



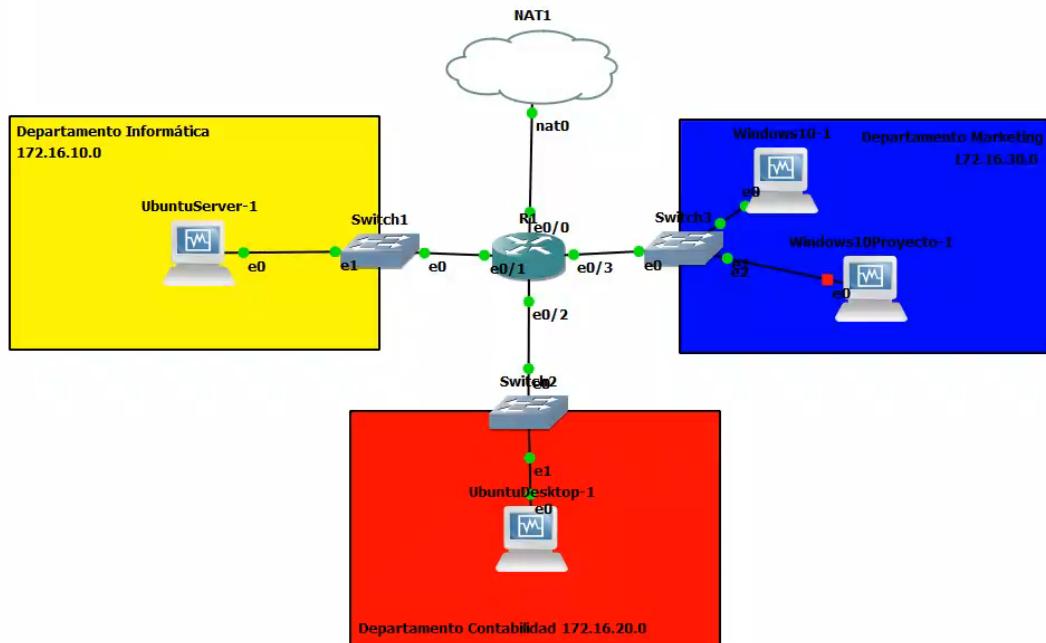
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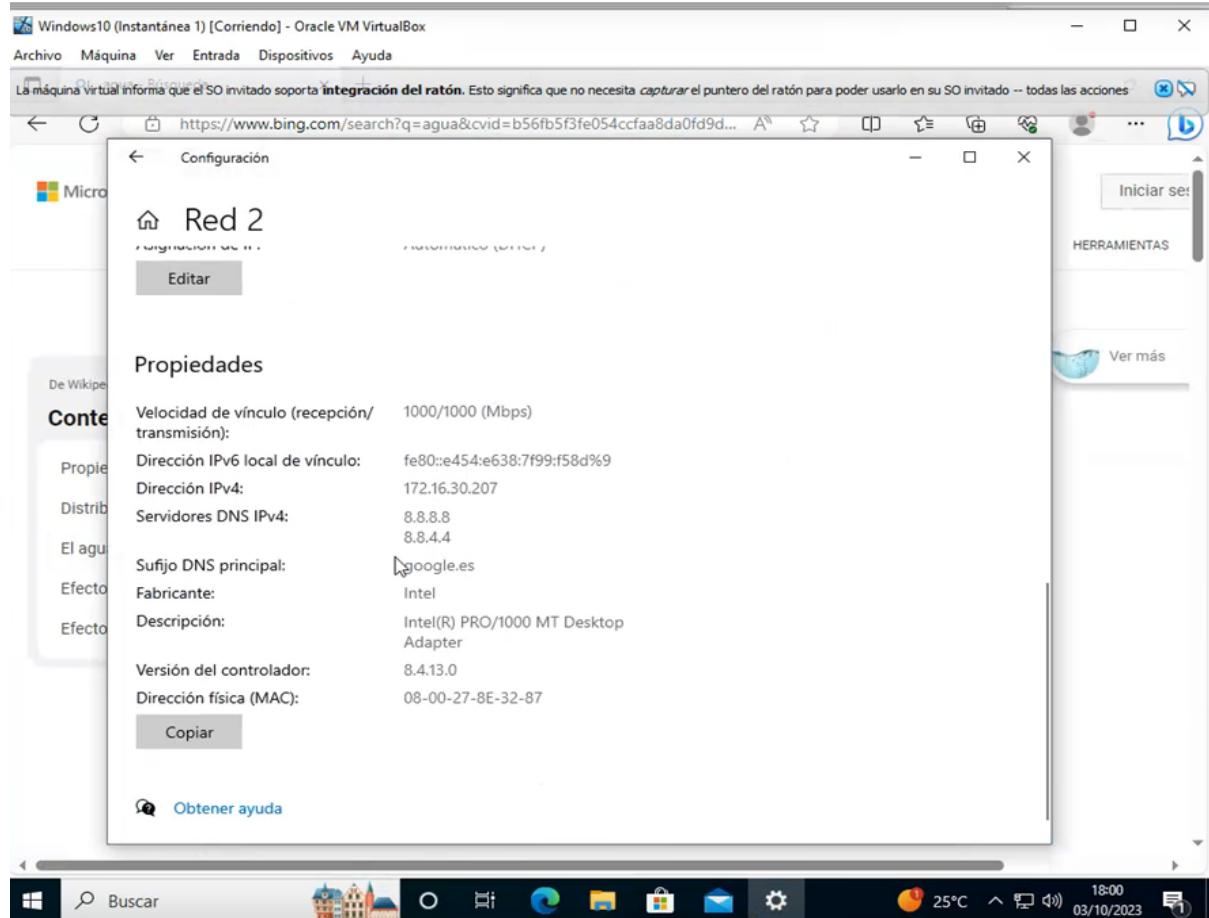
# TOPOLOGÍA

Primero hacemos la topología con una nube nat, un router cisco, 3 switches ethernet, 2 máquinas de windows 10, 1 ubuntu server y 1 ubuntu desktop

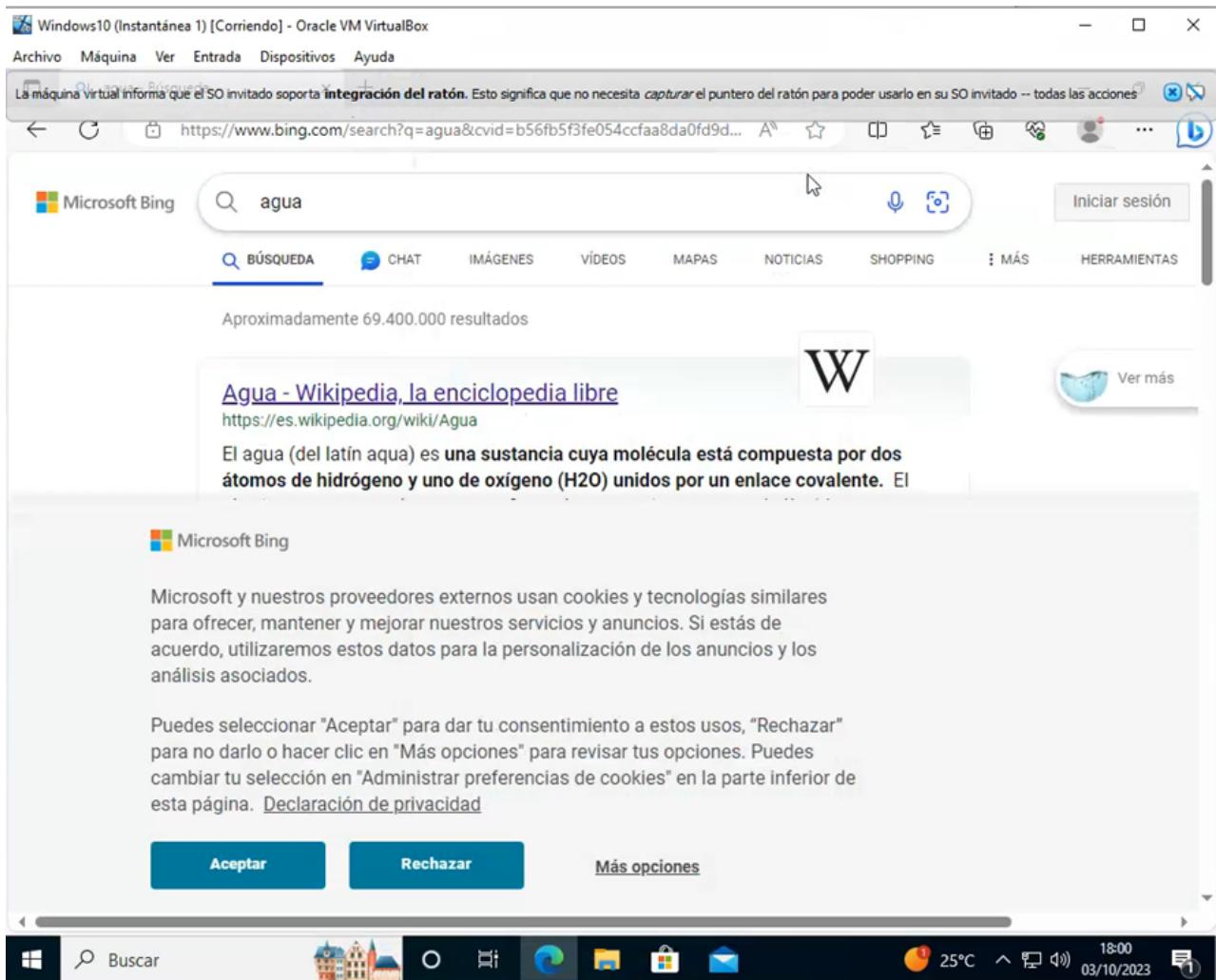


# CLIENTE WINDOWS

Entramos en el cliente de windows a configuración de IP y como lo tenemos en automático ya tendremos internet en el equipo.

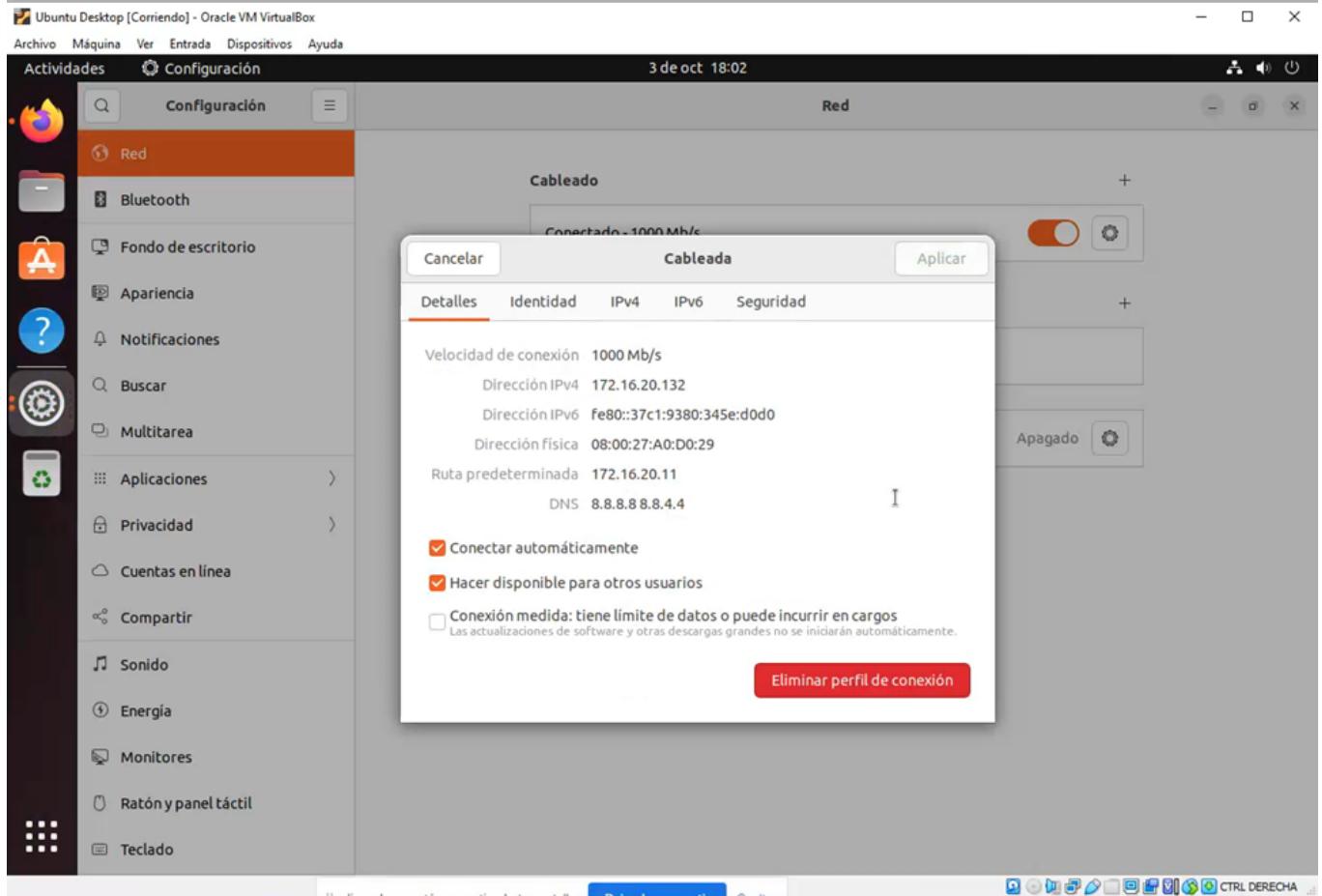


Por último comprobamos si está todo bien y comprobamos si tenemos internet buscando algo en internet.

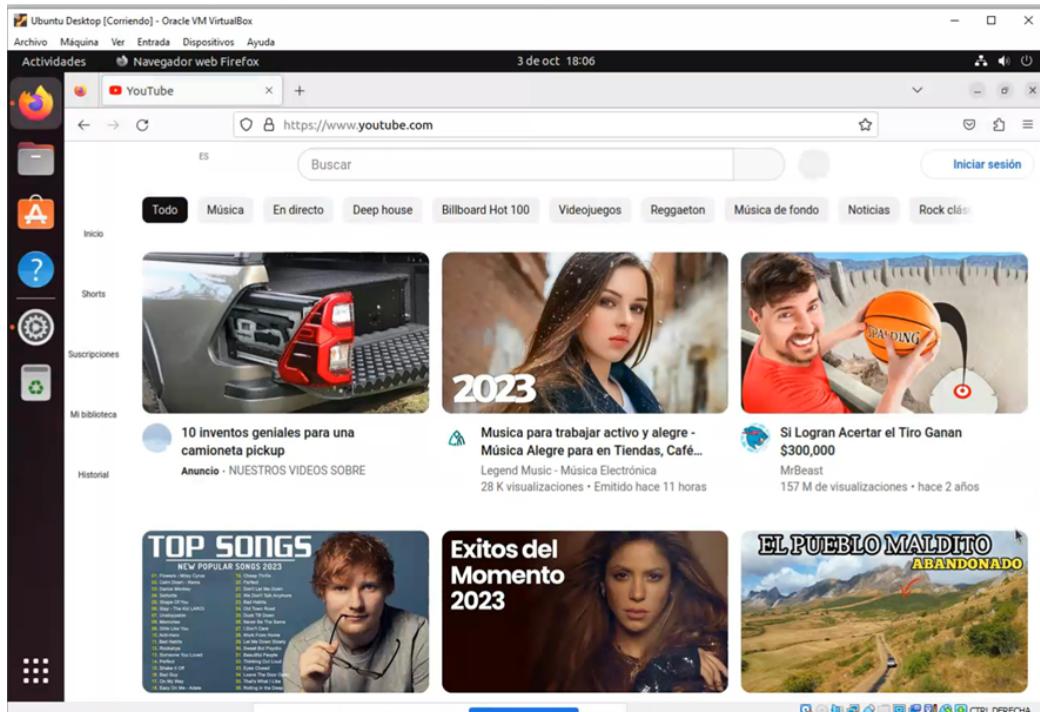


# CLIENTE UBUNTU

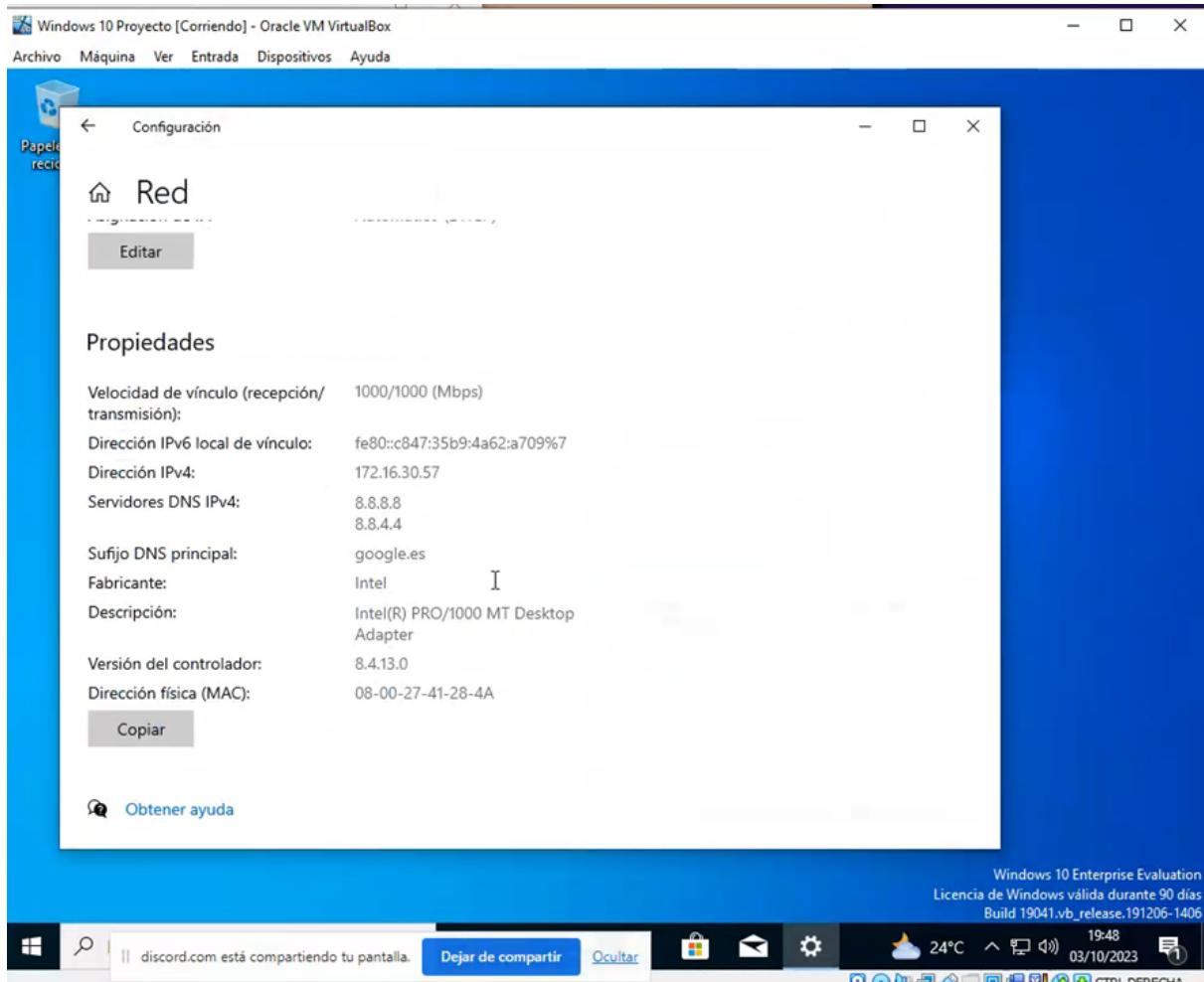
Al igual que en el cliente de windows lo tenemos configurado para que coga la ip de manera automática en DHCP.

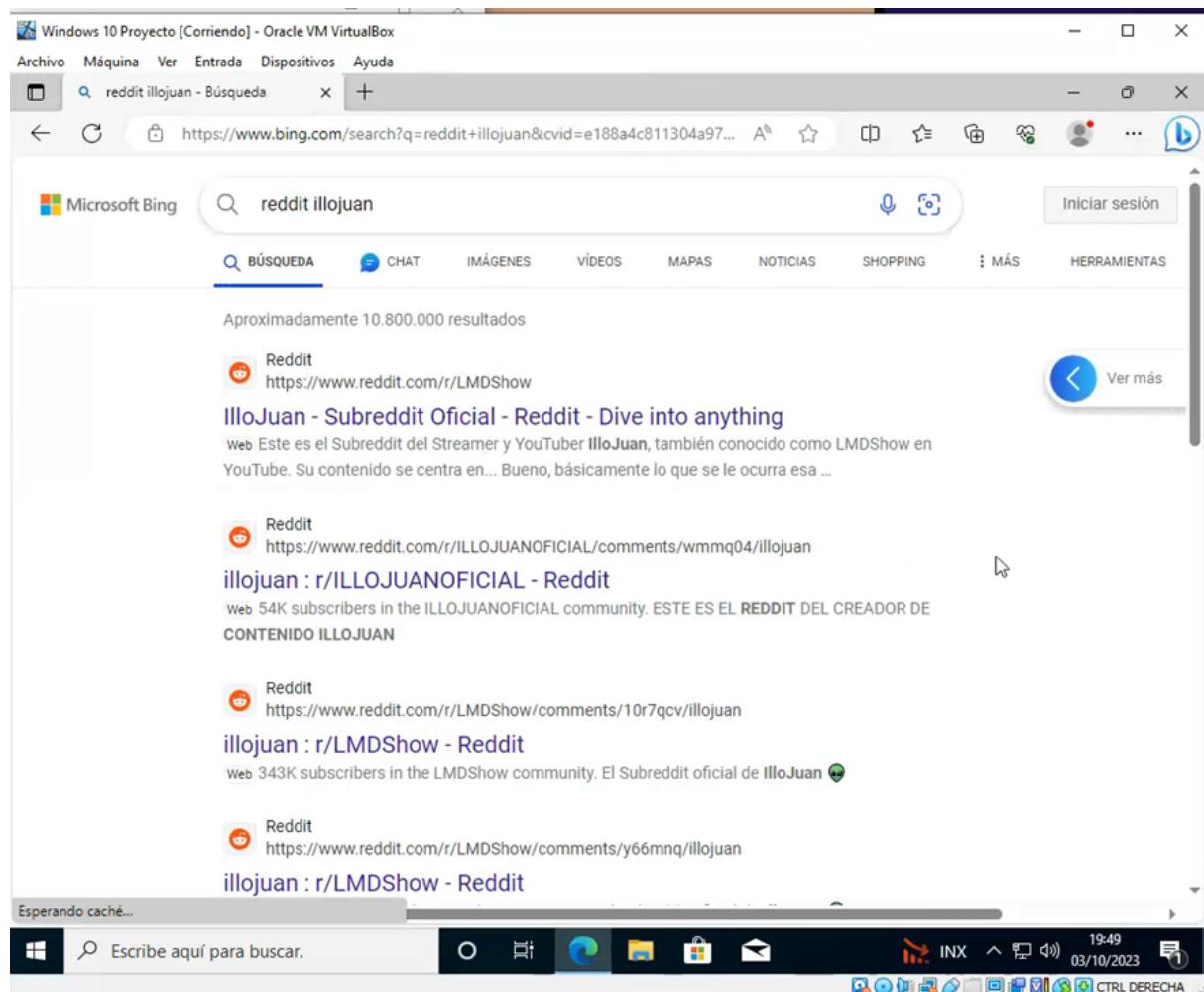


Comprobamos si nos va el internet buscando algo por internet.



# WINDOWS 10





# COMPROBACIONES

Ping router a google

```
R1#ping 8.8.8.8
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 8.8.8.8, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 12/12/14 ms
R1#
```

Ping ubuntu server a google

```
dfelix@server:~$ ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=109 time=12.8 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=109 time=12.5 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=109 time=14.6 ms
64 bytes from 8.8.8.8: icmp_seq=4 ttl=109 time=12.5 ms
^Z
[1]+  Stopped                  ping 8.8.8.8
dfelix@server:~$
```

PING INFORMATICA A MARKETING

```
dfelix@server:~$ ping 172.16.30.207
PING 172.16.30.207 (172.16.30.207) 56(84) bytes of data.
64 bytes from 172.16.30.207: icmp_seq=1 ttl=127 time=1.64 ms
64 bytes from 172.16.30.207: icmp_seq=2 ttl=127 time=1.72 ms
64 bytes from 172.16.30.207: icmp_seq=3 ttl=127 time=1.19 ms
64 bytes from 172.16.30.207: icmp_seq=4 ttl=127 time=1.73 ms
^Z
[8]+  Stopped                  ping 172.16.30.207
dfelix@server:~$
```

## PING COMPATIBILIDAD A MARKETING

```
dfelix@dfelix-VirtualBox:~$ ping 172.16.30.207
PING 172.16.30.207 (172.16.30.207) 56(84) bytes of data.
64 bytes from 172.16.30.207: icmp_seq=1 ttl=127 time=2.04 ms
64 bytes from 172.16.30.207: icmp_seq=2 ttl=127 time=1.26 ms
64 bytes from 172.16.30.207: icmp_seq=3 ttl=127 time=8.00 ms
64 bytes from 172.16.30.207: icmp_seq=4 ttl=127 time=2.63 ms
64 bytes from 172.16.30.207: icmp_seq=5 ttl=127 time=1.27 ms
^Z
[1]+  Detenido                  ping 172.16.30.207
```

## PING MARKETING A COMPATIBILIDAD

```
C:\Users\alumne>ping 172.16.20.132

Haciendo ping a 172.16.20.132 con 32 bytes de datos:
Respuesta desde 172.16.20.132: bytes=32 tiempo=1ms TTL=63

Estadísticas de ping para 172.16.20.132:
    Paquetes: enviados = 4, recibidos = 4, perdidos = 0
                (0% perdidos),
Tiempos aproximados de ida y vuelta en milisegundos:
    Mínimo = 1ms, Máximo = 1ms, Media = 1ms
```

Fichero concesion

```

hardware ethernet 08:00:27:a0:d0:29;
uid "\001\010\000'\\"240\320)";
client-hostname "dfelix-VirtualBox";
}

lease 172.16.30.57 {
    starts 5 2023/10/06 14:16:37;
    ends 5 2023/10/06 14:21:37;
    tstp 5 2023/10/06 14:21:37;
    cltt 5 2023/10/06 14:16:37;
    binding state free;
    hardware ethernet 08:00:27:41:28:4a;
    uid "\001\010\000'A(J'";
    set vendor-class-identifier = "MSFT 5.0";
}

lease 172.16.20.132 {
    starts 5 2023/10/06 14:23:09;
    ends 5 2023/10/06 14:28:09;
    cltt 5 2023/10/06 14:23:09;
    binding state active;
    next binding state free;
    rewind binding state free;
    hardware ethernet 08:00:27:a0:d0:29;
    uid "\001\010\000'\\"240\320)";
    client-hostname "dfelix-VirtualBox";
}

lease 172.16.20.132 {
    starts 5 2023/10/06 14:25:39;
    ends 5 2023/10/06 14:30:39;
    cltt 5 2023/10/06 14:25:39;
    binding state active;
    next binding state free;
    rewind binding state free;
    hardware ethernet 08:00:27:a0:d0:29;
    uid "\001\010\000'\\"240\320)";
    client-hostname "dfelix-VirtualBox";
}
dfelix@server:~$ _

```

### Fichero comprobación IP asignada por rango

```

dfelix@dfelix-VirtualBox:~$ dhclient -r
dfelix@dfelix-VirtualBox:~$ sudo dhclient -nw
dfelix@dfelix-VirtualBox:~$ 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,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether 08:00:27:a0:d0:29 brd ff:ff:ff:ff:ff:ff
        inet 172.16.20.132/24 brd 172.16.20.255 scope global dynamic noprefixroute enp0s3
            valid_lft 187sec preferred_lft 187sec
        inet 172.16.20.133/24 brd 172.16.20.255 scope global secondary dynamic enp0s3
            valid_lft 243sec preferred_lft 243sec
        inet6 fe80::37c1:9380:345e:d0d0/64 scope link noprefixroute
            valid_lft forever preferred_lft forever

```

```
dfelix@dfelix-VirtualBox:~$ nmcli device show | grep IP4
IP4.ADDRESS[1]:                         172.16.20.133/24
IP4.ADDRESS[2]:                         172.16.20.132/24
IP4.GATEWAY:                           172.16.20.11
IP4.ROUTE[1]:                           dst = 172.16.20.0/24, nh = 0.0.0.0, mt = 100
IP4.ROUTE[2]:                           dst = 169.254.0.0/16, nh = 0.0.0.0, mt = 1000
IP4.ROUTE[3]:                           dst = 0.0.0.0/0, nh = 172.16.20.11, mt = 100
IP4.ROUTE[4]:                           dst = 0.0.0.0/0, nh = 172.16.20.11, mt = 0
IP4.DNS[1]:                             8.8.8.8
IP4.DNS[2]:                             8.8.4.4
IP4.DOMAIN[1]:                          google.es
IP4.ADDRESS[1]:                         127.0.0.1/8
IP4.GATEWAY:                           --
```

### Comprobación IP de windows

```
C:\Users\alumne>ipconfig /release
Configuración IP de Windows

Adaptador de Ethernet Ethernet:
  Sufijo DNS específico para la conexión. . . :
  Vínculo: dirección IPv6 local. . . : fe80::e454:e638:7f99:f58d%9
  Puerta de enlace predeterminada . . . . . :

C:\Users\alumne>ipconfig /renew
Configuración IP de Windows

Adaptador de Ethernet Ethernet:
  Sufijo DNS específico para la conexión. . . : ascofoods.foo
  Vínculo: dirección IPv6 local. . . : fe80::e454:e638:7f99:f58d%9
  Dirección IPv4. . . . . : 172.16.30.207
  Máscara de subred . . . . . : 255.255.255.0
  Puerta de enlace predeterminada . . . . : 172.16.30.254
```

## Building configuration...

```
Current configuration : 2111 bytes
!
version 15.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname R1
!
boot-start-marker
boot-end-marker
!
!
aqm-register-fnf
!
!
no aaa new-model
mmi polling-interval 60
no mmi auto-configure
no mmi pvc
mmi snmp-timeout 180
```

```
no ip icmp rate-limit unreachable
!
R1#show run
Building configuration...
Current configuration : 2111 bytes
!
version 15.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname R1
!
boot-start-marker
boot-end-marker
!
!
aqm-register-fnf
!
!
no aaa new-model
mmi polling-interval 60
no mmi auto-configure
no mmi pvc
mmi snmp-timeout 180
no ip icmp rate-limit unreachable
!
!
!
!
!
!
!
!
!
!
no ip domain lookup
ip cef
no ipv6 cef
!
multilink bundle-name authenticated
!
!
```

```
!
!
!
!
!
!
redundancy
!
!
ip tcp synwait-time 5
!
!
!
!
!
!
!
!
!
!
!
!
!
!
!
```

interface Ethernet0/0

```
ip address dhcp
ip nat outside
ip virtual-reassembly in
!
```

interface Ethernet0/1

```
ip address 172.16.10.1 255.255.255.0
ip nat inside
ip virtual-reassembly in
!
```

interface Ethernet0/2

```
ip address 172.16.20.11 255.255.255.0
ip helper-address 172.16.10.50
ip nat inside
ip virtual-reassembly in
!
```

interface Ethernet0/3

```
ip address 172.16.30.254 255.255.255.0
ip helper-address 172.16.10.50
ip nat inside
ip virtual-reassembly in
!
```

interface Ethernet1/0

```
no ip address
```

```
shutdown
!
interface Ethernet1/1
no ip address
shutdown
!
interface Ethernet1/2
no ip address
shutdown
!
interface Ethernet1/3
no ip address
shutdown
!
interface Serial2/0
no ip address
shutdown
serial restart-delay 0
!
interface Serial2/1
no ip address
shutdown
serial restart-delay 0
!
interface Serial2/2
no ip address
shutdown
serial restart-delay 0
!
interface Serial2/3
no ip address
shutdown
serial restart-delay 0
!
interface Serial3/0
no ip address
shutdown
serial restart-delay 0
!
interface Serial3/1
no ip address
shutdown
serial restart-delay 0
!
interface Serial3/2
no ip address
shutdown
```

```
serial restart-delay 0
!
interface Serial3/3
no ip address
shutdown
serial restart-delay 0
!
ip forward-protocol nd
!
!
no ip http server
no ip http secure-server
ip nat inside source list 1 interface Ethernet0/0 overload
!
!
!
access-list 1 permit any
!
control-plane
!
!
!
!
!
!
!
line con 0
exec-timeout 0 0
privilege level 15
logging synchronous
line aux 0
exec-timeout 0 0
privilege level 15
logging synchronous
line vty 0 4
login
transport input none
!
!
end
```

## ANEXOS

Entramos a la configuración del router y ponemos estos comandos.

```
R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#int e0/3
R1(config-if)#ip address 172.16.30.254 255.255.255.0
R1(config-if)#int e0/2
R1(config-if)#ip address 172.16.20.11 255.255.255.0
R1(config-if)#exit
R1(config)#exit
R1#
*Oct 2 15:32:05.272: %SYS-5-CONFIG_I: Configured from console by console
R1#do wr
^
% Invalid input detected at '^' marker.

R1#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R1(config)#do wr
Building configuration...
[OK]
R1(config)#exit
R1#
*Oct 2 15:32:46.502: %SYS-5-CONFIG_I: Configured from console by console
R1#show int
R1#show interface brief
^
% Invalid input detected at '^' marker.

R1#show ip interface brief
Any interface listed with OK? value "NO" does not have a valid configuration



| Interface   | IP-Address      | OK? | Method | Status                | Protocol |
|-------------|-----------------|-----|--------|-----------------------|----------|
| Ethernet0/0 | 192.168.122.118 | YES | DHCP   | up                    | up       |
| Ethernet0/1 | 172.16.10.1     | YES | manual | up                    | up       |
| Ethernet0/2 | 172.16.20.11    | YES | manual | up                    | up       |
| Ethernet0/3 | 172.16.30.254   | YES | manual | up                    | up       |
| Ethernet1/0 | unassigned      | YES | NVRAM  | administratively down | down     |
| Ethernet1/1 | unassigned      | YES | NVRAM  | administratively down | down     |
| Ethernet1/2 | unassigned      | YES | NVRAM  | administratively down | down     |
| Ethernet1/3 | unassigned      | YES | NVRAM  | administratively down | down     |
| Serial2/0   | unassigned      | YES | NVRAM  | administratively down | down     |
| Serial2/1   | unassigned      | YES | NVRAM  | administratively down | down     |


```

Ponemos este comando “sudo nano /etc/netplan/00-installer-config.yaml” y editamos el fichero así:

```

GNU nano 6.2                               /etc/netplan/00-installer-config.yaml *
# This is the network config written by 'subiquity'
network:
  ethernets:
    enp0s3:
      addresses: [172.16.10.50/24]
      routes:
        - to: default
          via: 172.16.10.1
      nameservers:
        addresses: [8.8.8.8,8.8.4.4]
      dhcp4: false
  version: 2

```

Y ponemos este comando “sudo netplan apply” para aplicar la nueva configuración.  
Ahora instalaremos los paquetes con los comandos: “sudo apt update” y “sudo apt install -y isc-dhcp-server” y ahora paramos el servicio con el comando “sudo service isc-dhcp-server stop”

Ahora entraremos a este fichero “sudo nano /etc/default/isc-dhcp-server” para editar la configuración de la red.

Tenemos que editar el fichero así:

```

GNU nano 6.2                               /etc/default/isc-dhcp-server
1 #·Defaults·for·isc-dhcp-server·(sourced·by·./etc/init.d/isc-dhcp-server)
2
3 #·Path·to·dhcpd's·config·file·(default:·./etc/dhcp/dhcpd.conf)·.
4 #DHCPDv4_CONF=·/etc/dhcp/dhcpd.conf
5 #DHCPDv6_CONF=·/etc/dhcp/dhcpd6.conf
6
7 #·Path·to·dhcpd's·PID·file·(default:··/var/run/dhcpd.pid)·.
8 #DHCPDv4_PID=·/var/run/dhcpd.pid
9 #DHCPDv6_PID=·/var/run/dhcpd6.pid
10
11 #·Additional·options·to·start·dhcpd·with.
12 #»      Don't use·options -cf·or -pf·here;·use·DHCPD_CONF/·DHCPD_PID·instead
13 #OPTIONS="""
14
15 #·On·what·interfaces·should·the·DHCP·server·(dhcpd)·serve·DHCP·requests?
16 #»      Separate·multiple·interfaces·with·spaces,·e.g. "eth0·eth1".
17 INTERFACESv4="enp0s3"
18 INTERFACESv6=""
19

```

Ahora vamos a hacer una copia del fichero /etc/dhcp/dhcpd.conf con los comandos “sudo cp /etc/dhcp/dhcpd.conf /etc/dhcp/dhcpd.conf.original” y “sudo nano /etc/dhcp/dhcpd.conf”.

Entramos al fichero sudo nano /etc/dhcp/dhcpd.conf y lo configuramos así:

```

GNU nano 6.2                               /etc/dhcp/dhcpd.conf *
# Sample configuration file for ISC dhcpcd
#
# Attention: If /etc/ltsp/dhcpd.conf exists, that will be used as
# configuration file instead of this file.
#
# option definitions common to all supported networks...
option domain-name "ascofoods.foo";
option domain-name-servers 8.8.8.8, 8.8.4.4;

default-lease-time 120;
max-lease-time 12420;

# The ddns-updates-style parameter controls whether or not the server will
# attempt to do a DNS update when a lease is confirmed. We default to the
# behavior of the version 2 packages ('none', since DHCP v2 didn't
# have support for DDNS.)
ddns-update-style none;

# Departamento Informatica 172.16.10.0/24
subnet 172.16.10.0 netmask 255.255.255.0 {
}

# Departamento Contabilidad 172.16.20.0/24
subnet 172.16.20.0 netmask 255.255.255.0 {
    range 172.16.20.132 172.16.20.162;
    option broadcast-address 172.16.20.255;
    option routers 172.16.20.11;
    option domain-name-servers 8.8.8.8, 8.8.4.4;
    default-lease-time 300;
    max-lease-time 3600;
}

-
^G Help      ^O Write Out  ^W Where Is   ^K Cut        ^T Execute   ^C Location  M-U Undo
^X Exit      ^R Read File  ^Y Replace    ^U Paste     ^J Justify   ^V Go To Line M-E Redo

```

```

GNU nano 6.2                               /etc/dhcp/dhcpd.conf *
# Departamento Contabilidad 172.16.20.0/24
subnet 172.16.20.0 netmask 255.255.255.0 {
    range 172.16.20.132 172.16.20.162;
    option broadcast-address 172.16.20.255;
    option routers 172.16.20.11;
    option domain-name-servers 8.8.8.8, 8.8.4.4;
    default-lease-time 300;
    max-lease-time 3600;
}

# Departamento Marketing 172.16.30.0/24
subnet 172.16.30.0 netmask 255.255.255.0 {
    range 172.16.30.57 172.16.30.157;
    option broadcast-address 172.16.30.255;
    option routers 172.16.30.254;
    option domain-name-servers 8.8.8.8, 8.8.4.4;

    # Maquina IP Fixa
    host impresora {
        option host-name "example.org";
        hardware ethernet 08:00:27:8E:32:87;
        fixed-address 172.16.30.207;
    }
}

#
# If this DHCP server is the official DHCP server for the local
# network, the authoritative directive should be uncommented.
#authoritative;

#
# Use this to send dhcp log messages to a different log file (you also
# have to hack syslog.conf to complete the redirection).

```

```

^G Help      ^O Write Out  ^W Where Is   ^K Cut        ^T Execute   ^C Location  M-U Undo
^X Exit      ^R Read File  ^Y Replace    ^U Paste     ^J Justify   ^V Go To Line M-E Redo

```

Ahora iniciamos el servidor con este comando “sudo service isc-dhcp-server start” y comprobamos el estado del servidor con este comando “sudo service isc-dhcp-server status”

```
subnet 172.16.30.0 netmask 255.255.255.0 {
range 172.16.30.57 172.16.30.157;
option broadcast-address 172.16.30.255;
option routers 172.16.30.254;
option domain-name-servers 8.8.8.8, 8.8.4.4;
default-lease-time 300;
max-lease-time 3600;

dfelix@server:~$ sudo service isc-dhcp-server stop
dfelix@server:~$ sudo service isc-dhcp-server start
dfelix@server:~$ sudo service isc-dhcp-server status
● isc-dhcp-server.service - ISC DHCP IPv4 server
   Loaded: loaded (/lib/systemd/system/isc-dhcp-server.service; enabled; vendor preset: enabled)
     Active: active (running) since Tue 2023-10-03 15:57:08 UTC; 5s ago
       Docs: man:dhcpcd(8)
     Main PID: 1093 (dhcpcd)
        Tasks: 4 (limit: 2220)
      Memory: 4.8M
         CPU: 25ms
      CGroup: /system.slice/isc-dhcp-server.service
              └─1093 dhcpcd -user dhcpcd -group dhcpcd -f -4 -pf /run/dhcp-server/dhcpcd.pid -cf /etc/dh
oct 03 15:57:08 server sh[1093]: Wrote 0 new dynamic host decls to leases file.
oct 03 15:57:08 server dhcpcd[1093]: Wrote 0 leases to leases file.
oct 03 15:57:08 server sh[1093]: Wrote 0 leases to leases file.
oct 03 15:57:08 server dhcpcd[1093]: Listening on LPF/enp0s3/08:00:27:f1:c0:cf/172.16.10.0/24
oct 03 15:57:08 server sh[1093]: Listening on LPF/enp0s3/08:00:27:f1:c0:cf/172.16.10.0/24
oct 03 15:57:08 server dhcpcd[1093]: Sending on   LPF/enp0s3/08:00:27:f1:c0:cf/172.16.10.0/24
oct 03 15:57:08 server sh[1093]: Sending on   LPF/enp0s3/08:00:27:f1:c0:cf/172.16.10.0/24
oct 03 15:57:08 server dhcpcd[1093]: Sending on   Socket/fallback/fallback-net
oct 03 15:57:08 server sh[1093]: Sending on   Socket/fallback/fallback-net
oct 03 15:57:08 server dhcpcd[1093]: Server starting service.
lines 1-21/21 (END)
[2]+  Stopped                  sudo service isc-dhcp-server status
dfelix@server:~$ _
```

Proces	Test case	Step	Descripció	Status	Expected result	Actual result
Connectivitat a Internet des del router	ping	1	Ping de router1 a IP d'Internet	pass	ok	ok
Connectivitat a Internet des de la subxarxa del servidor	ping	1	Ping d'Informàtica a domini d'Internet	pass	ok	ok
Funcionament del servidor DHCP	systemctl status dhcpcd	1	Estat del servei DHCP	pass	active, enabled	active, enable
Concessions DHCP al servidor	cat /var/lib/dhcpcd/dhcpcd.leases	1	Concessió DHCP a contabilitat	pass	ok	ko
Concessions DHCP als clients	dhclient -r dhclient -nw ifconfig ip a ip r cat /etc/resolv.conf nmcli device show   grep IP4	1	Concessió DHCP a contabilitat	PASS	ok	ko
	ipconfig /release ipconfig /renew ipconfig /all	2	Concessió DHCP a Direcció	open	ok	
Connectivitat IP entre les subxarxes	ping	1	Ping d'Informàtica a a contabilitat	ok	ok	
		2	Ping d'Informàtica a marqueting	ok	ok	ko
		3	Ping de contabilitat a marqueting	ok	ok	
		4	Ping de marqueting a contabilitat	OK	ok	
		5		open	ok	
		6		open	ok	