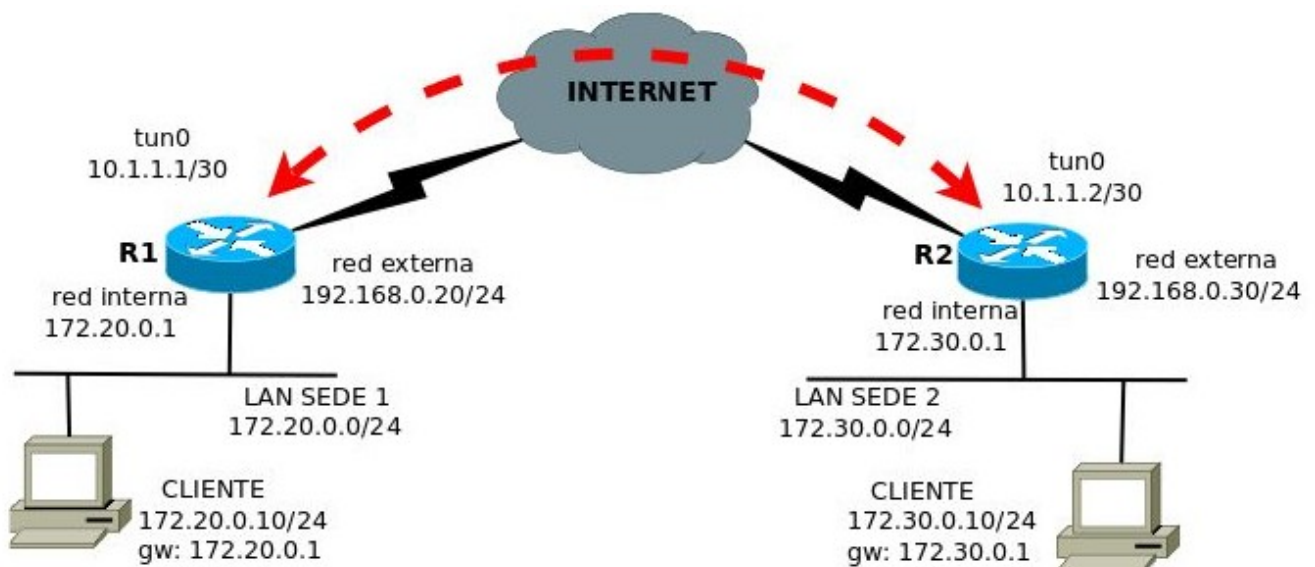


## SAD.T5P1\_ VPNs

Vamos a realizar la practica con la opcion3, pero vamos a realizarlo con ubuntu server en vez de routers mas que nada por estar mas familiarizado con este.

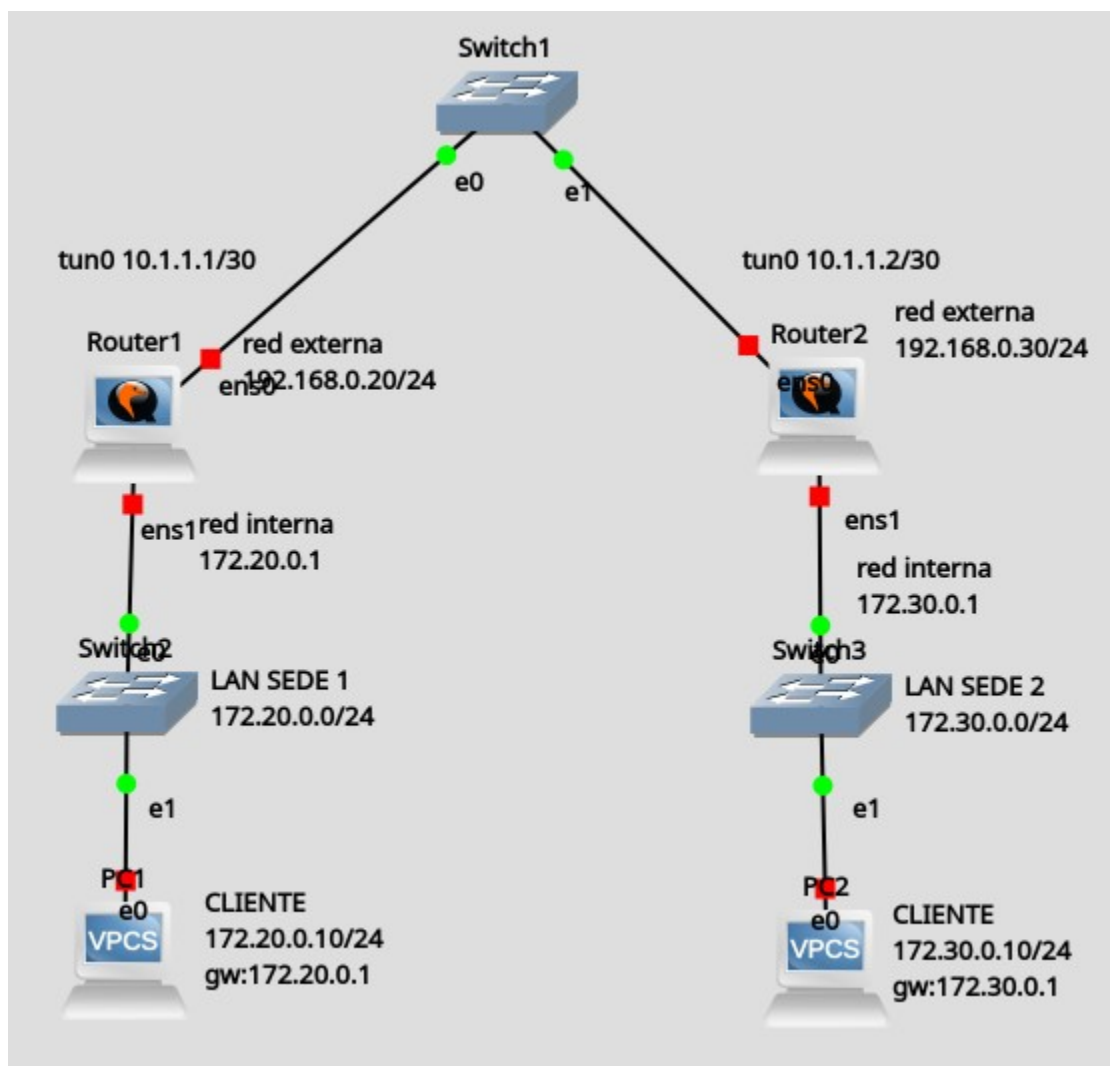
Mi sorpresa es que según descargo la imagen de Ubuntu Server tienen interfaz grafica xD

El esquema de red es el siguiente



SAD.T5P1\_VPNs

Aquí lo vemos en el GNS3



Configuramos las IP de las interfaces y luego configuramos el ip forwarding y el NAT

Esta captura es del Router2

```
gns3@gns3:~$ sudo nano /etc/sys
sysctl.conf sysctl.d/    systemd/
gns3@gns3:~$ sudo nano /etc/sysctl.conf
[sudo] password for gns3:
gns3@gns3:~$ sudo sysctl -p
net.ipv4.ip_forward = 1
gns3@gns3:~$ sudo iptables -t nat -A POSTROUTING -s 172.30.0.0/24 -o eth0 -j MASQUERADE
gns3@gns3:~$
```

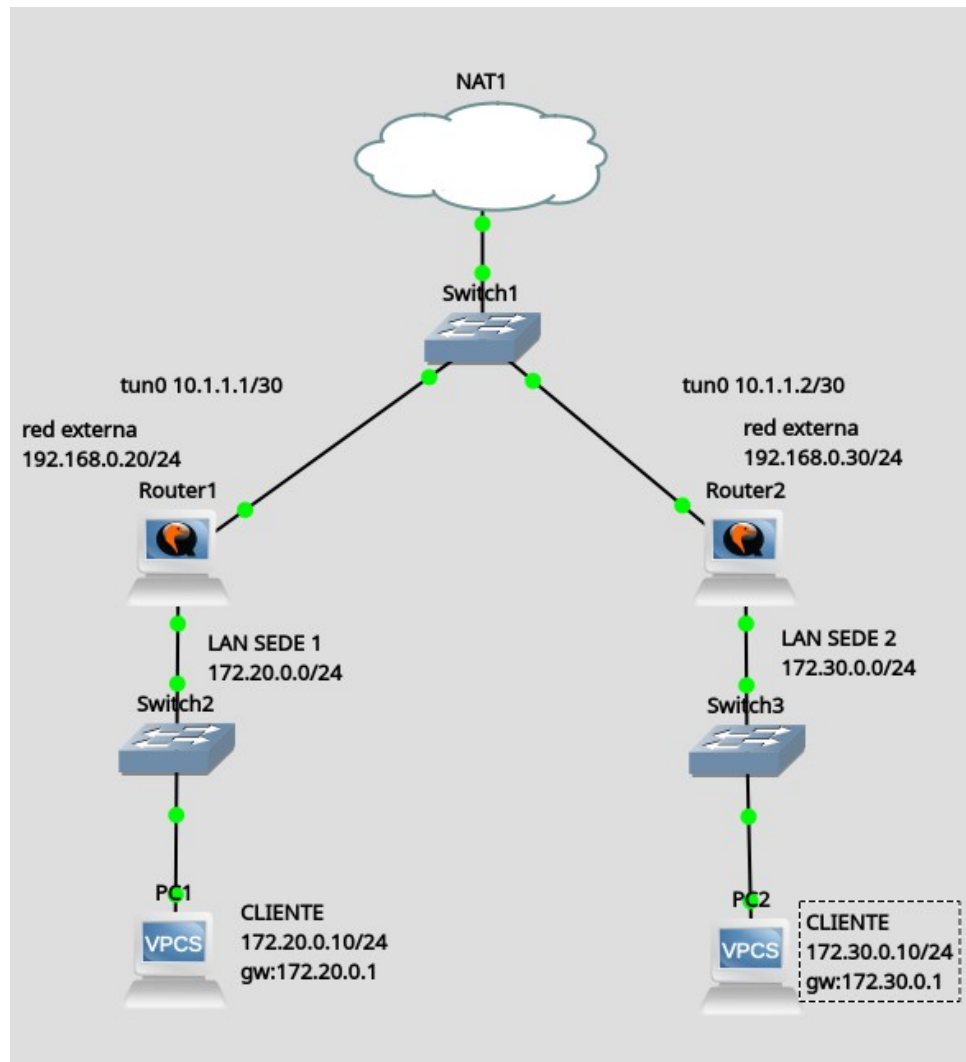
## SAD.T5P1\_ VPNs

Para guardar la configuracion habra que escribir

```
sudo /sbin/iptables-save
```

Asi cada vez que reiniciemos se aplicaran.

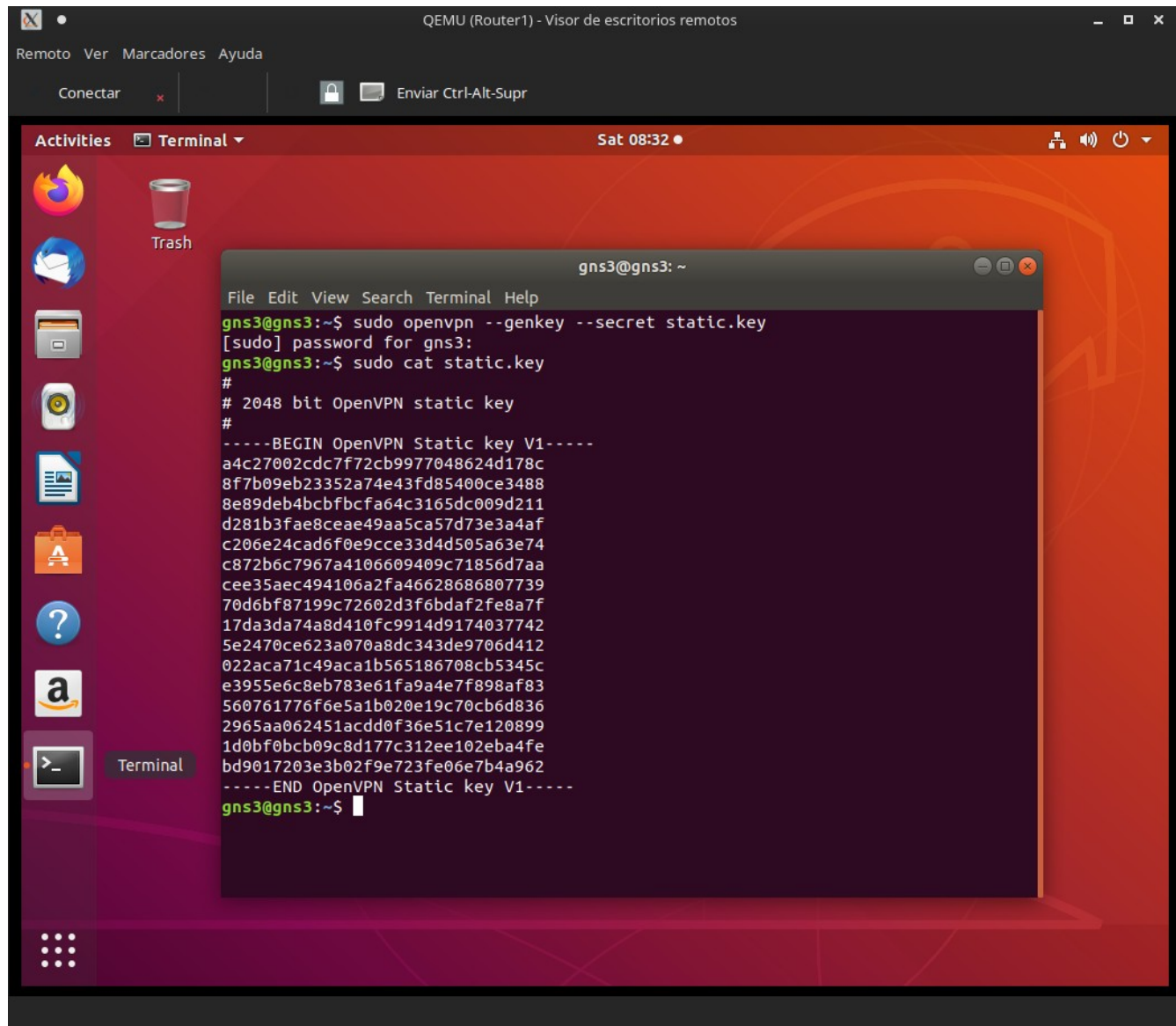
Una vez configurados los routers asignaremos las IP a los VPCS y editaremos un poco el esquema para facilitar las cosas quedando así.



La instalación OpenVPN al precisar de Internet lo he instalado antes conectando los routers directamente a la NAT

## SAD.T5P1\_ VPNs

Por lo que procederemos a generar la clave simétrica del primer router



```
QEMU (Router1) - Visor de escritorios remotos
Remoto Ver Marcadores Ayuda
Conectar x Enviar Ctrl-Alt-Supr

Activities Terminal Sat 08:32
Trash
Terminal
gns3@gns3: ~
File Edit View Search Terminal Help
gns3@gns3:~$ sudo openvpn --genkey --secret static.key
[sudo] password for gns3:
gns3@gns3:~$ sudo cat static.key
#
# 2048 bit OpenVPN static key
#
-----BEGIN OpenVPN Static key V1-----
a4c27002cdc7f72cb9977048624d178c
8f7b09eb23352a74e43fd85400ce3488
8e89deb4bcbfbcfa64c3165dc009d211
d281b3fae8ceae49aa5ca57d73e3a4af
c206e24cad6f0e9cce33d4d505a63e74
c872b6c7967a4106609409c71856d7aa
cee35aec494106a2fa46628686807739
70d6bf87199c72602d3f6bdaf2fe8a7f
17da3da74a8d410fc9914d9174037742
5e2470ce623a070a8dc343de9706d412
022aca71c49aca1b565186708cb5345c
e3955e6c8eb783e61fa9a4e7f898af83
560761776f6e5a1b020e19c70cb6d836
2965aa062451acdd0f36e51c7e120899
1d0bf0bcb09c8d177c312ee102eba4fe
bd9017203e3b02f9e723fe06e7b4a962
-----END OpenVPN Static key V1-----
gns3@gns3:~$
```

## SAD.T5P1\_ VPNs

Una vez creada la copiamos en el directorio de openvpn y reiniciamos el servidor

```
gns3@gns3: ~
File Edit View Search Terminal Help
gns3@gns3:~$ sudo cp /home/gns3/
.bash_logout .ICEauthority static.key
.bashrc .local/ .sudo_as_admin_successful
.cache/ .mozilla/ Templates/
.config/ Music/ Videos/
Desktop/ Pictures/ .viminfo
Documents/ .profile .Xauthority
Downloads/ Public/ .xsessionrc
.gnupg/ .ssh/
gns3@gns3:~$ sudo cp /home/gns3/static.key /etc/openvpn/static.key
gns3@gns3:~$ sudo systemctl restart openvpn@server
gns3@gns3:~$ sudo systemctl status openvpn@server
● openvpn@server.service - OpenVPN connection to server
   Loaded: loaded (/lib/systemd/system/openvpn@.service; indirect; vendor preset: enabled)
   Active: active (running) since Sat 2019-12-14 15:55:52 UTC; 3s ago
     Docs: man:openvpn(8)
           https://community.openvpn.net/openvpn/wiki/Openvpn24ManPage
           https://community.openvpn.net/openvpn/wiki/HOWTO
   Main PID: 2855 (openvpn)
   Status: "Pre-connection initialization successful"
     Tasks: 1 (limit: 4651)
    CGroup: /system.slice/system-openvpn.slice/openvpn@server.service
            └─2855 /usr/sbin/openvpn --daemon ovpn-server --status /run/openvpn/server.status 10 --cd /et

Dec 14 15:55:52 gns3 ovpn-server[2855]: WARNING: INSECURE cipher with block size less than 128 bit (64 b
Dec 14 15:55:52 gns3 ovpn-server[2855]: TUN/TAP device tun0 opened
Dec 14 15:55:52 gns3 ovpn-server[2855]: do_ifconfig, tt->did_ifconfig_ipv6_setup=0
Dec 14 15:55:52 gns3 ovpn-server[2855]: /sbin/ip link set dev tun0 up mtu 1500
Dec 14 15:55:52 gns3 ovpn-server[2855]: /sbin/ip addr add dev tun0 local 10.1.1.1 peer 10.1.1.2
Dec 14 15:55:52 gns3 ovpn-server[2855]: Could not determine IPv4/IPv6 protocol. Using AF_INET
Dec 14 15:55:52 gns3 ovpn-server[2855]: UDPv4 link local (bound): [AF_INET][undef]:1194
Dec 14 15:55:52 gns3 ovpn-server[2855]: UDPv4 link remote: [AF_UNSPEC]
Dec 14 15:55:52 gns3 ovpn-server[2855]: GID set to nogroup
Dec 14 15:55:52 gns3 ovpn-server[2855]: UID set to nobody
lines 1-22/22 (END)
```

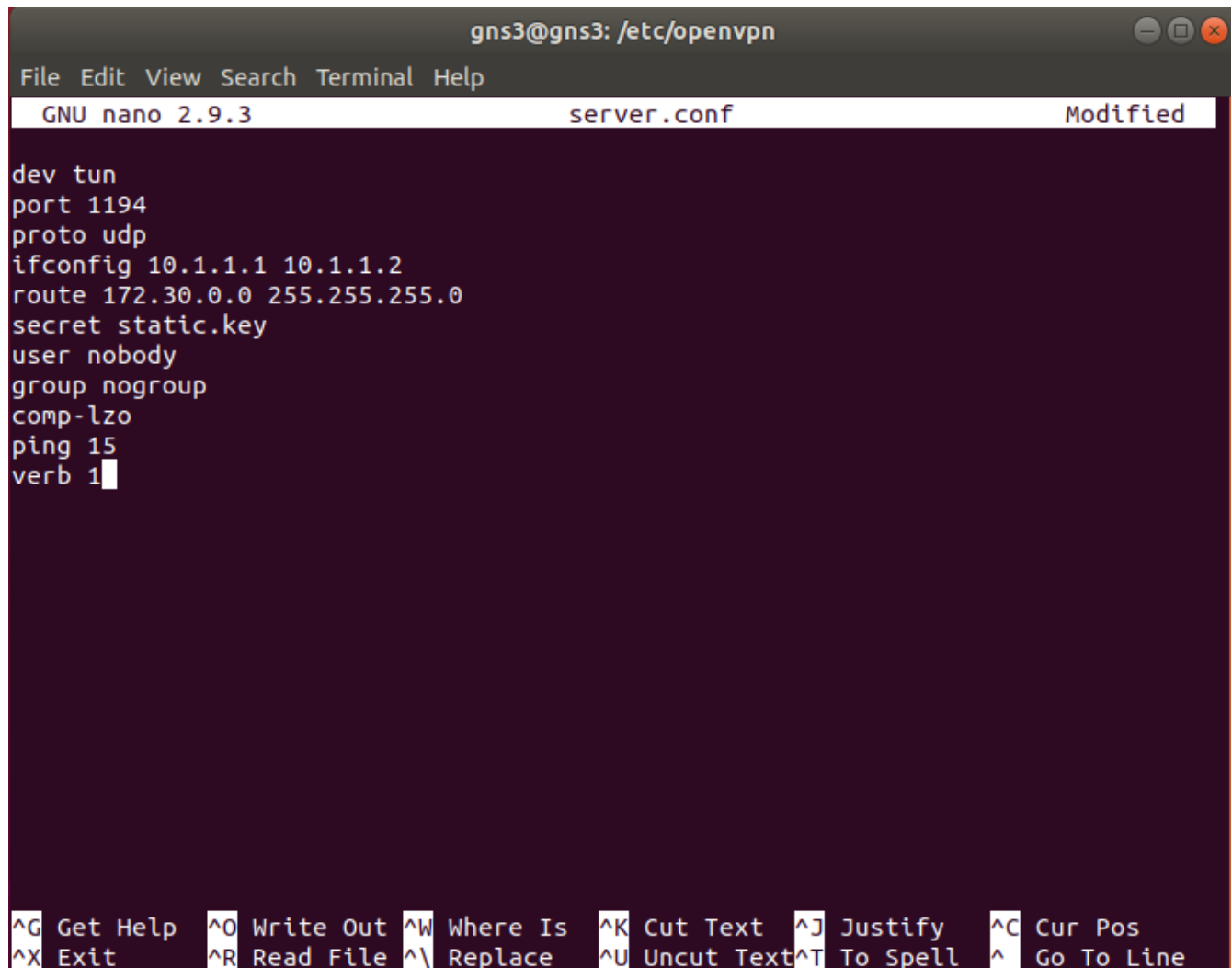
Mediante SCP transferiremos al router2 para que después pueda conectar.

```
gns3@gns3:~$ sudo scp static.key gns3@192.168.0.30:/home/gns3
gns3@192.168.0.30's password:
static.key 100% 636 1.0MB/s 00:00
gns3@gns3:~$
```

## SAD.T5P1\_ VPNs

Nos vamos al directorio de openvpn y crearemos un fichero de configuración de nuestro servicio.

Le indicamos en ifconfig, la Ip de nuestra interfaz virtual tun0 y la del destino. Le indicamos el puerto de escucha del servicio, protocolo y la ruta de la red privada a la que podemos llegar a través de dicha ruta virtual. También le indicamos la ubicación del fichero con la clave simétrica. De este modo, la interfaz tun0 del Router uno tendrá la dirección 10.1.1.1, y la del Router 2 la dirección Ip 10.1.1.2 (ip's del túnel):

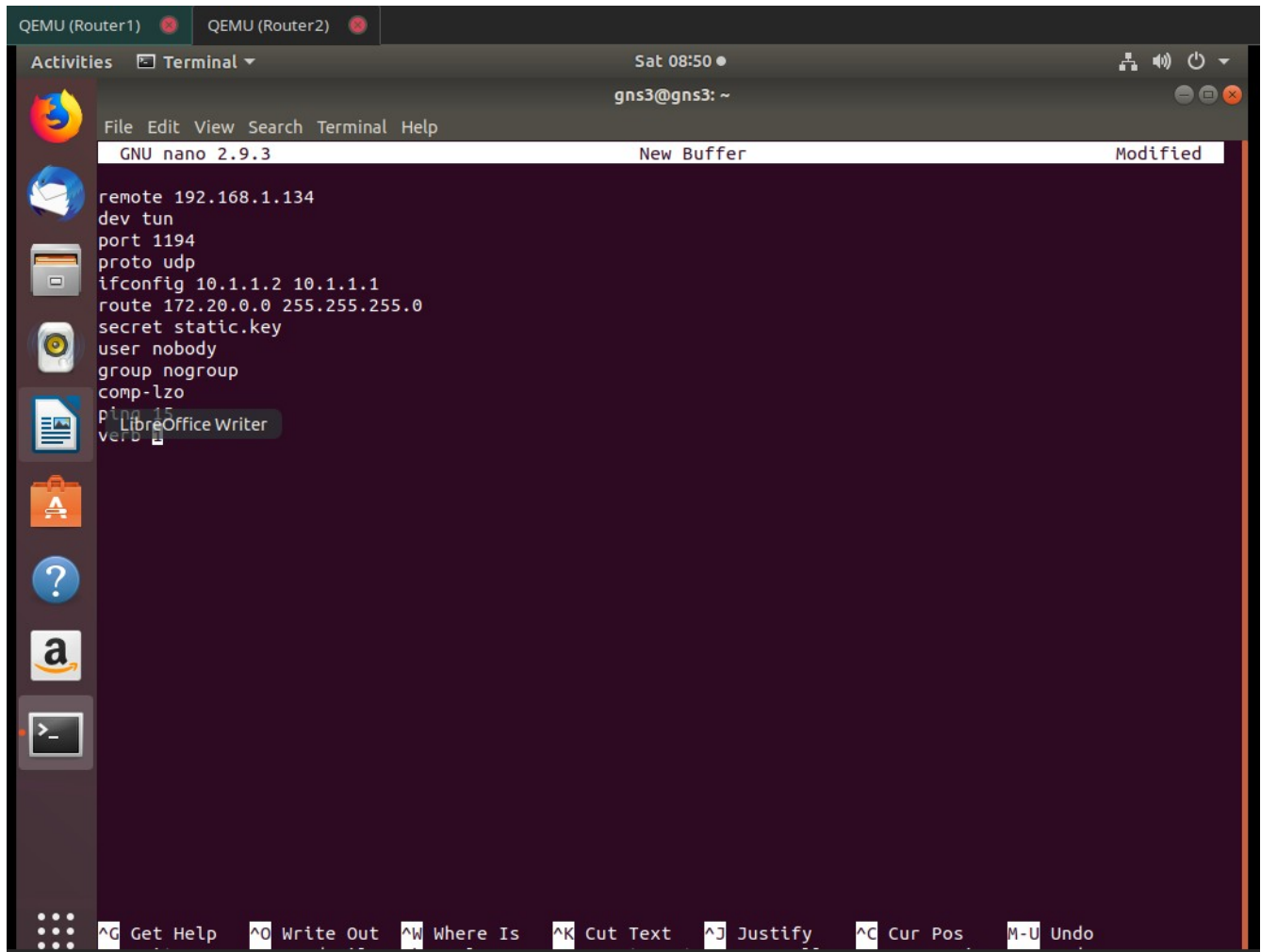


```
gns3@gns3: /etc/openvpn
File Edit View Search Terminal Help
GNU nano 2.9.3 server.conf Modified
dev tun
port 1194
proto udp
ifconfig 10.1.1.1 10.1.1.2
route 172.30.0.0 255.255.255.0
secret static.key
user nobody
group nogroup
comp-lzo
ping 15
verb 1

^G Get Help  ^O Write Out ^W Where Is  ^K Cut Text  ^J Justify   ^C Cur Pos
^X Exit       ^R Read File ^\ Replace  ^U Uncut Text ^T To Spell  ^_ Go To Line
```

SAD.T5P1\_ VPNs

Ahora nos iremos al Router2 y crearemos otro fichero pero esta vez del cliente que se llamara client.conf



The screenshot shows a Linux desktop environment with a terminal window open. The terminal window has two tabs: 'QEMU (Router1)' and 'QEMU (Router2)'. The active tab is 'QEMU (Router2)'. The terminal displays the output of the 'cat' command for a file named 'client.conf'. The file content is as follows:

```
remote 192.168.1.134
dev tun
port 1194
proto udp
ifconfig 10.1.1.2 10.1.1.1
route 172.20.0.0 255.255.255.0
secret static.key
user nobody
group nogroup
comp-lzo
ping 15
verb 0
```

The terminal window also shows the standard GNU nano 2.9.3 interface with a menu bar (File, Edit, View, Search, Terminal, Help) and a status bar at the bottom with various keyboard shortcuts (e.g., ^G Get Help, ^O Write Out, ^W Where Is, ^K Cut Text, ^J Justify, ^C Cur Pos, M-U Undo).



## SAD.T5P1\_ VPNs

Copiamos la static.key del Router1 en el directorio de OpenVPN y reiniciamos el cliente OpenVPN

```
gns3@gns3: ~  
File Edit View Search Terminal Help  
  
gns3@gns3:~$ clear  
  
gns3@gns3:~$ sudo cp /home/gns3/static.key /etc/openvpn/static.key  
gns3@gns3:~$ sudo systemctl restart openvpn@client  
gns3@gns3:~$ sudo systemctl status openvpn@client status  
Unit status.service could not be found.  
● openvpn@client.service - OpenVPN connection to client  
   Loaded: loaded (/lib/systemd/system/openvpn@.service; indirect; vendor preset: enabled)  
   Rhythmbox active (running) since Sat 2019-12-14 15:57:57 UTC; 4s ago  
     Docs: man:openvpn(8)  
           https://community.openvpn.net/openvpn/wiki/Openvpn24ManPage  
           https://community.openvpn.net/openvpn/wiki/HOWTO  
  Main PID: 3046 (openvpn)  
    Status: "Pre-connection initialization successful"  
   Tasks: 1 (limit: 2314)  
  CGroup: /system.slice/system-openvpn.slice/openvpn@client.service  
          └─3046 /usr/sbin/openvpn --daemon ovpn-client --status /run/openvpn/client.status 10 --cd /et  
  
Dec 14 15:57:57 gns3 ovpn-client[3046]: WARNING: INSECURE cipher with block size less than 128 bit (64 b  
Dec 14 15:57:57 gns3 ovpn-client[3046]: TUN/TAP device tun0 opened  
Dec 14 15:57:57 gns3 ovpn-client[3046]: do_ifconfig, tt->did_ifconfig_ipv6_setup=0  
Dec 14 15:57:57 gns3 ovpn-client[3046]: /sbin/ip link set dev tun0 up mtu 1500  
Dec 14 15:57:57 gns3 ovpn-client[3046]: /sbin/ip addr add dev tun0 local 10.1.1.2 peer 10.1.1.1  
Dec 14 15:57:57 gns3 ovpn-client[3046]: TCP/UDP: Preserving recently used remote address: [AF_INET]192.1  
Dec 14 15:57:57 gns3 ovpn-client[3046]: UDP link local (bound): [AF_INET][undef]:1194  
Dec 14 15:57:57 gns3 ovpn-client[3046]: UDP link remote: [AF_INET]192.168.0.20:1194  
Dec 14 15:57:57 gns3 ovpn-client[3046]: GID set to nogroup  
Dec 14 15:57:57 gns3 ovpn-client[3046]: UID set to nobody  
  
gns3@gns3:~$ ifconfig  
ens3: flags=4163<UP,BROADCAST,RUNNING,MULTICAST>  mtu 1500  
        inet 192.168.0.30  netmask 255.255.255.0  broadcast 192.168.0.255  
        inet6 fe80::bfe1:4ffe:b859:11e1  prefixlen 64  scopeid 0x20<link>  
        ether 0c:ef:11:b8:cd:00  txqueuelen 1000  (Ethernet)
```

lo mismo haremos en el server de Router1



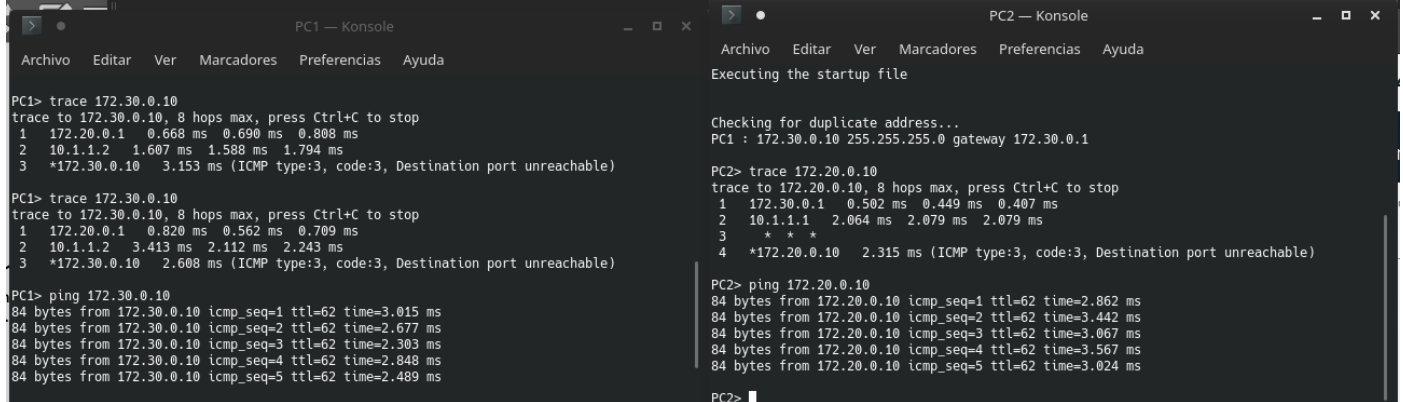
## SAD.T5P1\_ VPNs

Después si nos vamos a cada router veremos como la conexión estará creada con Ifconfig que sera la “tun0” y probamos a hacer ping desde el cliente el router 1 respondera.

```
gns3@gns3: ~  
File Edit View Search Terminal Help  
TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
tun0: flags=4305<UP,POINTOPOINT,RUNNING,NOARP,MULTICAST> mtu 1500  
    inet 10.1.1.2 netmask 255.255.255.255 destination 10.1.1.1  
    inet6 fe80::c23f:a7b5:15ba:d3ae prefixlen 64 scopeid 0x20<link>  
    unspec 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00 txqueuelen 100 (UNSPEC)  
    RX packets 1 bytes 48 (48.0 B)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 3 bytes 144 (144.0 B)  
Rhythmbox errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
  
gns3@gns3:~$ ping 10.1.1.1  
PING 10.1.1.1 (10.1.1.1) 56(84) bytes of data.  
64 bytes from 10.1.1.1: icmp_seq=1 ttl=64 time=1.58 ms  
64 bytes from 10.1.1.1: icmp_seq=2 ttl=64 time=1.54 ms  
64 bytes from 10.1.1.1: icmp_seq=3 ttl=64 time=1.73 ms  
64 bytes from 10.1.1.1: icmp_seq=4 ttl=64 time=1.54 ms  
64 bytes from 10.1.1.1: icmp_seq=5 ttl=64 time=1.74 ms  
64 bytes from 10.1.1.1: icmp_seq=6 ttl=64 time=1.94 ms  
64 bytes from 10.1.1.1: icmp_seq=7 ttl=64 time=1.59 ms  
64 bytes from 10.1.1.1: icmp_seq=8 ttl=64 time=1.53 ms  
64 bytes from 10.1.1.1: icmp_seq=9 ttl=64 time=1.50 ms  
64 bytes from 10.1.1.1: icmp_seq=10 ttl=64 time=0.838 ms  
64 bytes from 10.1.1.1: icmp_seq=11 ttl=64 time=1.37 ms  
64 bytes from 10.1.1.1: icmp_seq=12 ttl=64 time=1.66 ms  
64 bytes from 10.1.1.1: icmp_seq=13 ttl=64 time=1.57 ms  
64 bytes from 10.1.1.1: icmp_seq=14 ttl=64 time=2.27 ms  
64 bytes from 10.1.1.1: icmp_seq=15 ttl=64 time=1.62 ms  
64 bytes from 10.1.1.1: icmp_seq=16 ttl=64 time=1.58 ms  
64 bytes from 10.1.1.1: icmp_seq=17 ttl=64 time=1.25 ms  
64 bytes from 10.1.1.1: icmp_seq=18 ttl=64 time=0.548 ms  
64 bytes from 10.1.1.1: icmp_seq=19 ttl=64 time=1.91 ms  
64 bytes from 10.1.1.1: icmp_seq=20 ttl=64 time=1.57 ms  
^C  
--- 10.1.1.1 ping statistics ---  
20 packets transmitted, 20 received, 0% packet loss, time 19054ms  
rtt min/avg/max/mdev = 0.548/1.548/2.277/0.359 ms  
gns3@gns3:~$
```

## SAD.T5P1\_ VPNs

Nos iremos a PC1y a PC2, hacemos los respectivos ping y trace (tracert)



The image shows two terminal windows side-by-side. The left window is titled 'PC1 — Konsole' and the right is 'PC2 — Konsole'. Both have a menu bar with 'Archivo', 'Editar', 'Ver', 'Marcadores', 'Preferencias', and 'Ayuda'. The PC1 terminal shows a successful trace to 172.30.0.10 and a successful ping. The PC2 terminal shows an error during its trace attempt and a successful ping.

```
PC1> trace 172.30.0.10
trace to 172.30.0.10, 8 hops max, press Ctrl+C to stop
 1 172.20.0.1 0.668 ms 0.690 ms 0.808 ms
 2 10.1.1.2 1.607 ms 1.588 ms 1.794 ms
 3 *172.30.0.10 3.153 ms (ICMP type:3, code:3, Destination port unreachable)

PC1> trace 172.30.0.10
trace to 172.30.0.10, 8 hops max, press Ctrl+C to stop
 1 172.20.0.1 0.820 ms 0.562 ms 0.709 ms
 2 10.1.1.2 3.413 ms 2.112 ms 2.243 ms
 3 *172.30.0.10 2.608 ms (ICMP type:3, code:3, Destination port unreachable)

PC1> ping 172.30.0.10
84 bytes from 172.30.0.10 icmp_seq=1 ttl=62 time=3.015 ms
84 bytes from 172.30.0.10 icmp_seq=2 ttl=62 time=2.677 ms
84 bytes from 172.30.0.10 icmp_seq=3 ttl=62 time=2.303 ms
84 bytes from 172.30.0.10 icmp_seq=4 ttl=62 time=2.848 ms
84 bytes from 172.30.0.10 icmp_seq=5 ttl=62 time=2.489 ms

PC2> trace 172.20.0.10
trace to 172.20.0.10, 8 hops max, press Ctrl+C to stop
 1 172.30.0.1 0.502 ms 0.449 ms 0.407 ms
 2 10.1.1.1 2.064 ms 2.079 ms 2.079 ms
 3 * * *
 4 *172.20.0.10 2.315 ms (ICMP type:3, code:3, Destination port unreachable)

PC2> ping 172.20.0.10
84 bytes from 172.20.0.10 icmp_seq=1 ttl=62 time=2.862 ms
84 bytes from 172.20.0.10 icmp_seq=2 ttl=62 time=3.442 ms
84 bytes from 172.20.0.10 icmp_seq=3 ttl=62 time=3.067 ms
84 bytes from 172.20.0.10 icmp_seq=4 ttl=62 time=3.567 ms
84 bytes from 172.20.0.10 icmp_seq=5 ttl=62 time=3.024 ms

PC2>
```

Y como se aprecia finalmente tendremos el tunel configurado.