

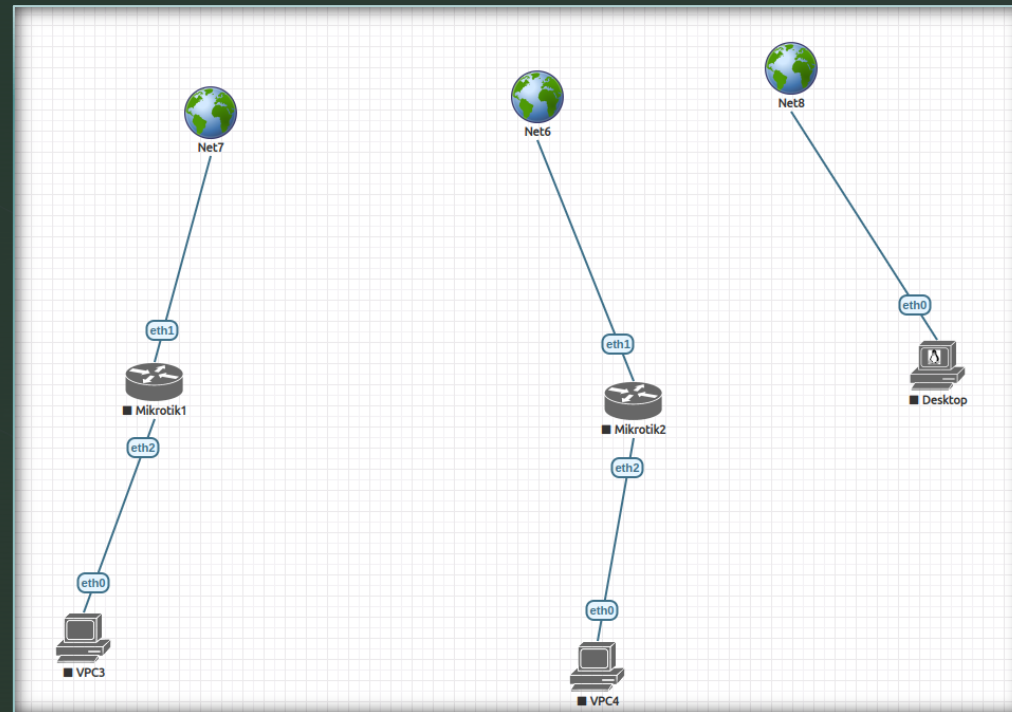
Laboratoare Retelistica



# Configurare OpenVPN Client-to- site si site-to-site

# Topologie

- In acest laborator pornim de la doua site-uri remote si un client remote pe care le vom conecta prin OpenVPN.



# Configurare OpenVPN MikroTik1

- Inainte de a configura serverul de OpenVPN trebuie sa facem un certificat CA, unul de server si unul de client/clienti.
- Pentru asta mergem in System->Certificates si facem un nou CA.
- Dupa ce il salvam dam "Sign"

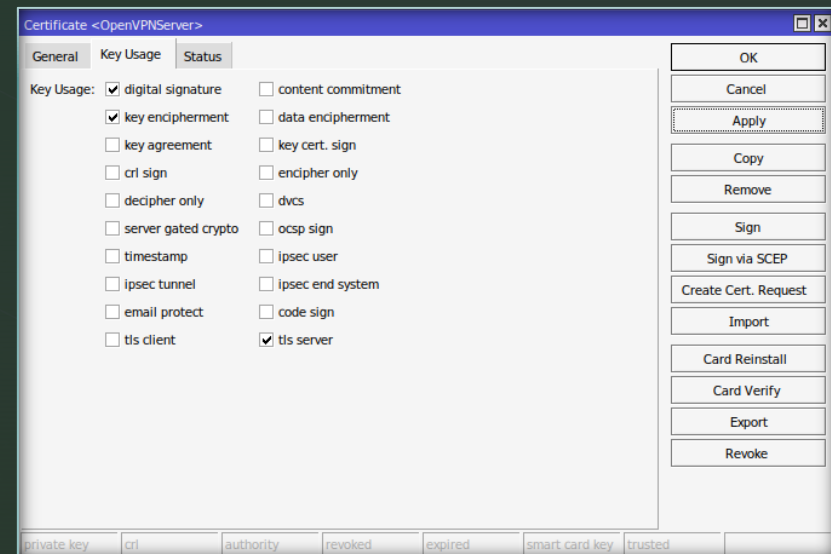
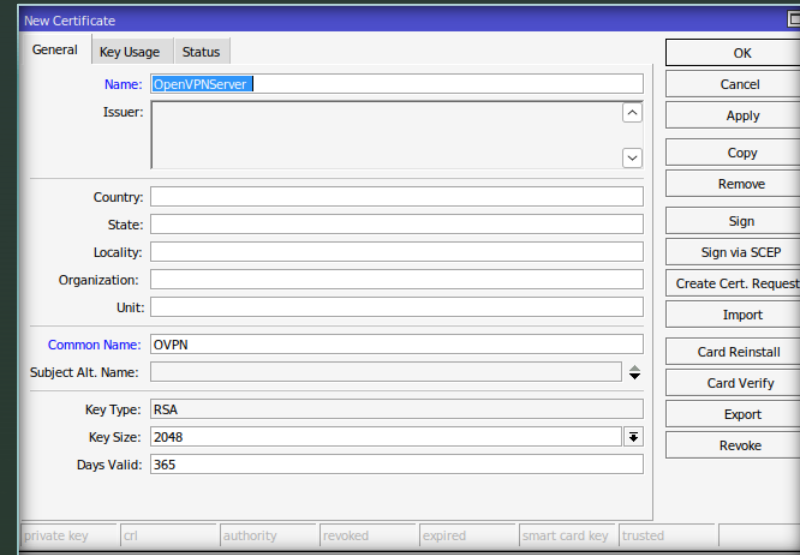
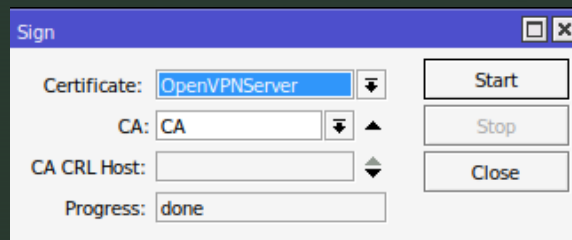
The 'New Certificate' dialog box is shown with the 'General' tab selected. The 'Name' field is set to 'CA'. The 'Issuer' field is empty. The 'Country', 'State', 'Locality', 'Organization', and 'Unit' fields are also empty. The 'Common Name' field is set to 'CA'. The 'Subject Alt. Name' field is empty. The 'Key Type' is set to 'RSA', 'Key Size' is '2048', and 'Days Valid' is '365'. The 'private key', 'crl', 'authority', 'revoked', 'expired', 'smart card key', and 'trusted' checkboxes are all unchecked. The 'OK', 'Cancel', 'Apply', 'Copy', 'Remove', 'Sign', 'Sign via SCEP', 'Create Cert. Request', 'Import', 'Card Reinstall', 'Card Verify', 'Export', and 'Revoke' buttons are visible on the right.

The 'New Certificate' dialog box is shown with the 'Key Usage' tab selected. The 'Key Usage' section has the following options:   
☐ digital signature ☐ content commitment   
☐ key encipherment ☐ data encipherment   
☐ key agreement ☒ key cert. sign   
☒ crl sign ☐ encipher only   
☐ decipher only ☐ dvcs   
☐ server gated crypto ☐ ocsf sign   
☐ timestamp ☐ ipsec user   
☐ ipsec tunnel ☐ ipsec end system   
☐ email protect ☐ code sign   
☐ tls client ☐ tls server   
The 'OK', 'Cancel', 'Apply', 'Copy', 'Remove', 'Sign', 'Sign via SCEP', 'Create Cert. Request', 'Import', 'Card Reinstall', 'Card Verify', 'Export', and 'Revoke' buttons are visible on the right.

The 'Sign' dialog box is shown. The 'Certificate' dropdown is set to 'CA'. The 'CA' dropdown is empty. The 'CA CRL Host' field is empty. The 'Progress' field shows 'done'. The 'Start', 'Stop', and 'Close' buttons are visible.

# Configurare OpenVPN MikroTik1

- Dupa ce am facut CA-ul trebuie sa facem un certificat de Server.
- Si il semnamn cu CA-ul facut mai devreme.
- Deschidem certificatul si bifam Trusted.



# Configurare OpenVPN MikroTik1

- Dupa ce am facut CA-ul si certificatul de Server mai trebuie sa facem si certificatul de client.
- Pe care il semnam tot cu CA-ul dar nu bifam trusted.

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# Configurare OpenVPN MikroTik1

- Acum trebuie sa facem un Adress Pool pentru OpenVPN.
- Dupa care trebuie sa facem un profil pentru server in PPP->Profiles.
- Unde la local address setam o adresa din aceasi retea cu pool-ul facut mai devreme.
- La remote address selecăm pool-ul de OpenVPN si putem salva.

New PPP Profile

General Protocols Limits Queue Scripts

Name: OpenVPN-Profile

Local Address: 10.10.10.1

Remote Address: OpenVPN-Pool

Remote IPv6 Prefix Pool:

DHCPv6 PD Pool:

Bridge:

Bridge Port Priority:

Bridge Path Cost:

Bridge Horizon:

Bridge Learning: default

Incoming Filter:

Outgoing Filter:

Address List:

Interface List:

DNS Server:

WINS Server:

Change TCP MSS

☐ no ☐ yes ☒ default

Use UPnP

☐ no ☐ yes ☒ default

OK Cancel Apply Comment Copy Remove

Pool <OpenVPN-Pool>

Name: OpenVPN-Pool

Addresses: 0.10.2-10.10.10.254

Next Pool: none

OK Cancel Apply Comment Copy Remove



## Configurare OpenVPN MikroTik1

- Putem sa adaugam acum primul client de vpn mergand la PPP->Secrets.
- Setam un username si o parola, la Service setam ovpn iar la Profile setam profilul pe care l-am creat mai sus.

New PPP Secret

Name:

Password:

Service:

Caller ID:

Profile:

Local Address:

Remote Address:

Remote IPv6 Prefix:

Routes:

IPv6 Routes:

Limit Bytes In:

Limit Bytes Out:

Last Logged Out:

Last Caller ID:

Last Disconnect Reason:

enabled

OK

Cancel

Apply

Disable

Comment

Copy

Remove

## Configurare OpenVPN MikroTik1

- Acum putem sa activam serverul de OpenVPN apasand buton din PPP->Interface->OVPN Server.
- Portul pe care va asculta serverul.
- Mode: IP
- Default Profile: profilul creat de noi
- Certificate: certificatul de server semnat de CA.
- Auth: alegem ce consideram noi ca fiind secure sau suportat.
- Cipher: la fel ca la auth alegem ce consideram secured sau suportat.

OVPN Server

☒ Enabled

Port: 1194

Mode: ip

Protocol: udp

Netmask: 24

MAC Address: FE:11:3F:CB:96:03

Max MTU: 1500

Keepalive Timeout: 60

Default Profile: OpenVPN-Profile

Certificate: OpenVPNServer

☒ Require Client Certificate

TLS Version: any

Auth.: ☐ sha1 ☐ md5  
☐ null ☐ sha256  
☒ sha512

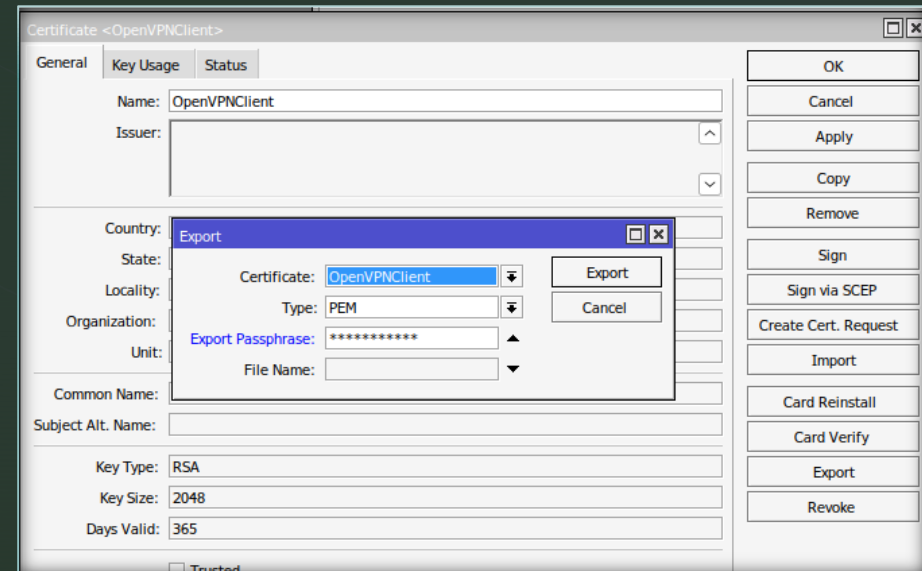
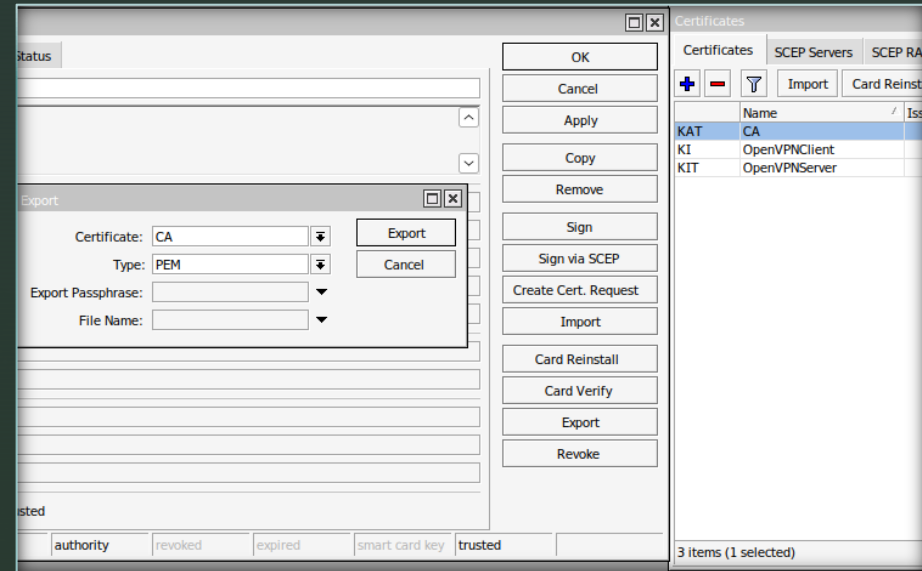
Cipher: ☐ blowfish 128 ☐ aes 128  
☐ aes 192 ☒ aes 256  
☐ null

OK  
Cancel  
Apply



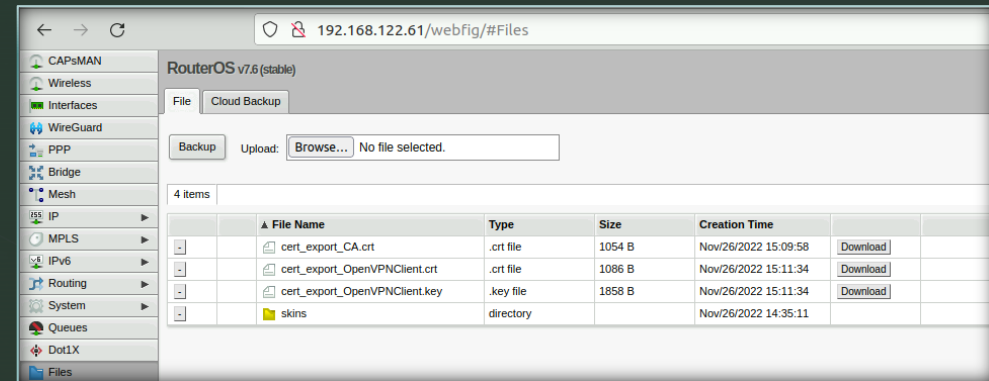
# Exportare Certificate din Router

- Pentru a putea configura clientul este necesar sa exportam CA-ul si certificatul de clienti din Router.
- Si acestea se vor gasi in meniul Files, de acolo le putem importa la client.



# Configurare Client OpenVPN

- In primul rand trebuie sa instalam pe gazda aplicatia de OpenVPN.
- Dupa care trebuie sa descarcam certificatele de pe router, prin interfata web, virtual box sau sftp.
- Facem un fisier pe care il numim client.openvpn (doar extensia conteaza).
- Si punem configul de pe [GitHub](#) de inceput
- Si configuram urmatoarele:



# Configurare Client OpenVPN

- dev tun (tipul de interfata o setam tun)
- proto tcp (pentru ca serverul nostru este configurat pe tcp)
- remote <server-ip> <server-port>
- ca, cert si key punem numele fisierelor (atentie sa fie in acelasi folder cu config-ul)
- remote-cert-tls server
- auth sha512 (asa am setat pe partea de server)
- cipher AES-256-CBC (asa am setat pe partea de server)
- auth-user-pass users.txt (aici facem fisierul si il populam cu username-ul si parola clientului.)
- redirect-gateway def1

# Testare

The screenshot displays a network simulation environment with three main components: a packet capture window, a terminal window, and a desktop window.

**VPC3\_eth0 Packet Capture:**

| No. | Time        | Source        | Destination   | Protocol | Length | Info                      |
|-----|-------------|---------------|---------------|----------|--------|---------------------------|
| 6   | 1.001732502 | 192.168.1.254 | 10.10.10.254  | ICMP     | 98     | Echo (ping) reply id=0x   |
| 7   | 2.001882575 | 10.10.10.254  | 192.168.1.254 | ICMP     | 98     | Echo (ping) request id=0x |
| 8   | 2.001971124 | 192.168.1.254 | 10.10.10.254  | ICMP     | 98     | Echo (ping) reply id=0x   |
| 9   | 3.003246518 | 10.10.10.254  | 192.168.1.254 | ICMP     | 98     | Echo (ping) request id=0x |
| 10  | 3.003507628 | 192.168.1.254 | 10.10.10.254  | ICMP     | 98     | Echo (ping) reply id=0x   |
| 11  | 4.005423527 | 10.10.10.254  | 192.168.1.254 | ICMP     | 98     | Echo (ping) request id=0x |
| 12  | 4.005593451 | 192.168.1.254 | 10.10.10.254  | ICMP     | 98     | Echo (ping) reply id=0x   |

Frame 1: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface eth0, id 0  
Ethernet II, Src: 50:00:00:01:00:01 (50:00:00:01:00:01), Dst: Private\_66:68:03 (00:50:79:66:68:03)  
Internet Protocol Version 4, Src: 10.10.10.254, Dst: 192.168.1.254  
Internet Control Message Protocol

Internet Control Message Protocol: Protocol Packets: 14 · Displayed: 10 (71.4%) Profile: Default

**VPC3 Terminal:**

```
Welcome to Virtual PC Simulator, version 1.3 (0.8.1)
Dedicated to Daling.
Build time: May 7 2022 15:27:29
Copyright (c) 2007-2015, Paul Meng (mirnshi@gmail.com)
Copyright (c) 2021, Alain Degreffe (alain.degreffe@eve-ng.net)
All rights reserved.

VPCS is free software, distributed under the terms of the "BSD" licence.
Source code and license can be found at vpcs.sf.net.
For more information, please visit wiki.freecode.com.cn.
Modified version for EVE-NG.

Press '?' to get help.

VPCS>
VPCS> dhcp
DORA IP 192.168.1.254/24 GW 192.168.1.1
VPCS>
```

**Desktop Terminal:**

```
root@Desktop: ~/Downloads
File Edit View Search Terminal Tabs Help

root@Desktop: ~/Downloads
64 bytes from 192.168.1.254: icmp_seq=1 ttl=63 time=2.46 ms
64 bytes from 192.168.1.254: icmp_seq=2 ttl=63 time=1.17 ms
64 bytes from 192.168.1.254: icmp_seq=3 ttl=63 time=1.72 ms
^C
--- 192.168.1.254 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2002ms
rtt min/avg/max/mdev = 1.170/1.781/2.458/0.527 ms
root@Desktop: ~/Downloads# ping 192.168.1.254
PING 192.168.1.254 (192.168.1.254) 56(84) bytes of data.
64 bytes from 192.168.1.254: icmp_seq=1 ttl=63 time=3.13 ms
64 bytes from 192.168.1.254: icmp_seq=2 ttl=63 time=2.25 ms
64 bytes from 192.168.1.254: icmp_seq=3 ttl=63 time=1.18 ms
64 bytes from 192.168.1.254: icmp_seq=4 ttl=63 time=1.58 ms
64 bytes from 192.168.1.254: icmp_seq=5 ttl=63 time=2.24 ms
^C
--- 192.168.1.254 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4006ms
rtt min/avg/max/mdev = 1.177/2.075/3.133/0.666 ms
root@Desktop: ~/Downloads#
```

# Configurare Site-to-Site

- In MikroTik1 mai adaugam un certificat si un secret ppoe.
- Exportam certificatele facute pentru site-ul remote si le copiem fie direct pe celalalt mikrotik fie prin calculatorul nostru.

PPP Secret <siteb>

Name: siteb

Password: \*\*\*\*\*

Service: ovpn

Caller ID:

Profile: OpenVPN-Profile

Local Address:

Remote Address:

Remote IPv6 Prefix:

Routes:

IPv6 Routes:

Limit Bytes In:

Limit Bytes Out:

Last Logged Out: Dec/02/2022 11:02:40

Last Caller ID: 192.168.122.103

Last Disconnect Reason: hung up

enabled

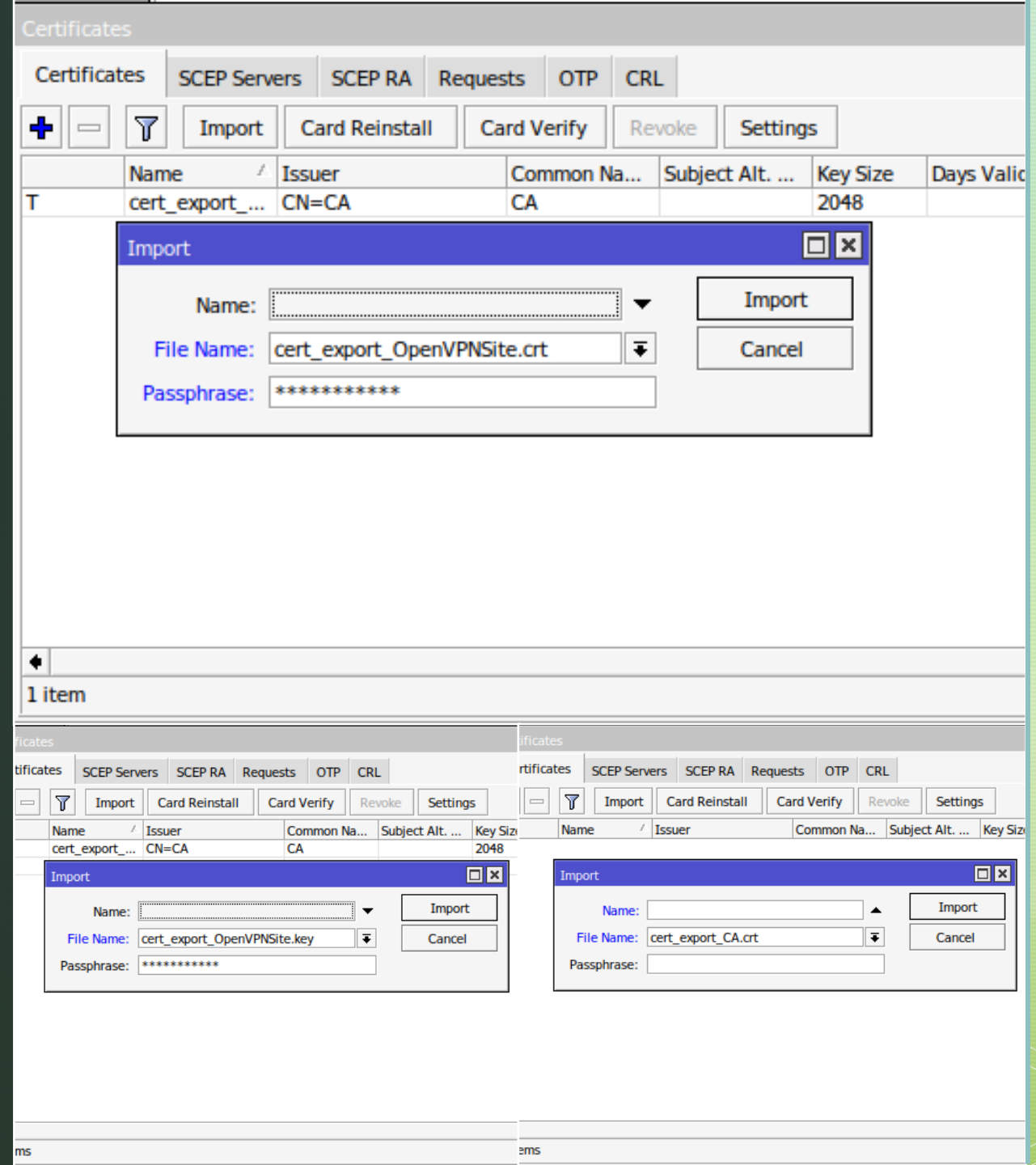
| Name | Issuer        | Common Name | Subject Alt. ... | Key Size | Days Valid | Trusted |
|------|---------------|-------------|------------------|----------|------------|---------|
| KAT  | CA            | CA          |                  | 2048     | 365        | yes     |
| KI   | OpenVPNClient | OVNOC       |                  | 2048     | 365        | no      |
| KIT  | OpenVPNServer | OVNPN       |                  | 2048     | 365        | yes     |
| KI   | OpenVPNSite   | OpenVPNSite |                  | 2048     | 365        | no      |

4 items



# Configurare Site-to-Site

- Pe al 2 lea MikroTik importam certificatele System->Certificates->Import
- Unde vom importa CA-ul, certificatul si cheia.





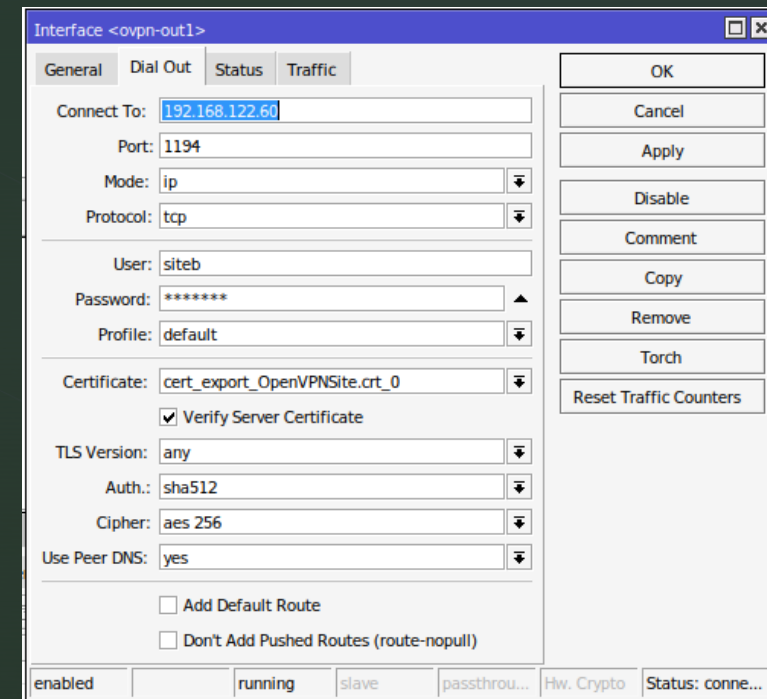
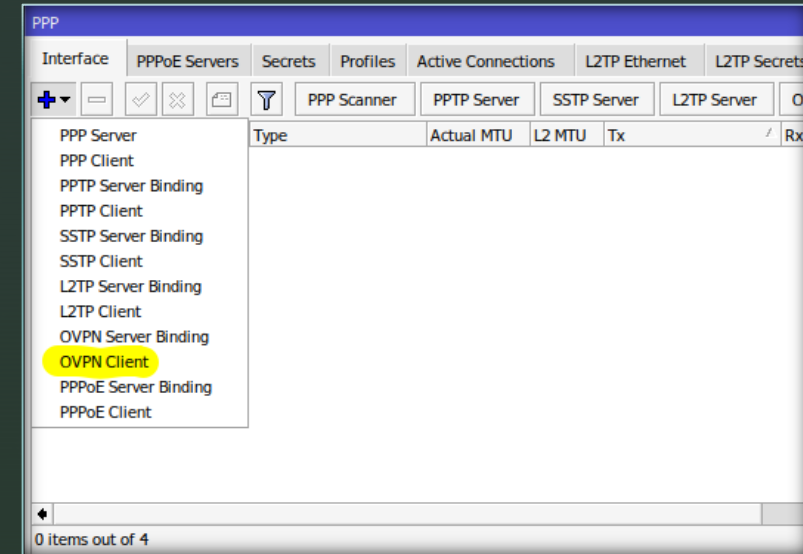
# Configurare Site-to-Site

Dupa care facem un client de OpenVPN merganand in meniul PPP si adaugand un client nou.

In aceasta interfata trebuie sa avem aceleasi setari cu server-ul pe partea de criptografie.

Connect To adresa ip a routerului 1

Portul pe care acesta asculta.



The image displays two side-by-side screenshots of the Mikrotik WinBox configuration interface, showing the setup for a Site-to-Site VPN using OSPF dynamic routing.

**Left Screenshot:**

- Session:** 192.168.122.60
- Route List:** Shows a table with columns 'Dst. Address' and 'Gateway'. It lists static routes for the VPN endpoints: 0.0.0.0/0 (Gateway: 192.168.122.1), 10.10.10.253/32 (Gateway: <ovpn-siteb>), 10.10.10.254/32 (Gateway: <ovpn-user1>), 192.168.1.0/24 (Gateway: ether2), 192.168.122.0/24 (Gateway: ether1), and 192.168.122.0/24 (Gateway: 10.10.10.253%<ovpn-siteb>).
- RIP Instance <rip-instance-1>:** Configuration window for the OSPF instance. Name: rip-instance-1, VRF: main, AFI: IPv4. It includes fields for Input Filter, Output Filter, Select Output Filter, and checkboxes for Redistribute (connected, static, rip, ospf, bgp, vpn, dhcp, fantasy, modem, copy). It also has fields for Originate Default, Routing Table, Route Timeout, Route GC Timeout, and Update Interval.
- RIP Interface <rip-interface-1>:** Configuration window for the interface. Name: rip-interface-1, Instance: rip-instance-1, Interfaces: <ovpn-siteb>. It includes fields for Source Addresses, Cost, Split Horizon, Poison Reverse, Mode, Key Chain, and Password.

**Right Screenshot:**

- Session:** 192.168.122.103
- Route List:** Shows a table with columns 'Dst. Address' and 'Gateway'. It lists static routes for the VPN endpoints: 0.0.0.0/0 (Gateway: 192.168.122.1), 10.10.10.24 (Gateway: ovpn-out1), 10.10.10.254/32 (Gateway: 10.10.10.1%ovpn-out1), 192.168.1.0/24 (Gateway: 10.10.10.1%ovpn-out1), 192.168.122.0/24 (Gateway: ether1), and 192.168.122.0/24 (Gateway: 10.10.10.1%ovpn-out1).
- RIP Instance <rip-instance-1>:** Configuration window for the OSPF instance. Name: rip-instance-1, VRF: main, AFI: IPv4. It includes fields for Input Filter, Output Filter, Select Output Filter, and checkboxes for Redistribute (connected, static, rip, ospf, bgp, vpn, dhcp, fantasy, modem, copy). It also has fields for Originate Default, Routing Table, Route Timeout, Route GC Timeout, and Update Interval.
- RIP Interface <rip-interface-1>:** Configuration window for the interface. Name: rip-interface-1, Instance: rip-instance-1, Interfaces: ovpn-out1. It includes fields for Source Addresses, Cost, Split Horizon, Poison Reverse, Mode, Key Chain, and Password.

Rutarea se poate face fie static fie printr-un algoritm de rutare dinamic.

# Configurare Site-to-Site

```
Terminal <2>

MMM      MMM      KKK      TTTTTTTTTT      KKK
MMMM     MMMM     KKK      TTTTTTTTTT      KKK
MMM MMMM MMM III KKK KKK RRRRRR 000000 TTT III KKK KKK
MMM MM  MMM III KKKKK RRR RRR 000 000 TTT III KKKKK
MMM      MMM III KKK KKK RRRRRR 000 000 TTT III KKK KKK
MMM      MMM III KKK KKK RRR RRR 000000 TTT III KKK KKK

MikroTik RouterOS 7.7beta8 (c) 1999-2022      https://www.mikrotik.com/

Press F1 for help

[admin@MikroTik] > ping 192.168.1.254

SEQ HOST                                SIZE TTL TIME          STAT
0 192.168.1.254                        56 63 3ms238us
1 192.168.1.254                        56 63 1ms876us
2 192.168.1.254                        56 63 1ms383us
3 192.168.1.254                        56 63 1ms607us
sent=4 received=4 packet-loss=0% min-rtt=1ms383us avg-rtt=2ms26us
max-rtt=3ms238us

[admin@MikroTik] >
```

```
Desktop

Applications Places System Fri Dec 2, 13:40

root@Desktop: ~/Downloads

File Edit View Search Terminal Tabs Help

root@Desktop: ~/Downloads root@Desktop: ~/Downloads

root@Desktop: ~/Downloads# ping 192.168.1.254
PING 192.168.1.254 (192.168.1.254) 56(84) bytes of data.
64 bytes from 192.168.1.254: icmp_seq=1 ttl=63 time=1.06 ms
64 bytes from 192.168.1.254: icmp_seq=2 ttl=63 time=1.40 ms
^C
--- 192.168.1.254 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1001ms
rtt min/avg/max/mdev = 1.057/1.230/1.404/0.173 ms
root@Desktop: ~/Downloads# ping 192.168.2.254
PING 192.168.2.254 (192.168.2.254) 56(84) bytes of data.
64 bytes from 192.168.2.254: icmp_seq=1 ttl=62 time=1.97 ms
64 bytes from 192.168.2.254: icmp_seq=2 ttl=62 time=2.32 ms
^C
--- 192.168.2.254 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1001ms
rtt min/avg/max/mdev = 1.965/2.141/2.318/0.176 ms
root@Desktop: ~/Downloads#
```

# Testare

```
VPCS> dhcp
DORA IP 192.168.2.254/24 GW 192.168.2.1

VPCS> ping 192.168.1.254

84 bytes from 192.168.1.254 icmp_seq=1 ttl=62 time=2.277 ms
84 bytes from 192.168.1.254 icmp_seq=2 ttl=62 time=2.069 ms
^C
VPCS>
```

```
VPC3

VPCS> ping 192.168.2.254

84 bytes from 192.168.2.254 icmp_seq=1 ttl=62 time=2.379 ms
84 bytes from 192.168.2.254 icmp_seq=2 ttl=62 time=2.708 ms
84 bytes from 192.168.2.254 icmp_seq=3 ttl=62 time=3.385 ms
^C
VPCS>
```