

# OpenWRT WireGuard Client Setup guide using LuCi

Latest iteration can be found at: <https://github.com/egc112/OpenWRT-egc-add-on/tree/main/notes>

Version 7

## Introduction

These are my notes for setting up WireGuard as a Client.

In essence WireGuard is a peer-to-peer protocol but because of differences in setup we still make a distinction between setting it up as a Client or as a Server, but a WireGuard interface can be setup to function as a Client and Server at the same time.

This guide was made on a NetGear R7800 running OpenWRT 24.10.0, screenshots are made with OpenWRT2020 theme which is not much different from the default theme.

My notes are using the easy way with a simple setup using LuCi although the corresponding config files are also listed.

This simple setup is done by importing a config file (.conf) from your VPN provider with necessary settings (see: [config file](#) ).

Importing a config file is possible if you installed the *wg-installer-client* package (see [Install WireGuard](#)). But just adding the settings manually will also do the trick.

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## Install WireGuard

LuCi > System > Software: click *Update Lists*

Install: *luci-proto-wireguard*, *wireguard-tools* and *wg-installer-client*.

## Download configuration

Download a WireGuard configuration file from your provider or WireGuard Server.

In this example we are going to download a WireGuard configuration file from Proton which is free but it will expire after a week or so:

Create an account on <https://protonvpn.com/>

Login

Go to Downloads and scroll to the bottom for the WireGuard configuration.

Give a name to your config and choose router for your Platform :

### WireGuard configuration

These configurations are provided to work with WireGuard routers and official clients.

#### 1. Give a name to the config to be generated

Device/certificate name ⓘ

wg\_proton\_nl

#### 2. Select platform

☐ Android ☐ iOS ☐ Windows ☐ macOS ☐ GNU/Linux ☒ Router

#### 3. Select VPN options

☐ NAT-PMP (Port Forwarding) [Learn more](#)

☒ VPN Accelerator [Learn more](#)

#### 4. Select a server to connect to


Use the best server according to current load and position: **NL-FREE#70**


Create

Or select a particular server:

☐ Standard server configs ☒ Free server configs ☐ Secure Core configs

Scroll down to the server you want to connect to and Choose Create:

^  Netherlands

| Name      | Status  | Action |
|-----------|---|--------|
| NL-FREE#1 |  63% | Create |

Download the config file to your computer, the config file (wg\_proton\_nl-NL-FREE-1.conf) looks like this:

**[Interface]**

```
# Key for wg_proton_nl
# Bouncing = 3
# NAT-PMP (Port Forwarding) = off
# VPN Accelerator = on
PrivateKey = UJmovcwC7KQ/vfgnradTHoHD30WJ6SonkvXYg23ex0A=
Address = 10.2.0.2/32
DNS = 10.2.0.1
```

**[Peer]**

```
# NL-FREE#1
PublicKey = vH2i8RY1qc66XfqwrixBpvH4K9GYJatkugJj0GHgoUQ=
AllowedIPs = 0.0.0.0/0
Endpoint = 217.23.3.76:51820
```

Add the `PersistentKeepAlive` so that the connection stays open:

*PersistentKeepalive* = 25 and if you use IPv6 add `:::0/0` to allowed IPs:  
*AllowedIPs* = 0.0.0.0/0, :::0

**The result:**

**[Interface]**

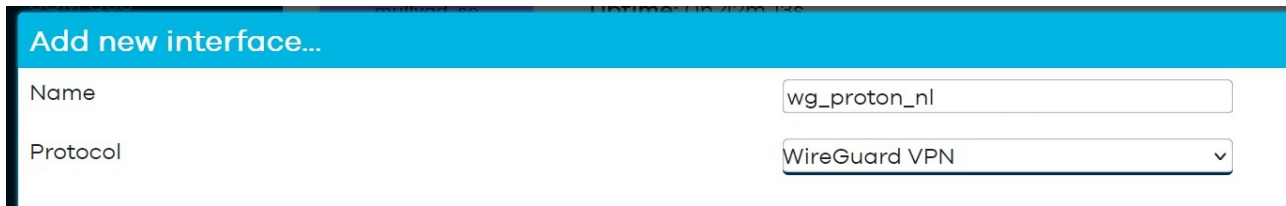
```
# Key for wg_proton_nl
# Bouncing = 3
# NAT-PMP (Port Forwarding) = off
# VPN Accelerator = on
PrivateKey = UJmovcwC7KQ/vfgnradTHoHD30WJ6SonkvXYg23ex0A=
Address = 10.2.0.2/32
DNS = 10.2.0.1
```

**[Peer]**

```
# NL-FREE#1
PublicKey = vH2i8RY1qc66XfqwrixBpvH4K9GYJatkugJj0GHgoUQ=
AllowedIPs = 0.0.0.0/0, :::0/0
Endpoint = 217.23.3.76:51820
PersistentKeepalive = 25
```

## Create WireGuard interface

Network > Interfaces on the bottom **click:** *Add New interface*



Add new interface...

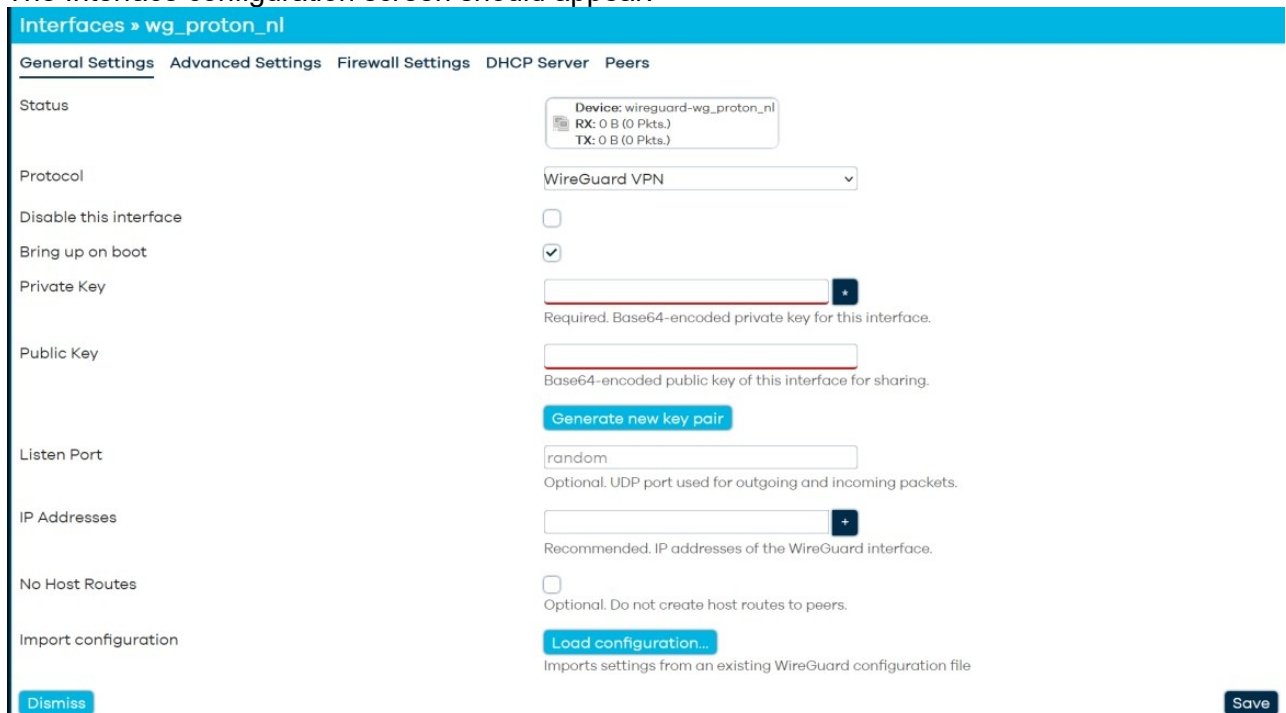
Name

Protocol

**Name:** give a descriptive name, hyphens are not allowed and the name has to be less than 15 characters!  
**Protocol:** *WireGuard VPN*

**Click:** *Create interface*

The Interface configuration screen should appear:



Interfaces > wg\_proton\_nl

General Settings Advanced Settings Firewall Settings DHCP Server Peers

Status 

Device: wireguard-wg\_proton\_nl  
RX: 0 B (0 Pkts.)  
TX: 0 B (0 Pkts.)

Protocol

Disable this interface ☐

Bring up on boot ☒

Private Key   
Required. Base64-encoded private key for this interface.

Public Key   
Base64-encoded public key of this interface for sharing.

[Generate new key pair](#)

Listen Port   
Optional. UDP port used for outgoing and incoming packets.

IP Addresses   
Recommended. IP addresses of the WireGuard interface.

No Host Routes ☐  
Optional. Do not create host routes to peers.

Import configuration [Load configuration...](#)  
Imports settings from an existing WireGuard configuration file

[Dismiss](#) [Save](#)

As the *wg-installer-client* is installed we can import our configuration file by clicking the button *Load configuration*

### Click: Load configuration

Drop the configuration file from the file manager into this box and automatically the settings should appear into the Interfaces configuration:

Interfaces » wg\_proton\_nl

General Settings

Advanced Settings

Firewall Settings

DHCP Server

Peers

Status

Device: wireguard-wg\_proton\_nl  
RX: 0 B (0 Pkts.)  
TX: 0 B (0 Pkts.)

Protocol

WireGuard VPN

Disable this interface

☐

Bring up on boot

☒

Private Key

.....\*

Required. Base64-encoded private key for this interface.

Public Key

1rMnp6/8iXg4uMdFNgkzWrSgLb14uSqa6

Base64-encoded public key of this interface for sharing.

Generate new key pair

Listen Port

random

Optional. UDP port used for outgoing and incoming packets.

IP Addresses

10.2.0.2/32

### MTU (Maximum Transmission Unit)

Interfaces » wg\_proton\_nl

General Settings

Advanced Settings

Firewall Settings

DHCP Server

Peers

Force link

☐  
Set interface properties regardless of the link carrier (If set handlers).

MTU

1420

Optional. Maximum Transmission Unit of tunnel interface.

MTU setting on the Advanced Settings tab can usually be left at its default setting (1420 or 1412 for PPPoE).

On occasion if you have **slow or hanging connections** especially when streaming you have to lower the MTU, start lowering to 1280, but sometimes you have to go even lower. For some further explanation see [MTU size problems](#) at the end of this guide.

Note that you also have to **enable MSS clamping** (option mtu\_fix '1') on the firewall zone the WireGuard interface is added to.

## Create WireGuard Peers section

Network > Interfaces > wg\_proton\_nl : **click edit**  
Go to *Peers* section:

## Interfaces » wg\_proton\_nl

[General Settings](#) [Advanced Settings](#) [Firewall Settings](#) [DHCP Server](#) [Peers](#)

Further information about WireGuard interfaces and peers at [wireguard.com](https://wireguard.com).

| Disabled   | Description                                 | Allowed IPs    | Endpoint Host     |                      |
|--|---|----------------|-------------------|----------------------|
| <input type="checkbox"/>   | wg_proton_nl-NL-FREE-1.conf<br>vH2i8_HgoUQ= | 0.0.0.0/0 :0/0 | 217.23.3.76:51820 | <a href="#">Edit</a> |
| <a href="#">Add peer</a> <a href="#">Import configuration as peer...</a> |   |                |                   |                      |

[Dismiss](#)

**Click: *Edit*** and the Peers section will open:

## Interfaces » wg\_proton\_nl » Edit peer

|                       |   |
|-----------------------|---|
| Disabled              | <input type="checkbox"/><br>Enable / Disable peer. Restart wireguard interface to apply changes.  |
| Description           | <input type="text" value="wg_proton_nl-NL-FREE-1.conf"/><br>Optional. Description of peer.  |
| Public Key            | <input type="text" value="vH2i8RY1qc66XfqwrixBpvH4K9GYJatkug"/><br>Required. Public key of the WireGuard peer.  |
| Private Key           | <input type="text"/><br>Optional. Private key of the WireGuard peer. The key is not required if a peer configuration or QR code is available. It can be generated if available.   |
|                       | <a href="#">Generate new key pair</a>   |
| Preshared Key         | <input type="text"/><br>Optional. Base64-encoded preshared key. Adds in an additional layer of post-quantum resistance.   |
|                       | <a href="#">Generate preshared key</a>  |
| Allowed IPs           | <input type="text" value="0.0.0.0/0"/><br><input type="text" value="::0/0"/><br><input type="text"/><br>Optional. IP addresses and prefixes that this peer is allowed to use to tunnel IP addresses and the networks the peer routes through the interface. |
| Route Allowed IPs     | <input type="checkbox"/><br>Optional. Create routes for Allowed IPs for this peer.  |
| Endpoint Host         | <input type="text" value="217.23.3.76"/><br>Optional. Host of peer. Names are resolved prior to bringing up the peer.   |
| Endpoint Port         | <input type="text" value="51820"/><br>Optional. Port of peer.   |
| Persistent Keep Alive | <input type="text" value="25"/><br>Optional. Seconds between keep alive messages. Default is 0 (disabled) if behind a NAT is 25.  |

**Now the most important part which is often overlooked:**

**Route Allowed IPs: *Enable (tick)***

|                   |  |
|-------------------|--|
| Route Allowed IPs | <input checked="" type="checkbox"/><br>Optional. Create routes for Allowed IPs for this peer |
|-------------------|--|

**Click: *Save***

In the next window **Click: *Save*** again

In the Interface window click ***Save & Apply***

```
/etc/config/network:
config interface 'wg_proton_nl'
    option proto 'wireguard'
```


```
option private_key 'UJmovcwC7KQ/vfgnrasdfggdfgdfgddsgfdc='  
list dns '10.2.0.1'  
list addresses '10.2.0.2/24'
```

```
config wireguard_wg_proton_nl  
option description 'wg_proton_nl-NL-FREE-1.conf'  
option public_key 'vH2i8RY1qc66XfqwrrixBpvH4K9dsfge4egdfgdfger='  
option endpoint_host '217.23.3.76'  
option endpoint_port '51820'  
list allowed_ips '0.0.0.0/0'  
list allowed_ips ':::0' # leave in place for PBR  
list allowed_ips ':::1'  
list allowed_ips '8000:::0'  
option route_allowed_ips '1'  
option persistent_keepalive '25'
```

**Note for IPv6** add `:::1` and `8000:::1` as Allowed IPs to create a default route, or disable Source routing (Interface wan6 > `option sourcefilter '0'` ) and set appropriate metrics on WG interface and higher metrics on default route in wan and wan6

After a few moments the interface appears and should be up and traffic should flow, both Tx and RX indicating the setup is correct:

---

|   |   |
|---|---|
|  | <b>Protocol:</b> WireGuard VPN<br><b>Uptime:</b> 0h 1m 37s<br><b>RX:</b> 300 B (5 Pkts.)<br><b>TX:</b> 8.87 KB (30 Pkts.)<br><b>IPv4:</b> 10.2.0.2/32 |
|---|---|

However this is depending on your default firewall setting with OUTPUT Accept, if not there will not be traffic yet.

Next up Firewall

## Firewall

### Easy method

Easiest method is to just add the wg\_proton\_nl interface to the WAN zone

Network > Firewall > WAN zone > **Click:** *edit*:

## Firewall - Zone Settings

General Settings Advanced Settings Conntrack Settings

This section defines common properties of "wan". The *input* and *output* options set the default policies for traffic entering and leaving the zone. The *forward* option sets the default policy for forwarded traffic between different networks within the zone. *Covered networks* specifies which available networks are covered by this zone.

|                    |   |
|--------------------|---|
| Name               | <input type="text" value="wan"/>  |
| Input              | <input type="text" value="reject"/>   |
| Output             | <input type="text" value="accept"/>   |
| Intra zone forward | <input type="text" value="reject"/>   |
| Masquerading       | <input checked="" type="checkbox"/><br>Enable network address and port translation IPv4 typically enabled on the <i>wan</i> zone. |
| MSS clamping       | <input checked="" type="checkbox"/>   |
| Covered networks   | <input type="text" value="wan: wan6: wan6:"/>   |

**Covered Networks:** add *wg\_proton\_n1*

|                  |   |
|------------------|---|
| Covered networks | <input type="text" value="wan: wan6: wg_proton_n1:"/> |
|------------------|---|

**For IPv6** enable IPv6 Masquerading on the WireGuard firewall zone:

Advanced settings > Enable IPv6 Masquerading  
but restrict this to the IPv6 subnet of the WireGuard interface

## Firewall - Zone Settings

General Settings Advanced Settings Conntrack Settings

The options below control the forwarding policies between this zone (*ovpn\_client*) and other zones. *Destination zones* cover forwarded traffic **originating from ovpn\_client**. *Source zones* match forwarded traffic from other zones **targeted at ovpn\_client**. The forwarding rule is *unidirectional*, e.g. a forward from *lan* to *wan* does *not* imply a permission to forward from *wan* to *lan* as well.

|   |  |
|---|--|
| Covered devices                               | <input type="text" value="unspecified"/><br>Use this option to classify zone traffic by raw, non-uci managed network devices.              |
| Covered subnets                               | <input type="text" value=""/><br>Use this option to classify zone traffic by source or destination subnet instead of networks or devices   |
| IPv6 Masquerading                             | <input checked="" type="checkbox"/><br>Enable network address and port translation IPv6 (NAT6 or NAPT6) for outbound traffic on this zone. |
| Restrict to address family                    | <input type="text" value="IPv4 and IPv6"/>   |
| Restrict Masquerading to given source subnets | <input type="text" value="fc00:bbbb:bbbb:bb01::6:4edd/64"/>  |

```
/etc/config/firewall:
config zone
    option name 'wan'
    option input 'REJECT'
    option output 'ACCEPT'
    option forward 'REJECT'
    option masq '1'
    option mtu_fix '1'
    option masq6 '1'
    list masq_src 'fc00:bbbb:bbbb:bb01::6:4edd/64'
    list network 'wan'
    list network 'wan6'
    list network 'wg_proton_n1'
```

**Click:** Save and click *Save & Apply*



This should give you a working WireGuard Client

Check from the routers console with `curl ipinfo.io` and/or from your LAN clients with `ipleak.net`

### Alternative Method

The Alternative method is to make a separate firewall zone for the VPN interface.

This can be useful if you want to make a killswitch (prevent traffic going out of the wan) or setup a Wireguard client on a [Bridged AP](#).

Note that a killswitch is not really necessary as the wireGuard interface stays up even if there is no connection but it will add an extra layer of security and guards against mis-configuration.

Furthermore a killswitch is not compatible with [Policy Based Routing \(PBR\)](#).

Network > Firewall > **Click: Add:**

**Name:** `vpn_client`

**Input:** `reject`

**Output:** `accept`

**Intra zone forward:** `reject`

**Masquerading:** `enabled`

**MSS clamping:** `enabled`

**Allow forward from source zone:** `lan`

### Firewall - Zone Settings

General Settings   Advanced Settings   Contrack Settings

This section defines common properties of "this new zone". The *input* and *output* options set the default policies for traffic entering describes the policy for forwarded traffic between different networks within the zone. *Covered networks* specifies which available

|                    |   |
|--------------------|---|
| Name               | <input type="text" value="vpn_client"/>   |
| Input              | <input type="text" value="reject"/>   |
| Output             | <input type="text" value="accept"/>   |
| Intra zone forward | <input type="text" value="reject"/>   |
| Masquerading       | <input checked="" type="checkbox"/><br>Enable network address and port translation IPv4 (NAT) typically enabled on the <i>wan</i> zone. |
| MSS clamping       | <input checked="" type="checkbox"/>   |
| Covered networks   | <input type="text" value="wg_proton_nl"/>   |

The options below control the forwarding policies between this zone (this new zone) and other zones. *Destination zones* cover forw  
*zones* match forwarded traffic from other zones **targeted at this new zone**. The forwarding rule is *unidirectional*, e.g. a forward fro  
from wan to lan as well.

|   |  |
|---|--|
| Allow forward to <i>destination zones</i> : | <input type="text" value="unspecified"/> |
| Allow forward from <i>source zones</i> :    | <input type="text" value="lan lan:"/>    |

If your VPN provider also supports **IPv6** (with ULA addresses) then on Advanced tab:

**IPv6 Masquerading:** `enable`

The options below control the forwarding policies between this zone (vpn\_client) and other zones. *Destination zones* cover for match forwarded traffic from other zones **targeted at vpn\_client**. The forwarding rule is *unidirectional*, e.g. a forward from lan to lan as well.

|  |   |
|--|---|
| Covered devices                                    | <div>unspecified ▾</div><br>Use this option to classify zone traffic by raw, non        |
| Covered subnets                                    | <div></div> +<br>Use this option to classify zone traffic by source c                   |
| IPv6 Masquerading                                  | <input checked="" type="checkbox"/><br>Enable network address and port translation IPv6 |
| Restrict to address family                         | <div>IPv4 and IPv6 ▾</div>  |
| Restrict Masquerading to given source subnets      | <div>0.0.0.0/0</div> +  |
| Restrict Masquerading to given destination subnets | <div>0.0.0.0/0</div> +  |

etc/config/firewall:

```
config zone
    option name 'vpn_client'
    option input 'REJECT'
    option output 'ACCEPT'
    option forward 'REJECT'
    option masq '1'
    option mtu_fix '1'
    list network 'wg_proton_n1'
    option masq6 '1'
```

To prevent traffic going out of the wan (the Killswitch) **Edit** the *lan* firewall zone and disable forwarding to *wan* and only allow forwarding to the *vpn\_client* zone

## Firewall - Zone Settings

### General Settings Advanced Settings Conntrack Settings

This section defines common properties of "lan". The *input* and *output* options set the default policies for traffic entering and policy for forwarded traffic between different networks within the zone. *Covered networks* specifies which available networks:

|                    |  |
|--------------------|--|
| Name               | <input type="text" value="lan"/>   |
| Input              | <input type="text" value="accept"/>  |
| Output             | <input type="text" value="accept"/>  |
| Intra zone forward | <input type="text" value="accept"/>  |
| Masquerading       | <input type="checkbox"/><br>Enable network address and port translation IP typically enabled on the <i>wan</i> zone. |
| MSS clamping       | <input type="checkbox"/>   |
| Covered networks   | <input type="text" value="lan: 🌐"/>  |

The options below control the forwarding policies between this zone (lan) and other zones. *Destination zones* cover forwarded traffic from other zones **targeted at lan**. The forwarding rule is *unidirectional*, e.g. a forward from lan to wan does

Allow forward to *destination zones*:

/etc/config/firewall:

config zone

```
option name 'vpn_client'
option input 'REJECT'
option output 'ACCEPT'
option forward 'REJECT'
option masq '1'
option mtu_fix '1'
list network 'wg_proton_nl'
option masq6 '1' # only for IPv6
```

config forwarding

```
option src 'lan'
option dest 'vpn_client'
```

## DNS Leak

On a typical phone (Android, iOS) or Windows the DNS is just set on the WireGuard interface and the DNS set is used after the tunnel is up.

On the OpenWRT router things are much more complicated (in contrast to other third party firmwares which handles this much better)

For some background reading: <https://github.com/egc112/OpenWRT-egc-add-on/tree/main/stop-dns-leak>

Be very careful with using the DNS server from your VPN provider as sole DNS server if that DNS server is not publicly available as you might end up in a catch 22 situation because the router must have the correct time (more or less) before it can connect and to get the correct time it needs DNS resolving which is not available.

So in that case instead of a domain for time server use IP addresses ( System > System > Time Synchronization)

Of course if you stop the tunnel you do not have DNS resolution in that case you need a [scripting solution](#) to use the VPN DNS server after the tunnel is up.

## WireGuard Client on a BridgedAP

If you want to setup a WireGuard Client on a BridgedAP, then be aware that normal traffic from your clients just bypasses your BridgedAP, so will not use the WireGuard tunnel unless you point the gateway of your clients to the BridgedAP (by using DNSMasq tagging with option 3 or iptables redirect) or setup a Guest Wifi on the BridgedAP.

In case of using a Guest wifi all clients using your Guest wifi will automatically use the WireGuard tunnel, so this is the more easier option.

First double check that you have setup your BridgedAP correctly see:

<https://openwrt.org/docs/guide-user/network/wifi/wifiextenders/bridgedap>

For a Guest Wifi see:

[https://openwrt.org/docs/guide-user/network/wifi/guestwifi/guestwifi\\_dumbap](https://openwrt.org/docs/guide-user/network/wifi/guestwifi/guestwifi_dumbap)

Setup the Guest wifi and **check that it is working without WireGuard!**

Note: do not forget to Enable Masquerading on the LAN zone

Setup a WireGuard client the regular way as described, but for firewall settings I recommend to use a separate zone for the WireGuard Interface ([Alternative Method](#)) as you need to enable MSS Clamping and then make a Forward rule to Forward from *guest* zone to *vpn\_client* zone.

If you then remove the forwarding from guest zone to lan zone you will have an effective killswitch.

For IPv6 make sure your lan has an IPv6 with prefix delegated, the Guest interface will then gets its own IPv6 address from Lan

## Asking for Help

You can ask for help at the [OpenWRT forum](#).

If you do, it helps if we can have a look at your configs, so please connect to your OpenWRT device [using ssh](#) and copy the output of the following commands and post it on the forum using the "Preformatted text </>" button



Remember to redact keys, passwords, MAC addresses and any public IP addresses you may have:

```
ubus call system board
cat /etc/config/network
cat /etc/config/wireless
cat /etc/config/firewall
wg show
```

To view the log for errors:

```
logread | grep -E -i 'netifd|wireguard'
```

## References

<https://openwrt.org/docs/guide-user/services/vpn/wireguard/start>  
<https://openwrt.org/docs/guide-user/services/vpn/wireguard/basics>  
<https://openwrt.org/docs/guide-user/services/vpn/wireguard/client>

<https://protonvpn.com/support/openwrt-wireguard>

## Miscellaneous

### Setup IPv6 on a bridgedAP

/etc/config/network:

```
config interface 'lan6'
    option ifname '@lan'
    option proto 'dhcpv6'
    #option reqprefix 'no'
    option reqprefix '62'    #for ipv6 guest interface
    #option sourcefilter '0' # disable source routing for WG server routing of IPv6
```

### Prevent Mullvad from hijacking your DNS

<https://schnerring.net/blog/use-custom-dns-servers-with-mullvad-and-any-wireguard-client/>

### Port forwarding via Proton VPN with natpmc

<https://protonvpn.com/support/port-forwarding-manual-setup/>  
<https://forum.openwrt.org/t/openwrt-protonvpn-and-pmp-port-forwarding-for-remote-ssh-access/229367>

### MTU size problems (no traffic, hang, slow loading, no streaming media, bad VoiP, slow RDP)

The MTU (Maximum Transmission Units) is the maximum datagram size in bytes that can be sent unfragmented over a particular network path, so to have the highest throughput you want the highest value without fragmentation.

But if the MTU is too high and the packets fragment this will manifest as connections which hang during periods of active usage, or does not load the whole page when browsing. Or you can connect but not see or use streaming media (like an IP Camera) or your connection is unexpected slow, VoIP can also be affected.

In the log you can see messages like: read UDP [EMSGSIZE path-MTU=1388]: Message too long (code=90) but that is not always present.

To test for the highest value basically use ping from a client on your local LAN, search for the maximum packetsize which can be send unfragmented , add 28 and that is your MTU value, see:

<https://hamy.io/post/000c/how-to-find-the-correct-mtu-and-mru-of-your-link/>

ICMP blackhole test to see if PMTUD is working:

<http://icmpcheck.popcount.org> or <http://icmpcheckv6.popcount.org/>

Packet loss test: <https://packetlosstest.com/>

Android, Windows and iOS can use their own defaults so when having problems connecting from Windows, Android or iOS try to delete the MTU entry in the conf file and let the OS itself decide what to use.

### WireGuard Watchdog

<https://github.com/egc112/OpenWRT-egc-add-on/tree/main/wireguard-watchdog>

Purpose: WireGuard watchdog with fail-over, by pinging every x seconds through the WireGuard interface, the WireGuard tunnel is monitored.

In case of failure of the WireGuard tunnel the next tunnel is automatically started.

When the last tunnel has failed, the script will start again with the first tunnel.

So in case you have only one tunnel this is just a watchdog which restarts the one tunnel you have.

with prioritizing :

<https://forum.openwrt.org/t/bash-script-for-automatic-change-between-2-wireguard-tunnels/228696/11>

### WireGuard Companion

<https://github.com/egc112/OpenWRT-egc-add-on/tree/main/wireguard-companion>

Purpose: Toggle WireGuard tunnels on/off, show status and log.