# Open VPN manual

# 1. TLS

## 1.1. Download software

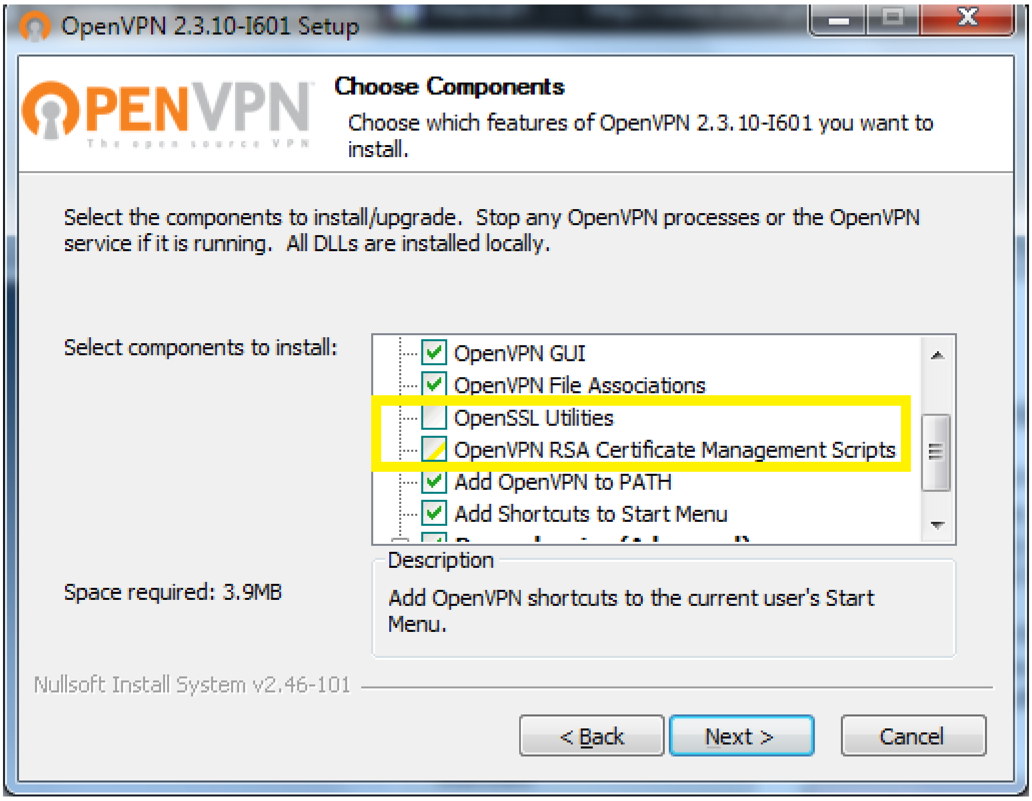
1.1.1. Download “**OpenVPN windows installer**” 64bit or 32bit software. (https://openvpn.net/index.php/open-source/downloads.html)

## 1.2. Installing software

1.2.1. Press “Next”

1.2.2. Press “I Agree”

1.2.3. If you want to create certificates using this computer check “OpenSSL Utilities” and “OpenVPN RSA Certificates Management Scripts” checkboxes (should be checked all boxes) otherwise leave default settings .



OpenVPN 2.3.10-I601 Setup

**Choose Components**

Choose which features of OpenVPN 2.3.10-I601 you want to install.

Select the components to install/upgrade. Stop any OpenVPN processes or the OpenVPN service if it is running. All DLLs are installed locally.

Select components to install:

- ☑ OpenVPN GUI
- ☑ OpenVPN File Associations
- □ OpenSSL Utilities
- □ OpenVPN RSA Certificate Management Scripts
- ☑ Add OpenVPN to PATH
- ☑ Add Shortcuts to Start Menu

Space required: 3.9MB

Description

Add OpenVPN shortcuts to the current user's Start Menu.

Nullsoft Install System v2.46-101

1.2.4. Press “Install” and wait for installation to complete.

1.2.5. Press “Next”

1.2.6. Press “Finish”

## 1.3. Creating certificates

1.3.1. Open cmd.exe (Start->Run->cmd.exe)

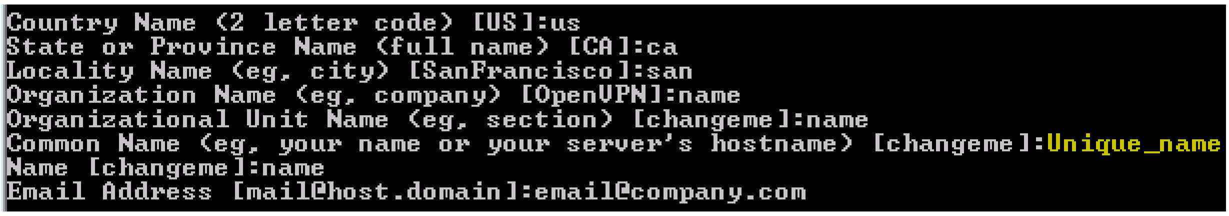
1.3.2. If you installed OpenVPN in default folder write “**cd \Program Files\OpenVPN\easy-rsa**” otherwise use your created file tree.

1.3.3. If you doing it for the first time write command “init-config” it will reset all certificate system. (if you have already created certificates on this computer and if you don’t want to recreate all your certificates skip this step .)

1.3.4. This step is optional (It will help to create certificates easier because you are creating hint for the certificate data). A new file will appear C:\OpenVPN\easy-rsa\**vars.bat**. Open it with your favorite text editor like notepad and edit these lines: After that save and close vars.bat file.

```
set KEY_COUNTRY= your_text_1
set KEY_PROVINCE= your_text_2
set KEY_CITY= your_text_3
set KEY_ORG= your_text_4
set KEY_EMAIL= your_text_5
```

1.3.5. To build root keys write these commands in cmd.exe: “**vars**”, “**clean-all**”, “**build-ca**”. Now you will be asked to write information (one line at the time) about your certificate:



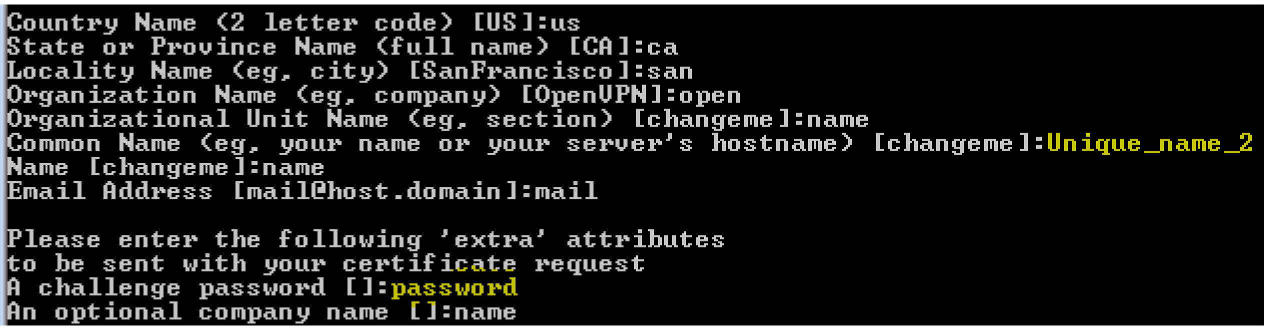
```
Country Name (2 letter code) [US]:us
State or Province Name (full name) [CA]:ca
Locality Name (eg, city) [SanFrancisco]:san
Organization Name (eg, company) [OpenVPN]:name
Organizational Unit Name (eg, section) [changeme]:name
Common Name (eg, your name or your server's hostname) [changeme]:Unique_name
Name [changeme]:name
Email Address [mail@host.domain]:email@company.com
```

Only “**Common Name (eg, your name or your server's hostname) [changeme]:**” is important because it must be unique name.

Now you have new file in your C:\OpenVPN\easy-rsa\**keys** catalog – “**ca.crt**”

This step should be done once and created file must be used in server and all clients’ settings.

1.3.6. To create server certificate write these commands in cmd.exe: “**vars**”, “**build-key-server server**”. Now you will be asked to write information (one line at the time) about your certificate:



```
Country Name (2 letter code) [US]:us
State or Province Name (full name) [CA]:ca
Locality Name (eg, city) [SanFrancisco]:san
Organization Name (eg, company) [OpenVPN]:open
Organizational Unit Name (eg, section) [changeme]:name
Common Name (eg, your name or your server's hostname) [changeme]:Unique_name_2
Name [changeme]:name
Email Address [mail@host.domain]:mail

Please enter the following 'extra' attributes
to be sent with your certificate request
A challenge password []:password
An optional company name []:name
```

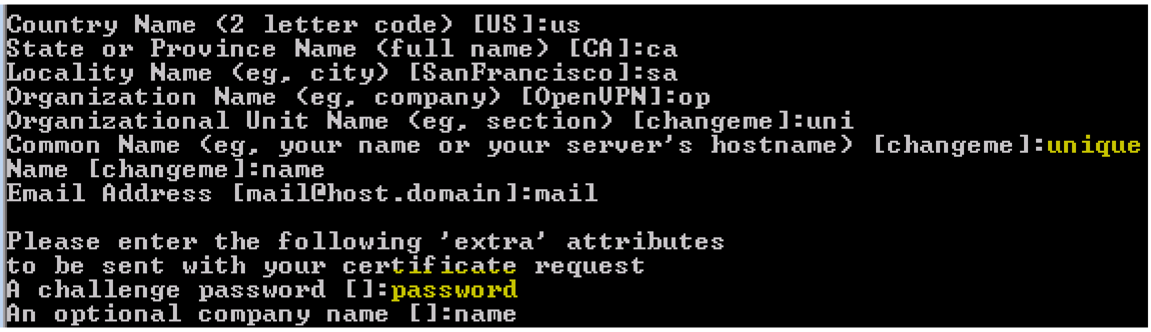
Only “**Common Name (ex. your name or your server's hostname) [changeme]:**” (it must be unique) and “**A challenge password []**” (you’ll have to use it in all clients certificates) are important.

After that you will be asked to agree, press “y” and “enter” two times.

Now you have new files in your C:\OpenVPN\easy-rsa\**keys** catalog – "**server.crt**" and "**server.key**".

1.3.7. To create Diffie Hellman file write to cmd.exe: "**build-dh**". Now you have new file in your C:\OpenVPN\easy-rsa\**keys** catalog – "**dh1024.pem**" (This is the last file required for server configuration).

1.3.8. To create Client certificate files write to cmd.exe: "**vars**", "**build-key <desired unique remote user name>**" (the same user name will be used in certificate data). Now you will be asked to write information (one line at the time) about your certificate:



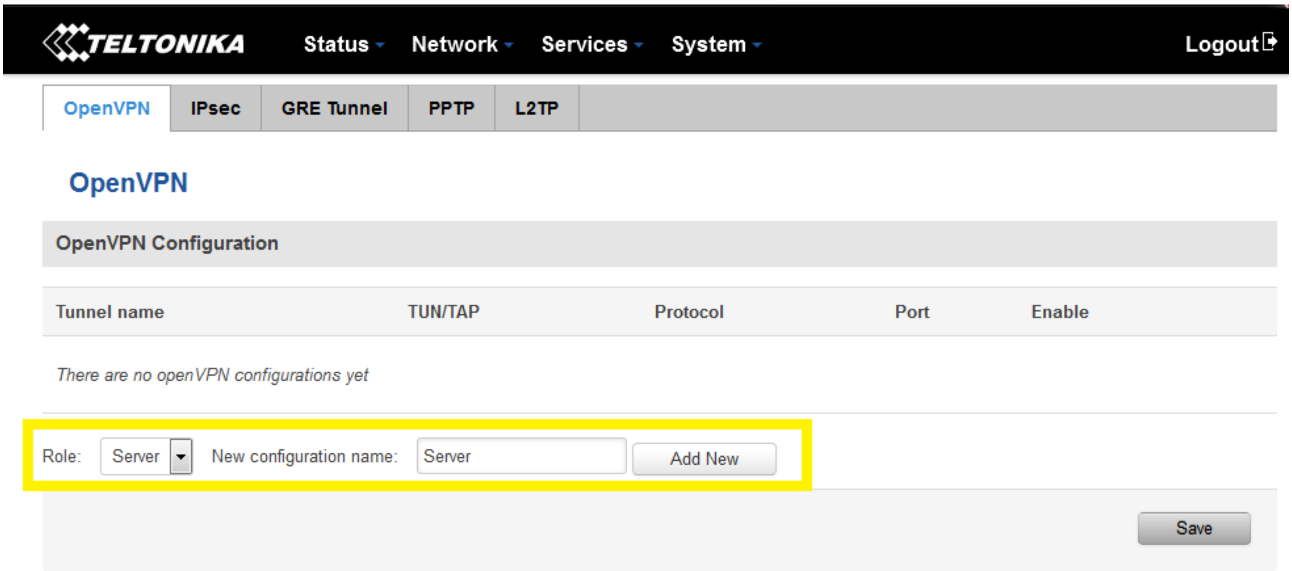
```
Country Name (2 letter code) [US]:us
State or Province Name (full name) [CA]:ca
Locality Name (eg, city) [SanFrancisco]:sa
Organization Name (eg, company) [OpenVPN]:op
Organizational Unit Name (eg, section) [changeme]:uni
Common Name (eg, your name or your server's hostname) [changeme]:unique
Name [changeme]:name
Email Address [mail@host.domain]:mail

Please enter the following 'extra' attributes
to be sent with your certificate request
A challenge password []:password
An optional company name []:name
```

Only "**Common Name (eg, your name or your server's hostname) [changeme]:**" (it must be unique and the same as in command you entered in cmd.exe **<desired unique remote user name>**) and "**A challenge password []**" (you'll have to use it in all clients certificates) are important. After that you will be asked to agree, press "y" and "enter" two times. Now you have new files in your C:\OpenVPN\easy-rsa\**keys** catalog – "**unique.crt** and "**unique.key**". (We have named these clients certificates client1.crt and client1.key)

## 1.4. Configure RUT9xx as an OpenVPN Tls server

1.4.1. Open RUT9xx web GUI and select Services -> VPN -> OpenVPN.

1.4.2. Create new configuration file by selecting role "**Server**" and typing configuration name which you like. Then press Add New button.



OpenVPN

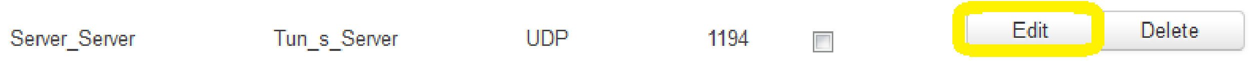
OpenVPN Configuration

| Tunnel name | TUN/TAP | Protocol | Port | Enable |
|---|---|---|---|---|

*There are no openVPN configurations yet*

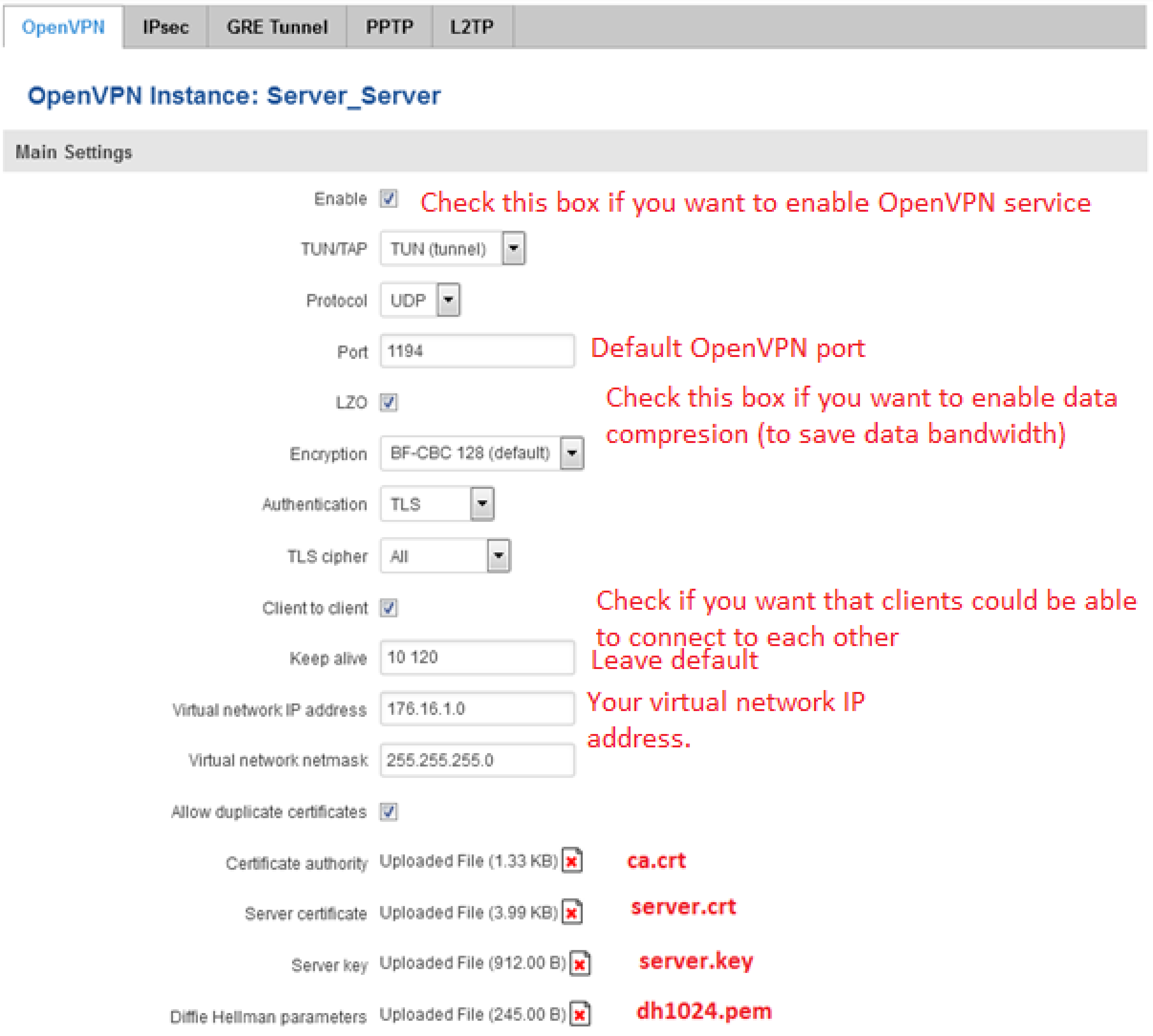
Role: Server New configuration name: Server

1.4.3. After that you will see a line with your tunnel. Press edit button to configure server.



Server_Server Tun_s_Server UDP 1194 □

1.4.4. On the opened page you will see Main Settings. After configuring press save at the bottom of the page.

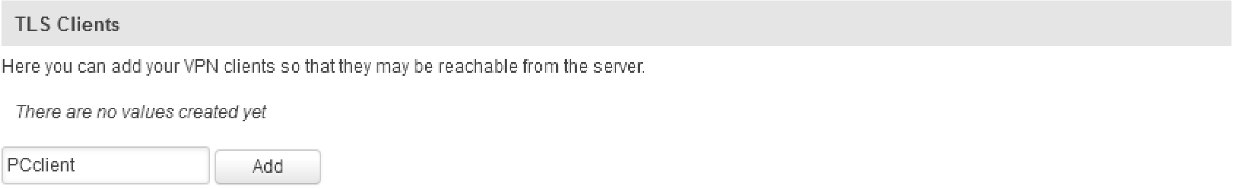


OpenVPN Instance: Server_Server

Main Settings

| | | |
|---|---|---|
| Enable | ☑ | Check this box if you want to enable OpenVPN service |
| TUN/TAP | TUN (tunnel) | |
| Protocol | UDP | |
| Port | 1194 | Default OpenVPN port |
| LZO | ☑ | Check this box if you want to enable data compresion (to save data bandwidth) |
| Encryption | BF-CBC 128 (default) | |
| Authentication | TLS | |
| TLS cipher | All | |
| Client to client | ☑ | Check if you want that clients could be able to connect to each other |
| Keep alive | 10 120 | Leave default |
| Virtual network IP address | 176.16.1.0 | Your virtual network IP address. |
| Virtual network netmask | 255.255.255.0 | |
| Allow duplicate certificates | ☑ | |
| Certificate authority | Uploaded File (1.33 KB) ☒ | ca.crt |
| Server certificate | Uploaded File (3.99 KB) ☒ | server.crt |
| Server key | Uploaded File (912.00 B) ☒ | server.key |
| Diffie Hellman parameters | Uploaded File (245.00 B) ☒ | dh1024.pem |

1.4.5. By default everyone who connects to the server will be able to connect to each other by virtual IP address, but if you want to connect to their local IP address you must add client by writing its' name (recommend to write its' unique name, for example PCclient) and pressing "add".



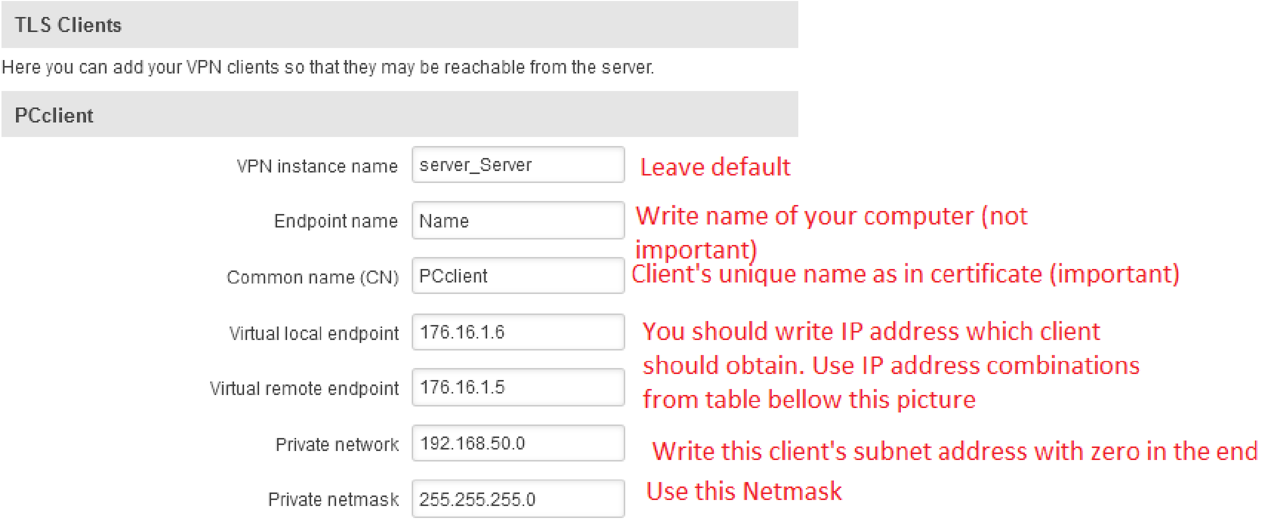
TLS Clients

Here you can add your VPN clients so that they may be reachable from the server.

*There are no values created yet*

PCclient

1.4.6. Configure client settings as in picture below and press "save" at the bottom of the page after configuring client settings.



TLS Clients

Here you can add your VPN clients so that they may be reachable from the server.

PCclient

| | | |
|---|---|---|
| VPN instance name | server_Server | Leave default |
| Endpoint name | Name | Write name of your computer (not important) |
| Common name (CN) | PCclient | Client's unique name as in certificate (important) |
| Virtual local endpoint | 176.16.1.6 | You should write IP address which client should obtain. Use IP address combinations from table bellow this picture |
| Virtual remote endpoint | 176.16.1.5 | |
| Private network | 192.168.50.0 | Write this client's subnet address with zero in the end |
| Private netmask | 255.255.255.0 | Use this Netmask |

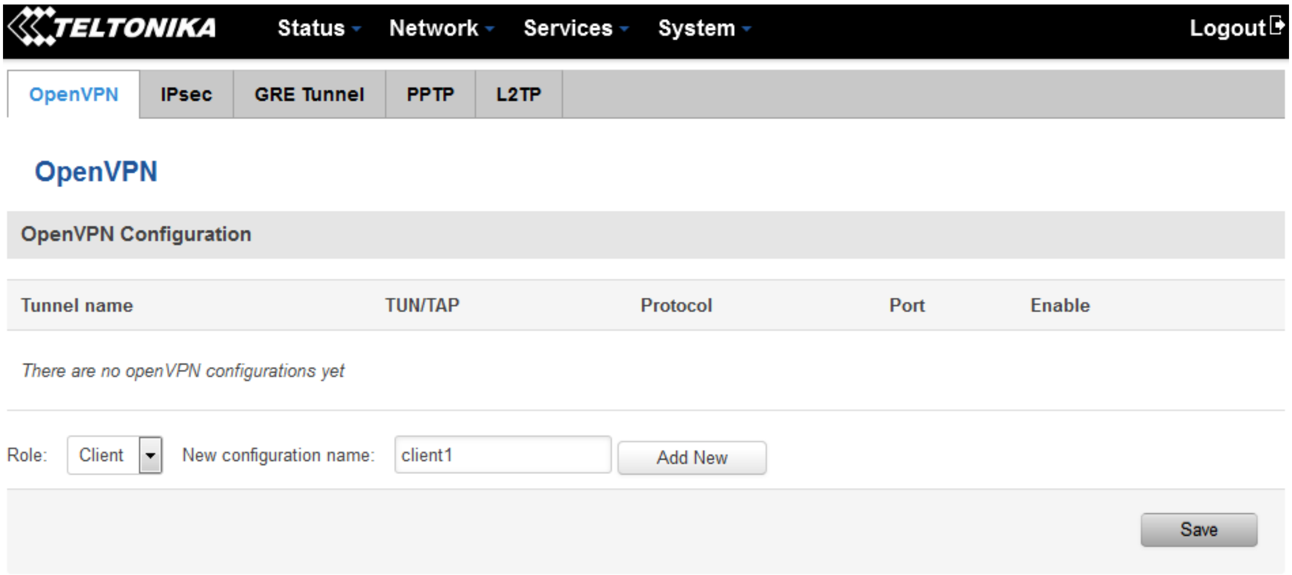
You have to choose virtual local/endpoint from these paired IP endings.

```
[  1,  2] [  5,  6] [  9, 10] [ 13, 14] [ 17, 18]
[ 21, 22] [ 25, 26] [ 29, 30] [ 33, 34] [ 37, 38]
[ 41, 42] [ 45, 46] [ 49, 50] [ 53, 54] [ 57, 58]
[ 61, 62] [ 65, 66] [ 69, 70] [ 73, 74] [ 77, 78]
[ 81, 82] [ 85, 86] [ 89, 90] [ 93, 94] [ 97, 98]
[101,102] [105,106] [109,110] [113,114] [117,118]
[121,122] [125,126] [129,130] [133,134] [137,138]
[141,142] [145,146] [149,150] [153,154] [157,158]
[161,162] [165,166] [169,170] [173,174] [177,178]
[181,182] [185,186] [189,190] [193,194] [197,198]
[201,202] [205,206] [209,210] [213,214] [217,218]
[221,222] [225,226] [229,230] [233,234] [237,238]
[241,242] [245,246] [249,250] [253,254]
```

## 1.5. Configure RUT9xx as an OpenVPN Tls client

1.5.1. Open RUT9xx web GUI and select Services -> VPN -> OpenVPN.

1.5.2. Create new configuration file by selecting role “**client**” and typing configuration name (we recommend to write same unique name as in certificate (CN)). Then press Add New button.



OpenVPN

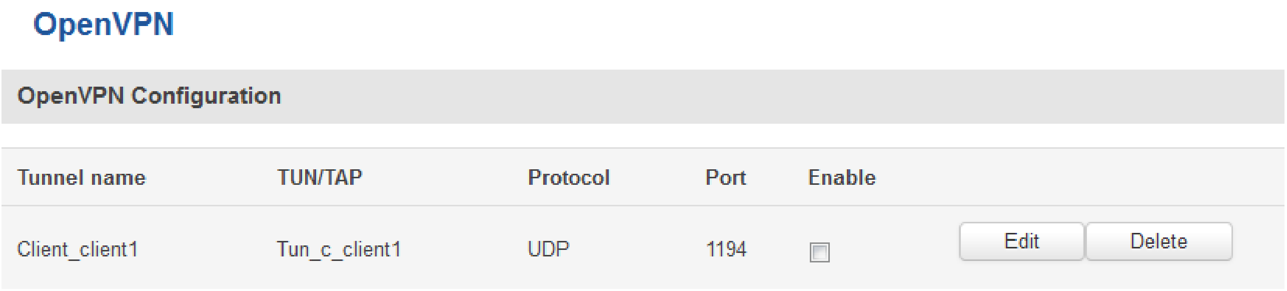
OpenVPN Configuration

| Tunnel name | TUN/TAP | Protocol | Port | Enable |
|---|---|---|---|---|

*There are no openVPN configurations yet*

Role: Client New configuration name: client1

1.5.3. Now press “**edit**” button.

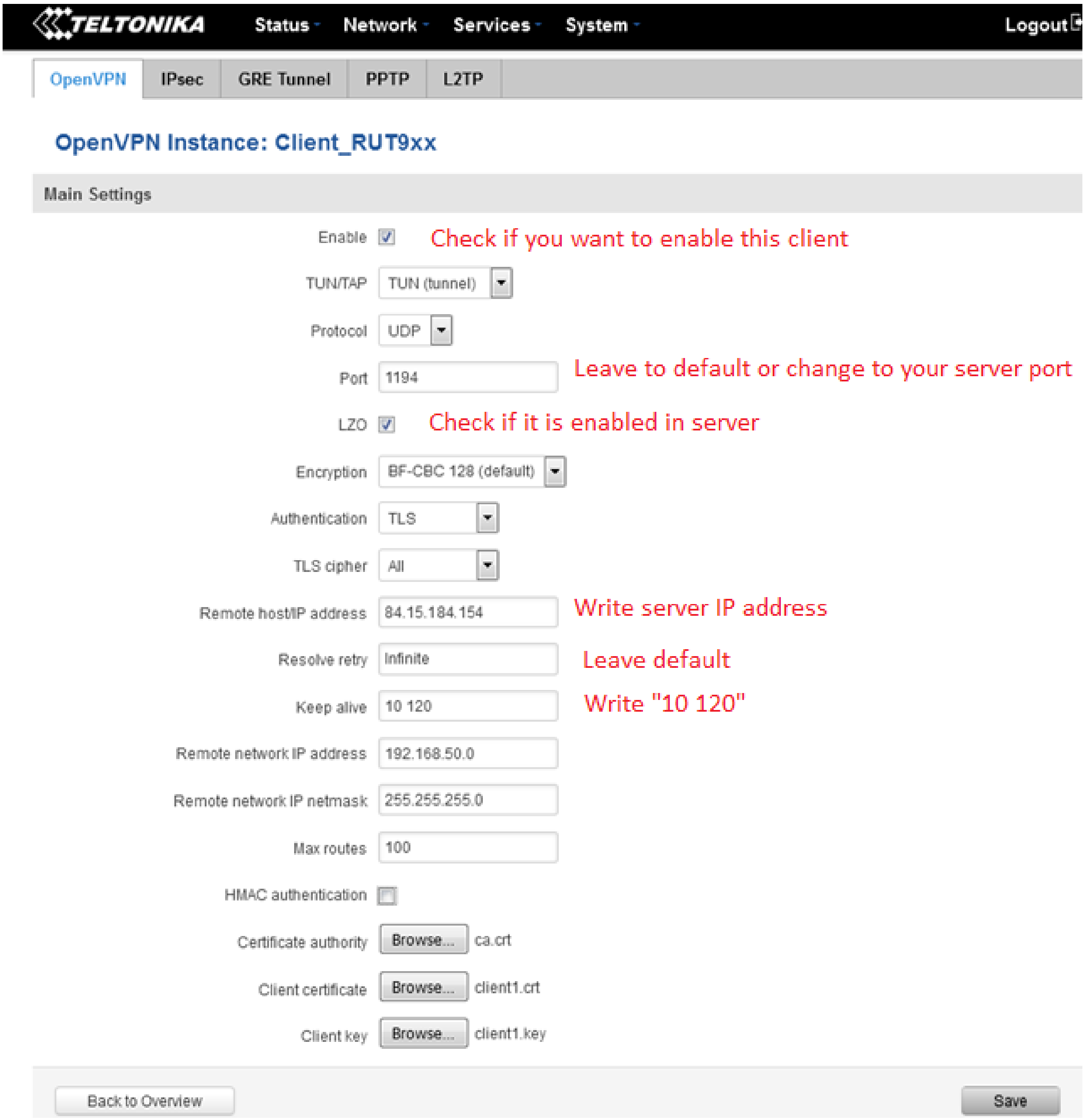


OpenVPN

OpenVPN Configuration

| Tunnel name | TUN/TAP | Protocol | Port | Enable |
|---|---|---|---|---|
| Client_client1 | Tun_c_client1 | UDP | 1194 | □ |

1.5.4. Fill forms as in example and press save.



OpenVPN Instance: Client_RUT9xx

Main Settings

| | | |
|---|---|---|
| Enable | ☑ | Check if you want to enable this client |
| TUN/TAP | TUN (tunnel) | |
| Protocol | UDP | |
| Port | 1194 | Leave to default or change to your server port |
| LZO | ☑ | Check if it is enabled in server |
| Encryption | BF-CBC 128 (default) | |
| Authentication | TLS | |
| TLS cipher | All | |
| Remote host/IP address | 84.15.184.154 | Write server IP address |
| Resolve retry | Infinite | Leave default |
| Keep alive | 10 120 | Write "10 120" |
| Remote network IP address | 192.168.50.0 | |
| Remote network IP netmask | 255.255.255.0 | |
| Max routes | 100 | |
| HMAC authentication | ☐ | |
| Certificate authority | Browse... ca.crt | |
| Client certificate | Browse... client1.crt | |
| Client key | Browse... client1.key | |

## 1.6. Configure Computer as an OpenVPN Tls server

1.6.1. In “**C:\Program Files\OpenVPN\config**” create file “**server.opvn**” which contains these settings:

```
## server.ovpn ##
port 1194
proto udp
dev tun
ca ca.crt
cert server.crt
key server.key
dh dh1024.pem
server 10.8.0.0 255.255.255.0
ifconfig 10.8.0.0 255.255.255.0
route 192.168.1.0 255.255.255.0
client-config-dir " C:\\Program Files\\OpenVPN\\config \\ccd"
ifconfig-pool-persist ipp.txt
status openvpn-status.log
comp-lzo
keepalive 10 120
persist-key
persist-tun
verb 5
```

Firstly choose your server virtual IP address “10.x.0.0” default is 10.8.0.0, then decide whether you need or not need to use data compression. If you need it leave “comp-lzo” if don’t - delete it.

1.6.2. In 1.6.1. settings you can see four names highlighted in green. These files should be copied in “**C:\Program Files\OpenVPN\config**” (the same folder as server config file).

1.6.3. Create folder “ccd” in directory in “**C:\Program Files\OpenVPN\config\ccd**”. In this folder create file with unique client name for example: “**unique**” (the same name as used for client certificate). In this example we use name “client1”. This file “**client1**” contains these settings:

```
ifconfig-push 10.8.0.9 10.8.0.10 #push routes prom IP pair table (first IP is to self, second - for client).

iroute 192.168.1.0 255.255.255.0 #example if client's network is .1.0/24
```

## 1.7. Configure Computer as an OpenVPN Tls client

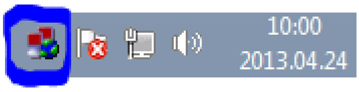
In "**C:\Program Files\OpenVPN\config**" create file "**unique.opvn**" which contains these settings:

```
##remote.ovpn##

client

dev tun

proto udp

remote 84.150.123.101

resolv-retry infinite

nobind

route 192.168.1.0 255.255.255.0

persist-key

persist-tun

ca ca.crt

cert client1.crt

key client1.key

comp-lzo
```

In line starting with "**remote**" write your server IP address and port (port is usually default 1194).

"**Route**" – this is RUT9xx (OpenVPN server) LAN subnet.

Files with name highlighted in green should be placed in "**C:\Program Files\OpenVPN\config**" (the same folder as client config file).

After that open application "**OpenVPN GUI**". It should be already installed in your computer as bundle of "**OpenVPN windows installer**". Then you will see this " 

" two computers with red displays. Press on it with right mouse button and select "**Connect**".

# 2. Static key

## 2.1. Configure your computer as a Server

2.1.1. Start “**Generate a static OpenVPN key**” shortcut and press enter. Then check your “**C:\Program Files\OpenVPN\config**” folder for new file key.txt.

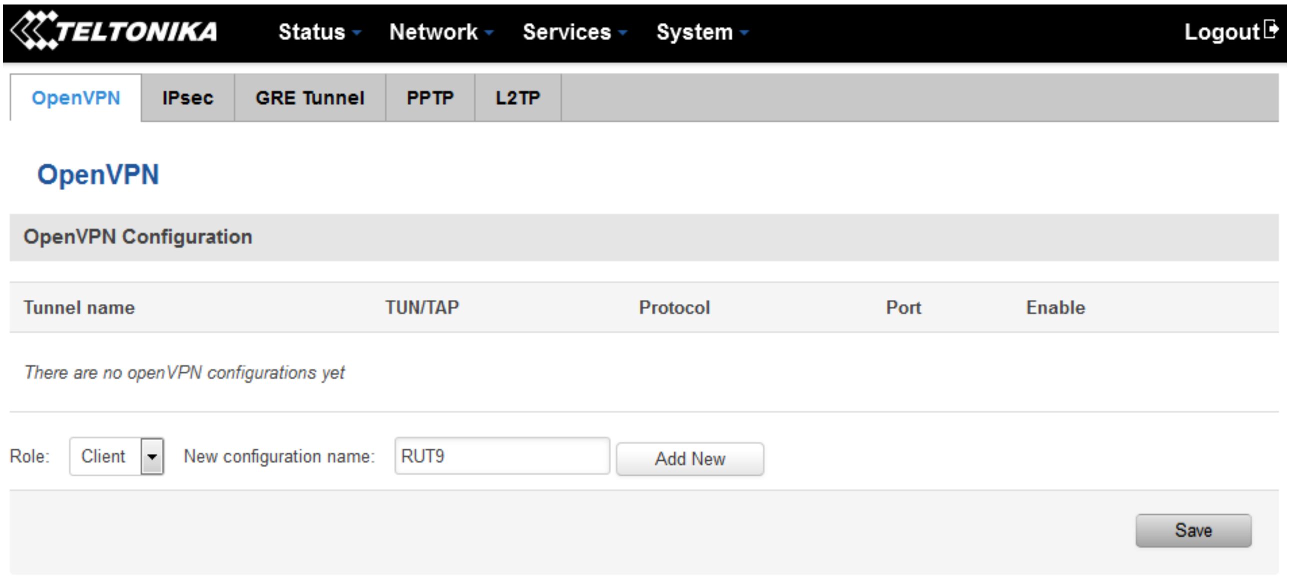
2.1.2. Open “**C:\Program Files\OpenVPN\config**” and create file “**static.ovpn**” with content as in example:

```
#server
port 1194
proto udp
dev tun
secret static.key
ifconfig 172.16.0.1 172.16.0.2
comp-lzo
route 192.168.1.0 255.255.255.0
keepalive 10 120
persist-key
persist-tun
resolv-retry infinite
verb 5
```

## 2.2 Configure RUT9xx as a Client.

2.2.1 Open RUT9xx web GUI and select Services -> VPN -> OpenVPN

2.2.2 Create new configuration file by selecting role “**Client**” and typing configuration name which you like. Then press Add New button



OpenVPN

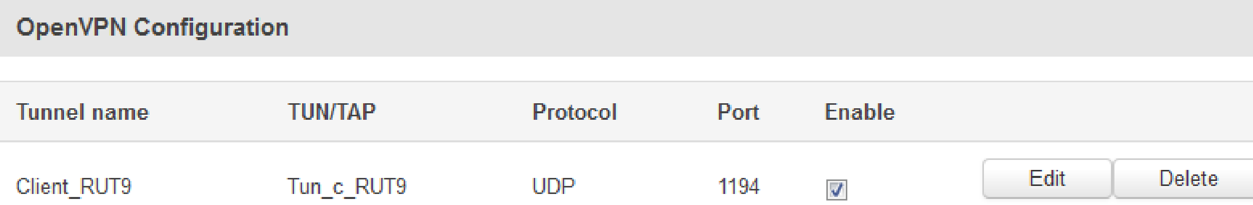
OpenVPN Configuration

| Tunnel name | TUN/TAP | Protocol | Port | Enable |
|---|---|---|---|---|

*There are no openVPN configurations yet*

Role: Client New configuration name: RUT9

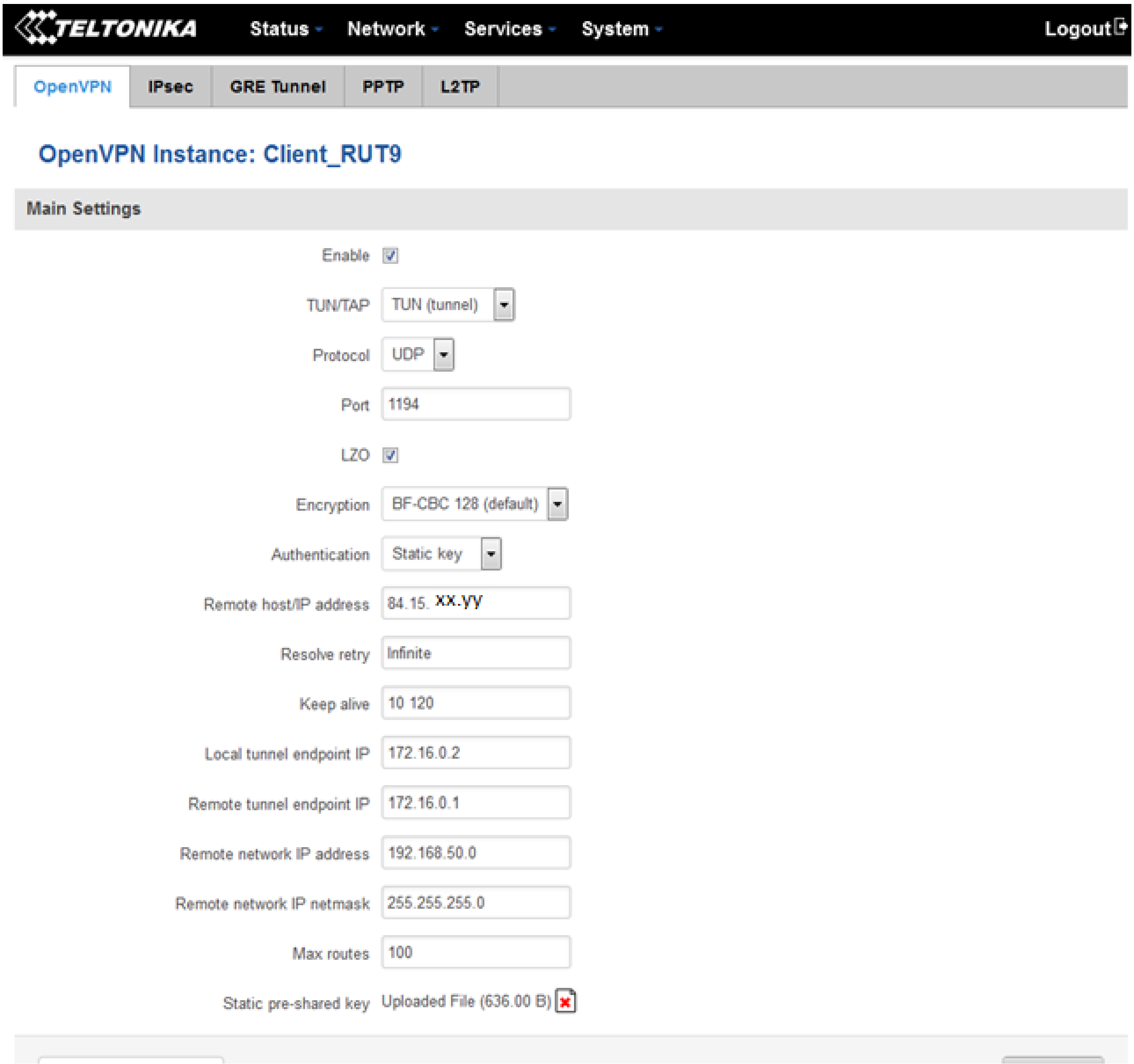
2.2.3 After that you will see a line with your tunnel. Press edit button to configure server.



OpenVPN Configuration

| Tunnel name | TUN/TAP | Protocol | Port | Enable | | |
|---|---|---|---|---|---|---|
| Client_RUT9 | Tun_c_RUT9 | UDP | 1194 | ☑ | Edit | Delete |

2.2.4 Fill forms as in example and press save.

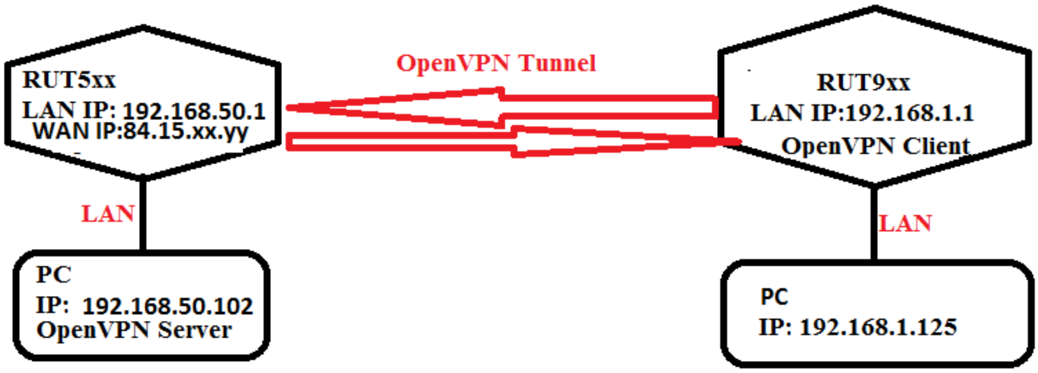


OpenVPN Instance: Client_RUT9

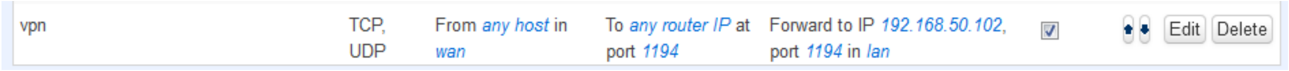
Main Settings

| | |
|---|---|
| Enable | ☑ |
| TUN/TAP | TUN (tunnel) |
| Protocol | UDP |
| Port | 1194 |
| LZO | ☑ |
| Encryption | BF-CBC 128 (default) |
| Authentication | Static key |
| Remote host/IP address | 84.15. xx.yy |
| Resolve retry | Infinite |
| Keep alive | 10 120 |
| Local tunnel endpoint IP | 172.16.0.2 |
| Remote tunnel endpoint IP | 172.16.0.1 |
| Remote network IP address | 192.168.50.0 |
| Remote network IP netmask | 255.255.255.0 |
| Max routes | 100 |
| Static pre-shared key | Uploaded File (636.00 B) ☒ |

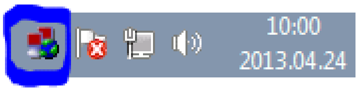
2.2.5 Network topology of this example:



2.2.6 Port forwarding rule in router RUT5xx for OpenVPN



| | | | | | | | |
|---|---|---|---|---|---|---|---|
| vpn | TCP, UDP | From *any host* in *wan* | To *any router IP* at port *1194* | Forward to IP *192.168.50.102*, port *1194* in *lan* | ☑ | ⬆ ⬇ | Edit Delete |

2.2.7 After that open application “**OpenVPN GUI**”. It should be already installed in your computer as bundle of “**OpenVPN windows installer**”. Then you will see this “  ” two computers with red displays. Press on it with right mouse button and select “**Connect**”.

## 2.3 Configure your computer as a client

2.3.1 Start “**Generate a static OpenVPN key**” shortcut and press enter. Then check your “**C:\Program Files\OpenVPN\config**” folder for new file key.txt.

2.3.2 Open “**C:\Program Files\OpenVPN\config**” and create file “**static.ovpn**” with content as in example:

```
remote 84.15.xx.yy
verb 5
proto udp
dev tun
comp-lzo
ifconfig 172.16.0.2 172.16.0.1
route 192.168.1.0 255.255.255.0
secret static.key
keepalive 10 120
persist-key
persist-tun
```

2.3.2.1 In line remote write your server IP address.

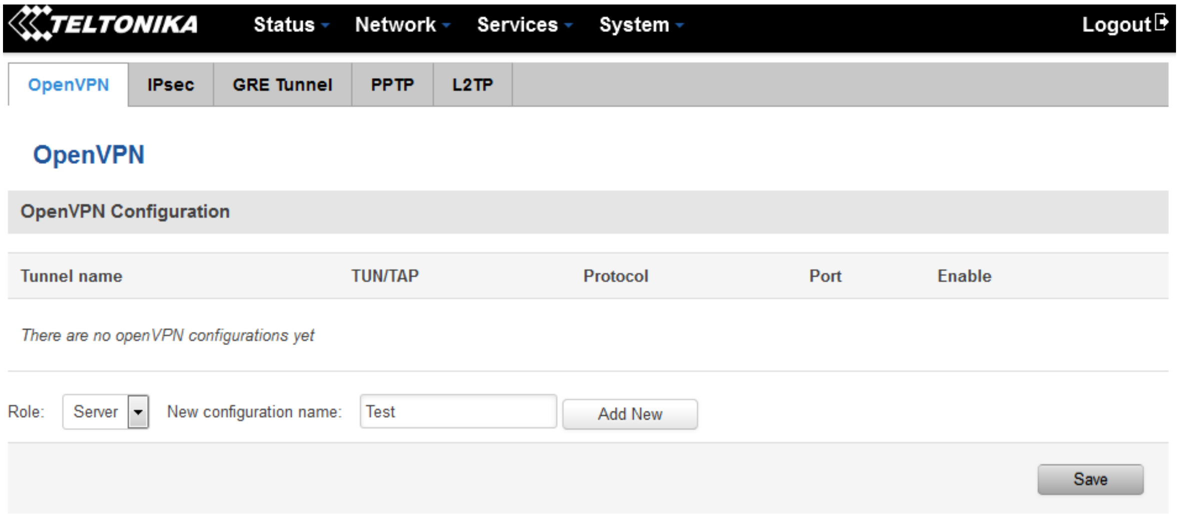
2.3.2.2 In line ifconfig write your virtual remote and local IP address as in example in 1.4.6 item.

2.3.2.3 The last line is the name of your static OpenVPN key, which you generated and have (it should stay here) in “**C:\Program Files\OpenVPN\config**” folder.

## 2.4 Configure Rut9xx as a server

2.4.2 Open RUT9xx web GUI and select services -> OpenVPN

2.4.3 Create new configuration file by selecting role “**server**” and typing configuration name which you like. Then press Add New button.



OpenVPN

OpenVPN Configuration

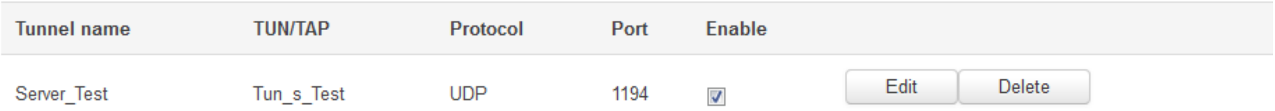
| Tunnel name | TUN/TAP | Protocol | Port | Enable |
|---|---|---|---|---|

*There are no openVPN configurations yet*

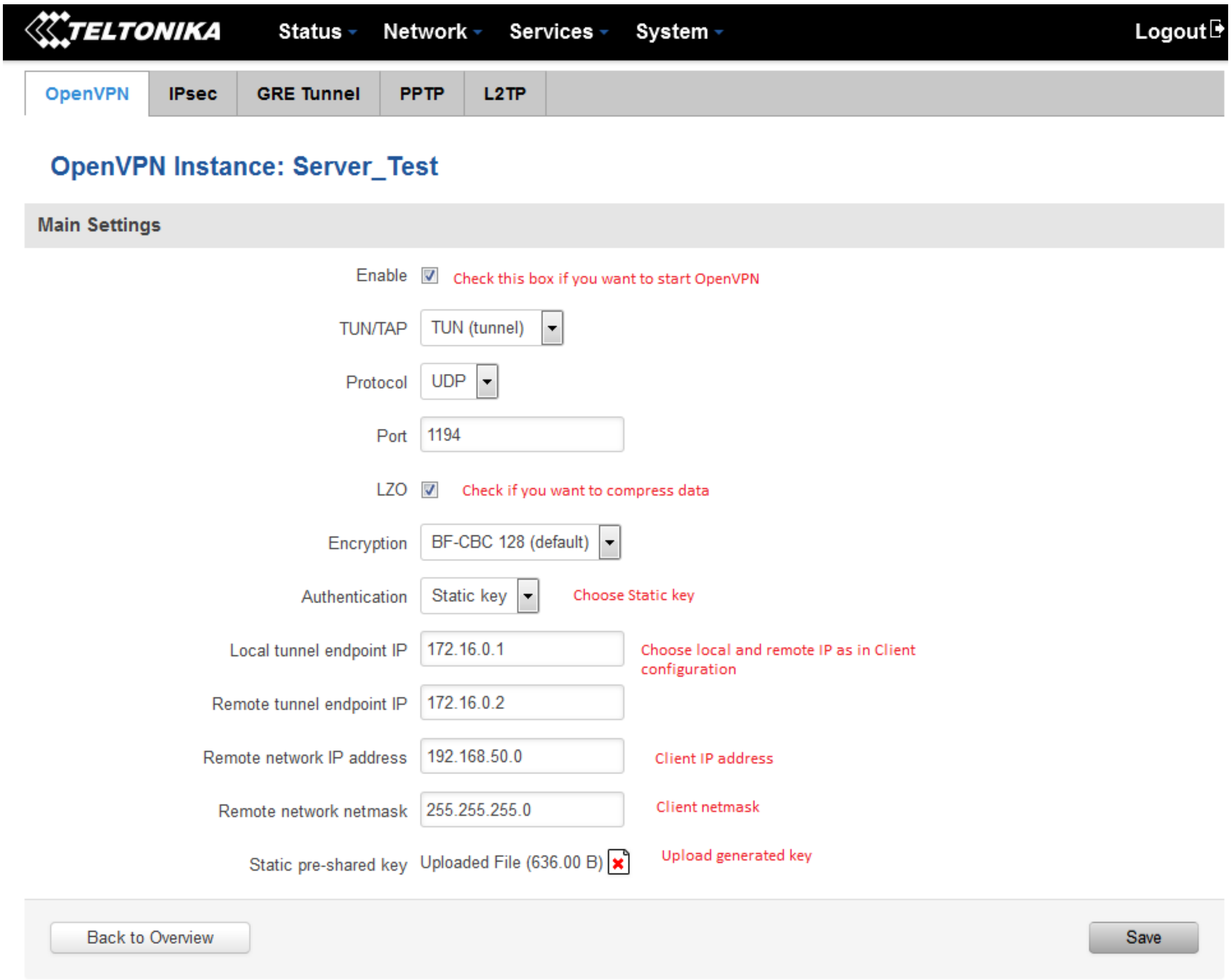
Role: Server

New configuration name: Test

2.4.4 After that you will see a line with your tunnel. Press edit button to configure server.



| Tunnel name | TUN/TAP | Protocol | Port | Enable | |
|---|---|---|---|---|---|
| Server_Test | Tun_s_Test | UDP | 1194 | ☑ | Edit Delete |



OpenVPN Instance: Server_Test

Main Settings

Enable ☑ Check this box if you want to start OpenVPN

TUN/TAP: TUN (tunnel)

Protocol: UDP

Port: 1194

LZO ☑ Check if you want to compress data

Encryption: BF-CBC 128 (default)

Authentication: Static key — Choose Static key

Local tunnel endpoint IP: 172.16.0.1 — Choose local and remote IP as in Client configuration

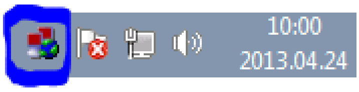
Remote tunnel endpoint IP: 172.16.0.2

Remote network IP address: 192.168.50.0 — Client IP address

Remote network netmask: 255.255.255.0 — Client netmask

Static pre-shared key: Uploaded File (636.00 B) — Upload generated key

## 2.5 Connect to server

2.5.2 After that open application "**OpenVPN GUI**". It should be already installed in your computer as bundle of "**OpenVPN windows installer**". Then you will see this " " two computers with red displays. Press on it with right mouse button and select "**Connect**".