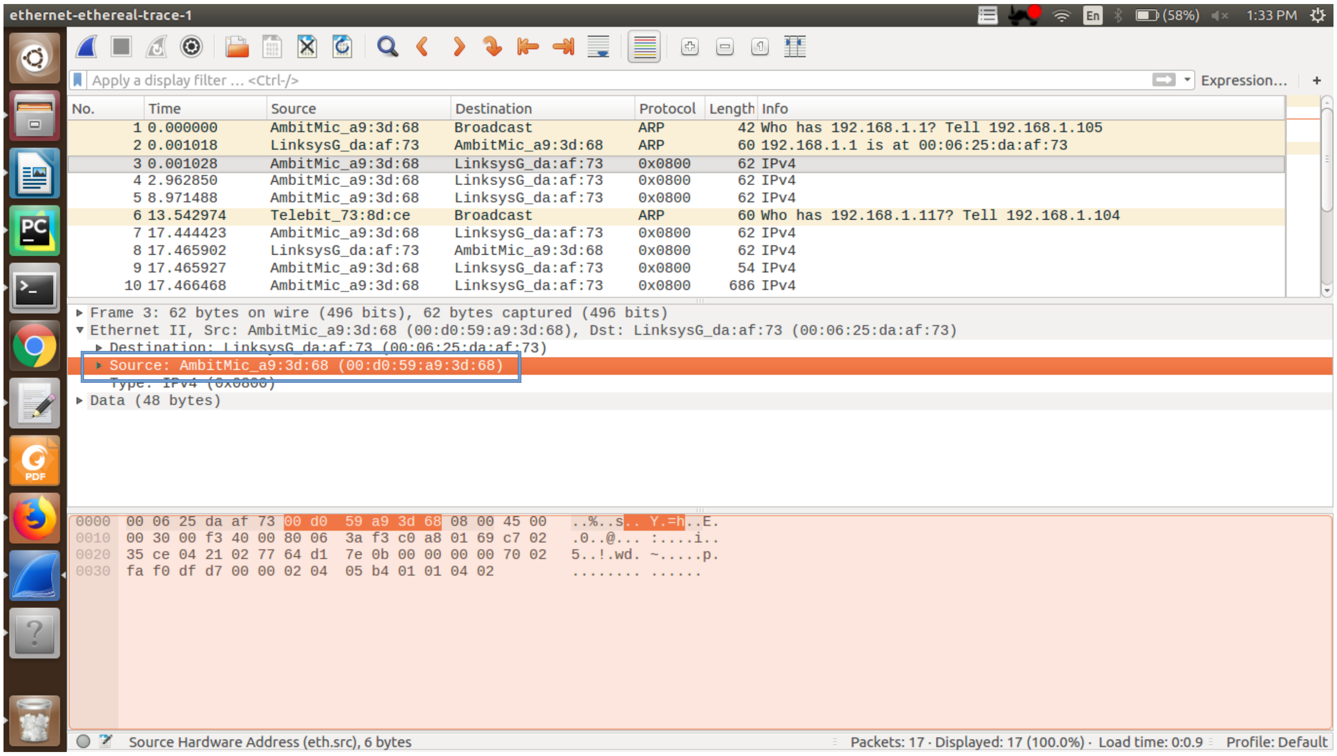
Q1 - What is the 48-bit Ethernet address of your computer?
Ans: Ethernet Address of computer: 00:d0:59:a9:3d:68

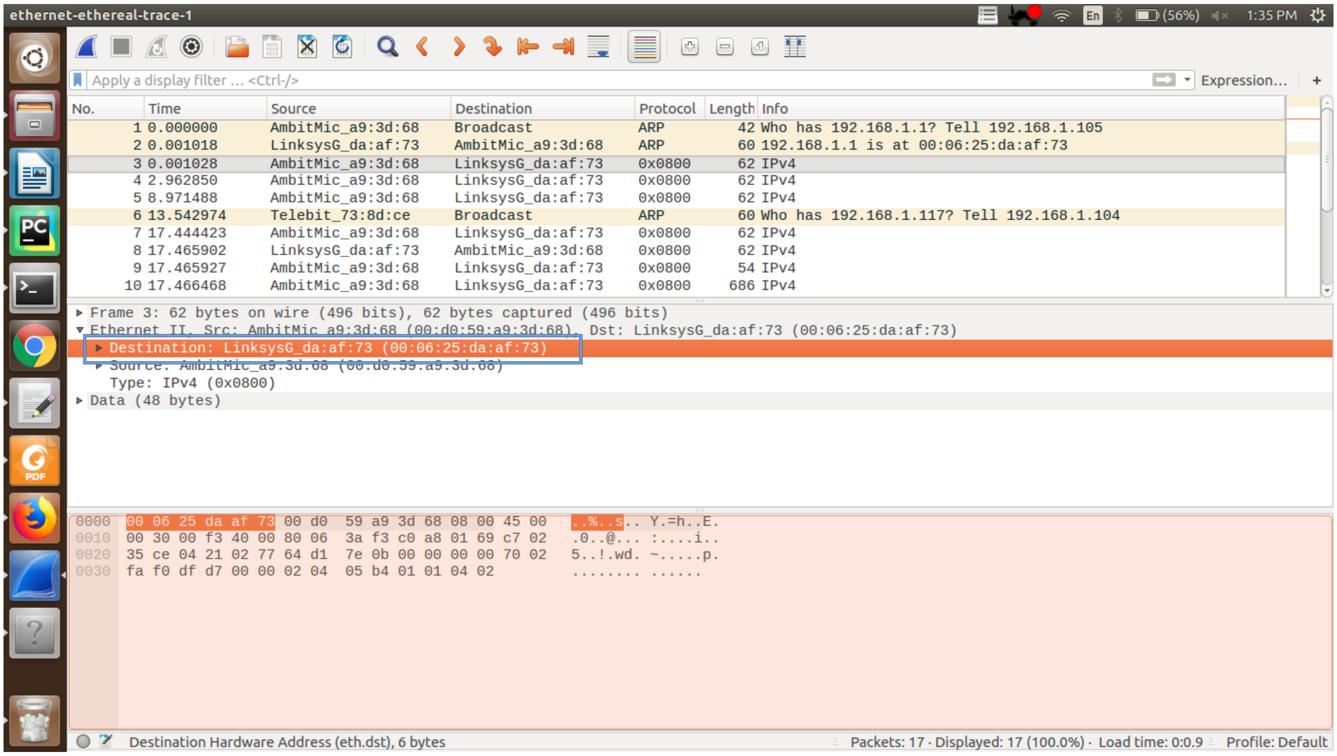

ethernet-ethereal-trace-1
(58%)
1:33 PM
Apply a display filter … <Ctrl-/>
Expression…
Source Hardware Address (eth.src), 6 bytes
Packets: 17 · Displayed: 17 (100.0%) · Load time: 0:0.9
Profile: Default

```
No.  Time       Source              Destination         Protocol Length Info
   1 0.000000   AmbitMic_a9:3d:68   Broadcast           ARP         42 Who has 192.168.1.1? Tell 192.168.1.105
   2 0.001018   LinksysG_da:af:73   AmbitMic_a9:3d:68   ARP         60 192.168.1.1 is at 00:06:25:da:af:73
   3 0.001028   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800      62 IPv4
   4 2.962850   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800      62 IPv4
   5 8.971488   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800      62 IPv4
   6 13.542974  Telebit_73:8d:ce    Broadcast           ARP         60 Who has 192.168.1.117? Tell 192.168.1.104
   7 17.444423  AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800      62 IPv4
   8 17.465902  LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800      62 IPv4
   9 17.465927  AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800      54 IPv4
  10 17.466468  AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800     686 IPv4
```

```
▸ Frame 3: 62 bytes on wire (496 bits), 62 bytes captured (496 bits)
▾ Ethernet II, Src: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68), Dst: LinksysG_da:af:73 (00:06:25:da:af:73)
  ▸ Destination: LinksysG_da:af:73 (00:06:25:da:af:73)
  ▸ Source: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
    Type: IPv4 (0x0800)
▸ Data (48 bytes)
```

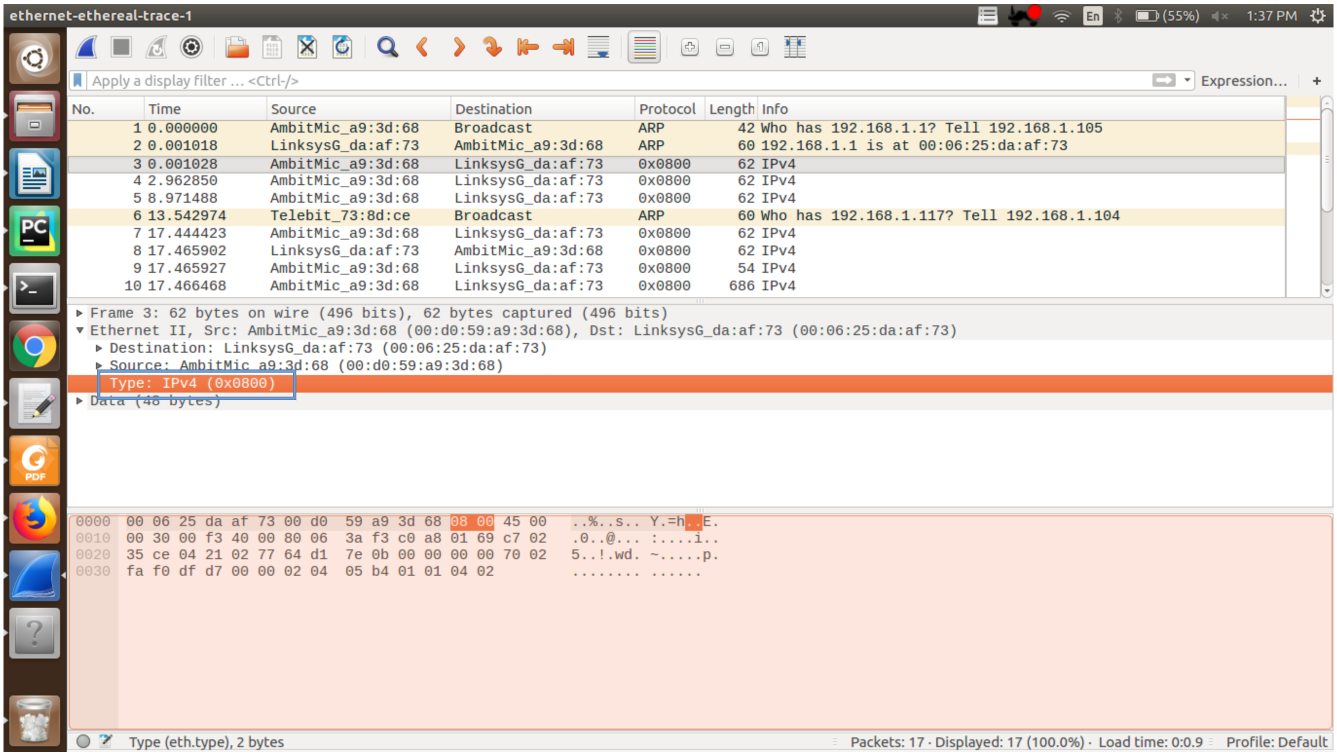
```
0000  00 06 25 da af 73 00 d0  59 a9 3d 68 08 00 45 00   ..%..s.. Y.=h..E.
0010  00 30 00 f3 40 00 80 06  3a f3 c0 a8 01 69 c7 02   .0..@... :....i..
0020  35 ce 04 21 02 77 64 d1  7e 0b 00 00 00 00 70 02   5..!.wd. ~.....p.
0030  fa f0 df d7 00 00 02 04  05 b4 01 01 04 02         ........ ......
```

Q2. What is the 48-bit destination address in the Ethernet frame? Is this the Ethernet address of gaia.cs.umass.edu? (Hint: the answer is no). What device has this as its Ethernet address?
Ans: 1) Destination address of ethernet frame: 00:06:25:da:af:73
2) No, this is not the ethernet address of gaia.cs.umass.edu.
3) It is the ethernet address of the LinkSys router, which is the link used to get off the subnet.



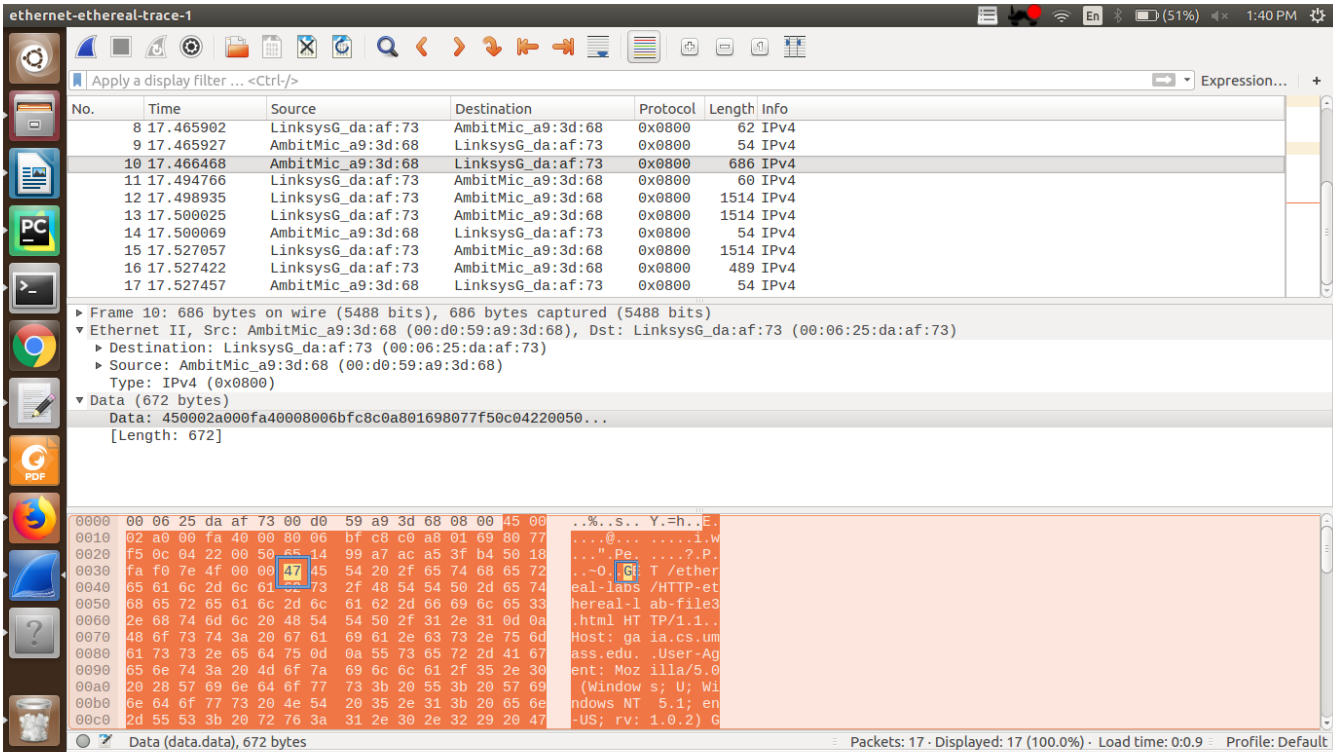
```
ethernet-ethereal-trace-1                                                    (56%)  1:35 PM

Apply a display filter ... <Ctrl-/>                                          Expression...  +

No.  Time        Source              Destination         Protocol Length Info
   1 0.000000    AmbitMic_a9:3d:68   Broadcast           ARP       42 Who has 192.168.1.1? Tell 192.168.1.105
   2 0.001018    LinksysG_da:af:73   AmbitMic_a9:3d:68   ARP       60 192.168.1.1 is at 00:06:25:da:af:73
   3 0.001028    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800    62 IPv4
   4 2.962850    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800    62 IPv4
   5 8.971488    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800    62 IPv4
   6 13.542974   Telebit_73:8d:ce    Broadcast           ARP       60 Who has 192.168.1.117? Tell 192.168.1.104
   7 17.444423   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800    62 IPv4
   8 17.465902   LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800    62 IPv4
   9 17.465927   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800    54 IPv4
  10 17.466468   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800   686 IPv4

▸ Frame 3: 62 bytes on wire (496 bits), 62 bytes captured (496 bits)
▾ Ethernet II, Src: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68), Dst: LinksysG_da:af:73 (00:06:25:da:af:73)
  ▸ Destination: LinksysG_da:af:73 (00:06:25:da:af:73)
  ▸ Source: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
    Type: IPv4 (0x0800)
▸ Data (48 bytes)

0000  00 06 25 da af 73 00 d0  59 a9 3d 68 08 00 45 00   ..%..s.. Y.=h..E.
0010  00 30 00 f3 40 00 80 06  3a f3 c0 a8 01 69 c7 02   .0..@... :....i..
0020  35 ce 04 21 02 77 64 d1  7e 0b 00 00 00 00 70 02   5..!.wd. ~.....p.
0030  fa f0 df d7 00 00 02 04  05 b4 01 01 04 02         ........ ......

Destination Hardware Address (eth.dst), 6 bytes    Packets: 17 · Displayed: 17 (100.0%) · Load time: 0:0.9    Profile: Default
```

3. Give the hexadecimal value for the two-byte Frame type field. What upper layer protocol does this correspond to?
Ans: a) Hexadecimal value in frame type field: 0x0800
b) It corresponds to IPv4 network layer protocol



```
ethernet-ethereal-trace-1                                                    (55%)  1:37 PM

Apply a display filter ... <Ctrl-/>                                          Expression...  +

No.  Time        Source              Destination         Protocol Length Info
   1 0.000000    AmbitMic_a9:3d:68   Broadcast           ARP       42 Who has 192.168.1.1? Tell 192.168.1.105
   2 0.001018    LinksysG_da:af:73   AmbitMic_a9:3d:68   ARP       60 192.168.1.1 is at 00:06:25:da:af:73
   3 0.001028    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800    62 IPv4
   4 2.962850    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800    62 IPv4
   5 8.971488    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800    62 IPv4
   6 13.542974   Telebit_73:8d:ce    Broadcast           ARP       60 Who has 192.168.1.117? Tell 192.168.1.104
   7 17.444423   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800    62 IPv4
   8 17.465902   LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800    62 IPv4
   9 17.465927   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800    54 IPv4
  10 17.466468   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800   686 IPv4

▸ Frame 3: 62 bytes on wire (496 bits), 62 bytes captured (496 bits)
▾ Ethernet II, Src: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68), Dst: LinksysG_da:af:73 (00:06:25:da:af:73)
  ▸ Destination: LinksysG_da:af:73 (00:06:25:da:af:73)
  ▸ Source: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
    Type: IPv4 (0x0800)
▸ Data (48 bytes)

0000  00 06 25 da af 73 00 d0  59 a9 3d 68 08 00 45 00   ..%..s.. Y.=h..E.
0010  00 30 00 f3 40 00 80 06  3a f3 c0 a8 01 69 c7 02   .0..@... :....i..
0020  35 ce 04 21 02 77 64 d1  7e 0b 00 00 00 00 70 02   5..!.wd. ~.....p.
0030  fa f0 df d7 00 00 02 04  05 b4 01 01 04 02         ........ ......

Type (eth.type), 2 bytes    Packets: 17 · Displayed: 17 (100.0%) · Load time: 0:0.9    Profile: Default
```

4. How many bytes from the very start of the Ethernet frame does the ASCII “G” in “GET” appear in the Ethernet frame?
Ans: 54 bytes



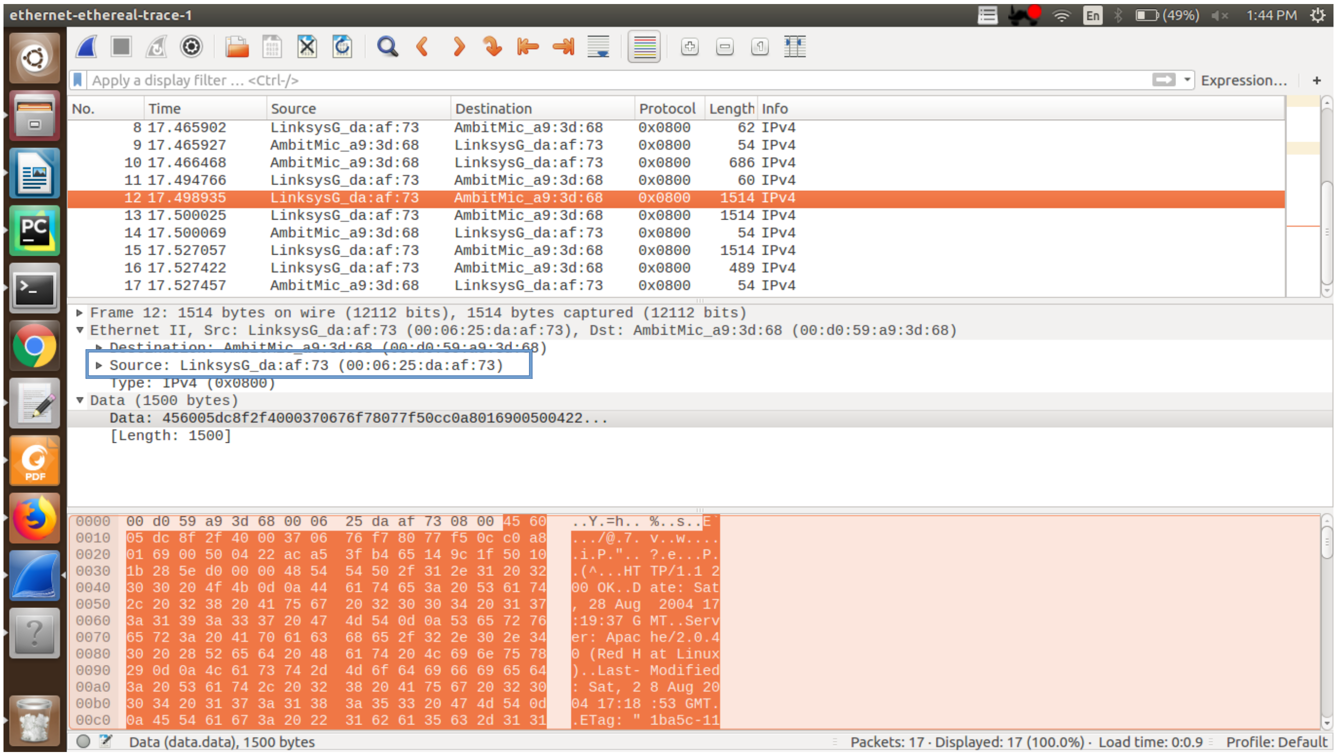
```
No.   Time       Source              Destination         Protocol Length Info
    8 17.465902  LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800      62 IPv4
    9 17.465927  AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800      54 IPv4
   10 17.466468  AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800     686 IPv4
   11 17.494766  LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800      60 IPv4
   12 17.498935  LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800    1514 IPv4
   13 17.500025  LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800    1514 IPv4
   14 17.500069  AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800      54 IPv4
   15 17.527057  LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800    1514 IPv4
   16 17.527422  LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800     489 IPv4
   17 17.527457  AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800      54 IPv4
```

```
▸ Frame 10: 686 bytes on wire (5488 bits), 686 bytes captured (5488 bits)
▾ Ethernet II, Src: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68), Dst: LinksysG_da:af:73 (00:06:25:da:af:73)
  ▸ Destination: LinksysG_da:af:73 (00:06:25:da:af:73)
  ▸ Source: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
    Type: IPv4 (0x0800)
▾ Data (672 bytes)
    Data: 450002a000fa40008006bfc8c0a801698077f50c04220050...
    [Length: 672]
```

```
0000  00 06 25 da af 73 00 d0  59 a9 3d 68 08 00 45 00   ..%..s.. Y.=h..E.
0010  02 a0 00 fa 40 00 80 06  bf c8 c0 a8 01 69 80 77   ....@... .....i.w
0020  f5 0c 04 22 00 50 65 14  99 a7 ac a5 3f b4 50 18   ...".Pe. ....?.P.
0030  fa f0 7e 4f 00 00 47 45  54 20 2f 65 74 68 65 72   ..~O..GE T /ether
0040  65 61 6c 2d 6c 61 62 73  2f 48 54 54 50 2d 65 74   eal-labs /HTTP-et
0050  68 65 72 65 61 6c 2d 6c  61 62 2d 66 69 6c 65 33   hereal-l ab-file3
0060  2e 68 74 6d 6c 20 48 54  54 50 2f 31 2e 31 0d 0a   .html HT TP/1.1..
0070  48 6f 73 74 3a 20 67 61  69 61 2e 63 73 2e 75 6d   Host: ga ia.cs.um
0080  61 73 73 2e 65 64 75 0d  0a 55 73 65 72 2d 41 67   ass.edu. .User-Ag
0090  65 6e 74 3a 20 4d 6f 7a  69 6c 6c 61 2f 35 2e 30   ent: Moz illa/5.0
00a0  20 28 57 69 6e 64 6f 77  73 3b 20 55 3b 20 57 69    (Window s; U; Wi
00b0  6e 64 6f 77 73 20 4e 54  20 35 2e 31 3b 20 65 6e   ndows NT  5.1; en
00c0  2d 55 53 3b 20 72 76 3a  31 2e 30 2e 32 29 20 47   -US; rv: 1.0.2) G
```

Data (data.data), 672 bytes   Packets: 17 · Displayed: 17 (100.0%) · Load time: 0:0.9   Profile: Default

5. What is the value of the Ethernet source address? Is this the address of your computer, or of gaia.cs.umass.edu (Hint: the answer is no). What device has this as its Ethernet address?
Ans: 1) Ethernet Source Address: 00:06:25:da:af:73
2) No, this is not the IP address of gaia.cs.umass.edu
3) No, it is the IP address of gateway router



```
No.   Time       Source              Destination         Protocol  Length Info
    8 17.465902  LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800      62 IPv4
    9 17.465927  AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800      54 IPv4
   10 17.466468  AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800     686 IPv4
   11 17.494766  LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800      60 IPv4
   12 17.498935  LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800    1514 IPv4
   13 17.500025  LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800    1514 IPv4
   14 17.500069  AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800      54 IPv4
   15 17.527057  LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800    1514 IPv4
   16 17.527422  LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800     489 IPv4
   17 17.527457  AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800      54 IPv4
```

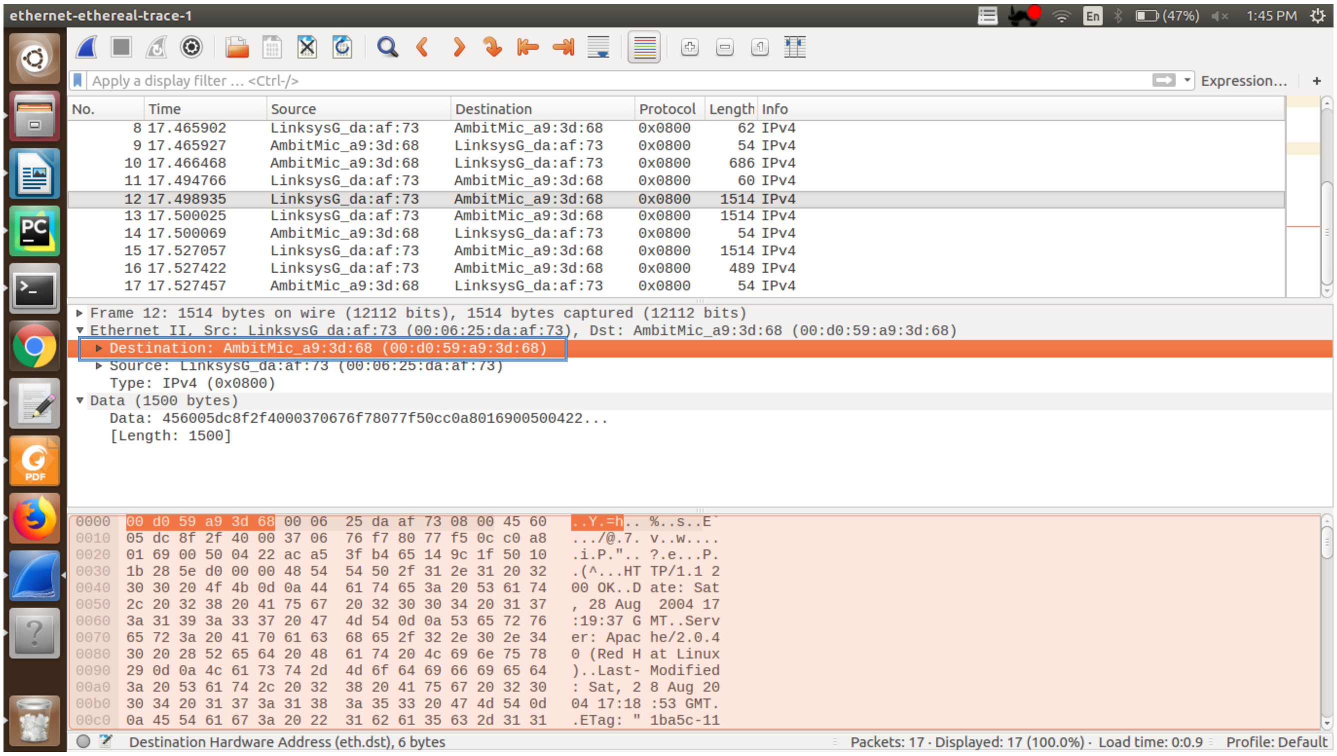
```
▸ Frame 12: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits)
▾ Ethernet II, Src: LinksysG_da:af:73 (00:06:25:da:af:73), Dst: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
  ▸ Destination: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
  ▸ Source: LinksysG_da:af:73 (00:06:25:da:af:73)
    Type: IPv4 (0x0800)
▾ Data (1500 bytes)
    Data: 456005dc8f2f4000370676f78077f50cc0a8016900500422...
    [Length: 1500]
```

```
0000  00 d0 59 a9 3d 68 00 06  25 da af 73 08 00 45 60   ..Y.=h.. %..s..E`
0010  05 dc 8f 2f 40 00 37 06  76 f7 80 77 f5 0c c0 a8   .../@.7. v..w....
0020  01 69 00 50 04 22 ac a5  3f b4 65 14 9c 1f 50 10   .i.P.".. ?.e...P.
0030  1b 28 5e d0 00 00 48 54  54 50 2f 31 2e 31 20 32   .(^...HT TP/1.1 2
0040  30 30 20 4f 4b 0d 0a 44  61 74 65 3a 20 53 61 74   00 OK..D ate: Sat
0050  2c 20 32 38 20 41 75 67  20 32 30 30 34 20 31 37   , 28 Aug  2004 17
0060  3a 31 39 3a 33 37 20 47  4d 54 0d 0a 53 65 72 76   :19:37 G MT..Serv
0070  65 72 3a 20 41 70 61 63  68 65 2f 32 2e 30 2e 34   er: Apac he/2.0.4
0080  30 20 28 52 65 64 20 48  61 74 20 4c 69 6e 75 78   0 (Red H at Linux
0090  29 0d 0a 4c 61 73 74 2d  4d 6f 64 69 66 69 65 64   )..Last- Modified
00a0  3a 20 53 61 74 2c 20 32  38 20 41 75 67 20 32 30   : Sat, 2 8 Aug 20
00b0  30 34 20 31 37 3a 31 38  3a 35 33 20 47 4d 54 0d   04 17:18 :53 GMT.
00c0  0a 45 54 61 67 3a 20 22  31 62 61 35 63 2d 31 31   .ETag: " 1ba5c-11
```

Data (data.data), 1500 bytes   Packets: 17 · Displayed: 17 (100.0%) · Load time: 0:0.9   Profile: Default

6. What is the destination address in the Ethernet frame? Is this the Ethernet address of your computer?

Ans: Destination address of the ethernet frame: 00:d0:59:a9:3d:68, Yes this is the ethernet address of my computer.



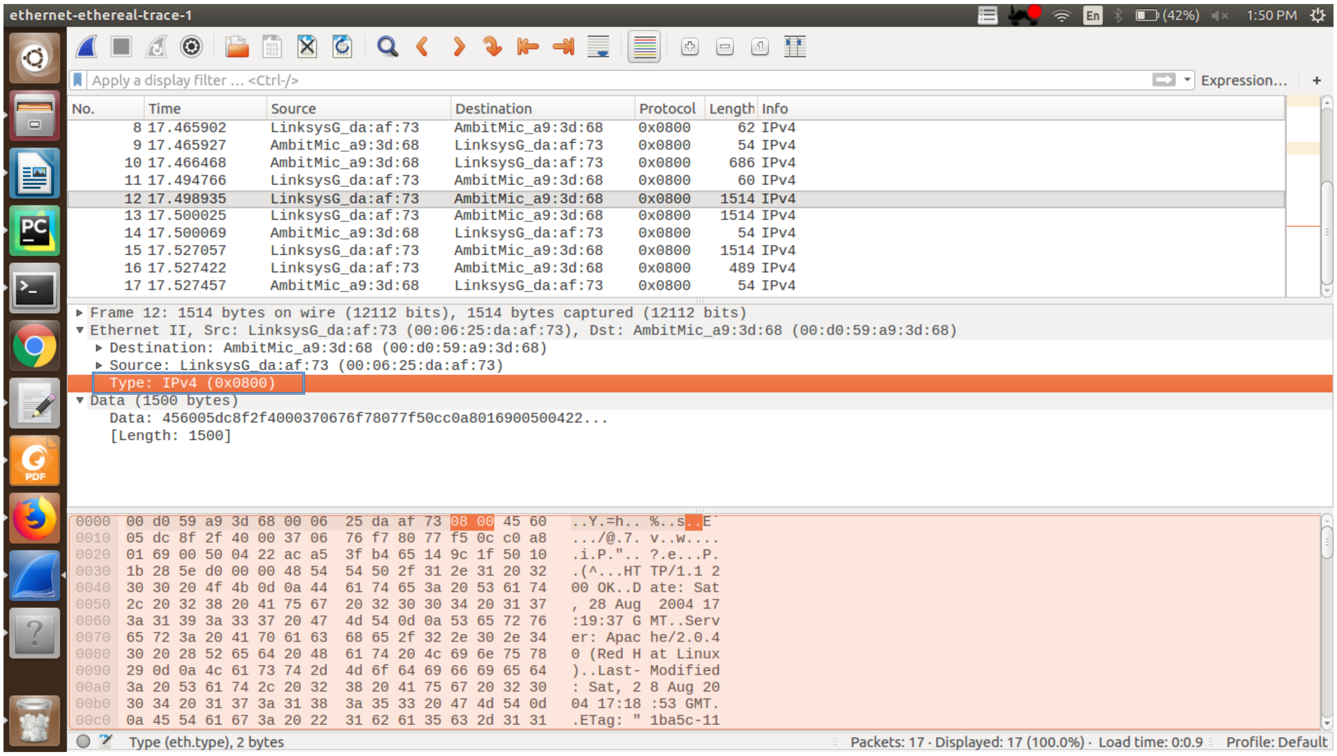
```
No.   Time       Source              Destination         Protocol  Length Info
    8 17.465902  LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800      62 IPv4
    9 17.465927  AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800      54 IPv4
   10 17.466468  AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800     686 IPv4
   11 17.494766  LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800      60 IPv4
   12 17.498935  LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800    1514 IPv4
   13 17.500025  LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800    1514 IPv4
   14 17.500069  AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800      54 IPv4
   15 17.527057  LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800    1514 IPv4
   16 17.527422  LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800     489 IPv4
   17 17.527457  AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800      54 IPv4
```

```
▸ Frame 12: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits)
▾ Ethernet II, Src: LinksysG_da:af:73 (00:06:25:da:af:73), Dst: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
  ▸ Destination: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
  ▸ Source: LinksysG_da:af:73 (00:06:25:da:af:73)
    Type: IPv4 (0x0800)
▾ Data (1500 bytes)
    Data: 456005dc8f2f4000370676f78077f50cc0a8016900500422...
    [Length: 1500]
```

```
0000  00 d0 59 a9 3d 68 00 06  25 da af 73 08 00 45 60   ..Y.=h.. %..s..E`
0010  05 dc 8f 2f 40 00 37 06  76 f7 80 77 f5 0c c0 a8   .../@.7. v..w....
0020  01 69 00 50 04 22 ac a5  3f b4 65 14 9c 1f 50 10   .i.P.".. ?.e...P.
0030  1b 28 5e d0 00 00 48 54  54 50 2f 31 2e 31 20 32   .(^...HT TP/1.1 2
0040  30 30 20 4f 4b 0d 0a 44  61 74 65 3a 20 53 61 74   00 OK..D ate: Sat
0050  2c 20 32 38 20 41 75 67  20 32 30 30 34 20 31 37   , 28 Aug  2004 17
0060  3a 31 39 3a 33 37 20 47  4d 54 0d 0a 53 65 72 76   :19:37 G MT..Serv
0070  65 72 3a 20 41 70 61 63  68 65 2f 32 2e 30 2e 34   er: Apac he/2.0.4
0080  30 20 28 52 65 64 20 48  61 74 20 4c 69 6e 75 78   0 (Red H at Linux
0090  29 0d 0a 4c 61 73 74 2d  4d 6f 64 69 66 69 65 64   )..Last- Modified
00a0  3a 20 53 61 74 2c 20 32  38 20 41 75 67 20 32 30   : Sat, 2 8 Aug 20
00b0  30 34 20 31 37 3a 31 38  3a 35 33 20 47 4d 54 0d   04 17:18 :53 GMT.
00c0  0a 45 54 61 67 3a 20 22  31 62 61 35 63 2d 31 31   .ETag: " 1ba5c-11
```

Destination Hardware Address (eth.dst), 6 bytes   Packets: 17 · Displayed: 17 (100.0%) · Load time: 0:0.9   Profile: Default

7. Give the hexadecimal value for the two-byte Frame type field. What upper layer protocol does this correspond to?
Ans: 1) Hexadecimal value of type field: 0x0080
2) It corresponds to the IPv4 network layer protocol



ethernet-ethereal-trace-1

Apply a display filter … <Ctrl-/>

```
No.   Time       Source             Destination        Protocol Length Info
    8 17.465902  LinksysG_da:af:73  AmbitMic_a9:3d:68  0x0800     62 IPv4
    9 17.465927  AmbitMic_a9:3d:68  LinksysG_da:af:73  0x0800     54 IPv4
   10 17.466468  AmbitMic_a9:3d:68  LinksysG_da:af:73  0x0800    686 IPv4
   11 17.494766  LinksysG_da:af:73  AmbitMic_a9:3d:68  0x0800     60 IPv4
   12 17.498935  LinksysG_da:af:73  AmbitMic_a9:3d:68  0x0800   1514 IPv4
   13 17.500025  LinksysG_da:af:73  AmbitMic_a9:3d:68  0x0800   1514 IPv4
   14 17.500069  AmbitMic_a9:3d:68  LinksysG_da:af:73  0x0800     54 IPv4
   15 17.527057  LinksysG_da:af:73  AmbitMic_a9:3d:68  0x0800   1514 IPv4
   16 17.527422  LinksysG_da:af:73  AmbitMic_a9:3d:68  0x0800    489 IPv4
   17 17.527457  AmbitMic_a9:3d:68  LinksysG_da:af:73  0x0800     54 IPv4
```

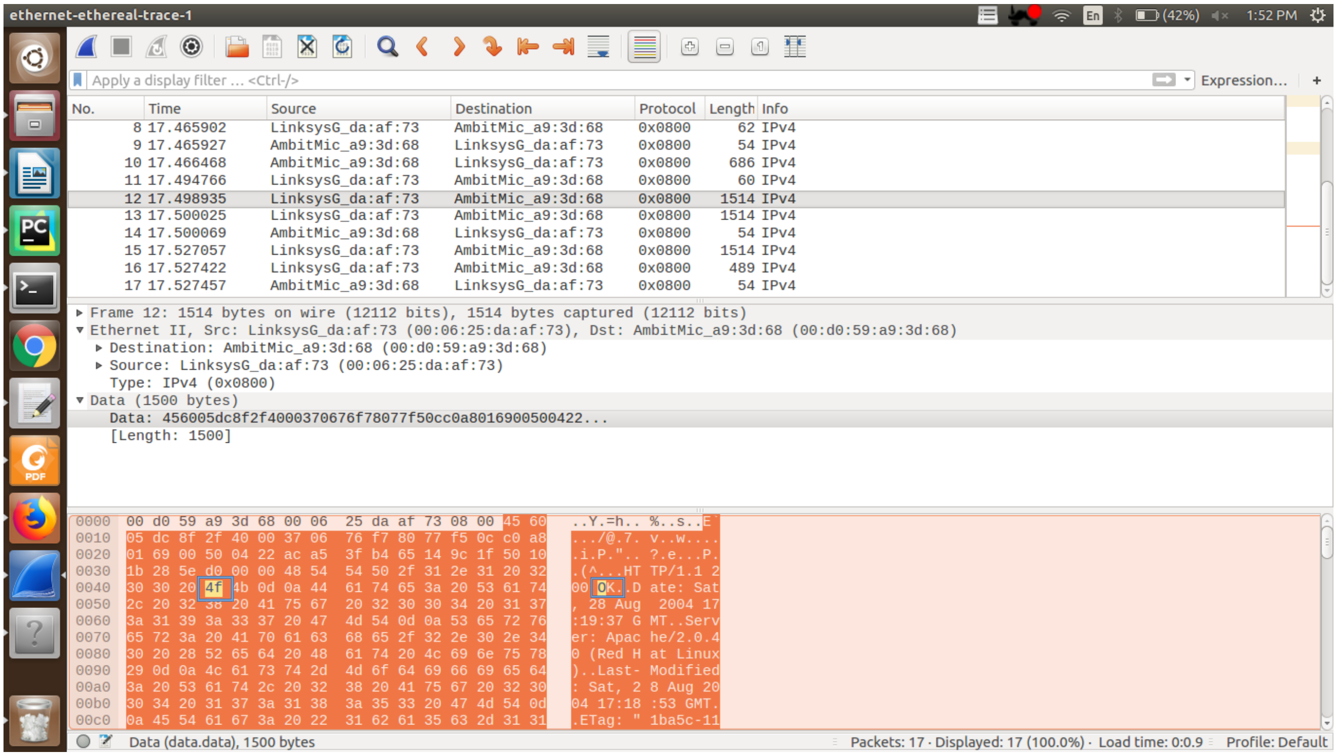
```
▸ Frame 12: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits)
▾ Ethernet II, Src: LinksysG_da:af:73 (00:06:25:da:af:73), Dst: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
  ▸ Destination: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
  ▸ Source: LinksysG_da:af:73 (00:06:25:da:af:73)
    Type: IPv4 (0x0800)
▾ Data (1500 bytes)
    Data: 456005dc8f2f4000370676f78077f50cc0a8016900500422...
    [Length: 1500]
```

```
0000  00 d0 59 a9 3d 68 00 06  25 da af 73 08 00 45 60   ..Y.=h.. %..s..E`
0010  05 dc 8f 2f 40 00 37 06  76 f7 80 77 f5 0c c0 a8   .../@.7. v..w....
0020  01 69 00 50 04 22 ac a5  3f b4 65 14 9c 1f 50 10   .i.P.".. ?.e...P.
0030  1b 28 5e d0 00 00 48 54  54 50 2f 31 2e 31 20 32   .(^...HT TP/1.1 2
0040  30 30 20 4f 4b 0d 0a 44  61 74 65 3a 20 53 61 74   00 OK..D ate: Sat
0050  2c 20 32 38 20 41 75 67  20 32 30 30 34 20 31 37   , 28 Aug  2004 17
0060  3a 31 39 3a 33 37 20 47  4d 54 0d 0a 53 65 72 76   :19:37 G MT..Serv
0070  65 72 3a 20 41 70 61 63  68 65 2f 32 2e 30 2e 34   er: Apac he/2.0.4
0080  30 20 28 52 65 64 20 48  61 74 20 4c 69 6e 75 78   0 (Red H at Linux
0090  29 0d 0a 4c 61 73 74 2d  4d 6f 64 69 66 69 65 64   )..Last- Modified
00a0  3a 20 53 61 74 2c 20 32  38 20 41 75 67 20 32 30   : Sat, 2 8 Aug 20
00b0  30 34 20 31 37 3a 31 38  3a 35 33 20 47 4d 54 0d   04 17:18 :53 GMT.
00c0  0a 45 54 61 67 3a 20 22  31 62 61 35 63 2d 31 31   .ETag: " 1ba5c-11
```

Type (eth.type), 2 bytes

Packets: 17 · Displayed: 17 (100.0%) · Load time: 0:0.9   Profile: Default

8. How many bytes from the very start of the Ethernet frame does the ASCII “O” in “OK” (i.e., the HTTP response code) appear in the Ethernet frame?
Ans: “O” appears 52 bytes from the start of the ethernet frame.



```
No.   Time       Source             Destination        Protocol Length Info
    8 17.465902  LinksysG_da:af:73  AmbitMic_a9:3d:68  0x0800      62 IPv4
    9 17.465927  AmbitMic_a9:3d:68  LinksysG_da:af:73  0x0800      54 IPv4
   10 17.466468  AmbitMic_a9:3d:68  LinksysG_da:af:73  0x0800     686 IPv4
   11 17.494766  LinksysG_da:af:73  AmbitMic_a9:3d:68  0x0800      60 IPv4
   12 17.498935  LinksysG_da:af:73  AmbitMic_a9:3d:68  0x0800    1514 IPv4
   13 17.500025  LinksysG_da:af:73  AmbitMic_a9:3d:68  0x0800    1514 IPv4
   14 17.500069  AmbitMic_a9:3d:68  LinksysG_da:af:73  0x0800      54 IPv4
   15 17.527057  LinksysG_da:af:73  AmbitMic_a9:3d:68  0x0800    1514 IPv4
   16 17.527422  LinksysG_da:af:73  AmbitMic_a9:3d:68  0x0800     489 IPv4
   17 17.527457  AmbitMic_a9:3d:68  LinksysG_da:af:73  0x0800      54 IPv4
```

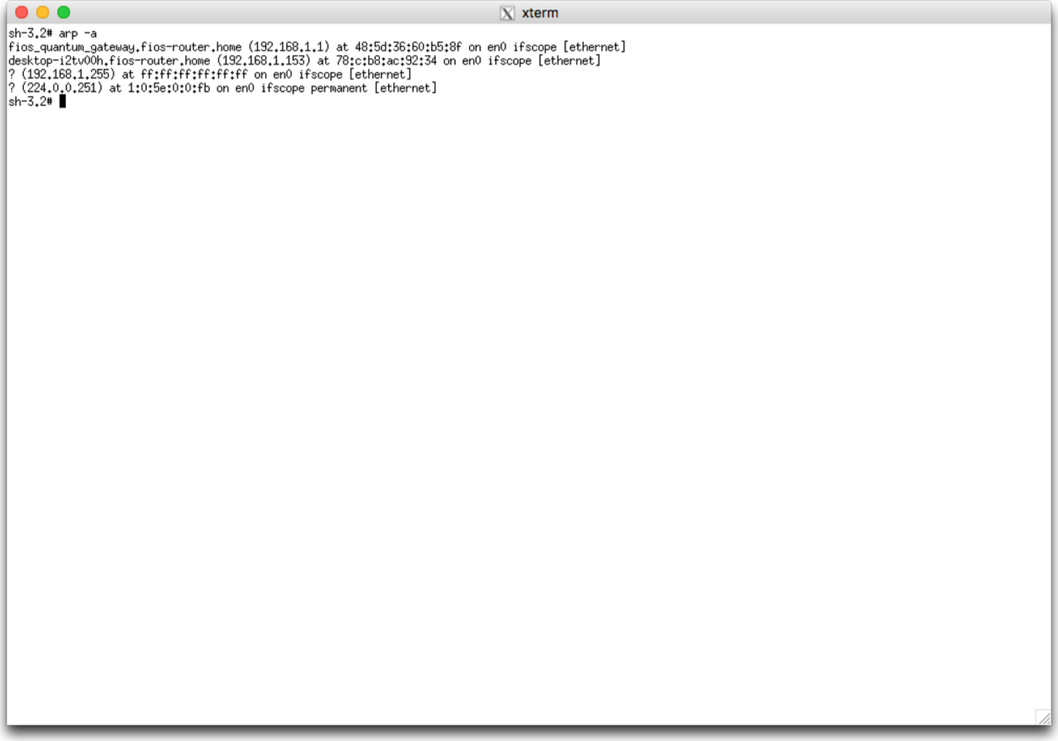
```
▸ Frame 12: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits)
▾ Ethernet II, Src: LinksysG_da:af:73 (00:06:25:da:af:73), Dst: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
  ▸ Destination: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
  ▸ Source: LinksysG_da:af:73 (00:06:25:da:af:73)
    Type: IPv4 (0x0800)
▾ Data (1500 bytes)
    Data: 456005dc8f2f4000370676f78077f50cc0a8016900500422...
    [Length: 1500]
```

```
0000  00 d0 59 a9 3d 68 00 06  25 da af 73 08 00 45 60   ..Y.=h.. %..s..E`
0010  05 dc 8f 2f 40 00 37 06  76 f7 80 77 f5 0c c0 a8   .../@.7. v..w....
0020  01 69 00 50 04 22 ac a5  3f b4 65 14 9c 1f 50 10   .i.P.".. ?.e...P.
0030  1b 28 5e d0 00 00 48 54  54 50 2f 31 2e 31 20 32   .(^...HT TP/1.1 2
0040  30 30 20 4f 4b 0d 0a 44  61 74 65 3a 20 53 61 74   00 OK..D ate: Sat
0050  2c 20 32 38 20 41 75 67  20 32 30 30 34 20 31 37   , 28 Aug  2004 17
0060  3a 31 39 3a 33 37 20 47  4d 54 0d 0a 53 65 72 76   :19:37 G MT..Serv
0070  65 72 3a 20 41 70 61 63  68 65 2f 32 2e 30 2e 34   er: Apac he/2.0.4
0080  30 20 28 52 65 64 20 48  61 74 20 4c 69 6e 75 78   0 (Red H at Linux
0090  29 0d 0a 4c 61 73 74 2d  4d 6f 64 69 66 69 65 64   )..Last- Modified
00a0  3a 20 53 61 74 2c 20 32  38 20 41 75 67 20 32 30   : Sat, 2 8 Aug 20
00b0  30 34 20 31 37 3a 31 38  3a 35 33 20 47 4d 54 0d   04 17:18 :53 GMT.
00c0  0a 45 54 61 67 3a 20 22  31 62 61 35 63 2d 31 31   .ETag: " 1ba5c-11
```

Data (data.data), 1500 bytes
Packets: 17 · Displayed: 17 (100.0%) · Load time: 0:0.9
Profile: Default

Q9) Write down the contents of your computer's ARP cache. What is the meaning of each column value?

Ans:- The first column has the name and IP address; the second column has the respective MAC address and third column indicates the protocol type.

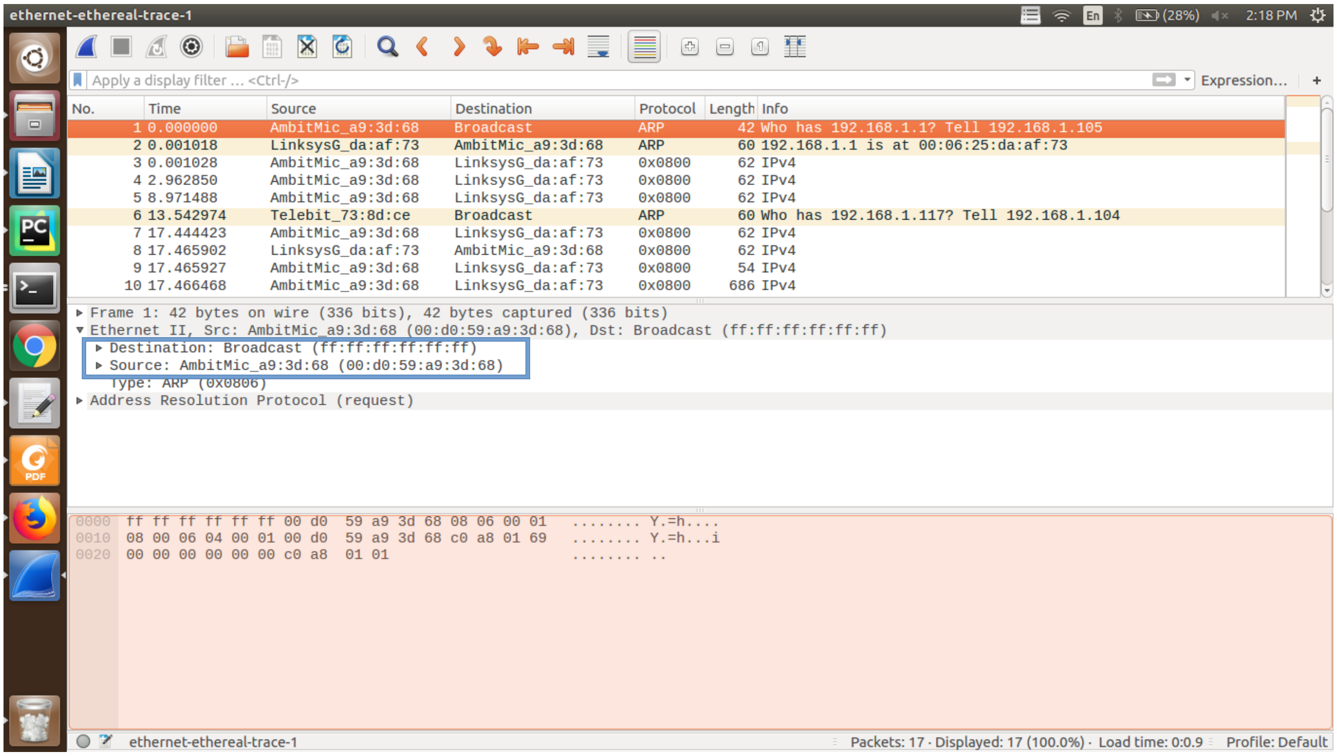


```
sh-3.2# arp -a
fios_quantum_gateway.fios-router.home (192.168.1.1) at 48:5d:36:60:b5:8f on en0 ifscope [ethernet]
desktop-i2tv00h.fios-router.home (192.168.1.153) at 78:c:b8:ac:92:34 on en0 ifscope [ethernet]
? (192.168.1.255) at ff:ff:ff:ff:ff:ff on en0 ifscope [ethernet]
? (224.0.0.251) at 1:0:5e:0:0:fb on en0 ifscope permanent [ethernet]
sh-3.2# 
```

10. What are the hexadecimal values for the source and destination addresses in the Ethernet frame containing the ARP request message?

Ans: Source: 00:d0:59:a9:3d:68

Destination: ff:ff:ff:ff:ff:ff



```
No.  Time       Source              Destination         Protocol  Length Info
   1 0.000000   AmbitMic_a9:3d:68   Broadcast           ARP           42 Who has 192.168.1.1? Tell 192.168.1.105
   2 0.001018   LinksysG_da:af:73   AmbitMic_a9:3d:68   ARP           60 192.168.1.1 is at 00:06:25:da:af:73
   3 0.001028   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800        62 IPv4
   4 2.962850   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800        62 IPv4
   5 8.971488   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800        62 IPv4
   6 13.542974  Telebit_73:8d:ce    Broadcast           ARP           60 Who has 192.168.1.117? Tell 192.168.1.104
   7 17.444423  AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800        62 IPv4
   8 17.465902  LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800        62 IPv4
   9 17.465927  AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800        54 IPv4
  10 17.466468  AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800       686 IPv4
```

```
▸ Frame 1: 42 bytes on wire (336 bits), 42 bytes captured (336 bits)
▾ Ethernet II, Src: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
  ▸ Destination: Broadcast (ff:ff:ff:ff:ff:ff)
  ▸ Source: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
    Type: ARP (0x0806)
▸ Address Resolution Protocol (request)
```

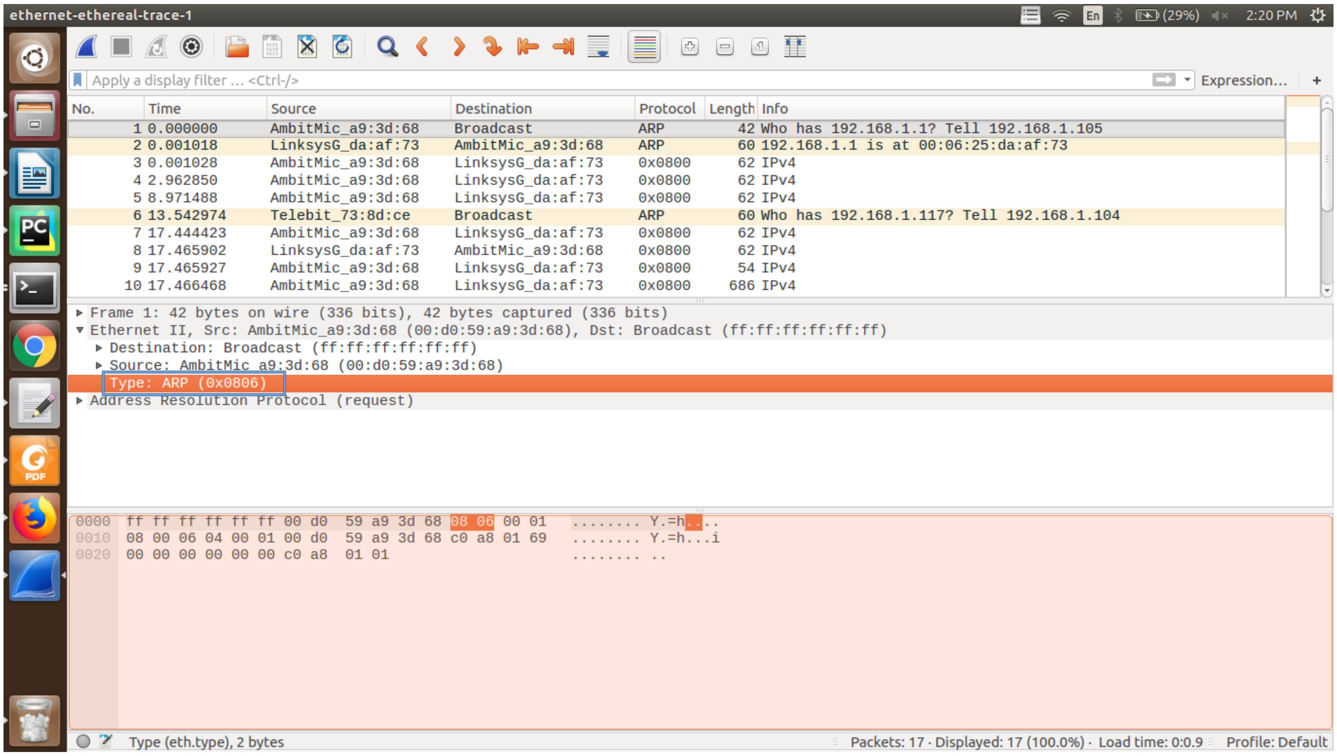
```
0000  ff ff ff ff ff ff 00 d0  59 a9 3d 68 08 06 00 01   ........ Y.=h....
0010  08 00 06 04 00 01 00 d0  59 a9 3d 68 c0 a8 01 69   ........ Y.=h...i
0020  00 00 00 00 00 00 c0 a8  01 01                     ........ ..
```

ethernet-ethereal-trace-1
Packets: 17 · Displayed: 17 (100.0%) · Load time: 0:0.9
Profile: Default

11. Give the hexadecimal value for the two-byte Ethernet Frame type field. What upper layer protocol does this correspond to?

Ans: a) Type: 0x0806

b) It corresponds to ARP protocol



No.	Time	Source	Destination	Protocol	Length	Info
1	0.000000	AmbitMic_a9:3d:68	Broadcast	ARP	42	Who has 192.168.1.1? Tell 192.168.1.105
2	0.001018	LinksysG_da:af:73	AmbitMic_a9:3d:68	ARP	60	192.168.1.1 is at 00:06:25:da:af:73
3	0.001028	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
4	2.962850	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
5	8.971488	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
6	13.542974	Telebit_73:8d:ce	Broadcast	ARP	60	Who has 192.168.1.117? Tell 192.168.1.104
7	17.444423	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
8	17.465902	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	62	IPv4
9	17.465927	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	54	IPv4
10	17.466468	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	686	IPv4

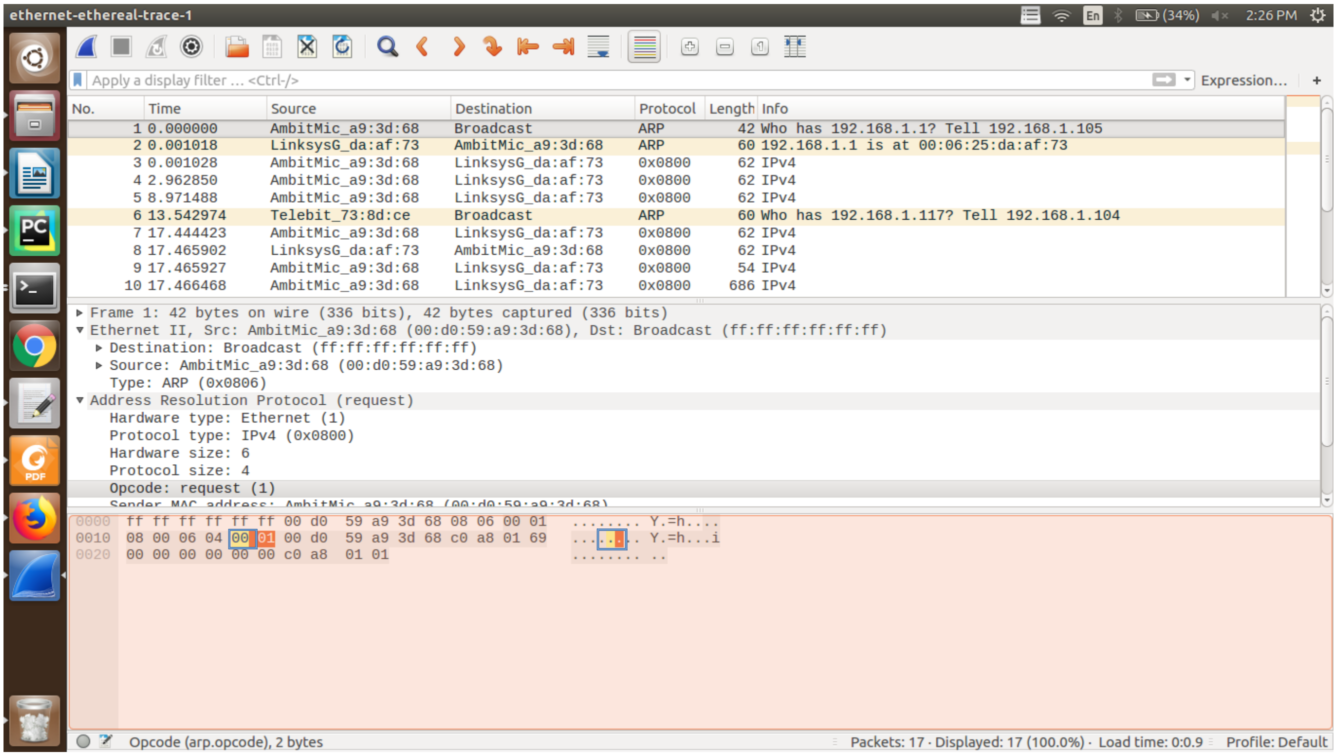
```
▸ Frame 1: 42 bytes on wire (336 bits), 42 bytes captured (336 bits)
▾ Ethernet II, Src: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
  ▸ Destination: Broadcast (ff:ff:ff:ff:ff:ff)
  ▸ Source: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
    Type: ARP (0x0806)
▸ Address Resolution Protocol (request)
```

```
0000  ff ff ff ff ff ff 00 d0  59 a9 3d 68 08 06 00 01   ........ Y.=h....
0010  08 00 06 04 00 01 00 d0  59 a9 3d 68 c0 a8 01 69   ........ Y.=h...i
0020  00 00 00 00 00 00 c0 a8  01 01                     ........ ..
```

Type (eth.type), 2 bytes · Packets: 17 · Displayed: 17 (100.0%) · Load time: 0:0.9 · Profile: Default

12) a) How many bytes from the very beginning of the Ethernet frame does the ARP opcode field begin?

Ans: 20 bytes from the beginning of the ethernet frame


ethernet-ethereal-trace-1
(34%)
2:26 PM
Apply a display filter … <Ctrl-/>
Expression…
Opcode (arp.opcode), 2 bytes
Packets: 17 · Displayed: 17 (100.0%) · Load time: 0:0.9
Profile: Default

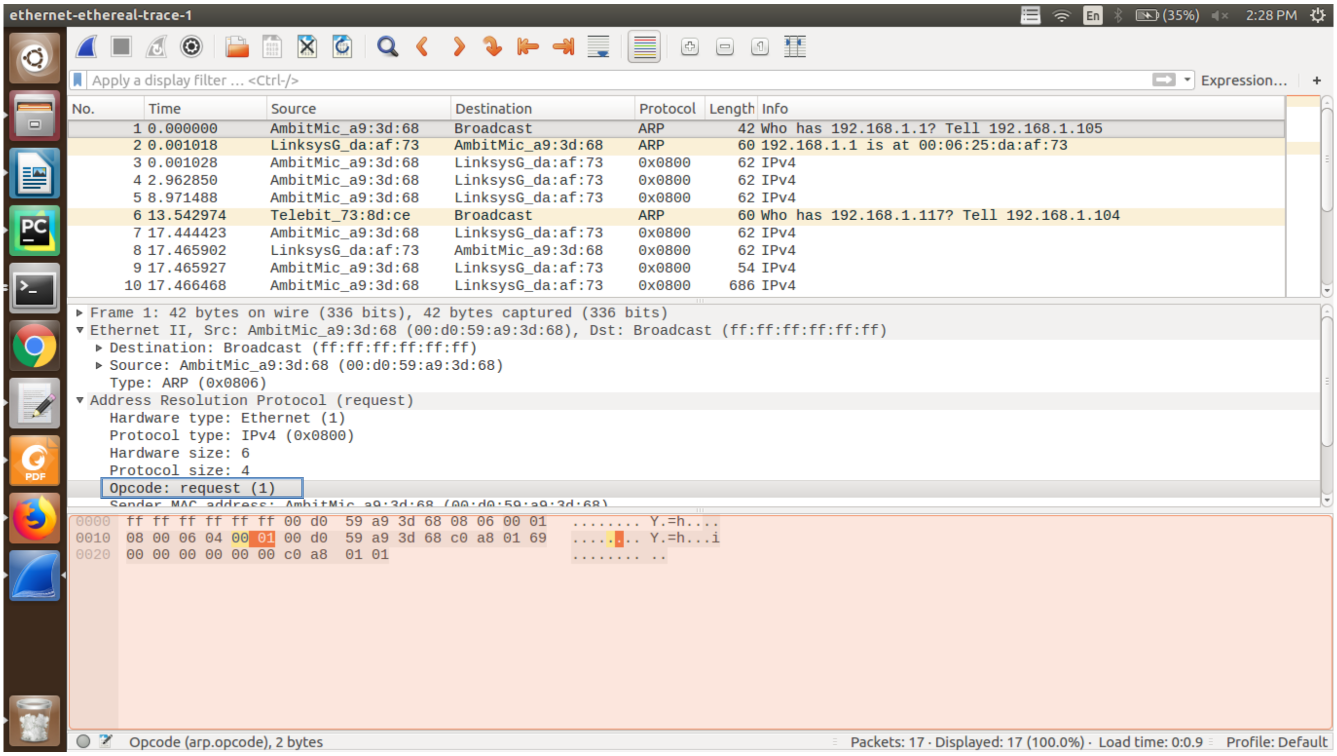
```
No.   Time        Source              Destination         Protocol Length Info
    1 0.000000    AmbitMic_a9:3d:68   Broadcast           ARP          42 Who has 192.168.1.1? Tell 192.168.1.105
    2 0.001018    LinksysG_da:af:73   AmbitMic_a9:3d:68   ARP          60 192.168.1.1 is at 00:06:25:da:af:73
    3 0.001028    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800       62 IPv4
    4 2.962850    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800       62 IPv4
    5 8.971488    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800       62 IPv4
    6 13.542974   Telebit_73:8d:ce    Broadcast           ARP          60 Who has 192.168.1.117? Tell 192.168.1.104
    7 17.444423   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800       62 IPv4
    8 17.465902   LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800       62 IPv4
    9 17.465927   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800       54 IPv4
   10 17.466468   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800      686 IPv4
```

```
▸ Frame 1: 42 bytes on wire (336 bits), 42 bytes captured (336 bits)
▾ Ethernet II, Src: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
  ▸ Destination: Broadcast (ff:ff:ff:ff:ff:ff)
  ▸ Source: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
    Type: ARP (0x0806)
▾ Address Resolution Protocol (request)
    Hardware type: Ethernet (1)
    Protocol type: IPv4 (0x0800)
    Hardware size: 6
    Protocol size: 4
    Opcode: request (1)
    Sender MAC address: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
```

```
0000  ff ff ff ff ff ff 00 d0  59 a9 3d 68 08 06 00 01   ........ Y.=h....
0010  08 00 06 04 00 01 00 d0  59 a9 3d 68 c0 a8 01 69   ........ Y.=h...i
0020  00 00 00 00 00 00 c0 a8  01 01                     ........ ..
```

b) What is the value of the opcode field within the ARP-payload part of the Ethernet frame in which an ARP request is made?

Ans: The value of OpCode field is 1.

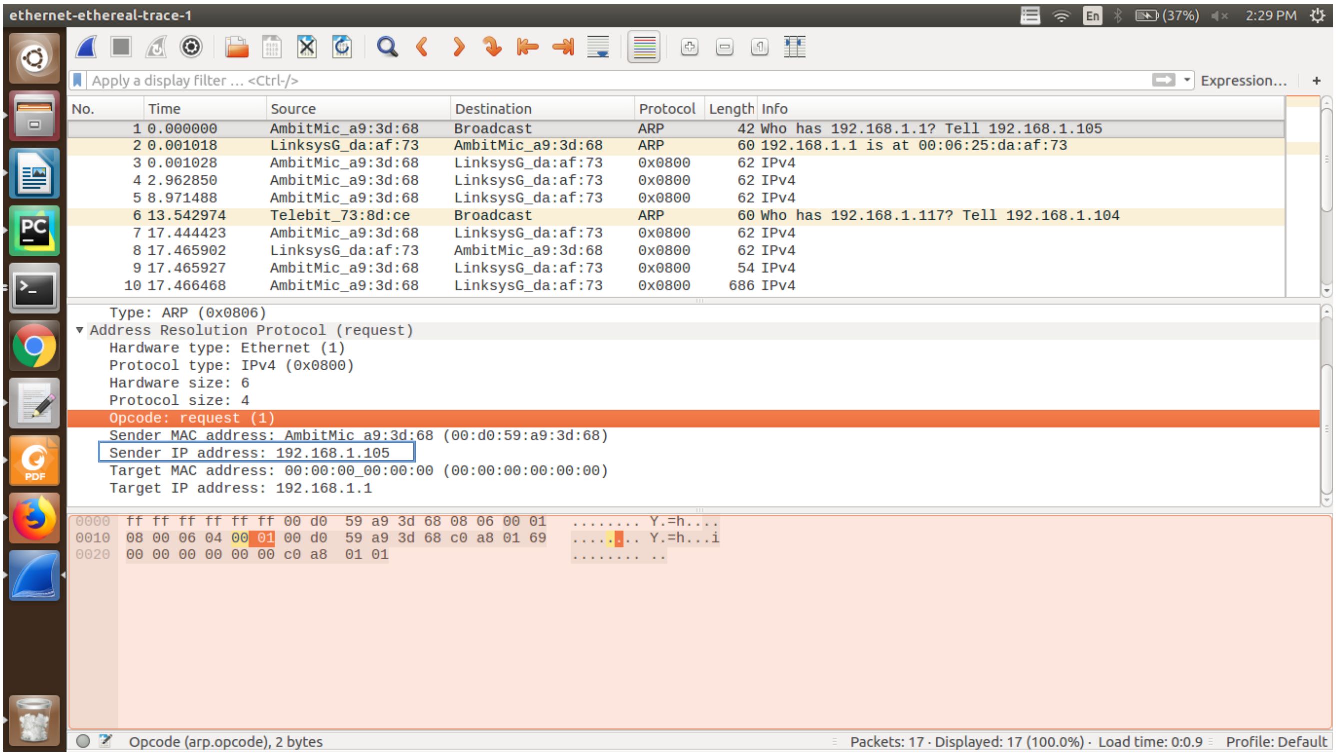

ethernet-ethereal-trace-1
(35%)
2:28 PM
Apply a display filter … <Ctrl-/>
Expression…
Opcode (arp.opcode), 2 bytes
Packets: 17 · Displayed: 17 (100.0%) · Load time: 0:0.9
Profile: Default

```
No.   Time        Source              Destination         Protocol Length Info
    1 0.000000    AmbitMic_a9:3d:68   Broadcast           ARP          42 Who has 192.168.1.1? Tell 192.168.1.105
    2 0.001018    LinksysG_da:af:73   AmbitMic_a9:3d:68   ARP          60 192.168.1.1 is at 00:06:25:da:af:73
    3 0.001028    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800       62 IPv4
    4 2.962850    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800       62 IPv4
    5 8.971488    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800       62 IPv4
    6 13.542974   Telebit_73:8d:ce    Broadcast           ARP          60 Who has 192.168.1.117? Tell 192.168.1.104
    7 17.444423   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800       62 IPv4
    8 17.465902   LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800       62 IPv4
    9 17.465927   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800       54 IPv4
   10 17.466468   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800      686 IPv4
```

```
▸ Frame 1: 42 bytes on wire (336 bits), 42 bytes captured (336 bits)
▾ Ethernet II, Src: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
  ▸ Destination: Broadcast (ff:ff:ff:ff:ff:ff)
  ▸ Source: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
    Type: ARP (0x0806)
▾ Address Resolution Protocol (request)
    Hardware type: Ethernet (1)
    Protocol type: IPv4 (0x0800)
    Hardware size: 6
    Protocol size: 4
    Opcode: request (1)
    Sender MAC address: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
```

```
0000  ff ff ff ff ff ff 00 d0  59 a9 3d 68 08 06 00 01   ........ Y.=h....
0010  08 00 06 04 00 01 00 d0  59 a9 3d 68 c0 a8 01 69   ........ Y.=h...i
0020  00 00 00 00 00 00 c0 a8  01 01                     ........ ..
```

c) Does the ARP message contain the IP address of the sender?
Ans: Yes, the ARP message contain the IP address of the sender



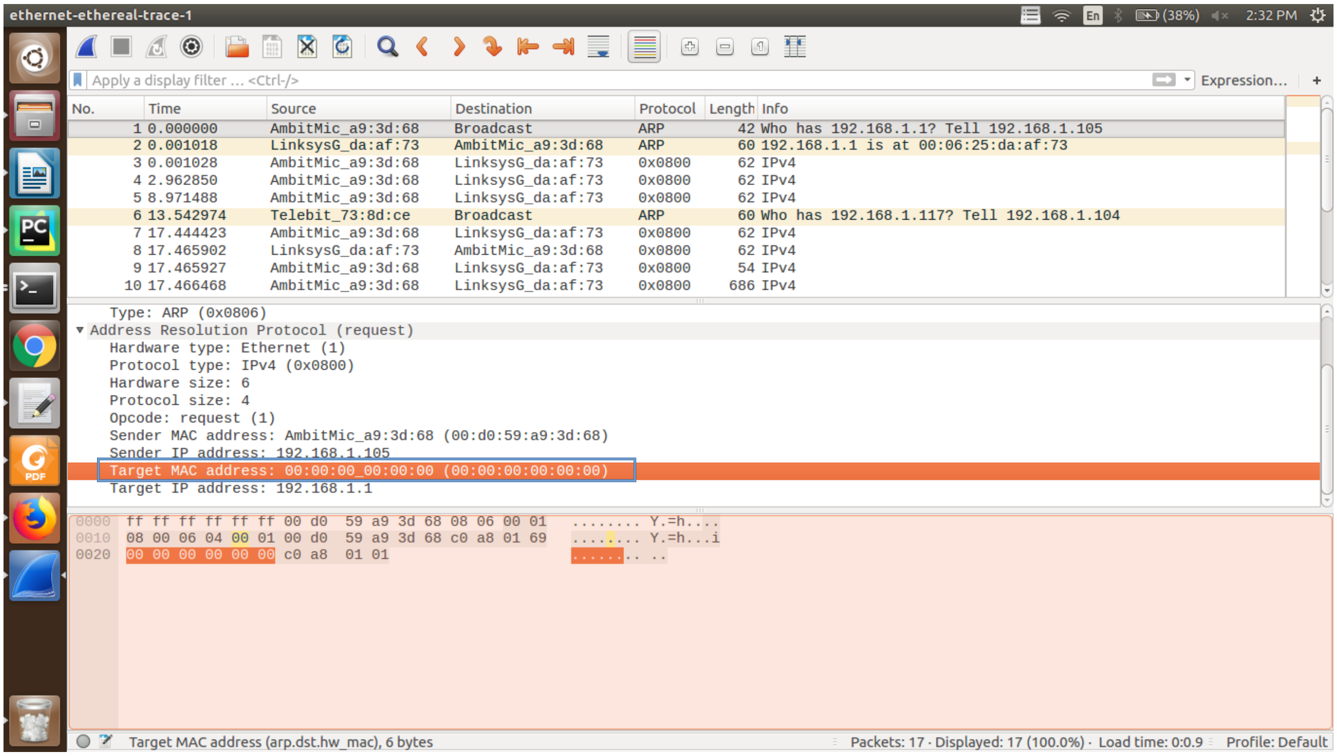
```
No.   Time        Source              Destination         Protocol  Length Info
    1 0.000000    AmbitMic_a9:3d:68   Broadcast           ARP           42 Who has 192.168.1.1? Tell 192.168.1.105
    2 0.001018    LinksysG_da:af:73   AmbitMic_a9:3d:68   ARP           60 192.168.1.1 is at 00:06:25:da:af:73
    3 0.001028    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800        62 IPv4
    4 2.962850    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800        62 IPv4
    5 8.971488    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800        62 IPv4
    6 13.542974   Telebit_73:8d:ce    Broadcast           ARP           60 Who has 192.168.1.117? Tell 192.168.1.104
    7 17.444423   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800        62 IPv4
    8 17.465902   LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800        62 IPv4
    9 17.465927   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800        54 IPv4
   10 17.466468   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800       686 IPv4
```

```
    Type: ARP (0x0806)
▼ Address Resolution Protocol (request)
    Hardware type: Ethernet (1)
    Protocol type: IPv4 (0x0800)
    Hardware size: 6
    Protocol size: 4
    Opcode: request (1)
    Sender MAC address: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
    Sender IP address: 192.168.1.105
    Target MAC address: 00:00:00_00:00:00 (00:00:00:00:00:00)
    Target IP address: 192.168.1.1
```

```
0000  ff ff ff ff ff ff 00 d0  59 a9 3d 68 08 06 00 01   ........ Y.=h....
0010  08 00 06 04 00 01 00 d0  59 a9 3d 68 c0 a8 01 69   ........ Y.=h...i
0020  00 00 00 00 00 00 c0 a8  01 01                     ........ ..
```

```
Opcode (arp.opcode), 2 bytes          Packets: 17 · Displayed: 17 (100.0%) · Load time: 0:0.9    Profile: Default
```

d) Where in the ARP request does the “question” appear – the Ethernet address of the machine whose corresponding IP address is being queried?
Ans: In the Target IP address field of the ARP request The field “Target MAC address” is set to 00:00:00:00:00:00 to question the machine whose corresponding IP address (192.168.1.1) is being queried.



ethernet-ethereal-trace-1

Apply a display filter … <Ctrl-/>

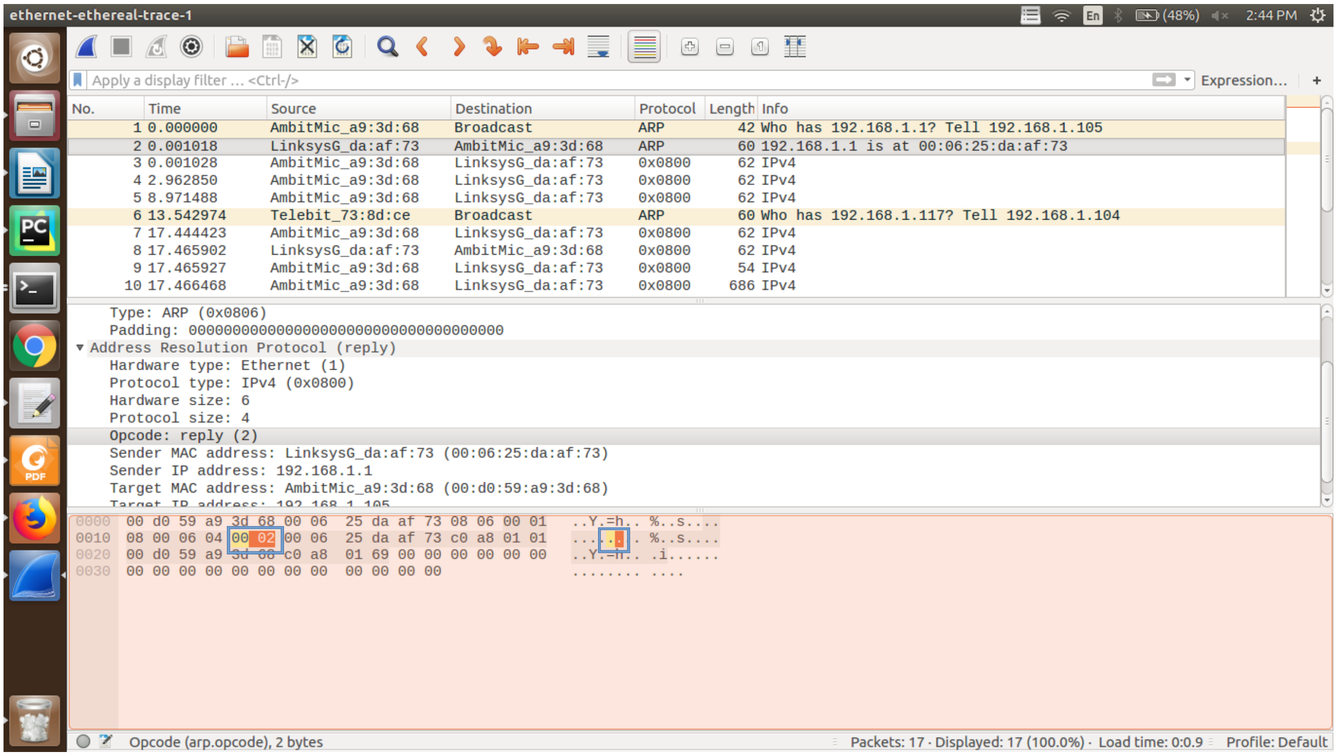
```
No.  Time        Source              Destination         Protocol Length Info
   1 0.000000    AmbitMic_a9:3d:68   Broadcast           ARP       42 Who has 192.168.1.1? Tell 192.168.1.105
   2 0.001018    LinksysG_da:af:73   AmbitMic_a9:3d:68   ARP       60 192.168.1.1 is at 00:06:25:da:af:73
   3 0.001028    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800    62 IPv4
   4 2.962850    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800    62 IPv4
   5 8.971488    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800    62 IPv4
   6 13.542974   Telebit_73:8d:ce    Broadcast           ARP       60 Who has 192.168.1.117? Tell 192.168.1.104
   7 17.444423   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800    62 IPv4
   8 17.465902   LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800    62 IPv4
   9 17.465927   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800    54 IPv4
  10 17.466468   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800   686 IPv4
```

```
    Type: ARP (0x0806)
▾ Address Resolution Protocol (request)
    Hardware type: Ethernet (1)
    Protocol type: IPv4 (0x0800)
    Hardware size: 6
    Protocol size: 4
    Opcode: request (1)
    Sender MAC address: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
    Sender IP address: 192.168.1.105
    Target MAC address: 00:00:00_00:00:00 (00:00:00:00:00:00)
    Target IP address: 192.168.1.1
```

```
0000  ff ff ff ff ff ff 00 d0  59 a9 3d 68 08 06 00 01   ........ Y.=h....
0010  08 00 06 04 00 01 00 d0  59 a9 3d 68 c0 a8 01 69   ........ Y.=h...i
0020  00 00 00 00 00 00 c0 a8  01 01                     ........ ..
```

Target MAC address (arp.dst.hw_mac), 6 bytes   Packets: 17 · Displayed: 17 (100.0%) · Load time: 0:0.9   Profile: Default

13. Now find the ARP reply that was sent in response to the ARP request.
a) How many bytes from the very beginning of the Ethernet frame does the ARP opcode field begin?
Ans: The ARP Opcode for the given ethernet frame begins at 20th byte.



ethernet-ethereal-trace-1

Apply a display filter … <Ctrl-/>

```
No.  Time        Source              Destination         Protocol Length Info
   1 0.000000    AmbitMic_a9:3d:68   Broadcast           ARP       42 Who has 192.168.1.1? Tell 192.168.1.105
   2 0.001018    LinksysG_da:af:73   AmbitMic_a9:3d:68   ARP       60 192.168.1.1 is at 00:06:25:da:af:73
   3 0.001028    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800    62 IPv4
   4 2.962850    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800    62 IPv4
   5 8.971488    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800    62 IPv4
   6 13.542974   Telebit_73:8d:ce    Broadcast           ARP       60 Who has 192.168.1.117? Tell 192.168.1.104
   7 17.444423   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800    62 IPv4
   8 17.465902   LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800    62 IPv4
   9 17.465927   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800    54 IPv4
  10 17.466468   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800   686 IPv4
```

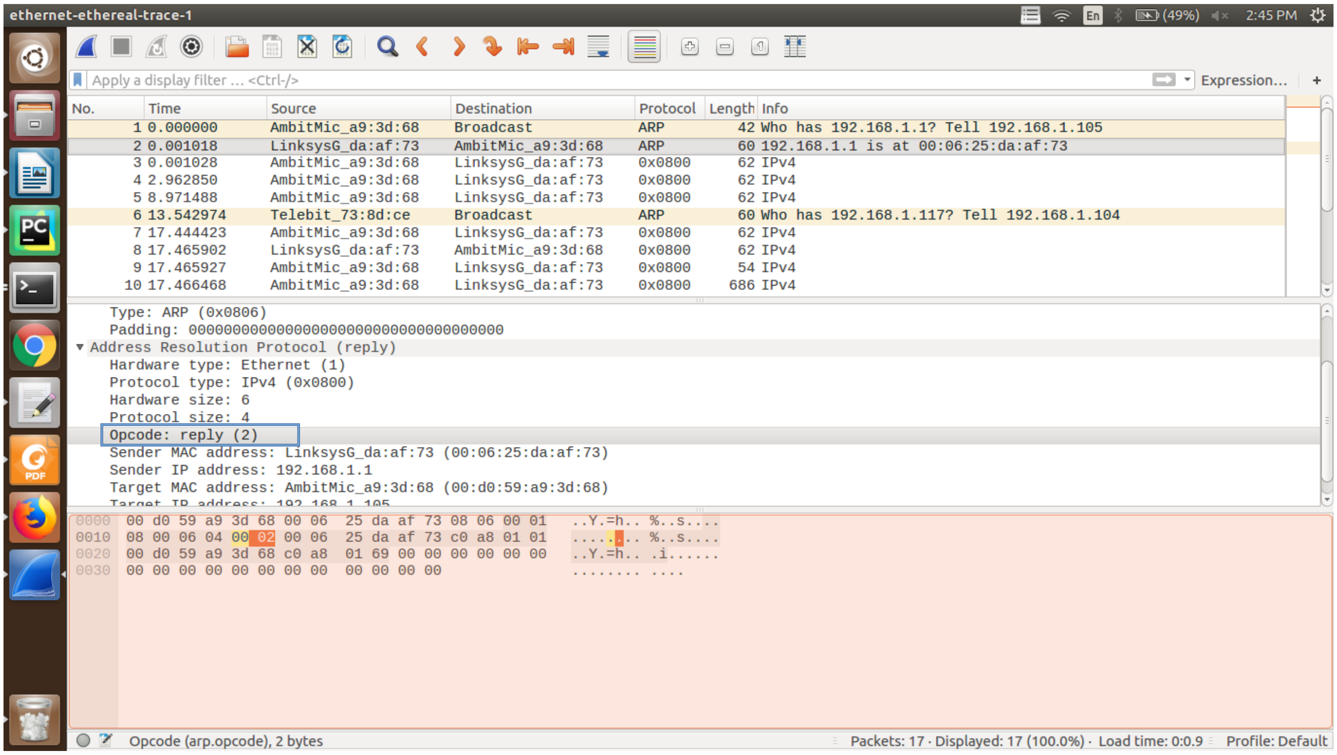
```
    Type: ARP (0x0806)
    Padding: 000000000000000000000000000000000000
▾ Address Resolution Protocol (reply)
    Hardware type: Ethernet (1)
    Protocol type: IPv4 (0x0800)
    Hardware size: 6
    Protocol size: 4
    Opcode: reply (2)
    Sender MAC address: LinksysG_da:af:73 (00:06:25:da:af:73)
    Sender IP address: 192.168.1.1
    Target MAC address: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
    Target IP address: 192.168.1.105
```

```
0000  00 d0 59 a9 3d 68 00 06  25 da af 73 08 06 00 01   ..Y.=h.. %..s....
0010  08 00 06 04 00 02 00 06  25 da af 73 c0 a8 01 01   ........ %..s....
0020  00 d0 59 a9 3d 68 c0 a8  01 69 00 00 00 00 00 00   ..Y.=h.. .i......
0030  00 00 00 00 00 00 00 00  00 00 00 00               ........ ....
```

Opcode (arp.opcode), 2 bytes   Packets: 17 · Displayed: 17 (100.0%) · Load time: 0:0.9   Profile: Default

b) What is the value of the opcode field within the ARP-payload part of the Ethernet frame in which an ARP response is made?

Ans: Value of Opcode in the ARP payload part: 0x002 (Reply)



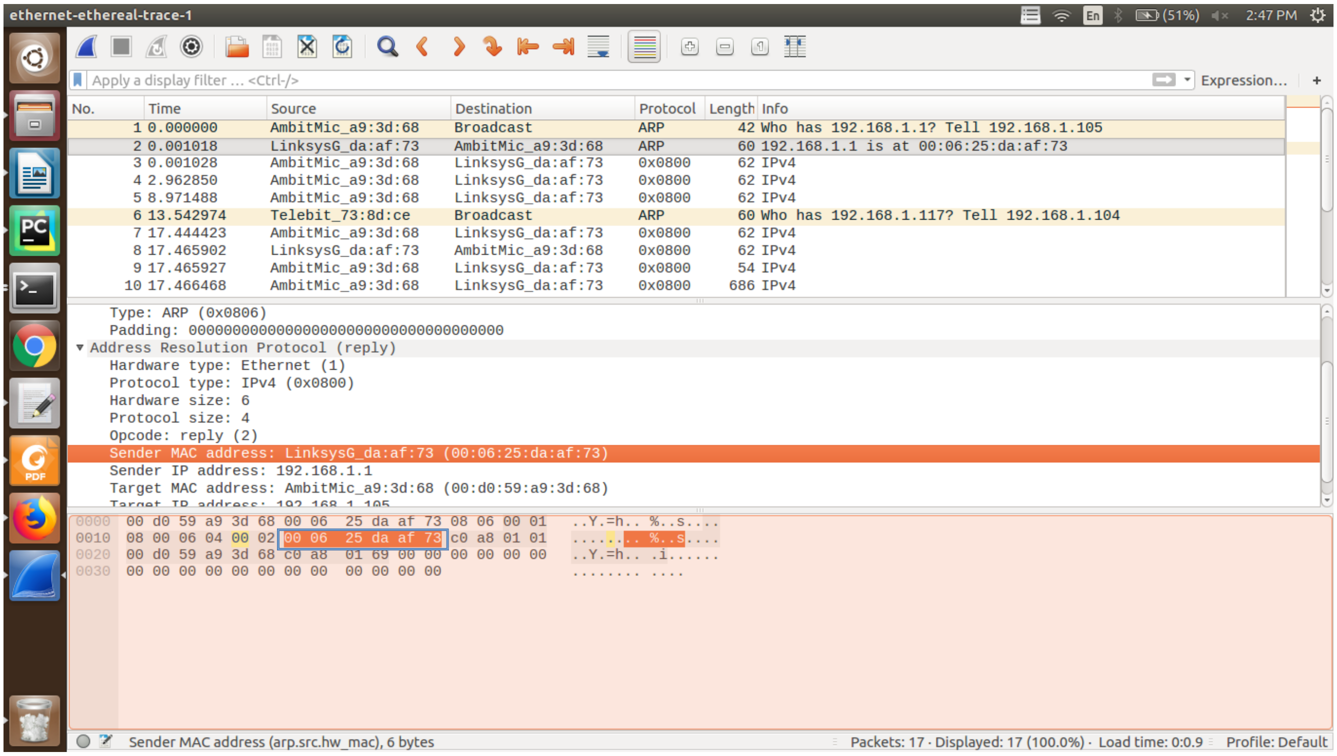
```
No.   Time        Source              Destination         Protocol  Length Info
    1 0.000000    AmbitMic_a9:3d:68   Broadcast           ARP         42 Who has 192.168.1.1? Tell 192.168.1.105
    2 0.001018    LinksysG_da:af:73   AmbitMic_a9:3d:68   ARP         60 192.168.1.1 is at 00:06:25:da:af:73
    3 0.001028    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800      62 IPv4
    4 2.962850    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800      62 IPv4
    5 8.971488    AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800      62 IPv4
    6 13.542974   Telebit_73:8d:ce    Broadcast           ARP         60 Who has 192.168.1.117? Tell 192.168.1.104
    7 17.444423   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800      62 IPv4
    8 17.465902   LinksysG_da:af:73   AmbitMic_a9:3d:68   0x0800      62 IPv4
    9 17.465927   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800      54 IPv4
   10 17.466468   AmbitMic_a9:3d:68   LinksysG_da:af:73   0x0800     686 IPv4
```

```
    Type: ARP (0x0806)
    Padding: 000000000000000000000000000000000000
▾ Address Resolution Protocol (reply)
    Hardware type: Ethernet (1)
    Protocol type: IPv4 (0x0800)
    Hardware size: 6
    Protocol size: 4
    Opcode: reply (2)
    Sender MAC address: LinksysG_da:af:73 (00:06:25:da:af:73)
    Sender IP address: 192.168.1.1
    Target MAC address: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
    Target IP address: 192.168.1.105
```

```
0000  00 d0 59 a9 3d 68 00 06  25 da af 73 08 06 00 01   ..Y.=h.. %..s....
0010  08 00 06 04 00 02 00 06  25 da af 73 c0 a8 01 01   ........ %..s....
0020  00 d0 59 a9 3d 68 c0 a8  01 69 00 00 00 00 00 00   ..Y.=h.. .i......
0030  00 00 00 00 00 00 00 00  00 00 00 00               ........ ....
```

```
Opcode (arp.opcode), 2 bytes      Packets: 17 · Displayed: 17 (100.0%) · Load time: 0:0.9      Profile: Default
```

c) Where in the ARP message does the “answer” to the earlier ARP request appear – the IP address of the machine having the Ethernet address whose corresponding IP address is being queried?
Ans: The Answer to the earlier ARP request appear in the Sender MAC address of the ARP field i.e. 00:06:25:da:af:73



```
No.  Time        Source              Destination        Protocol Length Info
   1 0.000000    AmbitMic_a9:3d:68   Broadcast          ARP       42 Who has 192.168.1.1? Tell 192.168.1.105
   2 0.001018    LinksysG_da:af:73   AmbitMic_a9:3d:68  ARP       60 192.168.1.1 is at 00:06:25:da:af:73
   3 0.001028    AmbitMic_a9:3d:68   LinksysG_da:af:73  0x0800    62 IPv4
   4 2.962850    AmbitMic_a9:3d:68   LinksysG_da:af:73  0x0800    62 IPv4
   5 8.971488    AmbitMic_a9:3d:68   LinksysG_da:af:73  0x0800    62 IPv4
   6 13.542974   Telebit_73:8d:ce    Broadcast          ARP       60 Who has 192.168.1.117? Tell 192.168.1.104
   7 17.444423   AmbitMic_a9:3d:68   LinksysG_da:af:73  0x0800    62 IPv4
   8 17.465902   LinksysG_da:af:73   AmbitMic_a9:3d:68  0x0800    62 IPv4
   9 17.465927   AmbitMic_a9:3d:68   LinksysG_da:af:73  0x0800    54 IPv4
  10 17.466468   AmbitMic_a9:3d:68   LinksysG_da:af:73  0x0800   686 IPv4
```

```
    Type: ARP (0x0806)
    Padding: 000000000000000000000000000000000000
  ▾ Address Resolution Protocol (reply)
    Hardware type: Ethernet (1)
    Protocol type: IPv4 (0x0800)
    Hardware size: 6
    Protocol size: 4
    Opcode: reply (2)
    Sender MAC address: LinksysG_da:af:73 (00:06:25:da:af:73)
    Sender IP address: 192.168.1.1
    Target MAC address: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
    Target IP address: 192.168.1.105
```

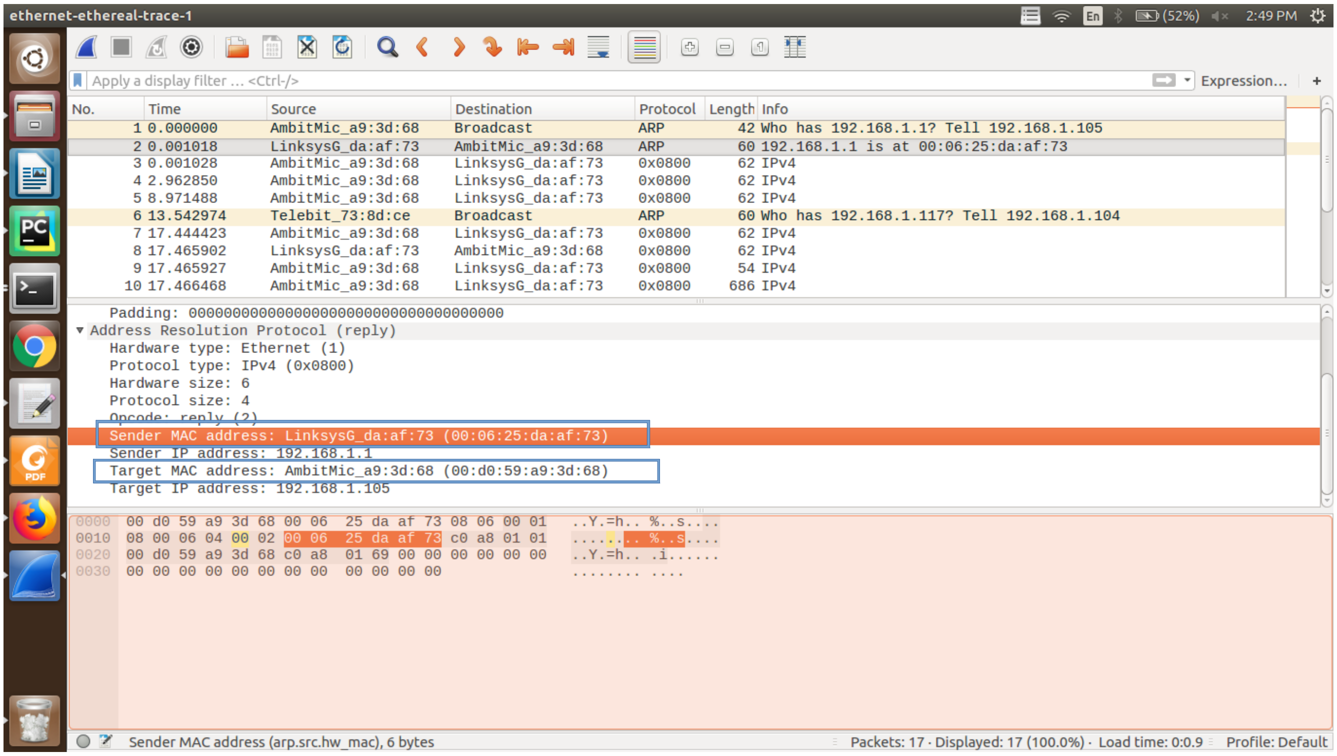
```
0000  00 d0 59 a9 3d 68 00 06  25 da af 73 08 06 00 01   ..Y.=h.. %..s....
0010  08 00 06 04 00 02 00 06  25 da af 73 c0 a8 01 01   ........ %..s....
0020  00 d0 59 a9 3d 68 c0 a8  01 69 00 00 00 00 00 00   ..Y.=h.. .i......
0030  00 00 00 00 00 00 00 00  00 00 00 00               ........ ....
```

Sender MAC address (arp.src.hw_mac), 6 bytes   Packets: 17 · Displayed: 17 (100.0%) · Load time: 0:0.9   Profile: Default

14. What are the hexadecimal values for the source and destination addresses in the Ethernet frame containing the ARP reply message?

Ans: Source address in the Ethernet frame: 00:06:25:da:af:73

Destination Address in the Ethernet frame: 00:d0:59:a9:3d:68



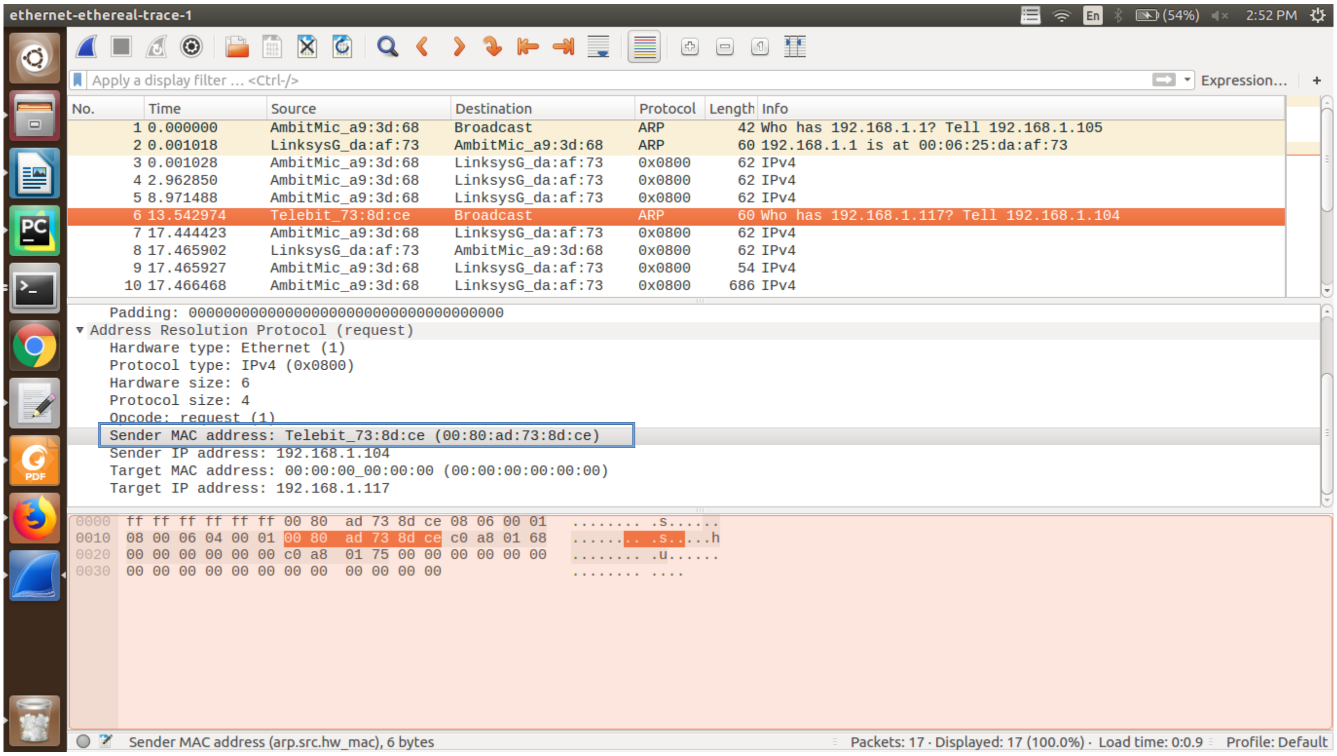
```
No.  Time        Source              Destination        Protocol Length Info
   1 0.000000    AmbitMic_a9:3d:68   Broadcast          ARP       42 Who has 192.168.1.1? Tell 192.168.1.105
   2 0.001018    LinksysG_da:af:73   AmbitMic_a9:3d:68  ARP       60 192.168.1.1 is at 00:06:25:da:af:73
   3 0.001028    AmbitMic_a9:3d:68   LinksysG_da:af:73  0x0800    62 IPv4
   4 2.962850    AmbitMic_a9:3d:68   LinksysG_da:af:73  0x0800    62 IPv4
   5 8.971488    AmbitMic_a9:3d:68   LinksysG_da:af:73  0x0800    62 IPv4
   6 13.542974   Telebit_73:8d:ce    Broadcast          ARP       60 Who has 192.168.1.117? Tell 192.168.1.104
   7 17.444423   AmbitMic_a9:3d:68   LinksysG_da:af:73  0x0800    62 IPv4
   8 17.465902   LinksysG_da:af:73   AmbitMic_a9:3d:68  0x0800    62 IPv4
   9 17.465927   AmbitMic_a9:3d:68   LinksysG_da:af:73  0x0800    54 IPv4
  10 17.466468   AmbitMic_a9:3d:68   LinksysG_da:af:73  0x0800   686 IPv4
```

```
    Padding: 000000000000000000000000000000000000
  ▾ Address Resolution Protocol (reply)
    Hardware type: Ethernet (1)
    Protocol type: IPv4 (0x0800)
    Hardware size: 6
    Protocol size: 4
    Opcode: reply (2)
    Sender MAC address: LinksysG_da:af:73 (00:06:25:da:af:73)
    Sender IP address: 192.168.1.1
    Target MAC address: AmbitMic_a9:3d:68 (00:d0:59:a9:3d:68)
    Target IP address: 192.168.1.105
```

```
0000  00 d0 59 a9 3d 68 00 06  25 da af 73 08 06 00 01   ..Y.=h.. %..s....
0010  08 00 06 04 00 02 00 06  25 da af 73 c0 a8 01 01   ........ %..s....
0020  00 d0 59 a9 3d 68 c0 a8  01 69 00 00 00 00 00 00   ..Y.=h.. .i......
0030  00 00 00 00 00 00 00 00  00 00 00 00               ........ ....
```

Sender MAC address (arp.src.hw_mac), 6 bytes   Packets: 17 · Displayed: 17 (100.0%) · Load time: 0:0.9   Profile: Default

Q15) Why is there no ARP reply (sent in response to the ARP request in packet 6) in the packet trace?
Ans: Because we are not at the sender and the reply of the ARP request is sent to the Sender , which in this case is 00:80:ad:73:8d:ce. Whereas our computer has sender address 00:d0:59:a9:3d:68.



```
No.   Time        Source               Destination          Protocol  Length Info
    1 0.000000    AmbitMic_a9:3d:68    Broadcast            ARP           42 Who has 192.168.1.1? Tell 192.168.1.105
    2 0.001018    LinksysG_da:af:73    AmbitMic_a9:3d:68    ARP           60 192.168.1.1 is at 00:06:25:da:af:73
    3 0.001028    AmbitMic_a9:3d:68    LinksysG_da:af:73    0x0800        62 IPv4
    4 2.962850    AmbitMic_a9:3d:68    LinksysG_da:af:73    0x0800        62 IPv4
    5 8.971488    AmbitMic_a9:3d:68    LinksysG_da:af:73    0x0800        62 IPv4
    6 13.542974   Telebit_73:8d:ce     Broadcast            ARP           60 Who has 192.168.1.117? Tell 192.168.1.104
    7 17.444423   AmbitMic_a9:3d:68    LinksysG_da:af:73    0x0800        62 IPv4
    8 17.465902   LinksysG_da:af:73    AmbitMic_a9:3d:68    0x0800        62 IPv4
    9 17.465927   AmbitMic_a9:3d:68    LinksysG_da:af:73    0x0800        54 IPv4
   10 17.466468   AmbitMic_a9:3d:68    LinksysG_da:af:73    0x0800       686 IPv4
```

```
  Padding: 000000000000000000000000000000000000
▼ Address Resolution Protocol (request)
    Hardware type: Ethernet (1)
    Protocol type: IPv4 (0x0800)
    Hardware size: 6
    Protocol size: 4
    Opcode: request (1)
    Sender MAC address: Telebit_73:8d:ce (00:80:ad:73:8d:ce)
    Sender IP address: 192.168.1.104
    Target MAC address: 00:00:00_00:00:00 (00:00:00:00:00:00)
    Target IP address: 192.168.1.117
```

```
0000  ff ff ff ff ff ff 00 80  ad 73 8d ce 08 06 00 01   ........ .s......
0010  08 00 06 04 00 01 00 80  ad 73 8d ce c0 a8 01 68   ........ .s.....h
0020  00 00 00 00 00 00 c0 a8  01 75 00 00 00 00 00 00   ........ .u......
0030  00 00 00 00 00 00 00 00  00 00 00 00               ........ ....
```

Sender MAC address (arp.src.hw_mac), 6 bytes   Packets: 17 · Displayed: 17 (100.0%) · Load time: 0:0.9   Profile: Default