Universidade do Minho

Departamento de Informática

LI4 - Proposta de Projeto

PL1 - Grupo 1.1

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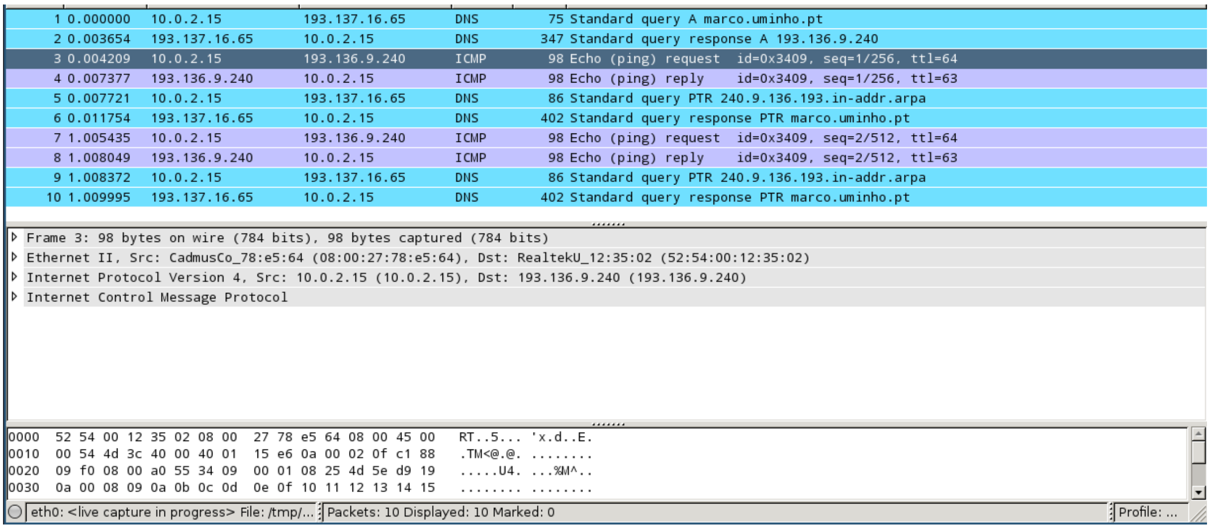
Capítulo 1

Questão 1

Comando Usado (Aplicação)	Protocolo de Aplicação	Protocolo de transporte	Porta de atendimento	Overhead de transporte em bytes
Ping	-	-	-	-
Tracerout	-	UDP	33446	8
telnet	telnet	TCP	23	20
ftp	ftp	TCP	21	20
Tftp	tftp	UDP	69	8
browser/http	http	TCP	80	20
ssh	sshv2	TCP	22	20



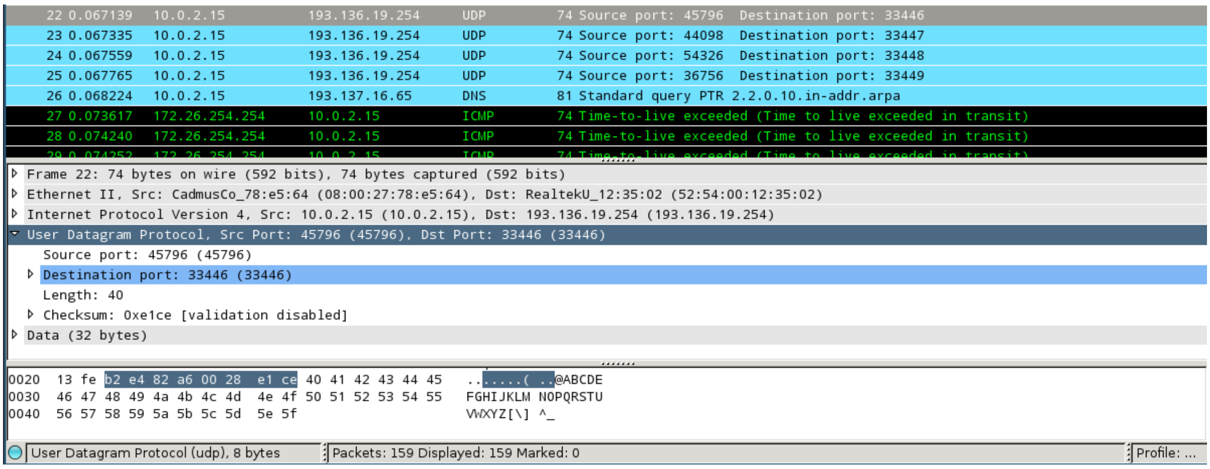
```
    1 0.000000   10.0.2.15         193.137.16.65     DNS        75 Standard query A marco.uminho.pt
    2 0.003654   193.137.16.65     10.0.2.15         DNS       347 Standard query response A 193.136.9.240
    3 0.004209   10.0.2.15         193.136.9.240     ICMP       98 Echo (ping) request  id=0x3409, seq=1/256, ttl=64
    4 0.007377   193.136.9.240     10.0.2.15         ICMP       98 Echo (ping) reply    id=0x3409, seq=1/256, ttl=63
    5 0.007721   10.0.2.15         193.137.16.65     DNS        86 Standard query PTR 240.9.136.193.in-addr.arpa
    6 0.011754   193.137.16.65     10.0.2.15         DNS       402 Standard query response PTR marco.uminho.pt
    7 1.005435   10.0.2.15         193.136.9.240     ICMP       98 Echo (ping) request  id=0x3409, seq=2/512, ttl=64
    8 1.008049   193.136.9.240     10.0.2.15         ICMP       98 Echo (ping) reply    id=0x3409, seq=2/512, ttl=63
    9 1.008372   10.0.2.15         193.137.16.65     DNS        86 Standard query PTR 240.9.136.193.in-addr.arpa
   10 1.009995   193.137.16.65     10.0.2.15         DNS       402 Standard query response PTR marco.uminho.pt
```

```
Frame 3: 98 bytes on wire (784 bits), 98 bytes captured (784 bits)
Ethernet II, Src: CadmusCo_78:e5:64 (08:00:27:78:e5:64), Dst: RealtekU_12:35:02 (52:54:00:12:35:02)
Internet Protocol Version 4, Src: 10.0.2.15 (10.0.2.15), Dst: 193.136.9.240 (193.136.9.240)
Internet Control Message Protocol
```

```
0000  52 54 00 12 35 02 08 00  27 78 e5 64 08 00 45 00   RT..5... 'x.d..E.
0010  00 54 4d 3c 40 00 40 01  15 e6 0a 00 02 0f c1 88   .TM<@.@. ........
0020  09 f0 08 00 a0 55 34 09  00 01 08 25 4d 5e d9 19   .....U4. ...%M^..
0030  0a 00 08 09 0a 0b 0c 0d  0e 0f 10 11 12 13 14 15   ........ ........
```

○ eth0: <live capture in progress> File: /tmp/...
Packets: 10 Displayed: 10 Marked: 0
Profile: ...

Figura 1.1: ping



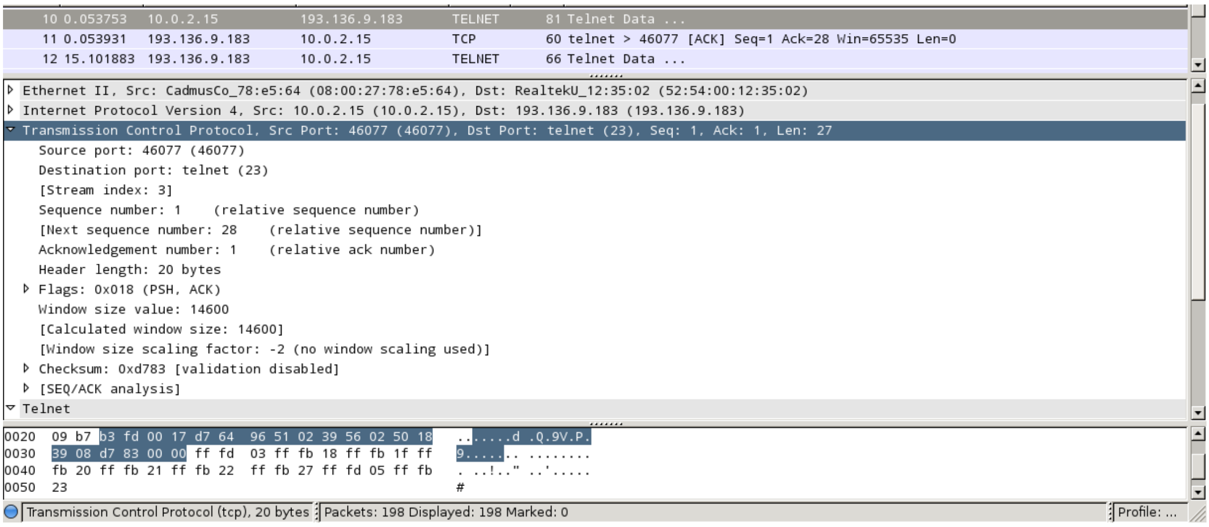
```
 22 0.067139   10.0.2.15         193.136.19.254    UDP      74 Source port: 45796  Destination port: 33446
 23 0.067335   10.0.2.15         193.136.19.254    UDP      74 Source port: 44098  Destination port: 33447
 24 0.067559   10.0.2.15         193.136.19.254    UDP      74 Source port: 54326  Destination port: 33448
 25 0.067765   10.0.2.15         193.136.19.254    UDP      74 Source port: 36756  Destination port: 33449
 26 0.068224   10.0.2.15         193.137.16.65     DNS      81 Standard query PTR 2.2.0.10.in-addr.arpa
 27 0.073617   172.26.254.254    10.0.2.15         ICMP     74 Time-to-live exceeded (Time to live exceeded in transit)
 28 0.074240   172.26.254.254    10.0.2.15         ICMP     74 Time-to-live exceeded (Time to live exceeded in transit)
 29 0.074252   172.26.254.254    10.0.2.15         ICMP     74 Time-to-live exceeded (Time to live exceeded in transit)
```

```
▷ Frame 22: 74 bytes on wire (592 bits), 74 bytes captured (592 bits)
▷ Ethernet II, Src: CadmusCo_78:e5:64 (08:00:27:78:e5:64), Dst: RealtekU_12:35:02 (52:54:00:12:35:02)
▷ Internet Protocol Version 4, Src: 10.0.2.15 (10.0.2.15), Dst: 193.136.19.254 (193.136.19.254)
▽ User Datagram Protocol, Src Port: 45796 (45796), Dst Port: 33446 (33446)
    Source port: 45796 (45796)
  ▷ Destination port: 33446 (33446)
    Length: 40
  ▷ Checksum: 0xe1ce [validation disabled]
▷ Data (32 bytes)

0020  13 fe b2 e4 82 a6 00 28  e1 ce 40 41 42 43 44 45   .......( ..@ABCDE
0030  46 47 48 49 4a 4b 4c 4d  4e 4f 50 51 52 53 54 55   FGHIJKLM NOPQRSTU
0040  56 57 58 59 5a 5b 5c 5d  5e 5f                     VWXYZ[\] ^_

User Datagram Protocol (udp), 8 bytes | Packets: 159 Displayed: 159 Marked: 0 | Profile: ...
```

Figura 1.2: tracerout



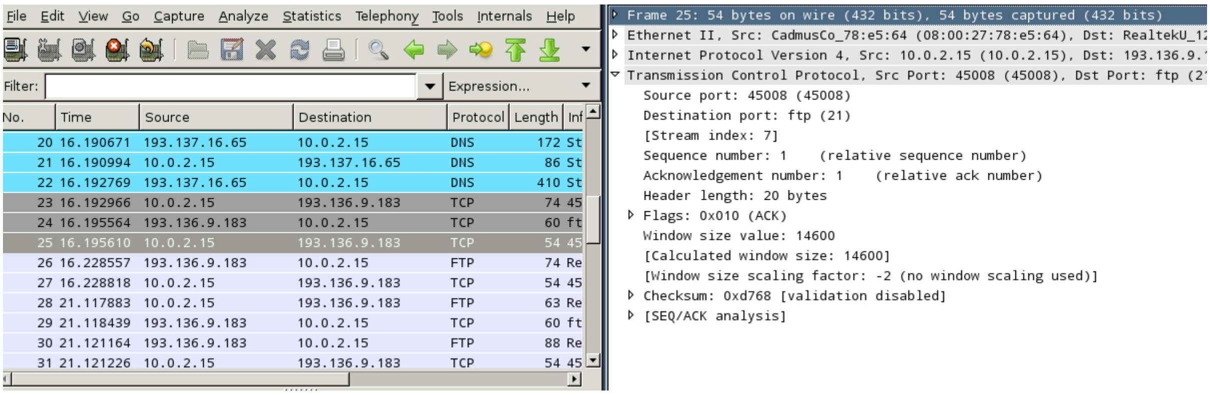
```
 10 0.053753   10.0.2.15         193.136.9.183     TELNET   81 Telnet Data ...
 11 0.053931   193.136.9.183     10.0.2.15         TCP      60 telnet > 46077 [ACK] Seq=1 Ack=28 Win=65535 Len=0
 12 15.101883  193.136.9.183     10.0.2.15         TELNET   66 Telnet Data ...
```

```
▷ Ethernet II, Src: CadmusCo_78:e5:64 (08:00:27:78:e5:64), Dst: RealtekU_12:35:02 (52:54:00:12:35:02)
▷ Internet Protocol Version 4, Src: 10.0.2.15 (10.0.2.15), Dst: 193.136.9.183 (193.136.9.183)
▽ Transmission Control Protocol, Src Port: 46077 (46077), Dst Port: telnet (23), Seq: 1, Ack: 1, Len: 27
    Source port: 46077 (46077)
    Destination port: telnet (23)
    [Stream index: 3]
    Sequence number: 1    (relative sequence number)
    [Next sequence number: 28    (relative sequence number)]
    Acknowledgement number: 1    (relative ack number)
    Header length: 20 bytes
  ▷ Flags: 0x018 (PSH, ACK)
    Window size value: 14600
    [Calculated window size: 14600]
    [Window size scaling factor: -2 (no window scaling used)]
  ▷ Checksum: 0xd783 [validation disabled]
  ▷ [SEQ/ACK analysis]
▽ Telnet

0020  09 b7 b3 fd 00 17 d7 64  96 51 02 39 56 02 50 18   .......d .Q.9V.P.
0030  39 08 d7 83 00 00 ff fd  03 ff fb 18 ff fb 1f ff   9....... ........
0040  fb 20 ff fb 21 ff fb 22  ff fb 27 ff fd 05 ff fb   . ..!.." ..'.....
0050  23                                                 #

Transmission Control Protocol (tcp), 20 bytes | Packets: 198 Displayed: 198 Marked: 0 | Profile: ...
```

Figura 1.3: telnet

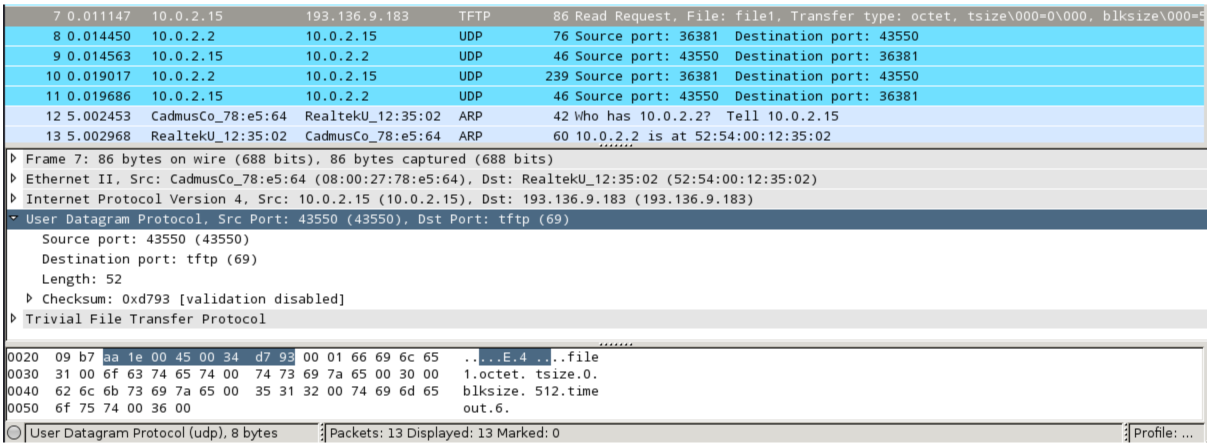


File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help
Filter:
Expression...

```
No.  Time       Source          Destination     Protocol Length Inf
 20 16.190671  193.137.16.65   10.0.2.15       DNS       172 St
 21 16.190994  10.0.2.15       193.137.16.65   DNS        86 St
 22 16.192769  193.137.16.65   10.0.2.15       DNS       410 St
 23 16.192966  10.0.2.15       193.136.9.183   TCP        74 45
 24 16.195564  193.136.9.183   10.0.2.15       TCP        60 ft
 25 16.195610  10.0.2.15       193.136.9.183   TCP        54 45
 26 16.228557  193.136.9.183   10.0.2.15       FTP        74 Re
 27 16.228818  10.0.2.15       193.136.9.183   TCP        54 45
 28 21.117883  10.0.2.15       193.136.9.183   FTP        63 Re
 29 21.118439  193.136.9.183   10.0.2.15       TCP        60 ft
 30 21.121164  193.136.9.183   10.0.2.15       FTP        88 Re
 31 21.121226  10.0.2.15       193.136.9.183   TCP        54 45
```

```
▷ Frame 25: 54 bytes on wire (432 bits), 54 bytes captured (432 bits)
▷ Ethernet II, Src: CadmusCo_78:e5:64 (08:00:27:78:e5:64), Dst: RealtekU_12
▷ Internet Protocol Version 4, Src: 10.0.2.15 (10.0.2.15), Dst: 193.136.9.
▽ Transmission Control Protocol, Src Port: 45008 (45008), Dst Port: ftp (2
    Source port: 45008 (45008)
    Destination port: ftp (21)
    [Stream index: 7]
    Sequence number: 1    (relative sequence number)
    Acknowledgement number: 1    (relative ack number)
    Header length: 20 bytes
  ▷ Flags: 0x010 (ACK)
    Window size value: 14600
    [Calculated window size: 14600]
    [Window size scaling factor: -2 (no window scaling used)]
  ▷ Checksum: 0xd768 [validation disabled]
  ▷ [SEQ/ACK analysis]
```

Figura 1.4: ftp



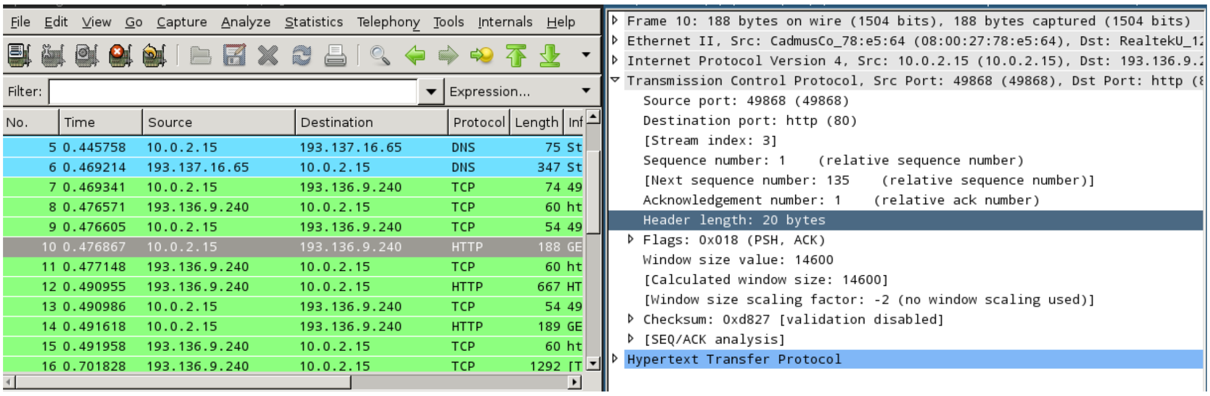
```
  7 0.011147   10.0.2.15          193.136.9.183      TFTP       86 Read Request, File: file1, Transfer type: octet, tsize\000=0\000, blksize\000=5
  8 0.014450   10.0.2.2           10.0.2.15          UDP        76 Source port: 36381  Destination port: 43550
  9 0.014563   10.0.2.15          10.0.2.2           UDP        46 Source port: 43550  Destination port: 36381
 10 0.019017   10.0.2.2           10.0.2.15          UDP       239 Source port: 36381  Destination port: 43550
 11 0.019686   10.0.2.15          10.0.2.2           UDP        46 Source port: 43550  Destination port: 36381
 12 5.002453   CadmusCo_78:e5:64  RealtekU_12:35:02  ARP        42 Who has 10.0.2.2?  Tell 10.0.2.15
 13 5.002968   RealtekU_12:35:02  CadmusCo_78:e5:64  ARP        60 10.0.2.2 is at 52:54:00:12:35:02
```

```
▷ Frame 7: 86 bytes on wire (688 bits), 86 bytes captured (688 bits)
▷ Ethernet II, Src: CadmusCo_78:e5:64 (08:00:27:78:e5:64), Dst: RealtekU_12:35:02 (52:54:00:12:35:02)
▷ Internet Protocol Version 4, Src: 10.0.2.15 (10.0.2.15), Dst: 193.136.9.183 (193.136.9.183)
▽ User Datagram Protocol, Src Port: 43550 (43550), Dst Port: tftp (69)
    Source port: 43550 (43550)
    Destination port: tftp (69)
    Length: 52
  ▷ Checksum: 0xd793 [validation disabled]
▷ Trivial File Transfer Protocol
```

```
0020  09 b7 aa 1e 00 45 00 34  d7 93 00 01 66 69 6c 65   ......E.4 ....file
0030  31 00 6f 63 74 65 74 00  74 73 69 7a 65 00 30 00   1.octet. tsize.0.
0040  62 6c 6b 73 69 7a 65 00  35 31 32 00 74 69 6d 65   blksize. 512.time
0050  6f 75 74 00 36 00                                  out.6.
```

○ User Datagram Protocol (udp), 8 bytes | Packets: 13 Displayed: 13 Marked: 0 | Profile: ...

Figura 1.5: Tftp

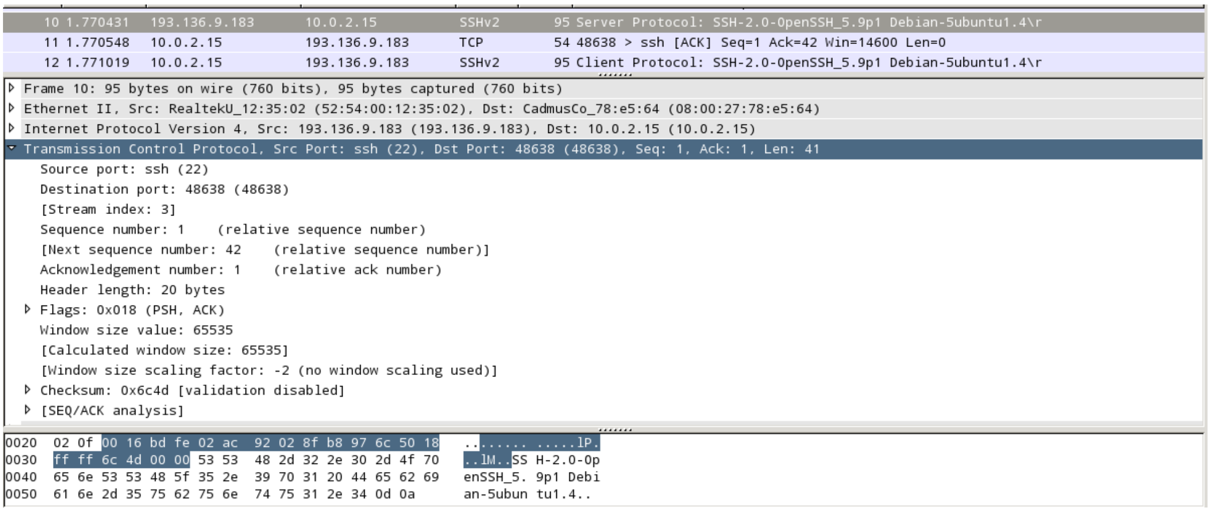


File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help
Filter:
Expression...

```
No.    Time       Source           Destination      Protocol Length Inf
     5 0.445758   10.0.2.15        193.137.16.65    DNS        75 St
     6 0.469214   193.137.16.65    10.0.2.15        DNS       347 St
     7 0.469341   10.0.2.15        193.136.9.240    TCP        74 49
     8 0.476571   193.136.9.240    10.0.2.15        TCP        60 ht
     9 0.476605   10.0.2.15        193.136.9.240    TCP        54 49
    10 0.476867   10.0.2.15        193.136.9.240    HTTP      188 GE
    11 0.477148   193.136.9.240    10.0.2.15        TCP        60 ht
    12 0.490955   193.136.9.240    10.0.2.15        HTTP      667 HT
    13 0.490986   10.0.2.15        193.136.9.240    TCP        54 49
    14 0.491618   10.0.2.15        193.136.9.240    HTTP      189 GE
    15 0.491958   193.136.9.240    10.0.2.15        TCP        60 ht
    16 0.701828   193.136.9.240    10.0.2.15        TCP      1292 [T
```

```
▷ Frame 10: 188 bytes on wire (1504 bits), 188 bytes captured (1504 bits)
▷ Ethernet II, Src: CadmusCo_78:e5:64 (08:00:27:78:e5:64), Dst: RealtekU_12
▷ Internet Protocol Version 4, Src: 10.0.2.15 (10.0.2.15), Dst: 193.136.9.2
▽ Transmission Control Protocol, Src Port: 49868 (49868), Dst Port: http (8
    Source port: 49868 (49868)
    Destination port: http (80)
    [Stream index: 3]
    Sequence number: 1    (relative sequence number)
    [Next sequence number: 135    (relative sequence number)]
    Acknowledgement number: 1    (relative ack number)
    Header length: 20 bytes
  ▷ Flags: 0x018 (PSH, ACK)
    Window size value: 14600
    [Calculated window size: 14600]
    [Window size scaling factor: -2 (no window scaling used)]
  ▷ Checksum: 0xd827 [validation disabled]
  ▷ [SEQ/ACK analysis]
▷ Hypertext Transfer Protocol
```

Figura 1.6: http/browser

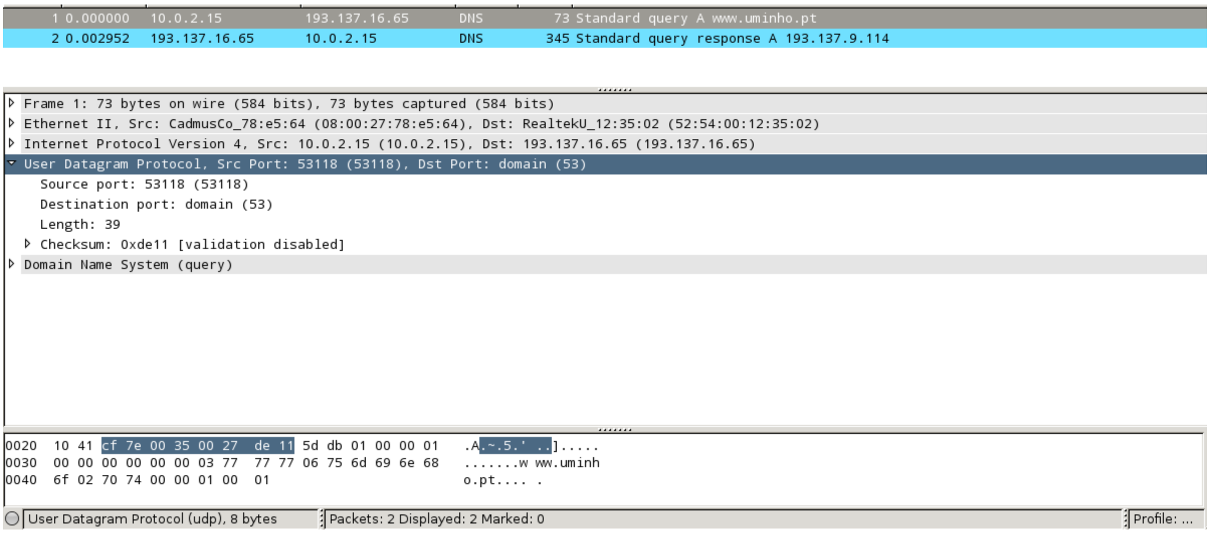


```
 10 1.770431   193.136.9.183      10.0.2.15          SSHv2      95 Server Protocol: SSH-2.0-OpenSSH_5.9p1 Debian-5ubuntu1.4\r
 11 1.770548   10.0.2.15          193.136.9.183      TCP        54 48638 > ssh [ACK] Seq=1 Ack=42 Win=14600 Len=0
 12 1.771019   10.0.2.15          193.136.9.183      SSHv2      95 Client Protocol: SSH-2.0-OpenSSH_5.9p1 Debian-5ubuntu1.4\r
```

```
▷ Frame 10: 95 bytes on wire (760 bits), 95 bytes captured (760 bits)
▷ Ethernet II, Src: RealtekU_12:35:02 (52:54:00:12:35:02), Dst: CadmusCo_78:e5:64 (08:00:27:78:e5:64)
▷ Internet Protocol Version 4, Src: 193.136.9.183 (193.136.9.183), Dst: 10.0.2.15 (10.0.2.15)
▽ Transmission Control Protocol, Src Port: ssh (22), Dst Port: 48638 (48638), Seq: 1, Ack: 1, Len: 41
    Source port: ssh (22)
    Destination port: 48638 (48638)
    [Stream index: 3]
    Sequence number: 1    (relative sequence number)
    [Next sequence number: 42    (relative sequence number)]
    Acknowledgement number: 1    (relative ack number)
    Header length: 20 bytes
  ▷ Flags: 0x018 (PSH, ACK)
    Window size value: 65535
    [Calculated window size: 65535]
    [Window size scaling factor: -2 (no window scaling used)]
  ▷ Checksum: 0x6c4d [validation disabled]
  ▷ [SEQ/ACK analysis]
```

```
0020  02 0f 00 16 bd fe 02 ac  92 02 8f b8 97 6c 50 18   ........ .....lP.
0030  ff ff 6c 4d 00 00 53 53  48 2d 32 2e 30 2d 4f 70   ..lM..SS H-2.0-Op
0040  65 6e 53 53 48 5f 35 2e  39 70 31 20 44 65 62 69   enSSH_5. 9p1 Debi
0050  61 6e 2d 35 75 62 75 6e  74 75 31 2e 34 0d 0a      an-5ubun tu1.4..
```

Figura 1.7: ssh



```
   1 0.000000   10.0.2.15        193.137.16.65      DNS        73 Standard query A www.uminho.pt
   2 0.002952   193.137.16.65    10.0.2.15          DNS       345 Standard query response A 193.137.9.114
```

```
▷ Frame 1: 73 bytes on wire (584 bits), 73 bytes captured (584 bits)
▷ Ethernet II, Src: CadmusCo_78:e5:64 (08:00:27:78:e5:64), Dst: RealtekU_12:35:02 (52:54:00:12:35:02)
▷ Internet Protocol Version 4, Src: 10.0.2.15 (10.0.2.15), Dst: 193.137.16.65 (193.137.16.65)
▽ User Datagram Protocol, Src Port: 53118 (53118), Dst Port: domain (53)
    Source port: 53118 (53118)
    Destination port: domain (53)
    Length: 39
  ▷ Checksum: 0xde11 [validation disabled]
▷ Domain Name System (query)
```

```
0020   10 41 cf 7e 00 35 00 27  de 11 5d db 01 00 00 01    .A.~.5.' ..].....
0030   00 00 00 00 00 00 03 77  77 77 06 75 6d 69 6e 68    .......w ww.uminh
0040   6f 02 70 74 00 00 01 00  01                         o.pt.... .
```

○ User Datagram Protocol (udp), 8 bytes | Packets: 2 Displayed: 2 Marked: 0 | Profile: ...

Figura 1.8: nslookup

Capítulo 2

Questão 2

Capítulo 3

Questão 3

Capítulo 4

Questão 4