

```
saravanan@saravanan-Inspiron-5520:~$ sudo dhclient -r  
[sudo] password for saravanan:  
saravanan@saravanan-Inspiron-5520:~$ sudo dhclient  
saravanan@saravanan-Inspiron-5520:~$ sudo dhclient  
RTNETLINK answers: File exists  
saravanan@saravanan-Inspiron-5520:~$ sudo dhclient -r  
Killed old client process  
saravanan@saravanan-Inspiron-5520:~$ sudo dhclient  
saravanan@saravanan-Inspiron-5520:~$ █
```

Renews IP

Releases IP



bootp

X → Expression... +

No.	Time	Source	Destination	Protocol	Length	Info
46	12.650542984	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xc97e230
49	13.478267522	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xc97e230
50	13.478468664	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xc97e230
51	13.482081889	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xc97e230
302	17.430385221	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xf7710f2c
303	17.473722076	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xf7710f2c
680	41.607923536	10.123.64.225	10.123.64.1	DHCP	342	DHCP Release - Transaction ID 0x22ec5649
696	47.042225469	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xa1831e08
697	47.049364011	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xa1831e08
698	47.049455627	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xa1831e08
699	47.053087091	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xa1831e08



Captured Packets

► Frame 46: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface 0
► Ethernet II, Src: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
► Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
► User Datagram Protocol, Src Port: 68, Dst Port: 67
► Bootstrap Protocol (Discover)

0020	ff ff	00 44 00 43 01 34	72 41	01 01 06 00 0c 97	..D.C.4 rA.....
0030	e2 30	00 00 00 00 00 00	00 00	00 00 00 00 00 00	.0.....
0040	00 00	00 00 00 00 c0 18	85 c2 84 ed	00 00 00 00 00 00
0050	00 00	00 00 00 00 00 00	00 00	00 00 00 00 00 00
0060	00 00	00 00 00 00 00 00	00 00	00 00 00 00 00 00
0070	00 00	00 00 00 00 00 00	00 00	00 00 00 00 00 00

User Datagram Protocol (udp), 8 bytes

Packets: 956 · Displayed: 11 (1.2%) · Dropped: 0 (0.0%) · Profile: Default



bootp

Expression... +

No.	Time	Source	Destination	Protocol	Length	Info
46	12.650542984	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xc97e230
49	13.478267522	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xc97e230
50	13.478468664	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xc97e230
51	13.482081889	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xc97e230
302	17.430385221	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xf7710f2c
303	17.473722076	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xf7710f2c
680	41.607923536	10.123.64.225	10.123.64.1	DHCP	342	DHCP Release - Transaction ID 0x22ec5649
696	47.042225469	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xa1831e08
697	47.049364011	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xa1831e08
698	47.049455627	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xa1831e08
699	47.053087091	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xa1831e08

- ▶ Frame 46: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface 0
- ▶ Ethernet II, Src: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
- ▶ Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255

User Datagram Protocol, Src Port: 68, Dst Port: 67

Source Port: 68
Destination Port: 67
Length: 308
Checksum: 0x7241 [unverified]
[Checksum Status: Unverified]
[Stream index: 1]

Bootstrap Protocol (Discover)

DHCP messages are sent over UDP

0020	ff ff	00 44 00 43 01 34	72 41	01 01 06 00 0c 97	..D.C.4 rA.....
0030	e2 30	00 00 00 00 00 00	00 00	00 00 00 00 00 00	.0.....
0040	00 00	00 00 00 00 c0 18	85 c2 84 ed	00 00 00 00 00 00
0050	00 00	00 00 00 00 00 00	00 00	00 00 00 00 00 00
0060	00 00	00 00 00 00 00 00	00 00	00 00 00 00 00 00
0070	00 00	00 00 00 00 00 00	00 00	00 00 00 00 00 00



2) DHCP uses Client-Server architecture

Time	0.0.0.0 Source IP 255.255.255.255	10.123.64.1 Destination IP	Comment
12.650542984	68 DHCP Discover - Transaction ID 0xc97e230 Port Number	67 Port Number	DHCP: DHCP Discover - Transaction ID 0xc97e230
13.478267522	Port Number	68 DHCP Offer - Transaction ID 0xc97e230 Port Number 68	DHCP: DHCP Offer - Transaction ID 0xc97e230
13.478468664	68 DHCP Request - Transaction ID 0xc97e230 Port Number	67 Port Number	DHCP: DHCP Request - Transaction ID 0xc97e230
13.482081889	Port Number	67 Port Number 68 DHCP ACK - Transaction ID 0xc97e230 Port Number 68	DHCP: DHCP ACK - Transaction ID 0xc97e230

bootp

X Expression... + dhcp

No.	Time	Source	Destination	Protocol	Length	Info
46	12.650542984	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xc97e230
49	13.478267522	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xc97e230
50	13.478468664	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xc97e230
51	13.482081889	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xc97e230
302	17.430385221	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xf7710f2c
303	17.473722076	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xf7710f2c
680	41.607923536	10.123.64.225	10.123.64.1	DHCP	342	DHCP Release - Transaction ID 0x22ec5649
696	47.042225469	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xa1831e08
697	47.049364011	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xa1831e08
698	47.049455627	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xa1831e08
699	47.053087091	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xa1831e08

Ethernet Address of host

Frame 46: 342 bytes on wire (2736 bits) 342 bytes captured (2736 bits) on interface 0

Ethernet II, Src: HonHaiPr_c2:84:ed [REDACTED], Dst: Broadcast (ff:ff:ff:ff:ff:ff)

- Destination: Broadcast (ff:ff:ff:ff:ff:ff)
- Source: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)
- Type: IPv4 (0x0800)

Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255

User Datagram Protocol, Src Port: 68, Dst Port: 67

Bootstrap Protocol (Discover)

0000	ff ff ff ff ff ff c0 18	85 c2 84 ed 08 00 45 10	E.....E.
0010	01 48 00 00 00 00 80 11	39 96 00 00 00 00 ff ff	H.....9.....
0020	ff ff 00 44 00 43 01 34	72 41 01 01 06 00 0c 97D.C.4 rA.....
0030	e2 30 00 00 00 00 00 00	00 00 00 00 00 00 00 00	0.....
0040	00 00 00 00 00 00 c0 18	85 c2 84 ed 00 00 00 00
0050	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00

Frame (frame), 342 bytes

Packets: 956 · Displayed: 11 (1.2%)

Profile: Default

No.	Time	Source	Destination	Protocol	Length	Info
46	12.650542984	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xc97e230
49	13.478267522	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xc97e230
50	13.478468664	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xc97e230
51	13.482081889	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xc97e230
302	17.430385221	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xf7710f2c
303	17.473722076	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xf7710f2c
680	41.607923536	10.123.64.225	10.123.64.1	DHCP	342	DHCP Release - Transaction ID 0x22ec5649
696	47.042225469	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xa1831e08
697	47.049364011	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xa1831e08
698	47.049455627	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xa1831e08
699	47.053087091	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xa1831e08

Next server IP address: 0.0.0.0
 Relay agent IP address: 0.0.0.0
 Client MAC address: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)
 Client hardware address padding: 000000000000000000000000
 Server host name not given
 Boot file name not given
 Magic cookie: DHCP

▼ Option: (53) DHCP Message Type (Discover)

Length: 1

DHCP: Discover (1)

► Option: (50) Requested IP Address

► Option: (12) Host Name

► Option: (55) Parameter Request List

► Option: (255) End

Padding: 00000000000000000000

Message type is Different
for DHCP discover and
request message

0000	ff ff ff ff ff c0 18	85 c2 84 ed 08 00 45 10	E.....
0010	01 48 00 00 00 80 11	39 96 00 00 00 00 ff ff	H..... 9.....
0020	ff ff 00 44 00 43 01 34	72 41 01 01 06 00 00 97	..D.C.4 rA.....
0030	e2 30 00 00 00 00 00 00	00 00 00 00 00 00 00 00	0.....
0040	00 00 00 00 00 00 c0 18	85 c2 84 ed 00 00 00 00
0050	00 00 00 00 00 00 00 00	00 00 00 00 00 00 00 00

No.	Time	Source	Destination	Protocol	Length	Info
46	12.650542984	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xc97e230
49	13.478267522	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xc97e230
50	13.478468664	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xc97e230
51	13.482081889	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xc97e230
302	17.430385221	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xf7710f2c
303	17.473722076	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xf7710f2c
680	41.607923536	10.123.64.225	10.123.64.1	DHCP	342	DHCP Release - Transaction ID 0x22ec5649
696	47.042225469	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xa1831e08
697	47.049364011	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xa1831e08
698	47.049455627	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xa1831e08
699	47.053087091	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xa1831e08

Relay agent IP address: 0.0.0.0
Client MAC address: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)
Client hardware address padding: 00000000000000000000
Server host name not given
Boot file name not given
Magic cookie: DHCP
▼ Option: (53) DHCP Message Type (Request)
 Length: 1
 DHCP: Request (3)
► Option: (54) DHCP Server Identifier
► Option: (50) Requested IP Address
▼ Option: (12) Host Name

DHCP message type and Server Identifier is different for DHCP request and discover message

0100	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0110	00	00	00	00	00	63	82	53	63	35	01	03	36	04
0120	7b	40	01	32	04	0a	7b	40	e1	0c	17	73	61	72
0130	61	6e	61	6e	2d	49	6e	73	70	69	72	6f	6e	2d
0140	32	30	37	0d	01	1c	02	03	0f	06	77	0c	2c	2f
0150	2a	ff	00	00	00	00	00	00	00	00	00	00	00	00

.....
.....c. Sc5..6.
{@.2..{@ ...sarav
anan-Ins piron-55
207..... .w.,/.y
*



bootp

Expression... + dhcp

No.	Time	Source	Destination	Protocol	Length	Info
46	12.650542984	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xc97e230
49	13.478267522	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xc97e230
50	13.478468664	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xc97e230
51	13.482081889	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xc97e230

Transaction id for first 4
DHCP messages



Wireshark · Packet 51 · wireshark

- ▶ Frame 51: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface eth0 at 13:48:20.081889 → (Broadcast) (Ethernet II [src: Fortinet_71 (08:00:27:01:00:00) [dst: 255.255.255.255 (ff:ff:ff:ff:ff:ff)]]) [ethernet] [arp] [tcp] [http]
- ▶ Ethernet II, Src: Fortinet_71 (08:00:27:01:00:00), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
- ▶ Internet Protocol Version 4, Src: 10.123.64.1 (10.123.64.1), Dst: 255.255.255.255 (ff:ff:ff:ff:ff:ff)
- ▶ User Datagram Protocol, Src Port: 63321 (63321), Dst Port: 67 (DHCP)
- ▼ Bootstrap Protocol (ACK)
 - Message type: Boot Reply (2)
 - Hardware type: Ethernet (0x0800)
 - Hardware address length: 6
 - Hops: 0
 - Transaction ID: 0x0c97e230
 - Seconds elapsed: 0
 - Bootp flags: 0x0000 (Unicast)
 - Client IP address: 0.0.0.0
 - Your (client) IP address: 10.123.64.1
 - Next server IP address: 0.0.0.0
 - Relay agent IP address: 0.0.0.0
 - Client MAC address: HonHaiPr_c2:00:00
 - Client hardware address padding
 - Server host name not given
 - Boot file name not given
 - Magic cookie: DHCP
 - Option: (53) DHCP Message Type
 - Option: (54) DHCP Server Identifier
 - Option: (51) IP Address Lease Time
 - Option: (1) Subnet Mask
 - Option: (2) Time Offset

No.: 51 · Time: 13.48208... Transaction ID 0xc97e230

Help

Close

Wireshark · Packet 46 · wireshark

- ▶ Frame 46: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface eth0 at 13:47:52.078267 → (Broadcast) (Ethernet II [src: HonHaiPr_c2:00:00 [dst: 255.255.255.255 (ff:ff:ff:ff:ff:ff)]]) [ethernet] [arp] [tcp] [http]
- ▶ Ethernet II, Src: HonHaiPr_c2:00:00 (08:00:27:c2:00:00), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
- ▶ Internet Protocol Version 4, Src: 10.123.64.1 (10.123.64.1), Dst: 255.255.255.255 (ff:ff:ff:ff:ff:ff)
- ▶ User Datagram Protocol, Src Port: 63321 (63321), Dst Port: 67 (DHCP)
- ▼ Bootstrap Protocol (Discover)
 - Message type: Boot Request (1)
 - Hardware type: Ethernet (0x0800)
 - Hardware address length: 6
 - Hops: 0
 - Transaction ID: 0x0c97e230
 - Seconds elapsed: 0
 - Bootp flags: 0x0000 (Unicast)
 - Client IP address: 0.0.0.0
 - Your (client) IP address: 0.0.0.0
 - Next server IP address: 0.0.0.0
 - Relay agent IP address: 0.0.0.0
 - Client MAC address: HonHaiPr_c2:00:00
 - Client hardware address padding
 - Server host name not given
 - Boot file name not given
 - Magic cookie: DHCP
 - Option: (53) DHCP Message Type
 - Option: (50) Requested IP Address
 - Option: (12) Host Name
 - Option: (55) Parameter Request
 - Option: (255) End

No.: 46 · Time: 12.650542... Transaction ID 0xc97e230

Help

Close

Wireshark · Packet 50 · wireshark

- ▶ Frame 50: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface eth0 at 13:47:54.078468 → (Broadcast) (Ethernet II [src: HonHaiPr_c2:00:00 [dst: 255.255.255.255 (ff:ff:ff:ff:ff:ff)]]) [ethernet] [arp] [tcp] [http]
- ▶ Ethernet II, Src: HonHaiPr_c2:00:00 (08:00:27:c2:00:00), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
- ▶ Internet Protocol Version 4, Src: 10.123.64.1 (10.123.64.1), Dst: 255.255.255.255 (ff:ff:ff:ff:ff:ff)
- ▶ User Datagram Protocol, Src Port: 63321 (63321), Dst Port: 67 (DHCP)
- ▼ Bootstrap Protocol (Request)
 - Message type: Boot Request (1)
 - Hardware type: Ethernet (0x0800)
 - Hardware address length: 6
 - Hops: 0
 - Transaction ID: 0x0c97e230
 - Seconds elapsed: 0
 - Bootp flags: 0x0000 (Unicast)
 - Client IP address: 0.0.0.0
 - Your (client) IP address: 0.0.0.0
 - Next server IP address: 0.0.0.0
 - Relay agent IP address: 0.0.0.0
 - Client MAC address: HonHaiPr_c2:00:00
 - Client hardware address padding
 - Server host name not given
 - Boot file name not given
 - Magic cookie: DHCP
 - Option: (53) DHCP Message Type
 - Option: (50) Requested IP Address
 - Option: (12) Host Name
 - Option: (55) Parameter Request
 - Option: (255) End

No.: 50 · Time: 13.478468... Transaction ID 0xc97e230

Help

Close

Wireshark · Packet 49 · wireshark

- ▶ Frame 49: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface eth0 at 13:47:54.078468 → (Broadcast) (Ethernet II [src: HonHaiPr_c2:00:00 [dst: 255.255.255.255 (ff:ff:ff:ff:ff:ff)]]) [ethernet] [arp] [tcp] [http]
- ▶ Ethernet II, Src: HonHaiPr_c2:00:00 (08:00:27:c2:00:00), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
- ▶ Internet Protocol Version 4, Src: 10.123.64.1 (10.123.64.1), Dst: 255.255.255.255 (ff:ff:ff:ff:ff:ff)
- ▶ User Datagram Protocol, Src Port: 63321 (63321), Dst Port: 67 (DHCP)
- ▼ Bootstrap Protocol (Offer)
 - Message type: Boot Reply (2)
 - Hardware type: Ethernet (0x0800)
 - Hardware address length: 6
 - Hops: 0
 - Transaction ID: 0x0c97e230
 - Seconds elapsed: 0
 - Bootp flags: 0x0000 (Unicast)
 - Client IP address: 0.0.0.0
 - Your (client) IP address: 10.123.64.1
 - Next server IP address: 0.0.0.0
 - Relay agent IP address: 0.0.0.0
 - Client MAC address: HonHaiPr_c2:00:00
 - Client hardware address padding
 - Server host name not given
 - Boot file name not given
 - Magic cookie: DHCP
 - Option: (53) DHCP Message Type
 - Option: (54) DHCP Server Identifier
 - Option: (51) IP Address Lease Time
 - Option: (1) Subnet Mask
 - Option: (2) Time Offset

No.: 49 · Time: 13.478267... Transaction ID 0xc97e230

Help

Close

boot

No.	Time	Source	Destination	Protocol	Length	Info
46	12.650542984	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xc97e230
49	13.478267522	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xc97e230
50	13.478468664	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xc97e230
51	13.482081889	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xc97e230
302	17.430385221	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xf7710f2c
303	17.473722076	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xf7710f2c

Wireshark · Packet 303 · wireshark_wlp8s0_20170719010113_zx85Rb

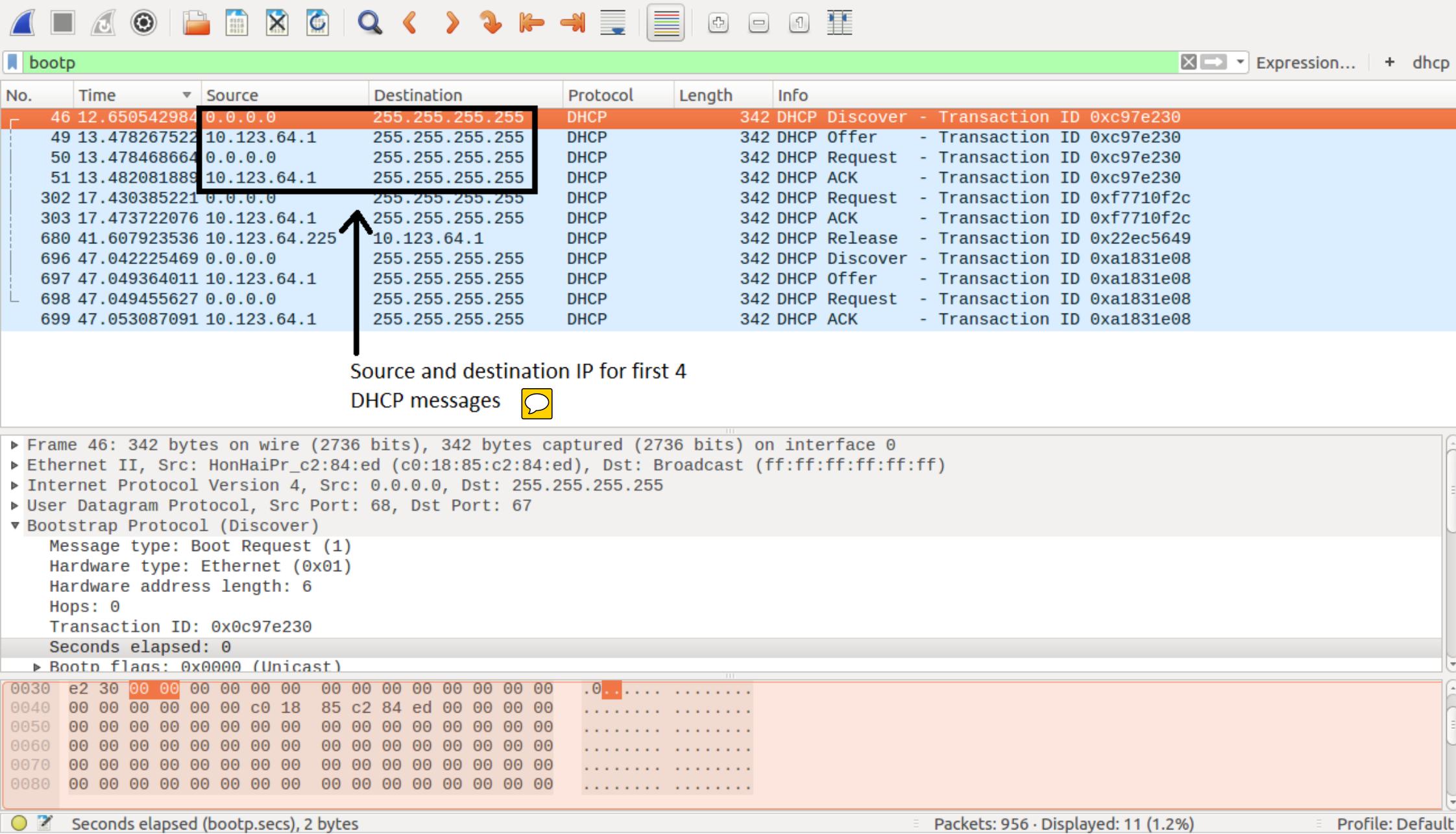
- ▶ Frame 303: 342 bytes on wire (2736 bits), 342 bytes captured
- ▶ Ethernet II, Src: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb), Dst: Broadcast
- ▶ Internet Protocol Version 4, Src: 10.123.64.1, Dst: 255.255.255.255
- ▶ User Datagram Protocol, Src Port: 67, Dst Port: 68
- ▼ Bootstrap Protocol (ACK)
 - Message type: Boot Reply (2)
 - Hardware type: Ethernet (0x01)
 - Hardware address length: 6
 - Hops: 0
 - Transaction ID: 0xf7710f2c**
 - Seconds elapsed: 0
- ▶ Bootp flags: 0x0000 (Unicast)
- Client IP address: 0.0.0.0
- Your (client) IP address: 10.123.64.225
- Next server IP address: 0.0.0.0
- Relay agent IP address: 0.0.0.0
- Client MAC address: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)
- Client hardware address padding: 000000000000000000000000
- Server host name not given
- Boot file name not given
- Magic cookie: DHCP
- ▶ Option: (53) DHCP Message Type (ACK)
- ▶ Option: (54) DHCP Server Identifier
- ▶ Option: (51) IP Address Lease Time
- ▶ Option: (1) Subnet Mask
- ▶ Option: (2) Time Offset

Wireshark · Packet 302 · wireshark_wlp8s0_20170719010113_zx85Rb

- ▶ Frame 302: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits)
- ▶ Ethernet II, Src: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed), Dst: Broadcast
- ▶ Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
- ▶ User Datagram Protocol, Src Port: 68, Dst Port: 67
- ▼ Bootstrap Protocol (Request)
 - Message type: Boot Request (1)
 - Hardware type: Ethernet (0x01)
 - Hardware address length: 6
 - Hops: 0
 - Transaction ID: 0xf7710f2c**
 - Seconds elapsed: 0
- ▶ Bootp flags: 0x0000 (Unicast)
- Client IP address: 0.0.0.0
- Your (client) IP address: 0.0.0.0
- Next server IP address: 0.0.0.0
- Relay agent IP address: 0.0.0.0
- Client MAC address: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)
- Client hardware address padding: 000000000000000000000000
- Server host name not given
- Boot file name not given
- Magic cookie: DHCP
- ▶ Option: (53) DHCP Message Type (Request)
- ▶ Option: (50) Requested IP Address
- ▶ Option: (12) Host Name
- ▶ Option: (55) Parameter Request List

Transaction id for second set
of DHCP messages

The transaction ID is
different so that the host
can distinguish between
different requests made by
the user.





bootp

No.	Time	Source	Destination	Protocol	Length	Info
46	12.650542984	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xc97e230
49	13.478267522	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xc97e230
50	13.478468664	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xc97e230
51	13.482081889	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xc97e230
302	17.430385221	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xf7710f2c
303	17.473722076	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xf7710f2c
680	41.607923536	10.123.64.225	10.123.64.1	DHCP	342	DHCP Release - Transaction ID 0x22ec5649
696	47.042225469	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xa1831e08
697	47.049364011	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xa1831e08
698	47.049455627	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xa1831e08
699	47.053087091	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xa1831e08

IP Address of DHCP Server



▶ Frame 46: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface 0
▶ Ethernet II, Src: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
▶ Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
▶ User Datagram Protocol, Src Port: 68, Dst Port: 67
▼ Bootstrap Protocol (Discover)

Message type: Boot Request (1)
Hardware type: Ethernet (0x01)
Hardware address length: 6
Hops: 0
Transaction ID: 0xc97e230
Seconds elapsed: 0

▶ Bootn flags: 0x0000 (Unicast)

0030	e2	30	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.0...
0040	00	00	00	00	00	00	c0	18	85	c2	84	ed	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
0050	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
0060	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
0070	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	
0080	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	

No.	Time	Source	Destination	Protocol	Length	Info
46	12.650542984	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xc97e230
49	13.478267522	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xc97e230
50	13.478468664	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xc97e230
51	13.482081889	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xc97e230
302	17.430385221	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xf7710f2c
303	17.473722076	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xf7710f2c
680	41.607923536	10.123.64.225	10.123.64.1	DHCP	342	DHCP Release - Transaction ID 0x22ec5649
696	47.042225469	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xa1831e08
697	47.049364011	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xa1831e08
698	47.049455627	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xa1831e08
699	47.053087091	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xa1831e08

Transaction ID: 0xc97e230

Seconds elapsed: 0

► Bootp flags: 0x0000 (Unicast)

Client IP address: 0.0.0.0

Your (client) IP address: 10.123.64.225

IP Address offered by DHCP server

Next server IP address: 0.0.0.0

Relay agent IP address: 0.0.0.0

Client MAC address: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)

Client hardware address padding: 000000000000000000000000

Server host name not given

Boot file name not given

Magic cookie: DHCP

▼ Option: (53) DHCP Message Type (Offer)

Length: 1

DHCP: Offer (2)

► Option: (54) DHCP Server Identifier

▼ Option: (51) IP Address Lease Time

Length: 4

IP Address Lease Time: (28890s) 8 hours Lease time

► Option: (1) Subnet Mask

► Option: (2) Time Offset

► Option: (3) Router

► Option: (6) Domain Name Server



The offer message contains the
DHCP address offered by server



10) DHCP Server provides the following info apart from IP address

- DNS Information
- Subnet Mask
- IP Address → lease time, Default IP time to live, IP renewal time
- Router IP Address
- Relay Agent IP address

No.	Time	Source	Destination	Protocol	Length	Info
46	12.650542984	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xc97e230
49	13.478267522	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xc97e230
50	13.478468664	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xc97e230
51	13.482081889	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xc97e230
302	17.430385221	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xf7710f2c
303	17.473722076	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xf7710f2c
680	41.607923536	10.123.64.225	10.123.64.1	DHCP	342	DHCP Release - Transaction ID 0x22ec5649
696	47.042225469	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xa1831e08
697	47.049364011	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xa1831e08
698	47.049455627	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xa1831e08
699	47.053087091	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xa1831e08

Transaction ID: 0x0c97e230

Seconds elapsed: 0

► Bootp flags: 0x0000 (Unicast)

Client IP address: 0.0.0.0

Your (client) IP address: 10.123.64.225

Next server IP address: 0.0.0.0

Relay agent IP address: 0.0.0.0

Client MAC address: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)

Client hardware address padding: 000000000000000000000000

Server host name not given

Boot file name not given

Magic cookie: DHCP

▼ Option: (53) DHCP Message Type (ACK)

Length: 1

DHCP: ACK (5)

▼ Option: (54) DHCP Server Identifier

Length: 4

DHCP Server Identifier: 10.123.64.1

▼ Option: (51) IP Address Lease Time

Length: 4



There is no relay agent in my experiment. The value of Relay agent IP address (0.0.0.0) indicates its absence

No.	Time	Source	Destination	Protocol	Length	Info
46	12.650542984	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xc97e230
49	13.478267522	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xc97e230
50	13.478468664	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xc97e230
51	13.482081889	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xc97e230
302	17.430385221	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xf7710f2c
303	17.473722076	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xf7710f2c
680	41.607923536	10.123.64.225	10.123.64.1	DHCP	342	DHCP Release - Transaction ID 0x22ec5649
696	47.042225469	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xa1831e08
697	47.049364011	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xa1831e08
698	47.049455627	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xa1831e08
699	47.053087091	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xa1831e08

Relay agent IP address: 0.0.0.0

Client MAC address: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)

Client hardware address padding: 000000000000000000000000

Server host name not given

Boot file name not given

Magic cookie: DHCP

► Option: (53) DHCP Message Type (Offer)

► Option: (54) DHCP Server Identifier

► Option: (51) IP Address Lease Time

▼ Option: (1) Subnet Mask

Length: 4

Subnet Mask: 255.255.224.0

▼ Option: (2) Time Offset

Length: 4

Time Offset: (-25200s) -7 hours

▼ Option: (3) Router

Length: 4

Router: 10.123.64.1

IP Address of Default Router

▼ Option: (6) Domain Name

Length: 8

Domain Name Server: 128.125.7.23

Domain Name Server: 128.125.253.194

▼ Option: (58) Renewal Time Value



Purpose of Subnet mask lines in DHCP offer message

- Tells the client which subnet mask to use, helps the client recognise whether the device is in local network or not using IP

Purpose of router in DHCP offer message

- Indicates where the client should send messages by default. Useful when client wants to send messages to different network

No.	Time	Source	Destination	Protocol	Length	Info
46	12.650542984	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xc97e230
49	13.478267522	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xc97e230
50	13.478468664	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xc97e230
51	13.482081889	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xc97e230
302	17.430385221	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xf7710f2c
303	17.473722076	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xf7710f2c
680	41.607923536	10.123.64.225	10.123.64.1	DHCP	342	DHCP Release - Transaction ID 0x22ec5649
696	47.042225469	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xa1831e08
697	47.049364011	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xa1831e08
698	47.049455627	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xa1831e08
699	47.053087091	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xa1831e08

Hops: 0

Transaction ID: 0xc97e230

Seconds elapsed: 0

► Bootp flags: 0x0000 (Unicast)



Client IP address: 0.0.0.0

Your (client) IP address: 0.0.0.0

Next server IP address: 0.0.0.0

Relay agent IP address: 0.0.0.0

Client MAC address: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)

Client hardware address padding: 000000000000000000000000

Server host name not given

Boot file name not given

Magic cookie: DHCP

► Option: (53) DHCP Message Type (Request)

► Option: (54) DHCP Server Identifier

▼ Option: (50) Requested IP Address

Length: 4

Requested IP Address: 10.123.64.225

No, the client doesn't accept
the IP after offer message

► Option: (12) Host Name

► Option: (55) Parameter Request List

► Option: (255) End

Padding: 00000000

Client's requested IP address

14)



- The purpose of the Release message is to ensure that the IP address is returned (released) back to the server
- No, the Server does not issue an acknowledgment of receipt of the client's DHCP request
- If the message is lost, the client releases its IP address, however the server will not reassign that particular address until the client's lease on the address expires.

No.	Time	Source	Destination	Protocol	Length	Info
38	8.894268134	HonHaiPr_c2:84:	Broadcast	ARP	42	Who has 128.125.253.194? Tell 192.168.122.1
39	9.823944946	fe80::565b:542:	ff02::fb	MDNS	102	Standard query 0x0000 PTR _googlecast._tcp.local, "QM" quest...
40	9.824248377	fe80::565b:542:	ff02::fb	MDNS	102	Standard query 0x0000 PTR _googlecast._tcp.local, "QM" quest...
41	9.893471630	Fortinet_71:a4:	HonHaiPr_c2:84:ed	ARP	56	Who has 10.123.64.225? Tell 10.123.64.1
42	9.894020567	HonHaiPr_c2:84:	Broadcast	ARP	42	Who has 128.125.253.194? Tell 192.168.122.1
43	9.894080541	HonHaiPr_c2:84:	Broadcast	ARP	42	Who has 128.125.7.23? Tell 192.168.122.1
44	10.989774016	Fortinet_71:a4:	HonHaiPr_c2:84:ed	ARP	56	Who has 10.123.64.225? Tell 10.123.64.1
45	11.988563679	Fortinet_71:a4:	HonHaiPr_c2:84:ed	ARP	56	Who has 10.123.64.225? Tell 10.123.64.1
46	12.650542984	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover - Transaction ID 0xc97e230
47	13.438172939	HonHaiPr_c2:84:	Broadcast	ARP	42	Who has 128.125.7.23? Tell 192.168.122.1
48	13.438394823	HonHaiPr_c2:84:	Broadcast	ARP	42	Who has 128.125.253.194? Tell 192.168.122.1
49	13.478267522	10.123.64.1	255.255.255.255	DHCP	342	DHCP Offer - Transaction ID 0xc97e230
50	13.478468664	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request - Transaction ID 0xc97e230
51	13.482081889	10.123.64.1	255.255.255.255	DHCP	342	DHCP ACK - Transaction ID 0xc97e230

► Frame 46: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface 0
 ► Ethernet II, Src: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
 ► Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255.255
 ► User Datagram Protocol, Src Port: 68, Dst Port: 67
 ▼ Bootstrap Protocol (Discover)

Message type: Boot Request (1)
 Hardware type: Ethernet (0x01)
 Hardware address length: 6
 Hops: 0
 Transaction ID: 0xc97e230
 Seconds elapsed: 0
 ▶ Bootp flags: 0x0000 (Unicast)
 Client IP address: 0.0.0.0
 Your (client) IP address: 0.0.0.0
 Next server IP address: 0.0.0.0
 Relay agent IP address: 0.0.0.0
 Client MAC address: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)
 Client hardware address padding: 000000000000000000000000
 Server host name not given
 Boot file name not given



Yes, there are ARP packets sent/received during the DHCP packet-exchange period.

They appear to be broadcasts sent out by network to build up the known IP addresses by the client's network

```
saravanan@saravanan-Inspiron-5520:~$ arp
Address           HWtype  HWaddress          Flags Mask   Iface
ns-rec2.usc.edu      ether   (incomplete)
fw31-v1437-gw.usc.edu  ether   08:5b:0e:71:a4:fb  C      wlp8s0
ns-rec1.usc.edu      ether   (incomplete)
saravanan@saravanan-Inspiron-5520:~$ █
```

Flags: indicate if the mac address has been learned, manually set, published (announced by another node than the requested) or is incomplete.



HWaddress: MAC address

Address: Hostname or IP address

Iface: Select an interface. When dumping the ARP cache only entries matching the specified interface will be printed.

HWtype: Denotes the hardware type, here its ethernet

No.	Time	Source	Destination	Protocol	Length	Info
112	17.989122513	Fortinet_71:a4...	HonHaiPr_c2:84:ed	ARP	56	56 Who has 10.123.64.225? Tell 10.123.64.1
113	17.989153866	HonHaiPr_c2:84...	Fortinet_71:a4:fb	ARP	42	42 10.123.64.225 is at c0:18:85:c2:84:ed
114	18.065420364	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
115	18.102109311	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
116	18.134118341	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
117	18.145773639	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
118	18.198120818	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
119	18.201540169	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
120	18.582104926	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
121	18.653379569	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4

► Frame 112: 56 bytes on wire (448 bits), 56 bytes captured (448 bits) on interface 0
 ► Ethernet II, Src: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb), Dst: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)
 ▼ Address Resolution Protocol (request)

Hardware type: Ethernet (1)
 Protocol type: IPv4 (0x0800)
 Hardware size: 6
 Protocol size: 4
 Opcode: request (1)

 Sender MAC address: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb) Source MAC Address
 Sender IP address: 10.123.64.1
 Target MAC address: 00:00:00_00:00:00 (00:00:00:00:00:00) Destination MAC Address
 Target IP address: 10.123.64.225

0000	c0 18 85 c2 84 ed 08 5b 0e 71 a4 fb 08 06 00 01[.q.....
0010	08 00 06 04 00 01 08 5b 0e 71 a4 fb 0a 7b 40 01[.q...{@.
0020	00 00 00 00 00 00 0a 7b 40 e1 00 00 00 00 00 00{@.....
0030	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

No.	Time	Source	Destination	Protocol	Length	Info
112	17.989122513	Fortinet_71:a4...	HonHaiPr_c2:84:ed	ARP	56	Who has 10.123.64.225? Tell 10.123.64.1
113	17.989153866	HonHaiPr_c2:84...	Fortinet_71:a4:fb	ARP	42	10.123.64.225 is at c0:18:85:c2:84:ed
114	18.065420364	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
115	18.102109311	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
116	18.134118341	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
117	18.145773639	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
118	18.198120818	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
119	18.201540169	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
120	18.582104926	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
121	18.653379569	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4

▶ Frame 112: 56 bytes on wire (448 bits), 56 bytes captured (448 bits) on interface 0
 ▼ Ethernet II, Src: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb), Dst: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)
 ▶ Destination: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)
 ▶ Source: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb)
 Type: ARP (0x0806)
 Trailer: 00000000000000000000000000000000
 ▶ Address Resolution Protocol (request)

hexadecimal value for the two byte Ethernet Frame type field

0000	c0	18	85	c2	84	ed	08	5b	0e	71	a4	fb	08	06	00	01	[.q....]
0010	08	00	06	04	00	01	08	5b	0e	71	a4	fb	0a	7b	40	01	[.q...{@.]
0020	00	00	00	00	00	00	0a	7b	40	e1	00	00	00	00	00	00	{ @.....
0030	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	



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

Expression... + dhcp

No.	Time	Source	Destination	Protocol	Length	Info
112	17.989122513	Fortinet_71:a4...	HonHaiPr_c2:84:ed	ARP	56	Who has 10.123.64.225? Tell 10.123.64.1
113	17.989153866	HonHaiPr_c2:84...	Fortinet_71:a4:fb	ARP	42	10.123.64.225 is at c0:18:85:c2:84:ed
114	18.065420364	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
115	18.102109311	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
116	18.134118341	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
117	18.145773639	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
118	18.198120818	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
119	18.201540169	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
120	18.582104926	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
121	18.653379569	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4

[Coloring Rule Name: ARP]
[Coloring Rule String: arp]

▼ Ethernet II, Src: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb), Dst: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)

► Destination: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)
► Source: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb)
Type: ARP (0x0806)

Trailer: 00000000000000000000000000000000



a) ARP opcode begins 20 bytes
from the beginning of ethernet
frame

▼ Address Resolution Protocol (request)

Hardware type: Ethernet (1)
Protocol type: IPv4 (0x0800)
Hardware size: 6
Protocol size: 4
Opcode: request (1) hex value 0x001
Sender MAC address: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb)
Sender IP address: 10.123.64.1
Target MAC address: 00:00:00_00:00:00 (00:00:00:00:00:00)
Target IP address: 10.123.64.225

0000	c0 18 85 c2 84 ed 08 5b 0e 71 a4 fb 08 06 00 01[.q.....
0010	08 00 06 04 00 01 08 5b 0e 71 a4 fb 0a 7b 40 01[.q...{@.
0020	00 00 00 00 00 00 0a 7b 40 e1 00 00 00 00 00 00{@.....
0030	00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00



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

Expression... + dhcp

No.	Time	Source	Destination	Protocol	Length	Info
112	17.989122513	Fortinet_71:a4...	HonHaiPr_c2:84:ed	ARP	56	Who has 10.123.64.225? Tell 10.123.64.1
113	17.989153866	HonHaiPr_c2:84...	Fortinet_71:a4:fb	ARP	42	10.123.64.225 is at c0:18:85:c2:84:ed
114	18.065420364	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
115	18.102109311	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
116	18.134118341	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
117	18.145773639	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
118	18.198120818	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
119	18.201540169	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
120	18.582104926	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
121	18.653379569	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4

[Coloring Rule Name: ARP]
[Coloring Rule String: arp]

▼ Ethernet II, Src: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb), Dst: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)

► Destination: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)
► Source: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb)
Type: ARP (0x0806)
Trailer: 00000000000000000000000000000000

▼ Address Resolution Protocol (request)

Hardware type: Ethernet (1)
Protocol type: IPv4 (0x0800)

Hardware size: 6

Protocol size: 4

Opcode: request (1) 

Sender MAC address: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb)

Sender IP address: 10.123.64.1 **IP Address of Sender**

Target MAC address: 00:00:00:00:00:00 (00:00:00:00:00:00)

Target IP address: 10.123.64.225

0000 c0 18 85 c2 84 ed 08 5b 0e 71 a4 fb 08 06 00 01[.q.....
0010 08 00 06 04 00 01 08 5b 0e 71 a4 fb 0a 7b 40 01[.q...{@.
0020 00 00 00 00 00 00 0a 7b 40 e1 00 00 00 00 00 00{ @.....
0030 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00



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

Expression... + dhcp

No.	Time	Source	Destination	Protocol	Length	Info
112	17.989122513	Fortinet_71:a4...	HonHaiPr_c2:84:ed	ARP	56	Who has 10.123.64.225? Tell 10.123.64.1
113	17.989153866	HonHaiPr_c2:84...	Fortinet_71:a4:fb	ARP	42	10.123.64.225 is at c0:18:85:c2:84:ed
114	18.065420364	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
115	18.102109311	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
116	18.134118341	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
117	18.145773639	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
118	18.198120818	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
119	18.201540169	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
120	18.582104926	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
121	18.653379569	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4

[Coloring Rule Name: ARP]
[Coloring Rule String: arp]

▼ Ethernet II, Src: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb), Dst: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)

► Destination: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)

► Source: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb)

Type: ARP (0x0806)

Trailer: 00000000000000000000000000000000

▼ Address Resolution Protocol (request)

Hardware type: Ethernet (1)

Protocol type: IPv4 (0x0800)

Hardware size: 6

Protocol size: 4

Opcode: request (1)

Sender MAC address: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb)

Sender IP address: 10.123.64.1

Target MAC address: 00:00:00_00:00:00 (00:00:00:00:00:00)

Target IP address: 10.123.64.225

ARP request with question
marks for target MAC
address

0000	c0	18	85	c2	84	ed	08	5b	0e	71	a4	fb	08	06	00	01q.....
0010	08	00	06	04	00	01	08	5b	0e	71	a4	fb	0a	7b	40	01q....{@.
0020	00	00	00	00	00	00	0a	7b	40	e1	00	00	00	00	00	00	{ @.....
0030	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	



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

Expression... + dhcp

No.	Time	Source	Destination	Protocol	Length	Info
112	17.989122513	Fortinet_71:a4...	HonHaiPr_c2:84:ed	ARP	56	Who has 10.123.64.225? Tell 10.123.64.1
113	17.989153866	HonHaiPr_c2:84...	Fortinet_71:a4:fb	ARP	42	10.123.64.225 is at c0:18:85:c2:84:ed
114	18.065420364	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
115	18.102109311	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
116	18.134118341	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
117	18.145773639	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
118	18.198120818	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
119	18.201540169	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
120	18.582104926	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
121	18.653379569	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4

[Protocols in frame: eth:ethertype:arp]

[Coloring Rule Name: ARP]

[Coloring Rule String: arp]

▼ Ethernet II, Src: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed), Dst: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb)
▶ Destination: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb)
▶ Source: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)
Type: ARP (0x0806)

▼ Address Resolution Protocol (reply)



a) ARP Opcode field begins 20 bytes
from beginning of ethernet frame

Opcode: reply (2) Hexvalue 0x0002

Sender MAC address: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)

Sender IP address: 10.123.64.225

Target MAC address: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb)

Target IP address: 10.123.64.1

0000	08	5b	0e	71	a4	fb	c0	18	85	c2	84	ed	08	06	00	01	.[.q....]
0010	08	00	06	04	00	02	c0	18	85	c2	84	ed	0a	7b	40	e1	.[.q....{@.]
0020	08	5b	0e	71	a4	fb	0a	7b	40	01							.[.q...{@.]



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

Expression... + dhcp

No.	Time	Source	Destination	Protocol	Length	Info
112	17.989122513	Fortinet_71:a4...	HonHaiPr_c2:84:ed	ARP	56	Who has 10.123.64.225? Tell 10.123.64.1
113	17.989153866	HonHaiPr_c2:84...	Fortinet_71:a4:fb	ARP	42	10.123.64.225 is at c0:18:85:c2:84:ed
114	18.065420364	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
115	18.102109311	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
116	18.134118341	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
117	18.145773639	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
118	18.198120818	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
119	18.201540169	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
120	18.582104926	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
121	18.653379569	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4

[Protocols in frame: eth:ethertype:arp]

[Coloring Rule Name: ARP]

[Coloring Rule String: arp]

▼ Ethernet II, Src: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed), Dst: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb)
 ► Destination: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb)
 ► Source: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)
 Type: ARP (0x0806)

▼ Address Resolution Protocol (reply)

 Hardware type: Ethernet (1)

 Protocol type: IPv4 (0x0800)

 Hardware size: 6

 Protocol size: 4 **IP Address** **MAC Address**

 Opcode: reply (2)

 Sender MAC address: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)

 Sender IP address: 10.123.64.225

 Target MAC address: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb)

 Target IP address: 10.123.64.1

0000 08 5b 0e 71 a4 fb c0 18 85 c2 84 ed 08 06 00 01 .[.q....
0010 08 00 06 04 00 02 c0 18 85 c2 84 ed 0a 7b 40 e1[.q....{ @.
0020 08 5b 0e 71 a4 fb 0a 7b 40 01 .[.q...{ @.



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

Expression... + dhcp

No.	Time	Source	Destination	Protocol	Length	Info
112	17.989122513	Fortinet_71:a4...	HonHaiPr_c2:84:ed	ARP	56	Who has 10.123.64.225? Tell 10.123.64.1
113	17.989153866	HonHaiPr_c2:84...	Fortinet_71:a4:fb	ARP	42	10.123.64.225 is at c0:18:85:c2:84:ed
114	18.065420364	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
115	18.102109311	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
116	18.134118341	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
117	18.145773639	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
118	18.198120818	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
119	18.201540169	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4
120	18.582104926	HonHaiPr_c2:84...	Fortinet_71:a4:fb	0x0800	66	IPv4
121	18.653379569	Fortinet_71:a4...	HonHaiPr_c2:84:ed	0x0800	66	IPv4

[Protocols in frame: eth:ethertype:arp]

[Coloring Rule Name: ARP]

[Coloring Rule String: arp]

▼ Ethernet II, Src: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed), Dst: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb)
▶ Destination: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb)
▶ Source: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed)
Type: ARP (0x0806)

▼ Address Resolution Protocol (reply)

Hardware type: Ethernet (1)

Protocol type: IPv4 (0x0800)

Hardware size: 6

Protocol size: 4

Opcode: reply (2)

Sender MAC address: HonHaiPr_c2:84:ed (c0:18:85:c2:84:ed) **Source MAC address**



Sender IP address: 10.123.64.225

Target MAC address: Fortinet_71:a4:fb (08:5b:0e:71:a4:fb) **Destination MAC address**

Target IP address: 10.123.64.1

0000 08 5b 0e 71 a4 fb c0 18 85 c2 84 ed 08 06 00 01 .[.q....
0010 08 00 06 04 00 02 c0 18 85 c2 84 ed 0a 7b 40 e1{.{@.
0020 08 5b 0e 71 a4 fb 0a 7b 40 01 .[.q...{ @.

22)



There is no reply in this trace, because we are not at the machine that sent the request. The ARP request is broadcast, however the ARP reply is sent back directly to the sender's Ethernet address. Thus there is no ARP reply (sent in response to the ARP request in Packet 6) in the packet trace.