



BASTIONADO DE REDES Y SISTEMAS

Tarea 4

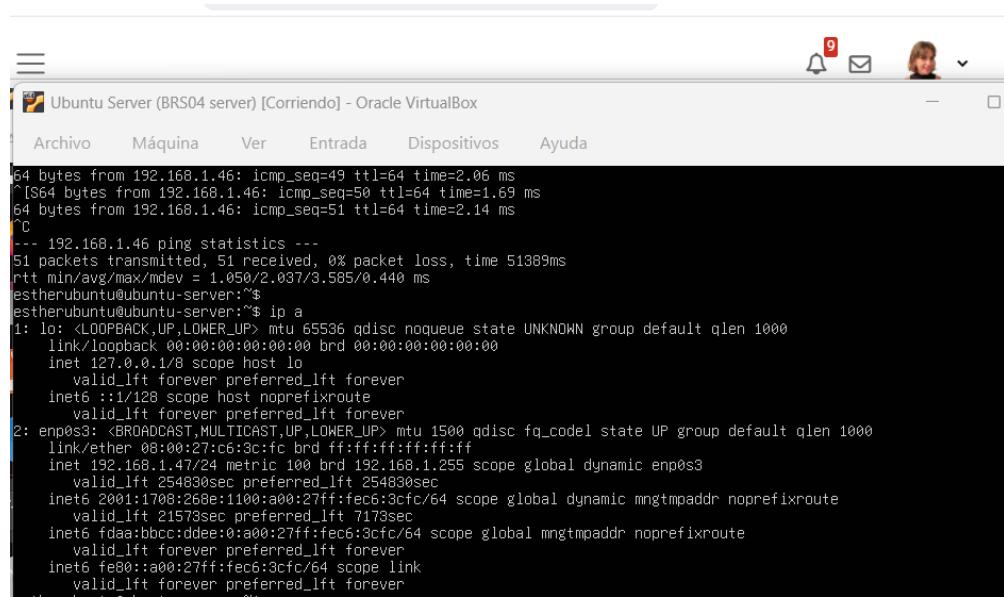
ESTHER CARRILLO GÁLVEZ

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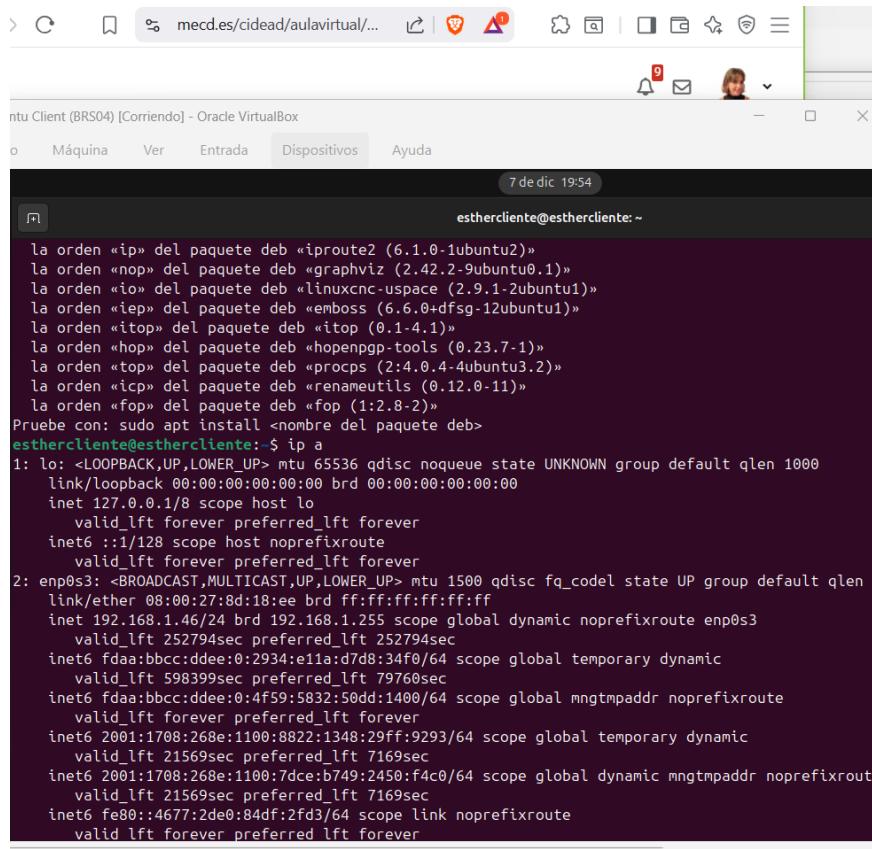
Comunicación entre máquina servidor y máquina cliente

Antes de comenzar es necesario comprobar las direcciones ip tanto de la máquina servidor como de la máquina cliente. La IP del servidor es 192.168.1.47



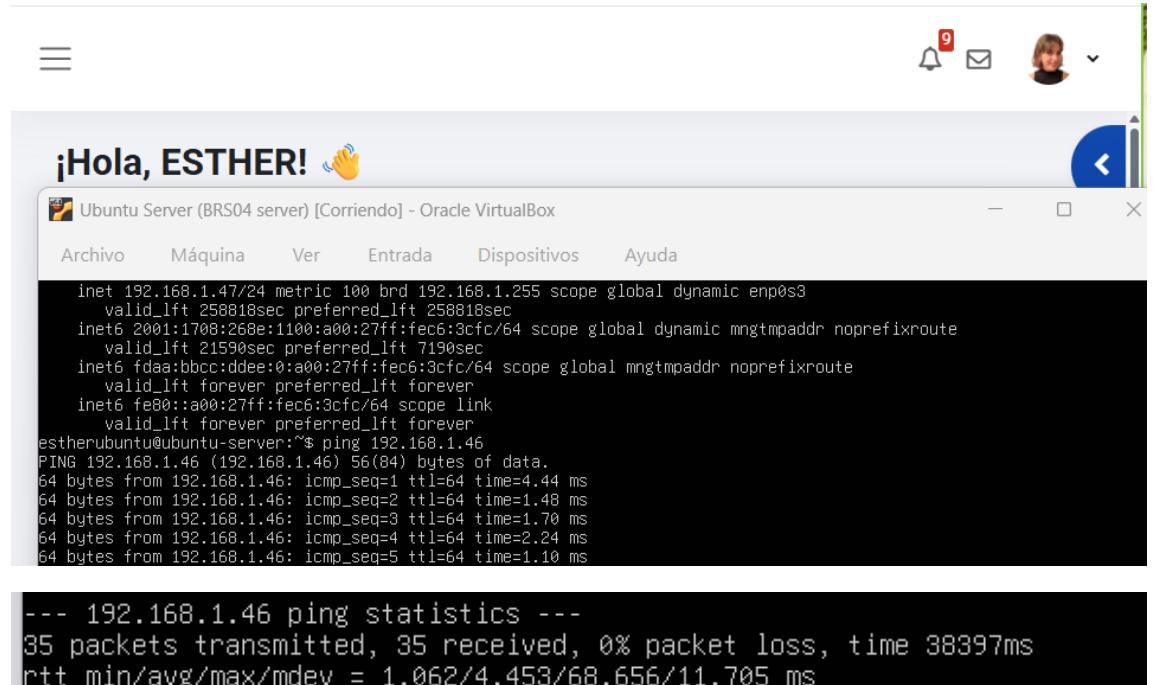
```
64 bytes from 192.168.1.46: icmp_seq=49 ttl=64 time=2.06 ms
^S64 bytes from 192.168.1.46: icmp_seq=50 ttl=64 time=1.69 ms
64 bytes from 192.168.1.46: icmp_seq=51 ttl=64 time=2.14 ms
^C
--- 192.168.1.46 ping statistics ---
51 packets transmitted, 51 received, 0% packet loss, time 51389ms
rtt min/avg/max/mdev = 1.050/2.037/3.585/0.440 ms
estherubuntu@estherubuntu-server:~$ estherubuntu@estherubuntu-server:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
        inet 127.0.0.1/8 scope host lo
            valid_lft forever preferred_lft forever
            inet6 ::1/128 scope host noprefixroute
                valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:c6:3c:f0 brd ff:ff:ff:ff:ff:ff
        inet 192.168.1.47/24 metric 100 brd 192.168.1.255 scope global dynamic enp0s3
            valid_lft 254830sec preferred_lft 254830sec
            inet6 2001:1708:268e:1100:8822:1348:29ff:9293/64 scope global dynamic mngtmpaddr noprefixroute
                valid_lft 21573sec preferred_lft 7173sec
            inet6 fd00:bbcc:ddee:0:a00:27ff:fed6:3fcf/64 scope global mngtmpaddr noprefixroute
                valid_lft forever preferred_lft forever
            inet6 fe80::a00:27ff:fed6:3fcf/64 scope link
                valid_lft forever preferred_lft forever
estherubuntu@estherubuntu-server:~$
```

La dirección IP de la máquina cliente es 192.168.1.46



```
7 de dic 19:54
esthercliente@esthercliente: ~
la orden «ip» del paquete deb «iproute2 (6.1.0-1ubuntu2)»
la orden «nop» del paquete deb «graphviz (2.42.2-9ubuntu0.1)»
la orden «io» del paquete deb «linuxcnc-ospace (2.9.1-2ubuntu1)»
la orden «iep» del paquete deb «emboss (6.6.0+dfsg-12ubuntu1)»
la orden «itop» del paquete deb «itop (0.1-4.1)»
la orden «hop» del paquete deb «openpgp-tools (0.23.7-1)»
la orden «top» del paquete deb «procps (2:4.0.4-4ubuntu3.2)»
la orden «icp» del paquete deb «renameutils (0.12.0-11)»
la orden «fop» del paquete deb «fop (1:2.8-2)»
Pruebe con: sudo apt install <nombre del paquete deb>
esthercliente@esthercliente:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
        inet 127.0.0.1/8 scope host lo
            valid_lft forever preferred_lft forever
            inet6 ::1/128 scope host noprefixroute
                valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:8d:18:e0 brd ff:ff:ff:ff:ff:ff
        inet 192.168.1.46/24 brd 192.168.1.255 scope global dynamic enp0s3
            valid_lft 252794sec preferred_lft 252794sec
            inet6 fd00:bbcc:ddee:0:934:a1a:d7db:34f0/64 scope global temporary dynamic
                valid_lft 598399sec preferred_lft 79760sec
            inet6 fd00:bbcc:ddee:0:4f59:5832:50dd:1400/64 scope global mngtmpaddr noprefixroute
                valid_lft forever preferred_lft forever
            inet6 2001:1708:268e:1100:8822:1348:29ff:9293/64 scope global temporary dynamic
                valid_lft 21569sec preferred_lft 7169sec
            inet6 fe80::4677:2de0:84df:2fd3/64 scope link noprefixroute
                valid_lft forever preferred_lft forever
esthercliente@esthercliente:~$
```

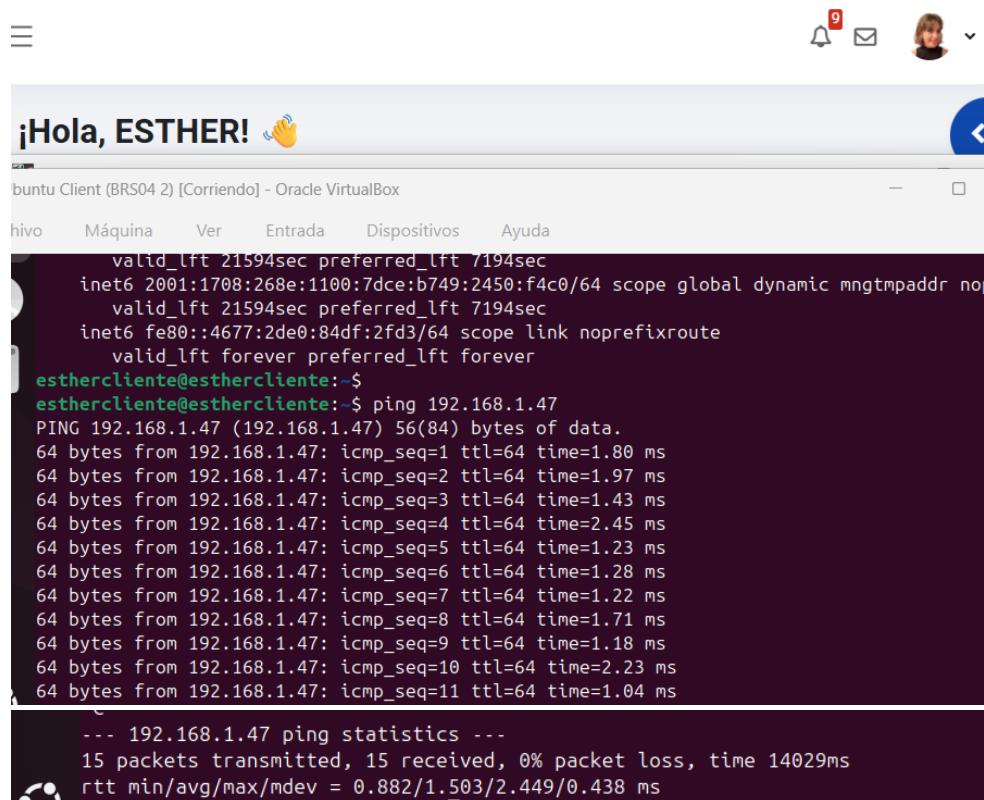
La dirección correspondiente al servidor es 192.168.1.47 y la de cliente es 192.168.1.46. A continuación, se comprueba la conexión entre las máquinas mediante un *ping*. Primero desde el servidor se comprueba que la conexión es exitosa.



```
inet 192.168.1.47/24 metric 100 brd 192.168.1.255 scope global dynamic enp0s3
    valid_lft 258818sec preferred_lft 258818sec
inet6 2001:1708:268e:1100:a00:27ff:fec6:3cfc/64 scope global dynamic mngtmpaddr noprefixroute
    valid_lft 21590sec preferred_lft 7190sec
inet6 fdaa:bbcc:ddee:0:a00:27ff:fec6:3cfc/64 scope global mngtmpaddr noprefixroute
    valid_lft forever preferred_lft forever
inet6 fe80::a00:27ff:fec6:3cfc/64 scope link
    valid_lft forever preferred_lft forever
estherubuntu@ubuntu-server:~$ ping 192.168.1.46
PING 192.168.1.46 (192.168.1.46) 56(84) bytes of data.
64 bytes from 192.168.1.46: icmp_seq=1 ttl=64 time=4.44 ms
64 bytes from 192.168.1.46: icmp_seq=2 ttl=64 time=1.48 ms
64 bytes from 192.168.1.46: icmp_seq=3 ttl=64 time=1.70 ms
64 bytes from 192.168.1.46: icmp_seq=4 ttl=64 time=2.24 ms
64 bytes from 192.168.1.46: icmp_seq=5 ttl=64 time=1.10 ms

--- 192.168.1.46 ping statistics ---
35 packets transmitted, 35 received, 0% packet loss, time 38397ms
rtt min/avg/max/mdev = 1.062/4.453/68.656/11.705 ms
```

La conexión desde la máquina cliente también es exitosa.



```
inet 192.168.1.47/24 metric 100 brd 192.168.1.255 scope global dynamic enp0s3
    valid_lft 21594sec preferred_lft 7194sec
inet6 2001:1708:268e:1100:7dce:b749:2450:f4c0/64 scope global dynamic mngtmpaddr noprefixroute
    valid_lft 21594sec preferred_lft 7194sec
inet6 fe80::4677:2de0:84df:2fd3/64 scope link noprefixroute
    valid_lft forever preferred_lft forever
esthercliente@esthercliente:~$ ping 192.168.1.47
PING 192.168.1.47 (192.168.1.47) 56(84) bytes of data.
64 bytes from 192.168.1.47: icmp_seq=1 ttl=64 time=1.80 ms
64 bytes from 192.168.1.47: icmp_seq=2 ttl=64 time=1.97 ms
64 bytes from 192.168.1.47: icmp_seq=3 ttl=64 time=1.43 ms
64 bytes from 192.168.1.47: icmp_seq=4 ttl=64 time=2.45 ms
64 bytes from 192.168.1.47: icmp_seq=5 ttl=64 time=1.23 ms
64 bytes from 192.168.1.47: icmp_seq=6 ttl=64 time=1.28 ms
64 bytes from 192.168.1.47: icmp_seq=7 ttl=64 time=1.22 ms
64 bytes from 192.168.1.47: icmp_seq=8 ttl=64 time=1.71 ms
64 bytes from 192.168.1.47: icmp_seq=9 ttl=64 time=1.18 ms
64 bytes from 192.168.1.47: icmp_seq=10 ttl=64 time=2.23 ms
64 bytes from 192.168.1.47: icmp_seq=11 ttl=64 time=1.04 ms

--- 192.168.1.47 ping statistics ---
15 packets transmitted, 15 received, 0% packet loss, time 14029ms
rtt min/avg/max/mdev = 0.882/1.503/2.449/0.438 ms
```

Instalación de FreeRADIUS en la máquina servidor.

Se procede a la instalación mediante el siguiente comando:

```
sudo apt update  
sudo apt install freeradius
```

Se comprueba que la instalación de los paquetes haya sido correcta con un `ls /etc/freeradius/3.0/`. En esta práctica se configurará el fichero *users*.

Configuración FreeRADIUS en máquina servidor

Se configura el archivo `sudo nano /etc/freeradius/3.0/users` con los clientes que añadiremos. Se añaden los clientes en el archivo de configuración y se guarda `ctrl+o, enter` y se cierra con `ctrl+x`.



The screenshot shows a web browser window with the Aula Virtual Cidead interface. The top bar includes the Spanish Government logo, the Ministry of Education, and the Cidead logo. The main content area displays a terminal window titled "Ubuntu Server (BRS04 server) [Corriendo] - Oracle VirtualBox". The terminal shows the command "sudo nano /etc/freeradius/3.0/users" being run, followed by the configuration file content:

```
#  
# This is a complete entry for "steve". Note that there is no Fall-Through  
# entry so that no DEFAULT entry will be used, and the user will NOT  
# get any attributes in addition to the ones listed here.  
#  
#steve  Cleartext-Password := "testing"  
#       Service-Type = Framed-User,  
#       Framed-Protocol = PPP,  
#       Framed-IP-Address = 172.16.3.33,  
#       Framed-IP-Netmask = 255.255.255.0,  
#       Framed-Routing = Broadcast-Listen,  
#       Framed-Filter-Id = "std.ppp",  
#       Framed-MTU = 1500,  
#       Framed-Compression = Van-Jacobsen-TCP-IP  
#  
# The canonical testing user which is in most of the  
# examples.  
#  
#bob    Cleartext-Password := "hello"  
#       Reply-Message := "Hello, %{User-Name}"  
arubio Cleartext-Password := "arubio"  
egalvez Cleartext-Password := "egalvez"  
rcarrillo Cleartext-Password := "rcarrillo"  
  
# This is an entry for a user with a space in their name.  
# Note the double quotes surrounding the name. If you have  
# users with spaces in their names, you must also change  
# the "filter_username" policy to allow spaces.  
#  
# See raddb/policy.d/filter, filter_username {} section.  
#  
#"John Doe"    Cleartext-Password := "hello"  
#               Reply-Message = "Hello, %{User-Name}"  
#  
# Dial user back and telnet to the default host for that port  
#  
#Deg    Cleartext-Password := "ge55ged"  
#       Service-Type = Callback-Login-User,  
#       Login-IP-Host = 0.0.0.0,  
#       Callback-Number = "9.5551212",
```

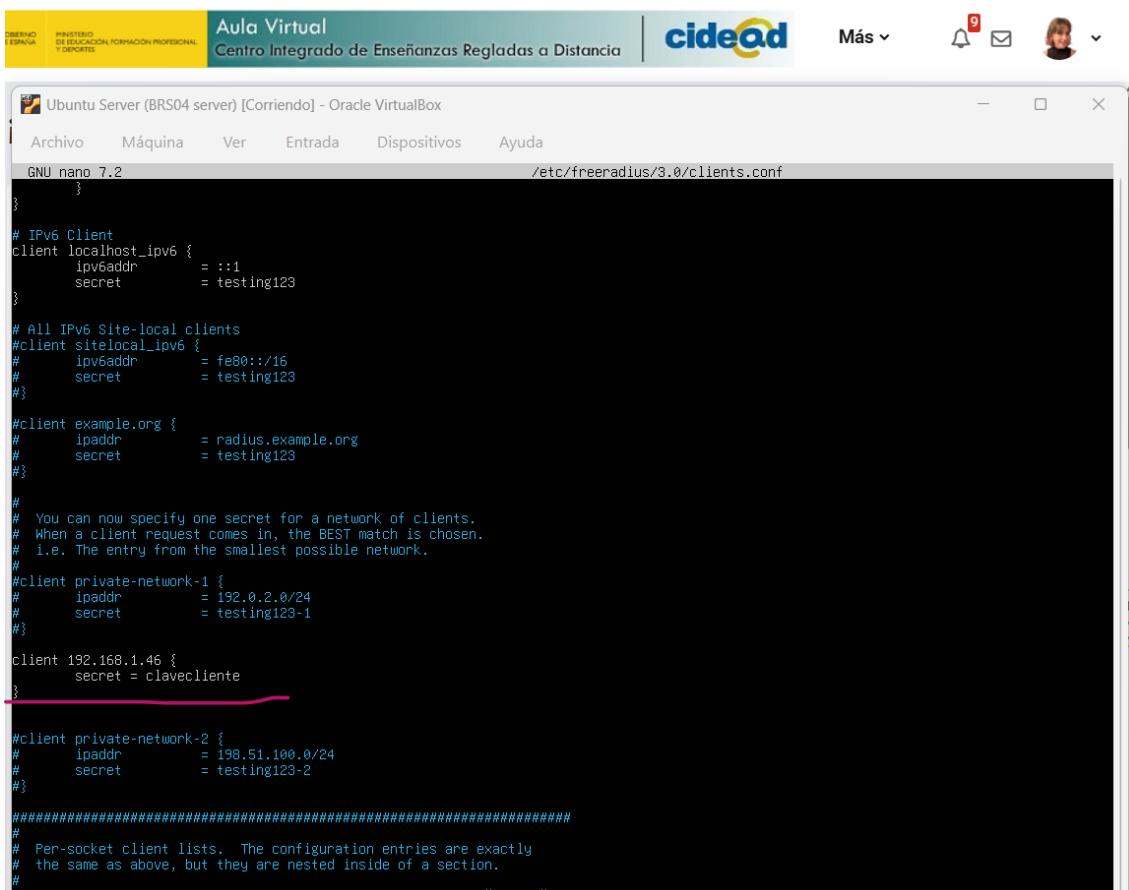
Ahora se añaden los clientes al archivo con el comando `sudo nano /etc/freeradius/3.0/clients.conf`



The screenshot shows a web browser window with the Aula Virtual Cidead interface. The top bar includes the Spanish Government logo, the Ministry of Education, and the Cidead logo. The main content area displays a terminal window titled "Ubuntu Server (BRS04 server) [Corriendo] - Oracle VirtualBox". The terminal shows the command "sudo nano /etc/freeradius/3.0/clients.conf" being run.

```
estherubuntu@ubuntu-server:~$ sudo nano /etc/freeradius/3.0/clients.conf
```

Se ha configurado la máquina cliente que se conectará al servidor RADIUS con la dirección IP 192.168.1.46. Y se ha asignado la clave *clavecliente* a ese cliente. Se guardan los cambios.



The screenshot shows a web browser window with the title "Ubuntu Server (BRS04 server) [Corriendo] - Oracle VirtualBox". The browser interface includes a top bar with the Spanish Ministry of Education logo, the "Aula Virtual" logo, and a "cidead" logo. On the right side of the browser, there are notification icons (9 messages), a user profile icon, and a "Más" dropdown menu. The main content area is a terminal window titled "GNU nano 7.2 /etc/freeradius/3.0/clients.conf". The terminal displays the configuration file for the Freeradius client. A pink highlight is applied to the line "secret = clavecliente" under the client entry for IP 192.168.1.46. The configuration file also contains comments and entries for IPv6 clients and site-local clients, along with a section for private networks.

```
GNUnano 7.2 /etc/freeradius/3.0/clients.conf
}

# IPv6 Client
client localhost_ipv6 {
    ipv6addr      = ::1
    secret        = testing123
}

# All IPv6 Site-local clients
#client sitelocal_ipv6 {
#    ipv6addr      = fe80::/16
#    secret        = testing123
#}

#client example.org {
#    ipaddr        = radius.example.org
#    secret        = testing123
#}

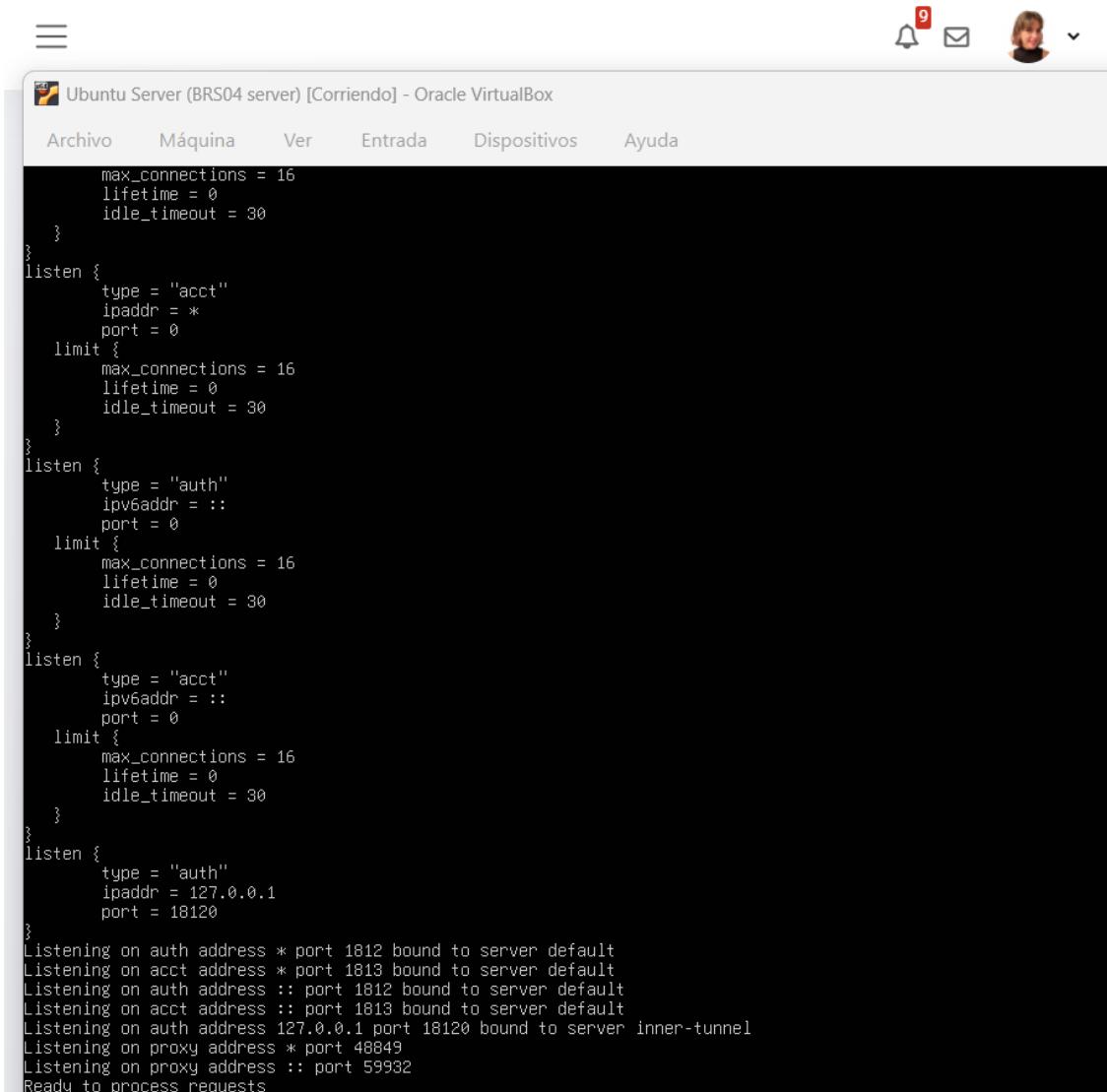
#
# You can now specify one secret for a network of clients.
# When a client request comes in, the BEST match is chosen.
# i.e. the entry from the smallest possible network.
#
#client private-network-1 {
#    ipaddr        = 192.0.2.0/24
#    secret        = testing123-1
#}

client 192.168.1.46 {
    secret = clavecliente
}

#client private-network-2 {
#    ipaddr        = 198.51.100.0/24
#    secret        = testing123-2
#}

#####
#
# Per-socket client lists. The configuration entries are exactly
# the same as above, but they are nested inside of a section.
#
# You can have as many per-socket client lists as you have "listen"
#
```

Comprobación del servidor radius con **sudo freeradius -X**. El estado actual es que el servidor RADIUS está listo para ejecutarse.



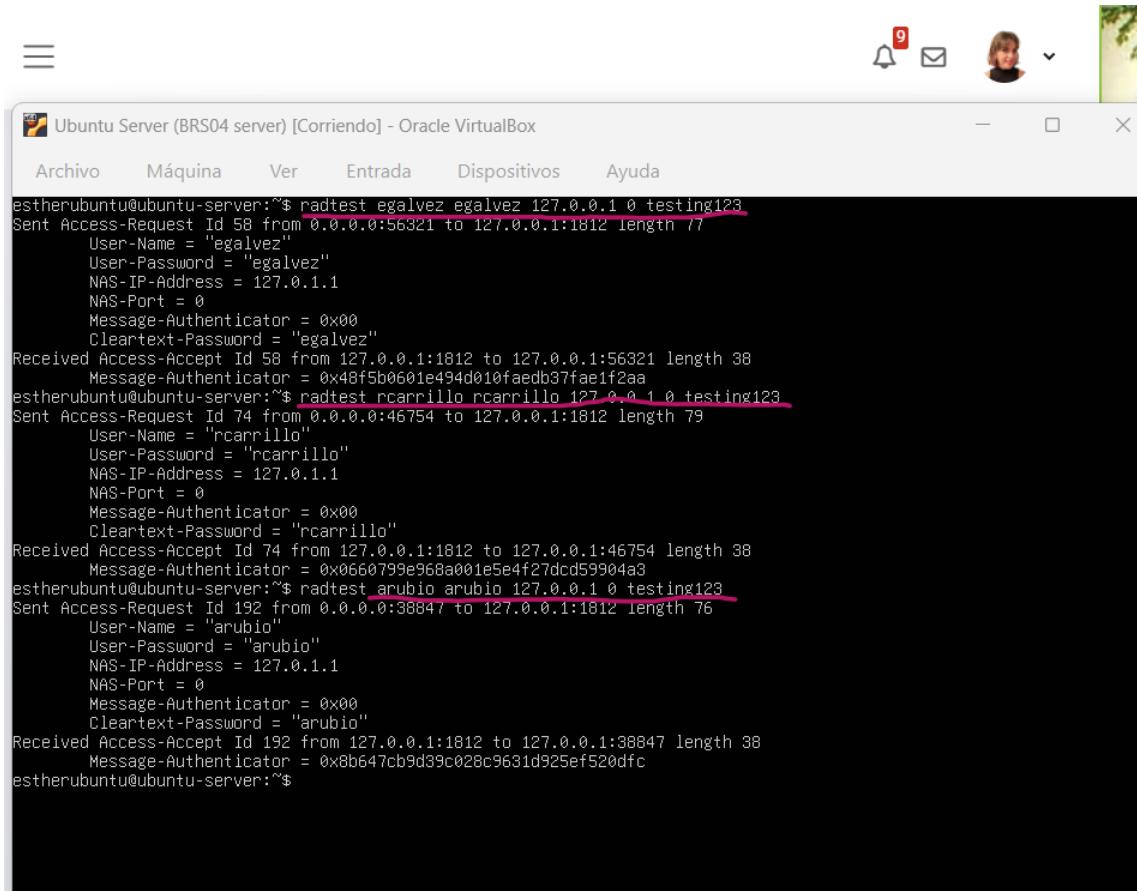
```
Ubuntu Server (BRS04 server) [Corriendo] - Oracle VirtualBox
Archivo Máquina Ver Entrada Dispositivos Ayuda

max_connections = 16
lifetime = 0
idle_timeout = 30
}
}
listen {
    type = "acct"
    ipaddr = *
    port = 0
    limit {
        max_connections = 16
        lifetime = 0
        idle_timeout = 30
    }
}
listen {
    type = "auth"
    ipv6addr = ::*
    port = 0
    limit {
        max_connections = 16
        lifetime = 0
        idle_timeout = 30
    }
}
listen {
    type = "acct"
    ipv6addr = ::*
    port = 0
    limit {
        max_connections = 16
        lifetime = 0
        idle_timeout = 30
    }
}
listen {
    type = "auth"
    ipaddr = 127.0.0.1
    port = 18120
}
Listening on auth address * port 1812 bound to server default
Listening on acct address * port 1813 bound to server default
Listening on auth address :: port 1812 bound to server default
Listening on acct address :: port 1813 bound to server default
Listening on auth address 127.0.0.1 port 18120 bound to server inner-tunnel
Listening on proxy address * port 48849
Listening on proxy address :: port 59932
Ready to process requests
```

Configuración clientes

A continuación, se realiza el test con los 3 clientes que ya se han añadido antes en el archivo de clientes.

- 1)** radtest egalvez 127.0.0.1 0 testing123
- 2)** radtest rcarrillo 127.0.0.1 0 testing123
- 3)** arubio arubio 127.0.0.1 0 testing123



```
Ubuntu Server (BRS04 server) [Corriendo] - Oracle VirtualBox
Archivo Máquina Ver Entrada Dispositivos Ayuda
estherubuntu@ubuntu-server:~$ radtest egalvez egalvez 127.0.0.1 0 testing123
Sent Access-Request Id 58 from 0.0.0:56321 to 127.0.0.1:1812 length 77
    User-Name = "egalvez"
    User-Password = "egalvez"
    NAS-IP-Address = 127.0.1.1
    NAS-Port = 0
    Message-Authenticator = 0x00
    Cleartext-Password = "egalvez"
Received Access-Accept Id 58 from 127.0.0.1:1812 to 127.0.0.1:56321 length 38
    Message-Authenticator = 0x48f5b0601e494d010faedb37fae1f2aa
estherubuntu@ubuntu-server:~$ radtest rcarrillo rcarrillo 127.0.0.1 0 testing123
Sent Access-Request Id 74 from 0.0.0:46754 to 127.0.0.1:1812 length 79
    User-Name = "rcarrillo"
    User-Password = "rcarrillo"
    NAS-IP-Address = 127.0.1.1
    NAS-Port = 0
    Message-Authenticator = 0x00
    Cleartext-Password = "rcarrillo"
Received Access-Accept Id 74 from 127.0.0.1:1812 to 127.0.0.1:46754 length 38
    Message-Authenticator = 0x0660799e968a001e5e4f27dc559904a3
estherubuntu@ubuntu-server:~$ radtest arubio arubio 127.0.0.1 0 testing123
Sent Access-Request Id 192 from 0.0.0:38847 to 127.0.0.1:1812 length 76
    User-Name = "arubio"
    User-Password = "arubio"
    NAS-IP-Address = 127.0.1.1
    NAS-Port = 0
    Message-Authenticator = 0x00
    Cleartext-Password = "arubio"
Received Access-Accept Id 192 from 127.0.0.1:1812 to 127.0.0.1:38847 length 38
    Message-Authenticator = 0xb6647cb9d39c028c9631d925ef520dfc
estherubuntu@ubuntu-server:~$
```

Instalación FreeRADIUS en máquina cliente

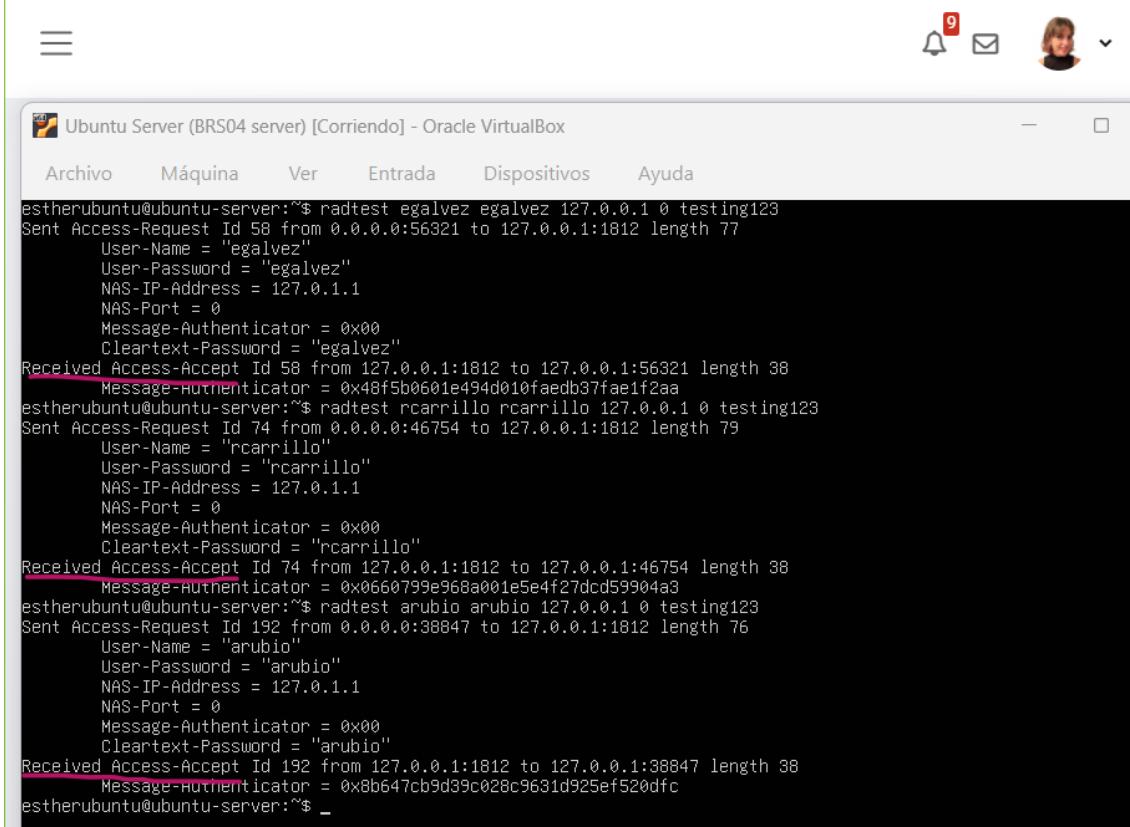
Para configurar el cliente, en primer lugar, se debe instalar FreeRADIUS en la máquina cliente con el comando: **`sudo apt install freeradius`**.

```
esthercliente@esthercliente:~$ sudo nano /etc/freeradius/3.0/clients.conf
[sudo] contraseña para esthercliente:
esthercliente@esthercliente:~$ sudo nano /etc/freeradius/3.0/clients.conf
[sudo] contraseña para esthercliente:
esthercliente@esthercliente:~$ sudo nano /etc/freeradius/3.0/clients.conf
esthercliente@esthercliente:~$ sudo apt install freeradius
Leyendo lista de paquetes... Hecho
Creando árbol de dependencias... Hecho
Leyendo la información de estado... Hecho
Se instalarán los siguientes paquetes adicionales:
  freeradius-common freeradius-config freeradius-utils freetds-common libct4 libdbi-perl libfreeradius3
Paquetes sugeridos:
  freeradius-krb5 freeradius-ldap freeradius-mysql freeradius-postgresql freeradius-python3 snmp libmldb
  libnet-daemon-perl libsql-statement-perl make-doc
Se instalarán los siguientes paquetes NUEVOS:
  freeradius freeradius-common freeradius-config freeradius-utils freetds-common libct4 libdbi-perl libf
  make
0 actualizados, 9 nuevos se instalarán, 0 para eliminar y 0 no actualizados.
Se necesita descargar 2.567 kB de archivos.
Se utilizarán 9.214 kB de espacio de disco adicional después de esta operación.
Desea continuar? [S/n] s
Des:1 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 freeradius-common all 3.2.5+dfsg-3~ubunt
]
Des:2 http://archive.ubuntu.com/ubuntu noble/main amd64 make amd64 4.3-4.1build2 [180 kB]
Des:3 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 freeradius-config amd64 3.2.5+dfsg-3~ubu
kB]
Des:4 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 libfreeradius3 amd64 3.2.5+dfsg-3~ubantu
Des:5 http://archive.ubuntu.com/ubuntu noble/main amd64 freetds-common all 1.3.17+ds-2build3 [26,9 kB]
Des:6 http://archive.ubuntu.com/ubuntu/noble/main amd64 libct4 amd64 1.3.17+ds-2build3 [169 kB]
Des:7 http://archive.ubuntu.com/ubuntu noble-updates/main amd64 freeradius amd64 3.2.5+dfsg-3~ubuntu24.0
```

Se ha realizado una prueba de autenticación con la herramienta *radtest* desde la máquina cliente, enviando las credenciales *egalvez / egalvez* al servidor RADIUS y recibiendo una respuesta exitosa

```
¡Hola, ESTHER! 🌟
Ubuntu Client (BRS04 2) [Corriendo] - Oracle VirtualBox
esthercliente@esthercliente:~$ radtest egalvez egalvez 192.168.1.47 0 clavecliente
Sent Access-Request Id 205 from 0.0.0.0:34193 to 192.168.1.47:1812 length 77
  User-Name = "egalvez"
  User-Password = "egalvez"
  NAS-IP-Address = 127.0.1.1
  NAS-Port = 0
  Message-Authenticator = 0x00
  Cleartext-Password = "egalvez"
Received Access-Accept Id 205 from 192.168.1.47:1812 to 192.168.1.46:34193 length 38
  Message-Authenticator = 0x9384b0c3ac8981260148b52802c3561a
esthercliente@esthercliente:~$
```

Se comprueba la conexión en la máquina servidor. La respuesta Access-Accept enviada por el servidor es la señal que la máquina cliente recibe para confirmar que la conexión y la autenticación han sido exitosas. El servidor RADIUS está configurado correctamente.



The screenshot shows a terminal window titled "Ubuntu Server (BRS04 server) [Corriendo] - Oracle VirtualBox". The window contains a log of RADIUS interactions:

```
estherubuntu@ubuntu-server:~$ radtest egalvez egalvez 127.0.0.1 0 testing123
Sent Access-Request Id 58 from 0.0.0.0:56321 to 127.0.0.1:1812 length 77
    User-Name = "egalvez"
    User-Password = "egalvez"
    NAS-IP-Address = 127.0.1.1
    NAS-Port = 0
    Message-Authenticator = 0x00
    Cleartext-Password = "egalvez"
Received Access-Accept Id 58 from 127.0.0.1:1812 to 127.0.0.1:56321 length 38
    Message-Authenticator = 0x40f5b0601e494d010faedb37fae1f2aa
estherubuntu@ubuntu-server:~$ radtest rcarrillo rcarrillo 127.0.0.1 0 testing123
Sent Access-Request Id 74 from 0.0.0.0:46754 to 127.0.0.1:1812 length 79
    User-Name = "rcarrillo"
    User-Password = "rcarrillo"
    NAS-IP-Address = 127.0.1.1
    NAS-Port = 0
    Message-Authenticator = 0x00
    Cleartext-Password = "rcarrillo"
Received Access-Accept Id 74 from 127.0.0.1:1812 to 127.0.0.1:46754 length 38
    Message-Authenticator = 0x0660799e968a001e5e4f27dcd59904a3
estherubuntu@ubuntu-server:~$ radtest arubio arubio 127.0.0.1 0 testing123
Sent Access-Request Id 192 from 0.0.0.0:38847 to 127.0.0.1:1812 length 76
    User-Name = "arubio"
    User-Password = "arubio"
    NAS-IP-Address = 127.0.1.1
    NAS-Port = 0
    Message-Authenticator = 0x00
    Cleartext-Password = "arubio"
Received Access-Accept Id 192 from 127.0.0.1:1812 to 127.0.0.1:38847 length 38
    Message-Authenticator = 0xb647cb9d39c028c9631d925ef520dfc
estherubuntu@ubuntu-server:~$ _
```

Bibliografía

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