

# DOS SUBREDES EN LINUX



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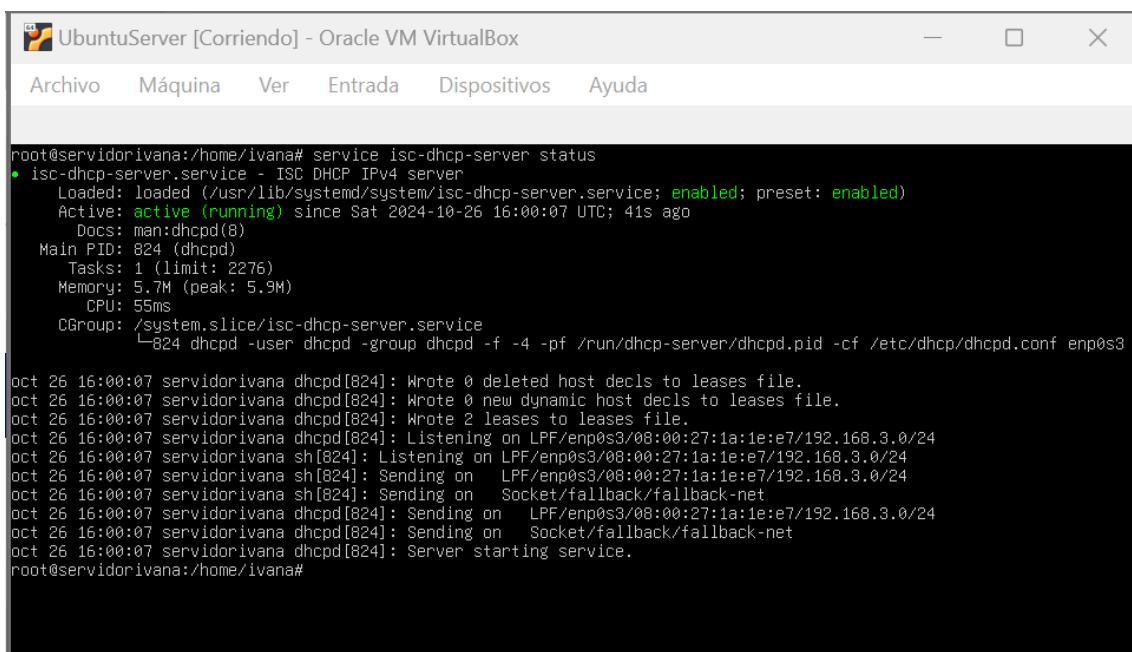
## **2º ASO**

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## 1- Entorno de trabajo

El que creamos en el ejercicio 1: 192.168.3.0/24 y para verificar la instalación utilizaremos el comando **service isc-dhcp-server status**



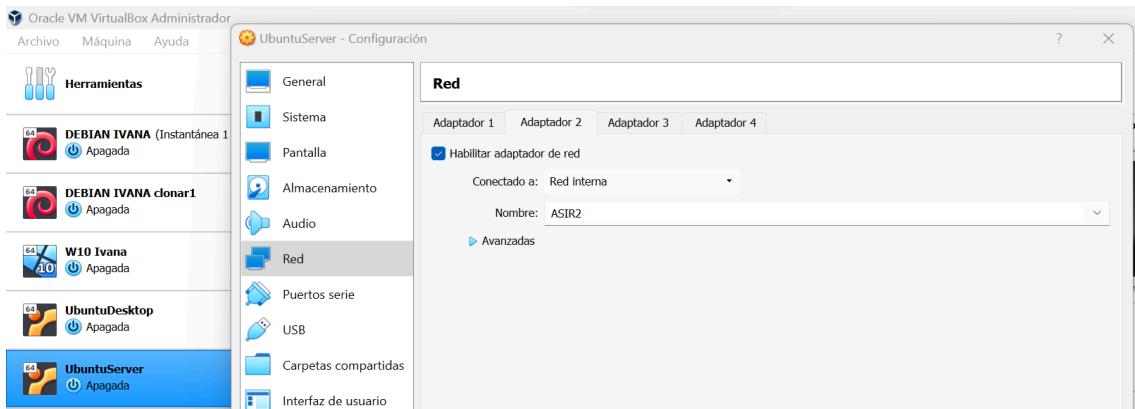
```
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root@servidorivana:/home/ivana# service isc-dhcp-server status
● isc-dhcp-server.service - ISC DHCP IPv4 server
   Loaded: loaded (/usr/lib/systemd/system/isc-dhcp-server.service; enabled; preset: enabled)
   Active: active (running) since Sat 2024-10-26 16:00:07 UTC; 41s ago
     Docs: man:dhcpcd(8)
       Main PID: 824 (dhcpcd)
          Tasks: 1 (limit: 2276)
        Memory: 5.7M (peak: 5.9M)
          CPU: 55ms
        CGroup: /system.slice/isc-dhcp-server.service
                └─824 dhcpcd -user dhcpcd -group dhcpcd -f -4 -pf /run/dhcp-server/dhcpcd.pid -cf /etc/dhcp/dhcpcd.conf enp0s3

oct 26 16:00:07 servidorivana dhcpcd[824]: Wrote 0 deleted host decls to leases file.
oct 26 16:00:07 servidorivana dhcpcd[824]: Wrote 0 new dynamic host decls to leases file.
oct 26 16:00:07 servidorivana dhcpcd[824]: Wrote 2 leases to leases file.
oct 26 16:00:07 servidorivana dhcpcd[824]: Listening on LPF/enp0s3/00:00:27:1a:1e:e7/192.168.3.0/24
oct 26 16:00:07 servidorivana sh[824]: Listening on LPF/enp0s3/00:00:27:1a:1e:e7/192.168.3.0/24
oct 26 16:00:07 servidorivana sh[824]: Sending on LPF/enp0s3/00:00:27:1a:1e:e7/192.168.3.0/24
oct 26 16:00:07 servidorivana sh[824]: Sending on Socket/fallback/fallback-net
oct 26 16:00:07 servidorivana dhcpcd[824]: Sending on LPF/enp0s3/00:00:27:1a:1e:e7/192.168.3.0/24
oct 26 16:00:07 servidorivana dhcpcd[824]: Sending on Socket/fallback/fallback-net
oct 26 16:00:07 servidorivana dhcpcd[824]: Server starting service.
root@servidorivana:/home/ivana#
```

## 2- Nueva red local

Como el entorno de trabajo del que partimos está configurado en la interfaz enp0s3, necesitamos una segunda interfaz para la nueva red. Para ello, lo primero que vamos a hacer es añadir un nueva tarjeta de red a Ubuntu Server en la configuración de VirtualBox que se va a llamar ASIR2.



Una vez creada, abrimos el Ubuntu Server y para comprobar las interfaces que tenemos ejecutando el comando ***ls /sys/class/net/***, o también podemos utilizar el comando ***ip link show***.

```
root@servidorivana:/home/ivana# ls /sys/class/net/
enp0s3  enp0s8  lo
root@servidorivana:/home/ivana#
```

```
root@servidorivana:/home/ivana# ip link show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN mode DEFAULT group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP mode DEFAULT group default qlen 1000
    link/ether 08:00:27:1a:1e:e7 brd ff:ff:ff:ff:ff:ff
3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP mode DEFAULT group default qlen 1000
    link/ether 08:00:27:bb:dd:b7 brd ff:ff:ff:ff:ff:ff
root@servidorivana:/home/ivana#
```

Restauramos con ***Sudo systemctl restart isc-dhcp-server*** y preparamos el servidor agregándole la segunda interfaz editando el archivo con ***sudo nano /etc/netplan/50-cloud-init.yaml*** para realizar los cambios pertinentes de nuestra nueva interfaz (enp0s8).

```
GNU nano 7.2                                     /etc/netplan/50-cloud-init.yaml *
# This file is generated from information provided by the datasource. Changes
# to it will not persist across an instance reboot. To disable cloud-init's
# network configuration capabilities, write a file
# /etc/cloud/cloud.cfg.d/99-disable-network-config.cfg with the following:
# network: {config: disabled}
network:
  version: 2
  ethernets:
    enp0s3:
      dhcp4: no
      addresses:
        - 192.168.3.0/24
      nameservers:
        addresses:
          - 8.8.8.8
          - 8.8.4.4
      routes:
        - to: default
          via: 192.168.3.1
          table: 1
    enp0s8:
      dhcp4: no
      addresses:
        - 192.168.4.0/24
      nameservers:
        addresses:
          - 8.8.8.8
          - 8.8.4.4
      routes:
        - to: default
          via: 192.168.4.1
          table: 2
```

### 3- Configurar servidor

Una vez tenemos configurado el entorno de red y preparado el servidor, vamos a proceder a configurarlo.

Creamos la nueva red local 192.168.4.0/24. Para ello añadiremos una nueva sección al archivo `dhcp.conf` para definir el ámbito de la nueva red.

```
GNU nano 7.2                                     /etc/dhcp/dhcpd.conf
option domain-name "example.org";
option domain-name-servers ns1.example.org, ns2.example.org;
default-lease-time 600;
max-lease-time 7200;
ddns-update-style none;

subnet 192.168.3.0 netmask 255.255.255.0 {
  option routers 192.168.3.1;
  option subnet-mask 255.255.255.0;
  option domain-name-servers 8.8.8.8 , 8.8.4.4;
  range 192.168.3.100 192.168.3.120;
}

subnet 192.168.4.0 netmask 255.255.255.0 {
  option routers 192.168.4.1;
  option subnet-mask 255.255.255.0;
  option domain-name-servers 8.8.8.8 , 8.8.4.4;
  range 192.168.4.120 192.168.4.140;
  default-lease-time 7200;
  max-lease-time 7200;
```

Hacemos la restauración:

**Sudo systemctl restart isc-dhcp-server**

En segundo lugar, añadimos la nueva interfaz enp0s8 al archivo de servidor de DHCP y restauramos el archivo.

```
GNU nano 7.2                                     /etc/default/isc-dhcp-server *
# Defaults for isc-dhcp-server (sourced by /etc/init.d/isc-dhcp-server)

# Path to dhcpcd's config file (default: /etc/dhcp/dhcpcd.conf).
#DHCPDv4_CONF=/etc/dhcp/dhcpcd.conf
#DHCPDv6_CONF=/etc/dhcp/dhcpcd6.conf

# Path to dhcpcd's PID file (default: /var/run/dhcpcd.pid).
#DHCPDv4_PID=/var/run/dhcpcd.pid
#DHCPDv6_PID=/var/run/dhcpcd6.pid

# Additional options to start dhcpcd with.
#       Don't use options -cf or -pf here; use DHCPD_CONF/ DHCPD_PID instead
#OPTIONS=""

# On what interfaces should the DHCP server (dhcpcd) serve DHCP requests?
#       Separate multiple interfaces with spaces, e.g. "eth0 eth1".
INTERFACESv4=" enp0s3 enp0s8"
INTERFACESv6=""
```

Volvemos a restaurar: **Sudo systemctl restart isc-dhcp-server**

```
root@servidorivana:/home/ivana#
root@servidorivana:/home/ivana# systemctl restart isc-dhcp-server
root@servidorivana:/home/ivana#
```

Aplicamos los cambios con **netplan apply**

Creamos políticas de enrutamiento con **ip rule**. Agregamos las reglas de enrutamiento manualmente mediante un archivo de servicio en systemd para aplicarlas en cada inicio del sistema. Así, creamos el archivo donde definimos las reglas de enrutamiento con el comando: **sudo nano /etc/systemd/system/routing-policy.service**

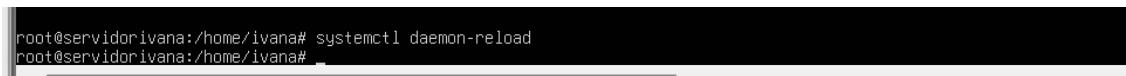
d

```
GNU nano 7.2                                     /etc/systemd/system/routing-policy.service *
[Unit]
Description=Configurar políticas de enrutamiento adicionales
After=network-online.target
Wants=network-online.target

[Service]
Type=oneshot
ExecStart=/bin/sh -c "/sbin/ip rule add from 192.168.3.0/24 table 1; /sbin/ip rule add from 192.168.4.0/24 table 2"
ExecStop=/bin/sh -c "/sbin/ip rule del from 192.168.3.0/24 table 1; /sbin/ip rule del from 192.168.4.0/24 table 2"
RemainAfterExit=yes

[Install]
WantedBy=multi-user.target
```

## Guardamos y recargamos con ***systemctl daemon-reload***



```
root@servidorivana:/home/ivana# systemctl daemon-reload
root@servidorivana:/home/ivana#
```

Habilitamos y arrancamos el servicio:

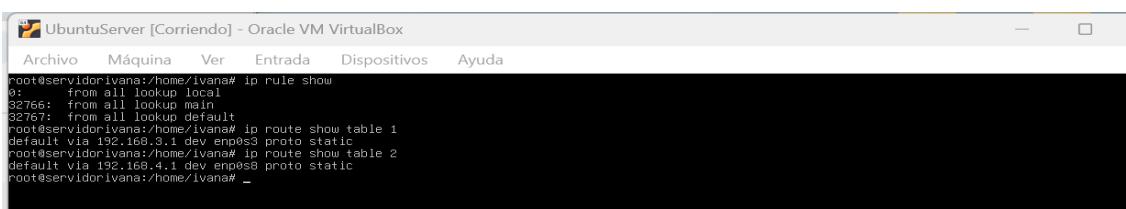
- ***Sudo systemctl enable routing-policy.service***
- ***Sudo systemctl start routing-policy.service***



```
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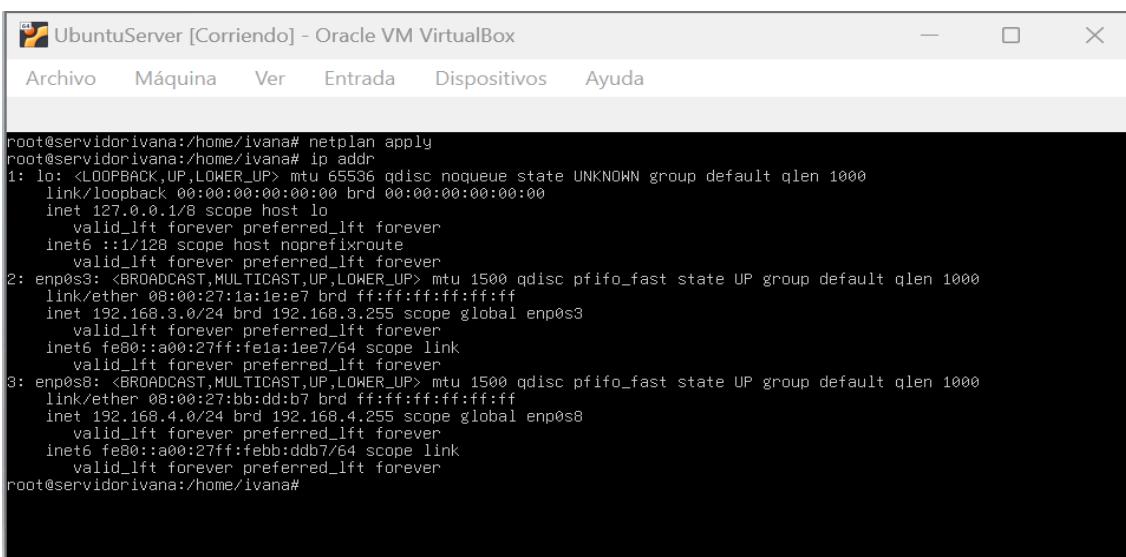
root@servidorivana:/home/ivana# systemctl enable routing-policy.service
Created symlink /etc/systemd/system/multi-user.target.wants/routing-policy.service → /etc/systemd/system/routing-policy.service
root@servidorivana:/home/ivana# systemctl start routing-policy.service
root@servidorivana:/home/ivana#
```

Una vez habilitado e iniciado el servicio, verificamos que las reglas de enrutamiento se hayan aplicado con ***ip rule show*** y con ***ip route show table***



```
UbuntuServer [Corriendo] - Oracle VM VirtualBox
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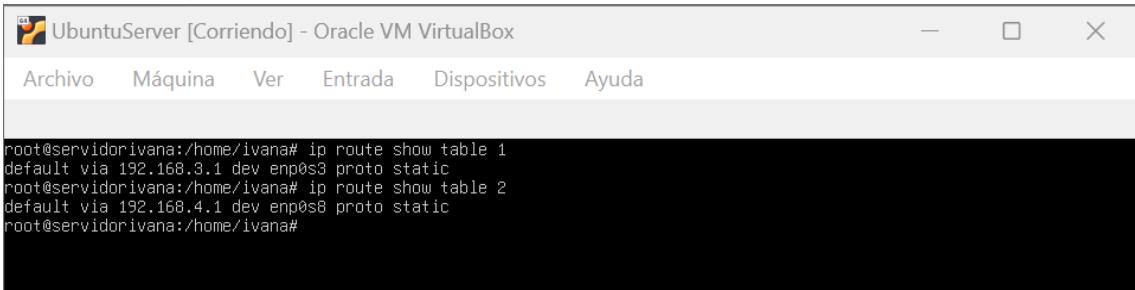
root@servidorivana:/home/ivana# ip rule show
0: from all lookup local
32766: from all lookup default
32767: from all lookup main
root@servidorivana:/home/ivana# ip route show table 1
default via 192.168.3.1 dev enp0s3 proto static
root@servidorivana:/home/ivana# ip route show table 2
default via 192.168.4.1 dev enp0s8 proto static
root@servidorivana:/home/ivana#
```



```
UbuntuServer [Corriendo] - Oracle VM VirtualBox
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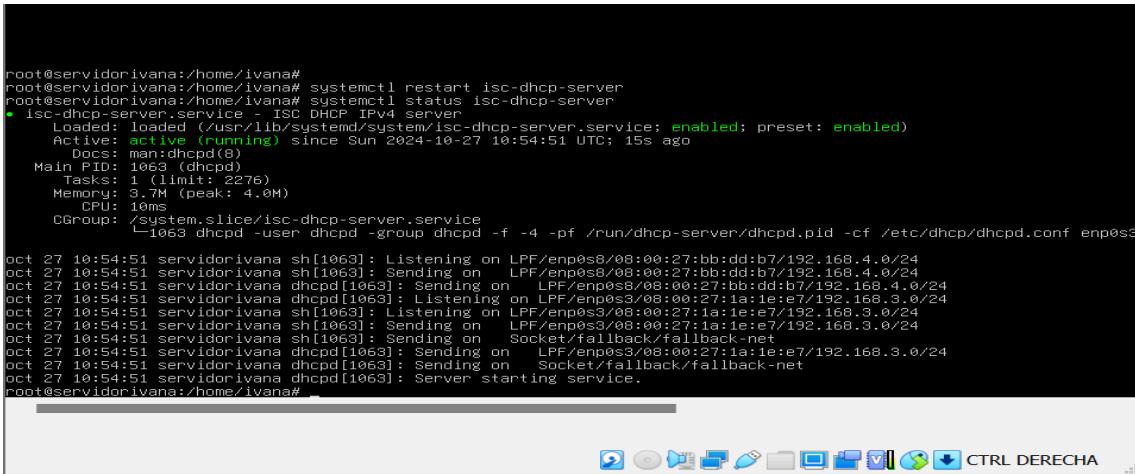
root@servidorivana:/home/ivana# netplan apply
root@servidorivana:/home/ivana# ip addr
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inetc6 ::1/128 scope host noprefixroute
        valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 00:00:27:1a:1e:e7 brd ff:ff:ff:ff:ff:ff
    inet 192.168.3.0/24 brd 192.168.3.255 scope global enp0s3
        valid_lft forever preferred_lft forever
    inetc6 fe80::a00:27ff:fe1a:1ee7/64 scope link
        valid_lft forever preferred_lft forever
3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 00:00:27:bb:dd:b7 brd ff:ff:ff:ff:ff:ff
    inet 192.168.4.0/24 brd 192.168.4.255 scope global enp0s8
        valid_lft forever preferred_lft forever
    inetc6 fe80::a00:27ff:febb:ddb7/64 scope link
        valid_lft forever preferred_lft forever
root@servidorivana:/home/ivana#
```

También podemos verificarlo con el comando ***ip route show table***



```
root@servidorivana:/home/ivanan# ip route show table 1
default via 192.168.3.1 dev enp0s3 proto static
root@servidorivana:/home/ivanan# ip route show table 2
default via 192.168.4.1 dev enp0s8 proto static
root@servidorivana:/home/ivanan#
```

Por último, hacemos **service isc-dhcp-server status** y observamos que el servidor está activo



```
root@servidorivana:/home/ivanan# systemctl restart isc-dhcp-server
root@servidorivana:/home/ivanan# systemctl status isc-dhcp-server
● isc-dhcp-server.service - ISC DHCP IPv4 server
   Loaded: loaded (/usr/lib/systemd/system/isc-dhcp-server.service; enabled; preset: enabled)
     Active: active (running) since Sun 2024-10-27 10:54:51 UTC; 15s ago
       Docs: man:dhcpd(8)
     Main PID: 1063 (dhcpd)
        Tasks: 1 (limit: 2276)
      Memory: 3.7M (peak: 4.0M)
        CPU: 10ms
      CGroup: /system.slice/isc-dhcp-server.service
              └─1063 dhcpd -user dhcpd -group dhcpd -f -4 -pf /run/dhcp-server/dhcpd.pid -cf /etc/dhcp/dhcpd.conf enp0s3

oct 27 10:54:51 servidorivana sh[1063]: Listening on LPF/enp0s8/08:00:27:bb:dd:b7/192.168.4.0/24
oct 27 10:54:51 servidorivana sh[1063]: Sending on  LPF/enp0s8/08:00:27:bb:dd:b7/192.168.4.0/24
oct 27 10:54:51 servidorivana dhcpd[1063]: Sending on  LPF/enp0s8/08:00:27:bb:dd:b7/192.168.4.0/24
oct 27 10:54:51 servidorivana dhcpd[1063]: Listening on LPF/enp0s3/08:00:27:ia:ie:7/192.168.3.0/24
oct 27 10:54:51 servidorivana sh[1063]: Listening on LPF/enp0s3/08:00:27:ia:ie:7/192.168.3.0/24
oct 27 10:54:51 servidorivana sh[1063]: Sending on  LPF/enp0s3/08:00:27:ia:ie:7/192.168.3.0/24
oct 27 10:54:51 servidorivana dhcpd[1063]: Sending on  LPF/enp0s3/08:00:27:ia:ie:7/192.168.3.0/24
oct 27 10:54:51 servidorivana dhcpd[1063]: Sending on  Socket/fallback/fallback-net
oct 27 10:54:51 servidorivana dhcpd[1063]: Sending on  Socket/fallback/fallback-net
oct 27 10:54:51 servidorivana dhcpd[1063]: Server starting service.
root@servidorivana:/home/ivanan#
```

## 4.- Comprobación en el cliente

Configuramos su archivo de netplan añadiendo la nueva interfaz enp0s8 y aplicamos los cambios con **sudo netplan apply**.

Desactivamos la interfaz anterior, la enp0s3 con **sudo ip link set enp0s3 down**, activamos la nueva con **sudo ip link set enp0s8 up** y forzamos al cliente a solicitar una nueva ip con **sudo dhclient -v enp0s8**.

```
root@ivana-VirtualBox:/home/ivana# ip link set enp0s3 down
root@ivana-VirtualBox:/home/ivana# ip link set enp0s8 up
root@ivana-VirtualBox:/home/ivana# dhclient -v enp0s8
Internet Systems Consortium DHCP Client 4.4.1
Copyright 2004-2018 Internet Systems Consortium.
All rights reserved.
For info, please visit https://www.isc.org/software/dhcp/

Listening on LPF/enp0s8/08:00:27:06:8e:d3
Sending on  LPF/enp0s8/08:00:27:06:8e:d3
Sending on  Socket/fallback
DHCPDISCOVER on enp0s8 to 255.255.255.255 port 67 interval 3 (xid=0xa00d4162)
DHCPOFFER of 192.168.4.121 from 192.168.4.0
DHCPREQUEST for 192.168.4.121 on enp0s8 to 255.255.255.255 port 67 (xid=0x62410d
a0)
DHCPACK of 192.168.4.121 from 192.168.4.0 (xid=0xa00d4162)
bound to 192.168.4.121 -- renewal in 2942 seconds.
root@ivana-VirtualBox:/home/ivana#
```

Confirmamos nuevamente con un *ip a* y hacemos una prueba ping al servidor en la IP 192.168.4.120

```
root@ivana-VirtualBox:/home/ivana# 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
        valid_lft forever preferred_lft forever
2: enp0s3: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN group default qlen 1000
    link/ether 08:00:27:70:ad:0c brd ff:ff:ff:ff:ff:ff
3: enp0s8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen
    link/ether 08:00:27:06:8e:d3 brd ff:ff:ff:ff:ff:ff
    inet 192.168.4.120/24 metric 100 brd 192.168.4.255 scope global dynamic enp0s8
        valid_lft 5524sec preferred_lft 5524sec
    inet6 fe80::a00:27ff:fe06:8ed3/64 scope link
        valid_lft forever preferred_lft forever
root@ivana-VirtualBox:/home/ivana#
```

```
root@ivana-VirtualBox:/home/ivana# ping 192.168.4.120
PING 192.168.4.120 (192.168.4.120) 56(84) bytes of data.
64 bytes from 192.168.4.120: icmp_seq=1 ttl=64 time=0.027 ms
64 bytes from 192.168.4.120: icmp_seq=2 ttl=64 time=0.075 ms
64 bytes from 192.168.4.120: icmp_seq=3 ttl=64 time=0.060 ms
64 bytes from 192.168.4.120: icmp_seq=4 ttl=64 time=0.029 ms
64 bytes from 192.168.4.120: icmp_seq=5 ttl=64 time=0.074 ms
64 bytes from 192.168.4.120: icmp_seq=6 ttl=64 time=0.079 ms
64 bytes from 192.168.4.120: icmp_seq=7 ttl=64 time=0.030 ms
^C
--- 192.168.4.120 ping statistics ---
7 packets transmitted, 7 received, 0% packet loss, time 6130ms
rtt min/avg/max/mdev = 0.027/0.053/0.079/0.022 ms
root@ivana-VirtualBox:/home/ivana#
```