

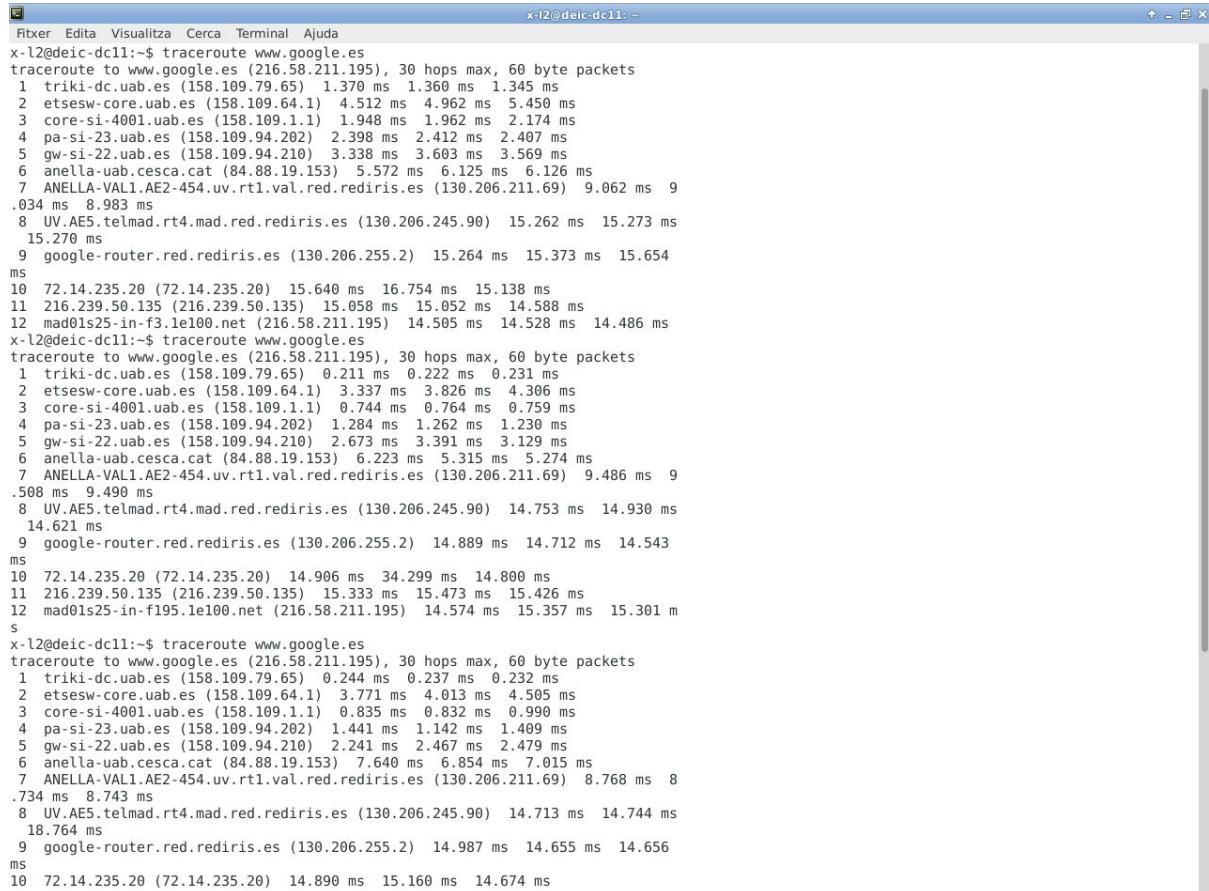
INFORME PRÀCTICA 2

XARXES

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Grup: X-L2

NOTA: en el següent informe es troben les respostes i raonaments de l'informe 2 de la tercera pràctica de Xarxes.

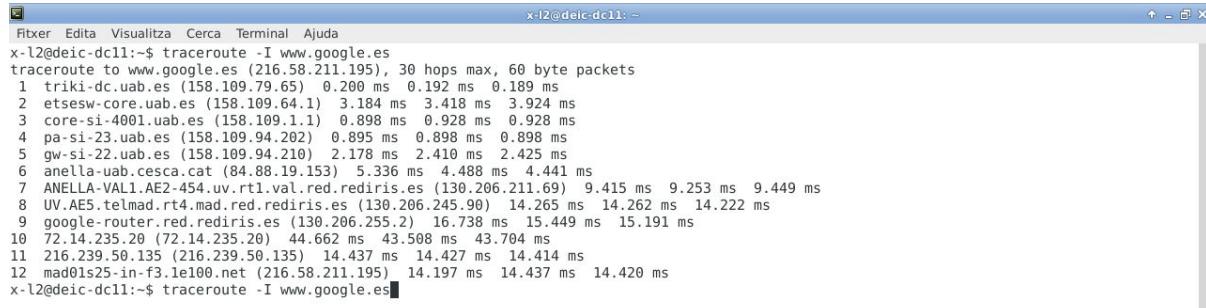
Pregunta 1:



```
Fitxer Edita Visualitza Cerca Terminal Ajuda
x-l2@deic-dc11:~$ traceroute www.google.es
traceroute to www.google.es (216.58.211.195), 30 hops max, 60 byte packets
 1 triki-dc.uab.es (158.109.79.65)  1.370 ms  1.360 ms  1.345 ms
 2 etsesw-core.uab.es (158.109.64.1)  4.512 ms  4.962 ms  5.450 ms
 3 core-si-4001.uab.es (158.109.1.1)  1.948 ms  1.962 ms  2.174 ms
 4 pa-si-23.uab.es (158.109.94.202)  2.398 ms  2.412 ms  2.407 ms
 5 gw-si-22.uab.es (158.109.94.210)  3.338 ms  3.603 ms  3.569 ms
 6 anella-uab.cesca.cat (84.88.19.153)  5.572 ms  6.125 ms  6.126 ms
 7 ANELLA-VAL1.AE2-454.uv.rt1.val.red.redirects.es (130.206.211.69)  9.062 ms  9
.034 ms  8.983 ms
 8 UV.AE5.telmad.rt4.mad.red.redirects.es (130.206.245.90)  15.262 ms  15.273 ms
 15.270 ms
 9 google-router.red.redirects.es (130.206.255.2)  15.264 ms  15.373 ms  15.654
ms
10 72.14.235.20 (72.14.235.20)  15.640 ms  16.754 ms  15.138 ms
11 216.239.50.135 (216.239.50.135)  15.058 ms  15.052 ms  14.588 ms
12 mad01s25-in-f3.1e100.net (216.58.211.195)  14.505 ms  14.528 ms  14.486 ms
x-l2@deic-dc11:~$ traceroute www.google.es
traceroute to www.google.es (216.58.211.195), 30 hops max, 60 byte packets
 1 triki-dc.uab.es (158.109.79.65)  0.211 ms  0.222 ms  0.231 ms
 2 etsesw-core.uab.es (158.109.64.1)  3.337 ms  3.826 ms  4.306 ms
 3 core-si-4001.uab.es (158.109.1.1)  0.744 ms  0.764 ms  0.759 ms
 4 pa-si-23.uab.es (158.109.94.202)  1.284 ms  1.262 ms  1.230 ms
 5 gw-si-22.uab.es (158.109.94.210)  2.673 ms  3.391 ms  3.129 ms
 6 anella-uab.cesca.cat (84.88.19.153)  6.223 ms  5.315 ms  5.274 ms
 7 ANELLA-VAL1.AE2-454.uv.rt1.val.red.redirects.es (130.206.211.69)  9.486 ms  9
.508 ms  9.490 ms
 8 UV.AE5.telmad.rt4.mad.red.redirects.es (130.206.245.90)  14.753 ms  14.930 ms
 14.621 ms
 9 google-router.red.redirects.es (130.206.255.2)  14.889 ms  14.712 ms  14.543
ms
10 72.14.235.20 (72.14.235.20)  14.906 ms  34.299 ms  14.800 ms
11 216.239.50.135 (216.239.50.135)  15.333 ms  15.473 ms  15.426 ms
12 mad01s25-in-f195.1e100.net (216.58.211.195)  14.574 ms  15.357 ms  15.301 m
s
x-l2@deic-dc11:~$ traceroute www.google.es
traceroute to www.google.es (216.58.211.195), 30 hops max, 60 byte packets
 1 triki-dc.uab.es (158.109.79.65)  0.244 ms  0.237 ms  0.232 ms
 2 etsesw-core.uab.es (158.109.64.1)  3.771 ms  4.013 ms  4.505 ms
 3 core-si-4001.uab.es (158.109.1.1)  0.835 ms  0.832 ms  0.990 ms
 4 pa-si-23.uab.es (158.109.94.202)  1.441 ms  1.142 ms  1.409 ms
 5 gw-si-22.uab.es (158.109.94.210)  2.241 ms  2.467 ms  2.479 ms
 6 anella-uab.cesca.cat (84.88.19.153)  7.640 ms  6.854 ms  7.015 ms
 7 ANELLA-VAL1.AE2-454.uv.rt1.val.red.redirects.es (130.206.211.69)  8.768 ms  8
.734 ms  8.743 ms
 8 UV.AE5.telmad.rt4.mad.red.redirects.es (130.206.245.90)  14.713 ms  14.744 ms
 18.764 ms
 9 google-router.red.redirects.es (130.206.255.2)  14.987 ms  14.655 ms  14.656
ms
10 72.14.235.20 (72.14.235.20)  14.890 ms  15.160 ms  14.674 ms
```

- a) Observem per quins routers passa el datagrama per a anar des del nostre ordinador fins a www.google.com.
- b) Si, en aquest cas hem obtingut en les 3 execucions realitzades el mateix resultat.
- c) Estem a 12 hops o salts del destí, un per a cada sortida per pantalla de traceroute.
- d) No, en tot cas signifiquen que aquell dispositiu no respon a respostes de ICMP.

Pregunta 2:



```
x-12@deic-dc11:~$ traceroute -T www.google.es
traceroute to www.google.es (216.58.211.195), 30 hops max, 60 byte packets
 1 triki-dc.uab.es (158.109.79.65)  0.200 ms  0.192 ms  0.189 ms
 2 etsesw-core.uab.es (158.109.64.1)  3.184 ms  3.418 ms  3.924 ms
 3 core-si-4001.uab.es (158.109.1.1)  0.898 ms  0.928 ms  0.928 ms
 4 pa-si-23.uab.es (158.109.94.202)  0.895 ms  0.898 ms  0.898 ms
 5 gw-si-22.uab.es (158.109.94.210)  2.178 ms  2.410 ms  2.425 ms
 6 anella-uab.cesca.cat (84.88.19.153)  5.336 ms  4.488 ms  4.441 ms
 7 ANELLA-VAL1.AE2-454.uv.rt1.val.red.rediris.es (130.206.211.69)  9.415 ms  9.253 ms  9.449 ms
 8 UV.AE5.telmad.rt4.mad.red.rediris.es (130.206.245.98)  14.265 ms  14.262 ms  14.222 ms
 9 google-router.red.rediris.es (130.206.255.2)  16.738 ms  15.449 ms  15.191 ms
10 72.14.235.20 (72.14.235.20)  44.662 ms  43.500 ms  43.704 ms
11 216.239.50.135 (216.239.50.135)  14.437 ms  14.427 ms  14.414 ms
12 mad01s25-in-f3.le100.net (216.58.211.195)  14.197 ms  14.437 ms  14.420 ms
x-12@deic-dc11:~$ traceroute -I www.google.es■
```

- a) Observem el mateix resultat que per a l'execució de la comanda anterior.
- b) Segons la captura d'imatge de l'execució de traceroute, estem a 12 hops.
- c) No, no apareix cap símbol *.

Pregunta 3:

Si especifiquem l'opció de -l, traceroute ens entregarà ICMP ECHO per a probes, mentre's que si no l'utilitzem, només mostrarà els ICMP TIME_EXCEEDED.

Pregunta 4:

```
x-12@deic-dc11: ~
Rxer Edita Visualiza Cerca Terminal Ajuda
Every 1,0s: netstat
Fri May 20 18:15:27 2016

Active Internet connections (w/o servers)
Proto Recv-Q Local Address          Foreign Address        State
tcp    0      0 deic-dc11.uab.es:756   moixero:1012        TIME_WAIT
tcp    0      0 deic-dc11.uab.es:891   moixero:1012        TIME_WAIT
tcp    0      0 deic-dc11.uab.es:36489  moixero:sunrpc     TIME_WAIT
tcp    0      0 deic-dc11.uab.es:36487  moixero:sunrpc     TIME_WAIT
tcp    0      0 deic-dc11.uab.es:937   moixero:1012        TIME_WAIT
tcp    0      0 deic-dc11.uab.es:867   moixero:1012        TIME_WAIT
tcp    0      0 deic-dc11.uab.es:906   moixero:1012        TIME_WAIT
tcp    0      0 deic-dc11.uab.es:918   moixero:1012        TIME_WAIT
tcp    0      0 deic-dc11.uab.es:51649  moixero:sunrpc     TIME_WAIT
tcp    0      0 deic-dc11.uab.es:940   moixero:1012        TIME_WAIT
tcp    0      0 deic-dc11.uab.es:52272  moixero:sunrpc     TIME_WAIT
tcp    0      0 deic-dc11.uab.es:46908  moixero:sunrpc     TIME_WAIT
tcp    0      0 deic-dc11.uab.es:934   moixero:1012        TIME_WAIT
tcp    0      0 deic-dc11.uab.es:43730  moixero:sunrpc     TIME_WAIT
tcp    0      0 deic-dc11.uab.es:57825  moixero:sunrpc     TIME_WAIT
tcp    0      0 deic-dc11.uab.es:1002   moixero:nfs       ESTABLISHED
tcp    0      0 deic-dc11.uab.es:46800  moixero:sunrpc     TIME_WAIT
tcp    0      0 deic-dc11.uab.es:898   moixero:1012        TIME_WAIT
tcp    0      0 deic-dc11.uab.es:37499  moixero:sunrpc     TIME_WAIT
tcp    0      0 deic-dc11.uab.es:907   moixero:1012        TIME_WAIT
tcp    0      0 deic-dc11.uab.es:900   moixero:1012        TIME_WAIT
tcp    0      0 deic-dc11.uab.es:762   moixero:1012        TIME_WAIT
tcp    0      0 deic-dc11.uab.es:42847  moixero:sunrpc     TIME_WAIT
tcp    0      0 deic-dc11.uab.es:34269  moixero:sunrpc     TIME_WAIT
tcp    0      0 deic-dc11.uab.es:893   moixero:1012        TIME_WAIT
tcp    0      0 deic-dc11.uab.es:39449  moixero:sunrpc     TIME_WAIT
tcp    0      0 deic-dc11.uab.es:915   moixero:1012        TIME_WAIT
tcp    0      0 deic-dc11.uab.es:50979  moixero:sunrpc     TIME_WAIT
tcp    0      0 deic-dc11.uab.es:46203  moixero:sunrpc     TIME_WAIT
tcp    0      0 deic-dc11.uab.es:46768  moixero:sunrpc     TIME_WAIT
tcp    0      0 deic-dc11.uab.es:872   moixero:1012        TIME_WAIT
tcp    0      0 deic-dc11.uab.es:47602  moixero:sunrpc     TIME_WAIT
tcp    0      0 deic-dc11.uab.es:889   moixero:1012        TIME_WAIT
tcp    0      0 deic-dc11.uab.es:870   moixero:1012        TIME_WAIT
tcp    0      0 deic-dc11.uab.es:52739  moixero:sunrpc     TIME_WAIT
tcp    0      0 deic-dc11.uab.es:926   moixero:1012        TIME_WAIT
tcp    0      0 deic-dc11.uab.es:920   moixero:1012        TIME_WAIT
tcp    0      0 deic-dc11.uab.es:45955  moixero:sunrpc     TIME_WAIT
tcp    0      0 deic-dc11.uab.es:swat  moixero:1012        TIME_WAIT
tcp    0      0 deic-dc11.uab.es:903   moixero:1012        TIME_WAIT
tcp    0      0 deic-dc11.uab.es:50695  moixero:sunrpc     TIME_WAIT
tcp    0      0 deic-dc11.uab.es:35144  moixero:sunrpc     TIME_WAIT
tcp    0      0 deic-dc11.uab.es:878   moixero:1012        TIME_WAIT
tcp    0      0 deic-dc11.uab.es:60308  ec2-52-24-217-21.:https ESTABLISHED
tcp    0      0 deic-dc11.uab.es:50275  moixero:sunrpc     TIME_WAIT
tcp    0      0 deic-dc11.uab.es:884   moixero:1012        TIME_WAIT
```

```

x-12@deic-dc11: ~
Fitxer Edita Visualitza Cerca Terminal Ajuda
Every 1,0s: netstat
Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State
tcp      0      0 deic-dc11.uab.es:891     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:867     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:906     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:918     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:44128    moixero:sunrpc        TIME_WAIT
tcp      0      0 deic-dc11.uab.es:1002    moixero:nfs           ESTABLISHED
tcp      0      0 deic-dc11.uab.es:898     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:907     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:40091    moixero:sunrpc        TIME_WAIT
tcp      0      0 deic-dc11.uab.es:900     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:893     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:915     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:872     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:36621    moixero:sunrpc        TIME_WAIT
tcp      0      0 deic-dc11.uab.es:889     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:870     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:920     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:swat   moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:903     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:35230    moixero:sunrpc        TIME_WAIT
tcp      0      0 deic-dc11.uab.es:878     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:884     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:50072    moixero:sunrpc        TIME_WAIT
tcp      0      0 deic-dc11.uab.es:904     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:49903    moixero:sunrpc        TIME_WAIT
tcp      0      0 deic-dc11.uab.es:894     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:50968    moixero:sunrpc        TIME_WAIT
tcp      0      0 deic-dc11.uab.es:58262    moixero:sunrpc        TIME_WAIT
tcp      0      0 deic-dc11.uab.es:41094    moixero:sunrpc        TIME_WAIT
tcp      0      0 deic-dc11.uab.es:33783    moixero:sunrpc        TIME_WAIT
tcp      0      0 deic-dc11.uab.es:37865    moixero:sunrpc        TIME_WAIT
tcp      0      0 deic-dc11.uab.es:56878    moixero:sunrpc        TIME_WAIT
tcp      0      0 deic-dc11.uab.es:35098    moixero:sunrpc        TIME_WAIT
tcp      0      0 deic-dc11.uab.es:882     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:50934    moixero:1111          ESTABLISHED
tcp      0      0 deic-dc11.uab.es:48965    moixero:sunrpc        TIME_WAIT
tcp      0      0 deic-dc11.uab.es:55736    moixero:sunrpc        TIME_WAIT
tcp      0      0 deic-dc11.uab.es:57683    moixero:sunrpc        TIME_WAIT
tcp      0      0 deic-dc11.uab.es:879     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:869     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:866     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:908     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:916     moixero:1012          TIME_WAIT
tcp      0      0 deic-dc11.uab.es:58914    moixero:sunrpc        TIME_WAIT
tcp      0      0 deic-dc11.uab.es:34168    ftp.mad.grn.es:http   TIME_WAIT
tcp      0      0 deic-dc11.uab.es:875     moixero:1012          TIME_WAIT

```

```

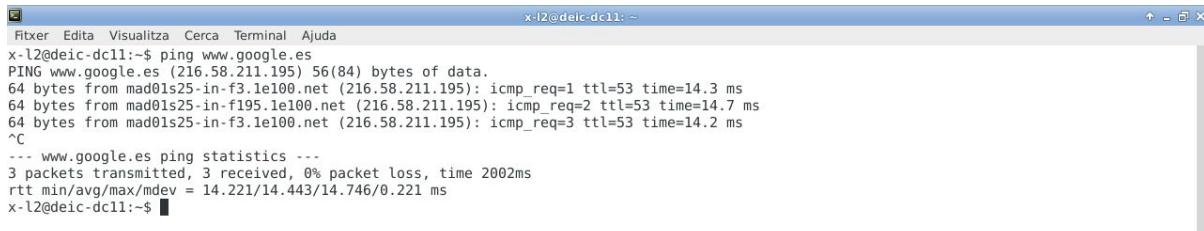
x-12@deic-dc11: ~
Fitxer Edits Visualitzar Cerca Terminal Ajuda
Every 1,0s: netstat
Fri May 20 18:27:40 2016

Active Internet connections (w/o servers)
Proto Recv-Q Send-Q Local Address          Foreign Address        State
tcp    0      0 deic-dc11.uab.es:43031    moixero:sunrpc      TIME_WAIT
tcp    0      0 deic-dc11.uab.es:37556    moixero:sunrpc      TIME_WAIT
tcp    0      0 deic-dc11.uab.es:891     moixero:1012       TIME_WAIT
tcp    0      0 deic-dc11.uab.es:37279    moixero:sunrpc      TIME_WAIT
tcp    0      0 deic-dc11.uab.es:56297    moixero:sunrpc      TIME_WAIT
tcp    0      0 deic-dc11.uab.es:867     moixero:1012       TIME_WAIT
tcp    0      0 deic-dc11.uab.es:906     moixero:1012       TIME_WAIT
tcp    0      0 deic-dc11.uab.es:918     moixero:1012       TIME_WAIT
tcp    0      0 deic-dc11.uab.es:36386    moixero:sunrpc      TIME_WAIT
tcp    0      0 deic-dc11.uab.es:42706    moixero:sunrpc      TIME_WAIT
tcp    0      0 deic-dc11.uab.es:1002    moixero:nfs        ESTABLISHED
tcp    0      0 deic-dc11.uab.es:898     moixero:1012       TIME_WAIT
tcp    0      0 deic-dc11.uab.es:907     moixero:1012       TIME_WAIT
tcp    0      0 deic-dc11.uab.es:900     moixero:1012       TIME_WAIT
tcp    0      0 deic-dc11.uab.es:893     moixero:1012       TIME_WAIT
tcp    0      0 deic-dc11.uab.es:915     moixero:1012       TIME_WAIT
tcp    0      0 deic-dc11.uab.es:51393    moixero:sunrpc      TIME_WAIT
tcp    0      0 deic-dc11.uab.es:35616    moixero:sunrpc      TIME_WAIT
tcp    0      0 deic-dc11.uab.es:872     moixero:1012       TIME_WAIT
tcp    0      0 deic-dc11.uab.es:889     moixero:1012       TIME_WAIT
tcp    0      0 deic-dc11.uab.es:870     moixero:1012       TIME_WAIT
tcp    0      0 deic-dc11.uab.es:34766    moixero:sunrpc      TIME_WAIT
tcp    0      0 deic-dc11.uab.es:49227    mad01s26-in-f3.1e:https ESTABLISHED
tcp    0      0 deic-dc11.uab.es:920     moixero:1012       TIME_WAIT
tcp    0      0 deic-dc11.uab.es:swat    moixero:1012       TIME_WAIT
tcp    0      0 deic-dc11.uab.es:903     moixero:1012       TIME_WAIT
tcp    0      0 deic-dc11.uab.es:878     moixero:1012       TIME_WAIT
tcp    0      0 deic-dc11.uab.es:51549    moixero:sunrpc      TIME_WAIT
tcp    0      0 deic-dc11.uab.es:41821    moixero:sunrpc      TIME_WAIT
tcp    0      0 deic-dc11.uab.es:39584    moixero:sunrpc      TIME_WAIT
tcp    0      0 deic-dc11.uab.es:56953    moixero:sunrpc      TIME_WAIT
tcp    0      0 deic-dc11.uab.es:38992    moixero:sunrpc      TIME_WAIT
tcp    0      0 deic-dc11.uab.es:884     moixero:1012       TIME_WAIT
tcp    0      0 deic-dc11.uab.es:904     moixero:1012       TIME_WAIT
tcp    0      0 deic-dc11.uab.es:894     moixero:1012       TIME_WAIT
tcp    0      0 deic-dc11.uab.es:35376    moixero:sunrpc      TIME_WAIT
tcp    0      0 deic-dc11.uab.es:55645    moixero:sunrpc      TIME_WAIT
tcp    0      0 deic-dc11.uab.es:44170    moixero:sunrpc      TIME_WAIT
tcp    0      0 deic-dc11.uab.es:882     moixero:1012       TIME_WAIT
tcp    0      0 deic-dc11.uab.es:50934    moixero:1111       ESTABLISHED
tcp    0      0 deic-dc11.uab.es:47063    moixero:sunrpc      TIME_WAIT
tcp    0      0 deic-dc11.uab.es:37445    moixero:sunrpc      TIME_WAIT
tcp    0      0 deic-dc11.uab.es:53831    mad01s26-in-f13.1:https ESTABLISHED
tcp    0      0 deic-dc11.uab.es:34183    ftp.mad.grn.es:http TIME_WAIT
tcp    0      0 deic-dc11.uab.es:879     moixero:1012       TIME_WAIT
tcp    0      0 deic-dc11.uab.es:869     moixero:1012       TIME_WAIT

```

- a) Origen: deic-dc1.uab.es:53831 // Destinació: mad01s26-in-f13.1:https
- b) La connexió està en estat “ESTABLISHED”, establerta.
- c) TIME_WAIT -> ESTABLISHED, són els estats que varem detectar al fer les probes.

Pregunta 5:



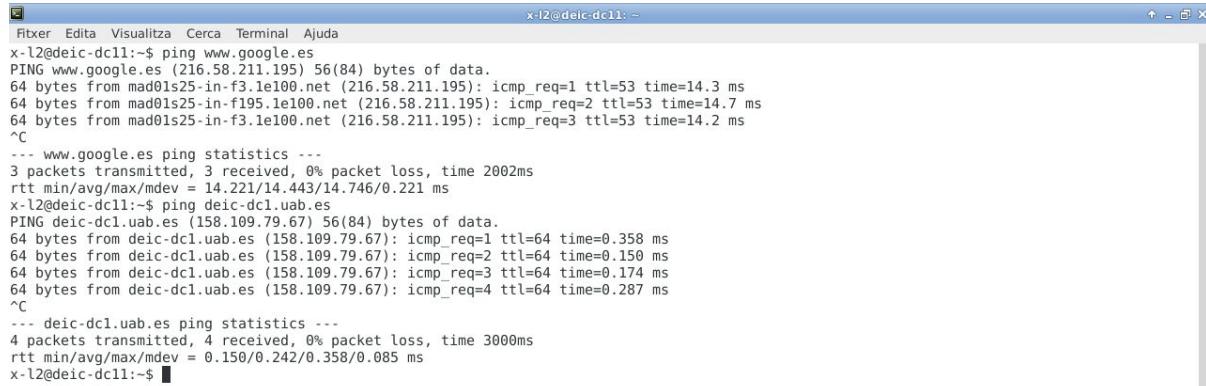
```
x-12@deic-dc11:~$ ping www.google.es
PING www.google.es (216.58.211.195) 56(84) bytes of data.
64 bytes from mad01s25-in-f3.1e100.net (216.58.211.195): icmp_req=1 ttl=53 time=14.3 ms
64 bytes from mad01s25-in-f195.1e100.net (216.58.211.195): icmp_req=2 ttl=53 time=14.7 ms
64 bytes from mad01s25-in-f3.1e100.net (216.58.211.195): icmp_req=3 ttl=53 time=14.2 ms
^C
--- www.google.es ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2002ms
rtt min/avg/max/mdev = 14.221/14.443/14.746/0.221 ms
x-12@deic-dc11:~$
```

- a) PING www.google.es (216.58.211.195) 56(84) bytes of data
comanda executada / destinació (direcció de destí) / tamany del datagrama enviat
- b) 64 bytes from mad01s25-in-f3.1e100.net (216.58.211.195): icmp_req=1 ttl=53 time=14.3ms
tamany del datagrama rebut / origen (direcció d'origen) / resposta de icmp número 1 / ttl del datagrama / temps transcorregut des de l'enviament a la recepció del datagrama
- c) 3 packets transmitted, 3 received, 0% packet loss, time 2002ms
rtt min/avg/max/mdev = 14.221/14.443/14.746/0.221 ms
Quantiat de packets enviats / packets rebuts / percentatge de packets no rebuts, és a dir, perduts / temps total de l'execució de la comanda
temps minim/mig/màxim/desviació mitja del temps de resposta dels packets
- d) Ping utilitza el protocol ICMP, específicament, ICMP ECHO REQUEST.

Pregunta 6:

- a) El missatge de ICMP ECHO REQUEST de ping ha tornat amb un ttl de 250, lo que significa que encara pot fer 250 salts més sense morir.
- b) El missatge encara pot fer 127 salts.
- c) No, ja que el datagrama hauria d'haver "mort" abans d'arribar.
- d) No, ja que ttl=255 és el valor màxim, significaria que no ha passat per cap router.

Pregunta 7:

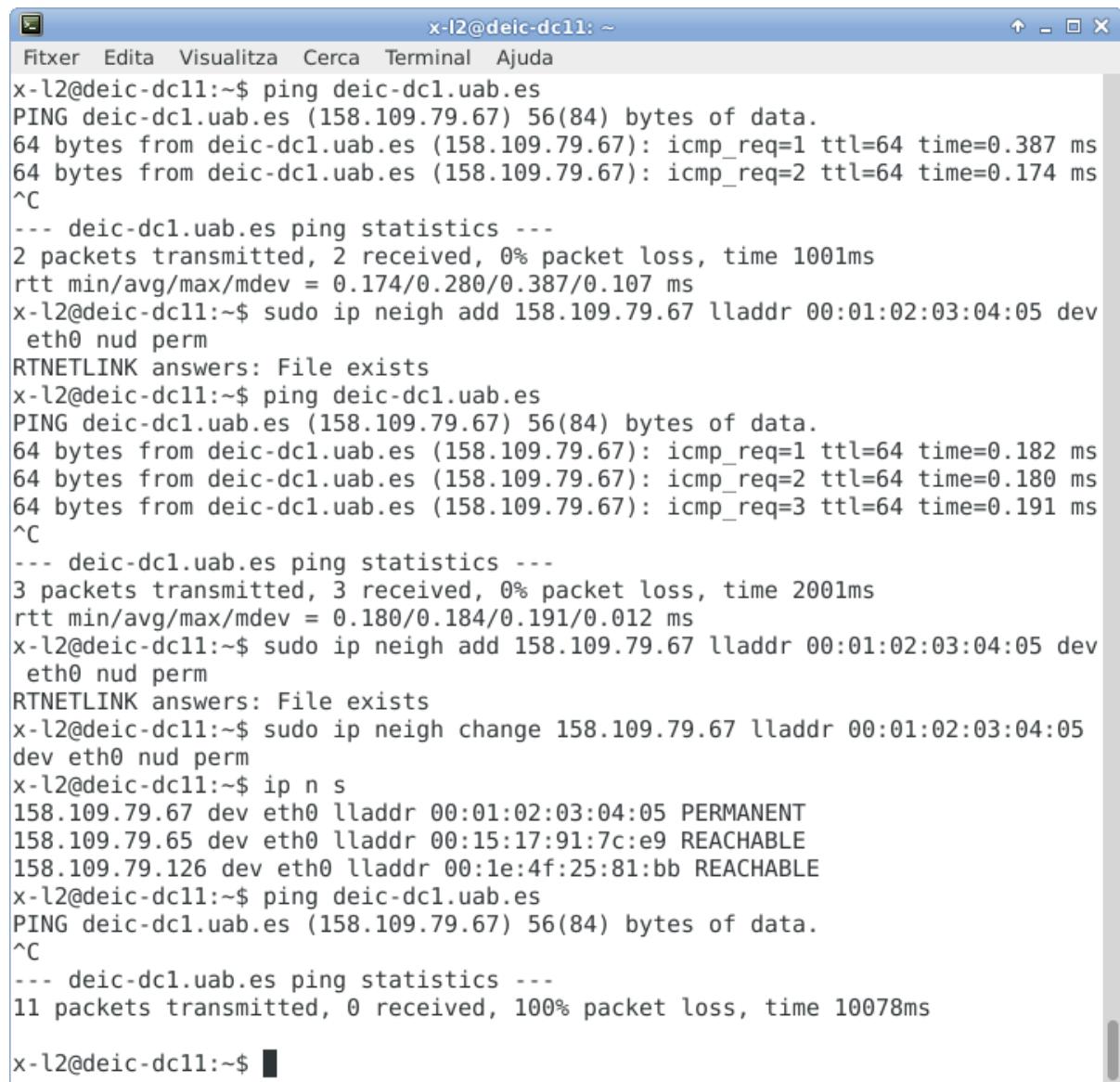


```
x-12@deic-dc11:~
```

```
Rtxer Edita Visualiza Cerca Terminal Ajuda
x-12@deic-dc11:~$ ping www.google.es
PING www.google.es (216.58.211.195) 56(84) bytes of data.
64 bytes from mad01s25-in-f3.1e100.net (216.58.211.195): icmp_req=1 ttl=53 time=14.3 ms
64 bytes from mad01s25-in-f195.1e100.net (216.58.211.195): icmp_req=2 ttl=53 time=14.7 ms
64 bytes from mad01s25-in-f3.1e100.net (216.58.211.195): icmp_req=3 ttl=53 time=14.2 ms
^C
--- www.google.es ping statistics ---
3 packets transmitted, 0% packet loss, time 2002ms
rtt min/avg/max/mdev = 14.221/14.443/14.746/0.221 ms
x-12@deic-dc11:~$ ping deic-dc1.uab.es
PING deic-dc1.uab.es (158.109.79.67) 56(84) bytes of data.
64 bytes from deic-dc1.uab.es (158.109.79.67): icmp_req=1 ttl=64 time=0.358 ms
64 bytes from deic-dc1.uab.es (158.109.79.67): icmp_req=2 ttl=64 time=0.150 ms
64 bytes from deic-dc1.uab.es (158.109.79.67): icmp_req=3 ttl=64 time=0.174 ms
64 bytes from deic-dc1.uab.es (158.109.79.67): icmp_req=4 ttl=64 time=0.287 ms
^C
--- deic-dc1.uab.es ping statistics ---
4 packets transmitted, 0% packet loss, time 3000ms
rtt min/avg/max/mdev = 0.150/0.242/0.358/0.085 ms
x-12@deic-dc11:~$
```

- a) No, totes les respostes no triguen el mateix. Si, la primera resposta triga més.
- b) La primera resposta de totes les execucions és la que triga més.
- c) La causa és que aquest host no està en la nostra taula d'encaminament i em de possar-la per primer cop (no és veí nostre).
- d) Quan ja s'ha fet ping altres vegades o la direcció ja està en la nostra taula d'encaminament.

Pregunta 8:



The screenshot shows a terminal window with the following session:

```
x-l2@deic-dc11:~$ ping deic-dc1.uab.es
PING deic-dc1.uab.es (158.109.79.67) 56(84) bytes of data.
64 bytes from deic-dc1.uab.es (158.109.79.67): icmp_req=1 ttl=64 time=0.387 ms
64 bytes from deic-dc1.uab.es (158.109.79.67): icmp_req=2 ttl=64 time=0.174 ms
^C
--- deic-dc1.uab.es ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1001ms
rtt min/avg/max/mdev = 0.174/0.280/0.387/0.107 ms
x-l2@deic-dc11:~$ sudo ip neigh add 158.109.79.67 lladdr 00:01:02:03:04:05 dev
eth0 nud perm
RTNETLINK answers: File exists
x-l2@deic-dc11:~$ ping deic-dc1.uab.es
PING deic-dc1.uab.es (158.109.79.67) 56(84) bytes of data.
64 bytes from deic-dc1.uab.es (158.109.79.67): icmp_req=1 ttl=64 time=0.182 ms
64 bytes from deic-dc1.uab.es (158.109.79.67): icmp_req=2 ttl=64 time=0.180 ms
64 bytes from deic-dc1.uab.es (158.109.79.67): icmp_req=3 ttl=64 time=0.191 ms
^C
--- deic-dc1.uab.es ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2001ms
rtt min/avg/max/mdev = 0.180/0.184/0.191/0.012 ms
x-l2@deic-dc11:~$ sudo ip neigh add 158.109.79.67 lladdr 00:01:02:03:04:05 dev
eth0 nud perm
RTNETLINK answers: File exists
x-l2@deic-dc11:~$ sudo ip neigh change 158.109.79.67 lladdr 00:01:02:03:04:05
dev eth0 nud perm
x-l2@deic-dc11:~$ ip n s
158.109.79.67 dev eth0 lladdr 00:01:02:03:04:05 PERMANENT
158.109.79.65 dev eth0 lladdr 00:15:17:91:7c:e9 REACHABLE
158.109.79.126 dev eth0 lladdr 00:1e:4f:25:81:bb REACHABLE
x-l2@deic-dc11:~$ ping deic-dc1.uab.es
PING deic-dc1.uab.es (158.109.79.67) 56(84) bytes of data.
^C
--- deic-dc1.uab.es ping statistics ---
11 packets transmitted, 0 received, 100% packet loss, time 10078ms
x-l2@deic-dc11:~$
```

En la captura de pantalla observem com es podien fer pings abans d'afegir l'entrada com a permanent.

- a) No, s'observa que quan es fa ping i l'entrada és permanent, es perden el 100% dels datagrames.
- b) Perque es buscarà la màquina amb direcció física 00:01:02:03:04:05 i amb direcció lògica 158.109.79.67, tot i que aquesta direcció lògica existeix, no li correspon la direcció física, el fet de que sigui permanent, vol dir que no anirà a aquella direcció si les adreces física i lògica coincideixen.

```
x-l2@deic-dc11: ~
Fitxer Edita Visualitza Cerca Terminal Ajuda
158.109.79.126 dev eth0 lladdr 00:1e:4f:25:81:bb REACHABLE
x-l2@deic-dc11:~$ sudo ip neigh change 158.109.79.67 lladdr 00:01:02:03:04:05
dev eth0 nud stale
x-l2@deic-dc11:~$ ip n s
158.109.79.67 dev eth0 lladdr 00:01:02:03:04:05 PERMANENT
158.109.79.65 dev eth0 lladdr 00:15:17:91:7c:e9 REACHABLE
158.109.79.126 dev eth0 lladdr 00:1e:4f:25:81:bb REACHABLE
x-l2@deic-dc11:~$ sudo ip neigh change 158.109.79.67 lladdr 00:01:02:03:04:05
dev eth0 nud reachable
x-l2@deic-dc11:~$ ip n s
158.109.79.67 dev eth0 lladdr 00:01:02:03:04:05 REACHABLE
158.109.79.65 dev eth0 lladdr 00:15:17:91:7c:e9 REACHABLE
158.109.79.126 dev eth0 lladdr 00:1e:4f:25:81:bb REACHABLE
x-l2@deic-dc11:~$ ping deic-dc1.uab.es
PING deic-dc1.uab.es (158.109.79.67) 56(84) bytes of data.
^C
--- deic-dc1.uab.es ping statistics ---
7 packets transmitted, 0 received, 100% packet loss, time 6047ms

x-l2@deic-dc11:~$ sudo ip neigh change 158.109.79.67 lladdr 00:01:02:03:04:05
dev eth0 nud stale
x-l2@deic-dc11:~$ ip n s
158.109.79.67 dev eth0 lladdr 00:01:02:03:04:05 REACHABLE
158.109.79.65 dev eth0 lladdr 00:15:17:91:7c:e9 DELAY
158.109.79.126 dev eth0 lladdr 00:1e:4f:25:81:bb REACHABLE
x-l2@deic-dc11:~$ ping deic-dc1.uab.es
PING deic-dc1.uab.es (158.109.79.67) 56(84) bytes of data.
64 bytes from deic-dc1.uab.es (158.109.79.67): icmp_req=3 ttl=64 time=0.191 ms
64 bytes from deic-dc1.uab.es (158.109.79.67): icmp_req=4 ttl=64 time=0.180 ms
64 bytes from deic-dc1.uab.es (158.109.79.67): icmp_req=5 ttl=64 time=0.167 ms
64 bytes from deic-dc1.uab.es (158.109.79.67): icmp_req=6 ttl=64 time=0.195 ms
^C
--- deic-dc1.uab.es ping statistics ---
6 packets transmitted, 4 received, 33% packet loss, time 5018ms
rtt min/avg/max/mdev = 0.167/0.183/0.195/0.014 ms
x-l2@deic-dc11:~$
```

- c) Quan fiquem l'entrada a STALE, le posa com a REACHABLE, és a dir, que es pot arribar.
d) L'entrada es posa a REACHABLE i si que es pot accedir, ja que respondrà la màquina amb direcció lògica 158.109.79.67 on la direcció física no ho pren com a important.

S'adjunten les execucions de wireshark amb permanent i stale respectivament:

eth0 [Wireshark 1.8.2]						
No.	Time	Source	Destination	Protocol	Length	Info
3	0.514513000	158.109.79.77	158.109.79.67	ICMP	98	Echo (ping) request id=0x1f22, seq=12/3072, ttl=64
4	1.514537000	158.109.79.77	158.109.79.67	ICMP	98	Echo (ping) request id=0x1f22, seq=13/3328, ttl=64
6	2.514539000	158.109.79.77	158.109.79.67	ICMP	98	Echo (ping) request id=0x1f22, seq=14/3584, ttl=64
7	3.514526000	158.109.79.77	158.109.79.67	ICMP	98	Echo (ping) request id=0x1f22, seq=15/3840, ttl=64
22	4.514538000	158.109.79.77	158.109.79.67	ICMP	98	Echo (ping) request id=0x1f22, seq=16/4096, ttl=64
43	5.514539000	158.109.79.77	158.109.79.67	ICMP	98	Echo (ping) request id=0x1f22, seq=17/4352, ttl=64
53	6.514537000	158.109.79.77	158.109.79.67	ICMP	98	Echo (ping) request id=0x1f22, seq=18/4608, ttl=64
54	7.514499000	158.109.79.77	158.109.79.67	ICMP	98	Echo (ping) request id=0x1f22, seq=19/4864, ttl=64
128	8.514499000	158.109.79.77	158.109.79.67	ICMP	98	Echo (ping) request id=0x1f22, seq=20/5120, ttl=64
129	9.514534000	158.109.79.77	158.109.79.67	ICMP	98	Echo (ping) request id=0x1f22, seq=21/5376, ttl=64
134	10.514551000	158.109.79.77	158.109.79.67	ICMP	98	Echo (ping) request id=0x1f22, seq=22/5632, ttl=64
158	11.514479000	158.109.79.77	158.109.79.67	ICMP	98	Echo (ping) request id=0x1f22, seq=23/5888, ttl=64
160	12.514477000	158.109.79.77	158.109.79.67	ICMP	98	Echo (ping) request id=0x1f22, seq=24/6144, ttl=64

eth0 [Wireshark 1.8.2]						
No.	Time	Source	Destination	Protocol	Length	Info
3	0.639432000	158.109.79.79	158.109.79.64	ICMP	98	Echo (ping) request id=0x19ee, seq=258/513, ttl=64
8	1.647423000	158.109.79.79	158.109.79.64	ICMP	98	Echo (ping) request id=0x19ee, seq=259/769, ttl=64
9	2.655382000	158.109.79.79	158.109.79.64	ICMP	98	Echo (ping) request id=0x19ee, seq=260/1025, ttl=64
11	3.663466000	158.109.79.79	158.109.79.64	ICMP	98	Echo (ping) request id=0x19ee, seq=261/1281, ttl=64
14	3.760997000	158.109.79.77	158.109.79.67	ICMP	98	Echo (ping) request id=0x1ee0, seq=1/256, ttl=64
15	3.761134000	158.109.79.67	158.109.79.77	ICMP	98	Echo (ping) reply id=0x1ee0, seq=1/256, ttl=64
18	4.671463000	158.109.79.79	158.109.79.64	ICMP	98	Echo (ping) request id=0x19ee, seq=262/1537, ttl=64
19	4.762145000	158.109.79.77	158.109.79.67	ICMP	98	Echo (ping) request id=0x1ee0, seq=2/512, ttl=64
20	4.762269000	158.109.79.67	158.109.79.77	ICMP	98	Echo (ping) reply id=0x1ee0, seq=2/512, ttl=64
44	5.679436000	158.109.79.79	158.109.79.64	ICMP	98	Echo (ping) request id=0x19ee, seq=263/1793, ttl=64
45	5.762532000	158.109.79.77	158.109.79.67	ICMP	98	Echo (ping) request id=0x1ee0, seq=3/768, ttl=64
46	5.762687000	158.109.79.67	158.109.79.77	ICMP	98	Echo (ping) reply id=0x1ee0, seq=3/768, ttl=64
49	6.687473000	158.109.79.79	158.109.79.64	ICMP	98	Echo (ping) request id=0x19ee, seq=264/2049, ttl=64
50	6.762487000	158.109.79.77	158.109.79.67	ICMP	98	Echo (ping) request id=0x1ee0, seq=4/1824, ttl=64
51	6.762617000	158.109.79.67	158.109.79.77	ICMP	98	Echo (ping) reply id=0x1ee0, seq=4/1824, ttl=64
56	7.695487000	158.109.79.79	158.109.79.64	ICMP	98	Echo (ping) request id=0x19ee, seq=265/2305, ttl=64
57	7.762482000	158.109.79.77	158.109.79.67	ICMP	98	Echo (ping) request id=0x1ee0, seq=5/1280, ttl=64
58	7.762628000	158.109.79.67	158.109.79.77	ICMP	98	Echo (ping) reply id=0x1ee0, seq=5/1280, ttl=64
61	8.703499000	158.109.79.79	158.109.79.64	ICMP	98	Echo (ping) request id=0x19ee, seq=266/2561, ttl=64
64	8.763726000	158.109.79.77	158.109.79.67	ICMP	98	Echo (ping) request id=0x1ee0, seq=6/1536, ttl=64
65	8.763864000	158.109.79.67	158.109.79.77	ICMP	98	Echo (ping) reply id=0x1ee0, seq=6/1536, ttl=64
73	9.711467000	158.109.79.79	158.109.79.64	ICMP	98	Echo (ping) request id=0x19ee, seq=267/2817, ttl=64
74	9.762726000	158.109.79.77	158.109.79.67	ICMP	98	Echo (ping) request id=0x1ee0, seq=7/1792, ttl=64
75	9.762905000	158.109.79.67	158.109.79.77	ICMP	98	Echo (ping) reply id=0x1ee0, seq=7/1792, ttl=64

Pregunta 9:

x-12@deic-dc11:~

```
Fitxer Edita Visualitza Cerca Terminal Ajuda
x-12@deic-dc11:~$ sudo ip neigh change 158.109.79.67 lladdr FF:FF:FF:FF:FF:FF
dev eth0 nud reachable
x-12@deic-dc11:~$ ip n s
158.109.79.67 dev eth0 lladdr ff:ff:ff:ff:ff:ff REACHABLE
158.109.79.65 dev eth0 lladdr 00:15:17:91:7c:e9 DELAY
158.109.79.126 dev eth0 lladdr 00:1e:4f:25:81:bb REACHABLE
x-12@deic-dc11:~$
```

eth0 (Wireshark 1.8.2)

File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help

Filter: icmp Expression... Clear Apply Desa

No.	Time	Source	Destination	Protocol	Length Info
94	5.123519080	158.109.79.77	158.109.79.67	ICMP	98 Echo (ping) request id=0x1fa9 seq=1/256, ttl=64
95	5.123714080	158.109.79.67	158.109.79.77	ICMP	98 Echo (ping) reply id=0x1fa9 seq=1/256, ttl=64
119	6.124612080	158.109.79.77	158.109.79.67	ICMP	98 Echo (ping) request id=0x1fa9 seq=2/512, ttl=64
120	6.124763080	158.109.79.67	158.109.79.77	ICMP	98 Echo (ping) reply id=0x1fa9 seq=2/512, ttl=64
126	7.125739080	158.109.79.77	158.109.79.67	ICMP	98 Echo (ping) request id=0x1fa9 seq=3/768, ttl=64
127	7.125899080	158.109.79.67	158.109.79.77	ICMP	98 Echo (ping) reply id=0x1fa9 seq=3/768, ttl=64
131	8.126956080	158.109.79.77	158.109.79.67	ICMP	98 Echo (ping) request id=0x1fa9 seq=4/1024, ttl=64
132	8.127687080	158.109.79.67	158.109.79.77	ICMP	98 Echo (ping) reply id=0x1fa9 seq=4/1024, ttl=64
135	9.128693080	158.109.79.77	158.109.79.67	ICMP	98 Echo (ping) request id=0x1fa9 seq=5/1280, ttl=64
136	9.128255080	158.109.79.67	158.109.79.77	ICMP	98 Echo (ping) reply id=0x1fa9 seq=5/1280, ttl=64
144	10.129287800	158.109.79.77	158.109.79.67	ICMP	98 Echo (ping) request id=0x1fa9 seq=6/1536, ttl=64
145	10.129418800	158.109.79.67	158.109.79.77	ICMP	98 Echo (ping) reply id=0x1fa9 seq=6/1536, ttl=64
149	11.128286800	158.109.79.77	158.109.79.67	ICMP	98 Echo (ping) request id=0x1fa9 seq=7/1792, ttl=64
150	11.128429800	158.109.79.67	158.109.79.77	ICMP	98 Echo (ping) reply id=0x1fa9 seq=7/1792, ttl=64
169	12.129366800	158.109.79.77	158.109.79.67	ICMP	98 Echo (ping) request id=0x1fa9 seq=8/2048, ttl=64
170	12.129513800	158.109.79.67	158.109.79.77	ICMP	98 Echo (ping) reply id=0x1fa9 seq=8/2048, ttl=64
173	13.130549800	158.109.79.77	158.109.79.67	ICMP	98 Echo (ping) request id=0x1fa9 seq=9/2304, ttl=64
174	13.130783800	158.109.79.67	158.109.79.77	ICMP	98 Echo (ping) reply id=0x1fa9 seq=9/2304, ttl=64
178	14.131060800	158.109.79.77	158.109.79.67	ICMP	98 Echo (ping) request id=0x1fa9 seq=10/2560, ttl=64
179	14.131207800	158.109.79.67	158.109.79.77	ICMP	98 Echo (ping) reply id=0x1fa9 seq=10/2560, ttl=64
182	15.131051800	158.109.79.77	158.109.79.67	ICMP	98 Echo (ping) request id=0x1fa9 seq=11/2816, ttl=64
183	15.131264800	158.109.79.67	158.109.79.77	ICMP	98 Echo (ping) reply id=0x1fa9 seq=11/2816, ttl=64
189	16.131034800	158.109.79.77	158.109.79.67	ICMP	98 Echo (ping) request id=0x1fa9 seq=12/3072, ttl=64
190	16.131168800	158.109.79.67	158.109.79.77	ICMP	98 Echo (ping) reply id=0x1fa9 seq=12/3072, ttl=64
208	17.131057800	158.109.79.77	158.109.79.67	ICMP	98 Echo (ping) request id=0x1fa9 seq=13/3328, ttl=64
209	17.131208800	158.109.79.67	158.109.79.77	ICMP	98 Echo (ping) reply id=0x1fa9 seq=13/3328, ttl=64
213	18.131063800	158.109.79.77	158.109.79.67	ICMP	98 Echo (ping) request id=0x1fa9 seq=14/3584, ttl=64
214	18.131210800	158.109.79.67	158.109.79.77	ICMP	98 Echo (ping) reply id=0x1fa9 seq=14/3584, ttl=64
220	19.131029800	158.109.79.77	158.109.79.67	ICMP	98 Echo (ping) request id=0x1fa9 seq=15/3840, ttl=64
221	19.131180800	158.109.79.67	158.109.79.77	ICMP	98 Echo (ping) reply id=0x1fa9 seq=15/3840, ttl=64

Frame 94: 98 bytes on wire (784 bits), 98 bytes captured (784 bits) on interface 0
Ethernet II, Src: Wireshark (00:0c:ed:02:12:1a), Dst: Broadcast (ff:ff:ff:ff:ff:ff)

Fem ping a la màquina on la seva direcció física correspon a Broadcast, lo que significa que no tenim en compte si es corresponen la lògica i la física, ja que amb Broadcast representarà a qualsevol màquina.

Pregunta 10:

Primerament es realitzen ping a cadascuna de les direccions:

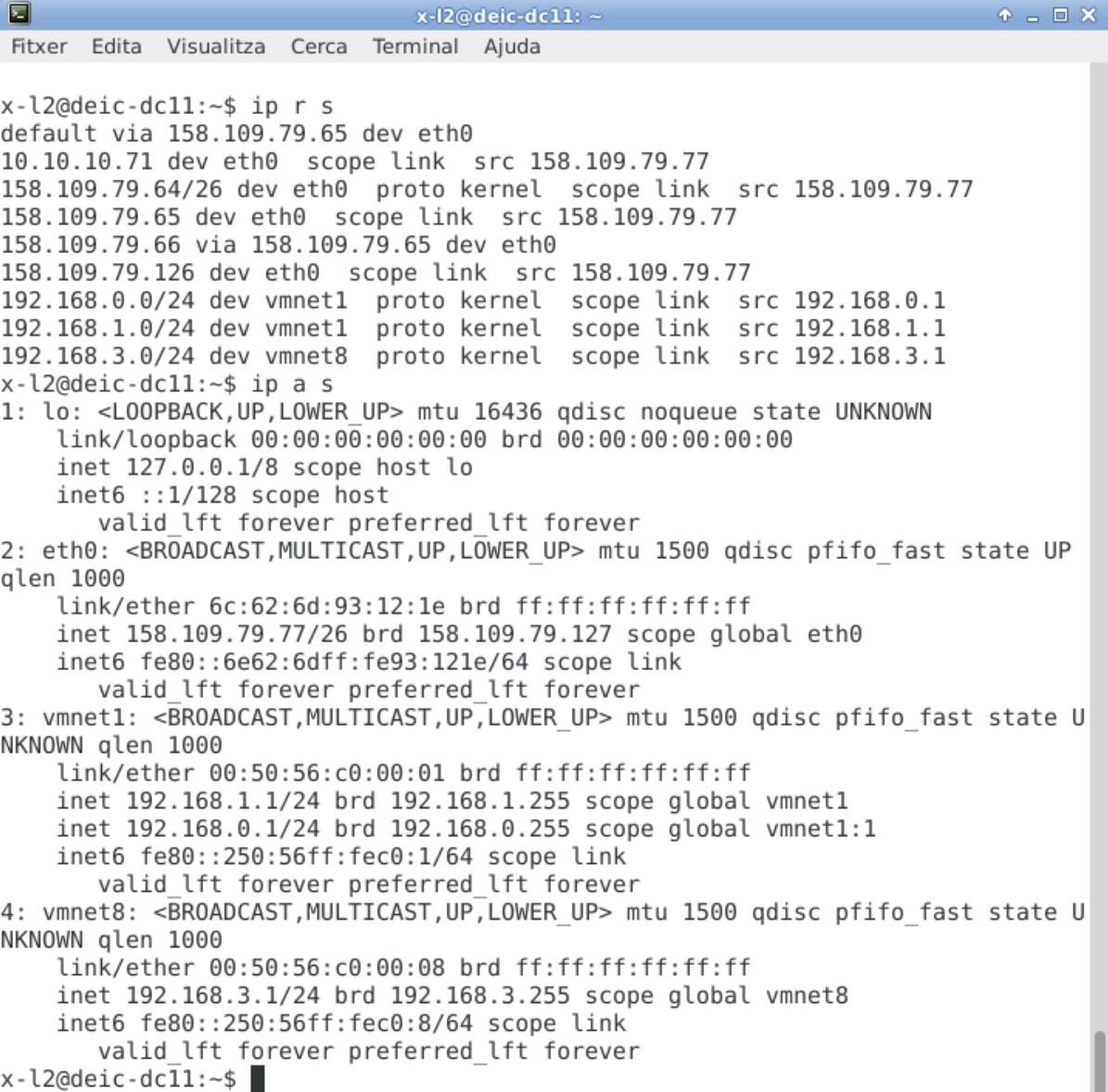
```
x-l2@deic-dc11: ~
Fitxer Edita Visualitza Cerca Terminal Ajuda
x-l2@deic-dc11:~$ ping www.uab.es
PING www.uab.es (158.109.95.225) 56(84) bytes of data.
64 bytes from www.autonoma.edu (158.109.95.225): icmp_req=1 ttl=253 time=0.685
ms
64 bytes from autonoma.cat (158.109.95.225): icmp_req=2 ttl=253 time=0.773 ms
64 bytes from autonoma.edu (158.109.95.225): icmp_req=3 ttl=253 time=0.794 ms
^C
--- www.uab.es ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2003ms
rtt min/avg/max/mdev = 0.685/0.750/0.794/0.056 ms
x-l2@deic-dc11:~$ ping deic-dc26.uab.es
PING deic-dc26.uab.es (158.109.79.92) 56(84) bytes of data.
64 bytes from deic-dc26.uab.es (158.109.79.92): icmp_req=1 ttl=64 time=0.410 m
s
64 bytes from deic-dc26.uab.es (158.109.79.92): icmp_req=2 ttl=64 time=0.198 m
s
64 bytes from deic-dc26.uab.es (158.109.79.92): icmp_req=3 ttl=64 time=0.197 m
s
^C
--- deic-dc26.uab.es ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2002ms
rtt min/avg/max/mdev = 0.197/0.268/0.410/0.101 ms
x-l2@deic-dc11:~$ ping 158.109.79.77
PING 158.109.79.77 (158.109.79.77) 56(84) bytes of data.
64 bytes from 158.109.79.77: icmp_req=1 ttl=64 time=0.071 ms
64 bytes from 158.109.79.77: icmp_req=2 ttl=64 time=0.030 ms
64 bytes from 158.109.79.77: icmp_req=3 ttl=64 time=0.034 ms
^C
--- 158.109.79.77 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 1999ms
rtt min/avg/max/mdev = 0.030/0.045/0.071/0.018 ms
x-l2@deic-dc11:~$
```

Seguit es mostra la taula de neighbors/veïns per a saber les direccions físiques:

```
x-l2@deic-dc11: ~
Fitxer Edita Visualitza Cerca Terminal Ajuda
64 bytes from deic-dc26.uab.es (158.109.79.92): icmp_req=1 ttl=64 time=0.410 ms
64 bytes from deic-dc26.uab.es (158.109.79.92): icmp_req=2 ttl=64 time=0.198 ms
64 bytes from deic-dc26.uab.es (158.109.79.92): icmp_req=3 ttl=64 time=0.197 ms
^C
--- deic-dc26.uab.es ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2002ms
rtt min/avg/max/mdev = 0.197/0.268/0.410/0.101 ms
x-l2@deic-dc11:~$ ping 158.109.79.77
PING 158.109.79.77 (158.109.79.77) 56(84) bytes of data.
64 bytes from 158.109.79.77: icmp_req=1 ttl=64 time=0.071 ms
64 bytes from 158.109.79.77: icmp_req=2 ttl=64 time=0.030 ms
64 bytes from 158.109.79.77: icmp_req=3 ttl=64 time=0.034 ms
^C
--- 158.109.79.77 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 1999ms
rtt min/avg/max/mdev = 0.030/0.045/0.071/0.018 ms
x-l2@deic-dc11:~$ ip n s
158.109.79.92 dev eth0 lladdr 00:24:81:05:68:ad STALE
158.109.79.67 dev eth0 lladdr 00:21:5a:6a:31:a9 STALE
158.109.79.65 dev eth0 lladdr 00:15:17:91:7c:e9 STALE
158.109.79.126 dev eth0 lladdr 00:1e:4f:25:81:bb REACHABLE
x-l2@deic-dc11:~$ ip r s
default via 158.109.79.65 dev eth0
10.10.10.71 dev eth0 scope link src 158.109.79.77
158.109.79.64/26 dev eth0 proto kernel scope link src 158.109.79.77
158.109.79.65 dev eth0 scope link src 158.109.79.77
158.109.79.66 via 158.109.79.65 dev eth0
158.109.79.126 dev eth0 scope link src 158.109.79.77
192.168.0.0/24 dev vmnet1 proto kernel scope link src 192.168.0.1
192.168.1.0/24 dev vmnet1 proto kernel scope link src 192.168.1.1
192.168.3.0/24 dev vmnet8 proto kernel scope link src 192.168.3.1
x-l2@deic-dc11:~$ ip a s
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 16436 qdisc noqueue state UNKNOWN
```

- a)
- b) 158.109.79.92 -> 00:24:81:05:68:ad
- c)

Pregunta 11:



x-l2@deic-dc11:~\$ ip r s
default via 158.109.79.65 dev eth0
10.10.10.71 dev eth0 scope link src 158.109.79.77
158.109.79.64/26 dev eth0 proto kernel scope link src 158.109.79.77
158.109.79.65 dev eth0 scope link src 158.109.79.77
158.109.79.66 via 158.109.79.65 dev eth0
158.109.79.126 dev eth0 scope link src 158.109.79.77
192.168.0.0/24 dev vmnet1 proto kernel scope link src 192.168.0.1
192.168.1.0/24 dev vmnet1 proto kernel scope link src 192.168.1.1
192.168.3.0/24 dev vmnet8 proto kernel scope link src 192.168.3.1
x-l2@deic-dc11:~\$ ip a s
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 16436 qdisc noqueue state UNKNOWN
 link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
 inet 127.0.0.1/8 scope host lo
 inet6 ::1/128 scope host
 valid_lft forever preferred_lft forever
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP
qlen 1000
 link/ether 6c:62:6d:93:12:1e brd ff:ff:ff:ff:ff:ff
 inet 158.109.79.77/26 brd 158.109.79.127 scope global eth0
 inet6 fe80::6e62:6dff:fe93:121e/64 scope link
 valid_lft forever preferred_lft forever
3: vmnet1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UNKNOWN
qlen 1000
 link/ether 00:50:56:c0:00:01 brd ff:ff:ff:ff:ff:ff
 inet 192.168.1.1/24 brd 192.168.1.255 scope global vmnet1
 inet 192.168.0.1/24 brd 192.168.0.255 scope global vmnet1:1
 inet6 fe80::250:56ff:fec0:1/64 scope link
 valid_lft forever preferred_lft forever
4: vmnet8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UNKNOWN
qlen 1000
 link/ether 00:50:56:c0:00:08 brd ff:ff:ff:ff:ff:ff
 inet 192.168.3.1/24 brd 192.168.3.255 scope global vmnet8
 inet6 fe80::250:56ff:fec0:8/64 scope link
 valid_lft forever preferred_lft forever
x-l2@deic-dc11:~\$

a) Tenim 4 interfícies, lo és loopback, que és la interfície que ens connecta amb nosaltres mateixos.

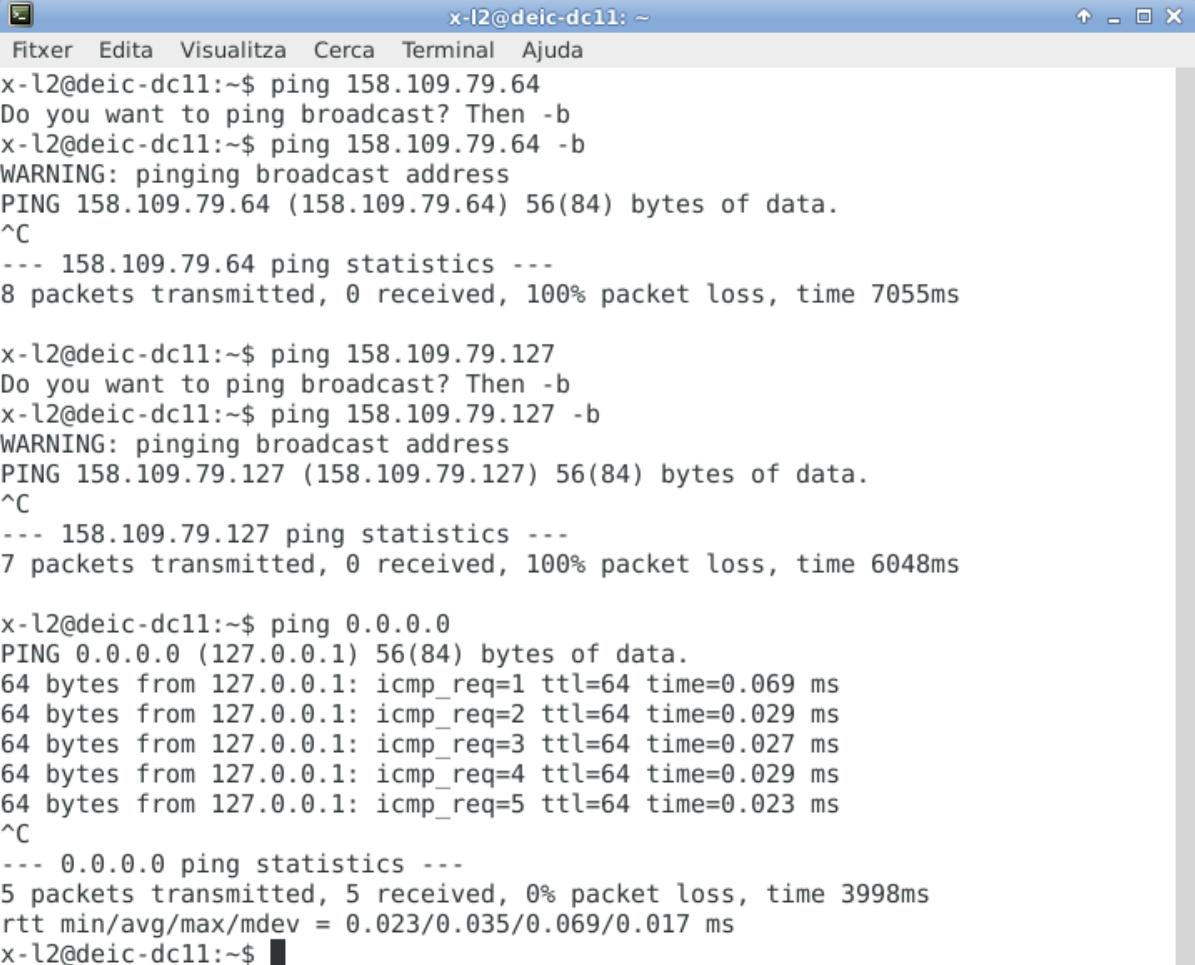
eth0 que és la per defecte i dues més.

Exemple:

nom de la interfície: <opcions> mtu de la interfície, tamany de la mtu, ..., tipus de cúa i màxim número d'elements a la cúa.

b) 158.109.79.77, indicada a la interfície eth0.

Pregunta 12:



```
x-l2@deic-dc11:~$ ping 158.109.79.64
Do you want to ping broadcast? Then -b
x-l2@deic-dc11:~$ ping 158.109.79.64 -b
WARNING: pinging broadcast address
PING 158.109.79.64 (158.109.79.64) 56(84) bytes of data.
^C
--- 158.109.79.64 ping statistics ---
8 packets transmitted, 0 received, 100% packet loss, time 7055ms

x-l2@deic-dc11:~$ ping 158.109.79.127
Do you want to ping broadcast? Then -b
x-l2@deic-dc11:~$ ping 158.109.79.127 -b
WARNING: pinging broadcast address
PING 158.109.79.127 (158.109.79.127) 56(84) bytes of data.
^C
--- 158.109.79.127 ping statistics ---
7 packets transmitted, 0 received, 100% packet loss, time 6048ms

x-l2@deic-dc11:~$ ping 0.0.0.0
PING 0.0.0.0 (127.0.0.1) 56(84) bytes of data.
64 bytes from 127.0.0.1: icmp_req=1 ttl=64 time=0.069 ms
64 bytes from 127.0.0.1: icmp_req=2 ttl=64 time=0.029 ms
64 bytes from 127.0.0.1: icmp_req=3 ttl=64 time=0.027 ms
64 bytes from 127.0.0.1: icmp_req=4 ttl=64 time=0.029 ms
64 bytes from 127.0.0.1: icmp_req=5 ttl=64 time=0.023 ms
^C
--- 0.0.0.0 ping statistics ---
5 packets transmitted, 5 received, 0% packet loss, time 3998ms
rtt min/avg/max/mdev = 0.023/0.035/0.069/0.017 ms
x-l2@deic-dc11:~$
```

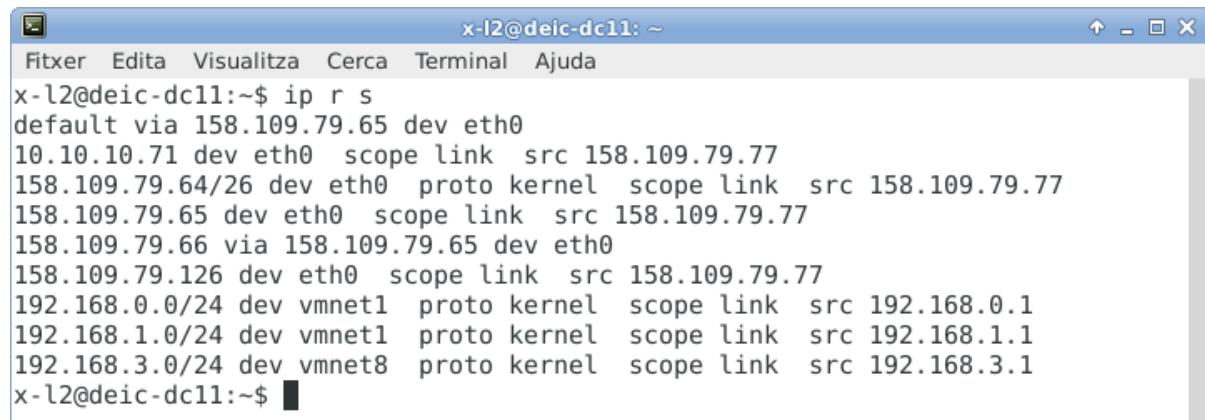
- a) No contesta ningú, és el netid de la xarxa i no està associada a ningú..
- b) És l'adreça de broadcast de la xarxa, no hi ha resposta. Ja que no fem ping a ningú en específic.
- c) el fet de fer ping a 0/0 produeix que fer un ping per loopback.

Pregunta 13:

- a) La interfície loopback (lo) serveix per a detectar problemes, diagnosticar-los i per a connectar servidors que s'estan executant en una màquina local.
- b) 127.0.0.0 on nosaltres som 127.0.0.1

Pregunta 14:

a)



```
x-l2@deic-dc11:~$ ip r s
default via 158.109.79.65 dev eth0
10.10.10.71 dev eth0 scope link src 158.109.79.77
158.109.79.64/26 dev eth0 proto kernel scope link src 158.109.79.77
158.109.79.65 dev eth0 scope link src 158.109.79.77
158.109.79.66 via 158.109.79.65 dev eth0
158.109.79.126 dev eth0 scope link src 158.109.79.77
192.168.0.0/24 dev vmnet1 proto kernel scope link src 192.168.0.1
192.168.1.0/24 dev vmnet1 proto kernel scope link src 192.168.1.1
192.168.3.0/24 dev vmnet8 proto kernel scope link src 192.168.3.1
x-l2@deic-dc11:~$
```

S'observen diferents rutes d'encaminament on la primera és la de default, la qual va al nostre router. Explicació del que significa:

direcció a on es vol anar / interfície per on s'ha d'anar / “via” enviament indirecte a través de la direcció següent.

scope link -> enviament directe / scope link src -> enviament directe i l'origen del paquet serà canviat pel que es possa a continuació

b) 158.109.79.64 (s'ha comprobat en exercicis anteriors).

c) 158.109.79.65 (default).

Pregunta 15:

- a) No sabriem a on enviar els datagrames que no estiguéssin a la nostra taula. No ens podríem connectar amb la resta de màquines que no estiguésin en la nostra xarxa.
- b) Només en el cas de que volguéssim especificar més, semblant a fer un subnetting de la xarxa per defecte. O només si hi haguéssin algunes màquines que fossin accedides per l'entrada default i haguéssin de requerir de més importància per a no haver de recórrer tota la routing table.

Pregunta 16:

a)

```
x-l2@deic-dc11:~$ sudo ip r add 10.10.10.71 dev eth0 scope link src 158.109.79  
.77  
x-l2@deic-dc11:~$ ip r s  
default via 158.109.79.65 dev eth0  
10.10.10.71 dev eth0 scope link src 158.109.79.77  
158.109.79.64/26 dev eth0 proto kernel scope link src 158.109.79.77  
158.109.79.65 dev eth0 scope link src 158.109.79.77  
158.109.79.66 via 158.109.79.65 dev eth0  
158.109.79.126 dev eth0 scope link src 158.109.79.77  
192.168.0.0/24 dev vmnet1 proto kernel scope link src 192.168.0.1  
192.168.1.0/24 dev vmnet1 proto kernel scope link src 192.168.1.1  
192.168.3.0/24 dev vmnet8 proto kernel scope link src 192.168.3.1  
x-l2@deic-dc11:~$ █
```

Tot i tenir l'adreça 158.109.79.77, es va afegir la 10.10.10.71, posteriorment s'afegeix la 10.10.10.77.

```
x-l2@deic-dc11:~$ sudo ip a add 10.10.10.77 dev eth0  
x-l2@deic-dc11:~$ ip a s  
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 16436 qdisc noqueue state UNKNOWN  
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00  
    inet 127.0.0.1/8 scope host lo  
      inet6 ::1/128 scope host  
        valid_lft forever preferred_lft forever  
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP  
qlen 1000  
    link/ether 6c:62:6d:93:12:1e brd ff:ff:ff:ff:ff:ff  
    inet 158.109.79.77/26 brd 158.109.79.127 scope global eth0  
      inet 10.10.10.77/32 scope global eth0  
        inet6 fe80::6e62:6dff:fe93:121e/64 scope link  
          valid_lft forever preferred_lft forever  
3: vmnet1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state U  
NKNOWN qlen 1000  
    link/ether 00:50:56:c0:00:01 brd ff:ff:ff:ff:ff:ff  
    inet 192.168.1.1/24 brd 192.168.1.255 scope global vmnet1  
      inet 192.168.0.1/24 brd 192.168.0.255 scope global vmnet1:1  
        inet6 fe80::250:56ff:fec0:1/64 scope link  
          valid_lft forever preferred_lft forever  
4: vmnet8: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state U  
NKNOWN qlen 1000  
    link/ether 00:50:56:c0:00:08 brd ff:ff:ff:ff:ff:ff  
    inet 192.168.3.1/24 brd 192.168.3.255 scope global vmnet8  
      inet6 fe80::250:56ff:fec0:8/64 scope link  
        valid_lft forever preferred_lft forever  
x-l2@deic-dc11:~$ sudo ip r add 10.10.10.71 dev eth0 scope link src 10.10.10.7  
7  
RTNETLINK answers: File exists  
x-l2@deic-dc11:~$ sudo ip r add 158.109.79.71 dev eth0 scope link src 10.10.10  
.77
```

b) Generem ping a la màquina:

2802 34.619562000 10.10.10.71	158.109.79.77	ICMP	98 Echo (ping) request	id=0x1751, seq=1/256, ttl=64
2805 34.619857000 158.109.79.77	10.10.10.71	ICMP	98 Echo (ping) reply	id=0x1751, seq=1/256, ttl=64
2807 35.564376000 158.109.79.85	158.109.79.67	ICMP	98 Echo (ping) request	id=0x239d, seq=731/56066, ttl=64
2808 35.618509000 10.10.10.71	158.109.79.77	ICMP	98 Echo (ping) request	id=0x1751, seq=2/512, ttl=64
2809 35.618540000 158.109.79.77	10.10.10.71	ICMP	98 Echo (ping) reply	id=0x1751, seq=2/512, ttl=64
2810 36.564319000 158.109.79.85	158.109.79.67	ICMP	98 Echo (ping) request	id=0x239d, seq=732/56322, ttl=64
2811 36.618162000 10.10.10.71	158.109.79.77	ICMP	98 Echo (ping) request	id=0x1751, seq=3/768, ttl=64
2812 36.618195000 158.109.79.77	10.10.10.71	ICMP	98 Echo (ping) reply	id=0x1751, seq=3/768, ttl=64
2814 37.564310000 158.109.79.85	158.109.79.67	ICMP	98 Echo (ping) request	id=0x239d, seq=733/56578, ttl=64
2815 37.618166000 10.10.10.71	158.109.79.77	ICMP	98 Echo (ping) request	id=0x1751, seq=4/1024, ttl=64
2816 37.618276000 158.109.79.77	10.10.10.71	ICMP	98 Echo (ping) reply	id=0x1751, seq=4/1024, ttl=64
2837 38.564276000 158.109.79.85	158.109.79.67	ICMP	98 Echo (ping) request	id=0x239d, seq=734/56834, ttl=64
2838 38.618116000 10.10.10.71	158.109.79.77	ICMP	98 Echo (ping) request	id=0x1751, seq=5/1280, ttl=64
2839 38.618152000 158.109.79.77	10.10.10.71	ICMP	98 Echo (ping) reply	id=0x1751, seq=5/1280, ttl=64

eth0 [Wireshark 1.8.2]				
File	Edit	View	Go	Capture
Analyze	Statistics	Telephony	Tools	Internals
Help				
Filter: icmp				
<input type="text"/> Expression... Clear Apply Desa				
No.	Time	Source	Destination	Protocol Length Info
33 9.675143000	10.10.10.71	158.109.79.71	ICMP	98 Echo (ping) request id=0x2482, seq=1/256, ttl=64
36 9.675551000	158.109.79.71	10.10.10.71	ICMP	98 Echo (ping) reply id=0x2482, seq=1/256, ttl=64
64 10.674472000	10.10.10.71	158.109.79.71	ICMP	98 Echo (ping) request id=0x2482, seq=2/512, ttl=64
65 10.674704000	158.109.79.71	10.10.10.71	ICMP	98 Echo (ping) reply id=0x2482, seq=2/512, ttl=64
67 11.674464000	10.10.10.71	158.109.79.71	ICMP	98 Echo (ping) request id=0x2482, seq=3/768, ttl=64
68 11.674676000	158.109.79.71	10.10.10.71	ICMP	98 Echo (ping) reply id=0x2482, seq=3/768, ttl=64
71 12.674489000	10.10.10.71	158.109.79.71	ICMP	98 Echo (ping) request id=0x2482, seq=4/1024, ttl=64
72 12.674723000	158.109.79.71	10.10.10.71	ICMP	98 Echo (ping) reply id=0x2482, seq=4/1024, ttl=64
74 13.674390000	10.10.10.71	158.109.79.71	ICMP	98 Echo (ping) request id=0x2482, seq=5/1280, ttl=64
75 13.674626000	158.109.79.71	10.10.10.71	ICMP	98 Echo (ping) reply id=0x2482, seq=5/1280, ttl=64
165 14.674460000	10.10.10.71	158.109.79.71	ICMP	98 Echo (ping) request id=0x2482, seq=6/1536, ttl=64
166 14.674662000	158.109.79.71	10.10.10.71	ICMP	98 Echo (ping) reply id=0x2482, seq=6/1536, ttl=64
191 15.674471000	10.10.10.71	158.109.79.71	ICMP	98 Echo (ping) request id=0x2482, seq=7/1792, ttl=64
192 15.674692000	158.109.79.71	10.10.10.71	ICMP	98 Echo (ping) reply id=0x2482, seq=7/1792, ttl=64
197 16.674467000	10.10.10.71	158.109.79.71	ICMP	98 Echo (ping) request id=0x2482, seq=8/2048, ttl=64
198 16.674694000	158.109.79.71	10.10.10.71	ICMP	98 Echo (ping) reply id=0x2482, seq=8/2048, ttl=64
200 17.674467000	10.10.10.71	158.109.79.71	ICMP	98 Echo (ping) request id=0x2482, seq=9/2304, ttl=64
201 17.674690000	158.109.79.71	10.10.10.71	ICMP	98 Echo (ping) reply id=0x2482, seq=9/2304, ttl=64
204 18.674470000	10.10.10.71	158.109.79.71	ICMP	98 Echo (ping) request id=0x2482, seq=10/2560, ttl=64
205 18.674491000	158.109.79.71	10.10.10.71	ICMP	98 Echo (ping) reply id=0x2482, seq=10/2560, ttl=64
212 19.674467000	10.10.10.71	158.109.79.71	ICMP	98 Echo (ping) request id=0x2482, seq=11/2816, ttl=64
213 19.674682000	158.109.79.71	10.10.10.71	ICMP	98 Echo (ping) reply id=0x2482, seq=11/2816, ttl=64
238 20.674464000	10.10.10.71	158.109.79.71	ICMP	98 Echo (ping) request id=0x2482, seq=12/3072, ttl=64
239 20.674698000	158.109.79.71	10.10.10.71	ICMP	98 Echo (ping) reply id=0x2482, seq=12/3072, ttl=64

En aquesta imatge es veu com s'afegeix la direcció de la màquina a la taula d'ençaminament i com es fa ping:

```
x-l2@deic-dc11:~$ sudo ip r add 158.109.79.71 dev eth0 scope link src 10.10.10.77
x-l2@deic-dc11:~$ ping 158.109.79.71
PING 158.109.79.71 (158.109.79.71) 56(84) bytes of data.
64 bytes from 158.109.79.71: icmp_req=1 ttl=64 time=0.456 ms
64 bytes from 158.109.79.71: icmp_req=2 ttl=64 time=0.264 ms
64 bytes from 158.109.79.71: icmp_req=3 ttl=64 time=0.240 ms
64 bytes from 158.109.79.71: icmp_req=4 ttl=64 time=0.260 ms
64 bytes from 158.109.79.71: icmp_req=5 ttl=64 time=0.264 ms
64 bytes from 158.109.79.71: icmp_req=6 ttl=64 time=0.222 ms
64 bytes from 158.109.79.71: icmp_req=7 ttl=64 time=0.248 ms
64 bytes from 158.109.79.71: icmp_req=8 ttl=64 time=0.245 ms
64 bytes from 158.109.79.71: icmp_req=9 ttl=64 time=0.247 ms
64 bytes from 158.109.79.71: icmp_req=10 ttl=64 time=0.244 ms
64 bytes from 158.109.79.71: icmp_req=11 ttl=64 time=0.238 ms
64 bytes from 158.109.79.71: icmp_req=12 ttl=64 time=0.259 ms
64 bytes from 158.109.79.71: icmp_req=13 ttl=64 time=0.201 ms
64 bytes from 158.109.79.71: icmp_req=14 ttl=64 time=0.220 ms
64 bytes from 158.109.79.71: icmp_req=15 ttl=64 time=0.145 ms
64 bytes from 158.109.79.71: icmp_req=16 ttl=64 time=0.208 ms
64 bytes from 158.109.79.71: icmp_req=17 ttl=64 time=0.224 ms
64 bytes from 158.109.79.71: icmp_req=18 ttl=64 time=0.186 ms
^C
--- 158.109.79.71 ping statistics ---
18 packets transmitted, 18 received, 0% packet loss, time 16999ms
rtt min/avg/max/mdev = 0.145/0.242/0.456/0.062 ms
```

- c) La màquina de destí ens ha d'afegir a nosaltres a la seva taula d'encaminament, tal i com es mostra a imatges anteriors.

Pregunta 17:

Tenir més d'una adreça IP associada a la mateixa interfície ens permetria dirigir cert tipus de trànsit de dades per una banda i un altre tipus per una altra, o donar preferència a una adreça per a fluxe de dades comuns i un altre de probes.

Pregunta 18:

Es fa primerament ping a www.uab.es, www.google.com i a 158.109.79.71 (màquina del laboratori):

```
x-l2@deic-dc11:~
```

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```
x-l2@deic-dc11:~$ traceroute www.uab.es
traceroute to www.uab.es (158.109.95.225), 30 hops max, 60 byte packets
 1 triki-dc.uab.es (158.109.79.65)  0.140 ms  0.129 ms  0.121 ms
 2 etsesw-core.uab.es (158.109.64.1)  3.152 ms  3.606 ms  4.043 ms
 3 core-si-4001.uab.es (158.109.1.1)  1.023 ms  1.020 ms  1.508 ms
 4 158.109.95.225 (158.109.95.225)  1.506 ms * *
```

```
x-l2@deic-dc11:~$ traceroute www.google.com
traceroute to www.google.com (216.58.211.196), 30 hops max, 60 byte packets
 1 triki-dc.uab.es (158.109.79.65)  0.277 ms  0.259 ms  0.251 ms
 2 etsesw-core.uab.es (158.109.64.1)  12.057 ms  12.210 ms  12.695 ms
 3 core-si-4001.uab.es (158.109.1.1)  1.468 ms  1.471 ms  1.665 ms
 4 pa-si-23.uab.es (158.109.94.202)  1.938 ms  1.929 ms  1.872 ms
 5 gw-si-22.uab.es (158.109.94.210)  3.124 ms  2.851 ms  3.109 ms
 6 anella-uab.cesca.cat (84.88.19.153)  4.539 ms  7.149 ms  7.098 ms
 7 ANELLA-VAL1.AE2-454.uv.rt1.val.red.rediris.es (130.206.211.69)  8.332 ms
 8.142 ms  8.124 ms
 9 google-router.red.rediris.es (130.206.255.2)  14.348 ms  14.330 ms  14.368 ms
10 72.14.235.20 (72.14.235.20)  14.550 ms  14.773 ms  14.867 ms
11 216.239.50.135 (216.239.50.135)  14.851 ms  14.633 ms  14.451 ms
12 mad01s25-in-f4.1e100.net (216.58.211.196)  14.381 ms  14.318 ms  14.345 ms
x-l2@deic-dc11:~$ traceroute 158.109.79.71
traceroute to 158.109.79.71 (158.109.79.71), 30 hops max, 60 byte packets
 1 deic-dc5.uab.es (158.109.79.71)  0.289 ms  0.303 ms  0.301 ms
x-l2@deic-dc11:~$
```

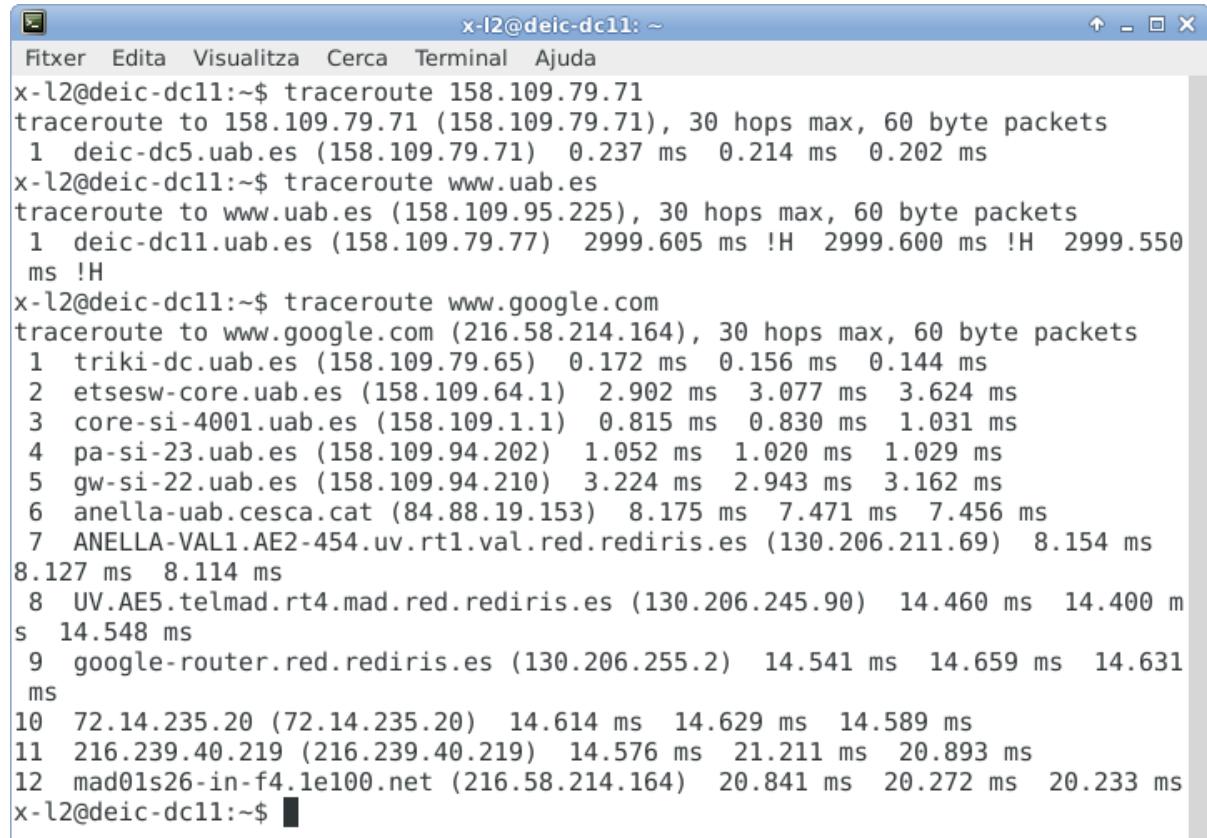
Després s'afegeix l'entrada descrita en l'exercici:

```
x-l2@deic-dc11:~
```

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```
x-l2@deic-dc11:~$ sudo ip route add 158.109.0.0/16 dev eth0 scope link
x-l2@deic-dc11:~$ ip r s
default via 158.109.79.65 dev eth0
10.10.10.71 dev eth0 scope link src 158.109.79.77
158.109.0.0/16 dev eth0 scope link
158.109.79.64/26 dev eth0 proto kernel scope link src 158.109.79.77
158.109.79.65 dev eth0 scope link src 158.109.79.77
158.109.79.66 via 158.109.79.65 dev eth0
158.109.79.126 dev eth0 scope link src 158.109.79.77
192.168.0.0/24 dev vmnet1 proto kernel scope link src 192.168.0.1
192.168.1.0/24 dev vmnet1 proto kernel scope link src 192.168.1.1
192.168.3.0/24 dev vmnet8 proto kernel scope link src 192.168.3.1
x-l2@deic-dc11:~$
```

I per finalitzar es torna a fer ping a les direccions anteriors:

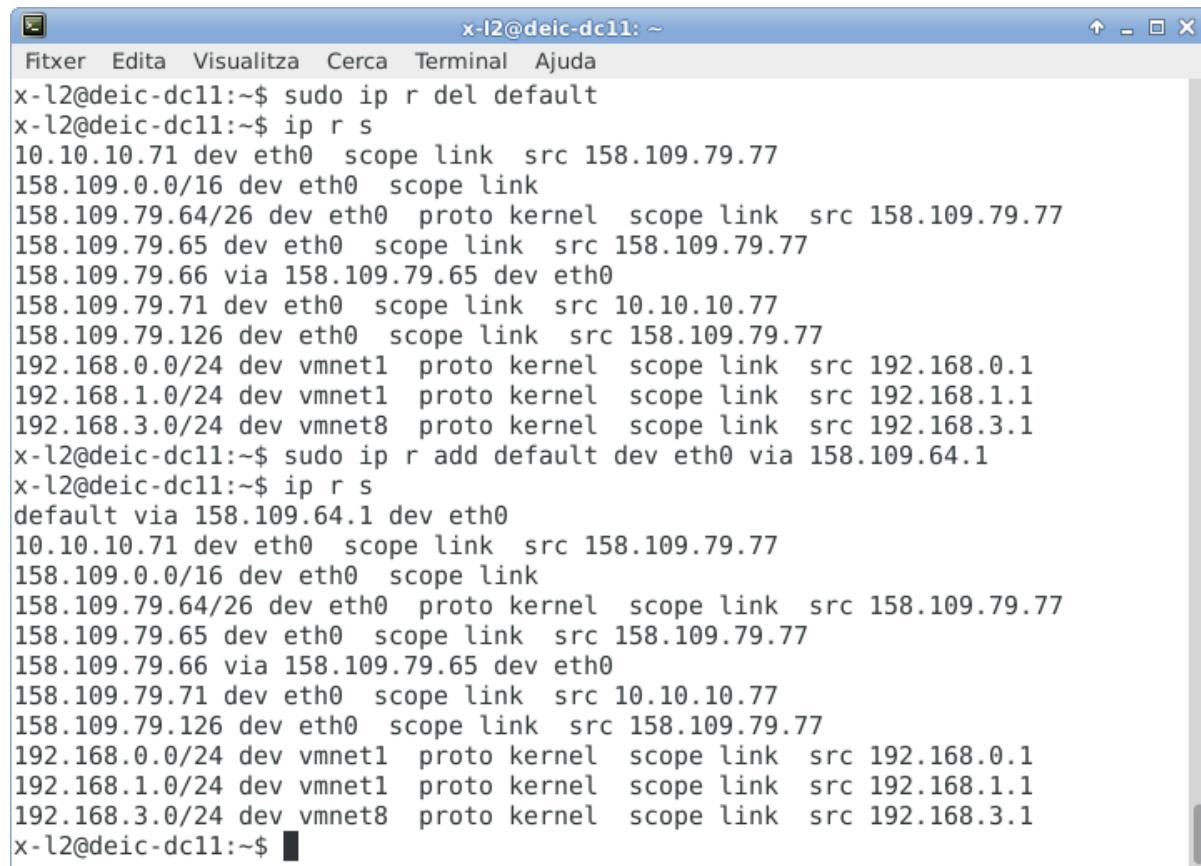


```
x-l2@deic-dc11:~$ traceroute 158.109.79.71
traceroute to 158.109.79.71 (158.109.79.71), 30 hops max, 60 byte packets
 1 deic-dc5.uab.es (158.109.79.71)  0.237 ms  0.214 ms  0.202 ms
x-l2@deic-dc11:~$ traceroute www.uab.es
traceroute to www.uab.es (158.109.95.225), 30 hops max, 60 byte packets
 1 deic-dc11.uab.es (158.109.79.77)  2999.605 ms !H  2999.600 ms !H  2999.550
ms !H
x-l2@deic-dc11:~$ traceroute www.google.com
traceroute to www.google.com (216.58.214.164), 30 hops max, 60 byte packets
 1 triki-dc.uab.es (158.109.79.65)  0.172 ms  0.156 ms  0.144 ms
 2 etsesw-core.uab.es (158.109.64.1)  2.902 ms  3.077 ms  3.624 ms
 3 core-si-4001.uab.es (158.109.1.1)  0.815 ms  0.830 ms  1.031 ms
 4 pa-si-23.uab.es (158.109.94.202)  1.052 ms  1.020 ms  1.029 ms
 5 gw-si-22.uab.es (158.109.94.210)  3.224 ms  2.943 ms  3.162 ms
 6 anella-uab.cesca.cat (84.88.19.153)  8.175 ms  7.471 ms  7.456 ms
 7 ANELLA-VAL1.AE2-454.uv.rtl.val.red.rediris.es (130.206.211.69)  8.154 ms
 8.127 ms  8.114 ms
 8 UV.AE5.telmad.rt4.mad.red.rediris.es (130.206.245.90)  14.460 ms  14.400 m
s 14.548 ms
 9 google-router.red.rediris.es (130.206.255.2)  14.541 ms  14.659 ms  14.631
ms
10 72.14.235.20 (72.14.235.20)  14.614 ms  14.629 ms  14.589 ms
11 216.239.40.219 (216.239.40.219)  14.576 ms  21.211 ms  20.893 ms
12 mad01s26-in-f4.1e100.net (216.58.214.164)  20.841 ms  20.272 ms  20.233 ms
x-l2@deic-dc11:~$
```

- a) Teòricament afegiria un tipus d'accés directe per a totes les màquines que tinguessin direccions 158.109.X.Y, el fet de que (seguint el mapa de xarxa de la UAB) hi hagi màquines amb aquest tipus de direccions les quals són accesos a través d'un router produuria error de tipus host unreachable, ja que faríem enviament directe estant a xarxes diferents.
- b) Experimentalment es comproba que dintre del mateix laboratori podem seguir accedint a les màquines veïnes, podem accedir fora de la xarxa de la UAB, però no podem anar a www.uab.cat ja que hi ha un router pel mig i li hem indicat a la màquina que estem directament connectats.
- c) Vegis les imatges anteriors i les respostes 18.a i 18.b.

Pregunta 19:

a)



The screenshot shows a terminal window titled "x-l2@deic-dc11: ~". The window contains the following text:

```
Fitxa Edita Visualitza Cerca Terminal Ajuda
x-l2@deic-dc11:~$ sudo ip r del default
x-l2@deic-dc11:~$ ip r s
10.10.10.71 dev eth0 scope link src 158.109.79.77
158.109.0.0/16 dev eth0 scope link
158.109.79.64/26 dev eth0 proto kernel scope link src 158.109.79.77
158.109.79.65 dev eth0 scope link src 158.109.79.77
158.109.79.66 via 158.109.79.65 dev eth0
158.109.79.71 dev eth0 scope link src 10.10.10.77
158.109.79.126 dev eth0 scope link src 158.109.79.77
192.168.0.0/24 dev vmnet1 proto kernel scope link src 192.168.0.1
192.168.1.0/24 dev vmnet1 proto kernel scope link src 192.168.1.1
192.168.3.0/24 dev vmnet8 proto kernel scope link src 192.168.3.1
x-l2@deic-dc11:~$ sudo ip r add default dev eth0 via 158.109.64.1
x-l2@deic-dc11:~$ ip r s
default via 158.109.64.1 dev eth0
10.10.10.71 dev eth0 scope link src 158.109.79.77
158.109.0.0/16 dev eth0 scope link
158.109.79.64/26 dev eth0 proto kernel scope link src 158.109.79.77
158.109.79.65 dev eth0 scope link src 158.109.79.77
158.109.79.66 via 158.109.79.65 dev eth0
158.109.79.71 dev eth0 scope link src 10.10.10.77
158.109.79.126 dev eth0 scope link src 158.109.79.77
192.168.0.0/24 dev vmnet1 proto kernel scope link src 192.168.0.1
192.168.1.0/24 dev vmnet1 proto kernel scope link src 192.168.1.1
192.168.3.0/24 dev vmnet8 proto kernel scope link src 192.168.3.1
x-l2@deic-dc11:~$
```

b1) No tindrà cap efecte, seguim estan dintre de la mateixa xarxa.

b2) Impossible accedir, ja que hem de passar per triki per a anar a l'exterior i no disposem ara de la seva direcció i hem d'anar a través d'un router que no està directament connectat amb nosaltres.

b3) Succeix el mateix que per a la resposta 19.b.2.

c) Veient la imatge a continuació, podem veure que les respostes teòriques coincideixen amb la pràctica. Fer ping a qualsevol cosa que no tinguem accés directe dona error "Destination Host Unreachable".

```
x-l2@deic-dc11:~$ ping 158.109.79.71
PING 158.109.79.71 (158.109.79.71) 56(84) bytes of data.
64 bytes from 158.109.79.71: icmp_req=1 ttl=64 time=0.546 ms
64 bytes from 158.109.79.71: icmp_req=2 ttl=64 time=0.220 ms
64 bytes from 158.109.79.71: icmp_req=3 ttl=64 time=0.173 ms
^C
--- 158.109.79.71 ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 1998ms
rtt min/avg/max/mdev = 0.173/0.313/0.546/0.165 ms
x-l2@deic-dc11:~$ ping www.uab.cat
ping: unknown host www.uab.cat
x-l2@deic-dc11:~$ ping www.uab.cat
PING www.uab.cat (158.109.95.225) 56(84) bytes of data.
From deic-dc11.uab.es (158.109.79.77) icmp_seq=1 Destination Host Unreachable
From deic-dc11.uab.es (158.109.79.77) icmp_seq=2 Destination Host Unreachable
From deic-dc11.uab.es (158.109.79.77) icmp_seq=3 Destination Host Unreachable
From deic-dc11.uab.es (158.109.79.77) icmp_seq=4 Destination Host Unreachable
From deic-dc11.uab.es (158.109.79.77) icmp_seq=5 Destination Host Unreachable
From deic-dc11.uab.es (158.109.79.77) icmp_seq=6 Destination Host Unreachable
^C
--- www.uab.cat ping statistics ---
8 packets transmitted, 0 received, +6 errors, 100% packet loss, time 7038ms
pipe 3
x-l2@deic-dc11:~$ ping www.google.com
PING www.google.com (91.213.30.187) 56(84) bytes of data.
From deic-dc11.uab.es (158.109.79.77) icmp_seq=1 Destination Host Unreachable
From deic-dc11.uab.es (158.109.79.77) icmp_seq=2 Destination Host Unreachable
From deic-dc11.uab.es (158.109.79.77) icmp_seq=3 Destination Host Unreachable
From deic-dc11.uab.es (158.109.79.77) icmp_seq=4 Destination Host Unreachable
From deic-dc11.uab.es (158.109.79.77) icmp_seq=5 Destination Host Unreachable
From deic-dc11.uab.es (158.109.79.77) icmp_seq=6 Destination Host Unreachable
^C
--- www.google.com ping statistics ---
7 packets transmitted, 0 received, +6 errors, 100% packet loss, time 6029ms
pipe 3
x-l2@deic-dc11:~$
```

Pregunta 20:

a)

The Wireshark interface is shown with the following details:

- Filter:** icmp
- Selected Row:** ICMP 98 Echo (ping) request id=0x2870, seq=1/256, ttl=64 (Packet 43)
- Protocol Tree:** ICMP (1)
 - Header length: 20 bytes
 - Differentiated Services Field: 0x00 (DSCP 0x00: Default; ECN: 0x00: Not-ECT (Not ECN-Capable Transport))
 - Total Length: 84
 - Identification: 0xf5f0 (62968)
 - Flags: 0x02 (Don't Fragment)
 - Fragment offset: 0
 - Time to live: 64
- Hex View:** Shows the raw hex dump of the selected ICMP request.
- Statistics:** Protocol (ip.proto), 1 byte | Packets: 47 | Displayed: 6 | Marked: 0 | Dropped: 59
- Profile:** Default

b) El número 01.

Pregunta 21:

El servei DNS s'utilitza com a protocol de resolució de noms de dominis, és a dir, qui té quin domini per a accedir a certs continguts i màquines a la xarxa.

Pregunta 22:

No pot rebre ja que no pot ser trobada per altres màquines, és a dir, estaria connectada però seria “invisible” o inassolible. Si que podria enviar tràfic. El no estar donat d'alta et deixa incomunicat dins la xarxa.

Pregunta 23:

- a) No.
- b) Si.
- c) En el cas de b), el fet de disposar més d'una direcció a la mateixa IP (google.com, google.es, ...) estan totes associades a la mateixa IP però en dominis diferents, permet accedir al lloc sense haver de passar per root tants cops, depenent del servidor de resolució de DNS.