Final report

Single-User VPN (WireGuard) integrated with Active Directory (Samba) authentication for one user

Performed by *Nikita Niakhai*

Stack:

- VPN protocol - **Wireguard**
- **For Active Directory (AD):** `Samba` / `Samba Domain Controller` (Samba DC) as an Active Directory Domain Controller
- SSSD and PAM, Kerberos
- **Linux Ubuntu 22.04 hosted on DigitalOcean with** : *1 vCPU / 1 GB Memory/ 25 GB SSD / 1 TB Transfer*
- Communication with server from Windows performed with `SSH` with shared keys and credentials (for AD)
- Access to AD done with `ssh` on **Powershell** and **Alpine** (**iSH** - IOS app)
- Apps for tunneling traffic **Wireguard Windows and IOS distributions**

Pipeline of work

1 - Setting up Wireguard

1. Update the server:
   `apt update && apt upgrade -y`

2. Install WireGuard:
   `apt install -y wireguard`
3. Generate server keys:
   `wg genkey | tee /etc/wireguard/privatekey | wg pubkey | tee /etc/wireguard/publickey`
4. Set permissions on the private key:
   `chmod 600 /etc/wireguard/privatekey`
5. Check network interface name:
   `ip a`
   This interface name is used in the config `/etc/wireguard/wg0.conf`
6. Configuration `/etc/wireguard/wg0.conf`:

```
[Interface]
PrivateKey = <privatekey>
Address = 10.0.0.1/24
ListenPort = 51830
PostUp = iptables -A FORWARD -i %i -j ACCEPT; iptables -t nat -A POSTR
OUTING -o eth0 -j MASQUERADE
PostDown = iptables -D FORWARD -i %i -j ACCEPT; iptables -t nat -D POS
TROUTING -o eth0 -j MASQUERADE
```

7. Network Interface is used in the PostUp and PostDown lines!
8. Then I replace `privatekey` with the contents of the file `/etc/wireguard/privatekey`
9. Configuration for IP forwarding (also line `SaveConfig = true` in wg0.conf will do it automatically with every boot):

   `echo "net.ipv4.ip_forward=1" >> /etc/sysctl.conf` - set config
   `sysctl -p` - check
10. Manage the systemd daemon for WireGuard:
    `systemctl enable wg-quick@wg0.service`
    `systemctl start wg-quick@wg0.service`
    `systemctl status wg-quick@wg0.service`
11. Create client keys:
    `wg genkey | tee /etc/wireguard/name_privatekey | wg pubkey | tee /etc/wireguard/name_publickey`

12. Add the client to the server config:
    `/etc/wireguard/wg0.conf`

```
[Peer]
PublicKey = <name_publickey>
AllowedIPs = 10.0.0.2/32
```

13. Replace `<name_publickey>` with the contents of the file `/etc/wireguard/name_publickey`
14. Restart the systemd service with WireGuard:
    `systemctl restart wg-quick@wg0`
    `systemctl status wg-quick@wg0`
15. On the local machine (for example, on a laptop), I create a text file with the client configuration:
    `name_wb.conf`

```
[Interface]
PrivateKey = <CLIENT-PRIVATE-KEY>
Address = 10.0.0.2/32
DNS = 8.8.8.8
[Peer]
PublicKey = <SERVER-PUBKEY>
Endpoint = <SERVER-IP>:51830
AllowedIPs = 0.0.0.0/0
PersistentKeepalive = 20
```

16. Replace `CLIENT-PRIVATE-KEY` with the client's private key (contents of `/etc/wireguard/name_privatekey` on the server). Then replace `SERVER-PUBKEY` with the server's public key (contents of `/etc/wireguard/publickey` on the server). Replace `SERVER-IP` with the server's IP address.
17. Open this file in the WireGuard client (available for all operating systems, including mobile) and click the connect button in the client. Tunneling is setup!

2 - Active Directory setup

1. Installation of tools

   ```
   sudo apt install -y samba krb5-user winbind libnss-winbind libpam-winbind sssd sssd-tools realmd acl attr policycoreutils-python-utils \
   python3-pip python3-venv git dnsutils resolvconf
   ```

   This script installs Samba (the AD DC bits), Kerberos user tools, winbind/sssd and related NSS/PAM helpers, and utilities required for domain provisioning and troubleshooting. `resolvconf` / `dnsutils` help update DNS/resolver state.

Provision Samba as an Active Directory Domain Controller

2. Stop processes of samba, if they are exist

   ```
   sudo systemctl stop samba-ad-dc.service || true
   ```

   ```
   sudo systemctl stop smbd nmbd samba || true
   ```

I got following, which means no samba is yet present - good:

> Failed to stop samba-ad-dc.service: Unit samba-ad-dc.service not loaded.
> Failed to stop samba.service: Unit samba.service not loaded.

3. Deleting previous (default one) configuration of samba. And setting up domain provision and other options for DC

   ```
   sudo rm -f /etc/samba/smb.conf
   ```

   ```
   sudo samba-tool domain provision --realm=VPN.LOCAL --domain=VPN --adminpass='Str0ngAdminPass!' --server-role=dc --use-rfc2307 --dns-backend=SAMBA_INTERNAL --option="dns forwarder = 8.8.8.8"
   ```

   Provision the AD domain (this creates the AD DC and DNS). **Files created/modified:** `/etc/samba/smb.conf`,

   Kerberos keytab and Samba internal DBs stored in `/var/lib/samba`.

   After setting up DC I got the error:

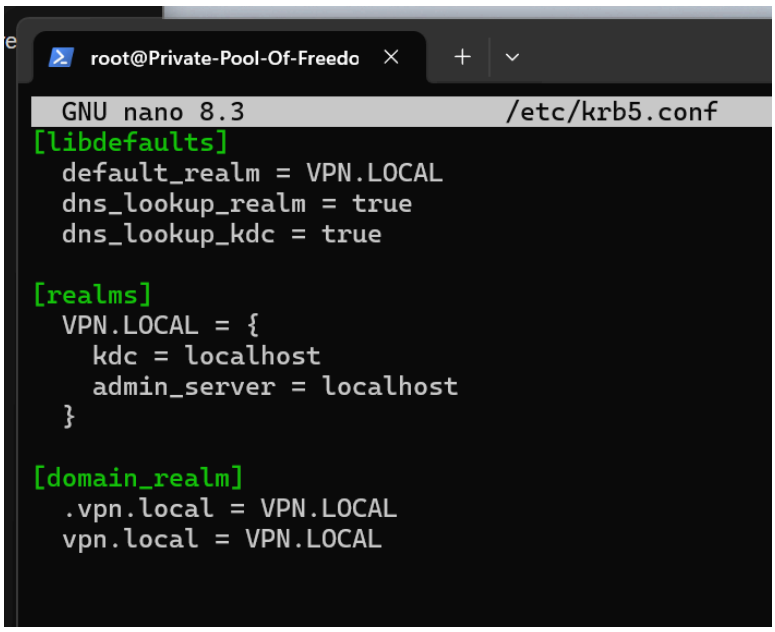
   > WARNING: Using passwords on command line is insecure. Installing the setproctitle python module will hide these from shortly after program start.
   > File "/usr/lib/python3/dist-packages/samba/netcmd/**init**.py", line 353, in

> _run
> return self.run(*args, **kwargs)
> ~~~~~~~~^^^^^^^^^^^^^^^^^^
> File "/usr/lib/python3/dist-packages/samba/netcmd/domain/provision.py", line 343, in run
> result = provision(self.logger,
> session, smbconf=smbconf, targetdir=targetdir,

4. **To resolve the error I only install (what they want from me) wider distribution of samba, which is `samba-ad-dc` (not remove previous samba installed):**

   `sudo apt install -y samba-ad-dc samba-dsdb-modules samba-vfs-modules python3-samba samba-common-bin smbclient winbind libnss-winbind libpam-winbind krb5-user`

5. I Write `krb5.conf` so system Kerberos uses the new AD realm. It ensures system Kerberos libraries look up KDC via DNS or the explicit localhost entries.



Content of file `krb5.conf`

```
root@Private-Pool-Of-Freedo
 GNU nano 8.3                                                    /etc/hosts *
# Your system has configured 'manage_etc_hosts' as True.
# As a result, if you wish for changes to this file to persist
# then you will need to either
# a.) make changes to the master file in /etc/cloud/templates/hosts.debian.tmpl
# b.) change or remove the value of 'manage_etc_hosts' in
#     /etc/cloud/cloud.cfg or cloud-config from user-data
#
127.0.0.1 dc1.vpn.local dc1 localhost
```

Content of file `/etc/hosts`

6. I start samba service and configure it to be enabled on boot

```
root@Private-Pool-Of-Freedom:~# sudo systemctl enable --now samba-ad-dc
Synchronizing state of samba-ad-dc.service with SysV service script with
 /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable samba-ad-dc
```

7. Now I verify how AD DC runs and DNS/Kerberos respond. Also I initiated Kerberos for administrator and set up default password

`sudo samba-tool domain level show`
`sudo host -t SRV _kerberos._tcp.vpn.local`
`sudo host -t SRV _ldap._tcp.vpn.local`
`sudo kinit administrator@VPN.LOCAL <<< 'Str0ngAdminPass!' && klist`

```
root@Private-Pool-Of-Freedom:~# sudo samba-tool domain level show
Domain and forest function level for domain 'DC=vpn,DC=local'

Forest function level: (Windows) 2008 R2
Domain function level: (Windows) 2008 R2
Lowest function level of a DC: (Windows) 2008 R2
root@Private-Pool-Of-Freedom:~# sudo host -t SRV _kerberos._tcp.vpn.local
_kerberos._tcp.vpn.local has SRV record 0 100 88 dc1.vpn.local.
root@Private-Pool-Of-Freedom:~# sudo host -t SRV _ldap._tcp.vpn.local
_ldap._tcp.vpn.local has SRV record 0 100 389 dc1.vpn.local.
```

```
root@Private-Pool-Of-Freedom:~# kinit administrator@VPN.LOCAL
Password for administrator@VPN.LOCAL:
Warning: Your password will expire in 41 days on Mon Dec 15 11:41:11 2025
root@Private-Pool-Of-Freedom:~# klist
Ticket cache: FILE:/tmp/krb5cc_0
Default principal: administrator@VPN.LOCAL

Valid starting     Expires            Service principal
11/03/25 11:43:05  11/03/25 21:43:05  krbtgt/VPN.LOCAL@VPN.LOCAL
        renew until 11/04/25 11:42:51
```

```
root@Private-Pool-Of-Freedom:~# sudo hostnamectl set-hostname dc1
.vpn.local
root@Private-Pool-Of-Freedom:~#
```

Results of verification of Sabma AD DC / DNS/Kerberos respond

8. Results:

- **Samba AD DC** is running (`samba-ad-dc.service active`).
- **Winbind** started correctly, so AD user lookups via PAM/SSSD will work.
- **DNS and SRV records** are now correct (pointing to `dc1.vpn.local`).
- **TLS self-signed certificates** for LDAPS/HTTPS were generated automatically.

Create AD group & AD users (create up to 10 test users)

Here I will grant rights to create WireGuard client configs. Group membership is managed by AD and not local UNIX accounts.

9. Create AD group `VPNUsers`

`sudo samba-tool group add VPNUsers`

```
root@Private-Pool-Of-Freedom:~# sudo samba-tool group add VPNUse
rs
Added group VPNUsers
```

2. Create AD users and add to `VPNUsers` (created 3 real users)

```
sudo samba-tool user add alice MySecurePassword123 \
--given-name=”alice” \
--description="VPN user"
```

These commands create AD users, then add them to the `VPNUsers` group. I use `samba-tool` so users are created directly in AD.

```
root@Private-Pool-Of-Freedom:~# sudo samba-tool user setpassword
 podarochek
New Password:
Retype Password:
Changed password OK
```

```
User 'infinity' added successfully
```

```
 --description="VPN user (optional)"
 User 'dilyara' added successfully
```

```
root@Private-Pool-Of-Freedom:~# sudo samba-tool group addmembers
 VPNUsers podarochek
Added members to group VPNUsers
root@Private-Pool-Of-Freedom:~# sudo samba-tool group addmembers
 VPNUsers infinity
Added members to group VPNUsers
root@Private-Pool-Of-Freedom:~# sudo samba-tool group addmembers
 VPNUsers dilyara
Added members to group VPNUsers
```

Results of user management

Configure SSSD and PAM so AD users can log into this server (locally) using their AD credentials

11. I ensure the Samba keytab is accessible. Export krb config file and set permission for the file:

```
root@Private-Pool-Of-Freedom:~# sudo samba-tool domain exportkey
tab /etc/krb5.keytab -U administrator
Export complete keytab to /etc/krb5.keytab
root@Private-Pool-Of-Freedom:~# sudo chown root:root /etc/krb5.k
eytab
root@Private-Pool-Of-Freedom:~# sudo chmod 0600 /etc/krb5.keytab
```

`sudo samba-tool domain exportkeytab /etc/krb5.keytab -U administrator`
`sudo chown root:root /etc/krb5.keytab`
`sudo chmod 0600 /etc/krb5.keytab`

13. Create the SSSD configuration file (full file). Secure sssd.conf and restart sssd

    Here I configured for `ad` provider pointing to `VPN.LOCAL`. It tells sssd to use Kerberos for auth, AD for identity, creates fallback home directories under `/home/%u`, and disables fully qualified usernames. `ldap_id_mapping = True` lets SSSD

generate UID/GID mapping for AD users.

```
root@Private-Pool-Of-Freedom:~# cat /etc/sssd/sssd.conf
[sssd]
services = nss, pam
config_file_version = 2
domains = VPN.LOCAL

[nss]
filter_groups = root
filter_users = root

[pam]

[domain/VPN.LOCAL]
id_provider = ad
auth_provider = krb5
chpass_provider = ad
access_provider = ad
ad_domain = vpn.local
krb5_realm = VPN.LOCAL
ldap_sudo_search_base = dc=vpn,dc=local
cache_credentials = True
enumerate = False
fallback_homedir = /home/%u
default_shell = /bin/bash
use_fully_qualified_names = False
ldap_id_mapping = True
krb5_store_password_if_offline = True
```

Content of `ssd.config`

Here I add permissions to file and start the daemon:

```
root@Private-Pool-Of-Freedom:~# sudo chmod 600 /etc/sssd/sssd.co
nf
root@Private-Pool-Of-Freedom:~# sudo systemctl enable --now sssd
Synchronizing state of sssd.service with SysV service script wit
h /usr/lib/systemd/systemd-sysv-install.
Executing: /usr/lib/systemd/systemd-sysv-install enable sssd
root@Private-Pool-Of-Freedom:~#
```

14. Configure NSS and PAM to use sssd (update /etc/nsswitch.conf and PAM)

    Here commands ensure Name Service Switch uses `sss` (sssd) for passwd/group/shadow lookups. This makes AD users resolvable via system

calls.

```
root@Private-Pool-Of-Freedom:~# cat /etc/nsswitch.conf
# /etc/nsswitch.conf
#
# Example configuration of GNU Name Service Switch functionality
.
# If you have the `glibc-doc-reference' and `info' packages inst
alled, try:
# `info libc "Name Service Switch"' for information about this f
ile.

passwd:         files systemd sss winbind
group:          files systemd sss winbind
shadow:         files systemd sss
gshadow:        files systemd

hosts:          files dns
networks:       files

protocols:      db files
services:       db files sss
ethers:         db files
rpc:            db files

netgroup:       nis sss
automount:  sss
```

Content of file `/etc/nsswitch.conf`

15. Configure PAM to create home directories and allow AD users to authenticate and then check if pam services are present

    `sudo pam-auth-update --enable mkhomedir`

```
root@Private-Pool-Of-Freedom:~# cat /etc/pam.d/common-session |
grep pam
# /etc/pam.d/common-session - session-related modules common to
all services
# As of pam 1.0.1-6, this file is managed by pam-auth-update by
default.
# pam-auth-update to manage selection of other modules.  See
# pam-auth-update(8) for details.
session [default=1]                     pam_permit.so
session requisite                       pam_deny.so
session required                        pam_permit.so
# The pam_umask module will set the umask according to the syste
m default in
# See "man pam_umask".
session optional                        pam_umask.so
session required        pam_unix.so
session optional                        pam_winbind.so
session optional                        pam_sss.so
session optional        pam_systemd.so
session optional                        pam_mkhomedir.so
# end of pam-auth-update config
```

Result of command that show: pam modules are present.

16. Locally test that AD users can be looked up and can authenticate

```
root@Private-Pool-Of-Freedom:~# getent passwd infinity
infinity:*:396801104:396800513:Infinity:/home/infinity:/bin/bash
root@Private-Pool-Of-Freedom:~# id infinity
uid=396801104(infinity) gid=396800513(domain users) groups=39680
0513(domain users),396801103(vpnusers),3000010(VPN\infinity),100
(users),3000011(VPN\vpnusers),3000006(BUILTIN\users)
root@Private-Pool-Of-Freedom:~# sudo su -s /bin/bash infinity -c
 "echo 'login-test'" <<< ''
login-test
root@Private-Pool-Of-Freedom:~#
```

Here `getent passwd` queries NSS via sssd to resolve the AD user entry, `id` shows UID/GID mapping, and `sudo su -s /bin/bash usename -c ...` attempts to run a shell as `user` . These commands verify sssd identity and that PAM/Kerberos auth is working locally.

Configure SSH for AD users and restrict sudo script execution to AD group

SSH access into the server will be the method to get client configs. For safety, I will restrict the management script to members of `VPNUsers`.

For the demo I will setup ssh to use credentials instead of shared keys but I will allow to root login as well (for the development).

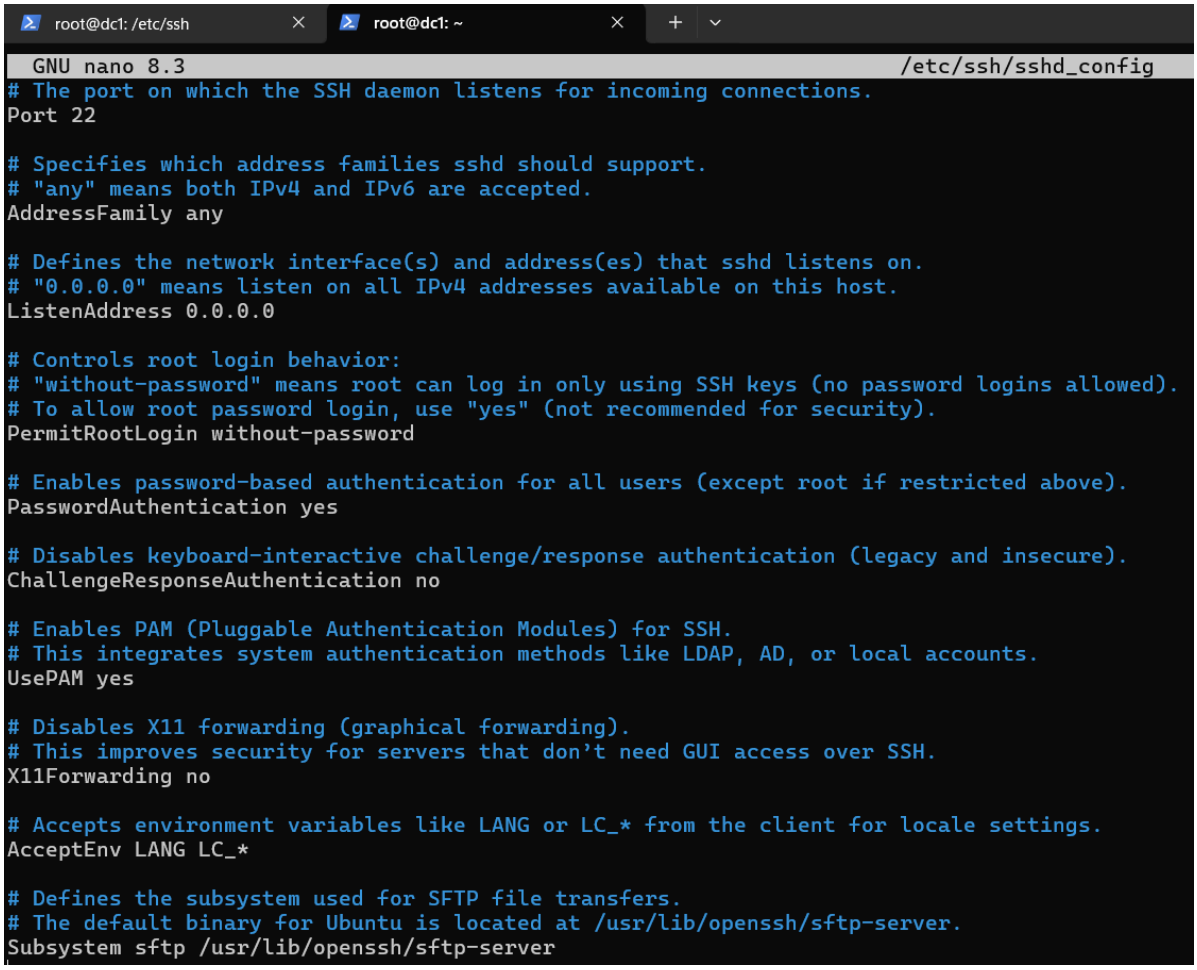
17. Now I edit `/etc/ssh/sshd_config` to abort shared keys

```
root@Private-Pool-Of-Freedom:~# sudo cp /etc/ssh/sshd_config /et
c/ssh/sshd_config.bak
```

```
root@Private-Pool-Of-Freedom:~# sudo systemctl restart sshd
root@Private-Pool-Of-Freedom:~# sudo systemctl enable sshd
Created symlink '/etc/systemd/system/sshd.service' → '/usr/lib/s
ystemd/system/ssh.service'.
Created symlink '/etc/systemd/system/multi-user.target.wants/ssh
.service' → '/usr/lib/systemd/system/ssh.service'.
```

I make bakup for the config file and then restart sshd daemon.

18. Logging in as user of AD



Content of `sshd_config` file

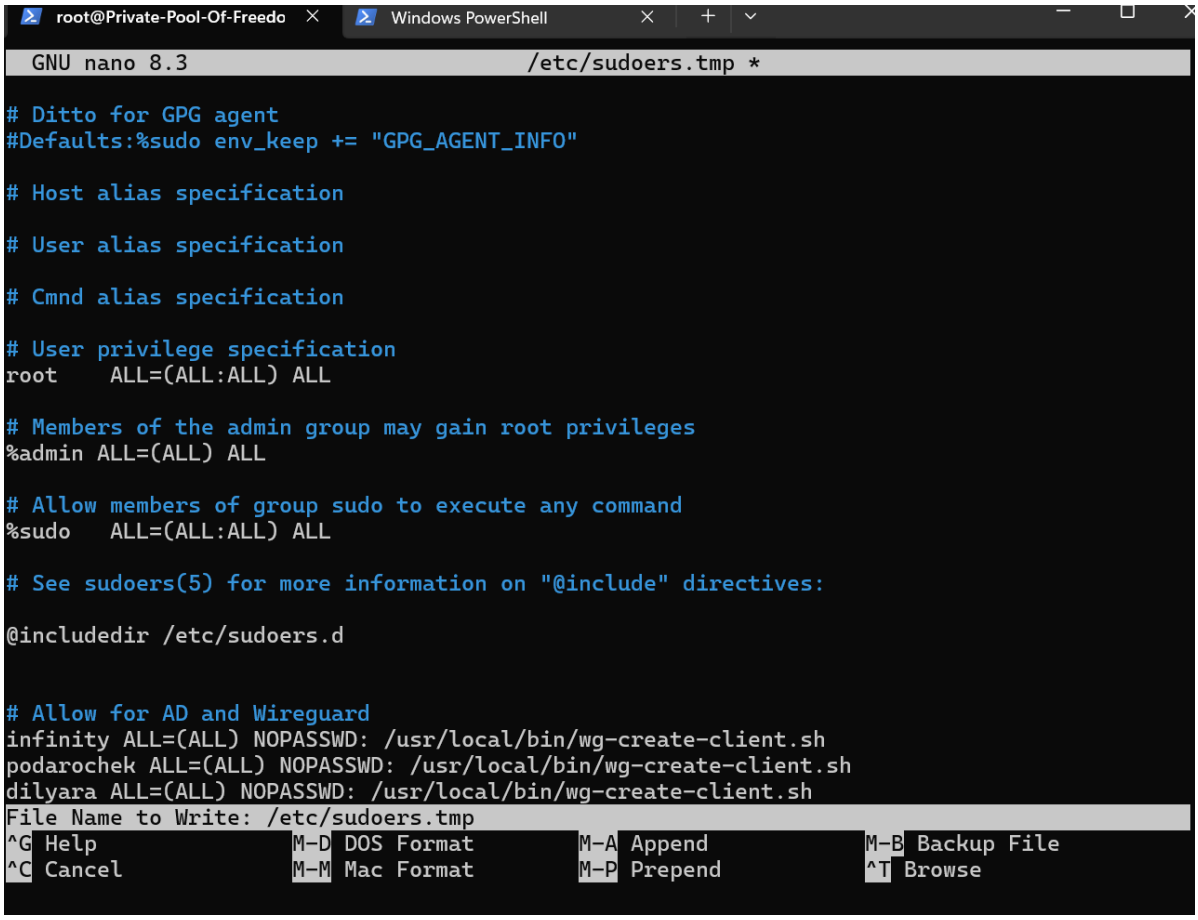
```
PS C:\Users\vaper> ssh infinity@209.38.40.145
infinity@209.38.40.145's password:
Welcome to Ubuntu 25.04 (GNU/Linux 6.14.0-35-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/pro

 System information as of Mon Nov  3 12:46:16 UTC 2025

  System load:  0.08              Processes:             180
  Usage of /:   12.6% of 23.10GB  Users logged in:       2
  Memory usage: 66%               IPv4 address for eth0: 209.38.40.145
  Swap usage:   0%                IPv4 address for eth0: 10.18.0.5

  => There is 1 zombie process.

0 updates can be applied immediately.

New release '25.10' available.
Run 'do-release-upgrade' to upgrade to it.



The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

groups: cannot find name for group ID 3000016
infinity@dc1:~$
```

User is logged in.

19. Create a system group mapping for sudoers.

```
root@Private-Pool-Of-Freedom:~# sudo tee /etc/sudoers.d/wg-clien
t-create > /dev/null <<'EOF'
# Allow members of AD group VPNUsers to run the WireGuard client
 creation script without password
%VPN\\Users ALL=(root) NOPASSWD: /usr/local/bin/wg-create-client
.sh
EOF
sudo chmod 0440 /etc/sudoers.d/wg-client-create
```

Now members of the AD `VPNUsers` group will run the `/usr/local/bin/wg-create-client.sh` future script as root without being prompted for a password.



Content of `/etc/sudoers.tmp` that gives permissions for AD users

Create the WireGuard client creation script — generate keypair, add peer to wg0, write client config

20. This script will: check the invoking user is in the AD `VPNUsers` group, generate WireGuard keypair (using `wg` and `/usr/bin/wg`), compute a client IP from the AD user uidNumber (or next available in the `10.0.0.0/24` pool), append the peer to `/etc/wireguard/wg0.conf`, call `wg addconf` or `wg set` to apply live, and output the client config file.

    > Full script on the path `/usr/local/bin/wg-create-client.sh` [last page of the Report]

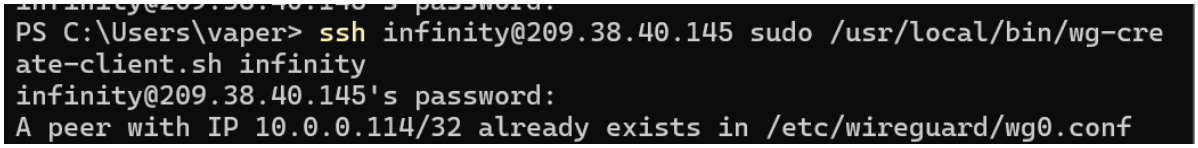
21. Set permission for the script

```
sudo chmod 700 /usr/local/bin/wg-create-client.sh
sudo chown root:root /usr/local/bin/wg-create-client.sh
```

Test the full flow (AD user obtains config, client connects)

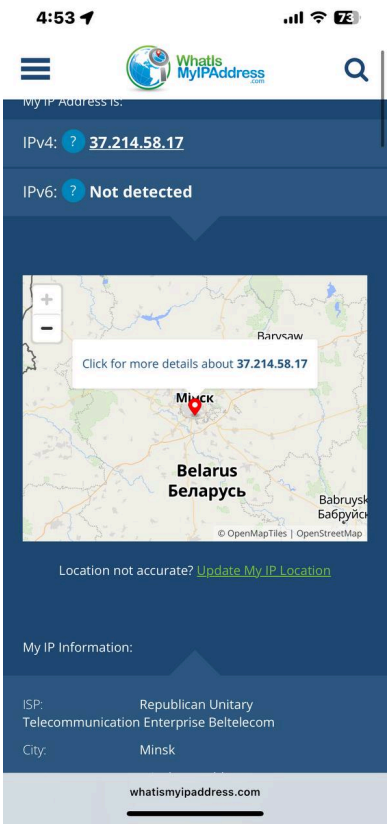
22. Now I run the script and then copy it to my local PC

```
ssh podarochek@209.38.40.145 sudo /usr/local/bin/wg-create-client.sh podarochek
scp podarochek@209.38.40.145:/home/podarochek/podarochek_wg.conf /
```



Here I see that on my PC I already received configs. Now I try my IOS.

23. I run the script and check my current IP from Linux machine on my IOS



IP before enabling tunelling

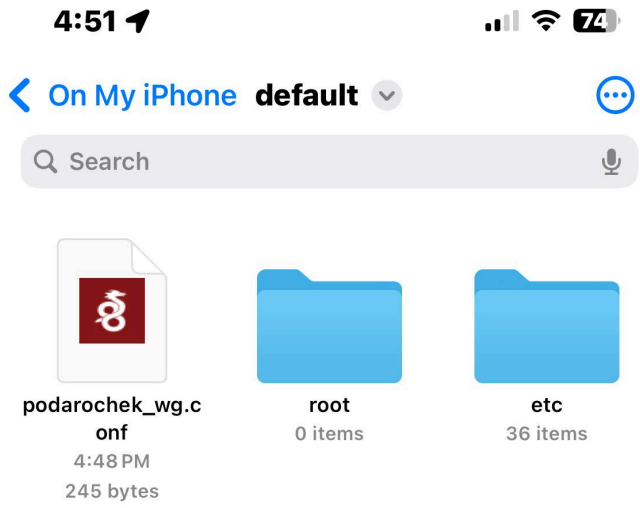
```
4:48                                74

localhost:~# sudo
-ash: sudo: not found
localhost:~# apk add openssh
OK: 12 MiB in 24 packages
localhost:~# openssh podarochek@209.38.40.145 sudo
 /usr/local/bin/wg-create-client.sh podarochek
-ash: openssh: not found
localhost:~# ssh podarochek@209.38.40.145 sudo /us
r/local/bin/wg-create-client.sh podarochek
The authenticity of host '209.38.40.145 (209.38.40
.145)' can't be established.
ED25519 key fingerprint is SHA256:oi0JKUPZLMh2kPsB
cF1ZAENI642kD9QdSGEnQ8ED9UY.
This key is not known by any other names
Are you sure you want to continue connecting (yes/
no/[fingerprint])? yes
Warning: Permanently added '209.38.40.145' (ED2551
9) to the list of known hosts.
podarochek@209.38.40.145's password:
Client config created at /home/podarochek/podaroch
ek_wg.conf
PublicKey: ++3EZdqyuAm/GzWPJZuDqC2Cg8wCQifACueG1u/
yiTw=
Client IP: 10.0.0.115/32
```

Execution of script from my IOS via podarochek credentials

24. I copy config to my local VM on IOS

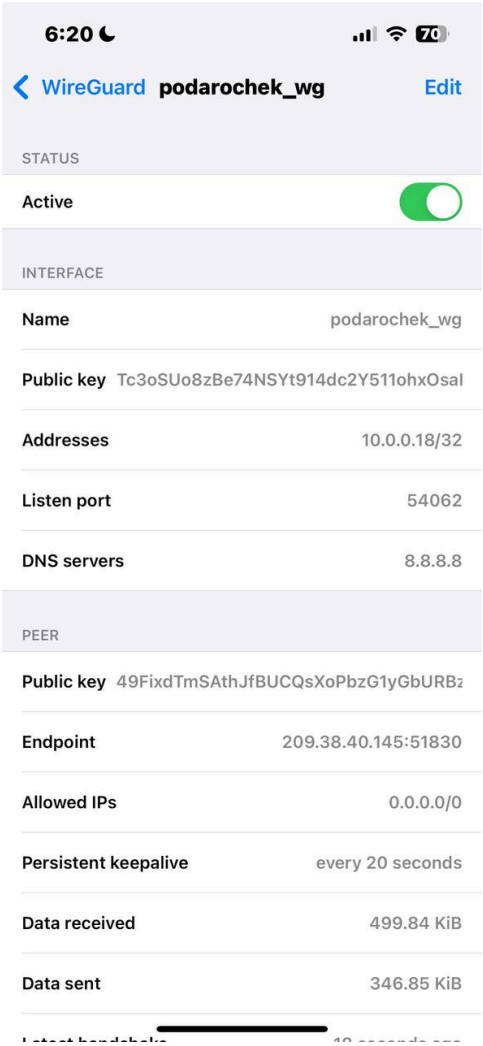
```
localhost:~# scp podarochek@209.38.40.145:/home/po
darochek/podarochek_wg.conf /
podarochek@209.38.40.145's password:
podarochek_wg.c 100%  245     3.7KB/s   00:00
```

Copy config file from server to my IOS via podarochek credentials

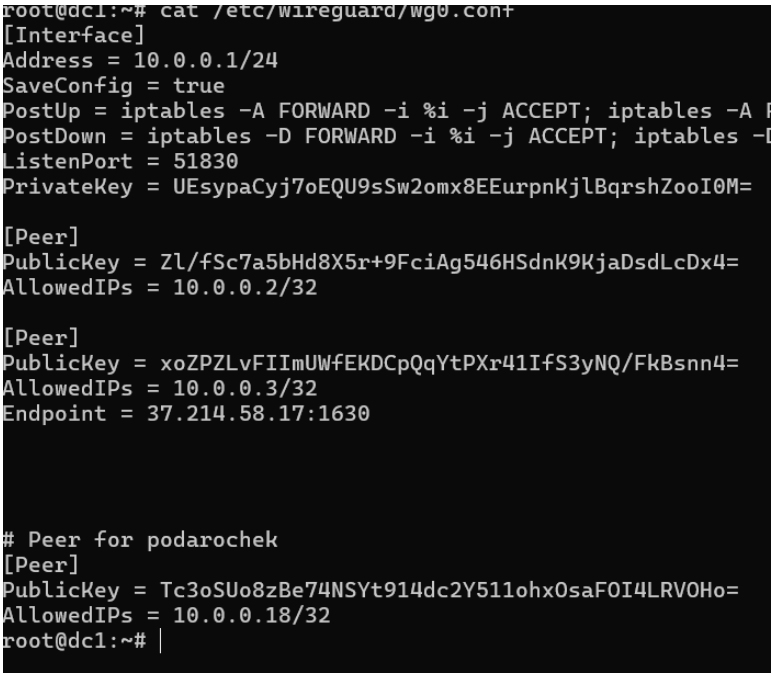


Copied file inside my IOS device

25. I added this config in Wireguard App so now I have access to tunneling

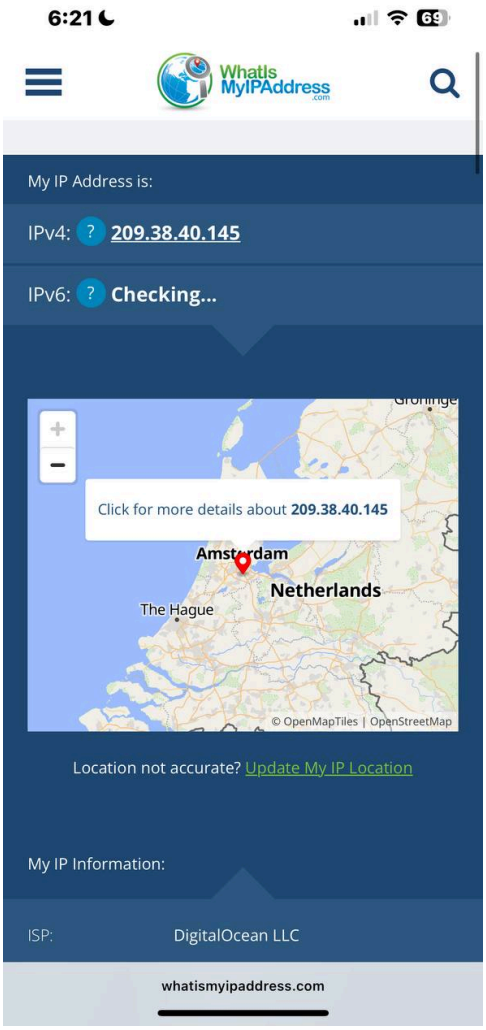


Configuration of podarochek wg_conf inside Wireguard App



Verification of logs inside config files inside Linux Machine

26. VPN works.



IP after enabling tunelling

Future upgrades:

- [ ] WireGuard UI (TSL/SSL)
- [ ] Firewall, IDS, and hardening (Fail2Ban, Crowdsec)
- [ ] Key rotation, access policy, and zero-trust elements
- [ ] Prometheus Node Exporter + Grafana, or simpler Netdata for dashboards and alerting (To telegram bot)

Applications

Script on the path `/usr/local/bin/wg-create-client.sh` **:**

```
sudo tee /usr/local/bin/wg-create-client.sh > /dev/null <<'EOF'
#!/usr/bin/env bash
# wg-create-client.sh
# Usage: sudo /usr/local/bin/wg-create-client.sh <username>
# This script must only be callable via sudo by members of the AD group VPN
Users (configured in /etc/sudoers.d/wg-client-create)

set -euo pipefail

WG_INTERFACE="wg0"
WG_CONF="/etc/wireguard/${WG_INTERFACE}.conf"
WG_NETWORK="10.0.0.0/24"
WG_SERVER_IP="10.0.0.1"   # server's wg IP (change if your server uses a diff
erent WG IP)
DNS_SERVERS="8.8.8.8"

if [ "$#" -ne 1 ]; then
  echo "Usage: sudo $0 <ad-username>"
  exit 2
fi

USERNAME="$1"

# Check caller is allowed (safety check)
if ! id "${SUDO_USER:-$USER}" >/dev/null 2>&1; then
  echo "Error: unable to determine invoking user"
  exit 3
fi

INVOKER="${SUDO_USER:-$USER}"

# check group membership (sssd/ad)
if ! id -nG "$INVOKER" | grep -qw "vpnusers"; then
  echo "Error: user $INVOKER is not a member of VPNUsers"
```

```
  exit 4
fi

# get UIDNUM for deterministic IP mapping
getent passwd "$USERNAME" >/dev/null 2>&1 || { echo "User $USERNAME n
ot found via NSS"; exit 5; }
UIDNUM=$(getent passwd "$USERNAME" | awk -F: '{print $3}')

# Compute an IP for the user, restricted to /32 range 10.0.0.1–10.0.0.32
USED_IPS=$(grep -oP '10\.0\.0\.\d+' "$WG_CONF" | awk -F. '{print $4}')
START_OCTET=1
END_OCTET=32

# Try to assign based on UIDNUM
if [[ "$UIDNUM" =~ ^[0-9]+$ ]]; then
    LAST_OCTET=$(( (UIDNUM % END_OCTET) + START_OCTET ))
else
    LAST_OCTET=$START_OCTET
fi

# Ensure LAST_OCTET is not already in use
while echo "$USED_IPS" | grep -qw "$LAST_OCTET"; do
    LAST_OCTET=$((LAST_OCTET + 1))
    if ((LAST_OCTET > END_OCTET)); then
        echo "No available IPs left in 10.0.0.0/32 range"
        exit 6
    fi
done

CLIENT_IP="10.0.0.${LAST_OCTET}/32"

# ensure address is not already used in wg conf
if grep -q "$CLIENT_IP" "$WG_CONF"; then
  echo "A peer with IP $CLIENT_IP already exists in $WG_CONF"
  exit 6
fi
```

```
# generate keypair
PRIVATE_KEY=$(wg genkey)
PUBLIC_KEY=$(printf '%s' "$PRIVATE_KEY" | wg pubkey)

# create client config
CLIENT_CONF_FILE="/home/$USERNAME/${USERNAME}_wg.conf"
mkdir -p "/home/$USERNAME"
cat > "$CLIENT_CONF_FILE" <<EOC
[Interface]
PrivateKey = $PRIVATE_KEY
Address = ${CLIENT_IP}
DNS = ${DNS_SERVERS}

[Peer]
PublicKey = $(wg show $WG_INTERFACE public-key)
AllowedIPs = 0.0.0.0/0
Endpoint = 209.38.40.145:51830
PersistentKeepalive = 20
EOC

# append peer to server config (persistent)
cat >> "$WG_CONF" <<EOP

# Peer for $USERNAME
[Peer]
PublicKey = $PUBLIC_KEY
AllowedIPs = ${CLIENT_IP}
EOP

# apply live to running wg interface
wg set "$WG_INTERFACE" peer "$PUBLIC_KEY" allowed-ips "${CLIENT_IP}"

# set file ownership so the AD user can download it over SSH/SFTP
PRIMARY_GROUP=$(id -gn "$USERNAME")
chown "$USERNAME":"$PRIMARY_GROUP" "$CLIENT_CONF_FILE"
```

```
chmod 0700 "$CLIENT_CONF_FILE"

echo "Client config created at $CLIENT_CONF_FILE"
echo "PublicKey: $PUBLIC_KEY"
echo "Client IP: ${CLIENT_IP}"
EOF
```