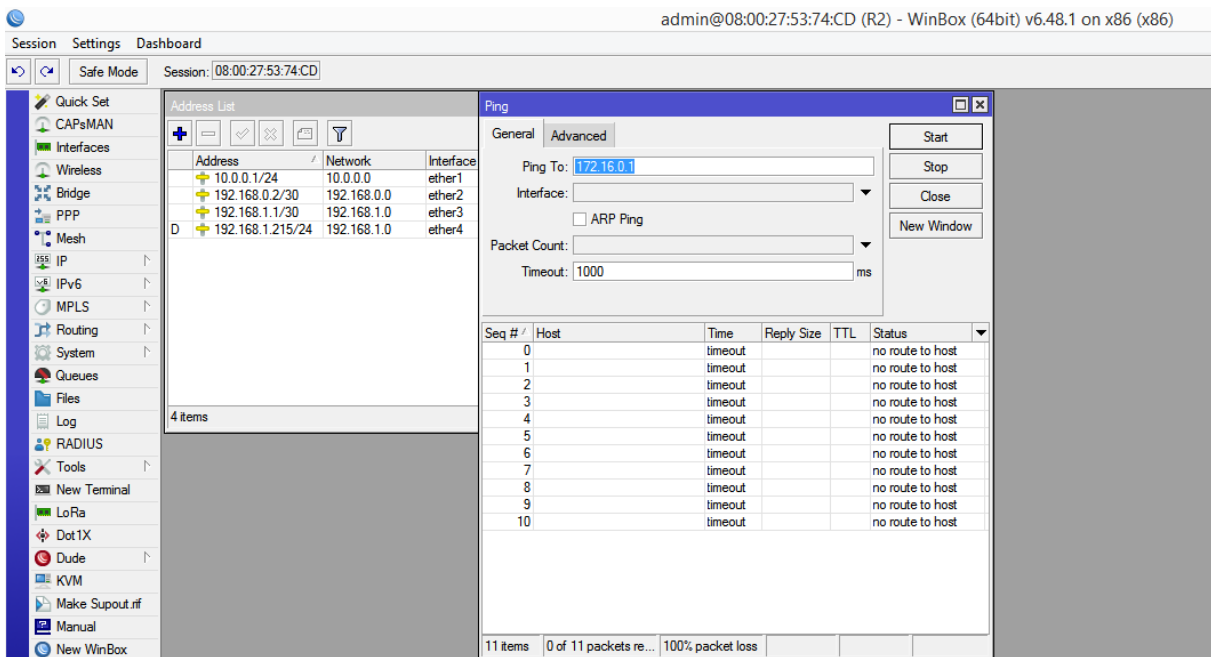


Fig. 6. An attempt to connect to the private network of the R1 router

Current routing routes for R1:

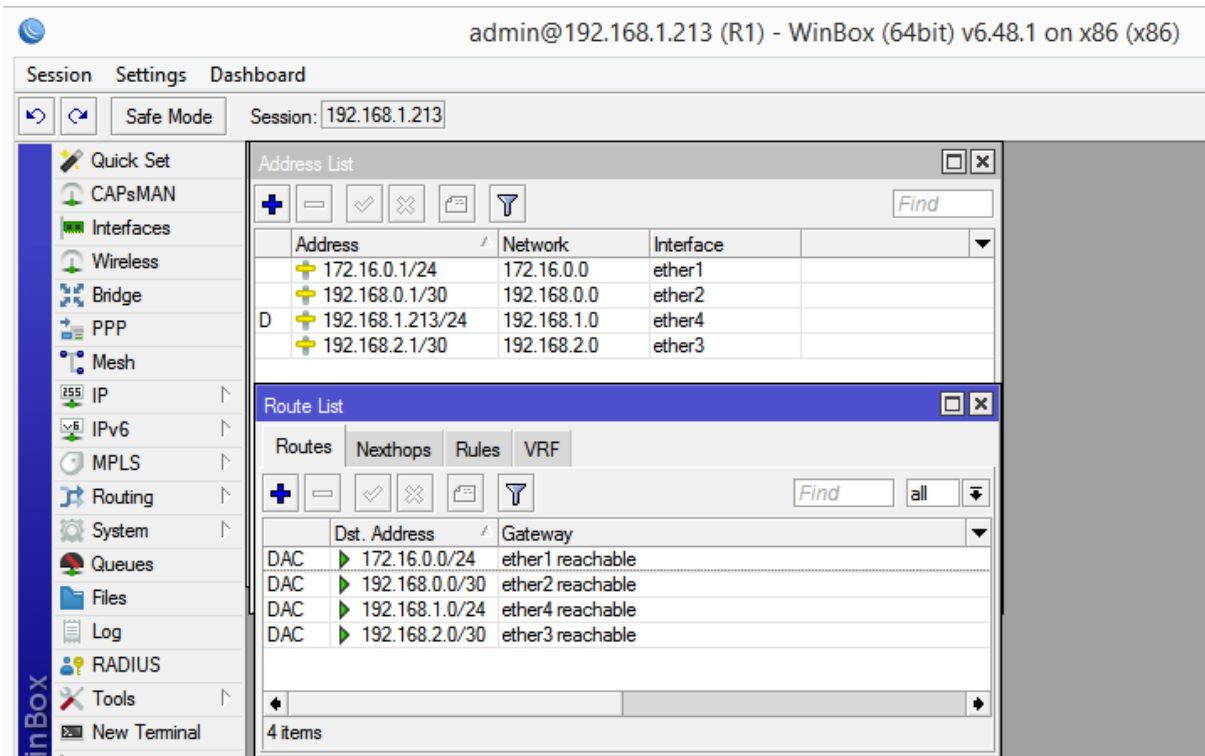


Fig. 7. R1 router routing routes

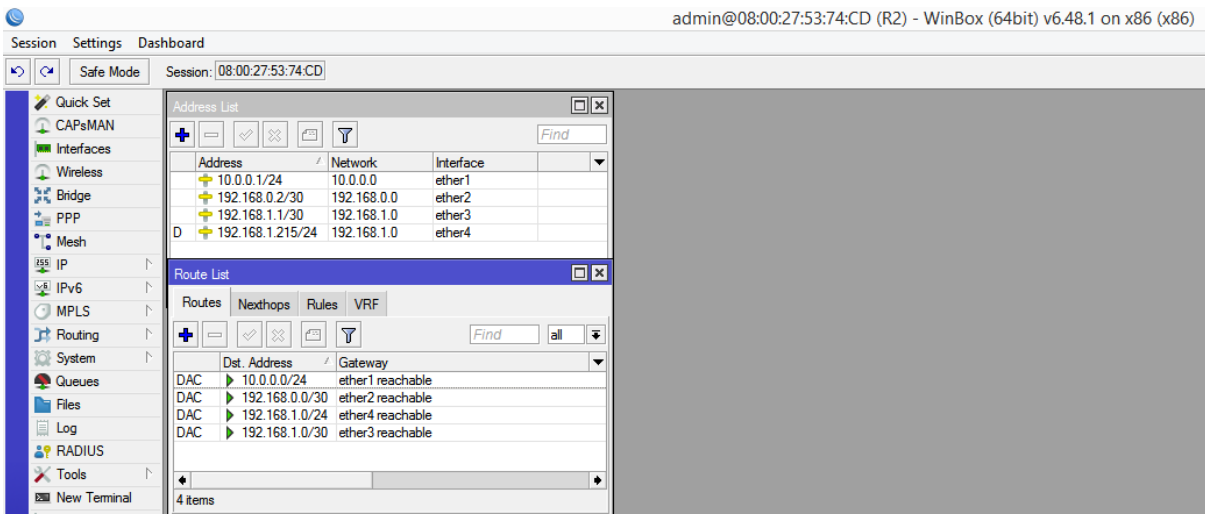
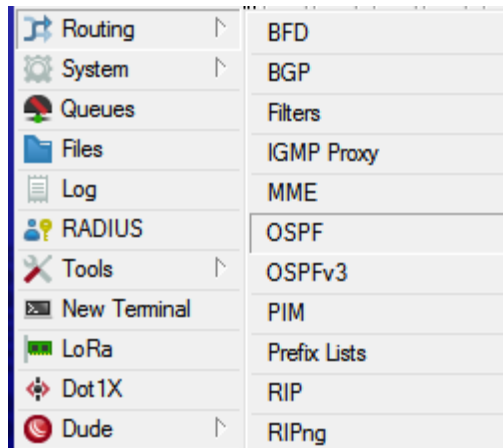


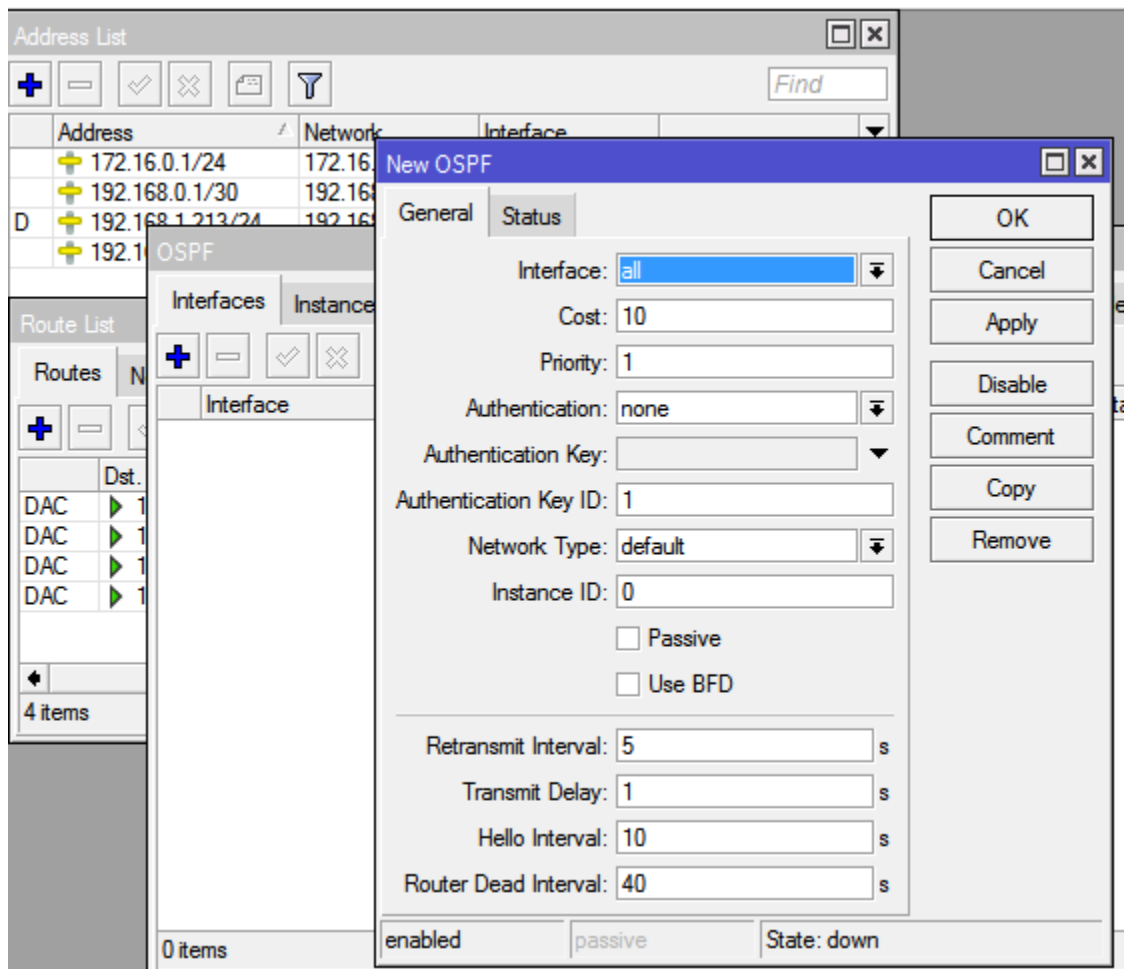
Fig. 8. Routes of the R2 router

OSPF configuration steps:

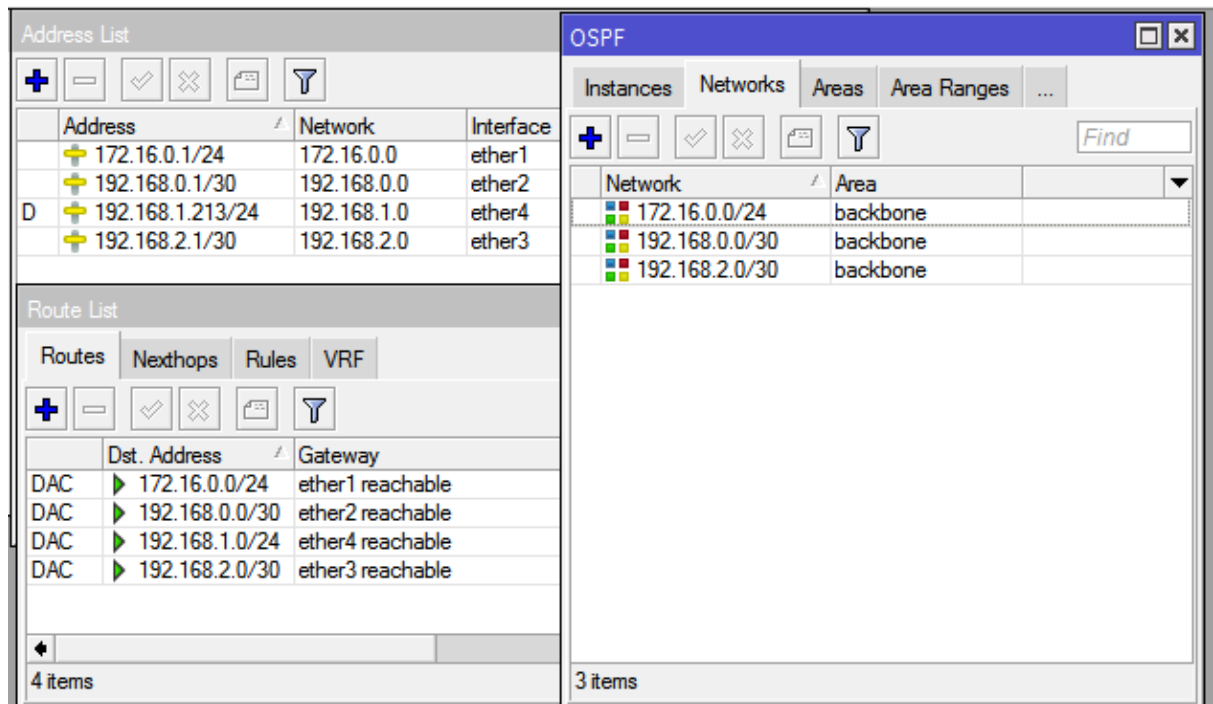
- R1 Router:
 - select Routing / OSPF from the menu



- in the Interfaces tab, select "+" and add "New OSPF", as an interface, select "all"

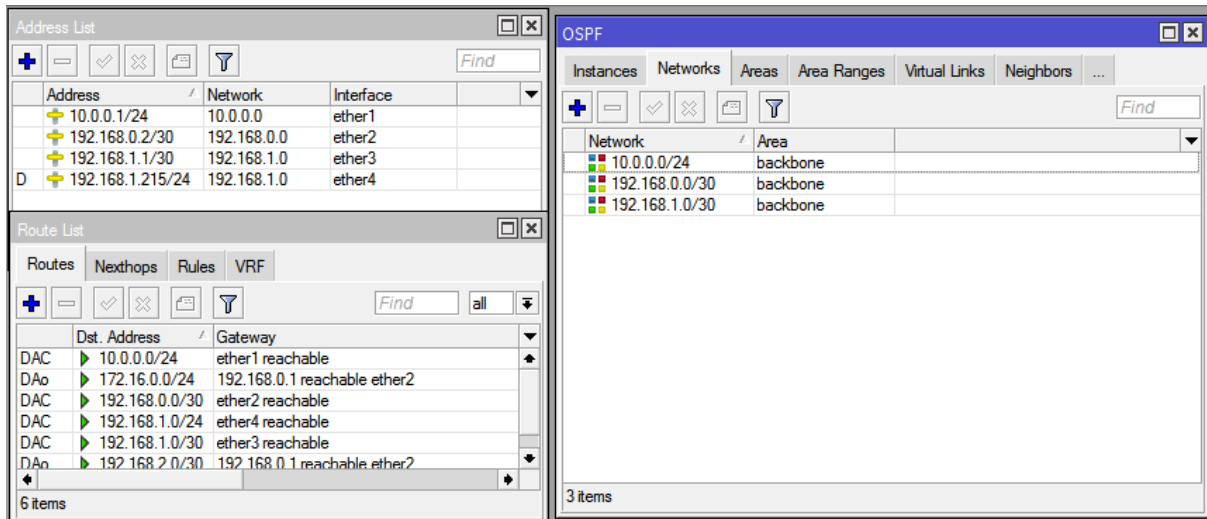


- we add all the relevant networks we have connected to our interfaces



R2 Router:

We follow the same steps as for the R1 router, except for the last step, in which we specify the networks that we have connected to the local interfaces in the R2 router, so:



If all parameters have been entered correctly, then each router should indicate its nearest neighbors in the "Neighbours" tab:

admin@192.168.1.213 (R1) - WinBox (64bit) v6.48.1 on x86 (x86)

Session Settings Dashboard

Safe Mode Session: 192.168.1.213

Quick Set CAPsMAN Interfaces Wireless Bridge PPP Mesh IP IPv6 MPLS Routing System Queues Files Log RADIUS Tools New Terminal

Address List

| Address | Network | Interface |
|------------------|-------------|-----------|
| 172.16.0.1/24 | 172.16.0.0 | ether1 |
| 192.168.0.1/30 | 192.168.0.0 | ether2 |
| 192.168.1.213/24 | 192.168.1.0 | ether4 |
| 192.168.2.1/30 | 192.168.2.0 | ether3 |

Route List

| Routes | Nexthops | Rules | VRF |
|----------------|------------------------------|-------|-----|
| Dst. Address | Gateway | | |
| 10.0.0.0/24 | 192.168.0.2 reachable ether2 | | |
| 172.16.0.0/24 | ether1 reachable | | |
| 192.168.0.0/30 | ether2 reachable | | |
| 192.168.1.0/24 | ether4 reachable | | |
| 192.168.1.0/30 | 192.168.0.2 reachable ether2 | | |
| 192.168.2.0/30 | ether3 reachable | | |

OSPF

Virtual Links Neighbors NBMA Neighbors Sham Links LSA Routes AS Border Routers

| Instance | Router ID | Address | Interface | State Changes |
|----------|-------------|-------------|-----------|---------------|
| default | 192.168.0.2 | 192.168.0.2 | ether2 | 5 |

admin@08:00:27:53:74:CD (R2) - WinBox (64bit) v6.48.1 on x86 (x86)

Session Settings Dashboard

Safe Mode Session: 08:00:27:53:74:CD

Quick Set CAPsMAN Interfaces Wireless Bridge PPP Mesh IP IPv6 MPLS Routing System Queues Files Log RADIUS Tools New Terminal

Address List

| Address | Network | Interface |
|------------------|-------------|-----------|
| 10.0.0.1/24 | 10.0.0.0 | ether1 |
| 192.168.0.2/30 | 192.168.0.0 | ether2 |
| 192.168.1.1/30 | 192.168.1.0 | ether3 |
| 192.168.1.215/24 | 192.168.1.0 | ether4 |

Route List

| Routes | Nexthops | Rules | VRF |
|----------------|------------------------------|-------|-----|
| Dst. Address | Gateway | | |
| 10.0.0.0/24 | ether1 reachable | | |
| 172.16.0.0/24 | 192.168.0.1 reachable ether2 | | |
| 192.168.0.0/30 | ether2 reachable | | |
| 192.168.1.0/24 | ether4 reachable | | |
| 192.168.1.0/30 | ether3 reachable | | |
| 192.168.2.0/30 | 192.168.0.1 reachable ether2 | | |

OSPF

Virtual Links Neighbors NBMA Neighbors Sham Links LSA Routes

| Instance | Router ID | Address | Interface | State Changes |
|----------|------------|-------------|-----------|---------------|
| default | 172.16.0.1 | 192.168.0.1 | ether2 | 5 |

Now we can check whether it is possible to establish a connection between the private networks of routers R1 and R2.

admin@192.168.1.213 (R1) - WinBox (64bit) v6.48.1 on x86 (x86)

admin@08:00:27:53:74:CD (R2) - WinBox (64bit) v6.48.1 on x86 (x86)

RouterOS WinBox Terminal

```

68 10.0.0.1 56 64 0ms
69 10.0.0.1 56 64 1ms
70 10.0.0.1 56 64 0ms
71 10.0.0.1 56 64 0ms
72 10.0.0.1 56 64 1ms
73 10.0.0.1 56 64 0ms
74 10.0.0.1 56 64 0ms
75 10.0.0.1 56 64 1ms
76 10.0.0.1 56 64 1ms
77 10.0.0.1 56 64 0ms
78 10.0.0.1 56 64 0ms
79 10.0.0.1 56 64 0ms
sent=80 received=80 packet-loss=0% min-rtt=0ms avg-rtt=0ms max-rtt=3ms
SRD HOST SIZE TTL TIME STATUS
80 10.0.0.1 56 64 1ms

```

RouterOS WinBox Terminal

```

56 172.16.0.1 56 64 0ms
57 172.16.0.1 56 64 0ms
58 172.16.0.1 56 64 1ms
59 172.16.0.1 56 64 0ms
60 172.16.0.1 56 64 1ms
61 172.16.0.1 56 64 1ms
62 172.16.0.1 56 64 0ms
63 172.16.0.1 56 64 1ms
64 172.16.0.1 56 64 0ms
65 172.16.0.1 56 64 0ms
66 172.16.0.1 56 64 2ms
67 172.16.0.1 56 64 0ms
68 172.16.0.1 56 64 0ms

```

It is worth noting that in the "Route List" routing table, there are entries that have the "DAo" type assigned, which means: D - dynamic, A - active, o - OSPF. The name of the network interface through which the packets are sent was automatically determined by the OSPF protocol.