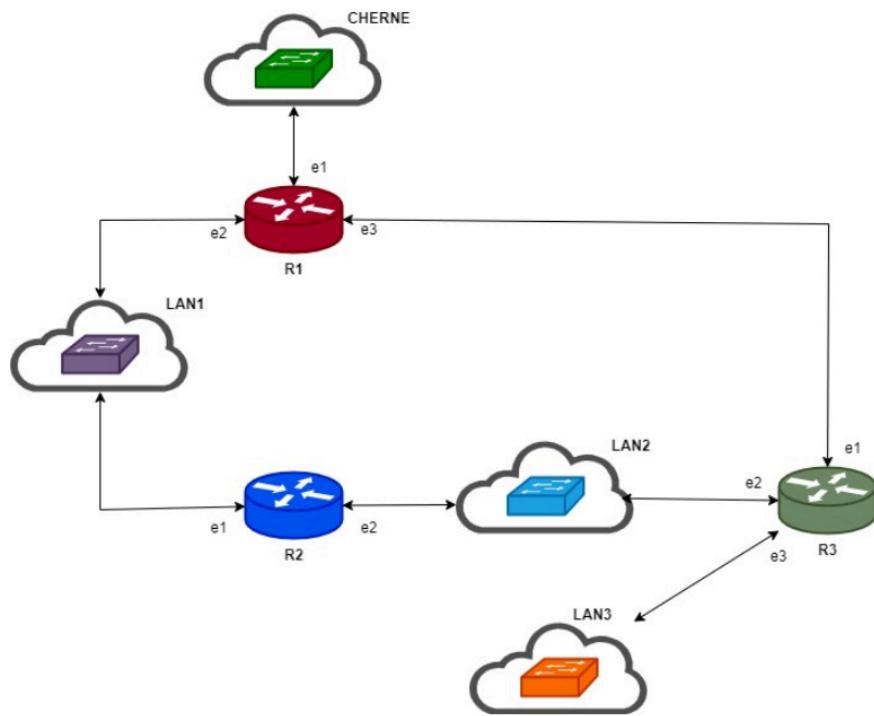


# DHCP,DNS,NAT,RIPv2



## Datos:

**LAN1:** 10.10.100.128/255.255.255.128

Red LAN1 = 10.10.100.128

Primera de la red = 10.10.100.129

Última de la red = 10.10.100.254

Broadcast = 10.10.100.255

**LAN2:** 172.16.2.0/255.255.254.0

Red LAN2 = 172.16.2.0/23

Primera de la red = 172.16.2.1

Última de la red = 172.16.3.254

Broadcast = 172.16.3.255

**LAN3:** 192.168.4.0/255.255.255.0

Red LAN3 = 192.168.4.0

Broadcast = 192.168.4.255

Primera de la red = 192.168.4.1

Última de la red = 192.168.4.254

**Enlace R1-R3:** 192.168.100.0/30

Primera de la red = 192.168.100.1

Última de la red = 192.168.100.2

R1 IP en e1 dinámica sin utilizar NAT en VMware o Virtualbox

R1 IP en e2 la **primera** de la red

R1 IP en e3 la **última** de la red

R2 IP en e1 la **última** de la red

R2 IP en e2 la **primera** de la red

R3 IP en e1 la **primera** de la red

R3 IP en e2 la **última** de la red

R3 IP en e3 la **primera** de la red

**1.** Configura la passwd de admin: 123456 en los tres routers

```
          .  
          .  
          .  
  
        MMM      MMM      KKK          TTTTTTTTTT      KKK  
        MMMMM    MMMMM    KKK          TTTTTTTTTT      KKK  
        MMM  MMMM  MMM  III  KKK  KKK  RRRRRR  000000  TTT  III  KKK  KKK  
        MMM  MM  MMM  III  KKKKKK  RRR  RRR  000  000  TTT  III  KKKKKK  
        MMM      MMM      III  KKK  KKK  RRRRRR  000  000  TTT  III  KKK  KKK  
        MMM      MMM      III  KKK  KKK  RRR  RRR  000000  TTT  III  KKK  KKK  
  
MikroTik RouterOS 7.13.1 (c) 1999-2024           https://www.mikrotik.com/  
  
Do you want to see the software license? [Y/n]: n  
Press F1 for help  
  
Change your password  
new password> *****  
repeat new password> *****  
  
Password changed  
[admin@MikroTik] >
```

## **2. Configura las direcciones IP en todas las interfaces de los tres routers.**

Configura solo las direcciones de Red de las interfaces, no las rutas. La interfaz e1 del R1 deberá configurarse como cliente DHCP y por tanto, se obtendrá una ruta por defecto en la red de CHERNE en este router.

DHCP Client	DHCP Client Options	DHCP Client					
<a href="#">Add New</a>							
1 item							
	Comment	Interface	Use Peer DNS	Add Default Route	IP Address	Expires After	
<a href="#">-</a> <a href="#">D</a>		ether1	yes	yes	192.168.1.184/24	11:26:04	

### Router 1:

Adaptador el está en bridged, con IP 192.168.1.184/24

#	ADDRESS	NETWORK	INTERFACE
0	D 192.168.1.184/24	192.168.1.0	ether1
1	10.10.100.129/25	10.10.100.128	ether2
2	192.168.100.2/30	192.168.100.0	ether3

### Router 2:

#	ADDRESS	NETWORK	INTERFACE
0	10.10.100.254/25	10.10.100.128	ether1
1	172.16.2.1/23	172.16.2.0	ether2

### Router 3:

#	ADDRESS	NETWORK	INTERFACE
0	172.16.3.254/23	172.16.2.0	ether2
1	192.168.4.1/24	192.168.4.0	ether3
2	192.168.100.1/30	192.168.100.0	ether1

3. Anota cuántas rutas existen en cada uno de los routers en este instante.

### Router 1:

4 items						
		Comment	▲ Dst. Address	Gateway	Distance	Pref. Source
	DAd		0.0.0.0/0	192.168.1.1	1	
	DAC		10.10.100.128/25	%ether2		
	DAC		192.168.1.0/24	%ether1		
	DAC		192.168.100.0/30	%ether3		

### Router 2:

		Comment	▲ Dst. Address	Gateway
	DAC		10.10.100.128/25	%ether1
	DAC		172.16.2.0/23	%ether2

### Router 3:

		Comment	Dst. Address	Gateway
-	DAC		172.16.2.0/23	%ether2
-	DAC		192.168.4.0/24	%ether3
-	DAC		192.168.100.0/30	%ether1

4. Activa RIP en R1 solo en las interfaces e2 y e3 y distribuye las rutas conectadas, las RIP y la ruta por defecto si está instalada. También activa RIP en R2 solo en la interfaz e1 para las rutas conectadas y las RIP. Anota las rutas existentes en los tres routers.

### Router 1:

The screenshot shows the configuration interface for a RIP instance named "rip-instance-1". The "Enabled" checkbox is checked. Under "Redistribute", the "connected" and "rip" options are selected. The "Originate Default" dropdown is set to "if installed". At the bottom, there are "Cancel", "Apply", and "OK" buttons.

Enabled	<input checked="" type="checkbox"/>
Name	rip-instance-1
VRF	▼
AFI	▼
Input Filter	▼
Output Filter	▼
Select Output Filter	▼
Redistribute	<input checked="" type="checkbox"/> connected <input type="checkbox"/> static <input checked="" type="checkbox"/> rip <input type="checkbox"/> ospf <input type="checkbox"/> bgp <input type="checkbox"/> vpn <input type="checkbox"/> dhcp <input type="checkbox"/> fantasy <input type="checkbox"/> modem <input type="checkbox"/> bgp-mpls-vpn
Originate Default	▲ if installed ▼
Routing Table	▼
Route Timeout	▼
Route GC Timeout	▼
Update Interval	▼
Cancel   Apply   OK	

Enabled	<input checked="" type="checkbox"/>
Name	rip-interface-1
Instance	rip-instance-1
Interfaces	ether2
Source Addresses	▼
Cost	▼
Split Horizon	▼
Poison Reverse	▼
Mode	▼
Use BFD	▼
Key Chain	▼
Password	▼
<input type="button" value="Cancel"/> <input type="button" value="Apply"/> <input type="button" value="OK"/>	
Enabled	<input checked="" type="checkbox"/>
Name	rip-interface-2
Instance	rip-instance-1
Interfaces	ether3
Source Addresses	▼
Cost	▼
Split Horizon	▼
Poison Reverse	▼
Mode	▼
Use BFD	▼
Key Chain	▼
Password	▼

<b>Add New</b>						
2 items						
		▲ Name	Instance	Cost	Key Chain	
-	D	rip-interface-1	rip-instance-1			
-	D	rip-interface-2	rip-instance-1			

**Router 2:**

1 item							
		▲ Name	VRF	AFI	Input Filter	Output Filter	Select Output Filter
-	D	rip-instance-1					

<input type="checkbox"/> Enabled <input checked="" type="checkbox"/> <span style="float: right;">Remove</span>									
Name	rip-interface-1								
Instance	rip-instance-1								
Interfaces	<input style="border: none; padding: 0; margin: 0; width: 100px; height: 20px;" type="button" value="ether1"/> <span style="font-size: 2em; margin-left: 10px;">▲</span> <span style="font-size: 2em; margin-left: 10px;">▼</span>								
Source Addresses	<span style="font-size: 2em; margin-left: 10px;">▼</span>								
Cost	<span style="font-size: 2em; margin-left: 10px;">▼</span>								
Split Horizon	<span style="font-size: 2em; margin-left: 10px;">▼</span>								
Poison Reverse	<span style="font-size: 2em; margin-left: 10px;">▼</span>								
Mode	<span style="font-size: 2em; margin-left: 10px;">▼</span>								
Use BFD	<span style="font-size: 2em; margin-left: 10px;">▼</span>								
Key Chain	<span style="font-size: 2em; margin-left: 10px;">▼</span>								
Password	<span style="font-size: 2em; margin-left: 10px;">▼</span>								

**Tabla rutas nueva router 1:**

		Comment	▲ Dst. Address	Gateway	Distance	Pref. Source
-	DAd		0.0.0.0	192.168.1.1	1	
-	DAC		10.10.100.128/25	%ether2		
-	DAr		172.16.2.0/23	10.10.100.254%ether2	120	
-	DAC		192.168.1.0/24	%ether1		
-	DAC		192.168.100.0/30	%ether3		

### Tabla rutas nueva router 2:

		Comment	▲ Dst. Address	Gateway	Distance	Pref. Source
-	DAr		0.0.0.0/0	10.10.100.129%ether1	120	
-	DAC		10.10.100.128/25	%ether1		
-	DAC		172.16.2.0/23	%ether2		
-	DAr		192.168.1.0/24	10.10.100.129%ether1	120	
-	DAr		192.168.100.0/30	10.10.100.129%ether1	120	

### Tabla rutas router 3:

		Comment	▲ Dst. Address	Gateway
-	DAC		172.16.2.0/23	%ether2
-	DAC		192.168.4.0/24	%ether3
-	DAC		192.168.100.0/30	%ether1

5. Activa RIP en R3 en todas las interfaces solo para las rutas conectadas y las RIP. En la interfaz e3 debe estar configurada en modo pasivo. Anota las rutas existentes en los tres routers.

The screenshot shows the configuration of a RIP instance named "rip-instance-1". The configuration includes:

- Enabled:** Checked
- Name:** rip-instance-1
- VRF:** Selected
- AFI:** IPv4 (selected)
- Input Filter:** (dropdown menu)
- Output Filter:** (dropdown menu)
- Select Output Filter:** (dropdown menu)
  - Redistribute:** (dropdown menu)
    - connected
    - static
    - rip
    - ospf
    - bgp
    - vpn
    - dhcp
    - fantasy
    - modem
    - bgp-mpls-vpn
- Originate Default:** (dropdown menu)

### RIP pasivo en e3:

Enabled	<input checked="" type="checkbox"/>
Name	rip-interface-2
Instance	rip-instance-1
Interfaces	ether3
Source Addresses	▼
Cost	▼
Split Horizon	▼
Poison Reverse	▼
Mode	▲ passive ▼

### RIP en e1 y e2:

Enabled	<input checked="" type="checkbox"/>
Name	rip-interface-1
Instance	rip-instance-1
Interfaces	ether2 ether1
Source Addresses	▼
Cost	▼

**Nueva tabla router 1:**

7 items						
		Comment	▲ Dst. Address	Gateway	Distance	Pref. Source
[ ]	DAd		0.0.0.0	10.20.0.1	1	
[ -]	DAC		10.10.100.128/25	%ether2		
[ -]	DAC		10.20.0.0/16	%ether1		
[ -]	DAr+		172.16.2.0/23	192.168.100.1%ether3	120	
[ -]	DAr		172.16.2.0/23	10.10.100.254%ether2	120	
[ -]	DAr		192.168.4.0/24	192.168.100.1%ether3	120	
[ -]	DAC		192.168.100.0/30	%ether3		

**Nueva tabla router 2:**

7 items				
		Comment	▲ Dst. Address	Gateway
[ -]	DAr		0.0.0.0/0	10.10.100.129%ether1
[ -]	DAC		10.10.100.128/25	%ether1
[ -]	Dr		172.16.2.0/23	10.10.100.129%ether1
[ -]	DAC		172.16.2.0/23	%ether2
[ -]	DAr		192.168.4.0/24	10.10.100.129%ether1
[ -]	DAr		192.168.100.0/30	10.10.100.129%ether1
[ -]	DAr		192.168.108.0/24	10.10.100.129%ether1

**Nueva tabla router 3:**

6 items					
		Comment	▲ Dst. Address	Gateway	Distance
[ -]	DAr		0.0.0.0/0	192.168.100.2%ether1	120
[ -]	DAr		10.10.100.128/25	192.168.100.2%ether1	120
[ -]	DAC		172.16.2.0/23	%ether2	
[ -]	DAC		192.168.4.0/24	%ether3	
[ -]	DAC		192.168.100.0/30	%ether1	
[ -]	DAr		192.168.108.0/24	192.168.100.2%ether1	120

- 6.** Activa RIP en la interfaz e2 de R2 para las interfaces conectadas y las RIP. Anota las rutas ECMP (Equal Cost MultiPath) de cada router (DAr+). Fíjate en que la gateway de cada ruta sea distinta.

Enabled	<input checked="" type="checkbox"/>
Name	rip-interface-2
Instance	rip-instance-1
Interfaces	ether2
Source Addresses	
Cost	
Split Horizon	
Poison Reverse	

### Nueva tabla router 1:

		Comment	Dst. Address	Gateway	Distance
[ ]	DAd		0.0.0.0/0	192.168.108.2	1
[ ]	Dr		10.10.100.128/25	192.168.100.1%ether3	120
[ ]	DAC		10.10.100.128/25	%ether2	
[ ]	DAr+		172.16.2.0/23	192.168.100.1%ether3	120
[ ]	DAr		172.16.2.0/23	10.10.100.254%ether2	120
[ ]	DAr		192.168.4.0/24	192.168.100.1%ether3	120
[ ]	Dr		192.168.100.0/30	10.10.100.254%ether2	120
[ ]	DAC		192.168.100.0/30	%ether3	
[ ]	DAC		192.168.108.0/24	%ether1	

### Nueva tabla router 2:

		Comment	Dst. Address	Gateway	Distance
[ ]	DAr		0.0.0.0/0	10.10.100.129%ether1	120
[ ]	DAC		10.10.100.128/25	%ether1	
[ ]	Dr		172.16.2.0/23	10.10.100.129%ether1	120
[ ]	DAC		172.16.2.0/23	%ether2	
[ ]	DAr		192.168.4.0/24	172.16.3.254%ether2	120
[ ]	DAr+		192.168.100.0/30	10.10.100.129%ether1	120
[ ]	DAr+		192.168.100.0/30	172.16.3.254%ether2	120
[ ]	DAr		192.168.108.0/24	10.10.100.129%ether1	120

### Nueva tabla router 3:

8 items					
		Comment	▲ Dst. Address	Gateway	Distance
-	DAr		0.0.0.0/0	192.168.100.2%ether1	120
-	DAr+		10.10.100.128/25	172.16.2.1%ether2	120
-	DAr		10.10.100.128/25	192.168.100.2%ether1	120
-	DAC		172.16.2.0/23	%ether2	
-	DAC		192.168.4.0/24	%ether3	
-	Dr		192.168.100.0/30	172.16.2.1%ether2	120
-	DAC		192.168.100.0/30	%ether1	
-	DAr		192.168.108.0/24	192.168.100.2%ether1	120

7. En el R1 aumenta el coste RIP de la interfaz e2 a 2 y verifica si hay alguna ECMP en la tabla de encaminamiento de este router.

7 items					
		Comment	▲ Dst. Address	Gateway	Distance
-	DAd		0.0.0.0/0	192.168.108.2	1
-	Dr		10.10.100.128/25	192.168.100.1%ether3	120
-	DAC		10.10.100.128/25	%ether2	
-	DAr		172.16.2.0/23	192.168.100.1%ether3	120
-	DAr		192.168.4.0/24	192.168.100.1%ether3	120
-	DAC		192.168.100.0/30	%ether3	
-	DAC		192.168.108.0/24	%ether1	

8. En el R1 aumenta el coste RIP de la interfaz e3 a 3 y verifica si hay alguna ECMP en la tabla de encaminamiento de este router.

8 items					
		Comment	▲ Dst. Address	Gateway	Distance
-	DAd		0.0.0.0/0	192.168.108.2	1
-	DAC		10.10.100.128/25	%ether2	
-	Dr		10.10.100.128/25	192.168.100.1%ether3	120
-	DAr		172.16.2.0/23	10.10.100.254%ether2	120
-	DAr+		192.168.4.0/24	10.10.100.254%ether2	120
-	DAr		192.168.4.0/24	192.168.100.1%ether3	120
-	DAC		192.168.100.0/30	%ether3	
-	DAC		192.168.108.0/24	%ether1	

### Nueva tabla router 3:

10 items					
		Comment	▲ Dst. Address	Gateway	Distance
[ ]	DAr		0.0.0.0/0	192.168.100.2%ether1	120
[ ]	DAr+		10.10.100.128/25	172.16.2.1%ether2	120
[ ]	DAr		10.10.100.128/25	192.168.100.2%ether1	120
[ ]	Dr		172.16.2.0/23	192.168.100.2%ether1	120
[ ]	DAC		172.16.2.0/23	%ether2	
[ ]	Dr		192.168.4.0/24	192.168.100.2%ether1	120
[ ]	DAC		192.168.4.0/24	%ether3	
[ ]	Dr		192.168.100.0/30	172.16.2.1%ether2	120
[ ]	DAC		192.168.100.0/30	%ether1	
[ ]	DAr		192.168.108.0/24	192.168.100.2%ether1	120

**9.** Activa el NAT en R1 para que las redes LAN1, LAN2 y LAN3 pero no la red 192.168.100.0/30 puedan acceder a Internet.

Permitimos NAT:

The screenshot shows a configuration interface for a NAT rule. The rule is enabled and set to the 'srcnat' chain. It applies to all source addresses (0.0.0.0/0) and has an empty destination address field. The rule is part of a list under the 'General' tab.

Enabled	✓
Comment	
General	
Chain	srcnat
Src. Address	▲ <input type="checkbox"/> 0.0.0.0/0
Dst. Address	▼
Src. Address List	▼
Dst. Address List	▼

**Advanced**

**Extra**

**Action**

Action	masquerade
Log	<input type="checkbox"/>
Log Prefix	▼
To Ports	▼

Evitamos que la red que conecta los dos routers puedan acceder a internet:

**General**

Chain	srcnat
Src. Address	192.168.100.0/30
Dst. Address	▼
Src. Address List	▼
Dst. Address List	▼
Protocol	▼

**Extra**

**Action**

Action	masquerade
Log	<input type="checkbox"/>
Log Prefix	▼
To Ports	▼

- 10.** Abre en R1 el puerto 81 para poder acceder a la gestión del router R2 desde la red CHERNE (redirige al R2 IP de la LAN1 y puerto 80)

**General**

Chain	dstnat
Src. Address	▼
Dst. Address	▼
Src. Address List	▼
Dst. Address List	▼

**▼ Action**

Action	dst-nat
Log	<input type="checkbox"/>
Log Prefix ▼	
To Addresses	▲ 10.10.100.254
To Ports	▲ 80

11. Abre en R1 el puerto 82 para poder acceder a la gestión del router R3 desde la red CHERNE (redirige al R3 IP 192.168.100.1 y puerto 80)

**▼ General**

Chain	dnsmasq
Src. Address	▼
Dst. Address	▼
Src. Address List	▼
Dst. Address List	▼
Protocol	▲ <input type="checkbox"/> tcp
Src. Port	▼
Dst. Port	▲ <input type="checkbox"/> 82

**▼ Action**

Action	dst-nat
Log	<input type="checkbox"/>
Log Prefix ▼	
To Addresses	▲ 192.168.100.1
To Ports	▲ 80

**12.** Crea en R1 3 pools de direcciones: lan1pool: 10.10.100.200-10.10.100.210, lan2pool: 172.16.3.0-172.16.3.200, lan3pool: 192.168.4.100-192.168.4.150. Despu s crea tres DHCP server en R1. En todos asigna el par metro Server Address con la IP de la interfaz e2 de R1. El segundo DHCP server debe tener como Relay la IP de e2 del R2 y tercero debe tener como Relay la IP de e3 del R3. La puerta de enlace que debe asignar para la LAN2 es la correspondiente al R3. El DNS de la LAN1 es 8.8.8.8, LAN2 1.1.1.1 y LAN3 8.8.4.4.

## POOLS:

3 items					
		Comment	Name	Addresses	Next Pool
-			lan1pool	10.10.100.200-10.10.100.210	none
-			lan2pool	172.16.3.0-172.16.3.200	none
-			lan3pool	192.168.4.100-192.168.4.150	none

## DHCP Lan1:

**General**

Name	DHCP_LAN1
Interface	ether2
Relay	▼
Lease Time	00:30:00
Bootp Lease Time	forever
Address Pool	lan1pool
DHCP Option Set	▼
Server Address	▲ 10.10.100.129
Delay Threshold	▼
Authoritative	yes
Bootp Support	static
Client MAC Limit	▼

Comment	<input type="text"/>
Address	<input type="text" value="10.10.100.128/25"/>
Gateway	<input type="text" value="10.10.100.129"/> ▲
Netmask	▲ <input type="text" value="25"/>
No DNS	<input type="checkbox"/>
DNS Servers	<input type="text" value="8.8.8.8"/> ▲
Domain	▼

### DHCP Lan2:

▼ General

Name	<input type="text" value="DHCP_LAN"/>
Interface	<input type="text" value="ether2"/>
Relay	▲ <input type="text" value="172.16.2.1"/>
Lease Time	<input type="text" value="00:30:00"/>
Bootp Lease Time	<input type="text" value="forever"/>
Address Pool	<input type="text" value="lan2pool"/>
DHCP Option Set	▼
Server Address	▲ <input type="text" value="10.10.100.129"/>
Delay Threshold	▼
Authoritative	<input type="text" value="yes"/>
Bootp Support	<input type="text" value="static"/>
Client MAC Limit	▼

Comment	<input type="text"/>
Address	<input type="text" value="172.16.2.0/23"/>
Gateway	<input type="text" value="172.16.3.254"/> ▲
Netmask	▲ <input type="text" value="23"/>
No DNS	<input type="checkbox"/>
DNS Servers	▼ <input type="text" value="1.1.1.1"/> ▲

### DHCP Lan3:

General	
Name	<input type="text" value="DHCP_LAN3"/>
Interface	<input type="text" value="ether2"/>
Relay	▲ <input type="text" value="192.168.4.1"/>
Lease Time	<input type="text" value="00:30:00"/>
Bootp Lease Time	<input type="text" value="forever"/>
Address Pool	<input type="text" value="lan3pool"/>
DHCP Option Set	▼
Server Address	▲ <input type="text" value="10.10.100.129"/>
Delay Threshold	▼

Comment	<input type="text"/>
Address	<input type="text" value="192.168.4.0/24"/>
Gateway	<input type="text" value="192.168.4.1"/> ▲
Netmask	▲ <input type="text" value="24"/>
No DNS	<input type="checkbox"/>
DNS Servers	▼ <input type="text" value="8.8.4.4"/> ▲
Domain	▼

**R2:**

▼ General

Name	<input type="text" value="DHCP_LAN2"/>
Interface	<input type="text" value="ether2"/>
DHCP Server	▼ <input type="text" value="10.10.100.129"/> ▲
Delay Threshold	▼
Local Address	▼
Add Relay Info	<input type="checkbox"/>
Relay Info Remote ID	<input type="text"/>
Requests	0
Responses	0

**R3:**

▼ General

Name	<input type="text" value="DHCP_LAN3"/>
Interface	<input type="text" value="ether3"/>
DHCP Server	▼ <input type="text" value="10.10.100.129"/> ▲
Delay Threshold	▼
Local Address	▼
Add Relay Info	<input type="checkbox"/>
Relay Info Remote ID	<input type="text"/>
Requests	0

**13.** Conecta un cliente en la LAN2 y obtén configuración IP dinámica.

Seguidamente ejecuta ping -t1 8.8.8.8 y anota la dirección IP que responde.

Después haz lo mismo con ping -t2 8.8.8.8

```
root@abraham-vmwarevirtualplatform:/home/abra# ping -t1 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
From 172.16.3.254 icmp_seq=1 Time to live exceeded
From 172.16.3.254 icmp_seq=2 Time to live exceeded
From 172.16.3.254 icmp_seq=3 Time to live exceeded
From 172.16.3.254 icmp_seq=4 Time to live exceeded
^C
```

```
root@abraham-vmwarevirtualplatform:/home/abra# ping -t2 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
From 10.10.100.129 icmp_seq=1 Time to live exceeded
From 10.10.100.129 icmp_seq=2 Time to live exceeded
^C
```

**14.** Guarda la configuración de cada Router y súbelo a la plataforma. Para guardar la configuración ve a Files -> Backup (pon el nombre <tu\_nombre>\_Router1 , <tu\_nombre>\_Router2 y <tu\_nombre>\_Router3 respectivamente), click en Backup luego en Download y súbelo en la tarea asignada.

## Interfaces:

### Router 1:

ether1 = bridged

ether2 = LAN1

ether3 = conexión de Router 1 con Router 3

### Router 2:

ether1 = LAN1

ether2 = LAN2

### Router 3:

ether1 = conexión de Router 1 con Router 3

ether2 = LAN2

ether3 = LAN3