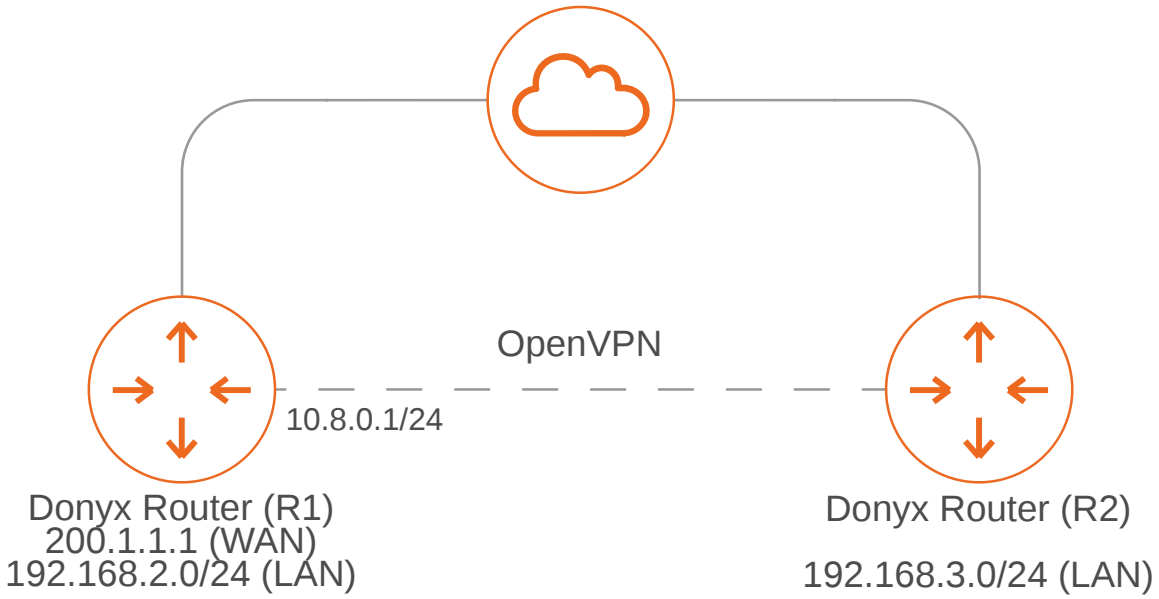
OpenVPN Server and Client Configuration on Donyx Routers

The objective is to establish a tunnel and ensure mutual connectivity between remote local networks. This configuration involves setting up one router as a **server** and the other as a **client**.

A public ("white") IP address is required only for the router acting as the **server**. The **client** router may utilize a private ("gray") IP address and can operate behind a **NAT** gateway.

OpenVPN Server-Client Network Topology:



In this example, router *R1* acts as the **server** with the public IP address *200.1.1.1* and the local network *192.168.2.0/24*. The client router *R2* has a local network with addresses in the *192.168.3.0/24* range.

The configuration of **OpenVPN** requires the presence of valid certificates for both the client and the server on the router. For instructions on how to create, export, and import certificates in *dnxOS*, please refer to the dedicated article.

Certificates may be generated using a standalone **Public Key Infrastructure (PKI)** (e.g., *easy-rsa*) or through the router's internal interface.

Configuration for Router R1 (Server)

Navigate to the */service/openvpn-server* section. An example of the server configuration is illustrated in the figure below.

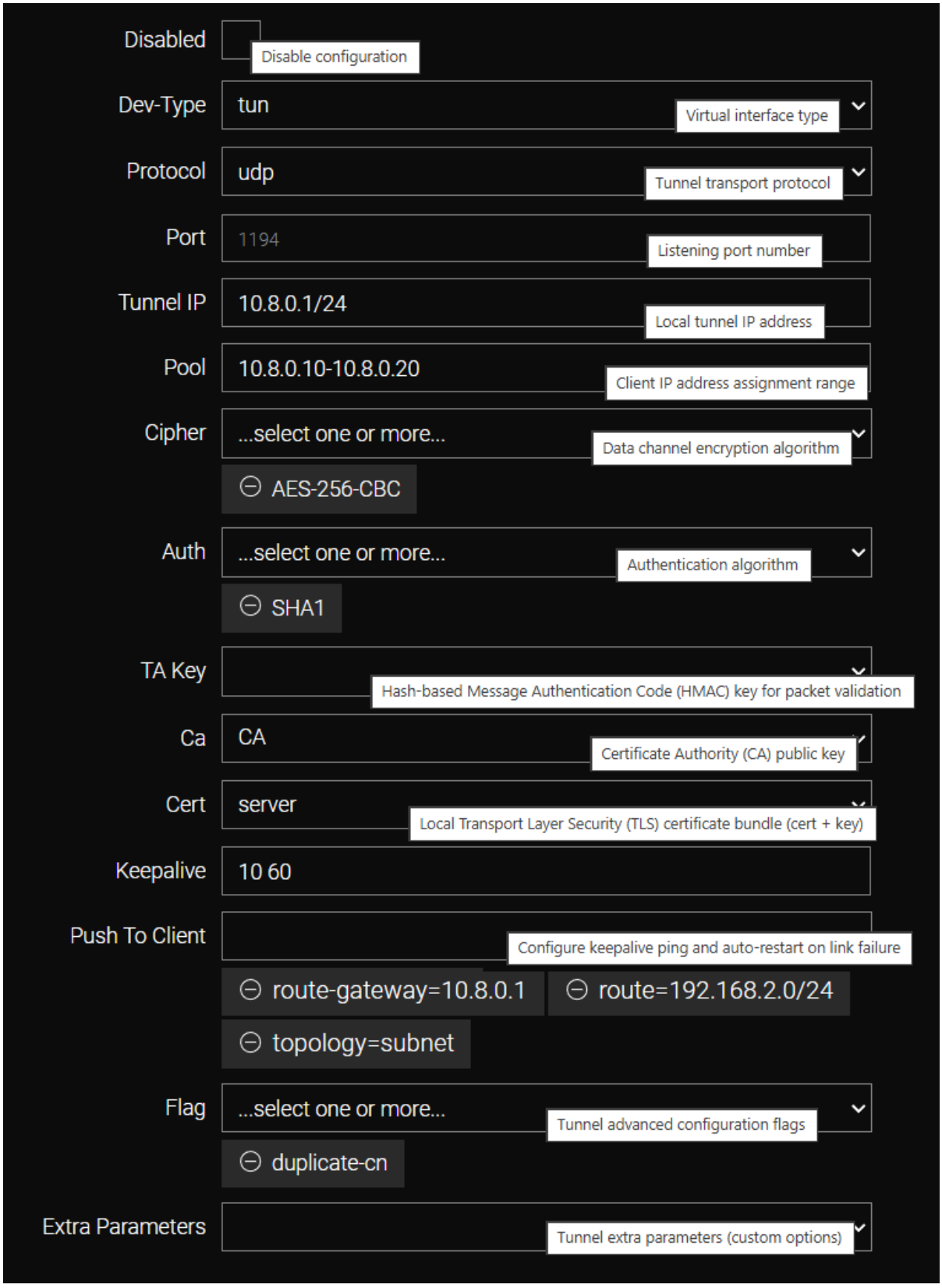


Table 1. OpenVPN Server Parameters

Field	Value
Dev-Type	*Tun*
Protocol	*UDP* (default).
Port	*1194* (default).
Tunnel IP	*10.8.0.1/24*
Pool	*10.8.0.10-10.8.0.20*
Cipher	*AES-256-CBC* (default).
Auth	*SHA1* (default).
TA Key	(Leave blank).
CA	CA file name (in this example: *CA*).
Cert	Server certificate name (in this example: *server*).
Keepalive	*10 60*
Push To Client	*topology=subnet* (default); *route=192.168.2.0/24* (the route to the local network of router *R1* is pushed to the client); *route-gateway=10.8.0.1* (the tunnel address of router *R1* is assigned as the gateway for the pushed route).
Flag	*duplicate-cn* (default).

Click **Apply** to activate the configuration.

CLI Configuration (server)

Please note that due to the requirement for pre-installed certificates, configuration via the CLI can be more complex than the web-based setup, although both interfaces utilize the same underlying parameters.

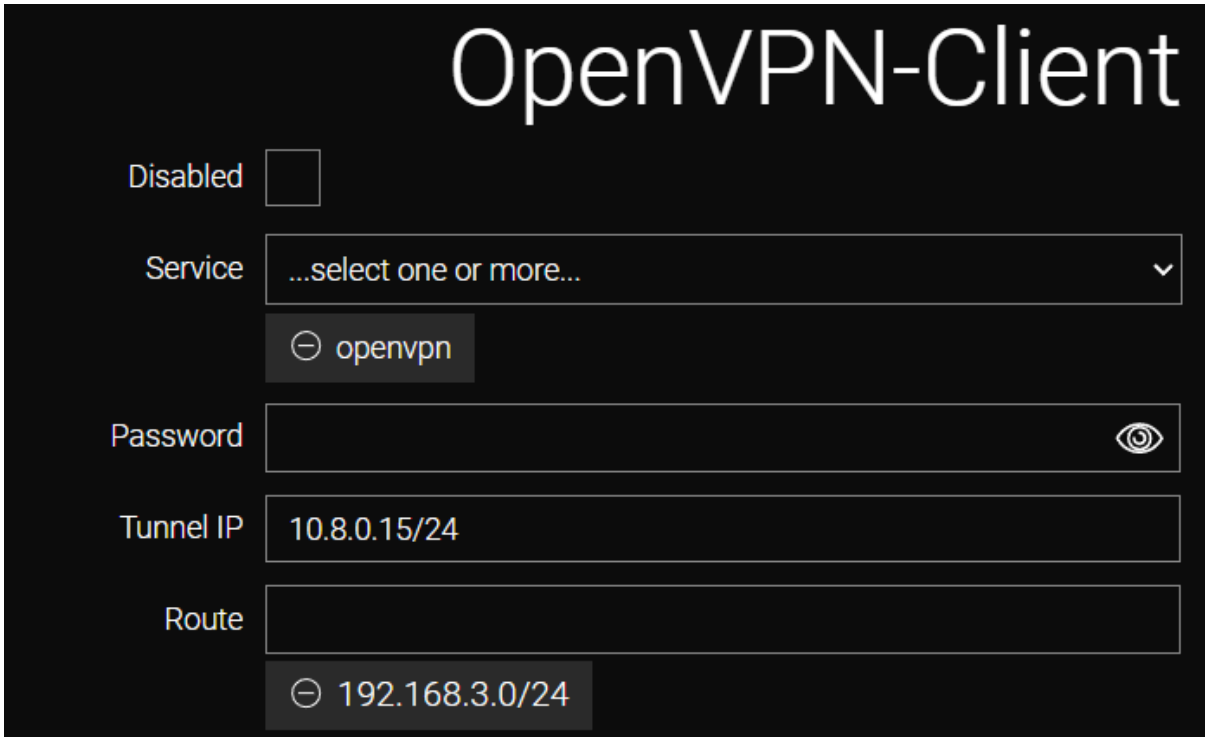
```
/service openvpn-server
    auth -
    auth SHA1
    ca CA
    cert server
    cipher -
    cipher AES-256-CBC
    dev-type tun
    disabled -
    extra -
    flag -
    flag duplicate-cn
    keepalive 10 60
    pool 10.8.0.10-10.8.0.20
    port 1194
    protocol udp
    push -
    push route-gateway=10.8.0.1,route=192.168.2.0/24,topology=subnet
    ta-key -
    tunnel-ip 10.8.0.1/24

  /service openvpn-server apply
```

Creating a Client Account

The client account is created in the */service/client* section.

1. Click the **Add** button.
2. Specify the **Username**.

The **Username** must strictly match the **Common Name (CN)** of the certificate used by the client connecting to the **OpenVPN** server.

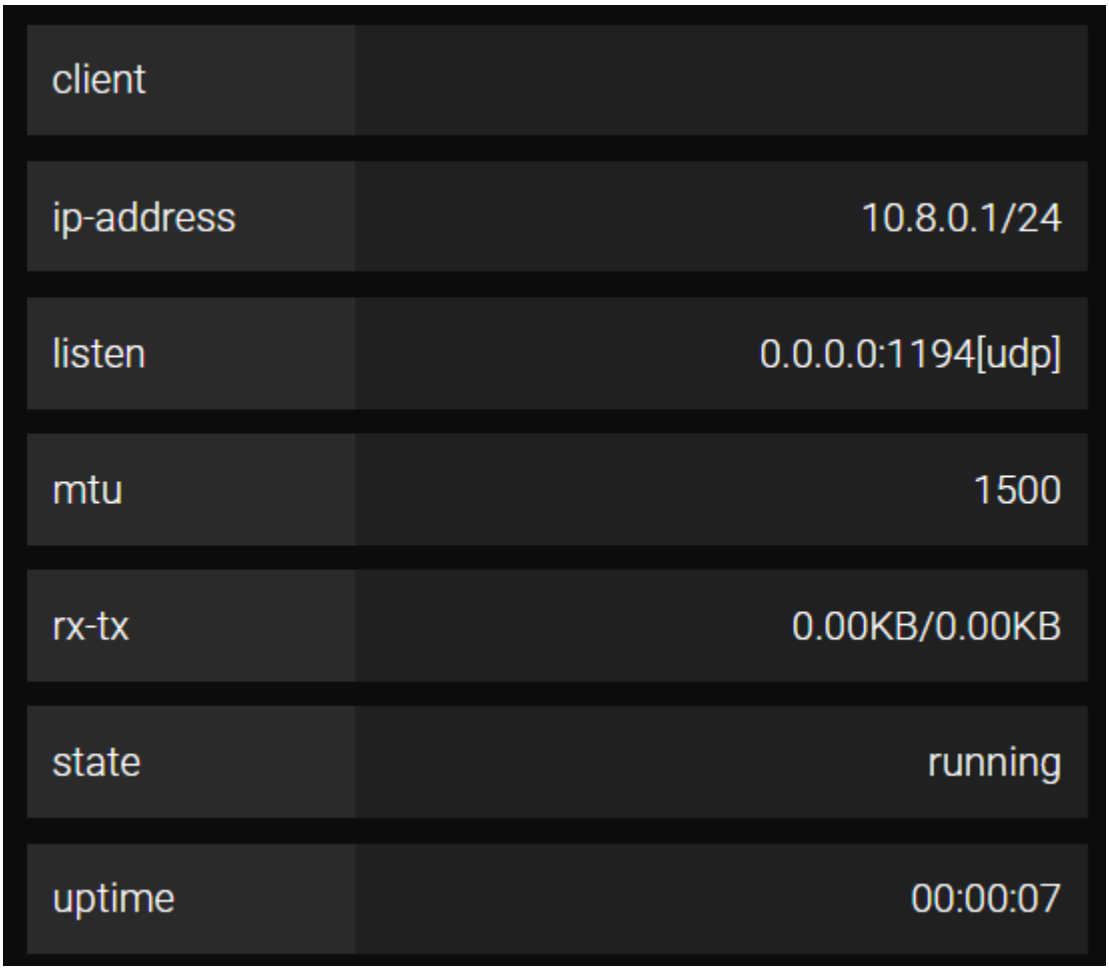


Configure the connecting client parameters:

1. In the **Service** field, select *openvpn*.
2. In the **Tunnel IP** field, the IP address and subnet mask (from the *Pool* range) can be specified for this client. If this field is left blank, the address is assigned automatically.
3. In the **Route** field, specify the local subnet of router *R2* that should be accessible from router *R1* (in this example, *192.168.3.0/24*).
4. Click **Apply**.

If multiple unique clients need to connect to **OpenVPN**, corresponding entries must be created in the */service/client* section with unique **Usernames** that match the **Common Name (CN)** of their respective certificates. If connectivity to the clients' local networks is required, their specific subnets must be specified in the **Route** field for each individual client account.

The **OpenVPN Server** can now be started in the */service/openvpn-server* section. Uncheck the **Disabled** box and click **Apply**. The tunnel status will change to *running*.



Configuration for Router R2 (Client)

Navigate to the */tunnel/openvpn* section. An example of the client configuration is illustrated in the figure below.

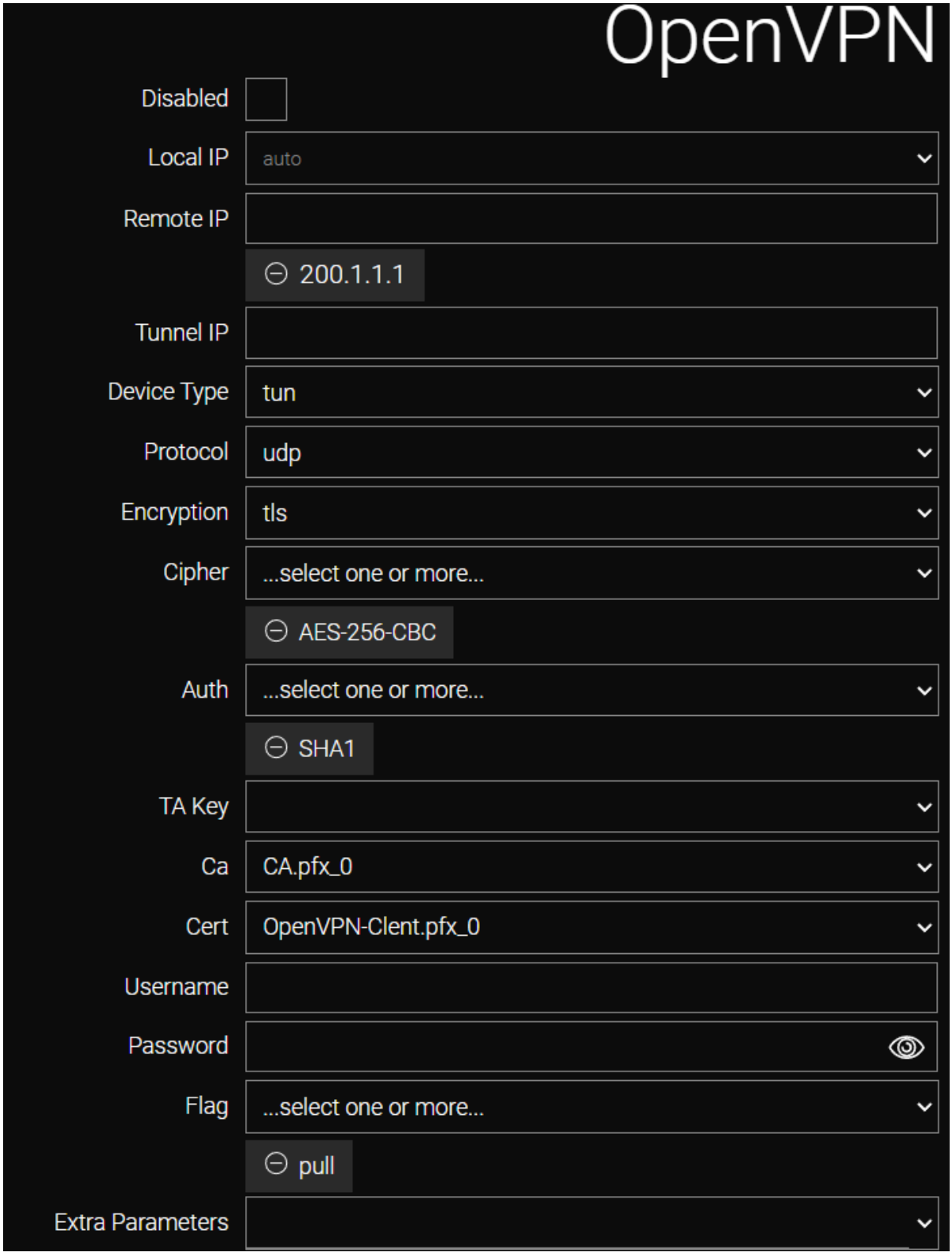


Table 2. OpenVPN Client Parameters

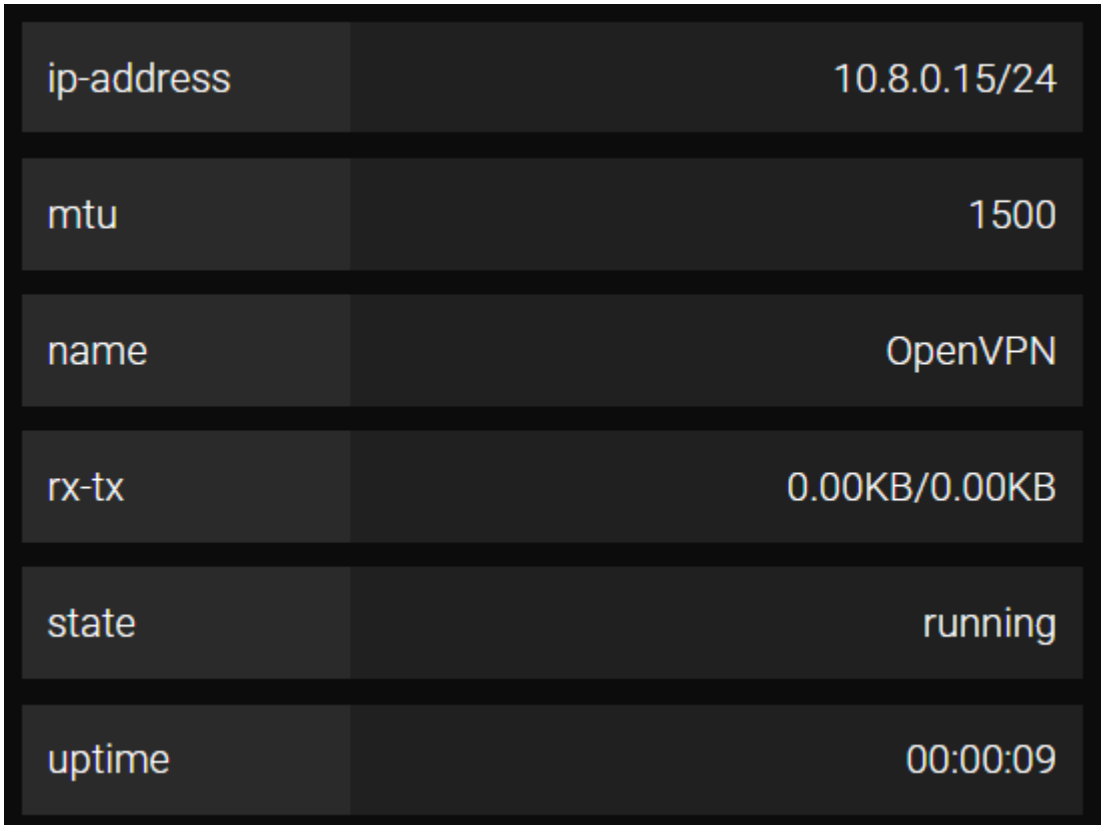
Field	Value
Local IP	*WAN*
Remote IP	*200.1.1.1*
Tunnel IP	(Leave blank).
Device Type	*tun*
Protocol	*udp*
Encryption	*tls*
Cipher	*AES-256-CBC*
Auth	*SHA1*
TA Key	*Not used in this example*.
CA	CA certificate filename (e.g., *CA.pfx_0*).
Cert	Client certificate filename (e.g., *OpenVPN-Client.pfx_0*).
Username	*Not used in this example*.
Password	*Not used in this example*.
Flag	*Pull* (default).
Extra Parameters	*Not used in this example*.

The *CA* and *Cert* filenames differ because they were generated on the *dnxOS* server and exported, which automatically modified the file identifiers.

To import certificates onto the router, first upload the files to the /storage/file section. Then use the import function in the /storage/certificate/cert_import section. For more information, please refer to the dedicated article.

To complete the configuration, uncheck the **Disabled** box and click **Apply**.

Once the tunnel is established, its status will be displayed as *running*:



CLI Configuration (client)

```
/tunnel openvpn add name=OpenVPN
    auth -
    auth SHA1
    ca ca.crt
    cert client-bundle.pem
    cipher -
    cipher AES-256-CBC
    dev-type tun
    disabled -
    encryption tls
    extra -
    flag -
    flag pull
    local-ip auto
    password -
    protocol udp
    remote-ip -
    remote-ip 200.1.1.1
    ta-key -
    tunnel-ip -
    username -
    apply
```

Verify that the client has received the required routes from the server by checking the routing table in the */ip/route/list* section.

NAME	STATE	DST-ADDR	INTERFACE	GATEWAY	METRIC	TABLE	SRC-ADDR	TYPE
1	D	10.8.0.0/24	OpenVPN		0	main	10.8.0.15	unicast
2	D	192.168.1.0/24	bridge0		0	main	192.168.1.2	unicast
3	D	192.168.2.0/24	OpenVPN	10.8.0.1	0	main	10.8.0.15	unicast
4	D	192.168.3.0/24	bridge1		200	main		unicast
5	D	200.1.1.0/24	WAN		200	main		unicast

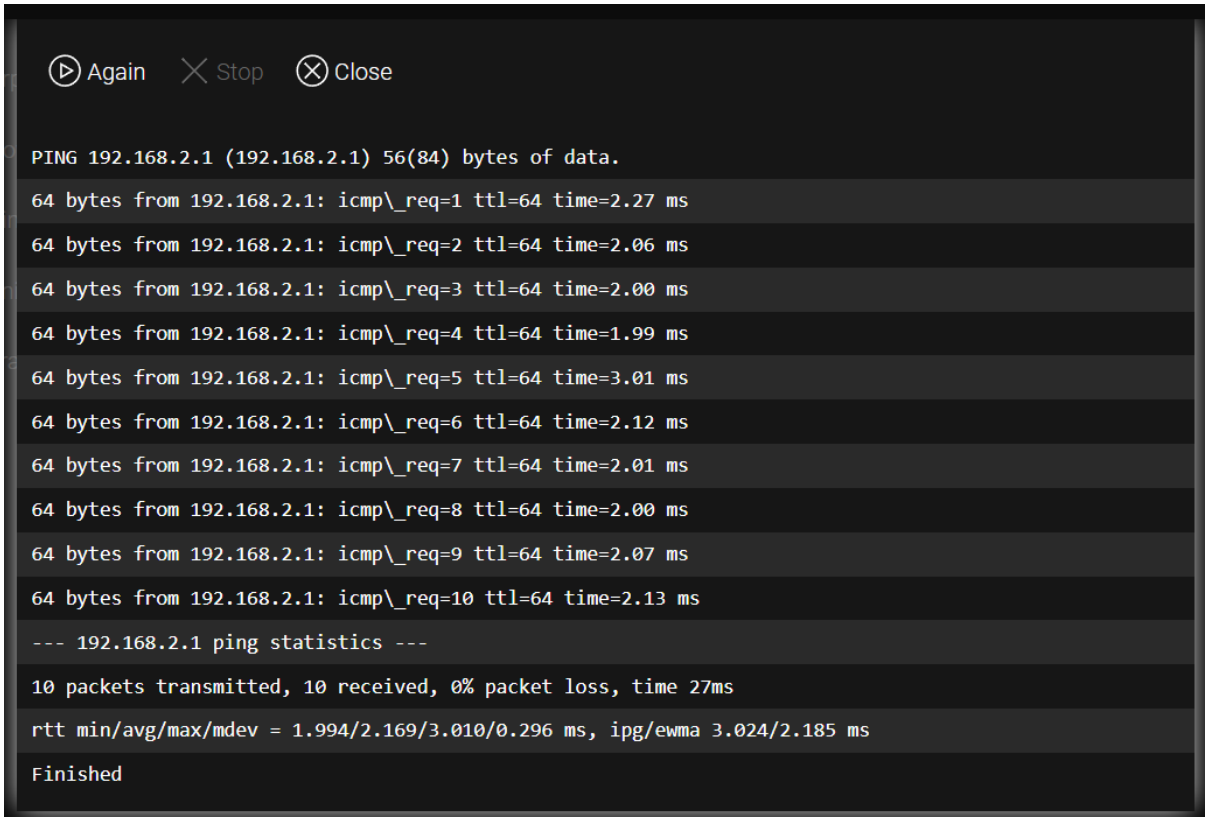
Confirm that route #1 is correctly associated with the tunnel interface and route #3 is established to the *R1* local network through the tunnel interface.

By default, all traffic for tunnel interfaces is permitted. If required, firewall rules can be configured in the */firewall/filter* section.

CLI Configuration

```
admin@Router[/ip route list]>

  NAME    STATE  DST-ADDR          INTERFACE  GATEWAY      METRIC  TABLE    SRC-ADDR
  1         D    10.8.0.0/24       OpenVPN                 0       main     10.8.0.15
  2         D    192.168.1.0/24    bridge0                 0       main     192.168.1.2
  3         D    192.168.2.0/24    OpenVPN    10.8.0.1     0       main     10.8.0.15
  4         D    192.168.3.0/24    bridge1                 200     main
  5         D    200.1.1.0/24      WAN                     200     main
```

Ping (/tools/ping) — from client *R2* to the server's local address



Additional Hub-and-Spoke Configuration

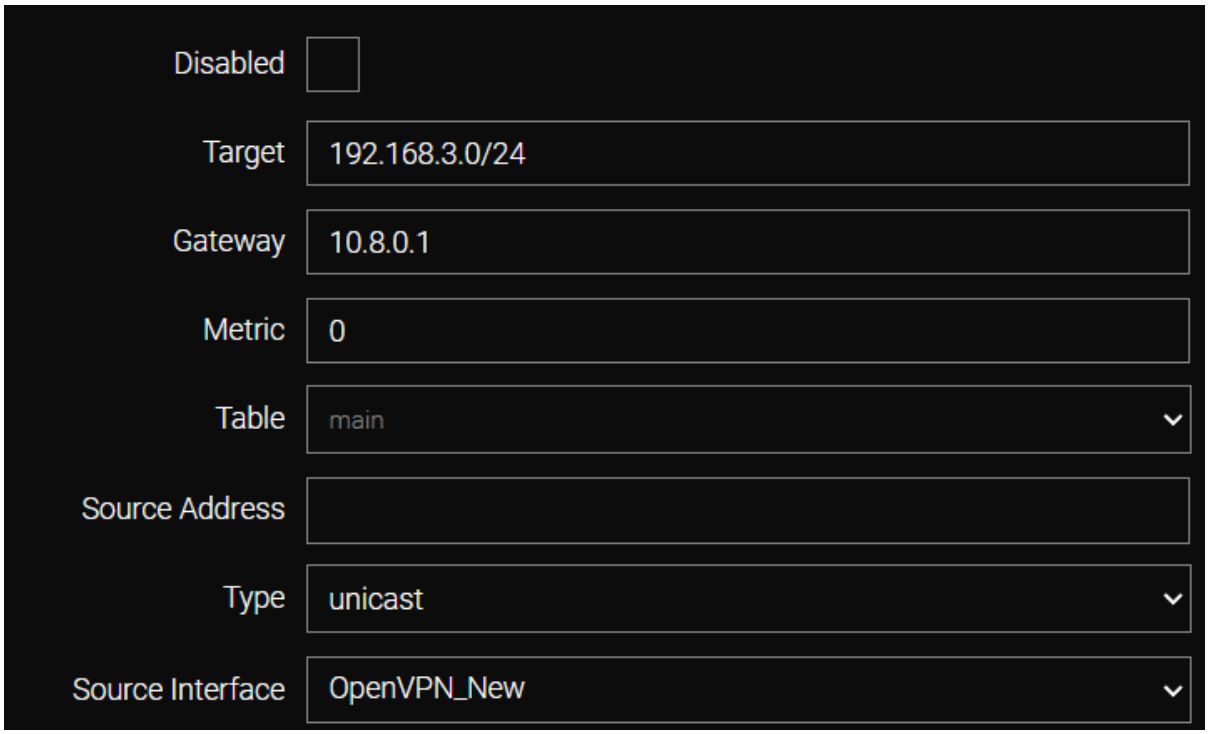
Currently, *dnxOS* does not support pushing multiple routes to clients automatically, which may require manual configuration in certain scenarios. When connecting two or more clients to an **OpenVPN server** with the requirement for mutual access between their local networks, the following procedure is implemented.

Assume the local network for Client #2 (router *R3*) is *192.168.4.0/24*.

1. Create a certificate for Client #2 (router *R3*) on the server router *R1* or via a standalone **PKI** system.
2. In the */service/client* section of the server, create an additional client record and specify the corresponding LAN subnet in the **Route** field.
3. Configure the **OpenVPN** connection on the second client according to the standard procedure.

Upon completion, Client #2 receives the route to the server's subnet (*192.168.2.0/24*) from the server. Server *R1* identifies the route to the *R3* subnet (*192.168.4.0/24*) through the **Route** parameter in the client record.

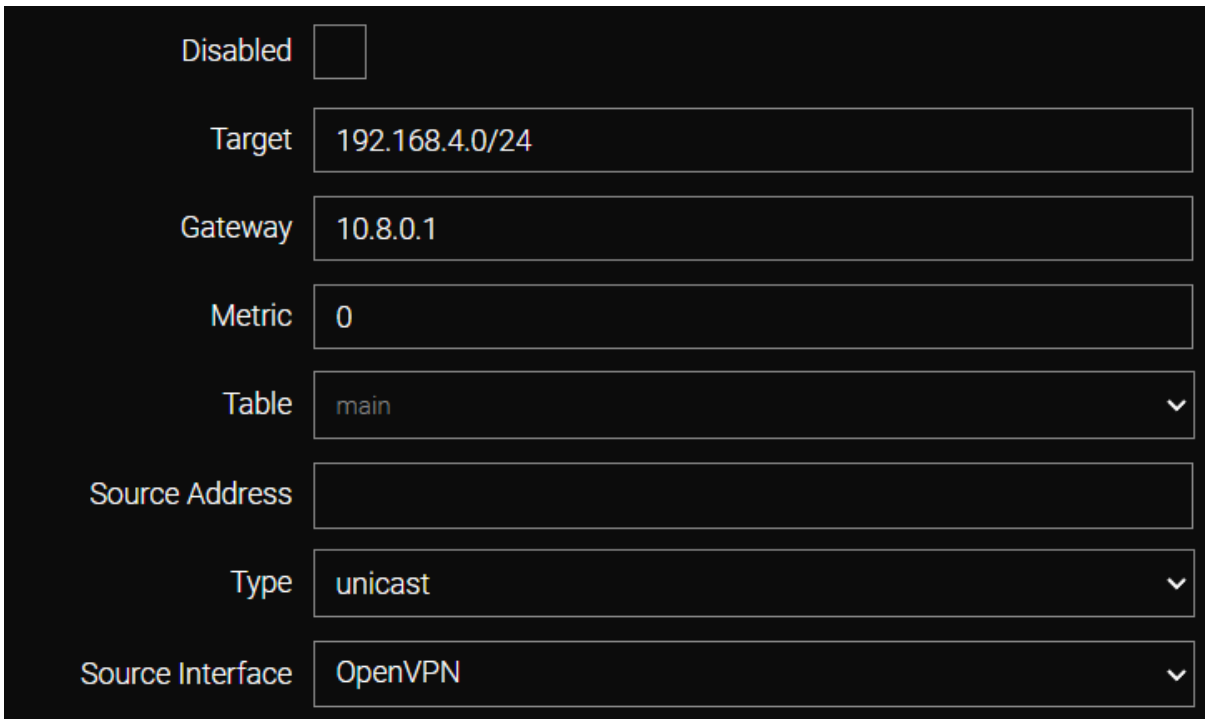
Additionally, a manual static route to the local network of Client *R2* (*192.168.3.0/24*) must be configured on Client *R3* via the **OpenVPN** tunnel interface, using *10.8.0.1* as the gateway.



CLI Configuration

```
/ip route list add dst-addr=192.168.3.0/24 interface=OpenVPN_New
    disabled -
    gateway 10.8.0.1
    metric -
    src-addr -
    table main
    type unicast
    apply
```

5. Additionally, on Client *R2*, a static route to the *R3* network (*192.168.4.0/24*) must be configured via the **OpenVPN** interface, using *10.8.0.1* as the gateway.



CLI Configuration

```
/ip route list add dst-addr=192.168.4.0/24 interface=OpenVPN
    disabled -
    gateway 10.8.0.1
    metric -
    src-addr -
    table main
    type unicast
    apply
```

After configuration, all three nodes and their respective local networks have full **connectivity**.

All modifications are permanently saved to the router configuration only after executing the */system config commit* command or clicking the **commit** button in the web interface.