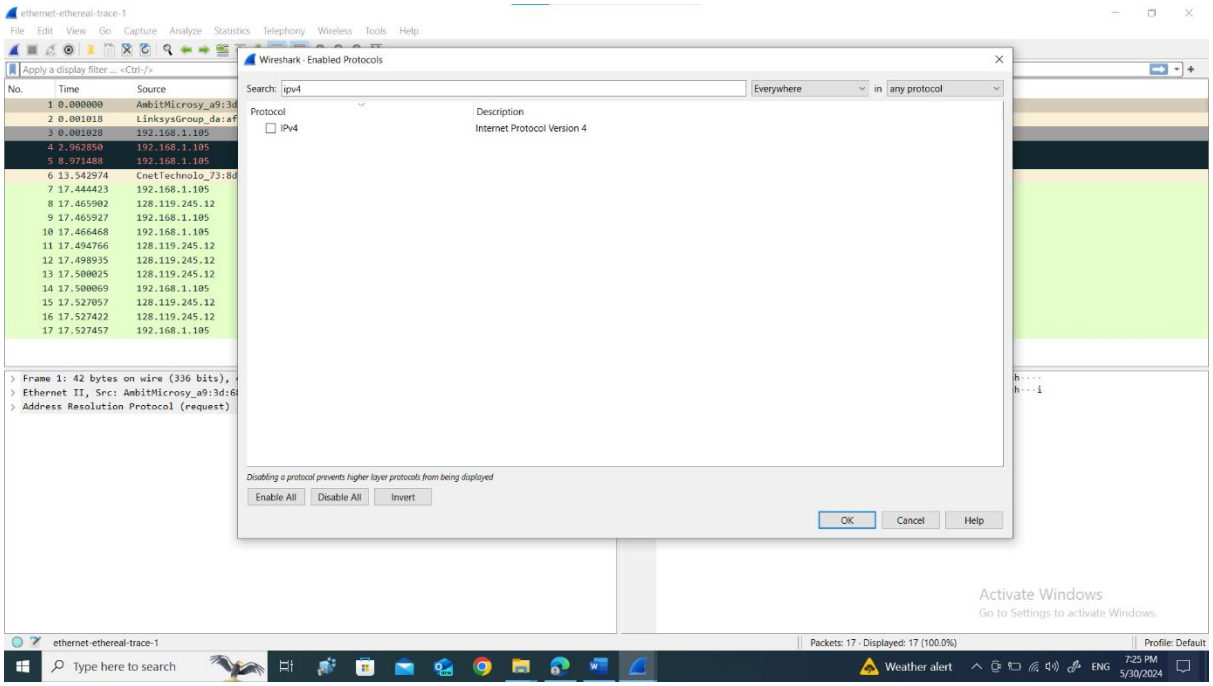
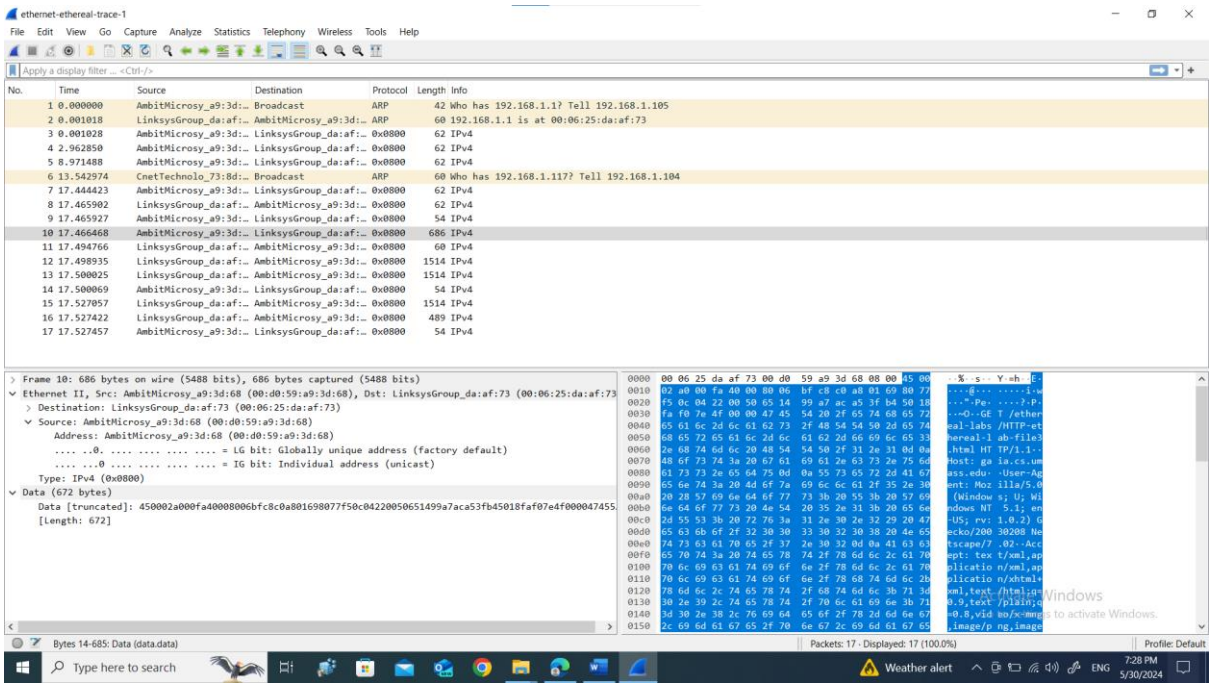


1. What is the 48-bit Ethernet address of your computer?



2. 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? [Note: this is an important question, and one that students sometimes get wrong. Re-read pages 468-469 in the text and make sure you understand the answer here.]

```
> Frame 10: 686 bytes on wire (5488 bits), 686 bytes captured (5488 bits)
v Ethernet II, Src: AmbitMicrosy_a9:3d:68 (00:d0:59:a9:3d:68), Dst: LinksysGroup_da:af:73 (00:06:25:da:af:73
  v Destination: LinksysGroup_da:af:73 (00:06:25:da:af:73)
      Address: LinksysGroup_da:af:73 (00:06:25:da:af:73)
      .... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
      .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
  v Source: AmbitMicrosy_a9:3d:68 (00:d0:59:a9:3d:68)
      Address: AmbitMicrosy_a9:3d:68 (00:d0:59:a9:3d:68)
      .... ..0. .... .... .... .... = LG bit: Globally unique address (factory default)
      .... ...0 .... .... .... .... = IG bit: Individual address (unicast)
    Type: IPv4 (0x0800)
v Data (672 bytes)
    Data [truncated]: 450002a000fa40008006bfc8c0a801698077f50c04220050651499a7aca53fb45018faf07e4f000047455
    [Length: 672]
```

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

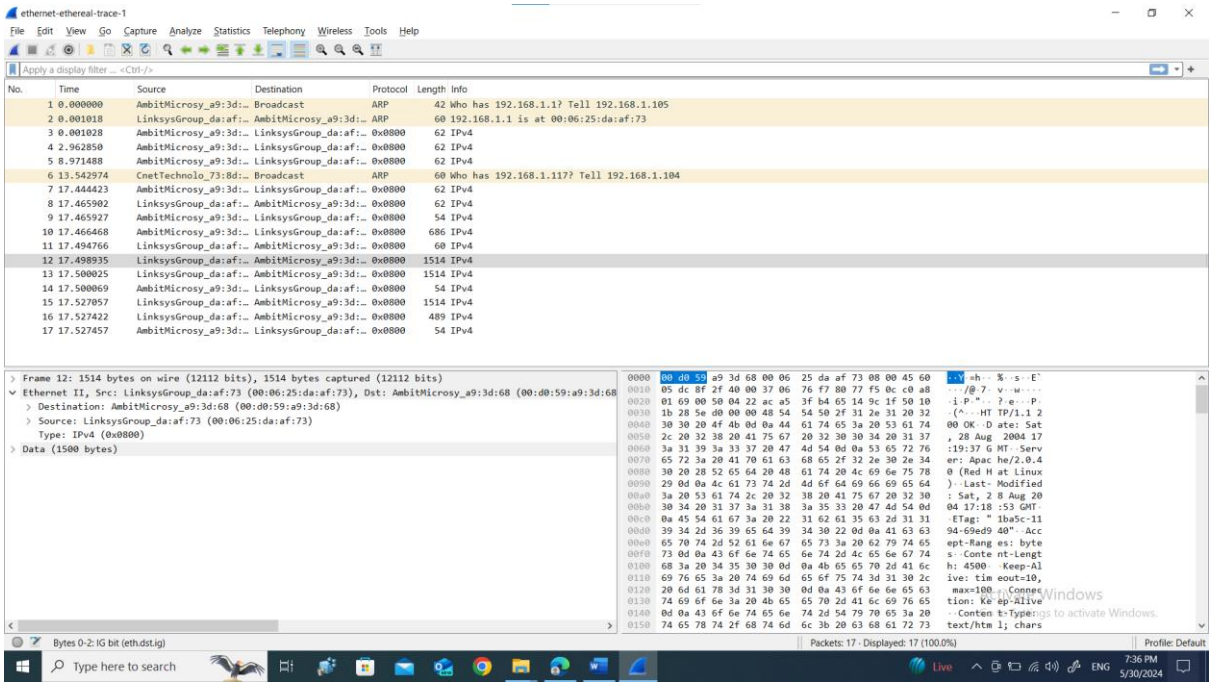
```
> Frame 10: 686 bytes on wire (5488 bits), 686 bytes captured (5488 bits)
v Ethernet II, Src: AmbitMicrosy_a9:3d:68 (00:d0:59:a9:3d:68), Dst: LinksysGroup_da:af:
  > Destination: LinksysGroup_da:af:73 (00:06:25:da:af:73)
  > Source: AmbitMicrosy_a9:3d:68 (00:d0:59:a9:3d:68)
    Type: IPv4 (0x0800)
> Data (672 bytes)
```

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

```
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
00d0  65 63 6b 6f 2f 32 30 30  33 30 32 30 38 20 4e 65    ecko/200 30208 Ne
00e0  74 73 63 61 70 65 2f 37  2e 30 32 0d 0a 41 63 63    tscape/7 .02··Acc
00f0  65 70 74 3a 20 74 65 78  74 2f 78 6d 6c 2c 61 70    ept: tex t/xml,ap
0100  70 6c 69 63 61 74 69 6f  6e 2f 78 6d 6c 2c 61 70    plicatio n/xml,ap
0110  70 6c 69 63 61 74 69 6f  6e 2f 78 68 74 6d 6c 2b    plicatio n/xhtml+
0120  78 6d 6c 2c 74 65 78 74  2f 68 74 6d 6c 3b 71 3d    xml,text /html;q=
0130  30 2e 39 2c 74 65 78 74  2f 70 6c 61 69 6e 3b 71    0.9,text /plain;q
0140  3d 30 2e 38 2c 76 69 64  65 6f 2f 78 2d 6d 6e 67    =0.8,vid eo/x-mng
0150  2c 69 6d 61 67 65 2f 70  6e 67 2c 69 6d 61 67 65    ,image/p ng,image
```


Packets: 17 · Displayed: 17 (100.0%)

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?



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

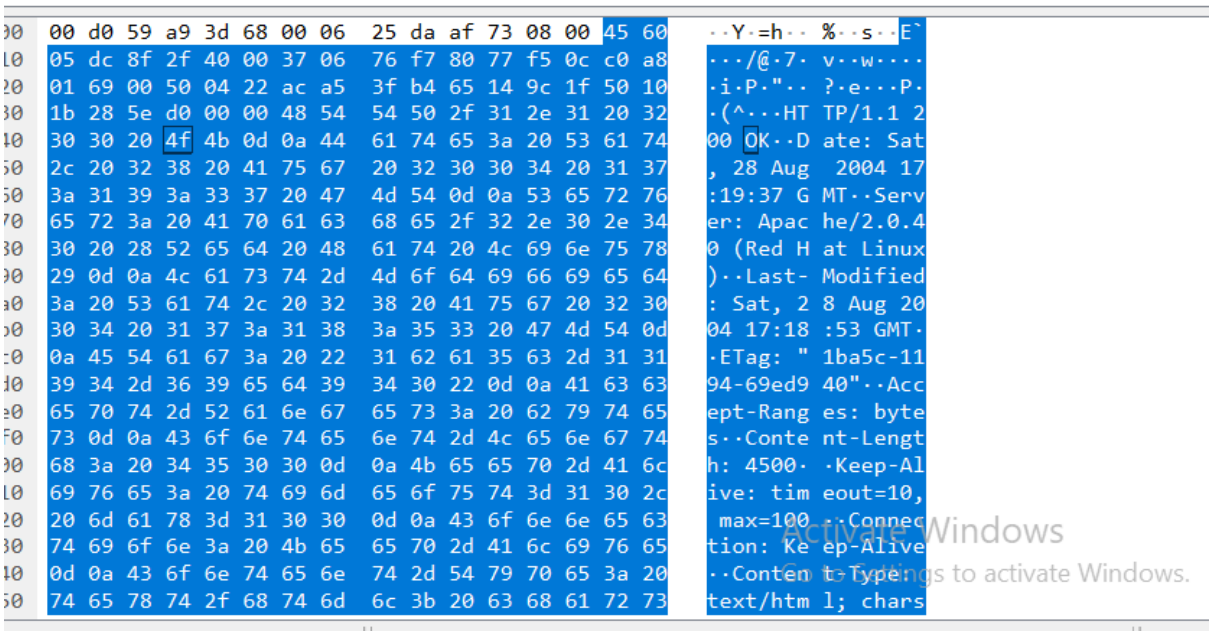
```
> Frame 12: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits)
v Ethernet II, Src: LinksysGroup_da:af:73 (00:06:25:da:af:73), Dst: AmbitMicrosy_a9:3d:68 (00:d0:59:a9:3d:68
    > Destination: AmbitMicrosy_a9:3d:68 (00:d0:59:a9:3d:68)
    > Source: LinksysGroup_da:af:73 (00:06:25:da:af:73)
      Type: IPv4 (0x0800)
> Data (1500 bytes)
```

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

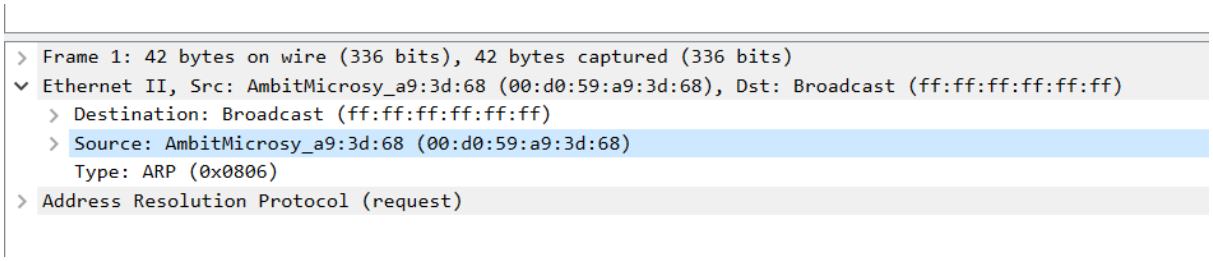
```
> Frame 12: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits)
v Ethernet II, Src: LinksysGroup_da:af:73 (00:06:25:da:af:73), Dst: AmbitMicrosy_a9:3d:68 (00:d0:59:a9:3d:68
    > Destination: AmbitMicrosy_a9:3d:68 (00:d0:59:a9:3d:68)
    > Source: LinksysGroup_da:af:73 (00:06:25:da:af:73)
      Type: IPv4 (0x0800)
> Data (1500 bytes)
```

8. How many bytes from the very start of the Ethernet frame does the ASCII “O” in “OK”

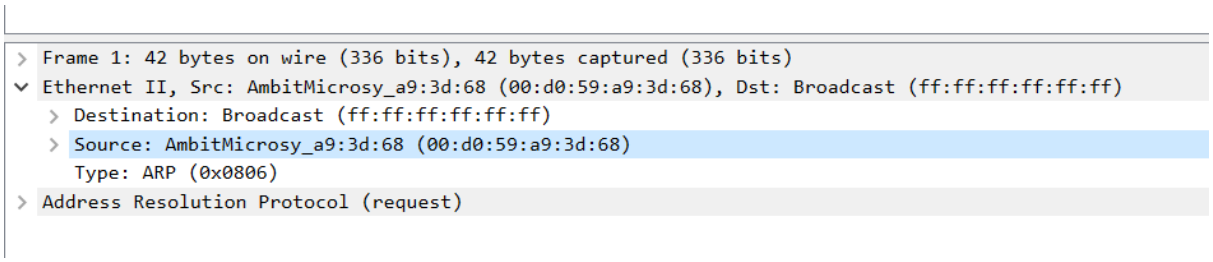
(i.e., the HTTP response code) appear in the Ethernet frame?



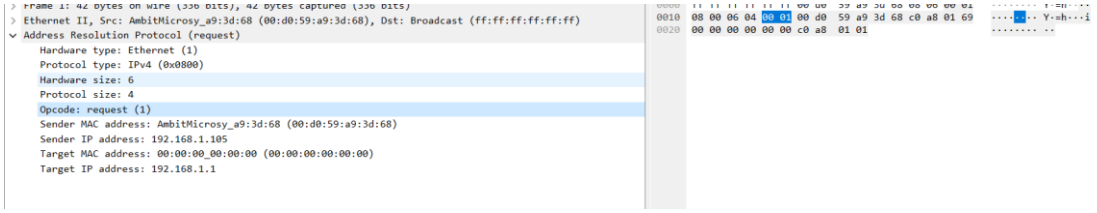
10. What are the hexadecimal values for the source and destination addresses in the Ethernet frame containing the ARP request message?



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



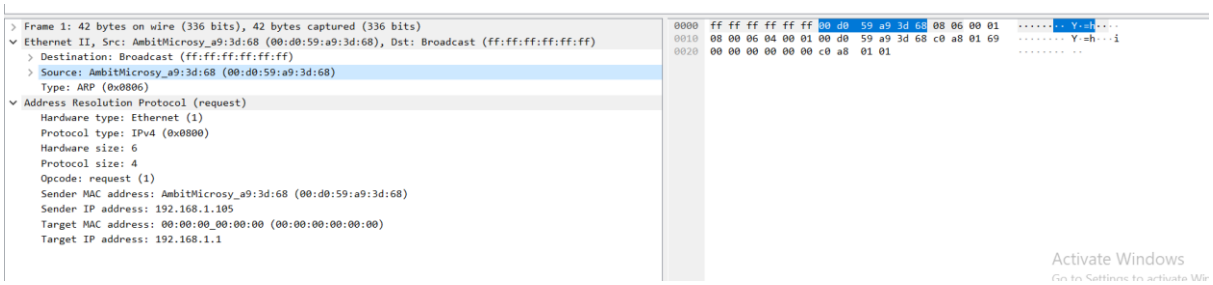
12. a) How many bytes from the very beginning of the Ethernet frame does the ARP opcode field begin?



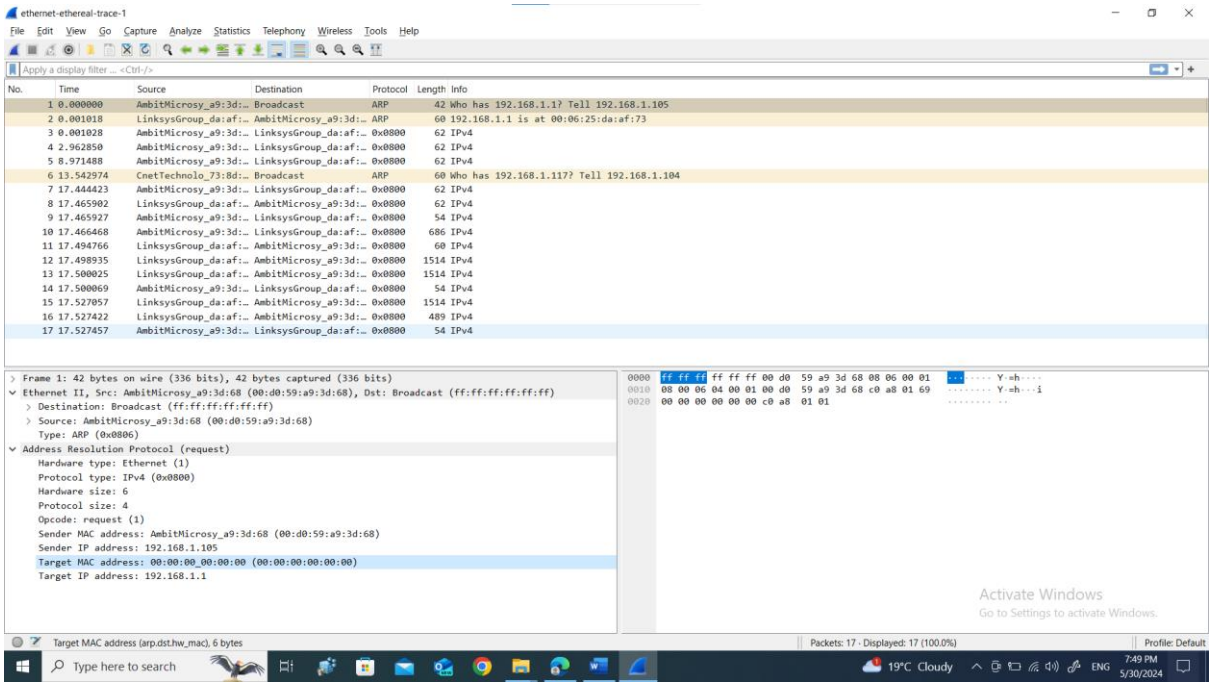
b) What is the value of the opcode field within the ARP-payload part of the Ethernet frame in which an ARP request is made?

Ans. 00 01

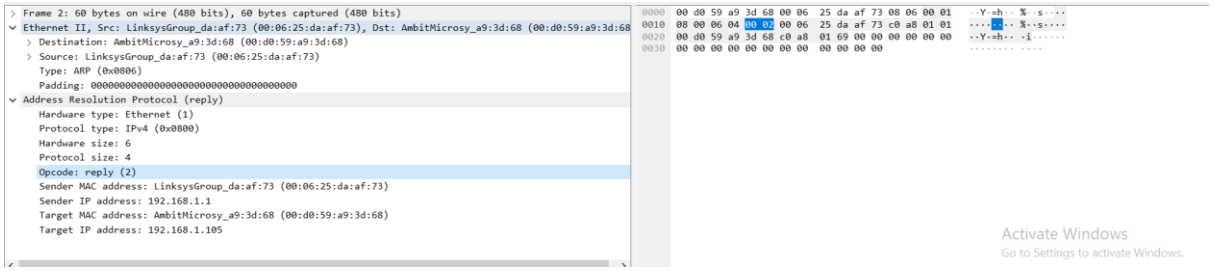
c) Does the ARP message contain the IP address of the sender?



d) Where in the ARP request does the “question” appear – the Ethernet address of the machine whose corresponding IP address is being queried?



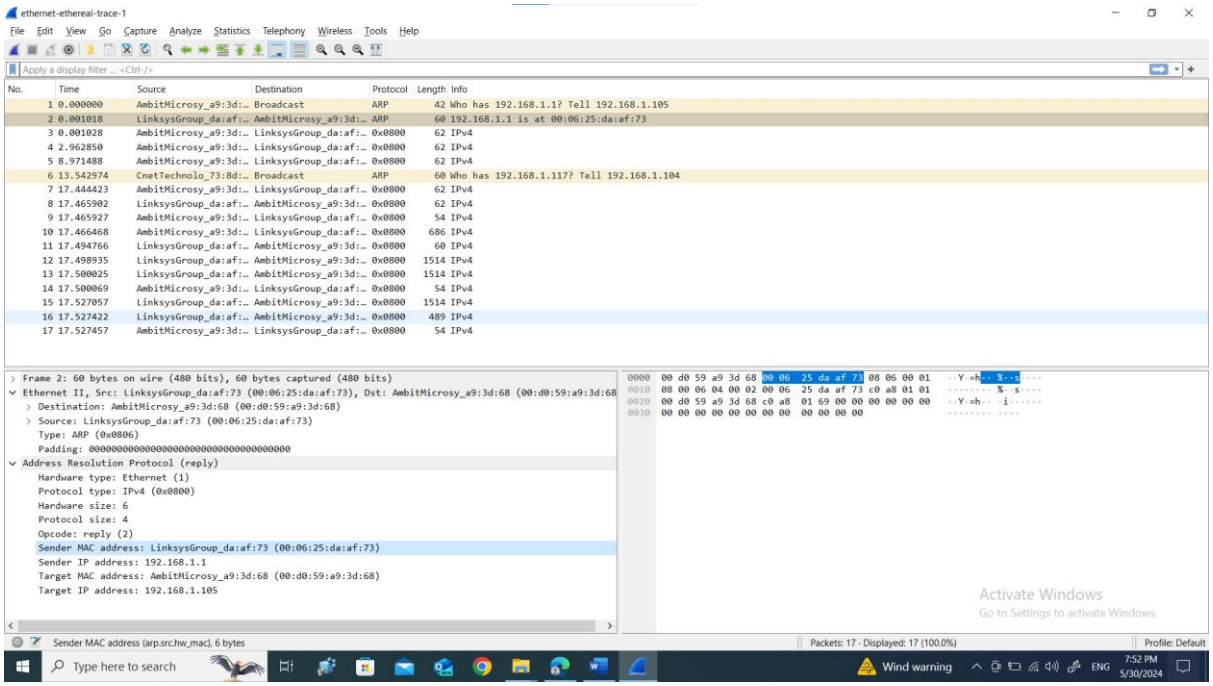
13. Now find the ARP reply that was sent in response to the ARP request. a) How many bytes from the very beginning of the Ethernet frame does the ARP opcode field begin?



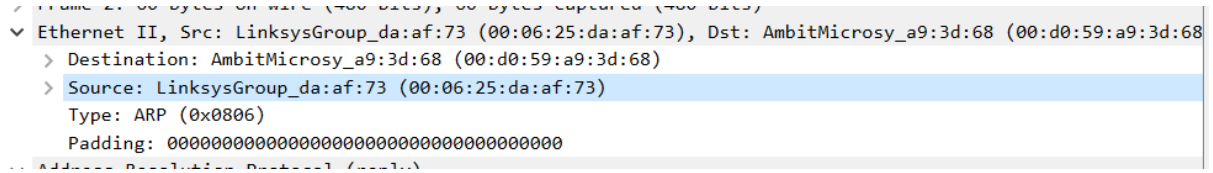
b) What is the value of the opcode field within the ARP-payload part of the Ethernet frame in which an ARP response is made?

Ans. 00 02

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?



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



15. Open the ethernet-ethereal-trace-1 trace file in http://gaia.cs.umass.edu/wireshark-labs/wireshark-traces.zip. The first and second ARP packets in this trace correspond to an ARP request sent by the computer running Wireshark, and the ARP reply sent to the computer running Wireshark by the computer with the ARP-requested Ethernet address. But there is yet another computer on this network, as indicated by packet 6 – another ARP request. Why is there no ARP reply (sent in response to the ARP request in

packet 6) in the packet trace?

1	0.000000	AmbitMicrosy_a9:3d:…	Broadcast	ARP	42	Who has 192.168.1.1? Tell 192.168.1.105
2	0.001018	LinksysGroup_da:af:…	AmbitMicrosy_a9:3d:…	ARP	60	192.168.1.1 is at 00:06:25:da:af:73
3	0.001028	AmbitMicrosy_a9:3d:…	LinksysGroup_da:af:…	0x0800	62	IPv4
4	2.962850	AmbitMicrosy_a9:3d:…	LinksysGroup_da:af:…	0x0800	62	IPv4
5	8.971488	AmbitMicrosy_a9:3d:…	LinksysGroup_da:af:…	0x0800	62	IPv4
6	13.542974	CnetTechnolo_73:8d:…	Broadcast	ARP	60	Who has 192.168.1.117? Tell 192.168.1.104
7	17.444423	AmbitMicrosy_a9:3d:…	LinksysGroup_da:af:…	0x0800	62	IPv4
8	17.465902	LinksysGroup_da:af:…	AmbitMicrosy_a9:3d:…	0x0800	62	IPv4
9	17.465927	AmbitMicrosy_a9:3d:…	LinksysGroup_da:af:…	0x0800	54	IPv4
10	17.466468	AmbitMicrosy_a9:3d:…	LinksysGroup_da:af:…	0x0800	686	IPv4
11	17.494766	LinksysGroup_da:af:…	AmbitMicrosy_a9:3d:…	0x0800	60	IPv4
12	17.498935	LinksysGroup_da:af:…	AmbitMicrosy_a9:3d:…	0x0800	1514	IPv4
13	17.500025	LinksysGroup_da:af:…	AmbitMicrosy_a9:3d:…	0x0800	1514	IPv4
14	17.500069	AmbitMicrosy_a9:3d:…	LinksysGroup_da:af:…	0x0800	54	IPv4
15	17.527057	LinksysGroup_da:af:…	AmbitMicrosy_a9:3d:…	0x0800	1514	IPv4
16	17.527422	LinksysGroup_da:af:…	AmbitMicrosy_a9:3d:…	0x0800	489	IPv4
17	17.527457	AmbitMicrosy_a9:3d:…	LinksysGroup_da:af:…	0x0800	54	IPv4