

# Redes de Computadores

Náthaly Martins De Sá

## Tópico 04

### 1. Comando Ping.

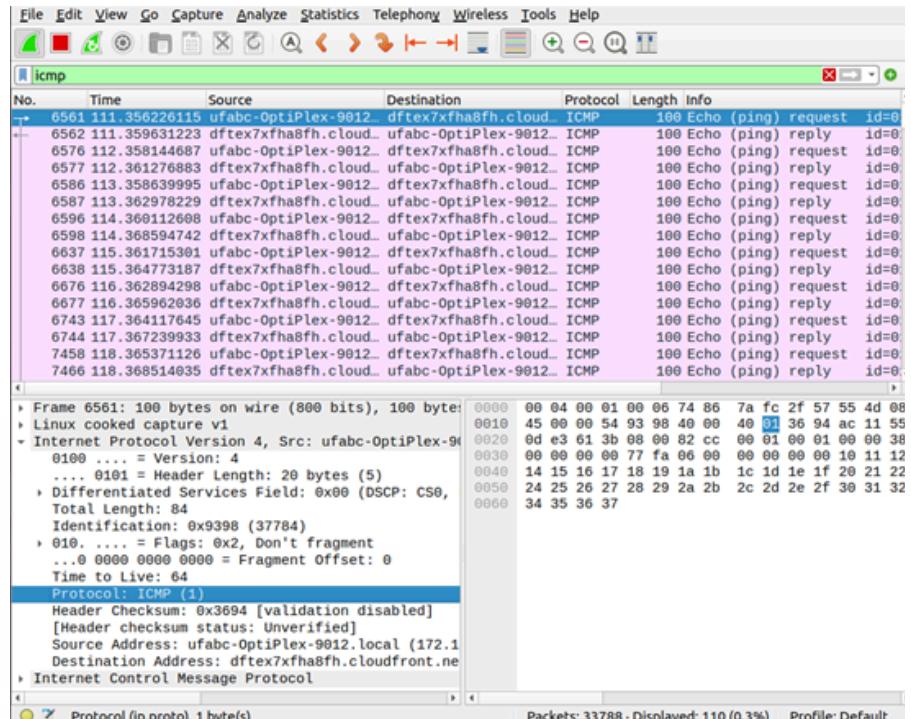
#### 1.1 Comando Ping [www.uol.com.br](http://www.uol.com.br), com o filtro para ICMP:

1.1.1 O campo Protocol no pacote IP;

1.1.2 Os tipos de mensagens ICMP trocados;

1.1.3 As demais informações que constam nos pacotes trocados;

1.1.4 O tempo de ida e volta das mensagens ICMP.



The screenshot shows a Wireshark capture window with the following details:

- Protocol:** icmp
- No.:** 6561 to 7466
- Time:** 13:22:26.115 to 13:22:26.135
- Source:** dftex7xfha8fh.cloud...
- Destination:** ufabc-OptiPlex-9012...
- Protocol:** ICMP
- Length:** 100 Echo (ping) request
- Info:** id=0

The details pane shows the structure of the ICMP request frame:

- Frame 6561: 100 bytes on wire (800 bits), 100 bytes captured (800 bits)
- Protocol: Internet Control Message Protocol (ICMP)
- Header:
  - Version: 4
  - Type: 8 (Echo (ping) request)
  - Checksum: 0x6bba [correct]
  - Identifier (BE): 1 (0x0001)
  - Identifier (LE): 256 (0x0100)
  - Sequence Number (BE): 4 (0x0004)
  - Sequence Number (LE): 1024 (0x0400)
  - [Request frame: 6596]
  - [Response time: 8,482 ms]

The status bar at the bottom indicates: Packets: 33788 - Displayed: 110 (0.3%) Profile: Default

```
ufabc@ufabc-OptiPlex-9010:~$ ping www.uol.com.br
PING www.uol.com.br (13.227.97.59) 56(84) bytes of data.
64 bytes from server-13-227-97-59.gru50.r.cloudfront.net (13.227.97.59): icmp_seq=37 ttl=244 time=3.12 ms
64 bytes from server-13-227-97-59.gru50.r.cloudfront.net (13.227.97.59): icmp_seq=38 ttl=244 time=3.14 ms
64 bytes from server-13-227-97-59.gru50.r.cloudfront.net (13.227.97.59): icmp_seq=39 ttl=244 time=3.08 ms
64 bytes from server-13-227-97-59.gru50.r.cloudfront.net (13.227.97.59): icmp_seq=40 ttl=244 time=3.19 ms
64 bytes from server-13-227-97-59.gru50.r.cloudfront.net (13.227.97.59): icmp_seq=41 ttl=244 time=3.22 ms
64 bytes from server-13-227-97-59.gru50.r.cloudfront.net (13.227.97.59): icmp_seq=42 ttl=244 time=3.14 ms
64 bytes from server-13-227-97-59.gru50.r.cloudfront.net (13.227.97.59): icmp_seq=43 ttl=244 time=3.23 ms
64 bytes from server-13-227-97-59.gru50.r.cloudfront.net (13.227.97.59): icmp_seq=44 ttl=244 time=3.09 ms
64 bytes from server-13-227-97-59.gru50.r.cloudfront.net (13.227.97.59): icmp_seq=45 ttl=244 time=3.19 ms
64 bytes from server-13-227-97-59.gru50.r.cloudfront.net (13.227.97.59): icmp_seq=46 ttl=244 time=3.13 ms
64 bytes from server-13-227-97-59.gru50.r.cloudfront.net (13.227.97.59): icmp_seq=47 ttl=244 time=3.29 ms
64 bytes from server-13-227-97-59.gru50.r.cloudfront.net (13.227.97.59): icmp_seq=48 ttl=244 time=3.19 ms
64 bytes from server-13-227-97-59.gru50.r.cloudfront.net (13.227.97.59): icmp_seq=49 ttl=244 time=3.31 ms
64 bytes from server-13-227-97-59.gru50.r.cloudfront.net (13.227.97.59): icmp_seq=50 ttl=244 time=3.11 ms
64 bytes from server-13-227-97-59.gru50.r.cloudfront.net (13.227.97.59): icmp_seq=51 ttl=244 time=3.17 ms
64 bytes from server-13-227-97-59.gru50.r.cloudfront.net (13.227.97.59): icmp_seq=52 ttl=244 time=3.10 ms
64 bytes from server-13-227-97-59.gru50.r.cloudfront.net (13.227.97.59): icmp_seq=53 ttl=244 time=3.07 ms
64 bytes from server-13-227-97-59.gru50.r.cloudfront.net (13.227.97.59): icmp_seq=54 ttl=244 time=3.13 ms
64 bytes from server-13-227-97-59.gru50.r.cloudfront.net (13.227.97.59): icmp_seq=55 ttl=244 time=3.08 ms
^C
--- dftex7xfha8fh.cloudfront.net ping statistics ---
55 packets transmitted, 55 received, 0% packet loss, time 54080ms
rtt min/avg/max/mdev = 3.071/3.340/8.510/0.773 ms
ufabc@ufabc-OptiPlex-9010:~$ 
```

```
-- dftex7xfha8fh.cloudfront.net ping statistics --
55 packets transmitted, 55 received, 0% packet loss, time 54080ms
rtt min/avg/max/mdev = 3.071/3.340/8.510/0.773 ms
ufabc@ufabc-OptiPlex-9010:~$ 
```

```
Destination Address: ufabc-OptiPlex-9012.local (172.17.85.77)
- Internet Control Message Protocol
  Type: 0 (Echo (ping) reply)
  Code: 0
  Checksum: 0x6bba [correct]
  [Checksum Status: Good]
  Identifier (BE): 1 (0x0001)
  Identifier (LE): 256 (0x0100)
  Sequence Number (BE): 4 (0x0004)
  Sequence Number (LE): 1024 (0x0400)
  [Request frame: 6596]
  [Response time: 8,482 ms]
  Timestamp from icmp data: Apr 13, 2023 10:13:39.000000000 -03
  [Timestamp from icmp data (relative): 0.469713903 seconds]
```

...0 0000 0000 0000 = Fragment Offset: 0 Time to Live: 244 Protocol: ICMP (1) Header Checksum: 0xf1ef [validation disabled] [Header checksum status: Unverified] Source Address: dftex7xaha8fh.cloudfront.net (172.217.11.10) Destination Address: ufabc-OptiPlex-9012.local (172.217.11.10)	...0 0000 0000 0000 = Fragment Offset: 0 Time to Live: 64 Protocol: ICMP (1) Header Checksum: 0x3694 [validation disabled] [Header checksum status: Unverified] Source Address: ufabc-OptiPlex-9012.local (172.217.11.10) Destination Address: dftex7xaha8fh.cloudfront.net (172.217.11.10)
<b>Internet Control Message Protocol</b> Type: 0 (Echo (ping) reply) Code: 0 Checksum: 0x8acc [correct] [Checksum Status: Good] Identifier (BE): 1 (0x0001) Identifier (LE): 256 (0x0100) Sequence Number (BE): 1 (0x0001) Sequence Number (LE): 256 (0x0100) <a href="#">[Request frame: 6561]</a>	<b>Internet Control Message Protocol</b> Type: 8 (Echo (ping) request) Code: 0 Checksum: 0x82cc [correct] [Checksum Status: Good] Identifier (BE): 1 (0x0001) Identifier (LE): 256 (0x0100) Sequence Number (BE): 1 (0x0001) Sequence Number (LE): 256 (0x0100) <a href="#">[Response frame: 6562]</a>

## 1.2 Comando Ping [www.receita.fazenda.gov.br](http://www.receita.fazenda.gov.br):

```
ufabc@ufabc-OptiPlex-9010:~$ ping www.receita.fazenda.gov.br
PING receita.fazenda.gov.br (161.148.231.100) 56(84) bytes of data.
```

Não houve devolução, pois o site do outro lado está filtrando os pacotes ICMP.

## 1.3 Ping's: [127.0.0.1](http://127.0.0.1); [www.ufabc.edu.br](http://www.ufabc.edu.br); [www.usp.br](http://www.usp.br); [www.google.com.br](http://www.google.com.br); [www.mit.edu](http://www.mit.edu); [www.ufl.edu](http://www.ufl.edu); [www.ubc.ca](http://www.ubc.ca); e [www.chat.ru](http://www.chat.ru) respectivamente:

```
ufabc@ufabc-OptiPlex-9010:~$ ping 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=0.031 ms
64 bytes from 127.0.0.1: icmp_seq=2 ttl=64 time=0.043 ms
64 bytes from 127.0.0.1: icmp_seq=3 ttl=64 time=0.057 ms
64 bytes from 127.0.0.1: icmp_seq=4 ttl=64 time=0.039 ms
^C
--- 127.0.0.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3079ms
rtt min/avg/max/mdev = 0.031/0.042/0.057/0.009 ms
ufabc@ufabc-OptiPlex-9010:~$ ping www.ufabc.edu.br
PING www.ufabc.edu.br (177.104.50.120) 56(84) bytes of data.
64 bytes from www.ufabc.edu.br (177.104.50.120): icmp_seq=1 ttl=61
time=0.576 ms
64 bytes from www.ufabc.edu.br (177.104.50.120): icmp_seq=2 ttl=61
time=0.722 ms
64 bytes from www.ufabc.edu.br (177.104.50.120): icmp_seq=3 ttl=61
time=0.653 ms
64 bytes from www.ufabc.edu.br (177.104.50.120): icmp_seq=4 ttl=61
time=0.633 ms
^C
--- www.ufabc.edu.br ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3005ms
rtt min/avg/max/mdev = 0.576/0.646/0.722/0.052 ms
```

```
ufabc@ufabc-OptiPlex-9010:~$ ping www.uspdigital.usp.br
ping: www.uspdigital.usp.br: Nome ou serviço desconhecido
ufabc@ufabc-OptiPlex-9010:~$ ping www.usp.br
PING usp.br (200.144.248.41) 56(84) bytes of data.
64 bytes from webhost.uspdigital.usp.br (200.144.248.41): icmp_seq=1 ttl=248 time=2.66 ms
64 bytes from webhost.uspdigital.usp.br (200.144.248.41): icmp_seq=2 ttl=248 time=2.85 ms
64 bytes from webhost.uspdigital.usp.br (200.144.248.41): icmp_seq=3 ttl=248 time=2.79 ms
^C
--- usp.br ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2003ms
rtt min/avg/max/mdev = 2.655/2.763/2.849/0.080 ms
ufabc@ufabc-OptiPlex-9010:~$ ping www.google.com.br
PING www.google.com.br (142.251.128.35) 56(84) bytes of data.
64 bytes from gru06s68-in-f3.1e100.net (142.251.128.35): icmp_seq=1 ttl=119 time=2.79 ms
64 bytes from gru06s68-in-f3.1e100.net (142.251.128.35): icmp_seq=2 ttl=119 time=2.78 ms
64 bytes from gru06s68-in-f3.1e100.net (142.251.128.35): icmp_seq=3 ttl=119 time=2.81 ms
64 bytes from gru06s68-in-f3.1e100.net (142.251.128.35): icmp_seq=4 ttl=119 time=2.73 ms
^C
--- www.google.com.br ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3005ms
rtt min/avg/max/mdev = 2.725/2.776/2.812/0.031 ms
ufabc@ufabc-OptiPlex-9010:~$ ping www.mit.edu
PING e9566.dscb.akamaiedge.net (104.104.169.64) 56(84) bytes of dat
a.
64 bytes from a104-104-169-64.deploy.static.akamaitechnologies.com
(104.104.169.64): icmp_seq=1 ttl=59 time=1.35 ms
64 bytes from a104-104-169-64.deploy.static.akamaitechnologies.com
(104.104.169.64): icmp_seq=2 ttl=59 time=1.38 ms
64 bytes from a104-104-169-64.deploy.static.akamaitechnologies.com
(104.104.169.64): icmp_seq=3 ttl=59 time=1.41 ms
64 bytes from a104-104-169-64.deploy.static.akamaitechnologies.com
(104.104.169.64): icmp_seq=4 ttl=59 time=1.42 ms
^C
--- e9566.dscb.akamaiedge.net ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3004ms
rtt min/avg/max/mdev = 1.352/1.388/1.418/0.026 ms
```

```
ufabc@ufabc-OptiPlex-9010:~$ ping www.ufl.edu
PING virtual-l2www-prod-ac-publicssl.server.ufl.edu (128.227.36.35)
 56(84) bytes of data.
64 bytes from virtual-l2www-prod-ac-publicssl.server.ufl.edu (128.2
27.36.35): icmp_seq=1 ttl=236 time=144 ms
64 bytes from presidentsearch.ufl.edu (128.227.36.35): icmp_seq=2 t
tl=236 time=144 ms
64 bytes from ufl.edu (128.227.36.35): icmp_seq=3 ttl=236 time=144
ms
64 bytes from presidentsearch.ufl.edu (128.227.36.35): icmp_seq=4 t
tl=236 time=144 ms
^C
--- virtual-l2www-prod-ac-publicssl.server.ufl.edu ping statistics
---
4 packets transmitted, 4 received, 0% packet loss, time 3004ms
rtt min/avg/max/mdev = 143.690/143.812/144.058/0.144 ms
```

```
ufabc@ufabc-OptiPlex-9010:~$ ping www.ubc.ca
PING d3tie7xuvq1kvm.cloudfront.net (13.227.97.18) 56(84) bytes of data.
64 bytes from server-13-227-97-18.gru50.r.cloudfront.net (13.227.97.18): icmp_seq=1 ttl=244 time=3.07 ms
64 bytes from server-13-227-97-18.gru50.r.cloudfront.net (13.227.97.18): icmp_seq=2 ttl=244 time=3.11 ms
64 bytes from server-13-227-97-18.gru50.r.cloudfront.net (13.227.97.18): icmp_seq=3 ttl=244 time=3.15 ms
64 bytes from server-13-227-97-18.gru50.r.cloudfront.net (13.227.97.18): icmp_seq=4 ttl=244 time=3.13 ms
^C
--- d3tie7xuvq1kvm.cloudfront.net ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3004ms
rtt min/avg/max/mdev = 3.066/3.114/3.153/0.032 ms
ufabc@ufabc-OptiPlex-9010:~$ ping www.chat.ru
PING www.chat.ru (77.244.218.84) 56(84) bytes of data.
64 bytes from 77.244.218.84 (77.244.218.84): icmp_seq=1 ttl=41 time=291 ms
64 bytes from 77.244.218.84 (77.244.218.84): icmp_seq=2 ttl=41 time=291 ms
64 bytes from 77.244.218.84 (77.244.218.84): icmp_seq=3 ttl=41 time=291 ms
64 bytes from 77.244.218.84 (77.244.218.84): icmp_seq=4 ttl=41 time=291 ms
^C
--- www.chat.ru ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3001ms
rtt min/avg/max/mdev = 291.324/291.354/291.392/0.024 ms
ufabc@ufabc-OptiPlex-9010:~$ █
```

O comando Ping primeiramente irá conferir se o Host está respondendo, pois ele é importante para saber a latência, o Jitter e a perda de pacotes e assim dependendo da rota entre a máquina e o Host, o tempo de resposta é definido.

## 2. Comando Traceroute.

2.1 Comando Traceroute [www.uol.com.br](http://www.uol.com.br), com filtro para ICMP:

2.1.1 O valor do TTL de cada mensagem enviada:

Primeira mensagem enviada possui valor TTL 1, próxima mensagem TTL 2, e assim sucessivamente;

2.1.2 O tipo de mensagem ICMP recebida:

'11 - Time to Live Exceeded';

2.1.3 As demais informações que constam nos pacotes trocados;

#### 2.1.4 Sequência de mensagens enviadas e recebidas, segundo o comando:

Para cada TTL são enviadas e recebidas 3 mensagens de forma aleatória, sendo que nesse comando quando as mensagens ICMP são enviadas de um Host para outro, elas são rotuladas com um número de sequência (números de sequência disponíveis para acompanhar quais pacotes foram enviados e recebidos), que dependendo do sistema operacional e da forma como a rede está configurada, esses números de sequência podem não ser atribuídos em ordem crescente. Isso pode levar à aparência de que as mensagens ICMP estão sendo enviadas em sequências aleatórias.

#### 2.2 Comando Traceroute nos endereços: [www.ufabc.edu.br](http://www.ufabc.edu.br); [www.usp.br](http://www.usp.br); [www.google.com.br](http://www.google.com.br); [www.mit.edu](http://www.mit.edu); [www.ufl.edu](http://www.ufl.edu); [www.ubc.ca](http://www.ubc.ca); e [www.chat.ru](http://www.chat.ru) respectivamente:

```
ufabc@ufabc-OptiPlex-9010:~$ traceroute www.ufabc.edu.br
traceroute to www.ufabc.edu.br (177.104.50.120), 30 hops max, 60 byte packets
 1 _gateway (172.17.85.1)  5.920 ms  5.933 ms  6.010 ms
 2 177.104.51.25 (177.104.51.25)  14.332 ms  14.315 ms  14.416 ms
 3 177.104.51.5 (177.104.51.5)  0.587 ms  0.570 ms  0.554 ms
 4 www.ufabc.edu.br (177.104.50.120)  0.702 ms !X  0.685 ms !X  0.
670 ms !X
ufabc@ufabc-OptiPlex-9010:~$ traceroute www.usp.br
traceroute to www.usp.br (200.144.248.41), 30 hops max, 60 byte packets
 1 _gateway (172.17.85.1)  0.289 ms  0.330 ms  0.361 ms
 2 177.104.51.25 (177.104.51.25)  0.229 ms  0.269 ms  0.253 ms
 3 177.104.51.5 (177.104.51.5)  0.610 ms  0.594 ms  0.577 ms
 4 177.104.51.141 (177.104.51.141)  0.758 ms  1.344 ms  1.031 ms
 5 babl.ufabc.edu.br (177.104.51.68)  0.796 ms  0.779 ms  0.764 ms
 6 as28571.saopaulo.sp.ix.br (187.16.220.3)  2.165 ms  2.135 ms  2
.236 ms
 7 e72361-sp2-r06-nx-swc.uspnet.usp.br (143.107.249.38)  3.129 ms
3.018 ms  3.211 ms
 8 * * *
 9 * * *
10 * * *
11 * * *
12 * * *
13 *^C
ufabc@ufabc-OptiPlex-9010:~$ traceroute www.google.com.br
traceroute to www.google.com.br (142.251.128.35), 30 hops max, 60 byte packets
 1 _gateway (172.17.85.1)  0.250 ms  0.330 ms  0.452 ms
 2 177.104.51.25 (177.104.51.25)  11.563 ms  11.547 ms  11.586 ms
 3 177.104.51.5 (177.104.51.5)  0.634 ms  0.618 ms  0.595 ms
 4 177.104.51.141 (177.104.51.141)  0.881 ms  2.712 ms  1.262 ms
 5 177.104.51.233 (177.104.51.233)  2.492 ms  2.476 ms  2.502 ms
 6 csp1-popsp.bkb.rnp.br (170.79.214.38)  2.562 ms  2.627 ms  2.52
9 ms
 7 as15169.saopaulo.sp.ix.br (187.16.218.58)  2.405 ms  2.389 ms a
s15169.saopaulo.sp.ix.br (187.16.216.55)  2.412 ms
 8 108.170.245.129 (108.170.245.129)  2.552 ms  108.170.245.161 (10
8.170.245.161)  3.626 ms  3.605 ms
 9 142.251.53.179 (142.251.53.179)  2.402 ms  142.251.53.181 (142.2
51.53.181)  2.839 ms  2.777 ms
10 gru06s68-in-f3.1e100.net (142.251.128.35)  2.760 ms  2.570 ms
2.703 ms
```

```
ufabc@ufabc-OptiPlex-9010:~$ traceroute www.mit.edu
traceroute to www.mit.edu (104.104.169.64), 30 hops max, 60 byte pa
ckets
 1 _gateway (172.17.85.1)  0.261 ms  0.366 ms  0.420 ms
 2 177.104.51.25 (177.104.51.25)  10.760 ms  10.845 ms  10.829 ms
 3 177.104.51.5 (177.104.51.5)  0.575 ms  0.560 ms  0.543 ms
 4 177.104.51.141 (177.104.51.141)  0.936 ms  1.029 ms  0.734 ms
 5 babl.ufabc.edu.br (177.104.51.68)  0.797 ms  0.781 ms  0.856 ms
 6 * * *
 7 a104-104-169-64.deploy.static.akamaitechnologies.com (104.104.1
69.64)  1.366 ms  1.351 ms  1.336 ms
ufabc@ufabc-OptiPlex-9010:~$ traceroute www.ufl.edu
traceroute to www.ufl.edu (128.227.36.35), 30 hops max, 60 byte pac
kets
 1 _gateway (172.17.85.1)  0.273 ms  0.359 ms  0.417 ms
 2 177.104.51.25 (177.104.51.25)  0.193 ms  0.199 ms  0.244 ms
 3 177.104.51.5 (177.104.51.5)  0.574 ms  0.559 ms  0.543 ms
 4 177.104.51.141 (177.104.51.141)  0.775 ms  0.901 ms  1.009 ms
 5 177.104.51.67 (177.104.51.67)  0.818 ms  0.977 ms  1.153 ms
 6 177.104.51.197 (177.104.51.197)  2.936 ms  2.955 ms  2.835 ms
 7 * 200.136.16.25 (200.136.16.25)  3.009 ms  2.984 ms
 8 36.8.39.170.ampath.net (170.39.8.36)  162.442 ms  162.426 ms  1
62.410 ms
 9 * * *
10 florida-lambdarail.10gigabitethernet3-2.core1.jax1.he.net (216.
66.2.154)  137.425 ms  137.408 ms  137.394 ms
11 orl-flrcore-asr9010-1-hu0600-1.net.flrnet.org (108.59.31.152)
145.189 ms  145.171 ms  145.155 ms
12 108.59.31.200 (108.59.31.200)  144.976 ms  143.581 ms  143.559
ms
13 jax-flrcore-asr9010-1-hu0701-1.net.flrnet.org (108.59.31.150)
143.098 ms  145.330 ms  145.289 ms
14 108.59.31.148 (108.59.31.148)  144.625 ms  145.059 ms  144.984
ms
15 con-ufl-gnv-internet-v1804.net.flrnet.org (108.59.29.243)  143.
590 ms  143.567 ms  143.639 ms
16 ctx36-pel-msfc-1-te12-1.ns.ufl.edu (128.227.236.176)  143.546 m
s  143.629 ms  143.679 ms
17 b0038tr01a-ewan-rtr-1-0038inside-1.ni.infr.ufl.edu (128.227.69.
193)  143.998 ms  143.977 ms  144.182 ms
18 b0038tr01a-bb-rtr-1-et121v750-1.ni.infr.ufl.edu (128.227.95.248
)  143.795 ms  143.884 ms  143.924 ms
19 b0038tr01a-bbflex-rtr-1-pc10-1.ni.infr.ufl.edu (128.227.95.15)
143.685 ms  143.904 ms  143.867 ms
20 ssrb230a-nexus-msfc-1-pc255v200-1.ni.infr.ufl.edu (128.227.95.2
51)  167.195 ms  166.939 ms  166.778 ms
21 ssrb230a-dcpopl3-7009-1-vdc2-v601-1.ns.ufl.edu (128.227.236.155
)  144.217 ms  144.073 ms  144.286 ms
22 ufl.edu (128.227.36.35)  144.210 ms  144.178 ms  144.117 ms
```

```
ufabc@ufabc-OptiPlex-9010:~$ traceroute www.ubc.ca
traceroute to www.ubc.ca (13.227.97.68), 30 hops max, 60 byte packets
 1 _gateway (172.17.85.1)  11.060 ms  11.144 ms  11.206 ms
 2 177.104.51.25 (177.104.51.25)  8.287 ms  8.354 ms  8.390 ms
 3 177.104.51.5 (177.104.51.5)  0.608 ms  0.591 ms  0.574 ms
 4 177.104.51.141 (177.104.51.141)  0.794 ms  1.078 ms  0.870 ms
 5 177.104.51.233 (177.104.51.233)  2.571 ms  2.456 ms  2.441 ms
 6 csp1-popsp.bkb.rnp.br (170.79.214.38)  2.424 ms  2.673 ms  2.72
0 ms
 7 as16509.saopaulo.sp.ix.br (187.16.221.99)  2.634 ms  2.989 ms
2.948 ms
 8 * * *
 9 * * *
10 * * *
11 * * *
12 * * *
13 * * *
14 * * *
15 server-13-227-97-68.gru50.r.cloudfront.net (13.227.97.68)  3.06
4 ms  3.043 ms  3.021 ms
```

```
ufabc@ufabc-OptiPlex-9010:~$ traceroute www.chat.ru
traceroute to www.chat.ru (77.244.218.84), 30 hops max, 60 byte packets
 1 _gateway (172.17.85.1)  9.516 ms  9.552 ms  9.607 ms
 2 177.104.51.25 (177.104.51.25)  5.829 ms  5.812 ms  5.838 ms
 3 177.104.51.5 (177.104.51.5)  0.624 ms  0.608 ms  0.586 ms
 4 177.104.51.141 (177.104.51.141)  0.875 ms  0.764 ms  1.090 ms
 5 177.104.51.67 (177.104.51.67)  14.873 ms  14.454 ms  15.038 ms
 6 177.104.51.197 (177.104.51.197)  2.920 ms  2.921 ms *
 7 200.136.16.25 (200.136.16.25)  3.438 ms  3.284 ms  3.238 ms
 8 36.8.39.170.ampath.net (170.39.8.36)  162.138 ms  162.256 ms  1
62.577 ms
 9 xe0-0-2-541.miami15.mia.seabone.net (195.22.199.209)  136.837 m
s 136.818 ms  136.795 ms
10 195.22.214.167 (195.22.214.167)  249.180 ms  250.328 ms  250.31
1 ms
11 195.22.214.35 (195.22.214.35)  247.917 ms  250.913 ms  250.066
ms
12 * mskn15-Lo1.transtelecom.net (217.150.55.234)  285.293 ms  288
.518 ms
13 92.53.94.96 (92.53.94.96)  287.576 ms  284.966 ms  288.291 ms
14 92.53.94.67 (92.53.94.67)  289.474 ms  290.657 ms  289.390 ms
15 92.53.94.63 (92.53.94.63)  288.605 ms  292.102 ms  293.643 ms
16 * * *
17 * * *
18 * * *
19 * * *
20 * * *
21 * * *
22 * * *
23 * * *
24 * * *
25 * * *
26 * * *
27 * * *
28 * * *
29 * * *
30 * * *
```

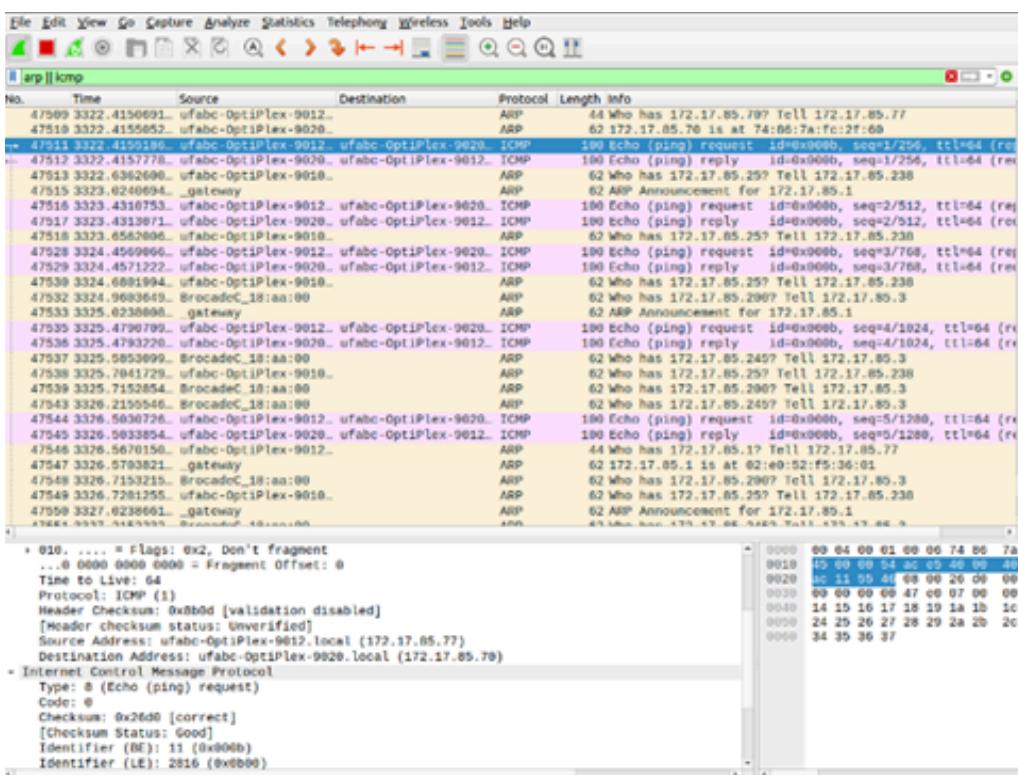
### 3. Comando Arp.

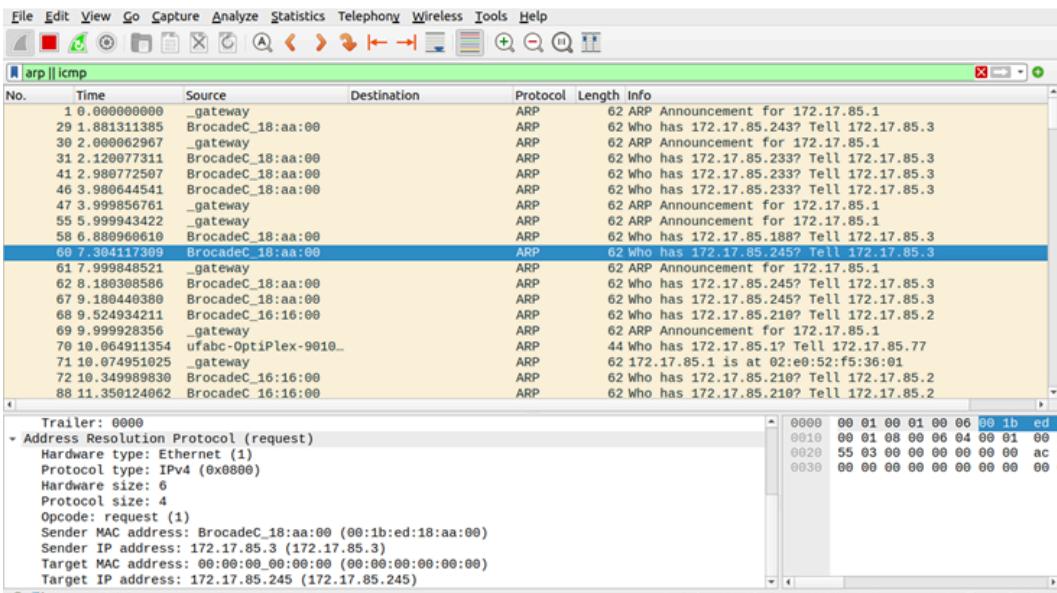
#### 3.1 Conteúdo da cache Arp:

```
ufabc@ufabc-OptiPlex-9010:~$ arp -a
? (172.17.85.204) em 74:86:7a:fc:2f:7b [ether] em eno1
_gateway (172.17.85.1) em 02:e0:52:f5:36:01 [ether] em eno1
? (172.17.85.2) em 00:1b:ed:16:16:00 [ether] em eno1
? (172.17.85.224) em 74:86:7a:fc:2e:34 [ether] em eno1
? (172.17.85.253) em 74:86:7a:fc:2e:fd [ether] em eno1
? (172.17.85.3) em 00:1b:ed:18:aa:00 [ether] em eno1
? (172.17.85.254) em 00:21:b7:02:a4:70 [ether] em eno1
ufabc@ufabc-OptiPlex-9010:~$
```

#### 3.2 Tabela e pacotes Arp e endereços Mec:

```
ufabc@ufabc-OptiPlex-9010:~$ net-tools (1.00+git20181103.6eebce-1ubuntu) ...
Configurando net-tools (1.00+git20181103.6eebce-1ubuntu) ...
A processar 'triggers' para man-db (2.10.2-1) ...
ufabc@ufabc-OptiPlex-9010:~$ arp -a
? (172.17.85.204) em 74:86:7a:fc:2f:7b [ether] em eno1
_gateway (172.17.85.1) em 02:e0:52:f5:36:01 [ether] em eno1
? (172.17.85.2) em 00:1b:ed:16:16:00 [ether] em eno1
? (172.17.85.224) em 74:86:7a:fc:2e:34 [ether] em eno1
? (172.17.85.253) em 74:86:7a:fc:2e:fd [ether] em eno1
? (172.17.85.3) em 00:1b:ed:18:aa:00 [ether] em eno1
? (172.17.85.254) em 00:21:b7:02:a4:70 [ether] em eno1
ufabc@ufabc-OptiPlex-9010:~$ ping 172.17.85.70
PING 172.17.85.70 (172.17.85.70) 56(84) bytes of data.
64 bytes from 172.17.85.70: icmp_seq=1 ttl=64 time=0.736 ms
64 bytes from 172.17.85.70: icmp_seq=2 ttl=64 time=0.360 ms
64 bytes from 172.17.85.70: icmp_seq=3 ttl=64 time=0.346 ms
64 bytes from 172.17.85.70: icmp_seq=4 ttl=64 time=0.379 ms
64 bytes from 172.17.85.70: icmp_seq=5 ttl=64 time=0.340 ms
64 bytes from 172.17.85.70: icmp_seq=6 ttl=64 time=0.337 ms
64 bytes from 172.17.85.70: icmp_seq=7 ttl=64 time=0.391 ms
64 bytes from 172.17.85.70: icmp_seq=8 ttl=64 time=0.379 ms
64 bytes from 172.17.85.70: icmp_seq=9 ttl=64 time=0.335 ms
64 bytes from 172.17.85.70: icmp_seq=10 ttl=64 time=0.285 ms
64 bytes from 172.17.85.70: icmp_seq=11 ttl=64 time=0.179 ms
64 bytes from 172.17.85.70: icmp_seq=12 ttl=64 time=0.266 ms
...
... 172.17.85.70 ping statistics ...
12 packets transmitted, 12 received, 0% packet loss, time 11256ms
rtt min/avg/max/mdev = 0.179/0.311/0.736/0.132 ms
ufabc@ufabc-OptiPlex-9010:~$
```





Foi utilizado a máquina com IP 172.17.85.70, sendo enviados e recebidos 12 pacotes, não havendo perda de pacotes na conexão, e com o tempo de 11.256 ms.

### 3.3 Comando Ping utilizando a máquina com IP 172.17.85.70:

Foram capturados pacotes Arp, pois é necessário para fazer o mapeamento e conseguir capturar o pacote.

### 3.4 Comandos Arp -D e Ping:

```
fabc@ufabc-OptiPlex-9010:~$ sudo arp -d 172.17.85.70
fabc@ufabc-OptiPlex-9010:~$ arp -a
(172.17.85.204) em 74:86:7a:fc:2f:7b [ether] em eno1
gateway (172.17.85.1) em 02:e0:52:f5:36:01 [ether] em eno1
(172.17.85.2) em 00:1b:ed:16:16:00 [ether] em eno1
(172.17.85.224) em 74:86:7a:fc:2e:34 [ether] em eno1
(172.17.85.253) em 74:86:7a:fc:2e:fd [ether] em eno1
(172.17.85.3) em 00:1b:ed:18:aa:00 [ether] em eno1
(172.17.85.254) em 00:21:b7:02:a4:70 [ether] em eno1
fabc@ufabc-OptiPlex-9010:~$ ping 172.17.85.70
PING 172.17.85.70 (172.17.85.70) 56(84) bytes of data.
64 bytes from 172.17.85.70: icmp_seq=1 ttl=64 time=0.808 ms
64 bytes from 172.17.85.70: icmp_seq=2 ttl=64 time=0.289 ms
64 bytes from 172.17.85.70: icmp_seq=3 ttl=64 time=0.269 ms
64 bytes from 172.17.85.70: icmp_seq=4 ttl=64 time=0.202 ms
64 bytes from 172.17.85.70: icmp_seq=5 ttl=64 time=0.248 ms
64 bytes from 172.17.85.70: icmp_seq=6 ttl=64 time=0.260 ms
64 bytes from 172.17.85.70: icmp_seq=7 ttl=64 time=0.216 ms
64 bytes from 172.17.85.70: icmp_seq=8 ttl=64 time=0.197 ms
64 bytes from 172.17.85.70: icmp_seq=9 ttl=64 time=0.290 ms
64 bytes from 172.17.85.70: icmp_seq=10 ttl=64 time=0.218 ms
64 bytes from 172.17.85.70: icmp_seq=11 ttl=64 time=0.189 ms
64 bytes from 172.17.85.70: icmp_seq=12 ttl=64 time=0.301 ms
64 bytes from 172.17.85.70: icmp_seq=13 ttl=64 time=0.258 ms
64 bytes from 172.17.85.70: icmp_seq=14 ttl=64 time=0.270 ms
64 bytes from 172.17.85.70: icmp_seq=15 ttl=64 time=0.245 ms
64 bytes from 172.17.85.70: icmp_seq=16 ttl=64 time=0.248 ms
^C
--- 172.17.85.70 ping statistics ---
16 packets transmitted, 16 received, 0% packet loss, time 15340ms
rtt min/avg/max/mdev = 0.189/0.281/0.808/0.139 ms
```

Os pacotes Arp continuam a ser capturados normalmente.

## 4. Configuração automática da rede.

## 4.1 Rede indisponível e comando Ifconfig:

```
ufabc@ufabc-OptiPlex-9010:~$ ifconfig
eno1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
      ether 74:86:7a:fc:2f:57 txqueuelen 1000 (Ethernet)
      RX packets 177385 bytes 228151510 (228.1 MB)
      RX errors 0 dropped 0 overruns 0 frame 0
      TX packets 19170 bytes 1726114 (1.7 MB)
      TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
      device interrupt 20 memory 0xf7d00000-f7d20000

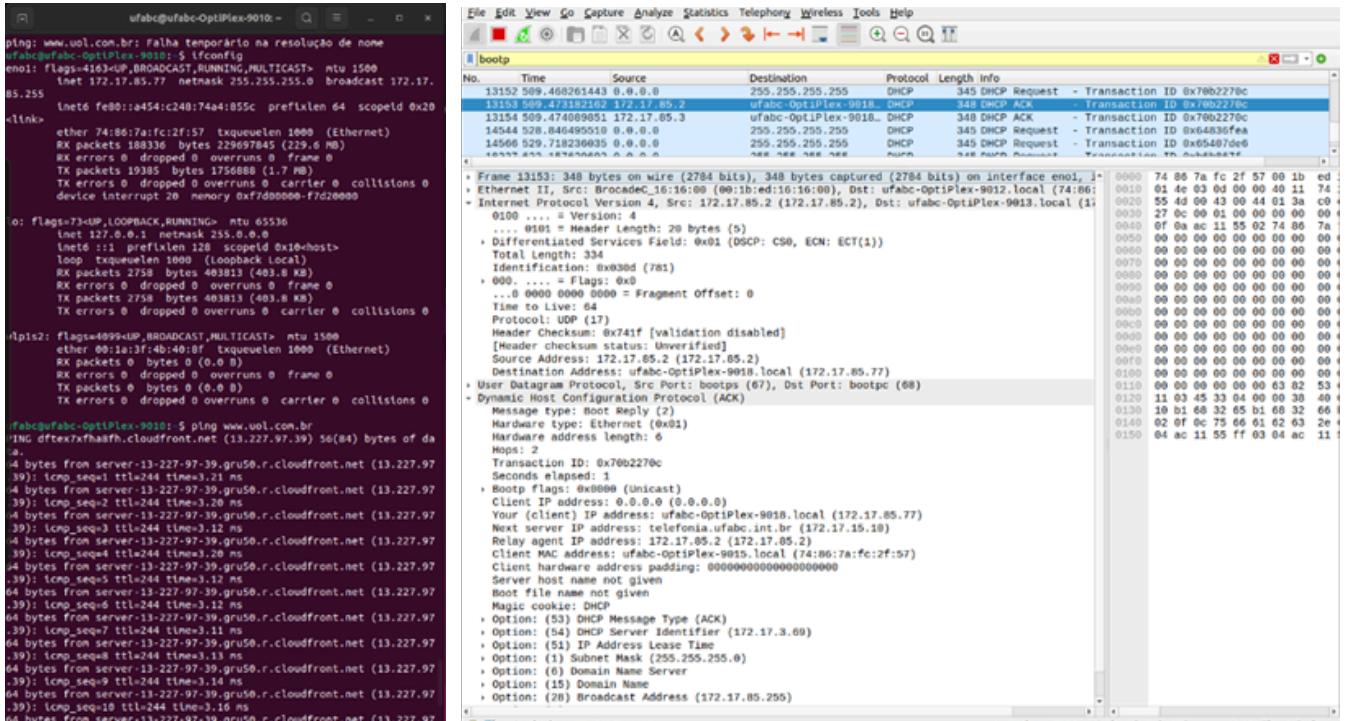
lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
      inet 127.0.0.1 netmask 255.0.0.0
      inet6 ::1 prefixlen 128 scopeid 0x10<host>
          loop txqueuelen 1000 (Loopback Local)
          RX packets 2420 bytes 364530 (364.5 KB)
          RX errors 0 dropped 0 overruns 0 frame 0
          TX packets 2420 bytes 364530 (364.5 KB)
          TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wlp1s2: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
      ether 00:1a:3f:4b:40:8f txqueuelen 1000 (Ethernet)
      RX packets 0 bytes 0 (0.0 B)
      RX errors 0 dropped 0 overruns 0 frame 0
      TX packets 0 bytes 0 (0.0 B)
      TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

ufabc@ufabc-OptiPlex-9010:~$ ping www.uol.com.br
ping: www.uol.com.br: Falha temporário na resolução de nome
ufabc@ufabc-OptiPlex-9010:~$ 
```

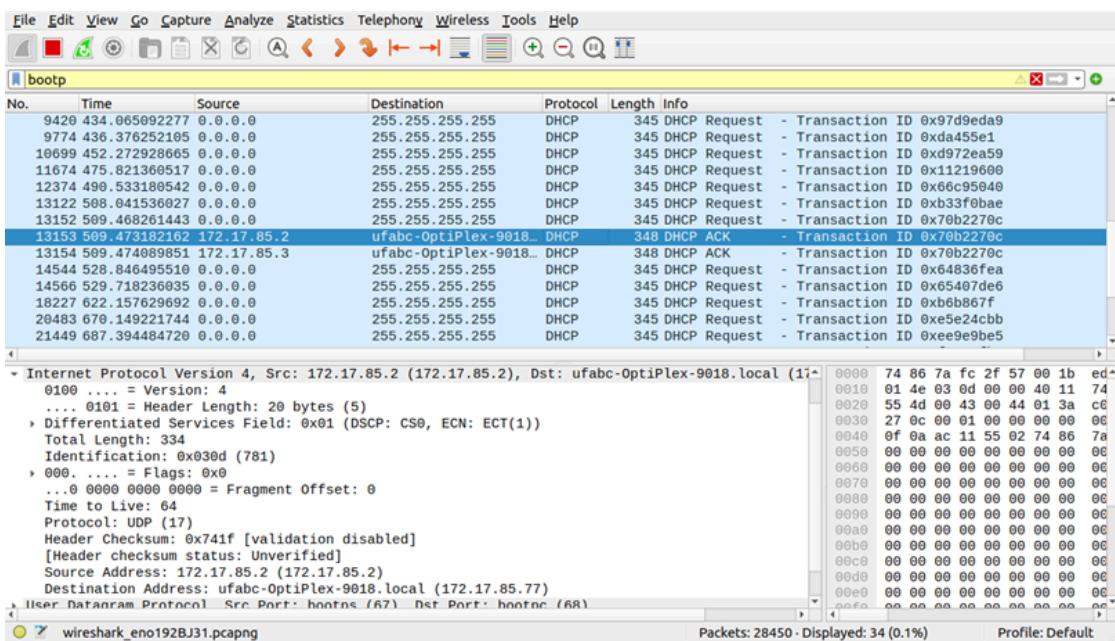
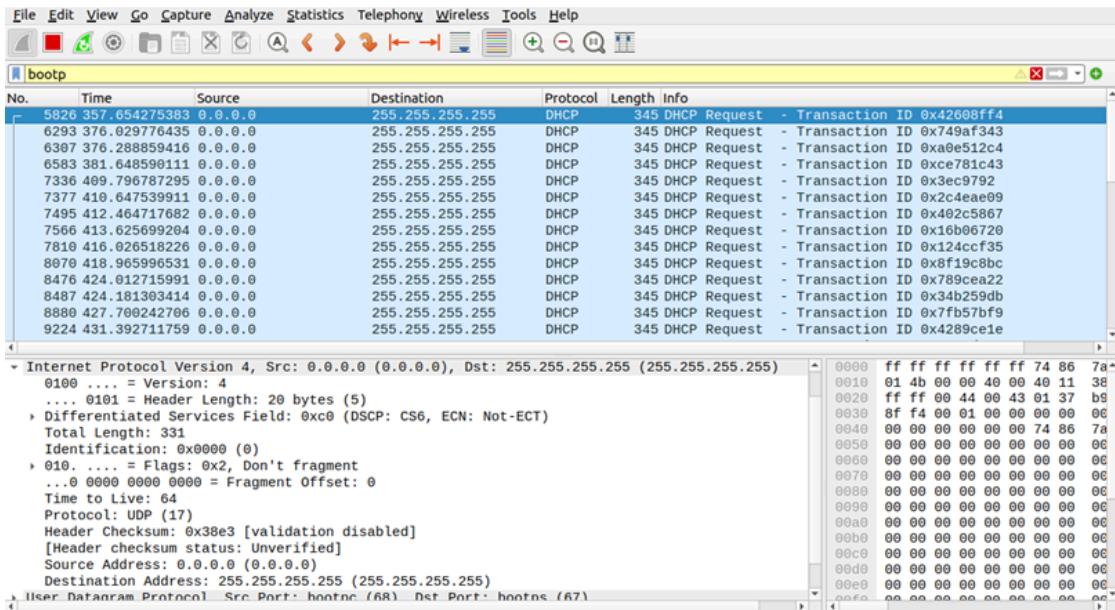
A máquina ainda possui endereço IP, porém a mesma manterá o endereço IP atribuído a ela até que o tempo de expiração do endereço seja atingido ou até que a máquina seja reiniciada.

## 4.2 Rede disponível e comando Ifconfig:



Funcionamento perfeito.

### 4.3 Informações nos pacotes DHCP, com filtro BOOTP:



Quando um dispositivo é conectado a uma rede, ele envia uma solicitação DHCP para o servidor DHCP solicitando um endereço IP. O servidor DHCP responde com uma oferta de um endereço IP disponível, juntamente com outras configurações de rede, como o gateway padrão, máscaras de sub-rede e o servidor DNS. Isso torna o gerenciamento de endereços IP e configurações de rede mais eficiente e menos propenso a erros.

## 5. Comando Route.

### 5.1 Rotas:

```
ufabc@ufabc-OptiPlex-9010:~$ route
Tabela de Roteamento IP do Kernel
Destino      Roteador      MáscaraGen.    Opções Métrica Ref
  Uso Iface
default       _gateway     0.0.0.0        UG      100      0
  0 eno1
link-local    0.0.0.0      255.255.0.0    U       1000      0
  0 eno1
172.17.85.0   0.0.0.0      255.255.255.0  U       100      0
  0 eno1
ufabc@ufabc-OptiPlex-9010:~$
```

As rotas presentes são: Default, Link-local e 172.17.85.0.

### 5.2 Comando Sudo Route Del Default:

```
ufabc@ufabc-OptiPlex-9010:~$ sudo route del default
[sudo] senha para ufabc:
ufabc@ufabc-OptiPlex-9010:~$ route
Tabela de Roteamento IP do Kernel
Destino      Roteador      MáscaraGen.    Opções Métrica Ref
  Uso Iface
link-local    0.0.0.0      255.255.0.0    U       1000      0
  0 eno1
172.17.85.0   0.0.0.0      255.255.255.0  U       100      0
  0 eno1
ufabc@ufabc-OptiPlex-9010:~$ ping www.uol.com.br
^C
ufabc@ufabc-OptiPlex-9010:~$ ping www.ufabc.edu.br
^C
ufabc@ufabc-OptiPlex-9010:~$
```

Não é possível acessar a rede, pois a rota principal foi apagada.

### 5.3 Comando Ping para o servidor:

```
ufabc@ufabc-OptiPlex-9010:~$ ping 172.17.85.255
ping: Do you want to ping broadcast? Then -b. If not, check your local firewall rules
ufabc@ufabc-OptiPlex-9010:~$ ping 172.17.85.77
PING 172.17.85.77 (172.17.85.77) 56(84) bytes of data.
64 bytes from 172.17.85.77: icmp_seq=1 ttl=64 time=0.024 ms
64 bytes from 172.17.85.77: icmp_seq=2 ttl=64 time=0.038 ms
64 bytes from 172.17.85.77: icmp_seq=3 ttl=64 time=0.033 ms
64 bytes from 172.17.85.77: icmp_seq=4 ttl=64 time=0.039 ms
^C
--- 172.17.85.77 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3056ms
rtt min/avg/max/mdev = 0.024/0.033/0.039/0.006 ms
ufabc@ufabc-OptiPlex-9010:~$
```

Como resultado temos a mensagem de erro, onde diz para checar as regras locais de firewall.

#### 5.4 Comando Ping para para uma máquina da sub-rede local:

```
ufabc@ufabc-OptiPlex-9010:~$ ping 172.17.85.1
PING 172.17.85.1 (172.17.85.1) 56(84) bytes of data.
64 bytes from 172.17.85.1: icmp_seq=1 ttl=64 time=11.9 ms
64 bytes from 172.17.85.1: icmp_seq=2 ttl=64 time=8.24 ms
64 bytes from 172.17.85.1: icmp_seq=3 ttl=64 time=6.91 ms
64 bytes from 172.17.85.1: icmp_seq=4 ttl=64 time=6.06 ms
^C
--- 172.17.85.1 ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3004ms
rtt min/avg/max/mdev = 6.061/8.266/11.853/2.212 ms
ufabc@ufabc-OptiPlex-9010:~$
```

O comando foi executado normalmente, pois não é necessário roteador para chegar a uma sub-rede local.

#### 5.5 Comando Sudo Route Add Default Gw e comando Ping para servidor externo:

```
ufabc@ufabc-OptiPlex-9010:~$ sudo route add default gw 172.17.85.1
ufabc@ufabc-OptiPlex-9010:~$ ping www.ufabc.edu.br
PING www.ufabc.edu.br (177.104.50.120) 56(84) bytes of data.
64 bytes from www.ufabc.edu.br (177.104.50.120): icmp_seq=1 ttl=61
time=0.719 ms
64 bytes from www.ufabc.edu.br (177.104.50.120): icmp_seq=2 ttl=61
time=0.697 ms
64 bytes from www.ufabc.edu.br (177.104.50.120): icmp_seq=3 ttl=61
time=0.702 ms
64 bytes from www.ufabc.edu.br (177.104.50.120): icmp_seq=4 ttl=61
time=0.656 ms
64 bytes from www.ufabc.edu.br (177.104.50.120): icmp_seq=5 ttl=61
time=0.666 ms
64 bytes from www.ufabc.edu.br (177.104.50.120): icmp_seq=6 ttl=61
time=0.663 ms
^C
--- www.ufabc.edu.br ping statistics ---
6 packets transmitted, 6 received, 0% packet loss, time 5008ms
rtt min/avg/max/mdev = 0.656/0.683/0.719/0.023 ms
ufabc@ufabc-OptiPlex-9010:~$
```

Funcionou normalmente, pois voltou a ter conexão com a rota principal.