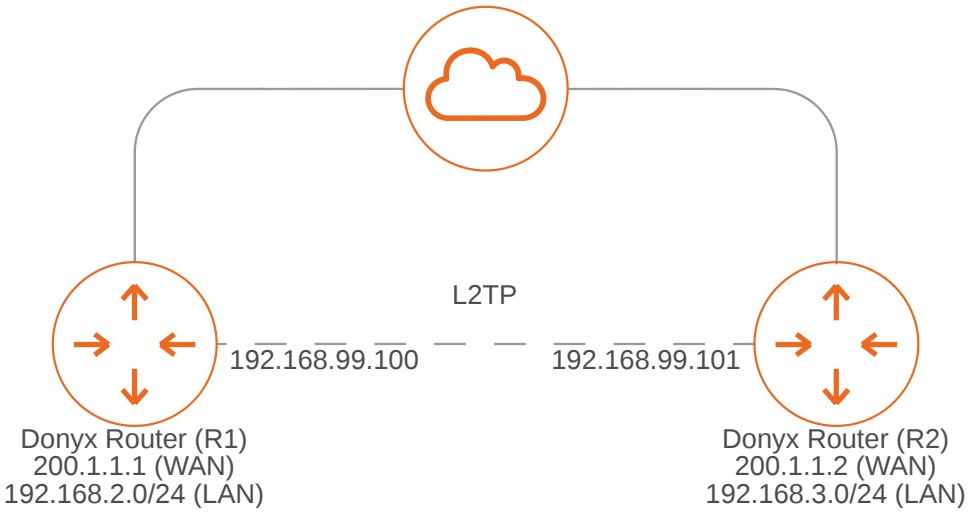
L2TP Server and Client Configuration on Donyx Routers

L2TP (Layer 2 Tunneling Protocol) is a tunneling protocol utilized for establishing **Virtual Private Networks (VPN)** by encapsulating data packets. As the protocol does not provide native encryption, it is typically implemented in conjunction with **IPsec** for enhanced security.

Donyx routers feature both integrated **L2TP Server** and **L2TP Client** capabilities.

The objective is to interconnect two local networks via the **L2TP** protocol. Configuration of *dnxOS* can be performed via the web interface or the **CLI** using **SSH**. The configuration logic remains consistent across both methods.

Network integration via an L2TP tunnel

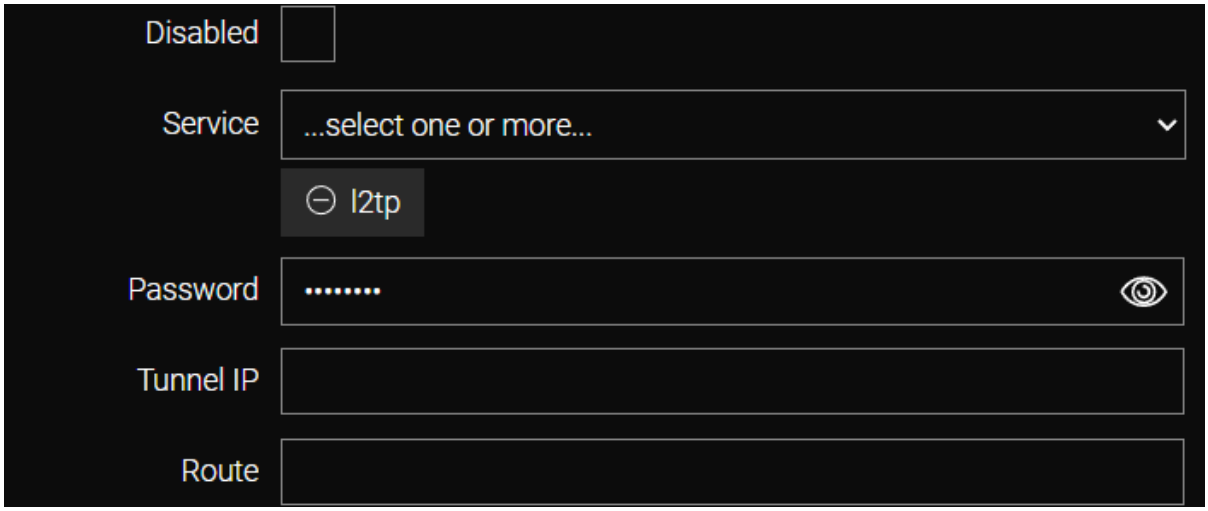


In this scenario, router *R1* acts as the **L2TP Server**, with the local network *192.168.2.0/24* and public IP address *200.1.1.1*. Router *R2* acts as the **L2TP Client**, with the local network *192.168.3.0/24* and public IP address *200.1.1.2*.

Configuration on Router R1 (Server)

The initial stage of server configuration involves creating user accounts for connecting clients.

1. The following procedure is performed in the */service/client* section:
   - Click **Add** and specify the username.
   - In the **Service** dropdown list, select the service for which the account is being created (in this example, *l2tp*).
   - Specify the account password in the **Password** field.
   - Click **Apply** to save the settings.



2. Subsequently, navigate to the */service/l2tp-server* section. Complete the form as shown in the example.

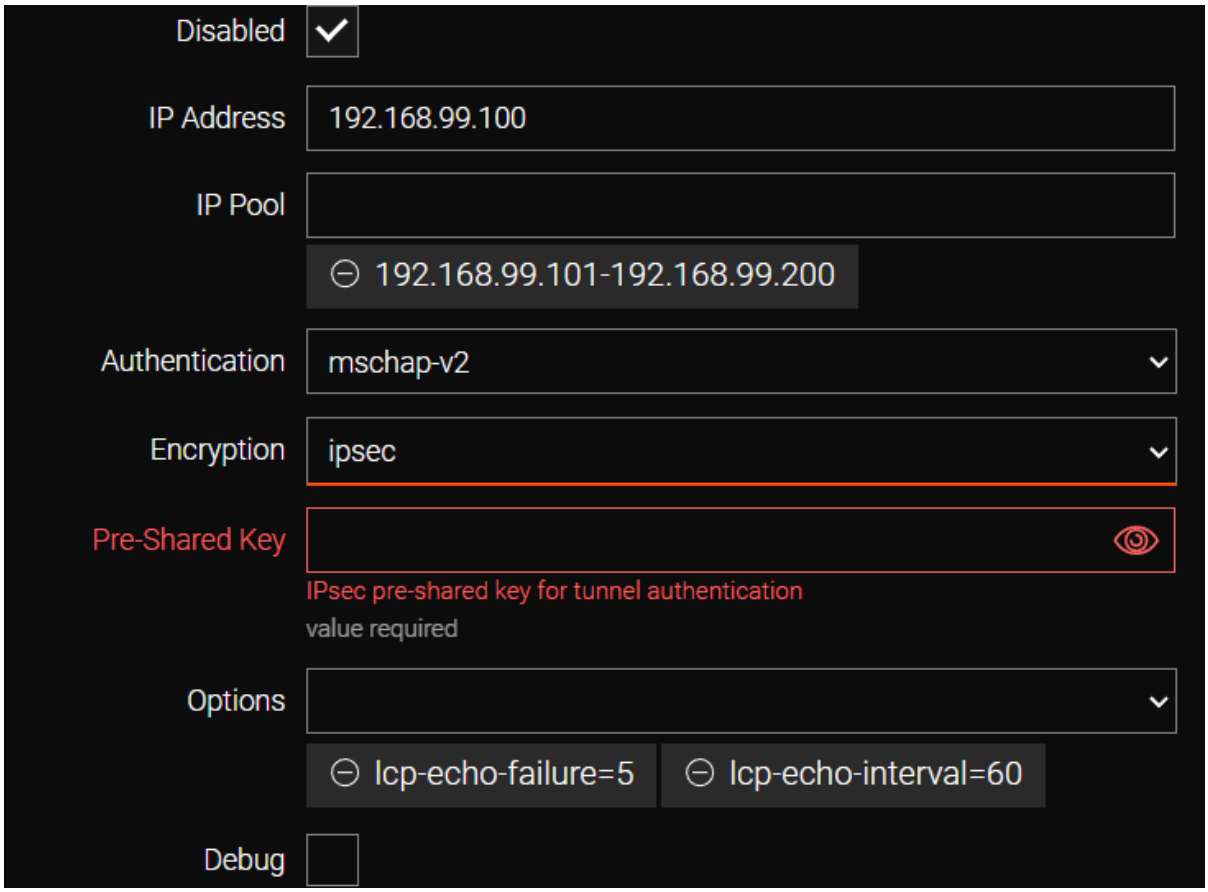


Table 1. Parameters for Router R1 (Server)

Field	Value
IP Address	The IP address assigned to the server's tunnel interface (default: *192.168.99.100*).
IP Pool	The range of IP addresses assigned to the **L2TP** server clients.
Authentication	Authentication protocol (default: *mschap-v2*).
Encryption	Virtual tunnel encryption protocol: *mppe*, *ipsec*, or *none*.
Pre-Shared Key	The shared key for **IPsec**. This field is available only if **Encryption** is set to *ipsec*.
Options	Additional configuration options.
Debug	Enables debug information in the system logs. This should be enabled only upon request from technical support.

To configure router **R1 (Server)** with **IPsec**, select the *ipsec* option in the **Encryption** field and specify the shared key in the **Pre-Shared Key** field.

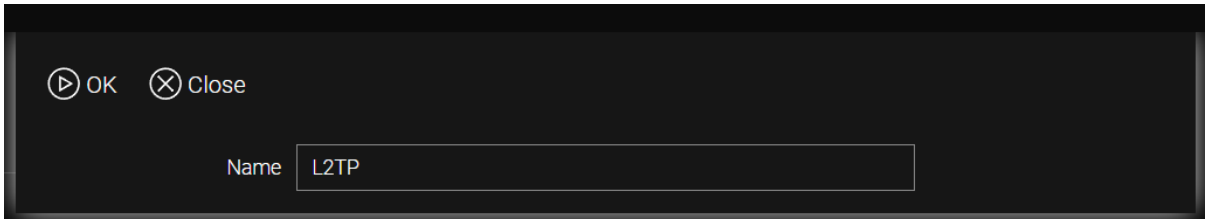
CLI Configuration

```
/service l2tp-server
    auth mschap-v2
    debug -
    disabled -
    encryption ipsec
    ip-addr 192.168.99.100
    ip-pool -
    ip-pool 192.168.99.101-192.168.99.200
    ppp-option -
    ppp-option lcp-echo-failure=5,lcp-echo-interval=60
    psk ipseckey

  /service l2tp-server apply
```

Configuration for Router R2 (Client) with IPSec

1. Navigate to the */tunnel/l2tp* section, click **Add**, and assign a name to the new connection.



2. Complete the form as shown in the example.

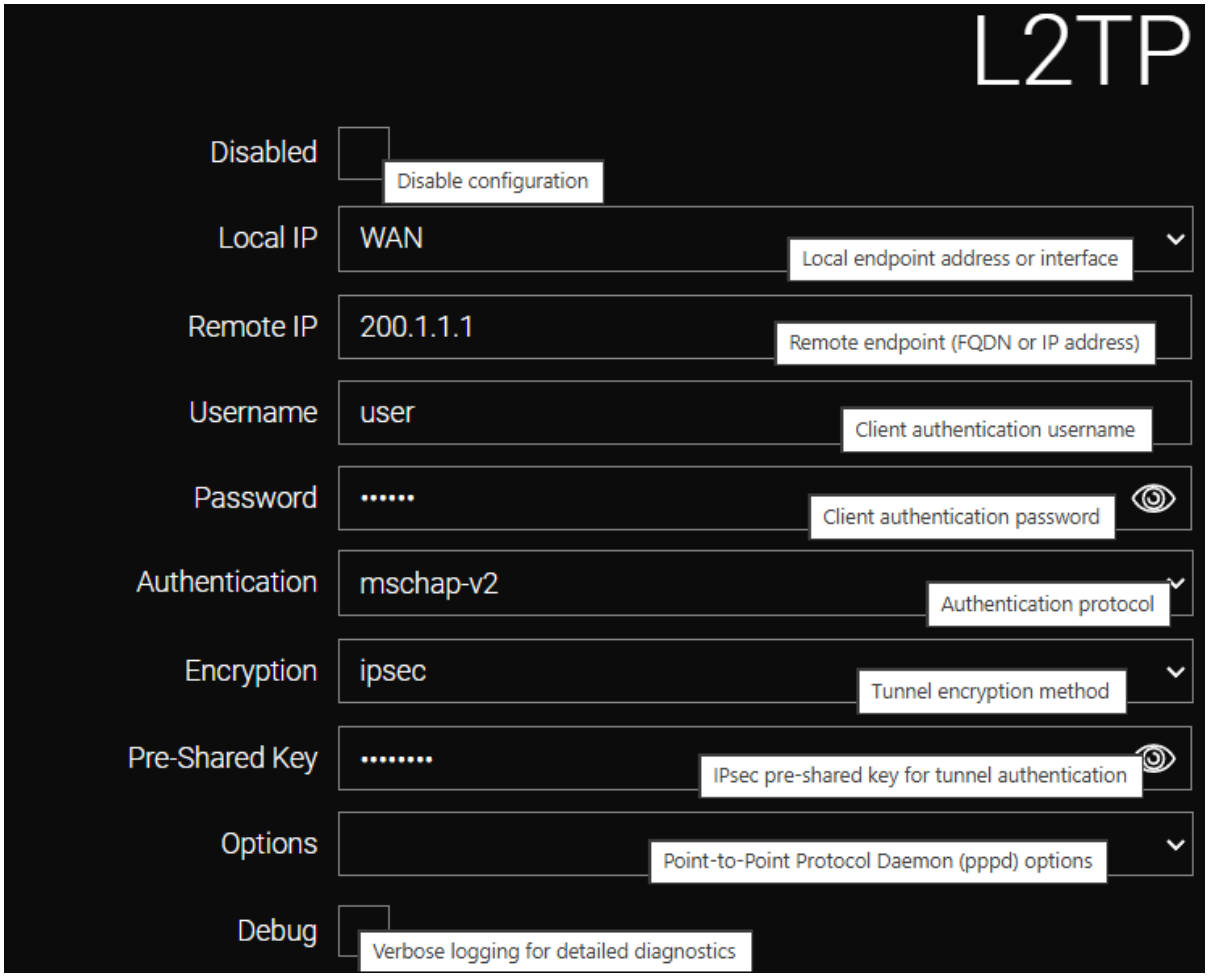


Table 2. Parameters for Router R2 (Client)

Field	Value
Local IP	The interface from which the tunnel is established. In this scenario, *WAN* (selected from the list).
Remote IP	The public IP address of the remote tunnel endpoint. In this scenario, *200.1.1.1* (public IP address of the server).
Username	The username for the **L2TP** client. In this scenario, *user* (must match the client name created on the server).
Password	The password for the **L2TP** client (the password assigned to the client on the server).
Authentication	Authentication protocol (default: *any*).
Encryption	Virtual tunnel encryption protocol: *mppe*, *ipsec*, or *none*. In this scenario, *ipsec*.
Pre-Shared Key	The shared key for **IPsec**. The secret key, must match the server configuration. This field is available only if **Encryption** is set to *ipsec*.
Options	Additional configuration options.

CLI Configuration

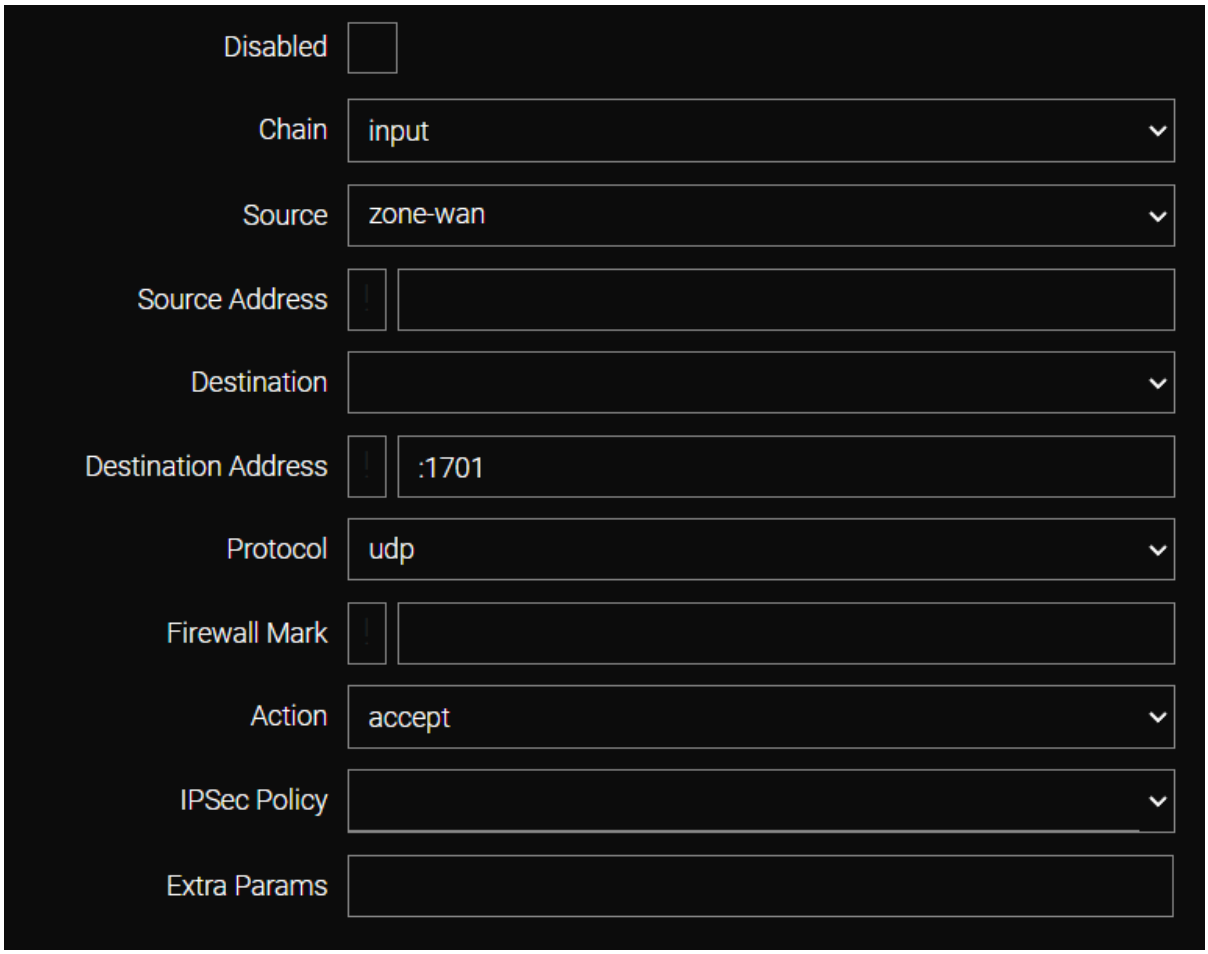
```
/tunnel l2tp add name=L2TP
    auth any
    debug -
    disabled -
    encryption ipsec
    local-ip WAN
    password password
    ppp-option -
    psk ipseckey
    remote-ip 200.1.1.1
    username test

/tunnel l2tp apply
```

Firewall Configuration

When **IPsec** encryption is utilized, the router automatically implements pre-installed firewall rules to facilitate the establishment of **L2TP** tunnels. However, if encryption is not used, a rule permitting **L2TP** protocol traffic (**UDP** port *1701*) must be manually created in the */firewall/filter* section. This rule must be positioned above any rules that deny traffic from the *WAN* zone.

1. To create the rule, navigate to the */firewall/filter* section and complete the required fields.

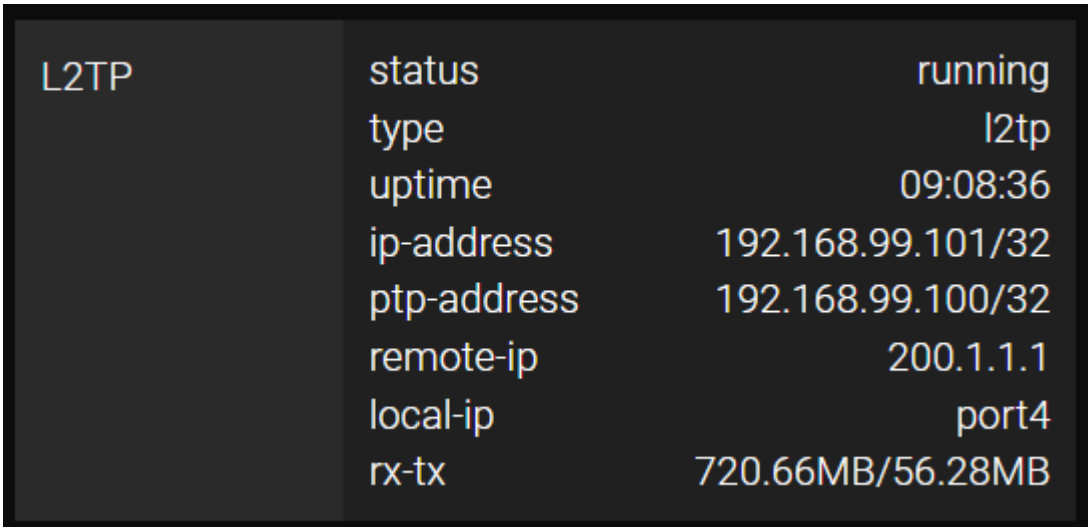


2. In the firewall table, move the newly created rule above any rules that deny traffic from the *WAN* zone.

CLI Configuration

```
/firewall filter add chain=input
    action accept
    dst-addr :1701
    protocol udp
    src zone-wan
    reorder position=-1
    apply
/firewall filter status
```

Once the connection is established, the tunnel status is displayed on the router’s dashboard:

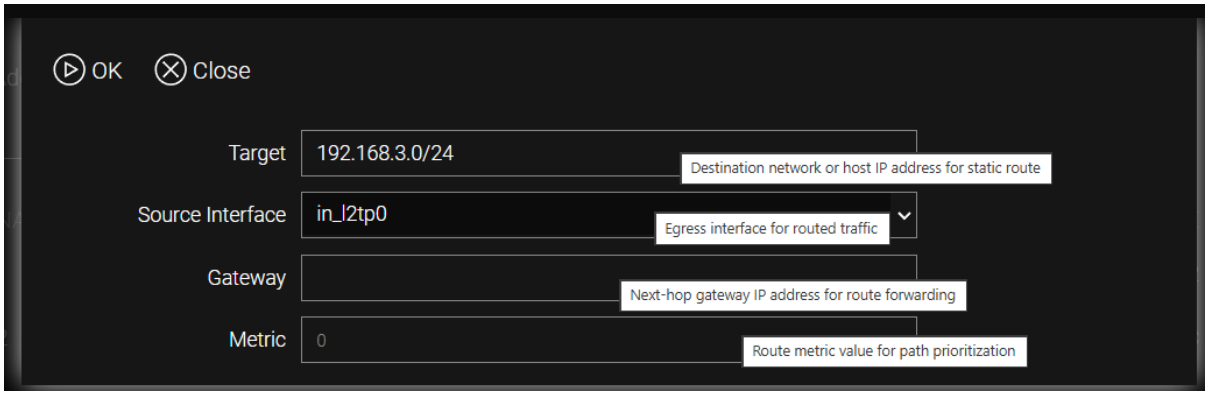


Routing Configuration

The next step is to configure routing.

Routing Settings for R1 (Server)

In the */ip/route/list* section, click **Add** and define the routing parameters:



- In the **Target** field, specify the destination subnet (in this example, *192.168.3.0/24*).
- In the **Source Interface** field, **manually** enter the interface name: *in_l2tp0*.
- In the **Gateway** field, specify the gateway for the **L2TP** protocol (optional).
- Click **OK**, then click **Apply**.

CLI Configuration

```
/ip route list add dst-addr=192.168.3.0/24 interface=in_l2tp0
    disabled -
    gateway -
    metric -
    src-addr -
    table main
    type unicast

  /ip route list apply
```

Routing Settings for R2 (Client)

In the */ip/route/list* section, click **Add** and define the routing parameters.

- In the **Target** field, specify the destination subnet (in this example, *192.168.2.0/24*).
- In the **Source Interface** field, **select** the tunnel interface name (in this example, *L2TP*).
- In the **Gateway** field, specify the gateway for the **L2TP** protocol (optional).
- Click **OK**, then click **Apply**.

CLI Configuration

```
/ip route list add dst-addr=192.168.2.0/24 interface=L2TP
    disabled -
    gateway -
    metric -
    src-addr -
    table main
    type unicast

  /ip route list apply
```

Ping (*/tools/ping*)

Verify connectivity using the **Ping** utility in the */tools/ping* section. Perform a ping from the **R1** server to the **R2** client.

Again Stop Close

```
PING 192.168.3.1 (192.168.3.1) 56(84) bytes of data.
64 bytes from 192.168.3.1: icmp\_req=1 ttl=64 time=1.75 ms
64 bytes from 192.168.3.1: icmp\_req=2 ttl=64 time=1.53 ms
64 bytes from 192.168.3.1: icmp\_req=3 ttl=64 time=1.40 ms
64 bytes from 192.168.3.1: icmp\_req=4 ttl=64 time=1.35 ms
64 bytes from 192.168.3.1: icmp\_req=5 ttl=64 time=1.47 ms
64 bytes from 192.168.3.1: icmp\_req=6 ttl=64 time=1.44 ms
64 bytes from 192.168.3.1: icmp\_req=7 ttl=64 time=1.40 ms
64 bytes from 192.168.3.1: icmp\_req=8 ttl=64 time=1.34 ms
64 bytes from 192.168.3.1: icmp\_req=9 ttl=64 time=1.46 ms
64 bytes from 192.168.3.1: icmp\_req=10 ttl=64 time=1.46 ms
--- 192.168.3.1 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 22ms
rtt min/avg/max/mdev = 1.347/1.465/1.754/0.119 ms, ipg/ewma 2.552/1.529 ms
Finished
```

Verify the connection from the opposite side. Perform a ping from the **R2** client to the **R1** server.

Again Stop Close

```
PING 192.168.2.1 (192.168.2.1) 56(84) bytes of data.
64 bytes from 192.168.2.1: icmp\_req=1 ttl=64 time=2.28 ms
64 bytes from 192.168.2.1: icmp\_req=2 ttl=64 time=1.87 ms
64 bytes from 192.168.2.1: icmp\_req=3 ttl=64 time=1.79 ms
64 bytes from 192.168.2.1: icmp\_req=4 ttl=64 time=1.69 ms
64 bytes from 192.168.2.1: icmp\_req=5 ttl=64 time=1.69 ms
64 bytes from 192.168.2.1: icmp\_req=6 ttl=64 time=1.73 ms
64 bytes from 192.168.2.1: icmp\_req=7 ttl=64 time=1.69 ms
64 bytes from 192.168.2.1: icmp\_req=8 ttl=64 time=1.80 ms
64 bytes from 192.168.2.1: icmp\_req=9 ttl=64 time=1.67 ms
64 bytes from 192.168.2.1: icmp\_req=10 ttl=64 time=1.69 ms
--- 192.168.2.1 ping statistics ---
10 packets transmitted, 10 received, 0% packet loss, time 24ms
rtt min/avg/max/mdev = 1.672/1.764/2.281/0.177 ms, ipg/ewma 2.685/1.895 ms
Finished
```

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.