

## 07 - Enrutamiento Estático



IP FORWARD:  
(1) Cambio temporal:  
# echo 1 > /proc/sys/net/ipv4/ip\_forward || sysctl -w net.ipv4.ip\_forward=1  
(2) Cambio permanente:  
# echo net.ipv4.ip\_forward=1 >> /etc/sysctl.conf && sysctl -p

kaliB:  
eth0:  
IP/MS: 10.10.10.1/8  
eth1:  
IP/MS: 172.30.1.1/16

DR: 10.0.0.0/8

kaliA:  
IP/MS: 10.10.10.10/8  
GW: 10.10.10.1

DR: 172.30.0.0/16

DR: 192.168.1.0/24

kaliD:  
IP/MS: 192.168.1.10/24  
GW: 192.168.1.1

kaliC:  
eth0:  
IP/MS: 172.30.1.2/16  
eth1:  
IP/MS: 192.168.1.1/24

Fig.1 - Enrutamiento Estático

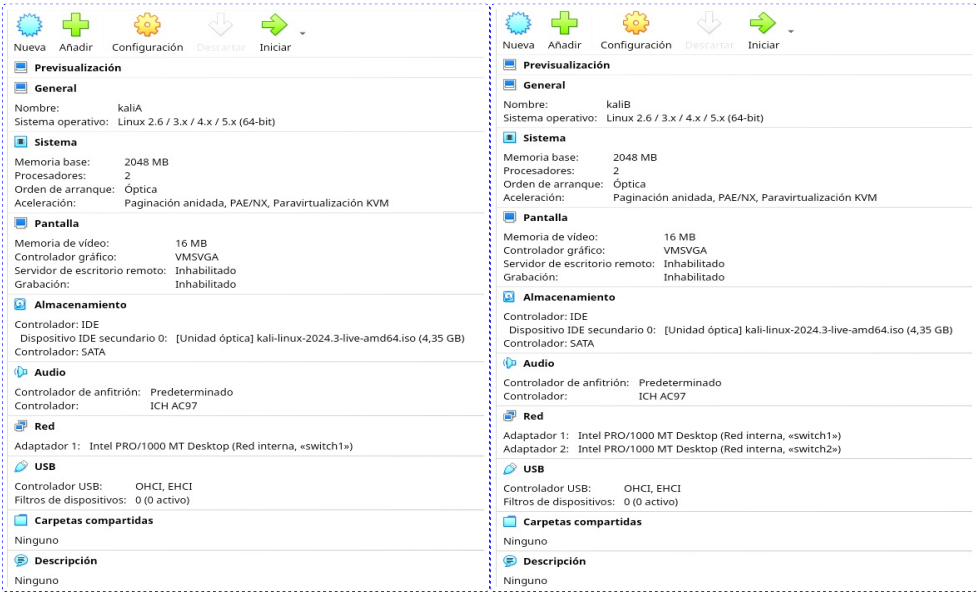


Fig.2 - Configuración kaliA en Oracle VirtualBox

Fig.3 - Configuración kaliB en Oracle VirtualBox

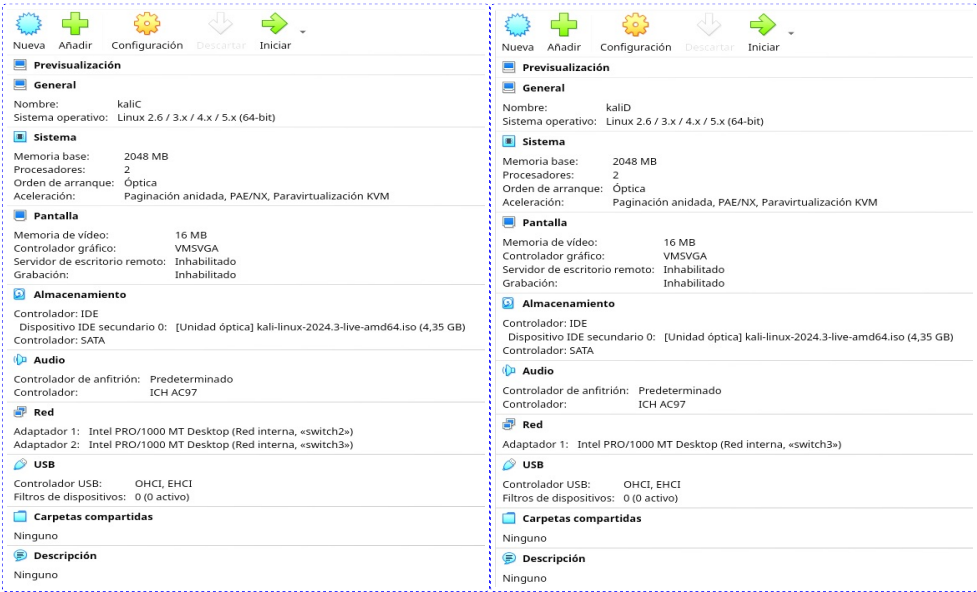


Fig.4 - Configuración kaliC en Oracle VirtualBox

Fig.5 - Configuración kaliD en Oracle VirtualBox

- NOTAS:**
- (1) O diagrama da Fig.1 representa 2 oficinas dunha empresa.
  - (2) As figuras Fig.2, Fig.3, Fig.4 e Fig.5 representan a configuración das máquinas virtuais(kaliA, kaliB, kaliC e kaliD) a crear en Oracle VirtualBox.
  - (3) IP=IPv4, MS=Máscara de Subrede, GW=Gateway, DR=Dirección de Rede.
  - (4) En Oracle VirtualBox unha tarxeta de rede(NIC) configurada como rede interna representa un switch virtual ao cal está conectado esta interface. É importante, xerar as redes internas co mesmo nome que aparece na Fig.1 e realizar a configuración das Fig.2, Fig.3, Fig.4 e Fig.5 para o correcto desenvolvemento do exercicio.

## Oracle VM VirtualBox - Máquinas virtuais GNU/Linux Kali

1. Realiza o representado no diagrama da Fig.1 mediante máquinas virtuais no Oracle VirtualBox. Para iso, ten en conta a configuración das Máquinas Virtuais (kaliA, kaliB, kaliC e kaliD) representado nas figuras Fig.2, Fig.3, Fig.4 e Fig.5
2. Arranca as máquinas virtuais e:
  - a. Cambia o hostname según corresponda.

```
kali@kali: ~  
File Actions Edit View Help  
  
(kali@kali)-[~]  
$ setxkbmap es  
  
(kali@kali)-[~]  
$ sudo su -  
(root@kali)-[~]  
# hostnamectl hostname kaliA  
  
(root@kali)-[~]  
# sed -i 's/kali/kaliA/g' /etc/hosts  
  
(root@kali)-[~]  
# exit  
  
(kali@kali)-[~]  
$ exit
```

```
kali@kali: ~  
File Actions Edit View Help  
  
(kali@kali)-[~]  
$ setxkbmap es  
  
(kali@kali)-[~]  
$ sudo su -  
(root@kali)-[~]  
# hostnamectl hostname kaliB  
  
(root@kali)-[~]  
# sed -i 's/kali/kaliB/g' /etc/hosts  
  
(root@kali)-[~]  
# exit  
  
(kali@kali)-[~]  
$ exit
```

```
kali@kali: ~  
File Actions Edit View Help  
  
(kali@kali)-[~]  
$ setxkbmap es  
  
(kali@kali)-[~]  
$ sudo su -  
(root@kali)-[~]  
# hostnamectl hostname kaliC  
  
(root@kali)-[~]  
# sed -i 's/kali/kaliC/g' /etc/hosts  
  
(root@kali)-[~]  
# exit  
  
(kali@kali)-[~]  
$ exit
```

```
kali@kali: ~  
File Actions Edit View Help  
  
(kali@kali)-[~]  
$ setxkbmap es  
  
(kali@kali)-[~]  
$ sudo su -  
(root@kali)-[~]  
# hostnamectl hostname kaliD  
  
(root@kali)-[~]  
# sed -i 's/kali/kaliD/g' /etc/hosts  
  
(root@kali)-[~]  
# exit  
  
(kali@kali)-[~]  
$ exit
```

- b. Realiza a configuración de rede indicada na Fig.1

```
root@kaliA: ~ (on kaliA)  
File Actions Edit View Help  
  
(kali@kaliA)-[~]  
$ sudo su -  
(root@kaliA)-[~]  
# systemctl stop avahi-daemon  
  
(root@kaliA)-[~]  
# ip addr add 10.10.10.8 dev eth0  
  
(root@kaliA)-[~]  
# ip route add default via 10.10.10.1 dev eth0  
  
(root@kaliA)-[~]  
# ip a  
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group def  
ault 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: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP g  
roup default qlen 1000  
    link/ether 08:00:27:e7:cb:a6 brd ff:ff:ff:ff:ff:ff  
    inet 10.10.10.8 scope global eth0  
        valid_lft forever preferred_lft forever  
    inet6 fe80::c44f:fafe:313f:d0f5/64 scope link noprefixroute  
        valid_lft forever preferred_lft forever
```

```
kali@kaliB: ~ (on kaliB)  
File Actions Edit View Help  
  
(kali@kaliB)-[~]  
$ sudo su -  
(root@kaliB)-[~]  
# systemctl stop avahi-daemon  
  
(root@kaliB)-[~]  
# ip addr add 10.10.10.1/8 dev eth0  
  
(root@kaliB)-[~]  
# ip addr add 172.30.1.1/16 dev eth1  
  
(root@kaliB)-[~]  
# exit  
  
(kali@kaliB)-[~]  
$
```

```
kali@kaliB: ~ (on kaliB)  
File Actions Edit View Help  
  
(kali@kaliB)-[~]  
$ ip a  
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group def  
ault 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: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP g  
roup default qlen 1000  
    link/ether 08:00:27:82:5c:74 brd ff:ff:ff:ff:ff:ff  
    inet 10.10.10.1/8 scope global eth0  
        valid_lft forever preferred_lft forever  
3: eth1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP g  
roup default qlen 1000  
    link/ether 08:00:27:c2:8e:59 brd ff:ff:ff:ff:ff:ff  
    inet 172.30.1.1/16 scope global eth1  
        valid_lft forever preferred_lft forever
```

```
(kali@kaliC)-[~]
$ sudo su -
(root@kaliC)-[~]
# pkill NetworkManager && systemctl stop avahi-daemon

(root@kaliC)-[~]
# ip addr add 172.30.1.2/16 dev eth0

(root@kaliC)-[~]
# ip addr add 192.168.1.1/24 dev eth1
```

```
(kali@kaliC)-[~]
$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group def
    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: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP g
    link/ether 08:00:27:5f:fb:34 brd ff:ff:ff:ff:ff:ff
    inet 172.30.1.2/16 scope global eth0
        valid_lft forever preferred_lft forever
    inet6 fe80::99d:97d1:4407:83a/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
3: eth1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP g
    link/ether 08:00:27:65:9e:94 brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.1/24 scope global eth1
        valid_lft forever preferred_lft forever
    inet6 fe80::3c37:47aa:690f:be4d/64 scope link noprefixroute
        valid_lft forever preferred_lft forever
```

```
root@kaliD: ~ (on kaliD)
File Actions Edit View Help

(kali@kaliD)-[~]
$ sudo su -
(root@kaliD)-[~]
# pkill NetworkManager && systemctl stop avahi-daemon

(root@kaliD)-[~]
# ip addr add 192.168.1.10/24 dev eth0

(root@kaliD)-[~]
# ip route add default via 192.168.1.1 dev eth0

(root@kaliD)-[~]
$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group def
    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: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP g
    link/ether 08:00:27:01:14:e3 brd ff:ff:ff:ff:ff:ff
    inet 192.168.1.10/24 scope global eth0
        valid_lft forever preferred_lft forever
```

3. Revisa a configuración de enrutamiento estático nas máquinas virtuais (kaliA, kaliB, kaliC e kaliD) executando os comandos:

```
$ ip route
$ /sbin/route
```

Captura as imaxes correspondentes aos comandos anteriores para cada máquina virtual.

```
kali@kaliA: ~ (on kaliA)
File Actions Edit View Help

(kali@kaliA)-[~]
$ ip route
default via 10.10.10.1 dev eth0
10.0.0.0/8 dev eth0 proto kernel scope link src 10.10.10.10

(kali@kaliA)-[~]
$ /sbin/route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
default 10.10.10.1 0.0.0.0 UG 0 0 0 eth0
10.0.0.0 0.0.0.0 255.0.0.0 U 0 0 0 eth0
```

```
kali@kaliB: ~ (on kaliB)
File Actions Edit View Help

(kali@kaliB)-[~]
$ ip route
10.0.0.0/8 dev eth0 proto kernel scope link src 10.10.10.1
172.30.0.0/16 dev eth1 proto kernel scope link src 172.30.1.1

(kali@kaliB)-[~]
$ /sbin/route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
10.0.0.0 0.0.0.0 255.0.0.0 U 0 0 0 eth0
172.30.0.0 0.0.0.0 255.255.0.0 U 0 0 0 eth1
```

```
(kali@kaliC)-[~]
$ ip route
172.30.0.0/16 dev eth0 proto kernel scope link src 172.30.1.2
192.168.1.0/24 dev eth1 proto kernel scope link src 192.168.1.1

(kali@kaliC)-[~]
$ /sbin/route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
172.30.0.0 0.0.0.0 255.255.0.0 U 0 0 0 eth0
192.168.1.0 0.0.0.0 255.255.255.0 U 0 0 0 eth1
```

```
(kali@kaliD)-[~]
$ ip route
default via 192.168.1.1 dev eth0
192.168.1.0/24 dev eth0 proto kernel scope link src 192.168.1.10

(kali@kaliD)-[~]
$ /sbin/route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
default 192.168.1.1 0.0.0.0 UG 0 0 0 eth0
192.168.1.0 0.0.0.0 255.255.255.0 U 0 0 0 eth0
```



4. A continuación, por cada apartado realiza mediante comandos un ping de 2 paquetes ICMP indicando que é o que acontece (Razoa a resposta):

a. De kaliA á IP 127.0.0.1

```
(kali@kaliA)-[~]
$ ping -c 2 127.0.0.1
PING 127.0.0.1 (127.0.0.1) 56(84) bytes of data.
64 bytes from 127.0.0.1: icmp_seq=1 ttl=64 time=0.021 ms
64 bytes from 127.0.0.1: icmp_seq=2 ttl=64 time=0.083 ms

— 127.0.0.1 ping statistics —
2 packets transmitted, 2 received, 0% packet loss, time 1004ms
rtt min/avg/max/mdev = 0.021/0.052/0.083/0.031 ms
```

De kaliA á IP 127.0.0.1 → ping -c 2 127.0.0.1 → Existe conectividade debido a que a dirección 127.0.0.1 pertence ao rango de direccións de loopback, que se empregan para probar e verificar a pila de rede do propio dispositivo local. A dirección 127.0.0.1, especificamente, sempre apunta á máquina local na que se executa o comando.

b. De kaliA á IP 127.127.127.127

```
(kali@kaliA)-[~]
$ ping -c 2 127.127.127.127
PING 127.127.127.127 (127.127.127.127) 56(84) bytes of data.
64 bytes from 127.127.127.127: icmp_seq=1 ttl=64 time=0.060 ms
64 bytes from 127.127.127.127: icmp_seq=2 ttl=64 time=0.074 ms

— 127.127.127.127 ping statistics —
2 packets transmitted, 2 received, 0% packet loss, time 1008ms
rtt min/avg/max/mdev = 0.060/0.067/0.074/0.007 ms
```

De kaliA á IP 127.127.127.127 → ping -c 2 127.127.127.127 → Existe conectividade xa que todos os enderezos do intervalo 127.0.0.0/8 (de 127.0.0.1 a 127.255.255.254) están reservados para a funcionalidade de loopback. Isto significa que, como ocorre con 127.0.0.1, os paquetes enviados a 127.127.127.127 non abandonarán o dispositivo e procesaranse localmente.

c. De kaliA á IP 10.10.10.10

```
(kali@kaliA)-[~]
$ ping -c 2 10.10.10.10
PING 10.10.10.10 (10.10.10.10) 56(84) bytes of data.
64 bytes from 10.10.10.10: icmp_seq=1 ttl=64 time=0.034 ms
64 bytes from 10.10.10.10: icmp_seq=2 ttl=64 time=0.083 ms

— 10.10.10.10 ping statistics —
2 packets transmitted, 2 received, 0% packet loss, time 1022ms
rtt min/avg/max/mdev = 0.034/0.058/0.083/0.024 ms
```

De kaliA á IP 10.10.10.10 → ping -c 2 10.10.10.10 → Existe conectividade debido a que esta é a propia dirección IP de kaliA.

d. De kaliA á IP 10.10.10.1

De kaliA á IP 10.10.10.1 → ping -c 2 10.10.10.1 → Existe conectividade debido a que os 2 equipos pertencen á mesma rede. A IP 10.10.10.1 é a porta de enlace de kaliA.

```
(kali@kaliA)-[~]
$ ping -c 2 10.10.10.1
PING 10.10.10.1 (10.10.10.1) 56(84) bytes of data.
64 bytes from 10.10.10.1: icmp_seq=1 ttl=64 time=1.57 ms
64 bytes from 10.10.10.1: icmp_seq=2 ttl=64 time=0.712 ms

— 10.10.10.1 ping statistics —
2 packets transmitted, 2 received, 0% packet loss, time 1026ms
rtt min/avg/max/mdev = 0.712/1.140/1.568/0.428 ms
```

e. De kaliA á IP 172.30.1.1

De kaliA á IP 172.30.1.1 → ping -c 2 172.30.1.1 → Existe conectividade porque kaliA ten configurado correctamente o gateway predeterminado (10.10.10.1), que corresponde á interface eth0 de kaliB. Cando kaliA envía un ping a 172.30.1.1, o tráfico é dirixido ao gateway, que reenvía os paquetes a través da súa interface eth0 coa IP 10.10.10.1. Entón, kaliB actúa como un intermediario entre as dúas redes, permitindo a comunicación ao estar configurado correctamente coas súas interfaces en ambas redes (a 10.0.0.0/24 e a 172.30.0.0/16).

```
(kali@kaliA)-[~]
$ ping -c 2 172.30.1.1
PING 172.30.1.1 (172.30.1.1) 56(84) bytes of data.
64 bytes from 172.30.1.1: icmp_seq=1 ttl=64 time=0.994 ms
64 bytes from 172.30.1.1: icmp_seq=2 ttl=64 time=1.48 ms

— 172.30.1.1 ping statistics —
2 packets transmitted, 2 received, 0% packet loss, time 1005ms
rtt min/avg/max/mdev = 0.994/1.236/1.478/0.242 ms
```

f. De kaliA á IP 172.30.1.2

De kaliA á IP 172.30.1.2 → ping -c 2 172.30.1.2 → Non existe conectividade porque o kaliB non é quen de enrutar para alcanzar esa dirección, que pertence a kaliC.

```
(kali@kaliA)-[~]
$ ping -c 2 172.30.1.2
PING 172.30.1.2 (172.30.1.2) 56(84) bytes of data.

— 172.30.1.2 ping statistics —
2 packets transmitted, 0 received, 100% packet loss, time 1032ms
```

g. De kaliA á IP 192.168.1.1

De kaliA á IP 192.168.1.1 → ping -c 2 192.168.1.1 → Non existe conectividade porque o kaliB non é quen de enrutar para alcanzar esa dirección, que pertence a kaliC.

```
(kali@kaliA)-[~]
$ ping -c2 192.168.1.1
PING 192.168.1.1 (192.168.1.1) 56(84) bytes of data.

— 192.168.1.1 ping statistics —
2 packets transmitted, 0 received, 100% packet loss, time 1023ms
```

h. De kaliA á IP 192.168.1.10

De kaliA á IP 192.168.1.10 → ping -c 2 192.168.1.10 → Non existe conectividade porque o kaliB non é quen de enrutar para alcanzar esa dirección, que pertence a kaliD.

```
(kali@kaliA)-[~]
$ ping -c2 192.168.1.10
PING 192.168.1.10 (192.168.1.10) 56(84) bytes of data.

— 192.168.1.10 ping statistics —
2 packets transmitted, 0 received, 100% packet loss, time 1013ms
```

5. A continuación, por cada apartado realiza mediante comandos un ping de 2 paquetes ICMP indicando que é o que acontece (Razoa a resposta):

a. De kaliD á IP 127.0.0.1

```
(kali@kaliD)-[~]
$ ping -c2 127.0.0.1
PING 127.0.0.1 (127.0.0.1) 56(84) bytes of data.
64 bytes from 127.0.0.1: icmp_seq=1 ttl=64 time=0.026 ms
64 bytes from 127.0.0.1: icmp_seq=2 ttl=64 time=0.052 ms

— 127.0.0.1 ping statistics —
2 packets transmitted, 2 received, 0% packet loss, time 1026ms
rtt min/avg/max/mdev = 0.026/0.039/0.052/0.013 ms
```

De kaliD á IP 127.0.0.1 → ping -c 2 127.0.0.1 → Existe conectividade debido a que a dirección 127.0.0.1 pertence ao rango de direccións de loopback, que se empregan para probar e verificar a pila de rede do propio dispositivo local. A dirección 127.0.0.1, especificamente, sempre apunta á máquina local na que se executa o comando.

b. De kaliD á IP 127.127.127.127

```
(kali@kaliD)-[~]
$ ping -c2 127.127.127.127
PING 127.127.127.127 (127.127.127.127) 56(84) bytes of data.
64 bytes from 127.127.127.127: icmp_seq=1 ttl=64 time=0.046 ms
64 bytes from 127.127.127.127: icmp_seq=2 ttl=64 time=0.099 ms

— 127.127.127.127 ping statistics —
2 packets transmitted, 2 received, 0% packet loss, time 1032ms
rtt min/avg/max/mdev = 0.046/0.072/0.099/0.026 ms
```

De kaliD á IP 127.127.127.127 → ping -c 2 127.127.127.127 → Existe conectividade xa que todos os enderezos do intervalo 127.0.0.0/8 (de 127.0.0.1 a 127.255.255.254) están reservados para a funcionalidade de loopback. Isto significa que, como ocorre con 127.0.0.1, os paquetes enviados a 127.127.127.127 non abandonarán o dispositivo e procesaranse localmente.

c. De kaliD á IP 192.168.1.10

```
(kali@kaliD)-[~]
$ ping -c2 192.168.1.10
PING 192.168.1.10 (192.168.1.10) 56(84) bytes of data.
64 bytes from 192.168.1.10: icmp_seq=1 ttl=64 time=0.038 ms
64 bytes from 192.168.1.10: icmp_seq=2 ttl=64 time=0.075 ms

— 192.168.1.10 ping statistics —
2 packets transmitted, 2 received, 0% packet loss, time 1005ms
rtt min/avg/max/mdev = 0.038/0.056/0.075/0.018 ms
```

De kaliD á IP 192.168.1.10 → ping -c 2 192.168.1.10 → Existe conectividade debido a que esta é a propia dirección IP de kaliD.

d. De kaliD á IP 192.168.1.1

```
(kali@kaliD)-[~]
$ ping -c2 192.168.1.1
PING 192.168.1.1 (192.168.1.1) 56(84) bytes of data.
64 bytes from 192.168.1.1: icmp_seq=1 ttl=64 time=0.993 ms
64 bytes from 192.168.1.1: icmp_seq=2 ttl=64 time=1.64 ms

— 192.168.1.1 ping statistics —
2 packets transmitted, 2 received, 0% packet loss, time 1003ms
rtt min/avg/max/mdev = 0.993/1.315/1.637/0.322 ms
```

De kaliD á IP 192.168.1.1 → ping -c 2 192.168.1.1 → Existe conectividade debido a que os 2 equipos pertencen á mesma rede. A IP 192.168.1.1 é a porta de enlace de kaliD.

e. De kaliD á IP 172.30.1.2

```
(kali@kaliD)-[~]
$ ping -c2 172.30.1.2
PING 172.30.1.2 (172.30.1.2) 56(84) bytes of data.
64 bytes from 172.30.1.2: icmp_seq=1 ttl=64 time=0.808 ms
64 bytes from 172.30.1.2: icmp_seq=2 ttl=64 time=1.51 ms

— 172.30.1.2 ping statistics —
2 packets transmitted, 2 received, 0% packet loss, time 1013ms
rtt min/avg/max/mdev = 0.808/1.158/1.509/0.350 ms
```

De kaliD á IP 172.30.1.2 → ping -c 2 172.30.1.2 → Existe conectividade porque kaliD ten configurado correctamente o gateway

predeterminado (192.168.1.1), que corresponde á interface eth1 de kaliC. Cando kaliD envía un ping a 172.30.1.2, o tráfico é dirixido ao gateway, que reenvía os paquetes a través da súa interface eth1 coa IP 192.168.1.1. Entón, kaliC actúa como un intermediario entre as dúas redes, permitindo a comunicación ao estar configurado correctamente coas súas interfaces en ambas redes (a 192.168.1.0/24 e a 172.30.0.0/16).

f. De kaliD á IP 172.30.1.1

```
(kali@kaliD)-[~]  
$ ping -c2 172.30.1.1  
PING 172.30.1.1 (172.30.1.1) 56(84) bytes of data.  
  
— 172.30.1.1 ping statistics —  
2 packets transmitted, 0 received, 100% packet loss, time 1005ms
```

De kaliD á IP 172.30.1.1 → ping -c 2 172.30.1.1 → Non existe conectividade porque o kaliC non é quen de enrutar para alcanzar esa dirección, que pertence a kaliB.

g. De kaliD á IP 10.10.10.1

```
(kali@kaliD)-[~]  
$ ping -c2 10.10.10.1  
PING 10.10.10.1 (10.10.10.1) 56(84) bytes of data.  
  
— 10.10.10.1 ping statistics —  
2 packets transmitted, 0 received, 100% packet loss, time 1032ms
```

De kaliD á IP 10.10.10.1 → ping -c 2 10.10.10.1 → Non existe conectividade porque o kaliC non é quen de enrutar para alcanzar esa dirección, que pertence a kaliB.

h. De kaliD á IP 10.10.10.10

```
(kali@kaliD)-[~]  
$ ping -c2 10.10.10.10  
PING 10.10.10.10 (10.10.10.10) 56(84) bytes of data.  
  
— 10.10.10.10 ping statistics —  
2 packets transmitted, 0 received, 100% packet loss, time 1011ms
```

De kaliD á IP 10.10.10.10 → ping -c 2 10.10.10.10 → Non existe conectividade porque o kaliC non é quen de enrutar para alcanzar esa dirección, que pertence a kaliA.

6. Realiza o comentado no **recadro IP FORWARD da Fig.1** nos hosts **kaliB** e **kaliC**. Realiza de novo os apartados 3), 4) e 5). Que é o que acontece?. Razoa as respostas.

**NOTA: ip\_forward a 1** activa o redireccionamento de paquetes IP en sistemas GNU/Linux, permitindo que o sistema funcione como un router. Con isto, os paquetes de datos poden ser reenviados entre interfaces de rede diferentes, facilitando a conexión entre redes separadas. Este axuste é fundamental para configurar tarefas como o enrutamento ou a compartición de conexións a Internet.

```
(kali@kaliB)-[~]
$ sudo su -
(root@kaliB)-[~]
# cat /proc/sys/net/ipv4/ip_forward
0

(root@kaliB)-[~]
# echo 1 > /proc/sys/net/ipv4/ip_forward || sysctl -w net.ipv4.ip_forward=1

(root@kaliB)-[~]
# cat /proc/sys/net/ipv4/ip_forward
1
```

```
(kali@kaliC)-[~]
$ sudo su -
(root@kaliC)-[~]
# cat /proc/sys/net/ipv4/ip_forward
0

(root@kaliC)-[~]
# echo 1 > /proc/sys/net/ipv4/ip_forward || sysctl -w net.ipv4.ip_forward=1

(root@kaliC)-[~]
# cat /proc/sys/net/ipv4/ip_forward
1
```

Apartado 3) non cambia nada:

```
kali@kaliA: ~ (on kaliA)
File Actions Edit View Help
(kali@kaliA)-[~]
$ ip route
default via 10.10.10.1 dev eth0 scope link src 10.10.10.10
10.0.0.0/8 dev eth0 proto kernel scope link src 10.10.10.10

(kali@kaliA)-[~]
$ /sbin/route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
default 10.10.10.1 0.0.0.0 UG 0 0 0 eth0
10.0.0.0 0.0.0.0 255.0.0.0 U 0 0 0 eth0
```

```
kali@kaliB: ~ (on kaliB)
File Actions Edit View Help
(kali@kaliB)-[~]
$ ip route
10.0.0.0/8 dev eth0 proto kernel scope link src 10.10.10.1
172.30.0.0/16 dev eth1 proto kernel scope link src 172.30.1.1

(kali@kaliB)-[~]
$ /sbin/route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
10.0.0.0 0.0.0.0 255.0.0.0 U 0 0 0 eth0
172.30.0.0 0.0.0.0 255.255.0.0 U 0 0 0 eth1
```

```
(kali@kaliC)-[~]
$ ip route
172.30.0.0/16 dev eth0 proto kernel scope link src 172.30.1.2
192.168.1.0/24 dev eth1 proto kernel scope link src 192.168.1.1

(kali@kaliC)-[~]
$ /sbin/route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
172.30.0.0 0.0.0.0 255.255.0.0 U 0 0 0 eth0
192.168.1.0 0.0.0.0 255.255.255.0 U 0 0 0 eth1
```

```
(kali@kaliD)-[~]
$ ip route
default via 192.168.1.1 dev eth0
192.168.1.0/24 dev eth0 proto kernel scope link src 192.168.1.10

(kali@kaliD)-[~]
$ /sbin/route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
default 192.168.1.1 0.0.0.0 UG 0 0 0 eth0
192.168.1.0 0.0.0.0 255.255.255.0 U 0 0 0 eth0
```

Apartado 4) e 5) agora segue ser posible a comunicación entre as redes 10.0.0.0/8 e 192.168.1.0/24, xa que precisaríamos que kaliB e kaliC enruten, é dicir, posúan rutas estáticas que pemitan a comunicación entres esas redes.

```
(kali@kaliA)-[~]
$ ping -c2 172.30.1.2
PING 172.30.1.2 (172.30.1.2) 56(84) bytes of data.
From 10.10.10.1 icmp_seq=1 Destination Net Unreachable
From 10.10.10.1 icmp_seq=2 Destination Net Unreachable

— 172.30.1.2 ping statistics —
2 packets transmitted, 0 received, +2 errors, 100% packet loss, time 1001ms

(kali@kaliA)-[~]
$ ping -c2 192.168.1.1
PING 192.168.1.1 (192.168.1.1) 56(84) bytes of data.
From 10.10.10.1 icmp_seq=1 Destination Net Unreachable
From 10.10.10.1 icmp_seq=2 Destination Net Unreachable

— 192.168.1.1 ping statistics —
2 packets transmitted, 0 received, +2 errors, 100% packet loss, time 1006ms

(kali@kaliA)-[~]
$ ping -c2 192.168.1.10
PING 192.168.1.10 (192.168.1.10) 56(84) bytes of data.
From 10.10.10.1 icmp_seq=1 Destination Net Unreachable
From 10.10.10.1 icmp_seq=2 Destination Net Unreachable

— 192.168.1.10 ping statistics —
2 packets transmitted, 0 received, +2 errors, 100% packet loss, time 1031ms
```

```
(kali@kaliD)-[~]
$ ping -c2 172.30.1.1
PING 172.30.1.1 (172.30.1.1) 56(84) bytes of data.

— 172.30.1.1 ping statistics —
2 packets transmitted, 0 received, 100% packet loss, time 1028ms

(kali@kaliD)-[~]
$ ping -c2 10.10.10.1
PING 10.10.10.1 (10.10.10.1) 56(84) bytes of data.
From 192.168.1.1 icmp_seq=1 Destination Net Unreachable
From 192.168.1.1 icmp_seq=2 Destination Net Unreachable

— 10.10.10.1 ping statistics —
2 packets transmitted, 0 received, +2 errors, 100% packet loss, time 1002ms

(kali@kaliD)-[~]
$ ping -c2 10.10.10.10
PING 10.10.10.10 (10.10.10.10) 56(84) bytes of data.
From 192.168.1.1 icmp_seq=1 Destination Net Unreachable
From 192.168.1.1 icmp_seq=2 Destination Net Unreachable

— 10.10.10.10 ping statistics —
2 packets transmitted, 0 received, +2 errors, 100% packet loss, time 1002ms
```



7. Realiza a configuración de enrutamento estático nos hosts (kaliA, kaliB, kaliC e kaliD) para que a conectividade entre kaliA e kaliD sexa posible. Captura imaxes que amosen:

a. Os comandos empregados para engadir as rutas estáticas, identificando rutas e host.

```
(root@kaliB)~# ip route add 192.168.1.0/24 via 172.30.1.2 dev eth1
```

```
(root@kaliC)~# ip route add 10.0.0.0/8 via 172.30.1.1 dev eth0
```

b. A saída dos comandos:

```
$ ip route
$ /sbin/route
```

```
(kali@kaliB)~# ip route
10.0.0.0/8 dev eth0 proto kernel scope link src 10.10.10.1
172.30.0.0/16 dev eth1 proto kernel scope link src 172.30.1.1
192.168.1.0/24 via 172.30.1.2 dev eth1
```

```
(kali@kaliB)~# $ /sbin/route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
10.0.0.0 0.0.0.0 255.0.0.0 U 0 0 0 eth0
172.30.0.0 0.0.0.0 255.255.0.0 U 0 0 0 eth1
192.168.1.0 172.30.1.2 255.255.255.0 UG 0 0 0 eth1
```

```
(kali@kaliC)~# ip route
10.0.0.0/8 via 172.30.1.1 dev eth0
172.30.0.0/16 dev eth0 proto kernel scope link src 172.30.1.2
192.168.1.0/24 dev eth1 proto kernel scope link src 192.168.1.1
```

```
(kali@kaliC)~# $ /sbin/route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use Iface
10.0.0.0 172.30.1.1 255.0.0.0 UG 0 0 0 eth0
172.30.0.0 0.0.0.0 255.255.0.0 U 0 0 0 eth0
192.168.1.0 0.0.0.0 255.255.255.0 U 0 0 0 eth1
```

c. A conectividade establecida de kaliA a kaliC mediante un ping de 2 paquetes ICMP.

```
(kali@kaliA)~# $ ping -c2 192.168.1.10
PING 192.168.1.10 (192.168.1.10) 56(84) bytes of data.
64 bytes from 192.168.1.10: icmp_seq=1 ttl=62 time=2.57 ms
64 bytes from 192.168.1.10: icmp_seq=2 ttl=62 time=2.70 ms

--- 192.168.1.10 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
rtt min/avg/max/mdev = 2.571/2.633/2.695/0.062 ms
```

d. A conectividade establecida de kaliD a kaliA mediante un ping de 2 paquetes ICMP.

```
(kali@kaliD)~# $ ping -c2 10.10.10.10
PING 10.10.10.10 (10.10.10.10) 56(84) bytes of data.
64 bytes from 10.10.10.10: icmp_seq=1 ttl=62 time=2.21 ms
64 bytes from 10.10.10.10: icmp_seq=2 ttl=62 time=2.29 ms

--- 10.10.10.10 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1001ms
rtt min/avg/max/mdev = 2.205/2.247/2.290/0.042 ms
```

8. Elimina a porta de enlace (gateway) do host kaliA. Realiza de novo os apartados 4) e 5). Que é que acontece? Razoa as respostas.

**NOTA:** Se ao verificar o apartado 3) segue existindo a ruta por defecto deshabilita e habilita de novo a rede para que teña efecto a eliminación do gateway.

```
(kali@kaliA)-[~]
$ sudo su -
(root@kaliA)-[~]
# ip route del default via 10.10.10.1 dev eth0
(root@kaliA)-[~]
# exit
```

Agora no apartado 4) non teremos conectividade coa eth1 de kaliB xa que o gateway non está configurado en kaliA:

```
(kali@kaliA)-[~]
$ ping -c2 127.0.0.1
PING 127.0.0.1 (127.0.0.1) 56(84) bytes of data.
64 bytes from 127.0.0.1: icmp_seq=1 ttl=64 time=0.033 ms
64 bytes from 127.0.0.1: icmp_seq=2 ttl=64 time=0.030 ms

--- 127.0.0.1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1027ms
rtt min/avg/max/mdev = 0.030/0.031/0.033/0.001 ms

(kali@kaliA)-[~]
$ ping -c2 127.127.127.127
PING 127.127.127.127 (127.127.127.127) 56(84) bytes of data.
64 bytes from 127.127.127.127: icmp_seq=1 ttl=64 time=0.029 ms
64 bytes from 127.127.127.127: icmp_seq=2 ttl=64 time=0.079 ms

--- 127.127.127.127 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1000ms
rtt min/avg/max/mdev = 0.029/0.054/0.079/0.025 ms

(kali@kaliA)-[~]
$ ping -c2 10.10.10.10
PING 10.10.10.10 (10.10.10.10) 56(84) bytes of data.
64 bytes from 10.10.10.10: icmp_seq=1 ttl=64 time=0.042 ms
64 bytes from 10.10.10.10: icmp_seq=2 ttl=64 time=0.072 ms

--- 10.10.10.10 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1021ms
rtt min/avg/max/mdev = 0.042/0.057/0.072/0.015 ms

(kali@kaliA)-[~]
$ ping -c2 10.10.10.1
PING 10.10.10.1 (10.10.10.1) 56(84) bytes of data.
64 bytes from 10.10.10.1: icmp_seq=1 ttl=64 time=1.01 ms
64 bytes from 10.10.10.1: icmp_seq=2 ttl=64 time=1.49 ms

--- 10.10.10.1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1001ms
rtt min/avg/max/mdev = 1.009/1.251/1.493/0.242 ms

(kali@kaliA)-[~]
$ ping -c2 172.30.1.1
ping: connect: Network is unreachable

(kali@kaliA)-[~]
$ ping -c2 172.30.1.2
ping: connect: Network is unreachable

(kali@kaliA)-[~]
$ ping -c2 192.168.1.1
ping: connect: Network is unreachable

(kali@kaliA)-[~]
$ ping -c2 192.168.1.10
ping: connect: Network is unreachable
```

Agora no apartado 5) non teremos conectividade coa IP 10.10.10.10 de kaliA, pero si teremos conectividade coa eth0 de kaliB. Isto é debido a que o gateway non está configurado en kaliA pero si en kaliD e a como temos as rutas estáticas configuradas en kaliB e kaliC:

```
(kali@kaliD)-[~]
$ ping -c2 127.0.0.1
PING 127.0.0.1 (127.0.0.1) 56(84) bytes of data.
64 bytes from 127.0.0.1: icmp_seq=1 ttl=64 time=0.023 ms
64 bytes from 127.0.0.1: icmp_seq=2 ttl=64 time=0.072 ms

--- 127.0.0.1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1029ms
rtt min/avg/max/mdev = 0.023/0.047/0.072/0.024 ms

(kali@kaliD)-[~]
$ ping -c2 127.127.127.127
PING 127.127.127.127 (127.127.127.127) 56(84) bytes of data.
64 bytes from 127.127.127.127: icmp_seq=1 ttl=64 time=0.023 ms
64 bytes from 127.127.127.127: icmp_seq=2 ttl=64 time=0.078 ms

--- 127.127.127.127 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1021ms
rtt min/avg/max/mdev = 0.023/0.050/0.078/0.027 ms

(kali@kaliD)-[~]
$ ping -c2 192.168.1.10
PING 192.168.1.10 (192.168.1.10) 56(84) bytes of data.
64 bytes from 192.168.1.10: icmp_seq=1 ttl=64 time=0.054 ms
64 bytes from 192.168.1.10: icmp_seq=2 ttl=64 time=0.066 ms

--- 192.168.1.10 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1027ms
rtt min/avg/max/mdev = 0.054/0.060/0.066/0.006 ms

(kali@kaliD)-[~]
$ ping -c2 192.168.1.1
PING 192.168.1.1 (192.168.1.1) 56(84) bytes of data.
64 bytes from 192.168.1.1: icmp_seq=1 ttl=64 time=0.890 ms
64 bytes from 192.168.1.1: icmp_seq=2 ttl=64 time=1.18 ms

--- 192.168.1.1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
rtt min/avg/max/mdev = 0.890/1.035/1.180/0.145 ms

(kali@kaliD)-[~]
$ ping -c2 172.30.1.2
PING 172.30.1.2 (172.30.1.2) 56(84) bytes of data.
64 bytes from 172.30.1.2: icmp_seq=1 ttl=64 time=0.782 ms
64 bytes from 172.30.1.2: icmp_seq=2 ttl=64 time=0.978 ms

--- 172.30.1.2 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
rtt min/avg/max/mdev = 0.782/0.880/0.978/0.098 ms

(kali@kaliD)-[~]
$ ping -c2 172.30.1.1
PING 172.30.1.1 (172.30.1.1) 56(84) bytes of data.
64 bytes from 172.30.1.1: icmp_seq=1 ttl=63 time=1.66 ms
64 bytes from 172.30.1.1: icmp_seq=2 ttl=63 time=1.81 ms

--- 172.30.1.1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
```

```
(kali@kaliD)-[~]
$ ping -c2 10.10.10.1
PING 10.10.10.1 (10.10.10.1) 56(84) bytes of data.
64 bytes from 10.10.10.1: icmp_seq=1 ttl=63 time=1.84 ms
64 bytes from 10.10.10.1: icmp_seq=2 ttl=63 time=2.59 ms

--- 10.10.10.1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
rtt min/avg/max/mdev = 1.835/2.210/2.585/0.375 ms

(kali@kaliD)-[~]
$ ping -c2 10.10.10.10
PING 10.10.10.10 (10.10.10.10) 56(84) bytes of data.

--- 10.10.10.10 ping statistics ---
2 packets transmitted, 0 received, 100% packet loss, time 1002ms
```

9. Volta a pór a porta de enlace (gateway) do host kaliA (ver Fig.1) e elimina a porta de enlace (gateway) do host kaliD. Realiza de novo os apartados 4) e 5). Que é que acontece? Razoa as respostas.

**NOTA:** Se ao verificar o apartado 3) segue existindo a ruta por defecto deshabilita e habilita de novo a rede para que teña efecto a eliminación do gateway.

```
(kali@kaliA)-[~]
$ sudo su -
(root@kaliA)-[~]
# ip route add default via 10.10.10.1 dev eth0
(root@kaliA)-[~]
# exit
```

```
(kali@kaliD)-[~]
$ sudo su -
(root@kaliD)-[~]
# ip route del default via 192.168.1.1 dev eth0
(root@kaliD)-[~]
# exit
```

Agora no apartado 4) non teremos conectividade coa IP 192.168.1.10 de kaliD, pero si teremos conectividade coa eth0 de kaliC. Isto é debido a que o gateway non está configurado en kaliD pero si en kaliA e a como temos as rutas estáticas configuradas en kaliB e kaliC:

```
(kali@kaliA)-[~]
$ ping -c2 127.0.0.1
PING 127.0.0.1 (127.0.0.1) 56(84) bytes of data.
64 bytes from 127.0.0.1: icmp_seq=1 ttl=64 time=0.033 ms
64 bytes from 127.0.0.1: icmp_seq=2 ttl=64 time=0.042 ms

— 127.0.0.1 ping statistics —
2 packets transmitted, 2 received, 0% packet loss, time 1009ms
rtt min/avg/max/mdev = 0.033/0.037/0.042/0.004 ms

(kali@kaliA)-[~]
$ ping -c2 127.127.127.127
PING 127.127.127.127 (127.127.127.127) 56(84) bytes of data.
64 bytes from 127.127.127.127: icmp_seq=1 ttl=64 time=0.022 ms
64 bytes from 127.127.127.127: icmp_seq=2 ttl=64 time=0.078 ms

— 127.127.127.127 ping statistics —
2 packets transmitted, 2 received, 0% packet loss, time 1033ms
rtt min/avg/max/mdev = 0.022/0.050/0.078/0.028 ms

(kali@kaliA)-[~]
$ ping -c2 10.10.10.10
PING 10.10.10.10 (10.10.10.10) 56(84) bytes of data.
64 bytes from 10.10.10.10: icmp_seq=1 ttl=64 time=0.034 ms
64 bytes from 10.10.10.10: icmp_seq=2 ttl=64 time=0.115 ms

— 10.10.10.10 ping statistics —
2 packets transmitted, 2 received, 0% packet loss, time 1008ms
rtt min/avg/max/mdev = 0.034/0.074/0.115/0.040 ms

(kali@kaliA)-[~]
$ ping -c2 10.10.10.1
PING 10.10.10.1 (10.10.10.1) 56(84) bytes of data.
64 bytes from 10.10.10.1: icmp_seq=1 ttl=64 time=0.625 ms
64 bytes from 10.10.10.1: icmp_seq=2 ttl=64 time=1.29 ms

— 10.10.10.1 ping statistics —
2 packets transmitted, 2 received, 0% packet loss, time 1009ms
rtt min/avg/max/mdev = 0.625/0.957/1.289/0.332 ms

(kali@kaliA)-[~]
$ ping -c2 172.30.1.1
PING 172.30.1.1 (172.30.1.1) 56(84) bytes of data.
64 bytes from 172.30.1.1: icmp_seq=1 ttl=64 time=0.600 ms
64 bytes from 172.30.1.1: icmp_seq=2 ttl=64 time=1.17 ms

— 172.30.1.1 ping statistics —
2 packets transmitted, 2 received, 0% packet loss, time 1019ms
rtt min/avg/max/mdev = 0.600/0.884/1.168/0.284 ms

(kali@kaliA)-[~]
$ ping -c2 172.30.1.2
PING 172.30.1.2 (172.30.1.2) 56(84) bytes of data.
64 bytes from 172.30.1.2: icmp_seq=1 ttl=63 time=1.48 ms
64 bytes from 172.30.1.2: icmp_seq=2 ttl=63 time=2.89 ms

— 172.30.1.2 ping statistics —
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
```

```
(kali@kaliA)-[~]
$ ping -c2 192.168.1.1
PING 192.168.1.1 (192.168.1.1) 56(84) bytes of data.
64 bytes from 192.168.1.1: icmp_seq=1 ttl=63 time=1.44 ms
64 bytes from 192.168.1.1: icmp_seq=2 ttl=63 time=2.56 ms

— 192.168.1.1 ping statistics —
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
rtt min/avg/max/mdev = 1.440/2.002/2.564/0.562 ms

(kali@kaliA)-[~]
$ ping -c2 192.168.1.10
PING 192.168.1.10 (192.168.1.10) 56(84) bytes of data.

— 192.168.1.10 ping statistics —
2 packets transmitted, 0 received, 100% packet loss, time 1011ms
```

Agora no apartado 5) non teremos conectividade coa eth0 de kaliC xa que o gateway non está configurado en kaliD:

```
(kali@kaliD)-[~]
$ ping -c2 127.0.0.1
PING 127.0.0.1 (127.0.0.1) 56(84) bytes of data.
64 bytes from 127.0.0.1: icmp_seq=1 ttl=64 time=0.033 ms
64 bytes from 127.0.0.1: icmp_seq=2 ttl=64 time=0.073 ms

--- 127.0.0.1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1004ms
rtt min/avg/max/mdev = 0.033/0.053/0.073/0.020 ms

(kali@kaliD)-[~]
$ ping -c2 127.127.127.127
PING 127.127.127.127 (127.127.127.127) 56(84) bytes of data.
64 bytes from 127.127.127.127: icmp_seq=1 ttl=64 time=0.032 ms
64 bytes from 127.127.127.127: icmp_seq=2 ttl=64 time=0.069 ms

--- 127.127.127.127 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1004ms
rtt min/avg/max/mdev = 0.032/0.050/0.069/0.018 ms

(kali@kaliD)-[~]
$ ping -c2 192.168.1.10
PING 192.168.1.10 (192.168.1.10) 56(84) bytes of data.
64 bytes from 192.168.1.10: icmp_seq=1 ttl=64 time=0.038 ms
64 bytes from 192.168.1.10: icmp_seq=2 ttl=64 time=0.065 ms

--- 192.168.1.10 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1005ms
rtt min/avg/max/mdev = 0.038/0.051/0.065/0.013 ms

(kali@kaliD)-[~]
$ ping -c2 192.168.1.1
PING 192.168.1.1 (192.168.1.1) 56(84) bytes of data.
64 bytes from 192.168.1.1: icmp_seq=1 ttl=64 time=0.519 ms
64 bytes from 192.168.1.1: icmp_seq=2 ttl=64 time=1.12 ms

--- 192.168.1.1 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1005ms
rtt min/avg/max/mdev = 0.519/0.820/1.121/0.301 ms

(kali@kaliD)-[~]
$ ping -c2 172.30.1.2
ping: connect: Network is unreachable

(kali@kaliD)-[~]
$ ping -c2 172.30.1.1
ping: connect: Network is unreachable

(kali@kaliD)-[~]
$ ping -c2 10.10.10.1
ping: connect: Network is unreachable

(kali@kaliD)-[~]
$ ping -c2 10.10.10.10
ping: connect: Network is unreachable
```

**NOTA:** Podemos comprobar o comportamento comentado mediante o comando traceroute.

a. Dende kaliA:

```
$ traceroute 127.0.0.1
$ traceroute 127.127.127.127
$ traceroute 10.10.10.10
$ traceroute 10.10.10.1
$ traceroute 172.30.1.1
$ traceroute 172.30.1.2
$ traceroute 192.168.1.1
$ traceroute 192.168.1.10
traceroute to 192.168.1.10 (192.168.1.10), 30 hops max, 60 byte packets
 1  10.10.10.1 (10.10.10.1)  1.730 ms  1.637 ms  1.870 ms
 2  172.30.1.2 (172.30.1.2)  3.268 ms  3.336 ms  3.306 ms
 3  * * *
 4  * * *
 5  * * *
...
30 * * *
```

b. Dende kaliD:

```
$ traceroute 127.0.0.1
$ traceroute 127.127.127.127
$ traceroute 192.168.1.10
$ traceroute 192.168.1.1
traceroute to 192.168.1.1 (192.168.1.1), 30 hops max, 60 byte packets
 1  192.168.1.1 (192.168.1.1)  0.912 ms  0.771 ms  0.705 ms

$ traceroute 172.30.1.2
traceroute to 172.30.1.2 (172.30.1.2), 30 hops max, 60 byte packets
connect: Network is unreachable

$ traceroute 172.30.1.1
$ traceroute 10.10.10.1
$ traceroute 10.10.10.10
```