VPN

??????????virtual private network????VPN??VPN???VPN????????

VPN?? Internet ??? VPN???????? (WAN) ?????? ????????????????????????????

- n2n VPN
- FreeLAN
- Outline
- WireGuard
- Cloudflare Tunnel
- ngrok
- More Solutions
- Tailscale

n2n VPN

Introduction

> n2n ???????????? EasyTier???????

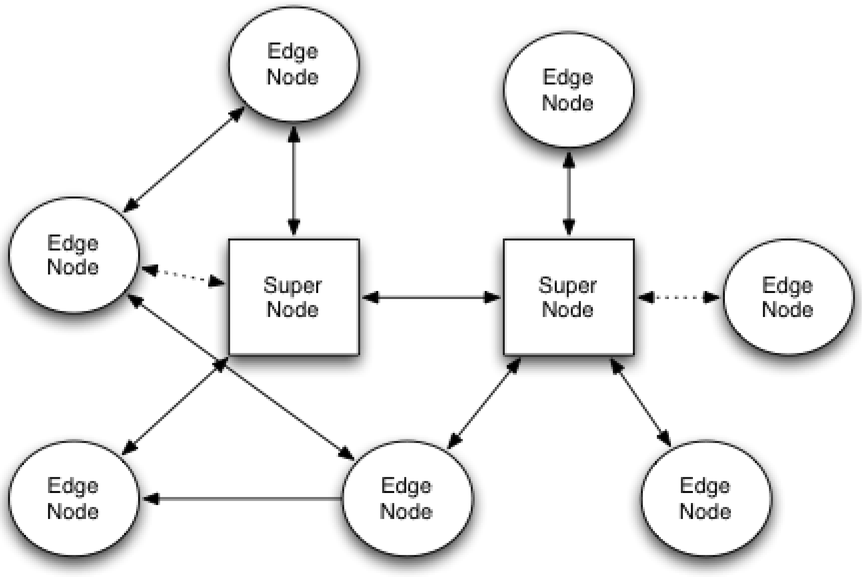
n2n is a layer-two **peer-to-peer** virtual private network (VPN) which allows users to exploit features typical of P2P applications at network instead of application level. This means that users can gain native IP visibility (e.g. two PCs belonging to the same n2n network can ping each other) and be reachable with the same network IP address regardless of the network where they currently belong. In a nutshell, as OpenVPN moved SSL from application (e.g. used to implement the https protocol) to network protocol, n2n moves P2P from application to network level.

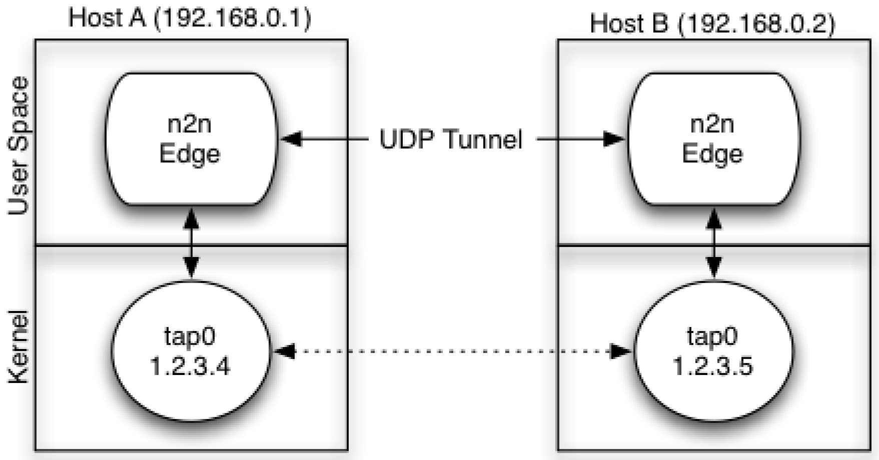
In order to start using n2n, two elements are required:

- A *supernode*: it allows edge nodes to announce and discover other nodes. It must have a port publicly accessible on internet.
- *edge* nodes: the nodes which will be a part of the virtual networks

A virtual network shared between multiple edge nodes in n2n is called a *community*. A single supernode can relay multiple communities and a single computer can be part of multiple communities at the same time. An encryption key can be used by the edge nodes to encrypt the packets within their community.

n2n tries to establish a direct peer-to-peer connection via udp between the edge nodes when possible. When this is not possible (usually due to special NAT devices), the supernode is also used to relay the packets.





Installation

Download: https://github.com/ntop/n2n

Ubuntu/Debian

```
sudo dpkg -i n2n_3.0.0-1038_amd64.deb
sudo apt install -f
```

Usage

One-liner command in foreground.

```
# On Linux, change the community, encrypt key and tun IP to your own
# edge -c <community> -k <encrypt key> -a <tun IP address> -l <supernode host:port> -f
sudo edge -c my-community -k my-secret -a 10.9.9.10 -l n2n.lucktu.com:10090 -f
```

Run as service in background.

```
# Generate the config file
sudo cp /etc/n2n/edge.conf.sample /etc/n2n/edge.conf

# Start the edge
sudo systemctl start edge
sudo systemctl enable edge
```

Supernode

```
sudo supernode -p 10090
```

????

- https://github.com/ntop/n2n
- n2n for Windows
- n2n GUI for Win
- OpenVPN Download
- Public Supernodes
- ZeroTier - P2P VPN Service
- FRP - Fast Reverse Proxy
    - [Video] ?????FRP??????????????

FreeLAN

Introduction

Freelan is a free, open-source, multi-platform, peer-to-peer VPN software that abstracts a LAN over the Internet. It works on Windows, Linux and Mac OSX.

Whether you want to connect the computers of your family, play an old LAN-only game with your friends, or give a privileged access to your private network to your collaborators, freelan will do the job perfectly.

FreeLAN is free all-around VPN open-source software for Windows, Linux, and macOS that can be used to create three types of VPN:

- Client-server
- Peer-to-peer
- Hybrid that includes the two types mentioned above.

Installation

Download: https://www.freelan.org/download.html

Ubuntu/Debian

```
sudo apt update
sudo apt install freelan
```

Windows

1. ?? Visual C++?
2. ?? freelan-2.2.0-amd64-install.exe?

Usage

One-liner command in foreground.

```
# On PC#1, which is correctly configured to allow access to the 12000/UDP from the internet.
# By default, the listen port is 12000/UDP and the tun_tap.ip_address is 9.0.0.1
freelan --security.passphrase "my_secret"
```

```
# On PC#2
freelan --security.passphrase "my_secret" --tap_adapter.ipv4_address_prefix_length 9.0.0.2/24 --fscp.contact
<IP-to-PC1>:12000
```

Outline

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Outline ??????????????? VPN????????????????????? Outline ???? VPN ?????????????????????????????????

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- https://getoutline.org/zh-TW
- https://github.com/Jigsaw-Code
- ??OUTLINE
- Outline VPN????? VPN ????
- https://outline.community/

For ARM CPU

- Outline Server with ARM64 support

WireGuard

WireGuard Server

- wireguard-install

WireGuard Client

- YT: WireGuard - How to Install and Configure WireGuard VPN Client on Ubuntu | Debian | LinuxMint - YouTube
- wireguird - wireguard gtk gui for linux
- How to configure WireGuard VPN client with NetworkManager GUI
- How to set up Wireguard VPN under Linux - Tutorial - YouTube

wg-quick

Installation

```
# Ubuntu/Debian
sudo apt install wireguard

# Fedora
sudo dnf -y install wireguard-tools
```

Generate the key pairs

```
sudo -i
cd /etc/wireguard
wg genkey | tee privatekey | wg pubkey > publickey
```

Configure the WireGuard interface on Peer A

`/etc/wireguard/wg0.conf` :

```
cat << EOF > /etc/wireguard/wg0.conf
[Interface]
Address = 10.0.0.2/32
```

```
PrivateKey = XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
DNS = 8.8.8.8, 4.4.4.4

[Peer]
PublicKey = XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
AllowedIPs = 0.0.0.0/0
Endpoint = the.wireguard.server:51820
EOF
```

Up & Down the wg link

```
sudo wg-quick up wg0
sudo wg
sudo journalctl -fu wg-quick@wg0

sudo wg-quick down wg0
```

nmcli

```
# Import the config file
CONF_FILE="wg0.conf"
nmcli connection import type wireguard file "$CONF_FILE"

# Show the profiles
nmcli
nmcli conn show   # List all profiles
nmcli conn show <name>  # Display the details for specified profile

# Delete the profile
nmcli connection delete wg0

# Modify the profile my-wg0
nmcli connection modify my-wg0 \
    autoconnect yes \
    ipv4.method manual \
    ipv4.addresses 192.168.7.5/24 \
    wireguard.listen-port 50000 \
    ...

# Active/Inactive the interface
```

```
nmcli connection up my-wg0
nmcli connection down my-wg0
```

Algo VPN

- Algo VPN is a set of Ansible scripts that simplify the setup of a personal WireGuard and IPsec VPN.

NetBird

- NetBird combines a configuration-free peer-to-peer private network and a centralized access control system in a single open-source platform
- [Video] Netbird - an Open Source, Self Hosted Wireguard based VPN system. Server GUI and client setup ease

PiVPN

PiVPN is a lightweight, open-source project designed to simplify setting up a VPN server on a Raspberry Pi or any Debian-based system.

It supports WireGuard and OpenVPN, allowing you to create a secure, private tunnel to your home network or VPS.

- Self-host Your Own VPN Using PiVPN

wg-easy

wg-easy is the easiest way to run WireGuard VPN + Web-based Admin UI.

- GitHub: https://github.com/wg-easy/wg-easy

Cloudflare Tunnel

Cloudflare Tunnel ??????????????? Argo Tunnel ?? Cloudflare ?????????????? Tunnel ???????? Router ?????????? Port ?????????

???? Firewall ?????????? port??????????? NAT ??????

- Cloudflare Tunnel
- Cloudflare Docs: Cloudflare Tunnel
- ?? Cloudflare Tunnel ???????????
- [Video] You Need to Learn This! Cloudflare Tunnel Easy Tutorial

Other alternatives

Twingate

Twingate - 5 users for free

- Docs: Twingate
- [Video] the END of VPNs?

Pangolin

Pangolin - Tunneled Reverse Proxy Management Server with Identity and Access Control and Dashboard UI

- GitHub: https://github.com/fosrl/pangolin

ngrok

ngrok - put localhost on the internet

?????

- ?????????????
- ??? dev/test ????????? webhook???????????????????????

Pyngrok

ngrok SDK for Python

- pyngrok - a Python wrapper for ngrok — pyngrok 7.1.6 documentation
- GitHub: https://github.com/alexdlaird/pyngrok

URLs

- ngrok | Unified Application Delivery Platform for Developers
- ?? ngrok ????????? localhost ??? - MyApollo

?????

- Localtunnel ~ Expose yourself to the world
- localhost.run | localhost.run

More Solutions

EasyTier

EasyTier is a simple, safe and decentralized VPN networking solution implemented with the Rust language and Tokio framework.

> ?? n2n VPN ???

- https://www.easytier.top/en/
- GitHub: https://github.com/EasyTier/EasyTier

Nebula

A scalable overlay networking tool with a focus on performance, simplicity and security

- Doc: https://nebula.defined.net/docs/
- GitHub: https://github.com/slackhq/nebula

Chisel

Chisel is a fast TCP/UDP tunnel, transported over HTTP, secured via SSH. Single executable including both client and server. Written in Go (golang). Chisel is mainly useful for passing through firewalls, though it can also be used to provide a secure endpoint into your network.

- GitHub: https://github.com/jpillora/chisel
- Chisel ???? TCP ?? - iT ???::??????????? IT ???? (ithome.com.tw)
- Chisel: Secure TCP/UDP Tunneling for Modern Networks - Deniz Halil

Tinc

Tinc is free and open-source VPN software that can be used to create mesh VPN networks. It is a small and powerful peer-to-peer VPN daemon that can be installed on multiple platforms. Tinc uses encryptions and tunneling for creating a secure private network between multiple hosts.

Requirement: ?? node ???? Public IP

- [How to Set Up Peer-to-Peer VPN with Tinc on Ubuntu 22.04]()

Tunneled Mesh Reverse Proxy

??????? Cloudflare Tunnel ????????????

Pangolin

Pangolin ???Pangolin ????????????????????????? (????????????????)?????????????????????

- [Fossorial]()
- GitHub: https://github.com/fosrl/pangolin
- [Pangolin is my new self-hosted best friend for my home lab]()

Wiredoor

Wiredoor is a self-hosted, open-source ingress-as-a-service platform that allows you to expose applications and services running in private or local networks to the internet—securely, reliably, and without complex infrastructure.

It uses reverse VPN connections powered by WireGuard and exposes services through a built-in NGINX reverse proxy. Perfect for developers, operators, or teams that want full control of their ingress without relying on public cloud solutions.

- https://www.wiredoor.net/
- GitHub: https://github.com/wiredoor/wiredoor

Tailscale

Tailscale ??? Mesh VPN ??????? WireGuard ? end-to-end ?? VPN ?????? Peer-to-peer VPN???? NAT?????????????? 3 ????

???

- Peer-to-peer VPN ???IoT ????
- Tunnel VPN ???Netflix Sharing
- ???????? Client-server ??
- ???????
- ????????????????????????????? NAT ????????????
- ???
    - ????????????? Google, Microsoft AD, GitHub, Okta ??
    - Access Controls Lists (ACLs)
    - ???????

???

- Tailscale quickstart
- How you can connect two home labs with a site-to-site VPN (and why you should)
- How to Set Up Remote Access to Your Local Network Using Tailscale VPN

Peer-to-peer VPN

- ?????????? tailnet ?????????????????????
- ?? IoT ??????
- Tailnet ?????

Tunnet VPN

- ????????????????????????
- ?? Netflix ???????????
- Tailnet ???Exit Node

Site-to-site VPN

- ??????? tailnet ??????? Subnet Router ????????????????????????????????? Tailscale
- ?????????????????????????
- Tailnet ???Subnet Router