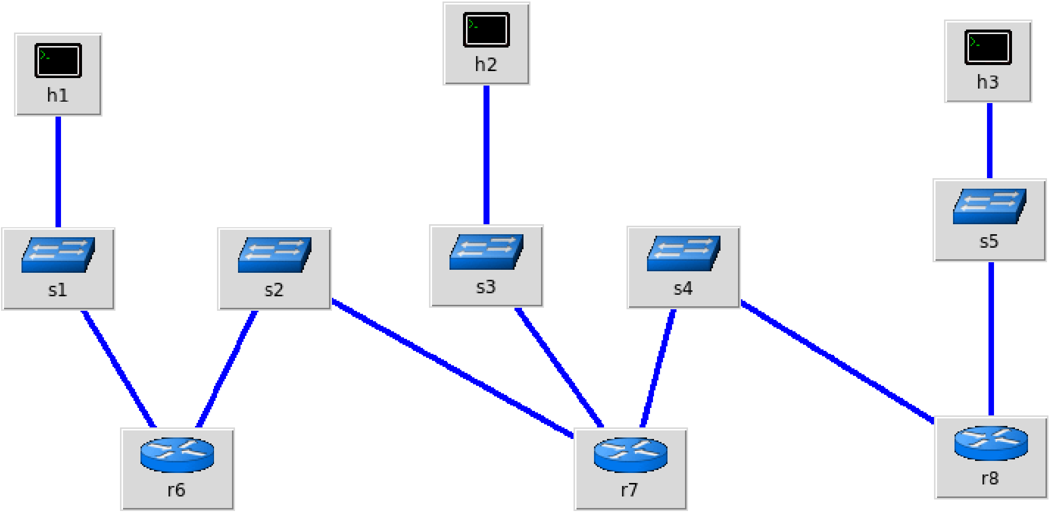
ESCENARIO 4

VIRTUAL NETWORK ELEMENT

stack it your way

ESQUEMA GRÁFICO DE LA RED

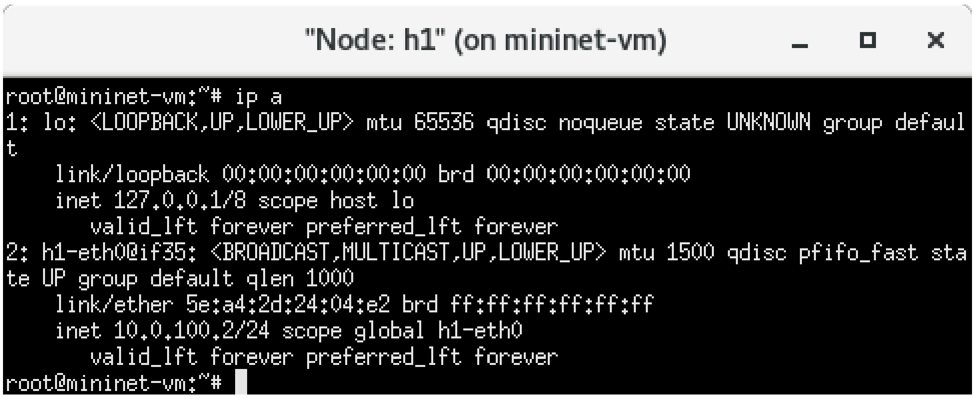


CONFIGURACIÓN DE ELEMENTOS

CONFIGURACIÓN DE LOS HOSTS

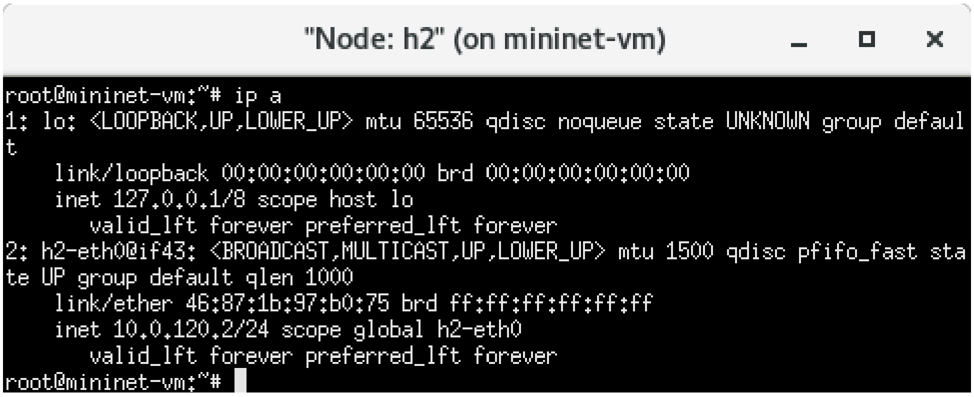
1. Comprobaremos con ***#ip a*** las interfaces de red de los diferentes elementos de la red y con **#ip a add** añadiremos las ip's a las interfaces de red de los elementos.

H1 → ***#ip a add 10.0.100.2/24 dev h1-eth0***.



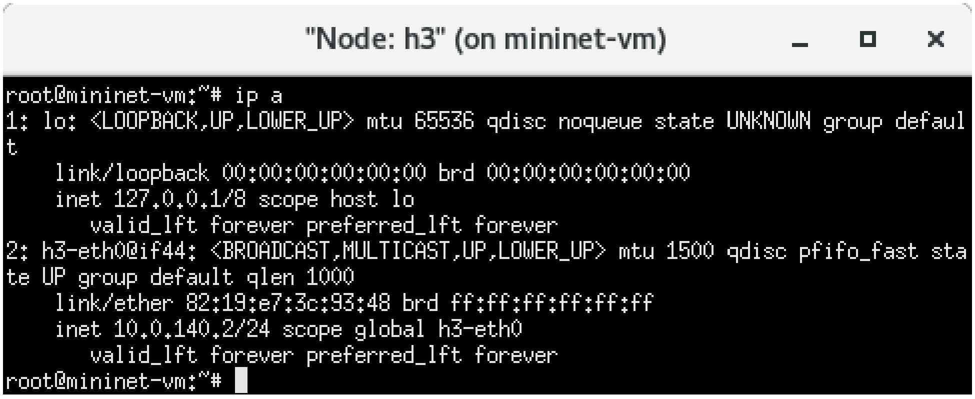
```
root@mininet-vm:~# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defaul
t
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
2: h1-eth0@if35: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast sta
te UP group default qlen 1000
    link/ether 5e:a4:2d:24:04:e2 brd ff:ff:ff:ff:ff:ff
    inet 10.0.100.2/24 scope global h1-eth0
       valid_lft forever preferred_lft forever
root@mininet-vm:~# 
```

H2 → ***#ip a add 10.0.120.2/24 dev h2-eth0***.



```
root@mininet-vm:~# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defaul
t
    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
2: h2-eth0@if43: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast sta
te UP group default qlen 1000
    link/ether 46:87:1b:97:b0:75 brd ff:ff:ff:ff:ff:ff
    inet 10.0.120.2/24 scope global h2-eth0
       valid_lft forever preferred_lft forever
root@mininet-vm:~# 
```

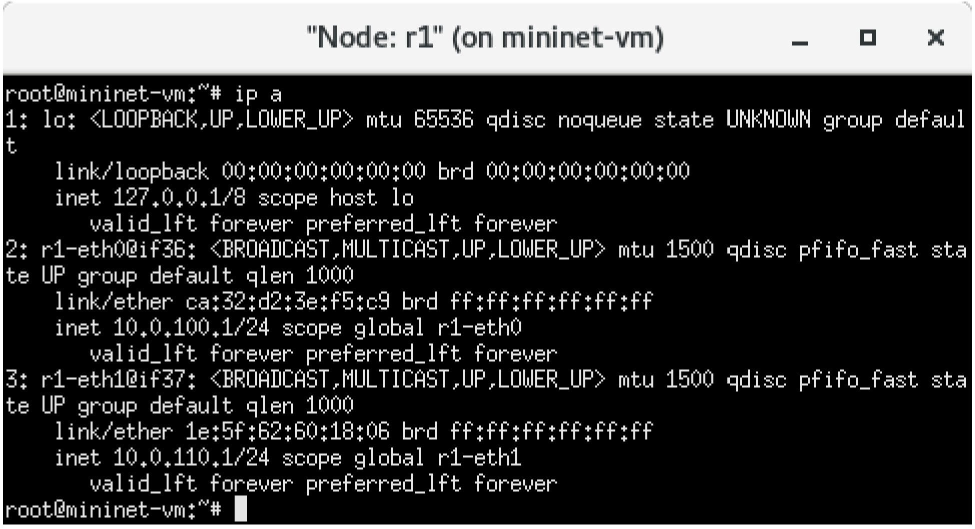
H3 → ***#ip a add 10.0.140.2/24 dev h3-eth0***.



```
root@mininet-vm:~# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defaul
t
    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
2: h3-eth0@if44: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast sta
te UP group default qlen 1000
    link/ether 82:19:e7:3c:93:48 brd ff:ff:ff:ff:ff:ff
    inet 10.0.140.2/24 scope global h3-eth0
       valid_lft forever preferred_lft forever
root@mininet-vm:~# 
```

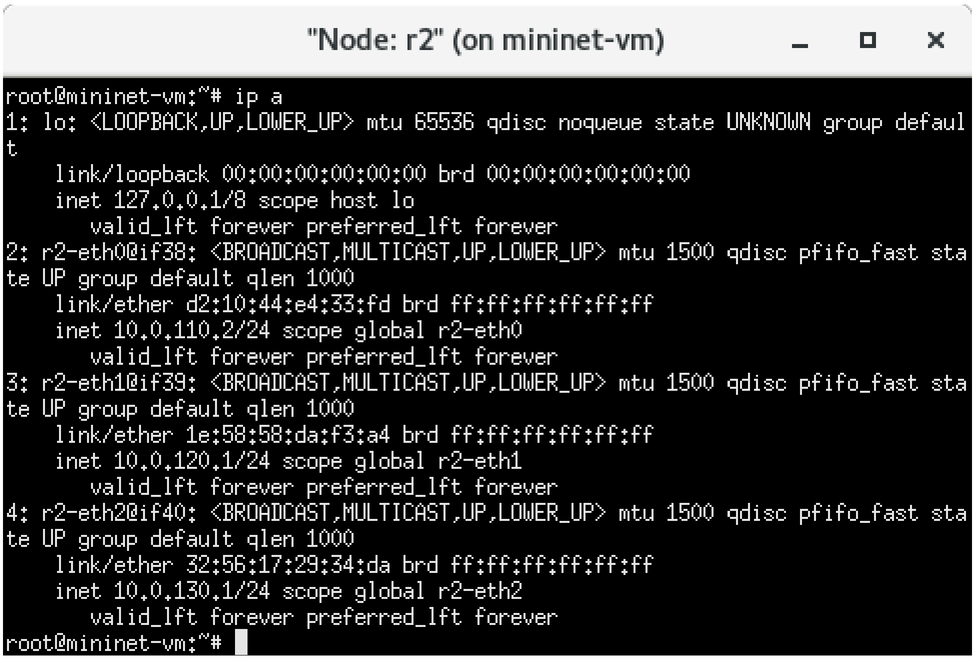
CONFIGURAR LOS ROUTERS

R1 -eth0 → ***#ip a add 10.0.100.1/24 dev r1-eth0***.
R1 -eth1 → ***#ip a add 10.0.1.110.1/24 dev r1-eth1***.



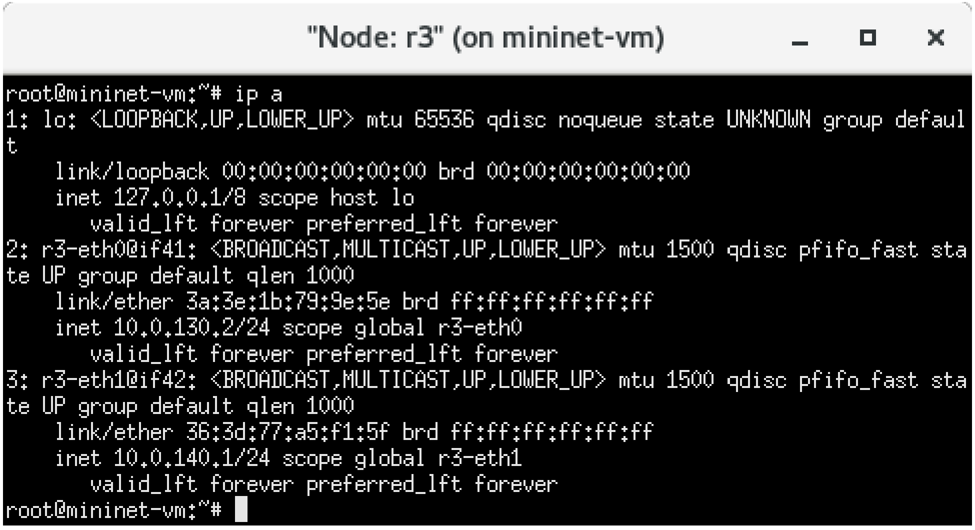
```
root@mininet-vm:~# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defaul
t
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
2: r1-eth0@if36: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast sta
te UP group default qlen 1000
    link/ether ca:32:d2:3e:f5:c9 brd ff:ff:ff:ff:ff:ff
    inet 10.0.100.1/24 scope global r1-eth0
       valid_lft forever preferred_lft forever
3: r1-eth1@if37: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast sta
te UP group default qlen 1000
    link/ether 1e:5f:62:60:18:06 brd ff:ff:ff:ff:ff:ff
    inet 10.0.110.1/24 scope global r1-eth1
       valid_lft forever preferred_lft forever
root@mininet-vm:~# 
```

R2 -eth0 → ***#ip a add 10.0.110.2/24 dev r2-eth0***.
R2 -eth1 → ***#ip a add 10.0.120.1/24 dev r2-eth1***.
R2 -eth2 → ***#ip a add 10.0.130.1/24 dev r2-eth2***.



```
root@mininet-vm:~# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defaul
t
    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
2: r2-eth0@if38: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast sta
te UP group default qlen 1000
    link/ether d2:10:44:e4:33:fd brd ff:ff:ff:ff:ff:ff
    inet 10.0.110.2/24 scope global r2-eth0
       valid_lft forever preferred_lft forever
3: r2-eth1@if39: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast sta
te UP group default qlen 1000
    link/ether 1e:58:58:da:f3:a4 brd ff:ff:ff:ff:ff:ff
    inet 10.0.120.1/24 scope global r2-eth1
       valid_lft forever preferred_lft forever
4: r2-eth2@if40: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast sta
te UP group default qlen 1000
    link/ether 32:56:17:29:34:da brd ff:ff:ff:ff:ff:ff
    inet 10.0.130.1/24 scope global r2-eth2
       valid_lft forever preferred_lft forever
root@mininet-vm:~# 
```

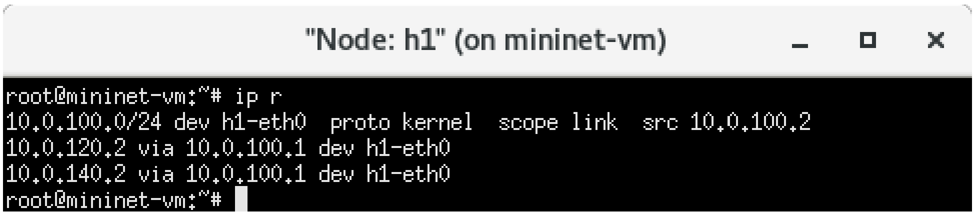
R3 -eth0 →***#ip a add 10.0.130.2/24 dev r3-eth0***.
R3 -eth1 → ***#ip a add 10.0.140.1/24 dev r3-eth1***.



```
root@mininet-vm:~# ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group defaul
t
    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
2: r3-eth0@if41: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast sta
te UP group default qlen 1000
    link/ether 3a:3e:1b:79:9e:5e brd ff:ff:ff:ff:ff:ff
    inet 10.0.130.2/24 scope global r3-eth0
       valid_lft forever preferred_lft forever
3: r3-eth1@if42: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast sta
te UP group default qlen 1000
    link/ether 36:3d:77:a5:f1:5f brd ff:ff:ff:ff:ff:ff
    inet 10.0.140.1/24 scope global r3-eth1
       valid_lft forever preferred_lft forever
root@mininet-vm:~# 
```

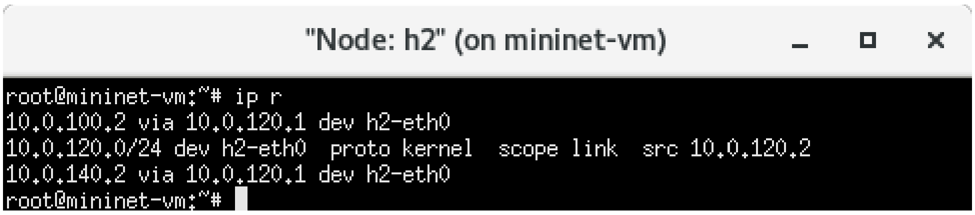
2. Una vez asignadas las ip’s le añadiremos las rutas de encaminamiento con ***#ip r add*** y las comprobaremos con ***#ip r***.

H1 → ***#ip r add 10.0.120.2 via 10.0.100.1*** (Para llegar al h2)
# ip r add 10.0.140.2 via 10.0.100.1 (Para llegar al h3)



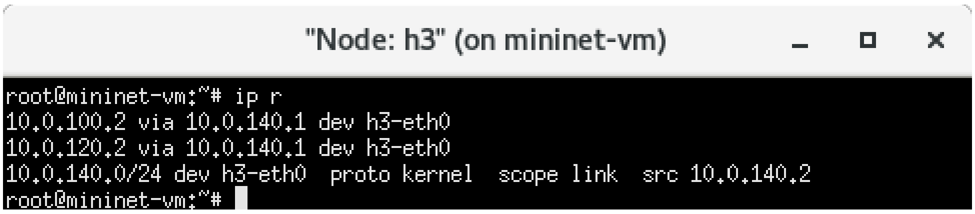
```
root@mininet-vm:~# ip r
10.0.100.0/24 dev h1-eth0  proto kernel  scope link  src 10.0.100.2
10.0.120.2 via 10.0.100.1 dev h1-eth0
10.0.140.2 via 10.0.100.1 dev h1-eth0
root@mininet-vm:~# 
```

H2 → ***#ip r add 10.0.100.2 via 10.0.120.1*** (Para llegar al h1)
#ip r add 10.0.140.2 via 10.0.120.1 (Para llegar a h3)



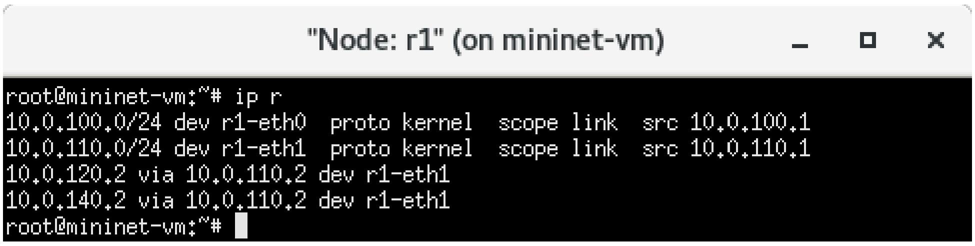
```
root@mininet-vm:~# ip r
10.0.100.2 via 10.0.120.1 dev h2-eth0
10.0.120.0/24 dev h2-eth0  proto kernel  scope link  src 10.0.120.2
10.0.140.2 via 10.0.120.1 dev h2-eth0
root@mininet-vm:~# 
```

H3 → ***#ip r add 10.0.100.2 via 10.0.140.1*** (Para llegar al h1)
#ip r add 10.0.120.2 via 10.0.140.1 (Para llegar al h2)



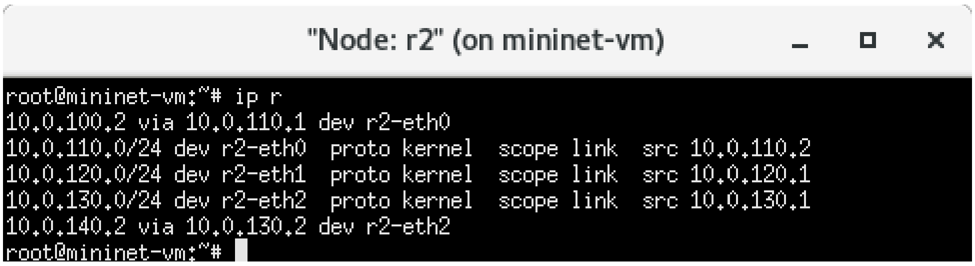
```
root@mininet-vm:~# ip r
10.0.100.2 via 10.0.140.1 dev h3-eth0
10.0.120.2 via 10.0.140.1 dev h3-eth0
10.0.140.0/24 dev h3-eth0  proto kernel  scope link  src 10.0.140.2
root@mininet-vm:~# 
```

R1 → ***#ip r add 10.0.120.2 via 10.0.110.2*** (Para llegar al h2)
# ip r add 10.0.140.2 via 10.0.110.2 (Para llegar al h3)



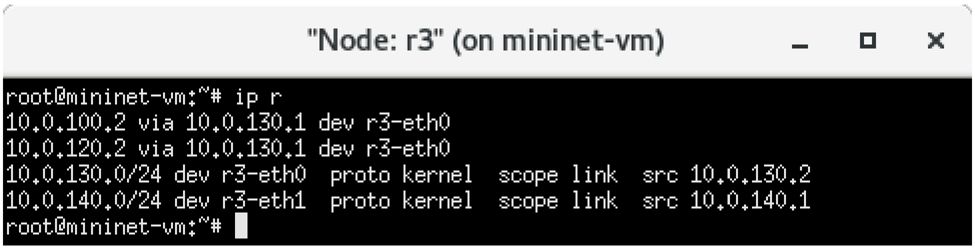
```
root@mininet-vm:~# ip r
10.0.100.0/24 dev r1-eth0  proto kernel  scope link  src 10.0.100.1
10.0.110.0/24 dev r1-eth1  proto kernel  scope link  src 10.0.110.1
10.0.120.2 via 10.0.110.2 dev r1-eth1
10.0.140.2 via 10.0.110.2 dev r1-eth1
root@mininet-vm:~#
```

R2 → ***#ip r add 10.0.100.2 via 10.0.110.1*** (Para llegar al h1)
#ip r add 10.0.140.2 via 10.0.130.2 (Para llegar al h3)



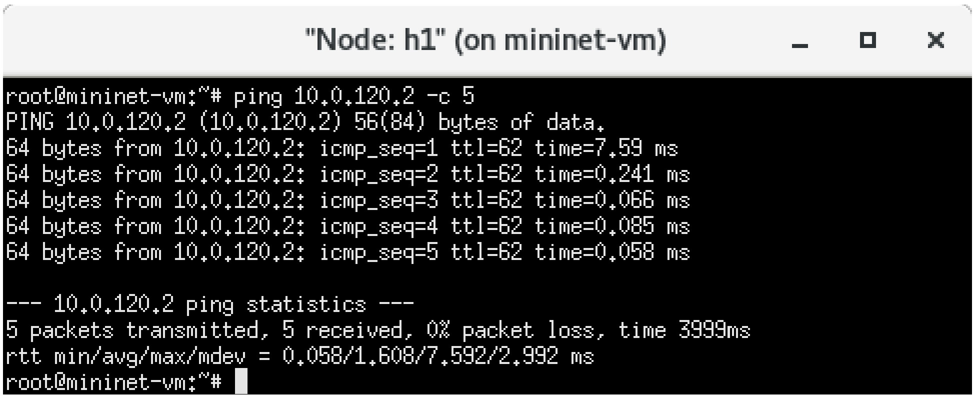
```
root@mininet-vm:~# ip r
10.0.100.2 via 10.0.110.1 dev r2-eth0
10.0.110.0/24 dev r2-eth0  proto kernel  scope link  src 10.0.110.2
10.0.120.0/24 dev r2-eth1  proto kernel  scope link  src 10.0.120.1
10.0.130.0/24 dev r2-eth2  proto kernel  scope link  src 10.0.130.1
10.0.140.2 via 10.0.130.2 dev r2-eth2
root@mininet-vm:~#
```

R3 → ***#ip r add 10.0.100.2 via 10.0.130.1*** (Para llegar al h1)
#ip r add 10.120.2 via 10.0.130.1 (Para llegar al h2)



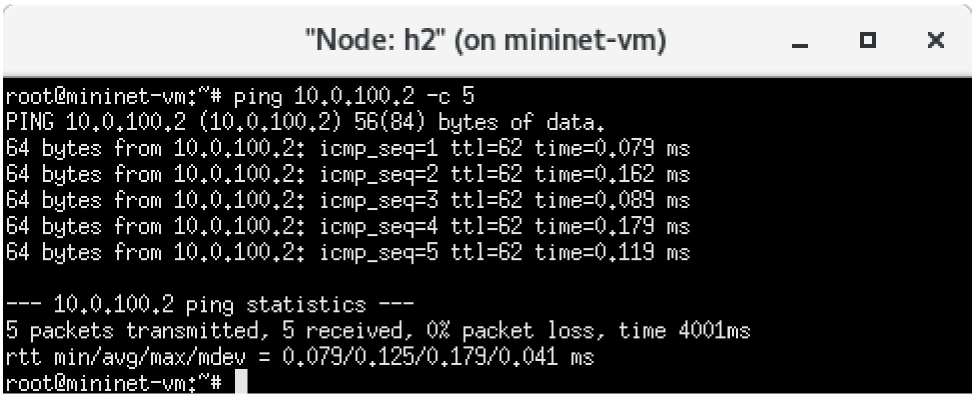
```
root@mininet-vm:~# ip r
10.0.100.2 via 10.0.130.1 dev r3-eth0
10.0.120.2 via 10.0.130.1 dev r3-eth0
10.0.130.0/24 dev r3-eth0  proto kernel  scope link  src 10.0.130.2
10.0.140.0/24 dev r3-eth1  proto kernel  scope link  src 10.0.140.1
root@mininet-vm:~#
```

3. Comprobamos la conectividad entre los hosts.



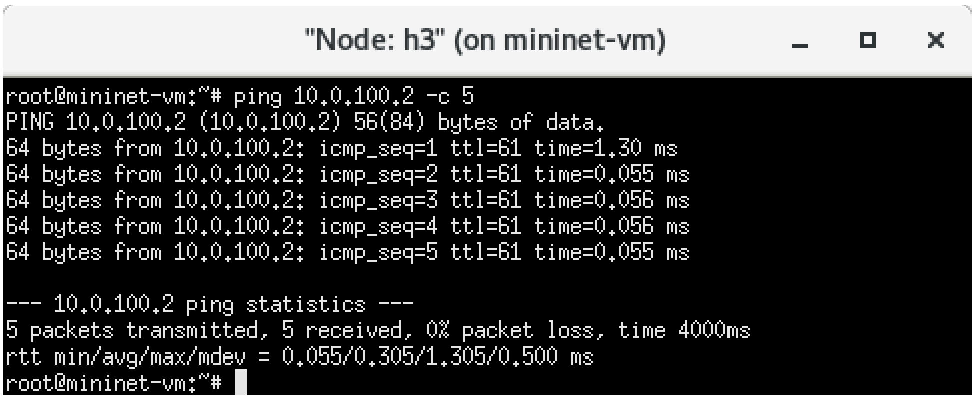
```
root@mininet-vm:~# ping 10.0.120.2 -c 5
PING 10.0.120.2 (10.0.120.2) 56(84) bytes of data.
64 bytes from 10.0.120.2: icmp_seq=1 ttl=62 time=7.59 ms
64 bytes from 10.0.120.2: icmp_seq=2 ttl=62 time=0.241 ms
64 bytes from 10.0.120.2: icmp_seq=3 ttl=62 time=0.066 ms
64 bytes from 10.0.120.2: icmp_seq=4 ttl=62 time=0.085 ms
64 bytes from 10.0.120.2: icmp_seq=5 ttl=62 time=0.058 ms

--- 10.0.120.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 3999ms
rtt min/avg/max/mdev = 0.058/1.608/7.592/2.992 ms
root@mininet-vm:~#
```



```
root@mininet-vm:~# ping 10.0.100.2 -c 5
PING 10.0.100.2 (10.0.100.2) 56(84) bytes of data.
64 bytes from 10.0.100.2: icmp_seq=1 ttl=62 time=0.079 ms
64 bytes from 10.0.100.2: icmp_seq=2 ttl=62 time=0.162 ms
64 bytes from 10.0.100.2: icmp_seq=3 ttl=62 time=0.089 ms
64 bytes from 10.0.100.2: icmp_seq=4 ttl=62 time=0.179 ms
64 bytes from 10.0.100.2: icmp_seq=5 ttl=62 time=0.119 ms

--- 10.0.100.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4001ms
rtt min/avg/max/mdev = 0.079/0.125/0.179/0.041 ms
root@mininet-vm:~#
```



```
root@mininet-vm:~# ping 10.0.100.2 -c 5
PING 10.0.100.2 (10.0.100.2) 56(84) bytes of data.
64 bytes from 10.0.100.2: icmp_seq=1 ttl=61 time=1.30 ms
64 bytes from 10.0.100.2: icmp_seq=2 ttl=61 time=0.055 ms
64 bytes from 10.0.100.2: icmp_seq=3 ttl=61 time=0.056 ms
64 bytes from 10.0.100.2: icmp_seq=4 ttl=61 time=0.056 ms
64 bytes from 10.0.100.2: icmp_seq=5 ttl=61 time=0.055 ms

--- 10.0.100.2 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 4000ms
rtt min/avg/max/mdev = 0.055/0.305/1.305/0.500 ms
root@mininet-vm:~# 
```