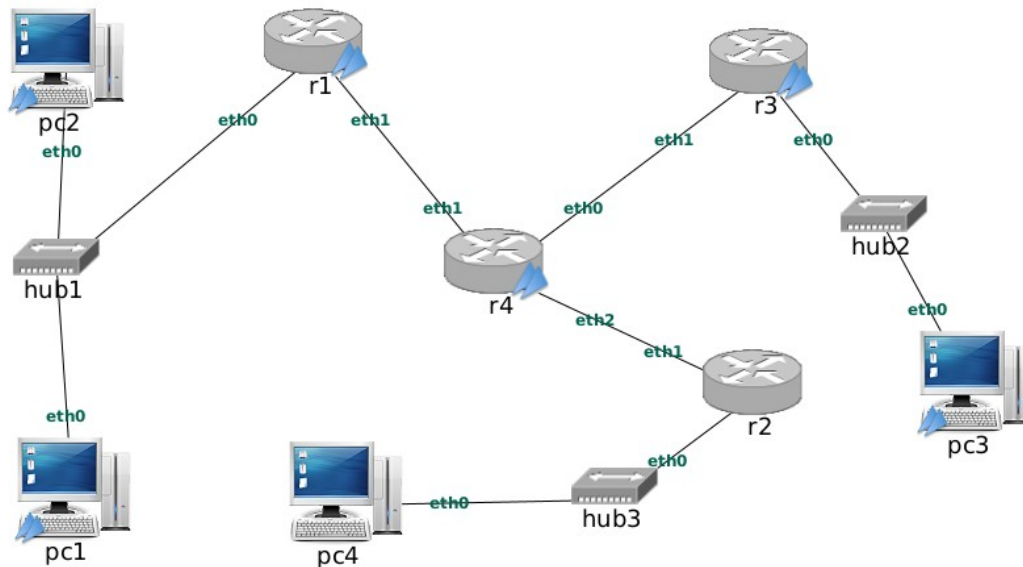# LABORATORIO VPN 1

Redes II, Tecnicatura en Administración de Sistemas y Software Libre

1.

2.

```
pc1:~# ping -c 3 pc2
PING pc2 (10.0.20.21) 56(84) bytes of data.
64 bytes from pc2 (10.0.20.21): icmp_seq=1 ttl=64 time=0.128 ms
64 bytes from pc2 (10.0.20.21): icmp_seq=2 ttl=64 time=0.445 ms
64 bytes from pc2 (10.0.20.21): icmp_seq=3 ttl=64 time=0.740 ms

--- pc2 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2009ms
rtt min/avg/max/mdev = 0.128/0.437/0.740/0.251 ms
pc1:~#
```

```
pc1:~# ping -c 3 pc3
PING pc3 (10.0.30.20) 56(84) bytes of data.

--- pc3 ping statistics ---
3 packets transmitted, 0 received, 100% packet loss, time 2010ms

pc1:~#
```

podemos hacer un tracepat

```
pc1:~# tracepath pc3
```

```
 1:  pc1 (10.0.20.20)                  0.093ms pmtu 1500
 1:  10.0.20.1 (10.0.20.1)             9.307ms
 1:  10.0.20.1 (10.0.20.1)             0.099ms
 2:  no reply
 3:  no reply

pc1:~#
```

podemos ver que no está saliendo desde r4, por lo que es posible que a ese router le falte un gateway por defecto.

3.

Configuraciones de las pcs (.startup)

#pc1 ifconfig eth0 10.0.20.20/24 hw ether AA:BB:CC:00:01:01 up route add default gw 10.0.20.1
#pc2 ifconfig eth0 10.0.20.21/24 hw ether AA:BB:CC:00:01:02 up route add default gw 10.0.20.1
#pc3 ifconfig eth0 10.0.30.20/24 hw ether AA:BB:CC:00:01:03 up route add default gw 10.0.30.1
#pc4 ifconfig eth0 10.0.40.21/24 hw ether AA:BB:CC:00:01:04 up route add default gw 10.0.40.2

Podemos ver que es la configuracion habitual de host – router.

Configuraciones de los routers

#r1 ifconfig eth0 10.0.20.1/24 hw ether AA:BB:CC:00:01:05 up ifconfig eth1 100.60.60.1/24 hw ether AA:BB:CC:00:01:06 up route add default gw 100.60.60.2
#r2 ifconfig eth1 100.80.80.1/24 hw ether AA:BB:CC:00:01:10 up ifconfig eth0 10.0.40.2/24 hw ether AA:BB:CC:00:01:09 up route add default gw 100.80.80.2
#r3 ifconfig eth1 100.50.50.1/24 hw ether AA:BB:CC:00:01:11 up ifconfig eth0 10.0.30.1/24 hw ether AA:BB:CC:00:01:12 up route add default gw 100.50.50.2
#r4 ifconfig eth0 100.50.50.2/24 hw ether AA:BB:CC:00:01:08 up ifconfig eth1 100.60.60.2/24 hw ether AA:BB:CC:00:01:07 up ifconfig eth2 100.80.80.2/24 hw ether AA:BB:CC:00:01:07 up

En este caso el unico router que no tiene un gw por defecto es r4, lo que hace que un ping que trate de ir de pc1 a pc4 no llegaria, o a pc3.

4.

```
r1:~# ifconfig
eth0    Link encap:Ethernet  HWaddr aa:bb:cc:00:01:05
        inet addr:10.0.20.1  Bcast:10.0.20.255  Mask:255.255.255.0
        inet6 addr: fe80::fc46:c8ff:fe27:2cd5/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:35 errors:0 dropped:0 overruns:0 frame:0
        TX packets:11 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:18012 (17.5 KiB)  TX bytes:1774 (1.7 KiB)
        Interrupt:5

eth1    Link encap:Ethernet  HWaddr aa:bb:cc:00:01:06
        inet addr:100.60.60.1  Bcast:100.60.60.255  Mask:255.255.255.0
        inet6 addr: fe80::6853:15ff:fe46:255/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:8 errors:0 dropped:0 overruns:0 frame:0
        TX packets:20 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:440 (440.0 B)  TX bytes:14472 (14.1 KiB)
        Interrupt:5

lo      Link encap:Local Loopback
        inet addr:127.0.0.1  Mask:255.0.0.0
        inet6 addr: ::1/128 Scope:Host
        UP LOOPBACK RUNNING  MTU:16436  Metric:1
        RX packets:2 errors:0 dropped:0 overruns:0 frame:0
        TX packets:2 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:100 (100.0 B)  TX bytes:100 (100.0 B)

r1:~#
```

```
r3:~# ifconfig
eth0    Link encap:Ethernet  HWaddr aa:bb:cc:00:01:12
        inet addr:10.0.30.1  Bcast:10.0.30.255  Mask:255.255.255.0
        inet6 addr: fe80::e4b1:84ff:fec3:6102/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:6 errors:0 dropped:0 overruns:0 frame:0
        TX packets:6 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:384 (384.0 B)  TX bytes:468 (468.0 B)
        Interrupt:5

eth1    Link encap:Ethernet  HWaddr aa:bb:cc:00:01:11
        inet addr:100.50.50.1  Bcast:100.50.50.255  Mask:255.255.255.0
        inet6 addr: fe80::90b8:a4ff:fed9:e7bd/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:6 errors:0 dropped:0 overruns:0 frame:0
        TX packets:6 errors:0 dropped:0 overruns:0 carrier:0
```

```
        collisions:0 txqueuelen:1000
        RX bytes:384 (384.0 B)  TX bytes:468 (468.0 B)
        Interrupt:5

lo      Link encap:Local Loopback
        inet addr:127.0.0.1  Mask:255.0.0.0
        inet6 addr: ::1/128 Scope:Host
        UP LOOPBACK RUNNING  MTU:16436  Metric:1
        RX packets:2 errors:0 dropped:0 overruns:0 frame:0
        TX packets:2 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:100 (100.0 B)  TX bytes:100 (100.0 B)

r3:~#
```

En el caso de r1, tiene activas las dos interfaces

5.

```
r3:~# /etc/init.d/openvpn start
Starting virtual private network daemon: serverOut of memory: kill process 325 (portmap)
score 439 or a child
Killed process 325 (portmap)
Out of memory: kill process 1074 (openssl-vulnkey) score 326 or a child
Killed process 1074 (openssl-vulnkey)
.
r3:~#
```

```
r1:~# /etc/init.d/openvpn start
Starting virtual private network daemon: clientOut of memory: kill process 325 (portmap)
score 439 or a child
Killed process 325 (portmap)
Out of memory: kill process 1098 (openssl-vulnkey) score 326 or a child
Killed process 1098 (openssl-vulnkey)
.
r1:~#
```

Luego verificamos las interfaces

```
r3:~# ifconfig
eth0    Link encap:Ethernet  HWaddr aa:bb:cc:00:01:12
        inet addr:10.0.30.1  Bcast:10.0.30.255  Mask:255.255.255.0
        inet6 addr: fe80::e4b1:84ff:fec3:6102/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:6 errors:0 dropped:0 overruns:0 frame:0
        TX packets:6 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:384 (384.0 B)  TX bytes:468 (468.0 B)
        Interrupt:5

eth1    Link encap:Ethernet  HWaddr aa:bb:cc:00:01:11
```

```
        inet addr:100.50.50.1  Bcast:100.50.50.255  Mask:255.255.255.0
        inet6 addr: fe80::90b8:a4ff:fed9:e7bd/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:96 errors:0 dropped:0 overruns:0 frame:0
        TX packets:95 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:10397 (10.1 KiB)  TX bytes:13507 (13.1 KiB)
        Interrupt:5

lo      Link encap:Local Loopback
        inet addr:127.0.0.1  Mask:255.0.0.0
        inet6 addr: ::1/128 Scope:Host
        UP LOOPBACK RUNNING  MTU:16436  Metric:1
        RX packets:2 errors:0 dropped:0 overruns:0 frame:0
        TX packets:2 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:100 (100.0 B)  TX bytes:100 (100.0 B)

tun0    Link encap:UNSPEC  HWaddr 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-
00
        inet addr:10.8.0.1  P-t-P:10.8.0.2  Mask:255.255.255.255
        UP POINTOPOINT RUNNING NOARP MULTICAST  MTU:1500  Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:100
        RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

r3:~#
```

```
r1:~# ifconfig
eth0    Link encap:Ethernet  HWaddr aa:bb:cc:00:01:05
        inet addr:10.0.20.1  Bcast:10.0.20.255  Mask:255.255.255.0
        inet6 addr: fe80::fc46:c8ff:fe27:2cd5/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:35 errors:0 dropped:0 overruns:0 frame:0
        TX packets:11 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:18012 (17.5 KiB)  TX bytes:1774 (1.7 KiB)
        Interrupt:5

eth1    Link encap:Ethernet  HWaddr aa:bb:cc:00:01:06
        inet addr:100.60.60.1  Bcast:100.60.60.255  Mask:255.255.255.0
        inet6 addr: fe80::6853:15ff:fe46:255/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
        RX packets:108 errors:0 dropped:0 overruns:0 frame:0
        TX packets:121 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:13032 (12.7 KiB)  TX bytes:26698 (26.0 KiB)
        Interrupt:5

lo      Link encap:Local Loopback
```

```
        inet addr:127.0.0.1  Mask:255.0.0.0
        inet6 addr: ::1/128 Scope:Host
        UP LOOPBACK RUNNING  MTU:16436  Metric:1
        RX packets:2 errors:0 dropped:0 overruns:0 frame:0
        TX packets:2 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:0
        RX bytes:100 (100.0 B)  TX bytes:100 (100.0 B)

tun0    Link encap:UNSPEC  HWaddr 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-
00
        inet addr:10.8.0.6  P-t-P:10.8.0.5  Mask:255.255.255.255
        UP POINTOPOINT RUNNING NOARP MULTICAST  MTU:1500  Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:100
        RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

r1:~#
```

Ahora tenemos una nueva interfaz llamada tun0.

6.

```
pc1:~# ping -c 3 pc2
PING pc2 (10.0.20.21) 56(84) bytes of data.
64 bytes from pc2 (10.0.20.21): icmp_seq=1 ttl=64 time=10.2 ms
64 bytes from pc2 (10.0.20.21): icmp_seq=2 ttl=64 time=0.361 ms
64 bytes from pc2 (10.0.20.21): icmp_seq=3 ttl=64 time=0.306 ms

--- pc2 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2000ms
rtt min/avg/max/mdev = 0.306/3.642/10.260/4.679 ms
pc1:~# ping -c 3 pc3
PING pc3 (10.0.30.20) 56(84) bytes of data.
64 bytes from pc3 (10.0.30.20): icmp_seq=1 ttl=62 time=0.773 ms
64 bytes from pc3 (10.0.30.20): icmp_seq=2 ttl=62 time=2.94 ms
64 bytes from pc3 (10.0.30.20): icmp_seq=3 ttl=62 time=2.22 ms

--- pc3 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2006ms
rtt min/avg/max/mdev = 0.773/1.980/2.949/0.905 ms
pc1:~#
```

```
pc2:~# ping -c 3 pc1
PING pc1 (10.0.20.20) 56(84) bytes of data.
64 bytes from pc1 (10.0.20.20): icmp_seq=1 ttl=64 time=0.112 ms
64 bytes from pc1 (10.0.20.20): icmp_seq=2 ttl=64 time=0.501 ms
64 bytes from pc1 (10.0.20.20): icmp_seq=3 ttl=64 time=0.311 ms

--- pc1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2007ms
rtt min/avg/max/mdev = 0.112/0.308/0.501/0.158 ms
```

```
pc2:~# ping -c 3 pc3
PING pc3 (10.0.30.20) 56(84) bytes of data.
64 bytes from pc3 (10.0.30.20): icmp_seq=1 ttl=62 time=10.9 ms
64 bytes from pc3 (10.0.30.20): icmp_seq=2 ttl=62 time=2.16 ms
64 bytes from pc3 (10.0.30.20): icmp_seq=3 ttl=62 time=1.05 ms

--- pc3 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2005ms
rtt min/avg/max/mdev = 1.054/4.715/10.924/4.414 ms
pc2:~#
```

```
pc3:~# ping -c 3 pc1
PING pc1 (10.0.20.20) 56(84) bytes of data.
64 bytes from pc1 (10.0.20.20): icmp_seq=1 ttl=62 time=1.96 ms
64 bytes from pc1 (10.0.20.20): icmp_seq=2 ttl=62 time=0.637 ms
64 bytes from pc1 (10.0.20.20): icmp_seq=3 ttl=62 time=0.724 ms

--- pc1 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2007ms
rtt min/avg/max/mdev = 0.637/1.109/1.966/0.607 ms
pc3:~# ping -c 3 pc2
PING pc2 (10.0.20.21) 56(84) bytes of data.
64 bytes from pc2 (10.0.20.21): icmp_seq=1 ttl=62 time=0.780 ms
64 bytes from pc2 (10.0.20.21): icmp_seq=2 ttl=62 time=0.623 ms
64 bytes from pc2 (10.0.20.21): icmp_seq=3 ttl=62 time=1.97 ms

--- pc2 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2017ms
rtt min/avg/max/mdev = 0.623/1.125/1.972/0.602 ms
pc3:~#
```

como no podíamos llegar de pc1 a pc3 hacemos un tracepath

```
pc1:~# tracepath pc3
 1:  pc1 (10.0.20.20)                         0.085ms pmtu 1500
 1:  10.0.20.1 (10.0.20.1)                    10.288ms
 1:  10.0.20.1 (10.0.20.1)                    0.128ms
 2:  10.8.0.1 (10.8.0.1)                      0.877ms
 3:  pc3 (10.0.30.20)                         10.952ms reached
        Resume: pmtu 1500 hops 3 back 62
pc1:~#
```

vemos que en un punto pasa por la ip de la interfaz de la vpn.

7.

```
pc4:~# ping -c 3 pc1
PING pc1 (10.0.20.20) 56(84) bytes of data.

--- pc1 ping statistics ---
3 packets transmitted, 0 received, 100% packet loss, time 2008ms

pc4:~# ping -c 3 pc2
```

```
PING pc2 (10.0.20.21) 56(84) bytes of data.

--- pc2 ping statistics ---
3 packets transmitted, 0 received, 100% packet loss, time 2012ms

pc4:~# ping -c 3 pc3
PING pc3 (10.0.30.20) 56(84) bytes of data.

--- pc3 ping statistics ---
3 packets transmitted, 0 received, 100% packet loss, time 2004ms

pc4:~#
```

para poder conectar la red 10.0.40.0/24 tendremos que conectar r2 a la vpn, como ya tenemos generadas las claves de r2 (r2.crt y r2.key) podemos llevarnoslo a la carpeta de /r2/etc/openvpn.

tendremos que crear el client.conf con lo siguiente

```
client
port 1194
proto tcp
dev tun
remote 100.50.50.1 1194
ca ca.crt
cert r2.crt
key r2.key
keepalive 10 120
comp-lzo
persist-key
persist-tun
status openvpn-status.log
log openvpn.log
verb 3
```

Adicionalmente en r3 tendremos que agregar el archivo r2 (sin extensión) en la carpeta /etc/openvpn/clients. Sirve para que el servidor vpn pueda enrutar el trafico de dicha red.

```
iroute 10.0.40.0 255.255.255.0
```

Ademas en el archivo /etc/openvpn/server.conf agregar la linea *route* .

```
route 10.0.40.0 255.255.255.0
```

La linea *route* le indicara a el servidor openvpn que esa red se alcanza mediante un tunel vpn. Y el archivo r2 en client indica que el cliente r2 es quien se encarga de encaminar el trafico de la red indiada por *iroute*.

* faltaria una explicacion de como generar las claves para los clientes pero invesrigando se hace usando el paquete .deb que hay en el servidor *easy-rsa*.

8. Una vpn sirve para poder usar servicios de una red privada como si estuvieramos en la misma red, sin la necesidad de que esos servicios esten abiertos publicamente (lo que puede ser peligroso). Es sumamente util para lugares con oficinas separadas y necesitan actuar como si estuvieran en el mismo red fisica (organimos estatales, policiales, sucursales empresariales, etc). En el caso del laboratorio tambien nos muestran que podemos conectar mediante vpn, redes que estan separadas entre si (en este caso r4 no tiene gateway y no podemos llegar de

una red a la otra) y de esta manera comunicarse entre si.

Ademas algo que yo no sabia es que se pueden conectar redes, yo pensaba que solo se podian conectar host como si fueran parte de esa red privada, pero con el iroute se pueden decir que host (router) encamina el trafico de una red en particular. Esto me parece bueno por que podemos tener una vpn en un router que este haciendo PAT y NAT (hacia internet), puediendo conectarme desde cualquier red publica, y poder acceder a resto de redes privadas del otro lado de la vpn.