

Tyler Cope

## CS372 Lab 4

1. The 48-bit Ethernet address is 00:d0:59:a9:3d:68

The image shows a Wireshark packet capture titled "ethernet-ethereal-trace-1". The packet list shows several frames, with frame 10 selected. Frame 10 is an Ethernet II frame, Src: AmbitMic\_a9:3d:68 (00:d0:59:a9:3d:68), Dst: LinksysG\_da:af:73 (00:06:25:da:af:73). The packet details pane shows the Ethernet II frame structure, including the destination and source MAC addresses, and the type (IPv4). The packet bytes pane shows the raw data in hexadecimal and ASCII.

No.	Time	Source	Destination	Protocol	Length	Info
3	13:19:20.158158	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
4	13:19:23.119980	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
5	13:19:29.128618	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
6	13:19:33.700104	Telebit_73:8d:ce	Broadcast	ARP	60	Who has 192.168.1.117? Tell 192.168.1.104
7	13:19:37.601553	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
8	13:19:37.623032	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	62	IPv4
9	13:19:37.623057	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	54	IPv4
10	13:19:37.623598	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	686	IPv4
11	13:19:37.651896	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	60	IPv4
12	13:19:37.656065	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	1514	IPv4
13	13:19:37.657155	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	1514	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)

Offset	Hex	ASCII
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 50 2d 65 74	ea1-labs /HTTP-et

Frame (frame), 686 bytes | Packets: 17 · Displayed: 17 (100.0%) · Marked: 1 (5.9%) · Load time: 0:0.3 | Profile: Default

2.
  - a. The 48-bit destination address is 00:06:25:da:af:73
  - b. It is not the address of gaia.cs.umass.edu (per hint). It's the address of my router which is used to leave the subnet.

ethernet-ethereal-trace-1

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No.	Time	Source	Destination	Protocol	Length	Info
3	13:19:20.158158	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
4	13:19:23.119980	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
5	13:19:29.128618	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
6	13:19:33.700104	Telebit_73:8d:ce	Broadcast	ARP	60	Who has 192.168.1.117? Tell 192.168.1.104
7	13:19:37.601553	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
8	13:19:37.623032	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	62	IPv4
9	13:19:37.623057	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	54	IPv4
10	13:19:37.623598	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	686	IPv4
11	13:19:37.651896	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	60	IPv4
12	13:19:37.656065	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	1514	IPv4
13	13:19:37.657155	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	1514	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)

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	ea1-labs /HTTP-et

Frame (frame), 686 bytes

Packets: 17 · Displayed: 17 (100.0%) · Marked: 1 (5.9%) · Load time: 0:0.3 | Profile: Default

3. 0x0800 and a value of 1 means it's the IP protocol.

4. There are 54 bytes before the ASCII "G."

ethernet-ethereal-trace-1

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

No.	Time	Source	Destination	Protocol	Length	Info
8	13:19:37.623032	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	62	IPv4
9	13:19:37.623057	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	54	IPv4
10	13:19:37.623598	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	686	IPv4
11	13:19:37.651896	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	60	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)

Address: LinksysG\_da:af:73 (00:06:25:da:af:73)

....0. .... = LG bit: Globally unique address (factory default)

....0. .... = IG bit: Individual address (unicast)

▼ Source: AmbitMic\_a9:3d:68 (00:d0:59:a9:3d:68)

Address: AmbitMic\_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)

▼ 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  ...~0..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

```

Length (data.len) Packets: 17 · Displayed: 17 (100.0%) · Load time: 0:0.1 Profile: Default

5. The value of the Ethernet source address is 00:06:25:da:af:73.

ethernet-ethereal-trace-1

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

No.	Time	Source	Destination	Protocol	Length	Info
9	13:19:37.623057	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	54	IPv4
10	13:19:37.623598	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	686	IPv4
11	13:19:37.651896	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	60	IPv4
12	13:19:37.656065	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	1514	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)

Address: AmbitMic\_a9:3d:68 (00:d0:59:a9:3d:68)

....0. .... = LG bit: Globally unique address (factory default)

....0. .... = IG bit: Individual address (unicast)

▼ Source: LinksysG\_da:af:73 (00:06:25:da:af:73)

Address: LinksysG\_da:af:73 (00:06:25:da:af:73)

....0. .... = LG bit: Globally unique address (factory default)

....0. .... = IG bit: Individual address (unicast)

Type: IPv4 (0x0800)

▼ Data (1500 bytes)

Data: 456005dc8f2f4000370676f78077f50cc0a8016900500422...

[Length: 1500]

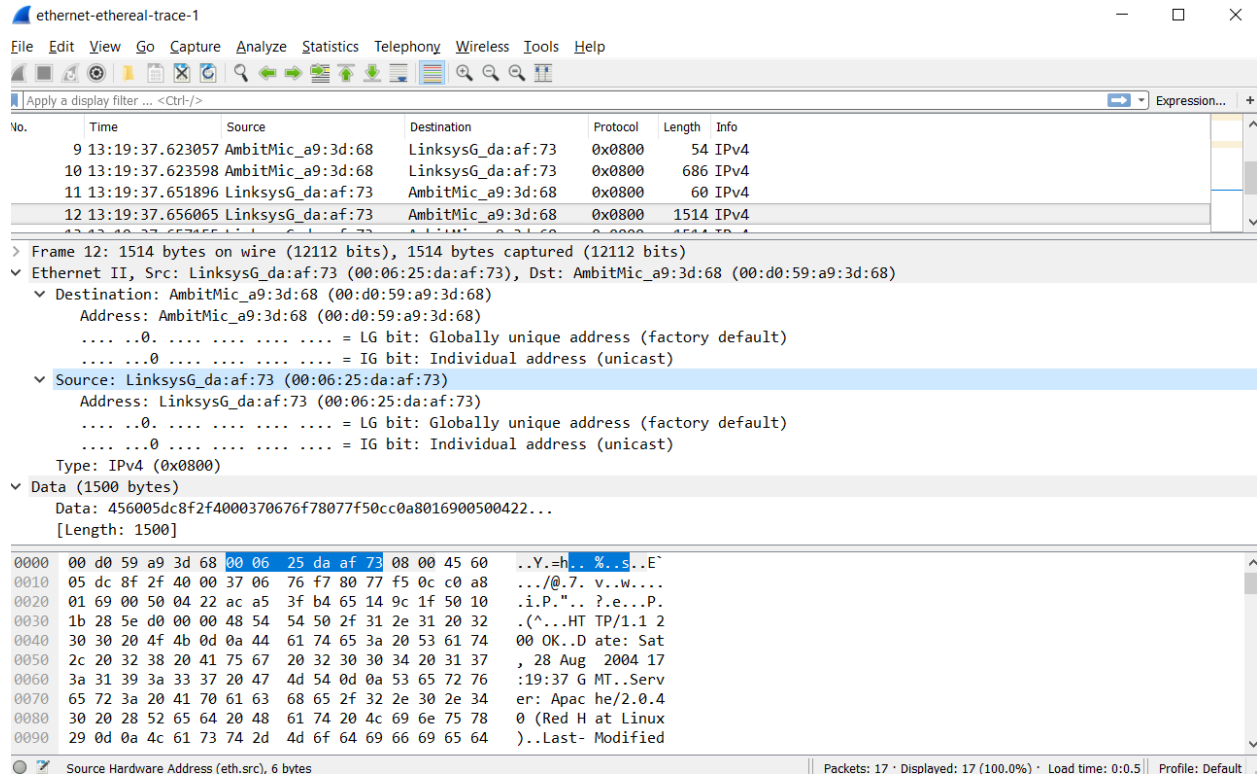
```

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

```

Source Hardware Address (eth.src), 6 bytes Packets: 17 · Displayed: 17 (100.0%) · Load time: 0:0.5 Profile: Default

- The destination address is 00:d0:59:a9:3d:68. This is not the address of my computer, but rather, the router.



- The hexadecimal address for the two-byte Frame field is 0x800. It corresponds to the IP protocol (see above screenshot).
- 66 bytes appear before the ASCII 'O'.

ethernet-ethereal-trace-1

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

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

No.	Time	Source	Destination	Protocol	Length	Info
10	13:19:37.623598	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	686	IPv4
11	13:19:37.651896	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	60	IPv4
12	13:19:37.656065	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	1514	IPv4
13	13:19:37.657155	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	1514	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)

Address: AmbitMic\_a9:3d:68 (00:d0:59:a9:3d:68)

.... ..0. .... = LG bit: Globally unique address (factory default)

.... ..0. .... = IG bit: Individual address (unicast)

▼ Source: LinksysG\_da:af:73 (00:06:25:da:af:73)

Address: LinksysG\_da:af:73 (00:06:25:da:af:73)

.... ..0. .... = LG bit: Globally unique address (factory default)

.... ..0. .... = IG bit: Individual address (unicast)

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 .../0.7. 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

```

Data (data.data), 1500 bytes | Packets: 17 · Displayed: 17 (100.0%) · Load time: 0:0.1 | Profile: Default

9. The Internet Address column is the IP Address, the Physical Address column is the MAC Address, and the Type column indicates the protocol type.

```

Command Prompt
Microsoft Windows [Version 10.0.15063]
(c) 2017 Microsoft Corporation. All rights reserved.

C:\Users\Tyler>arp -a -v

Interface: 127.0.0.1 --- 0x1
Internet Address      Physical Address      Type
224.0.0.2             static
224.0.0.22            static
239.255.255.250       static

Interface: 0.0.0.0 --- 0xffffffff
Internet Address      Physical Address      Type
224.0.0.2             01-00-5e-00-00-02    static
224.0.0.22            01-00-5e-00-00-16    static

Interface: 0.0.0.0 --- 0xffffffff
Internet Address      Physical Address      Type
224.0.0.2             01-00-5e-00-00-02    static
224.0.0.22            01-00-5e-00-00-16    static

Interface: 0.0.0.0 --- 0xffffffff
Internet Address      Physical Address      Type
10.73.10.5            00-ff-69-53-25-94    invalid
10.73.10.7            ff-ff-ff-ff-ff-ff    static
224.0.0.2             01-00-5e-00-00-02    static
224.0.0.22            01-00-5e-00-00-16    static
224.0.0.251           01-00-5e-00-00-fb    static
224.0.0.252           01-00-5e-00-00-fc    static
239.255.255.250       01-00-5e-7f-ff-fa    static
255.255.255.255       ff-ff-ff-ff-ff-ff    static

Interface: 192.168.99.1 --- 0xe
Internet Address      Physical Address      Type
192.168.99.255       ff-ff-ff-ff-ff-ff    static

```

10.

a. Source address: 00:d0:59:a9:3d:68

ethernet-ethereal-trace-1

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

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

No.	Time	Source	Destination	Protocol	Length	Info
1	13:19:20.157130	AmbitMic_a9:3d:68	Broadcast	ARP	42	Who has 192.168.1.1? Tell 192.168.1.105
2	13:19:20.158148	LinksysG_da:af:73	AmbitMic_a9:3d:68	ARP	60	192.168.1.1 is at 00:06:25:da:af:73
3	13:19:20.158158	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
4	13:19:23.119980	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
5	13:19:29.128618	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
6	13:19:33.700104	Telebit_73:8d:ce	Broadcast	ARP	60	Who has 192.168.1.117? Tell 192.168.1.104
7	13:19:37.601553	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
8	13:19:37.623032	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	62	IPv4
9	13:19:37.623057	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	54	IPv4

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: 0:0.1 | Profile: Default

ethernet-ethereal-trace-1

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

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

No.	Time	Source	Destination	Protocol	Length	Info
1	13:19:20.157130	AmbitMic_a9:3d:68	Broadcast	ARP	42	Who has 192.168.1.1? Tell 192.168.1.105
2	13:19:20.158148	LinksysG_da:af:73	AmbitMic_a9:3d:68	ARP	60	192.168.1.1 is at 00:06:25:da:af:73
3	13:19:20.158158	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
4	13:19:23.119980	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
5	13:19:29.128618	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
6	13:19:33.700104	Telebit_73:8d:ce	Broadcast	ARP	60	Who has 192.168.1.117? Tell 192.168.1.104
7	13:19:37.601553	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
8	13:19:37.623032	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	62	IPv4
9	13:19:37.623057	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	54	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)

Address: Broadcast (ff:ff:ff:ff:ff:ff)

.... 1. .... = LG bit: Locally administered address (this is NOT the factory default)

.... 1. .... = IG bit: Group address (multicast/broadcast)

▼ Source: AmbitMic\_a9:3d:68 (00:d0:59:a9:3d:68)

Address: AmbitMic\_a9:3d:68 (00:d0:59:a9:3d:68)

.... 0. .... = LG bit: Globally unique address (factory default)

.... 0. .... = IG bit: Individual address (unicast)

```

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: 0:0.1 | Profile: Default

b. Destination address: ff:ff:ff:ff:ff:ff

ethernet-ethereal-trace-1

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

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No.	Time	Source	Destination	Protocol	Length	Info
1	13:19:20.157130	AmbitMic_a9:3d:68	Broadcast	ARP	42	Who has 192.168.1.1? Tell 192.168.1.105
2	13:19:20.158148	LinksysG_da:af:73	AmbitMic_a9:3d:68	ARP	60	192.168.1.1 is at 00:06:25:da:af:73
3	13:19:20.158158	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
4	13:19:23.119980	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
5	13:19:29.128618	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
6	13:19:33.700104	Telebit_73:8d:ce	Broadcast	ARP	60	Who has 192.168.1.117? Tell 192.168.1.104
7	13:19:37.601553	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
8	13:19:37.623032	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	62	IPv4
9	13:19:37.623057	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	54	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)

Address: Broadcast (ff:ff:ff:ff:ff:ff)

.... 1. .... = LG bit: Locally administered address (this is NOT the factory default)

.... 1. .... = IG bit: Group address (multicast/broadcast)

▼ Source: AmbitMic\_a9:3d:68 (00:d0:59:a9:3d:68)

Address: AmbitMic\_a9:3d:68 (00:d0:59:a9:3d:68)

.... 0. .... = LG bit: Globally unique address (factory default)

.... 0. .... = IG bit: Individual address (unicast)

```

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: 0:0.1 | Profile: Default

11. The hex value for the two-byte Ethernet frame field is 0x0806. This corresponds to the ARP protocol.

ethernet-ethereal-trace-1

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

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

No.	Time	Source	Destination	Protocol	Length	Info
1	13:19:20.157130	AmbitMic_a9:3d:68	Broadcast	ARP	42	Who has 192.168.1.1? Tell 192.168.1.105
2	13:19:20.158148	LinksysG_da:af:73	AmbitMic_a9:3d:68	ARP	60	192.168.1.1 is at 00:06:25:da:af:73
3	13:19:20.158158	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
4	13:19:23.119980	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
5	13:19:29.128618	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
6	13:19:33.700104	Telebit_73:8d:ce	Broadcast	ARP	60	Who has 192.168.1.117? Tell 192.168.1.104
7	13:19:37.601553	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
8	13:19:37.623032	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	62	IPv4
9	13:19:37.623057	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	54	IPv4

Address: Broadcast (ff:ff:ff:ff:ff:ff)  
 ....1. .... = LG bit: Locally administered address (this is NOT the factory default)  
 ....1. .... = IG bit: Group address (multicast/broadcast)  
 Source: AmbitMic\_a9:3d:68 (00:d0:59:a9:3d:68)  
 Address: AmbitMic\_a9:3d:68 (00:d0:59:a9:3d:68)  
 ....0. .... = LG bit: Globally unique address (factory default)  
 ....0. .... = IG bit: Individual address (unicast)  
 Type: ARP (0x0806)  
 Address Resolution Protocol (request)

0000 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: 0:0.1 · Profile: Default

- 12.
- There are 20 bytes before the ARP opcode.
  - The value is 1.
  - This does include the IP Address of the sender: 192.168.1.105
  - You can see the target MAC address as 00:00:00:00:00:00. This is the question for the machine whose IP address is being queried.



ethernet-ethereal-trace-1

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

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

No.	Time	Source	Destination	Protocol	Length	Info
1	13:19:20.157130	AmbitMic_a9:3d:68	Broadcast	ARP	42	Who has 192.168.1.1? Tell 192.168.1.105
2	13:19:20.158148	LinksysG_da:af:73	AmbitMic_a9:3d:68	ARP	60	192.168.1.1 is at 00:06:25:da:af:73
3	13:19:20.158158	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
4	13:19:23.119980	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
5	13:19:29.128618	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
6	13:19:33.700104	Telebit_73:8d:ce	Broadcast	ARP	60	Who has 192.168.1.117? Tell 192.168.1.104
7	13:19:37.601553	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
8	13:19:37.623032	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	62	IPv4
9	13:19:37.623057	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	54	IPv4

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: 0:0.1 | Profile: Default

13.

- There are 20 bytes before the ARP opcode.
- The value of the opcode field is 2, which means reply.
- The answer is in the Sender MAC address field. The MAC address is 00:06:25:da:af:73.

ethernet-ethereal-trace-1

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

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

No.	Time	Source	Destination	Protocol	Length	Info
1	13:19:20.157130	AmbitMic_a9:3d:68	Broadcast	ARP	42	Who has 192.168.1.1? Tell 192.168.1.105
2	13:19:20.158148	LinksysG_da:af:73	AmbitMic_a9:3d:68	ARP	60	192.168.1.1 is at 00:06:25:da:af:73
3	13:19:20.158158	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
4	13:19:23.119980	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
5	13:19:29.128618	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
6	13:19:33.700104	Telebit_73:8d:ce	Broadcast	ARP	60	Who has 192.168.1.117? Tell 192.168.1.104
7	13:19:37.601553	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
8	13:19:37.623032	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	62	IPv4
9	13:19:37.623057	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	54	IPv4

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

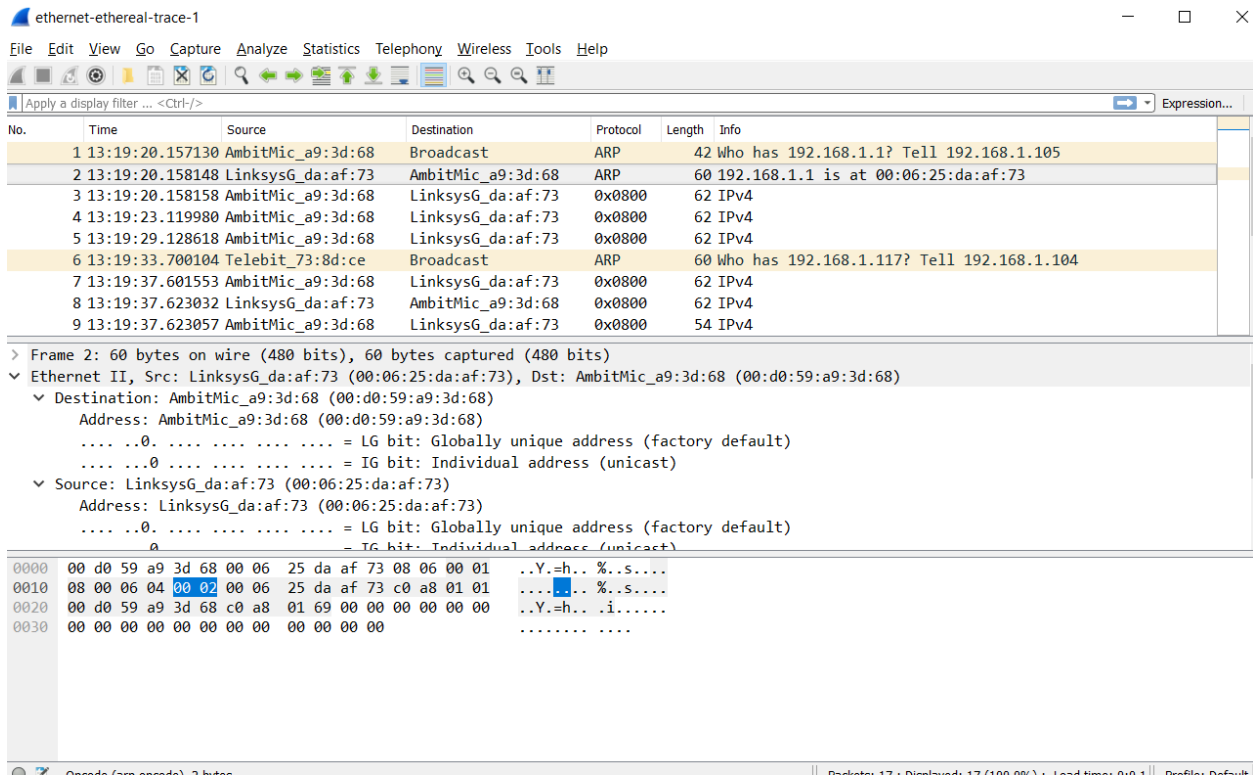
```

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 00 00 00  .....

```

14.

- Source: 00:06:25:da:af:73
- Destination: 00:d0:59:a9:3d:68



15. There is no reply because this trace doesn't have the machine that broadcast the message (as evidenced by the change in source IP address). The reply is sent directly back to the broadcaster so we won't see it.

ethernet-ethereal-trace-1

File Edit View Go Capture Analyze Statistics Telephony Wireless Tools Help

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

Expression...

No.	Time	Source	Destination	Protocol	Length	Info
1	13:19:20.157130	AmbitMic_a9:3d:68	Broadcast	ARP	42	Who has 192.168.1.1? Tell 192.168.1.105
2	13:19:20.158148	LinksysG_da:af:73	AmbitMic_a9:3d:68	ARP	60	192.168.1.1 is at 00:06:25:da:af:73
3	13:19:20.158158	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
4	13:19:23.119980	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
5	13:19:29.128618	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
6	13:19:33.700104	Telebit_73:8d:ce	Broadcast	ARP	60	Who has 192.168.1.117? Tell 192.168.1.104
7	13:19:37.601553	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	62	IPv4
8	13:19:37.623032	LinksysG_da:af:73	AmbitMic_a9:3d:68	0x0800	62	IPv4
9	13:19:37.623057	AmbitMic_a9:3d:68	LinksysG_da:af:73	0x0800	54	IPv4

Ethernet II, Src: Telebit\_73:8d:ce (00:80:ad:73:8d:ce), Dst: Broadcast (ff:ff:ff:ff:ff:ff)

Destination: Broadcast (ff:ff:ff:ff:ff:ff)

Address: Broadcast (ff:ff:ff:ff:ff:ff)

....1. .... = LG bit: Locally administered address (this is NOT the factory default)

....1. .... = IG bit: Group address (multicast/broadcast)

Source: Telebit\_73:8d:ce (00:80:ad:73:8d:ce)

Address: Telebit\_73:8d:ce (00:80:ad:73:8d:ce)

....0. .... = LG bit: Globally unique address (factory default)

....0. .... = IG bit: Individual address (unicast)

Type: ARP (0x0806)

0000	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 00 00 00 00	.....