OpenWRT Netbird

version 11
Latest version:
https://raw.githubusercontent.com/egc112/OpenWRT-egc-add-on/main/notes/OpenWRT%20Netbird.pdf
This is a WIP, I am working to make a real install guide, comment is welcome.

Introduction

NetBird combines a WireGuard®-based overlay network with Zero Trust Network Access, providing a unified open source platform for reliable and secure connectivity

This sounds amazing and you can use it for remote access to your home network, to connect multiple routers and other clients (phone/PC/Mac etc.) and when setup as exit node as a remote VPN but you are using a commercial third party and although it is advertised as free and it is to some extent, they do have an incentive to pull you into a paid tier, besides they know your clients and routes but the traffic of course is still encrypted via the WireGuard encryption. But with Netbird you should be able to self host your control plane in which case none of the drawbacks should exist.

Usually you can do the same by setting up your own WireGuard server and clients.
WireGuard Server Setup Guide
WireGuard Client Setup Guide

But this only works if you have at least a public IP address on one side of the connection.
If you are behind CGNAT, so do not have a public IPv4 address and also do not have a public IPv6 address (check with: *ifstatus wan6*) or using IPv6 is not applicable then you have to involve a commercial third party as man-in-the-middle.

This can be a VPN provider which supports port forwarding (e.g. ProtonVPN), or you can rent a Virtal Private Server (I have an Oracle VPS which can be had for free, see at the bottom of this guide), or use things like Netbird, Zerotier, Cloudflared, Tailscale or ngrok and there are more.

I favor Netbird because it is open source and has some advantages over Tailscale, but all things mentioned will get the job done, using Netbird is just my personal choice.

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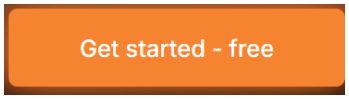
Start with viewing: https://docs.netbird.io/how-to/getting-started
All the docs can be found at: https://docs.netbird.io/

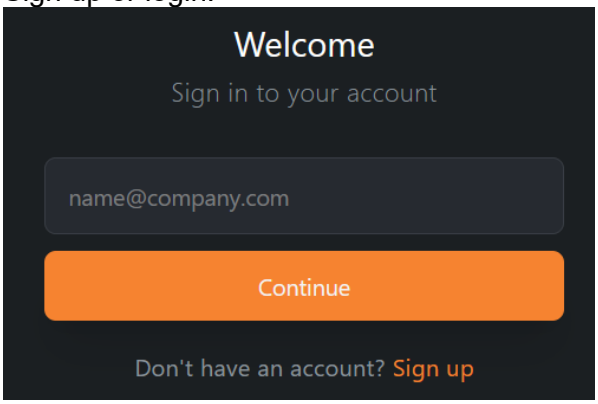
Very useful OpenWRT thread for discussion and support: https://forum.openwrt.org/t/netbird-support-discussion-thread/237831

Make a free account on Netbird

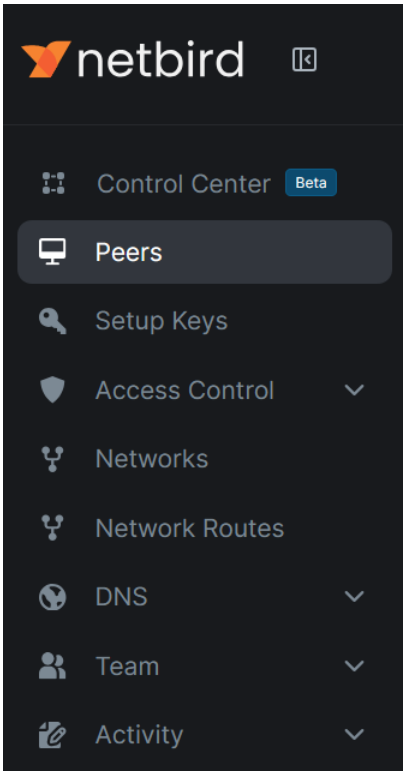
go to: http://netbird.io

Click: 

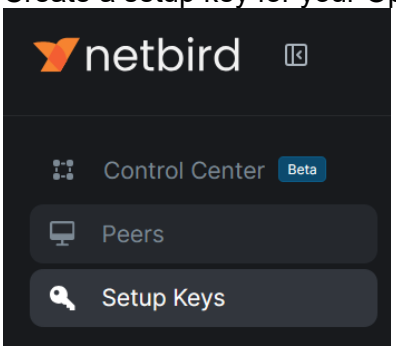
Sign up or login:



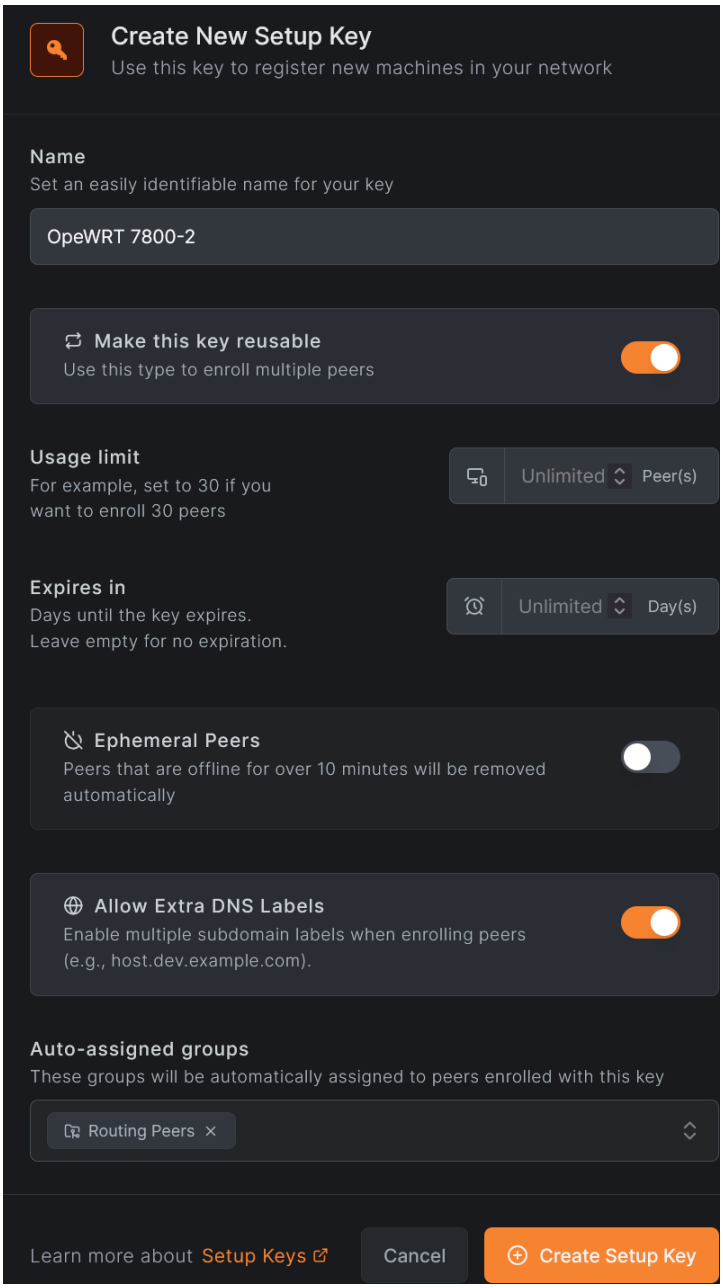
Now you are connected to your Netbird Dashboard the central administration:



Create a setup key for your OpenWRT router: **Netbird Dashboard** > **Setup Keys**:



Fill in the name of your router and change the other items, shown are my settings, when done Click *Create Setup Key.*



Copy and store the setup key

Install Netbird on OpenWRT router

For opkg:
opkg update
opkg install netbird

or for apk:
apk update
apk add netbird

Netbird is a rather large package around 20 MB written in Go so make sure your storage is sufficient

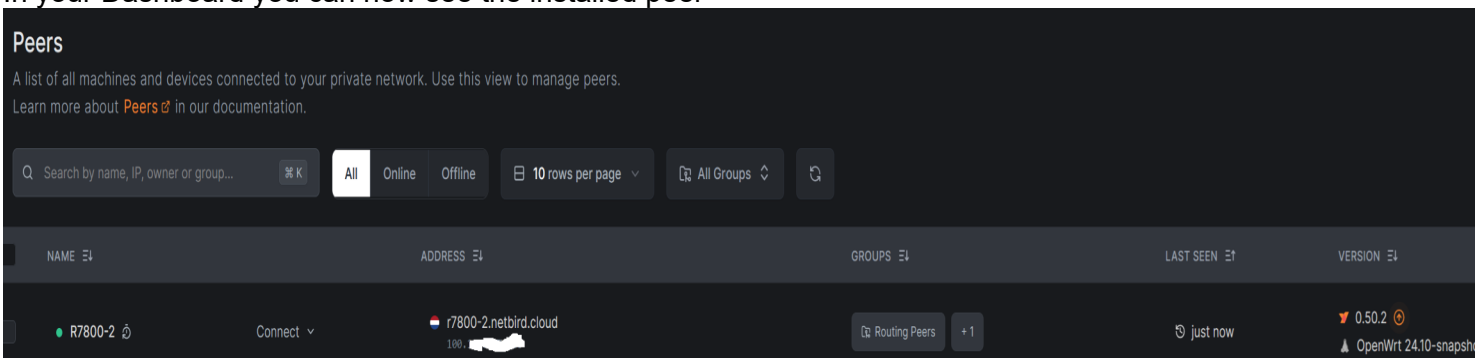
The netbird executable is stored in */usr/share/netbird*, or in later versions (>0.55) in */usr/bin/netbird.*
The service is called from */etc/init.d/netbird*
config file (>0.55) is stored in */root/.config/netbird,* you might add this path to */etc/sysupgrade.conf*, so that it is included in the backup

When installed you can setup with:
netbird up --setup-key <key from previous step>

After some time you will see:
root@R7800-2:~# netbird up --setup-key E20033F4-0XXXXXXXXXXXXXXX
Connected
root@R7800-2:~#

You can use *netbird help* to see the available commands e,g,:
netbird up/down/status etc
but using e.g.:
service netbird status/stop/start etc. will also work (for complete list: *service netbird*)

In your Dashboard you can now see the installed peer

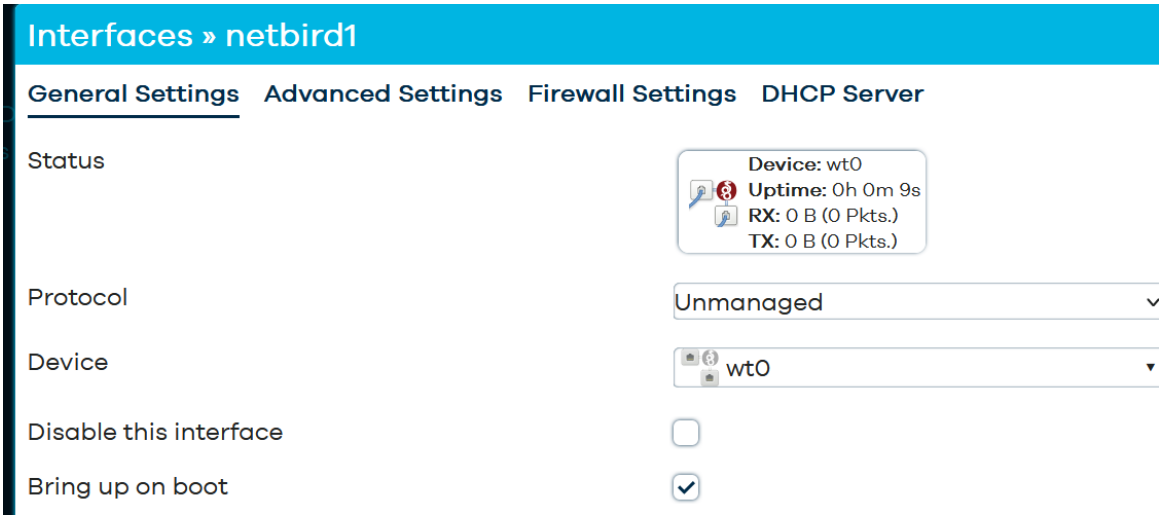


with ifconfig or ip address show on the router, you should see the new interface (device) wt0
If not reboot the router and check netbird status: *netbird status*

Network setup

Create a new unmanaged interface via LuCI: **Network** > **Interfaces** > **Add new interface**

- Name: **netbird1**
- Protocol: **Unmanaged**
- Device: wt**0** **#**For compatibility e.g. with e.g. PBR always name your interface e.g. **wtX**



/etc/config/network:

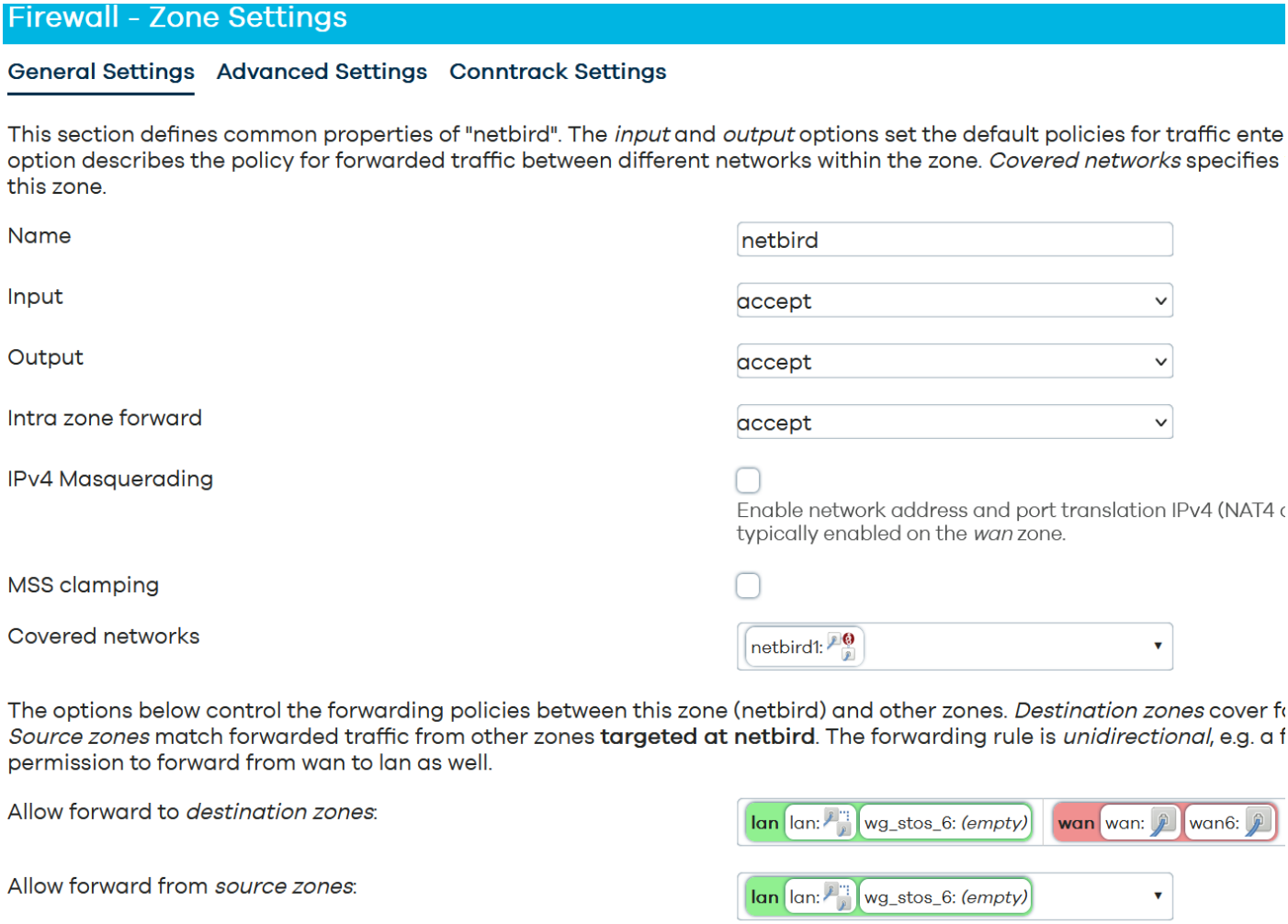
```
config interface 'netbird1'
        option proto 'none'
        option device 'wt0'
```

Firewall setup

Create a new firewall zone via LuCI: **Network** → **Firewall** → **Zones** → **Add**

- Name: **netbird**
- Input: **ACCEPT** (default)
- Output: **ACCEPT** (default)
- Forward: **ACCEPT**
- Masquerading: **off** (might be necessary under some circumstances)
- MSS Clamping: **on** (might not be necessary)
- Covered networks: **netbird1**
- Allow forward to destination zones: Select your **LAN** (and/or other internal zones or WAN if you plan on using this device as an exit node), as this is na exit node **WAN** is slected
- Allow forward from source zones: Select your **LAN** (and/or other internal zones or leave it blank if you do not want to route LAN traffic to other tailscale hosts)

Click ***Save & Apply***



/etc/config/firewall:

```
config zone
        option name 'netbird'
        option input 'ACCEPT'
        option output 'ACCEPT'
        option forward 'ACCEPT'
        option masq '1'
        option mtu_fix '1'
        list network 'netbird1'

config forwarding
        option src 'netbird'
        option dest 'lan'

config forwarding
        option src 'lan'
        option dest 'netbird'

# As this is an exit node traffic from netbird to wan is allowed
config forwarding
        option src 'netbird'
        option dest 'wan'
```

In the end ***reboot*** the router or do service network restart, service firewall restart and service netbird restart.

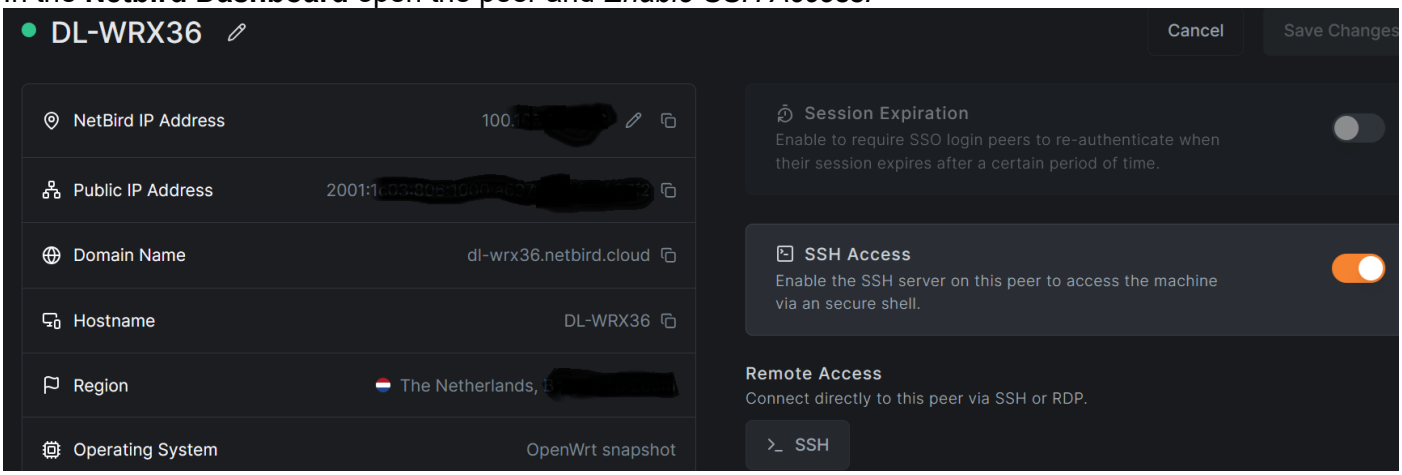
Check with ifconfig (ip a) and ip route that the interface (wt0) and route are present:

```
root@DL-WRX36:~# ip address show wt0
31: wt0: <POINTOPOINT,NOARP,UP,LOWER_UP> mtu 1280 qdisc noqueue state UNKNOWN group
default qlen 1000
    link/none
    inet 100.105.224.116/16 brd 100.105.255.255 scope global wt0
       valid_lft forever preferred_lft forever

root@DL-WRX36:~# ip route
default via 192.168.0.1 dev wan proto static src 192.168.0.9
100.105.0.0/16 dev wt0 proto kernel scope link src 100.105.224.116
```

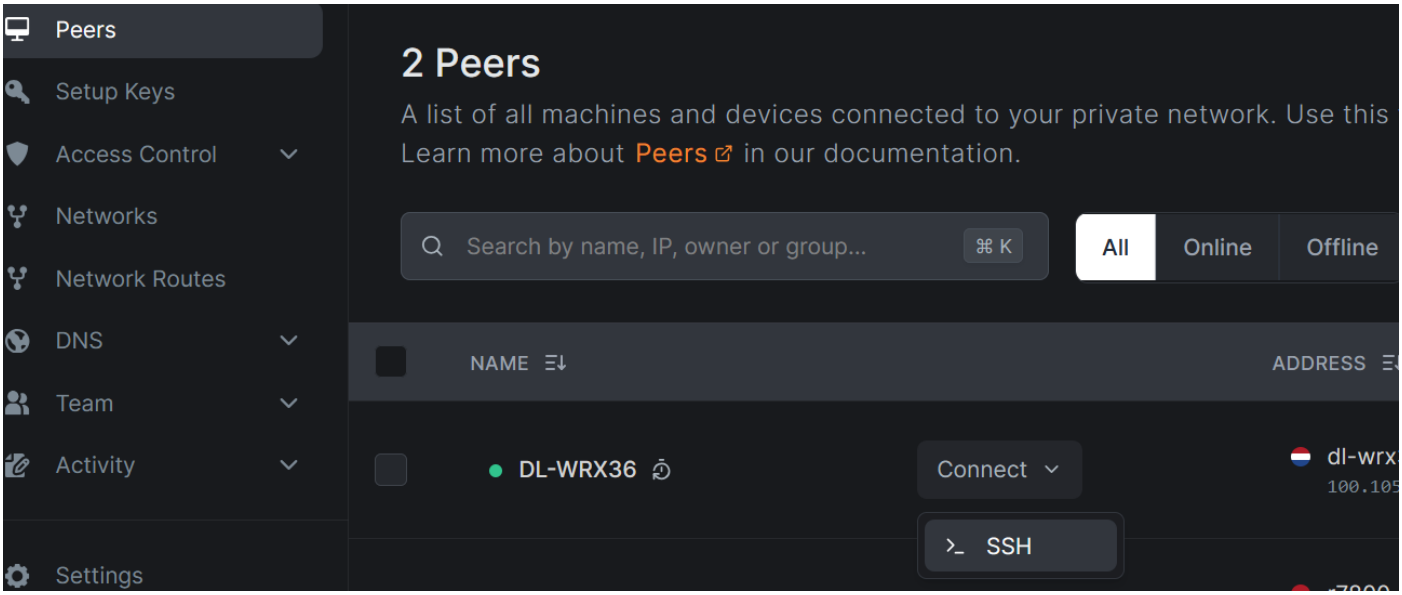
Allow SSH access from Dashboard

In the **Netbird Dashboard** open the peer and *Enable SSH Access:*

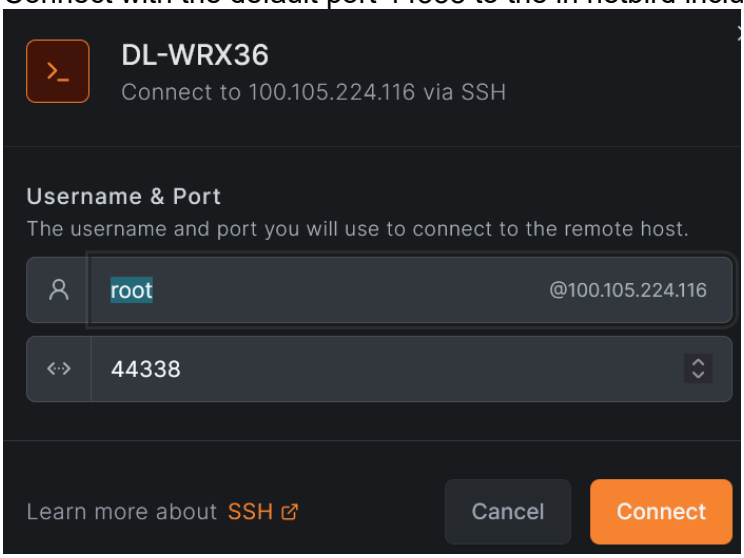


On the router
Make sure SSH is allowed (https://github.com/netbirdio/netbird/issues/2632):
netbird down
netbird up --allow-server-ssh

On your Netbird dashboard you should now be able to SSH into your router:
Dashboard > Peers > Connect dropdown and click SSH:



Connect with the default port 44338 to the in netbird included SSH server:



Create Routes

See: https://docs.netbird.io/how-to/routing-traffic-to-private-networks

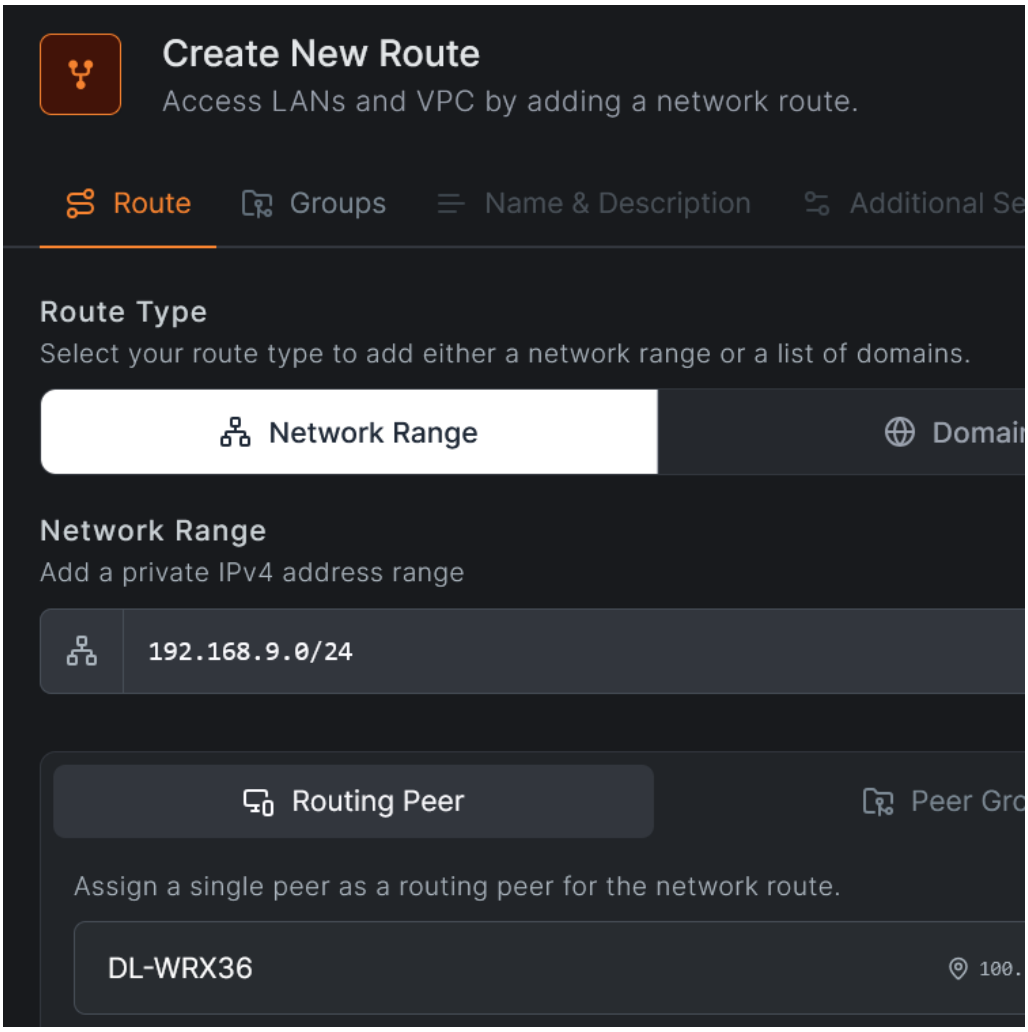
Note for routing between your peers it is imperative that all involved subnets are unique!

My DL-WRX36 has subnet 192.168.9.0/24.
I will create a routing rule to create a route for this 192.168.9.0/24 subnet to my DL-WRX36 and push that route to all peers.
Those pushed routes are pushed to an alternate routing table on all peers, this table is usually called netbird.

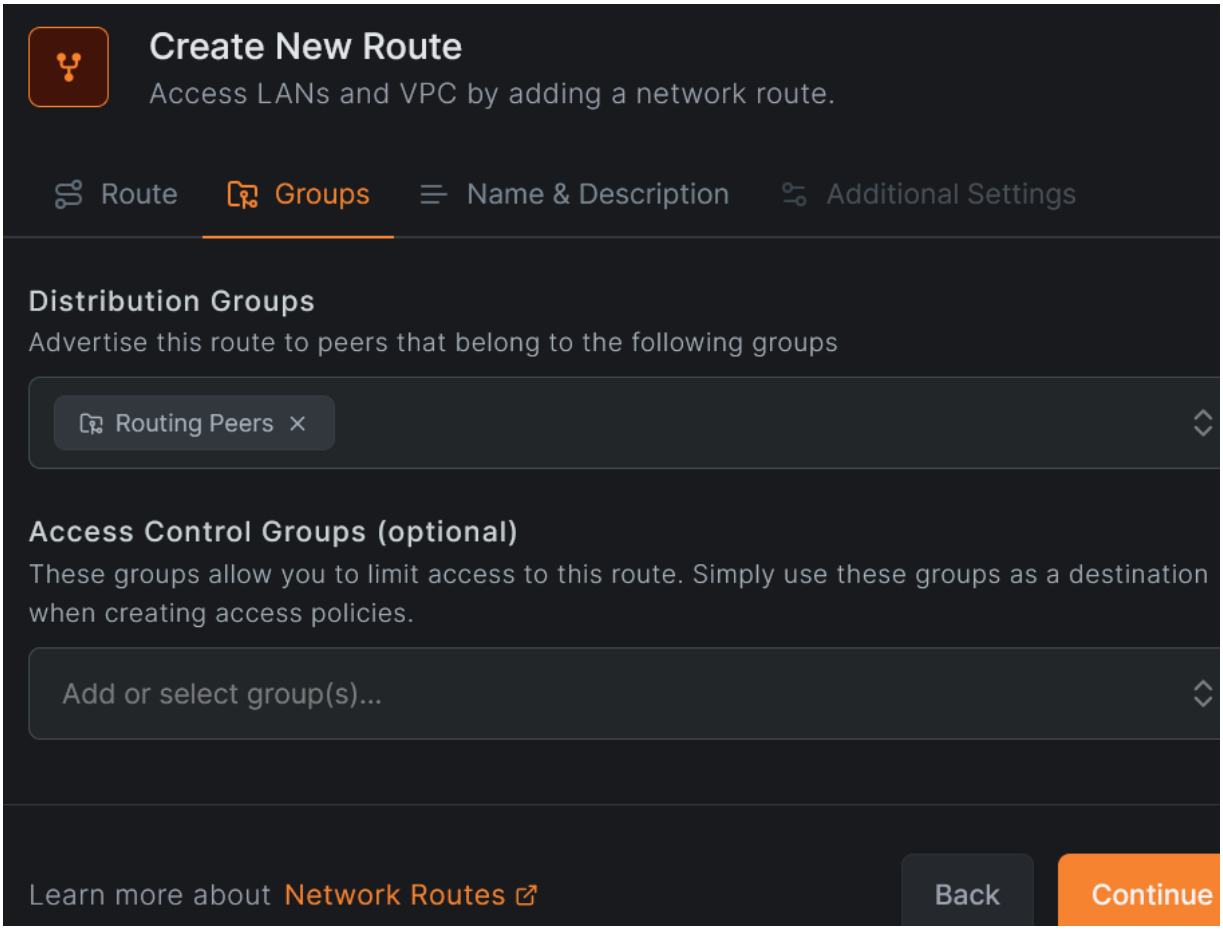
Lets go:

Netbird Dashboard> Network Routes > Add Route

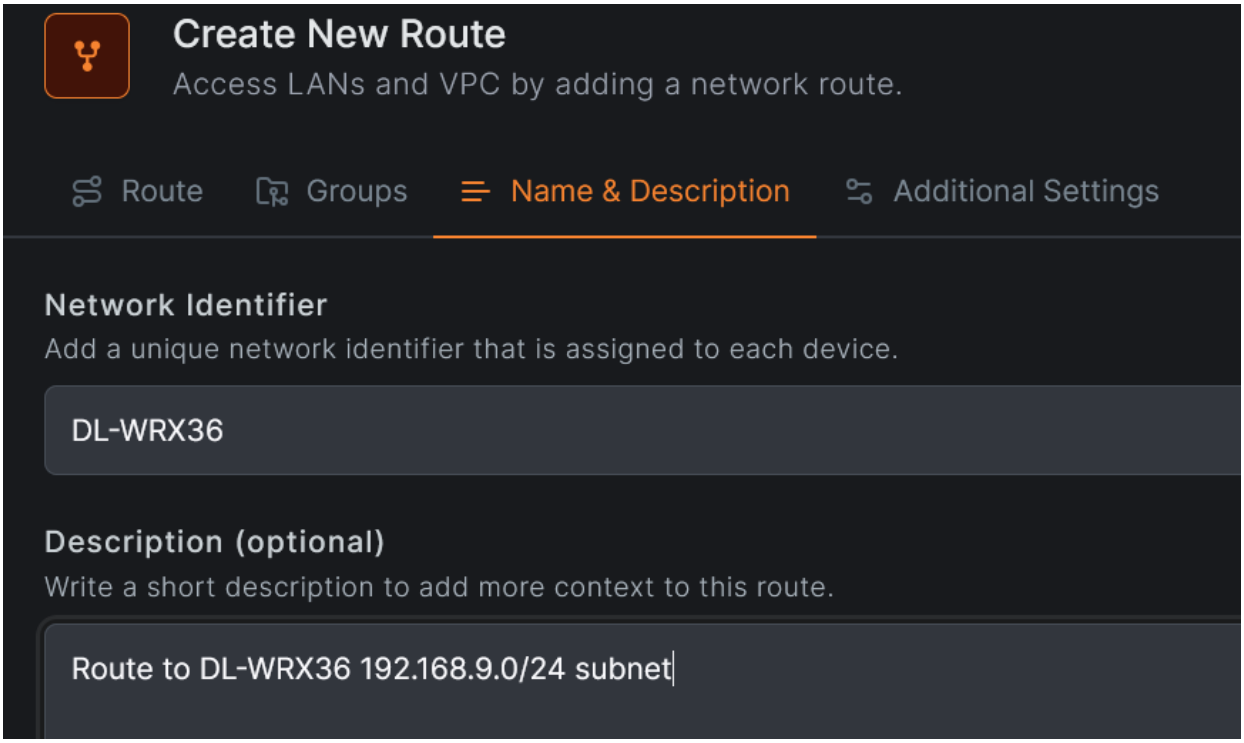
Add the network range to my DL-WRX36:



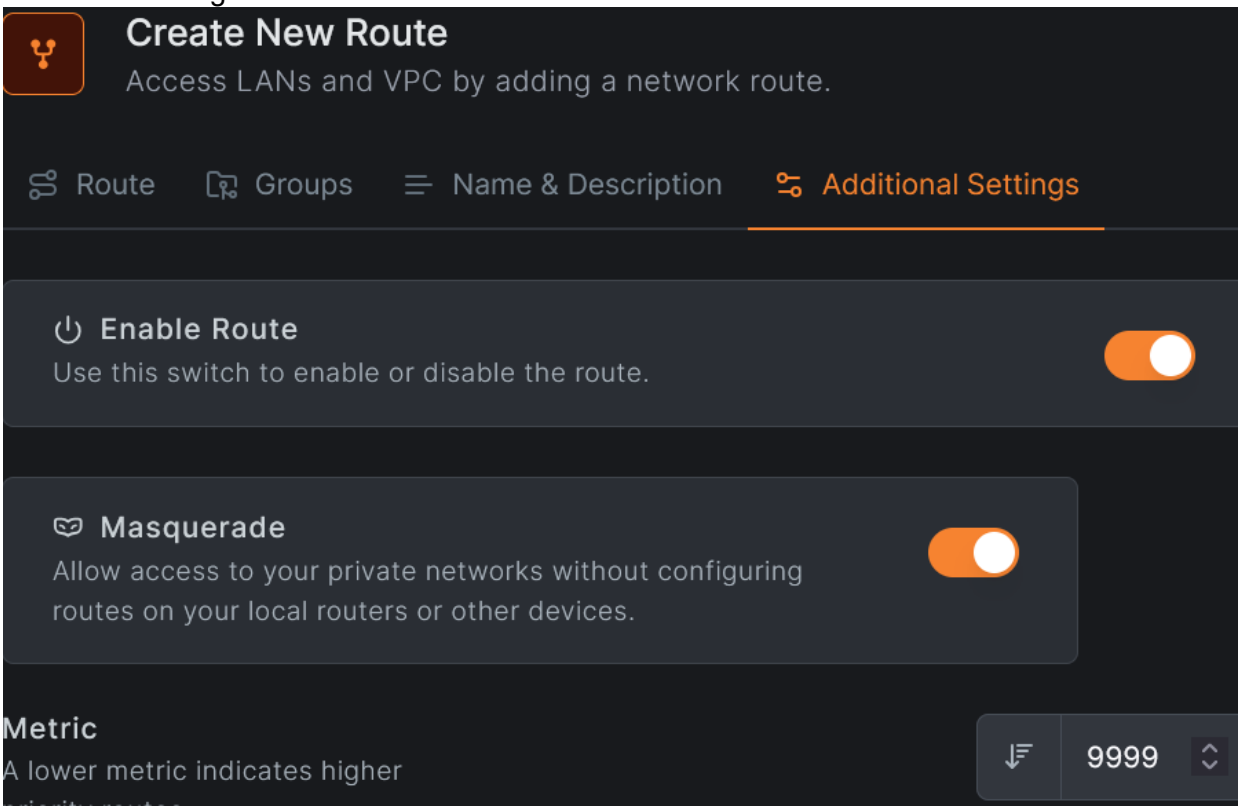
Advertise this route to all my peers:



Name and description:



Additional settings:



You might need to restart netbird on all peers

On my Oracle VPS I can now see the rules and the alternate routing table created by netbird:
ubuntu@vps-egc:~$ ip rule show
0:	from all lookup local
105:	from all lookup main suppress_prefixlength 0
110:	not from all fwmark 0x1bd00 lookup netbird
32766:	from all lookup main
32767:	from all lookup default
ubuntu@vps-egc:~$

ubuntu@vps-egc:~$ ip route sho table netbird
192.168.9.0/24 dev wt0
ubuntu@vps-egc:~$

So from my oracle VPS there now is a route to my DL-WRX36 subnet

Create Networks

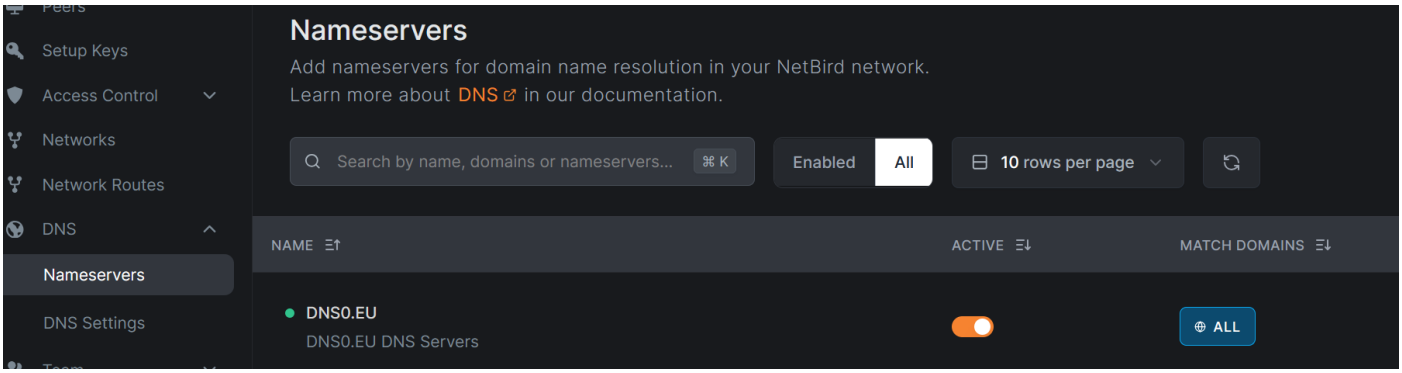
See: https://docs.netbird.io/how-to/networks

Using Networks comes instead of creating routes. Although the routes will stay valid and avalaible

DNS settings

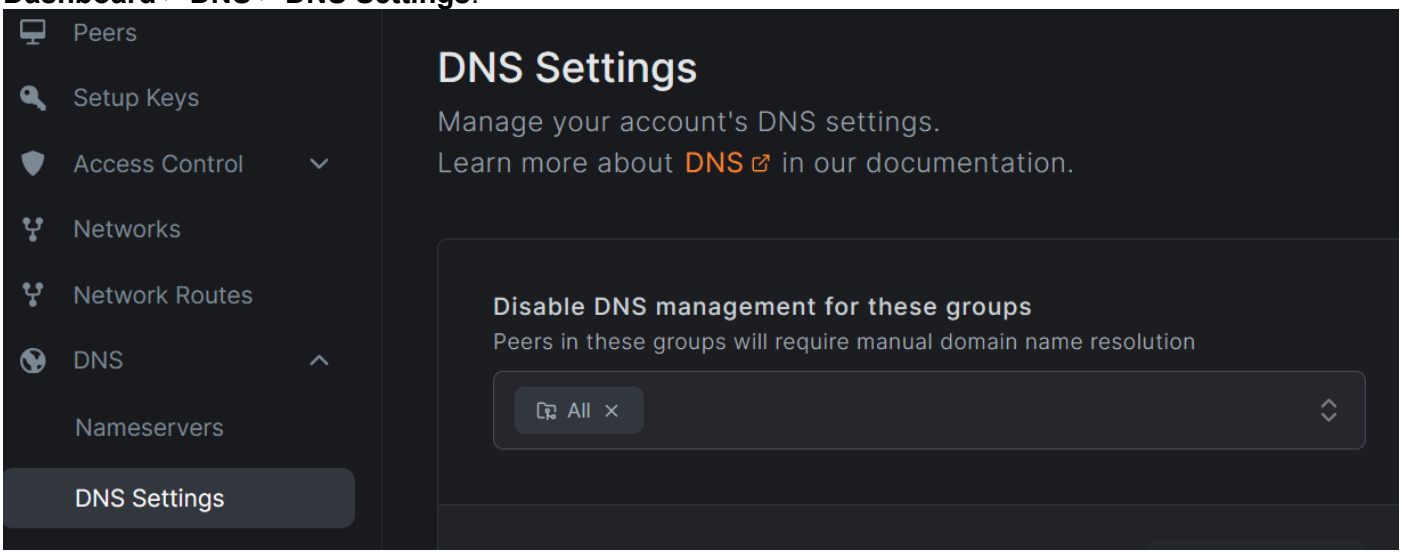
See: https://docs.netbird.io/how-to/manage-dns-in-your-network

Netbird by default runs its own DNS server on the peers, this is included in the Netbird executable and is used by default.
So make sure you set a Nameserver under DNS settings:
Dashboard > DNS > Nameservers:



I have chosen the DNS0.EU nameserver but you can choose others from a list or add your own.

If you do not want to use the Netbird DNS on your peers than you can disable it:
Dashboard > DNS > DNS Settings:



In this example I have disabled it for all peers, so all peers are using their own DNS settings and servers.

Create Exit node

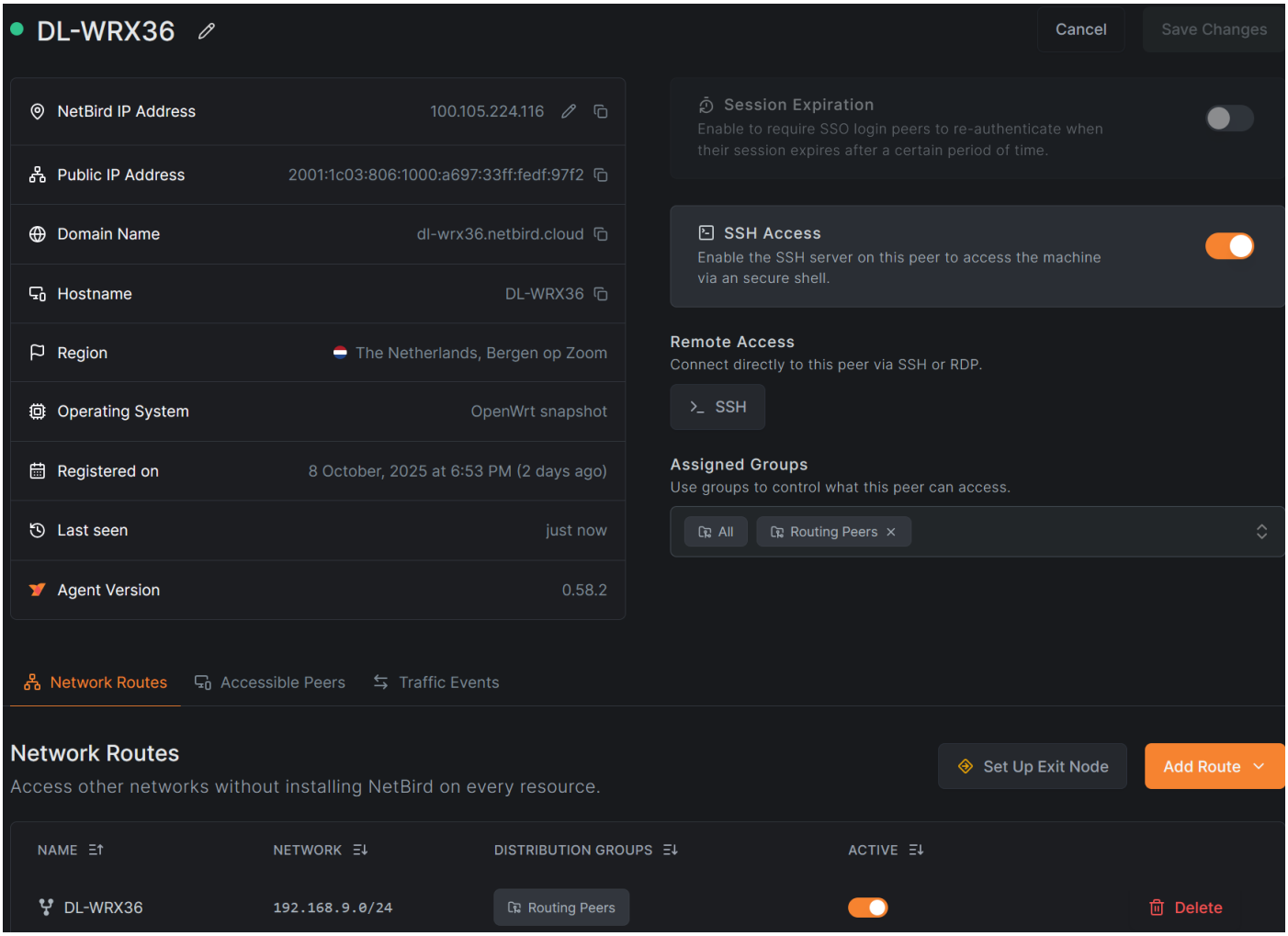
An exit node is a peer which acts as a VPN server other designated peers route all their traffic via the exit node.

On the exit node it is important that the firewall allows forwarding from **netbird** to **wan**, see paragraph about firewall.

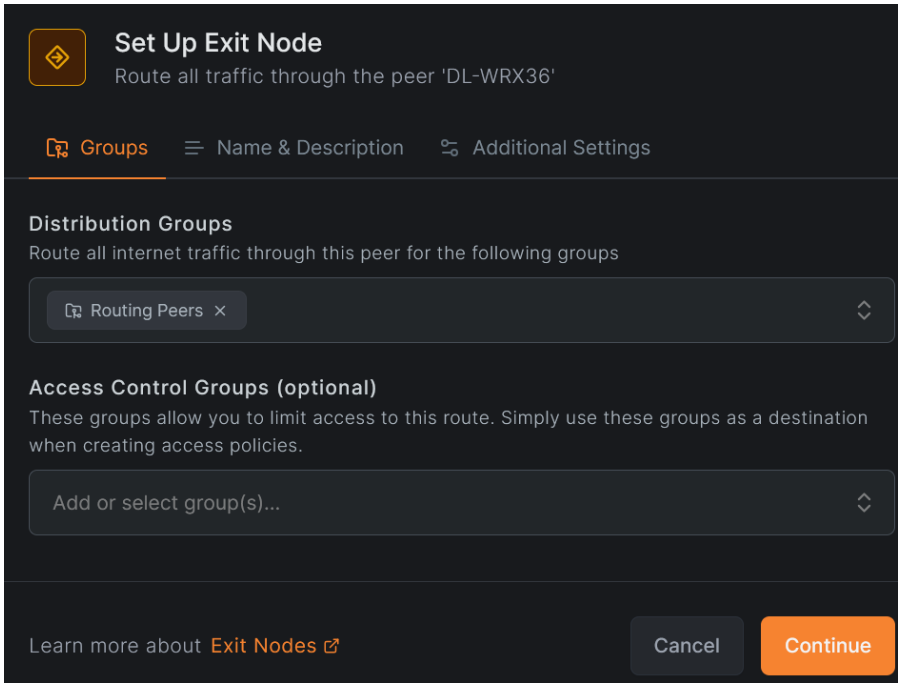
N etbird documentation: https://netbird.io/knowledge-hub/netbird-network-routes, scroll down to he bottom.

Login in the Netbird dashboard

Peers > Click on the peer you want to be the exit node > On the overview page scroll to the bottom and click **Setup Exit node**

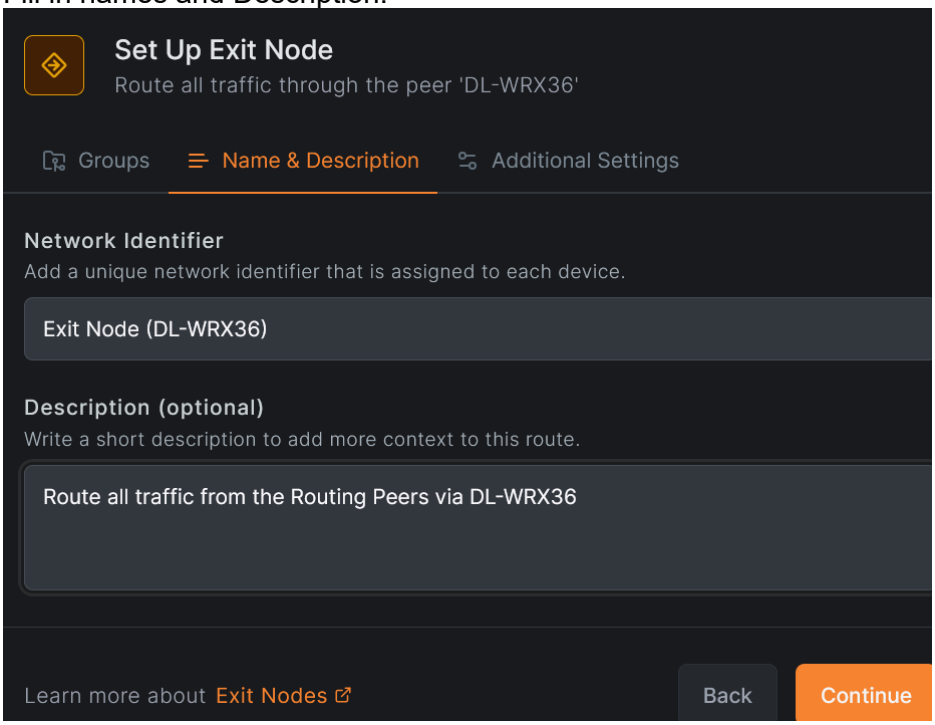


Under **Groups** add the peers you want to use the exit node, I had created a group **Routing Peers** and I want all those peers to use this router as exit node



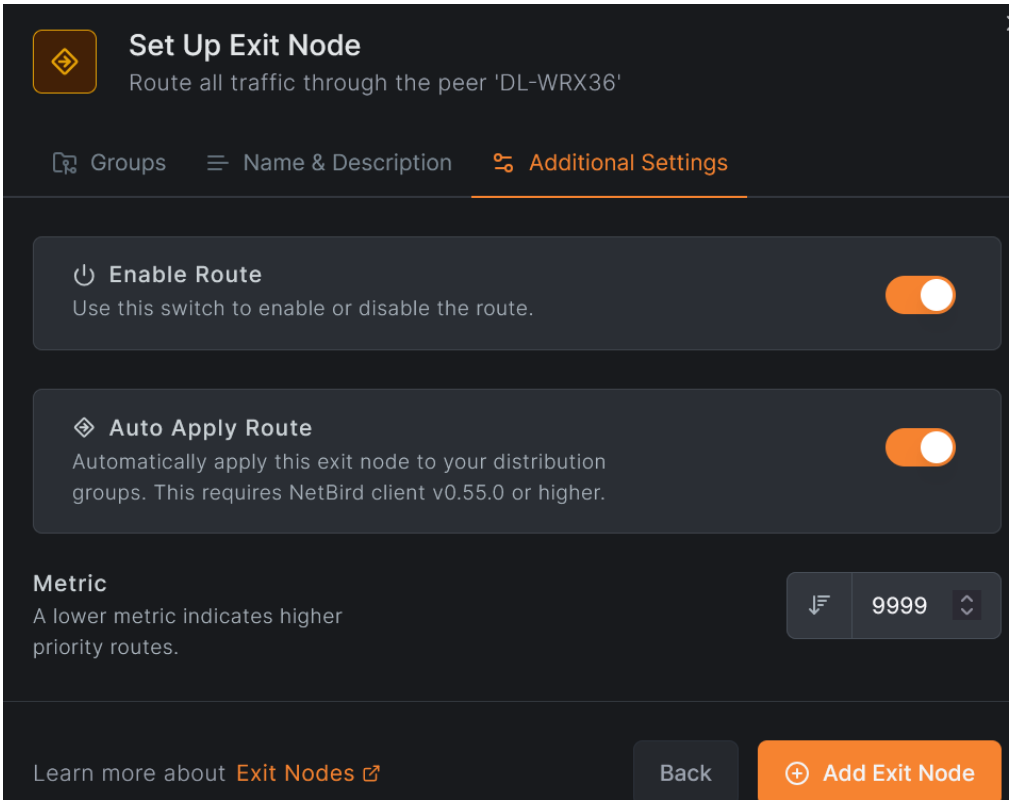
Continue

Fill in names and Description:



Continue

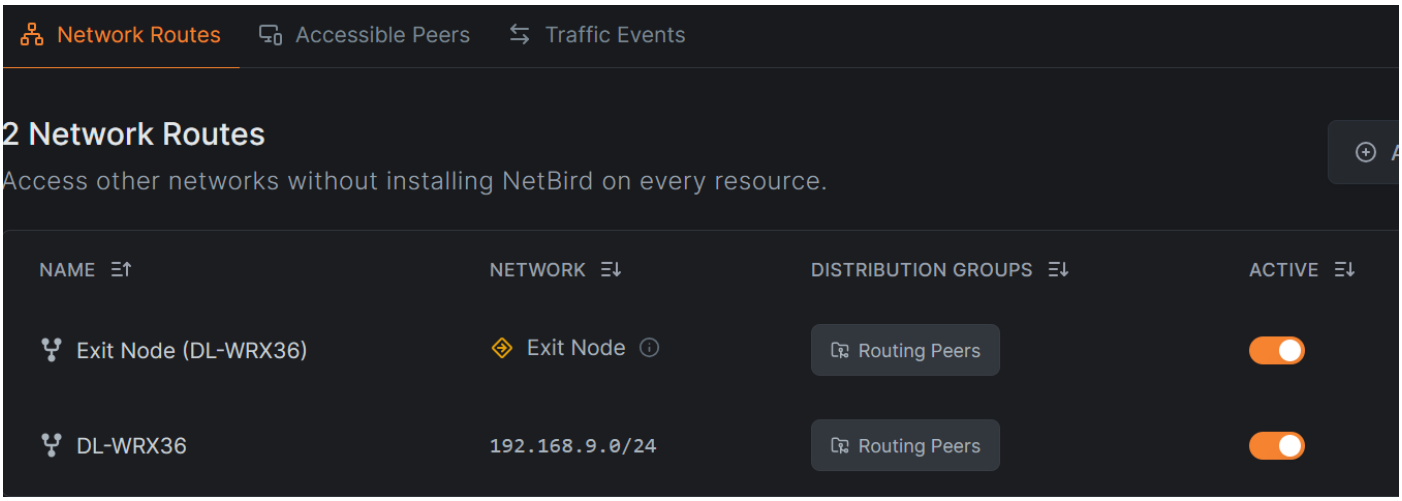
Enable Route and Auto Apply Route



Add Exit Node

My DL-WRX36 is running Snapshot with Netbird 0.58 (you can see it on the overview page if you click on the Peer) so all routes are applied automatically.

My DL-WRX36 now has set a route to its own subnet (which is 192.168.9.0/24), pushed to all the Routing peers en an Exit node which pushes a default route to all the routing peers.



You can check on one of the other routing peers e.g. my R7800-2 where you can see the pushed default route and the pushed route to reach the DL-WRX36:

root@R7800-2:~# ip route show table netbird
default dev wt0
192.168.9.0/24 dev wt0
root@R7800-2:~#

Now all traffic from the R7800-2 (and all its clients are routed) via Netbird, Netbird internally routes this traffic to the exit node.

Support

For support and questions see the Netbird support thread:
https://forum.openwrt.org/t/netbird-support-discussion-thread/237831/8

Netbird log

Showing netbird log:
cat /tmp/log/netbird/client.log

Using PBR together with Netbird

To work together with PBR add to the PBR config (**version 1.2.X** and higher):
`option uplink_ip_rules_priority '99'`
This will make sure the PBR ip rules will come before the netbird rules (>100).

Install on Oracle VPS with Ubuntu (24.04)

sudo apt-get update
sudo apt install ca-certificates curl gnupg -y
curl -sSL https://pkgs.netbird.io/debian/public.key | sudo gpg --dearmor --output /usr/share/keyrings/netbird-archive-keyring.gpg
echo 'deb [signed-by=/usr/share/keyrings/netbird-archive-keyring.gpg] https://pkgs.netbird.io/debian stable main' | sudo tee /etc/apt/sources.list.d/netbird.list

sudo apt-get update
sudo apt-get install netbird
 # only for the GUI
#sudo apt-get install netbird-ui

netbird up –setup-key <setup-key made on dashboard> --allow-server-ssh

Log on Ubuntu: *cat /var/log/netbird/client.log*

SSH access note that the user name is usually: *ubuntu*

For (SSH) Access add thes firewall rules

sudo iptables -I INPUT 3 -p udp --dport 3478 -j ACCEPT # NetBird TURN
sudo iptables -I INPUT 4 -p tcp --dport 44338 -j ACCEPT # SSH service port from netbird

sudo iptables -I INPUT 5 -p udp --dport 51820 -j ACCEPT # NetBird WireGuard
#sudo iptables -t nat -I POSTROUTING -o ens3 -j MASQUERADE #To Masquerade traffic

Make persistent:
`sudo netfilter-persistent save`

vcn-XXX > Security > Default Security List for vcn-XXX > Security rules:

☐	No	0.0.0.0/0	UDP	All	3478
☐	No	0.0.0.0/0	TCP	All	44338
☐	No	0.0.0.0/0	UDP	All	51820

Setup Oracle free OpenVPN cloud server

https://www.youtube.com/watch?v=E-CLtExRzX8
https://mateo.cogeanu.com/2020/wireguard-vpn-pihole-on-free-oracle-cloud/

References

Netbird support thread: https://forum.openwrt.org/t/netbird-support-discussion-thread/237831/8
Upgrade from 0.50 to 0.58: https://github.com/netbirdio/netbird/issues/4322