

# Wireguard Server/Client

We use Wireguard VPN client on hangdevice because it allows us to have a secure private IPv4 (and possibly IPv6) tunnel to a known server. This also works in case the public IPv6 system of Freifunk fails (which was tested a lot). That means that Wireguard is the preferred way to communicate from external networks.

## Server side

We use our existing Wireguard server. See [Wireguard VPN Server](#)

## hangdevice Client

### Install Wireguard and add some interface

```
#on hangdevice - see https://www.sigmdel.ca/michel/ha/wireguard/wireguard_02_en.html (client)
echo "deb http://deb.debian.org/debian/ unstable main" | sudo tee --append
/etc/apt/sources.list.d/unstable.list
apt-key adv --keyserver keyserver.ubuntu.com --recv-keys 04EE7237B7D453EC
printf 'Package: *\nPin: release a=unstable\nPin-Priority: 150\n' | sudo tee --append
/etc/apt/preferences.d/limit-unstable
apt update
apt install wireguard -y
reboot
```

### Create peer key pair (for client)

```
wg genkey | tee peeroneprivatekey | wg pubkey > peeronepublickey
```

```
vim /etc/wireguard/wg0.conf
```

```
[Interface]
Address = 192.168.11.2/24
Privatekey = PPKofClient
#DNS = 1.1.1.1
```

```
[Peer]
```

```
PublicKey = PubKeyOfServer
#AllowedIPs = 0.0.0.0/0
AllowedIPs = 192.168.11.0/16
Endpoint = the.wireguard.server:54321
PersistentKeepalive = 25
```

## Start Wireguard (as service)

```
systemctl enable wg-quick@wg0
wg-quick up wg0
wg #show info
wg-quick save wg0 #save that info immediately

#stop
#wg-quick down wg0
```

## udpdump Test Wireguard (Client + Server)

If the command `wg` does not show a line with "handshake" on the client, then the connection was not established. If `wg` shows no peers on the server, this also means that no connection was established by a client.

```
#on server:
netstat -anlup | grep 54321
ps aux | grep wireguard
ss -lun 'sport = :54321'
tcpdump -i bond1 udp port 54321 -vv -X

#on client (hangdevice)
echo -n "blah:36|c" | nc -w 1 -u -4 the.wireguard.server 54321

#on server:
18:55:42.919037 IP (tos 0x0, ttl 54, id 4198, offset 0, flags [DF], proto UDP (17), length 37)
  gianotti.chemnitz.freifunk.net.36882 > 192.168.1.66.54321: [udp sum ok] UDP, length 9
    0x0000:  4500 0025 1066 4000 3611 fbe1 a3ac d2e9  E..%.f@.6.....
    0x0010:  c0a8 0142 9012 d431 0011 cb82 626c 6168  ...B...1....blah
    0x0020:  3a33 367c 6300 0000 0000 0000 0000      :36|c.....
```

wg #run this on client and on server each. It should return peer connections on both sides plus successful handshake

```
15:38:37 ✓ root@raspberrypi: ~ # cat /etc/wireguard/wg0.conf
interface: wg0
  public key: 25DN...
  private key: (hidden)
  listening port: 38162
  fwmark: 0xca6c

peer: [redacted]
  endpoint: [redacted]
  allowed ips: 0.0.0.0/0
  latest handshake: 1 minute, 9 seconds ago
  transfer: 33.50 KiB received, 12.92 KiB sent
  persistent keepalive: every 25 seconds
15:38:38 ✓ root@raspberrypi: ~ #
```

## Troubleshooting

### RTNETLINK answers: Operation not supported (Kernel Update / Firmware Update)

```
[#] ip link add wg0 type wireguard
RTNETLINK answers: Operation not supported
Unable to access interface: Protocol not supported
[#] ip link delete dev wg0
Cannot find device "wg0"

modprobe wireguard
modprobe: FATAL: Module wireguard not found in directory /lib/modules/4.19.118-v7+

#fix variant 1
dpkg-reconfigure wireguard-dkms

#fix variant 2
sudo apt remove wireguard-dkms
sudo apt install wireguard-dkms

#fix variant 3 - make recent headers manually
sudo apt-get install git bc bison flex libssl-dev
sudo wget https://raw.githubusercontent.com/notro/rpi-source/master/rpi-source -O
```

```
/usr/local/bin/rpi-source && sudo chmod +x /usr/local/bin/rpi-source && /usr/local/bin/rpi-  
source -q --tag-update  
cd ~/  
rpi-source  
  
#in case of failure:  
cd ~/  
rm -rf linux-fe2c7bf4cad4641dfb6f12712755515ab15815ca/  
rpi-source
```

## Helpful ressources

- <https://www.sebastian-fritz.net/2019/01/28/wireguard-vpn-und-ubuntu-18-04>
- <https://www.bachmann-lan.de/raspberry-pi-mit-wireguard-als-vpn-server-mit-wireguard>
- <https://www.linode.com/docs/networking/vpn/set-up-wireguard-vpn-on-ubuntu>
- [https://www.thomas-krenn.com/de/wiki/Ubuntu\\_18.04\\_als\\_WireGuard\\_VPN\\_Client\\_konfigurieren](https://www.thomas-krenn.com/de/wiki/Ubuntu_18.04_als_WireGuard_VPN_Client_konfigurieren)
- <https://emanuelduss.ch/2018/09/wireguard-vpn-road-warrior-setup>

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