EE450

Lab2 Report

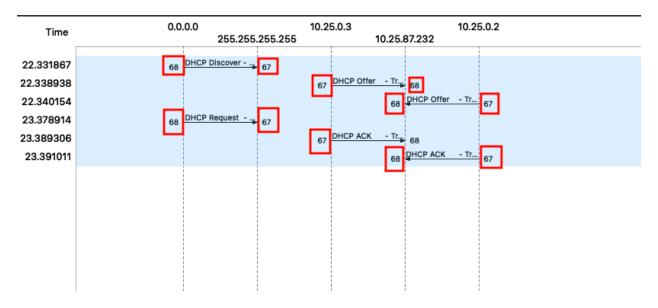
Yuhang Xiao

1. DHCP is sent over UDP as shown in the figure.

```
> Frame 21: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface en0, id 0
> Ethernet II, Src: Apple_cd:74:12 (08:6d:41:cd:74:12), Dst: Broadcast (ff:ff:ff:ff:ff:ff)
> Internet Protocol Version 4, Src: 0.0.0.0, Dst: 255.255.255
> User Datagram Protocol, Src Port: 68, Dst Port: 67
> Dynamic Host Configuration Protocol (Discover)
```

2.

Discover DHCP: src port: 68 dst port: 67 Offer DHCP: src port: 67 dst port: 68 Request DHCP: src port: 68 dst port: 67 ACK DHCP: src port: 67 dst port: 68 The port number is the same as examples.



3. The link-layer address of my host is 08:6d:41:cd:74:12.

```
Frame 21: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface en0, id 0

Ethernet II, Src: Apple_cd:74:12 (08:6d:41:cd:74:12). Dst: Broadcast (ff:ff:ff:ff:ff)

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

> Source: Apple_cd:74:12 (08:6d:41:cd:74:12)

Address: Apple_cd:74:12 (08:6d:41:cd:74:12)

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

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

Type: IPv4 (0x0800)

> Internet Protocol Version 4. Src: 0.0.0.0 Dst: 255.255.255.255
```

4. The value 'Option: (53) DHCP Message Type' differentiates the Discover and Request message.

No.	Time	Source	Destination	Protocol	Length	Info					
	21 17.025005	0.0.0.0	255.255.255.255	DHCP			Discover	- T	ransaction	ID	0x19b66ccc
	24 18.064758	10.25.0.3	10.25.87.232	DHCP	344	DHCP	0ffer	- T	ransaction	ID	0x19b66cc
	26 19.070766	0.0.0.0	255.255.255.255	DHCP	342	DHCP	Request	- T	ransaction	ID	0x19b66cc
	27 20.072054	0.0.0.0	255.255.255.255	DHCP	342	DHCP	Request	- T	ransaction	ID	0x19b66cc
	28 22.331867	0.0.0.0	255.255.255.255	DHCP	342	DHCP	Discover	- т	ransaction	ID	0x19b66cc
	31 22.338938	10.25.0.3	10.25.87.232	DHCP	344	DHCP	0ffer	- T	ransaction	ID	0x19b66cc
	32 22.340154	10.25.0.2	10.25.87.232	DHCP	344	DHCP	0ffer	- T	ransaction	ID	0x19b66cc
i	39 23.378914	0.0.0.0	255.255.255.255	DHCP	342	DHCP	Request		ransaction		
	rransaction iv:	мхтароосса				0					
	Seconds elapsed	: 0									
)	Bootp flags: 0x	0000 (Unicast)									
	Client IP addres	ss: 0.0.0.0									
	Your (client) I	P address: 0.0.0.0									
	Next server IP	address: 0.0.0.0									
		address: 0.0.0.0									
	, ,		2 (08:6d:41:cd:74:12)								
		—	00000000000000000000								
	Server host name										
	Boot file name										
	Magic cookie: D										
		CP Message Type (D:	iscover)								
		rameter Request Li									
)	•	ximum DHCP Message									
	Option: (61) Cl:										
	•										
	Option: (51) IP	Address Lease Time	e								
	Option: (51) IP	Address Lease Time	e			0					
	Option: (51) IP	Address Lease Time	е			0					
)	Option: (51) IP	Address Lease Time	Destination	Protocol	Length	Info					
)	•			Protocol DHCP			Discover	- т	ransaction	ID	0x19b66cc
)	Time	Source	Destination		342	DHCP	Discover Offer		ransaction ransaction		
)	Time 21 17.025005	Source	Destination 255.255.255	DHCP	342 344	DHCP DHCP	Offer	- T		ID	0x19b66cc
)	Time 21 17.025005 24 18.064758	Source 0.0.0.0 10.25.0.3	Destination 255.255.255.255 10.25.87.232	DHCP DHCP	342 344 342	DHCP DHCP	Offer Request	– T	ransaction	ID ID	0x19b66cc 0x19b66cc
)	Time 21 17.025005 24 18.064758 26 19.070766	Source 0.0.0.0 10.25.0.3 0.0.0.0	Destination 255.255.255.255 10.25.87.232 255.255.255.255	DHCP DHCP DHCP	342 344 342 342	DHCP DHCP DHCP	Offer Request Request	- T	ransaction ransaction ransaction	ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc
	Time 21 17.025005 24 18.064758 26 19.070766 27 20.072054 28 22.331867	Source 0.0.0.0 10.25.0.3 0.0.0.0 0.0.0.0	Destination 255.255.255.255 10.25.87.232 255.255.255.255 255.255.255.255 255.255.	DHCP DHCP DHCP DHCP DHCP	342 344 342 342 342	DHCP DHCP DHCP DHCP	Offer Request Request Discover	- T - T - T	ransaction ransaction ransaction ransaction	ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
)	Time 21 17.025005 24 18.064758 26 19.070766 27 20.072054	Source 0.0.0.0 10.25.0.3 0.0.0.0	Destination 255.255.255.255 10.25.87.232 255.255.255.255 255.255.255.255	DHCP DHCP DHCP DHCP	342 344 342 342 342 344	DHCP DHCP DHCP DHCP DHCP	Offer Request Request	- T - T - T - T	ransaction ransaction ransaction	ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
)	Time 21 17.025005 24 18.064758 26 19.070766 27 20.072054 28 22.331867 31 22.338938 32 22.340154	Source 0.0.0.0 10.25.0.3 0.0.0.0 0.0.0.0 0.0.0.0 10.25.0.3 10.25.0.2	Destination 255.255.255.255 10.25.87.232 255.255.255.255 255.255.255.255 255.255.	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 342 342 342 344 344	DHCP DHCP DHCP DHCP DHCP DHCP DHCP	Offer Request Request Discover Offer Offer	- T - T - T - T	ransaction ransaction ransaction ransaction ransaction ransaction	ID ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
)	Time 21 17.025005 24 18.064758 26 19.070766 27 20.072054 28 22.331867 31 22.338938 32 22.340154 39 23.378914	Source 0.0.0.0 10.25.0.3 0.0.0.0 0.0.0.0 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0	Destination 255. 255. 255. 255 10.25.87.232 255.255.255.255 255.255.255.255 255.255.	DHCP DHCP DHCP DHCP DHCP DHCP	342 344 342 342 342 344 344	DHCP DHCP DHCP DHCP DHCP DHCP DHCP	Offer Request Request Discover Offer Offer	- T - T - T - T	ransaction ransaction ransaction ransaction ransaction	ID ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
)	Time 21 17.025005 24 18.064758 26 19.070766 27 20.072054 28 22.331867 31 22.338938 32 22.340154 39 23.378914 Transaction id:	Source 0.0.0.0 10.25.0.3 0.0.0.0 0.0.0.0 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0	Destination 255.255.255.255 10.25.87.232 255.255.255.255 255.255.255.255 255.255.	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 342 342 342 344 344	DHCP DHCP DHCP DHCP DHCP DHCP DHCP	Offer Request Request Discover Offer Offer	- T - T - T - T	ransaction ransaction ransaction ransaction ransaction ransaction	ID ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
No.	Time 21 17.025005 24 18.064758 26 19.070766 27 20.072054 28 22.331867 31 22.338938 32 22.340154 39 23.378914 Transaction id: Seconds elapsed:	Source 0.0.0.0 10.25.0.3 0.0.0.0 0.0.0.0 10.25.0.3 10.25.0.3 10.25.0.2 0.0.0.0	Destination 255.255.255.255 10.25.87.232 255.255.255.255 255.255.255.255 255.255.	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 342 342 342 344 344	DHCP DHCP DHCP DHCP DHCP DHCP DHCP	Offer Request Request Discover Offer Offer	- T - T - T - T	ransaction ransaction ransaction ransaction ransaction ransaction	ID ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
No.	Time 21 17.025005 24 18.064758 26 19.070766 27 20.072054 28 22.331867 31 22.338938 32 22.340154 39 23.378914 Transaction iv: Seconds elapsed: Bootp flags: 0x6	Source 0.0.0.0 10.25.0.3 0.0.0.0 0.0.0.0 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0 exignocca	Destination 255.255.255.255 10.25.87.232 255.255.255.255 255.255.255.255 255.255.	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 342 342 342 344 344	DHCP DHCP DHCP DHCP DHCP DHCP DHCP	Offer Request Request Discover Offer Offer	- T - T - T - T	ransaction ransaction ransaction ransaction ransaction ransaction	ID ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
No.	Time 21 17.025005 24 18.064758 26 19.070766 27 20.072054 28 22.331867 31 22.338938 32 22.348154 39 23.378914 Transaction idea Bootp flags: 0x6 Client IP addres	Source 0.0.0.0 10.25.0.3 0.0.0.0 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0	Destination 255.255.255.255 10.25.87.232 255.255.255.255 255.255.255.255 255.255.	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 342 342 342 344 344	DHCP DHCP DHCP DHCP DHCP DHCP DHCP	Offer Request Request Discover Offer Offer	- T - T - T - T	ransaction ransaction ransaction ransaction ransaction ransaction	ID ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
No.	Time 21 17.025005 24 18.064758 26 19.070766 27 20.072054 28 22.331867 31 22.338938 32 22.340154 39 23.378914 Transaction ID: Seconds elapsed: Bootp flags: 0x6 Client IP addres Your (client) IF	Source 0.0.0.0 10.25.0.3 0.0.0.0 0.0.0.0 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0 **Example of the control of the	Destination 255.255.255.255 10.25.87.232 255.255.255.255 255.255.255.255 255.255.	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 342 342 342 344 344	DHCP DHCP DHCP DHCP DHCP DHCP DHCP	Offer Request Request Discover Offer Offer	- T - T - T - T	ransaction ransaction ransaction ransaction ransaction ransaction	ID ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
No.	Time 21 17.025005 24 18.064758 26 19.070766 27 20.072054 28 22.331867 31 22.338938 32 22.340154 39 23.378914 Transaction ID: Seconds elapseds: Bootp flags: 0x6 Client IP addres Your (client) IR Next server IP a	Source 0.0.0.0 10.25.0.3 0.0.0.0 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0 EXISTRACE 20000 (Unicast) 55: 0.0.0.0 20ddress: 0.0.0.0 20ddress: 0.0.0.0	Destination 255.255.255.255 10.25.87.232 255.255.255.255 255.255.255.255 255.255.	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 342 342 342 344 344	DHCP DHCP DHCP DHCP DHCP DHCP DHCP	Offer Request Request Discover Offer Offer	- T - T - T - T	ransaction ransaction ransaction ransaction ransaction ransaction	ID ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
No.	Time 21 17.025005 24 18.064758 26 19.070766 27 20.072054 28 22.331867 31 22.338938 32 22.340154 39 23.378914 Transaction ip: Seconds elapseds: Bootp flags: 0x0 Client IP addres Your (client) II Next server IP a Relay agent IP a	Source 0.0.0 10.25.0.3 0.0.0 0.0.0 0.0.0 10.25.0.3 10.25.0.2 0.0.0 0.0.0 0x19DDDCCC 2 2 0.0.0 0 2 address: 0.0.0 0 address: 0.0.0 0 address: 0.0.0	Destination 255.255.255.255 10.25.87.232 255.255.255.255 255.255.255.255 255.255.	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 342 342 342 344 344	DHCP DHCP DHCP DHCP DHCP DHCP DHCP	Offer Request Request Discover Offer Offer	- T - T - T - T	ransaction ransaction ransaction ransaction ransaction ransaction	ID ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
No.	Time 21 17.025005 24 18.064758 26 19.070766 27 20.072054 28 22.331867 31 22.338938 32 22.340154 39 23.378914 Transaction ID: Seconds elapsed: Bootp flags: 0x6 Client IP addres: Your (client) IF Next server IP a Relay agent IP a Client MAC addres	Source 0.0.0.0 10.25.0.3 0.0.0.0 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0 exispocca 2 2000 (Unicast) Ss: 0.0.0.0 2 address: 0.0.0.0	Destination 255.255.255.255 10.25.87.232 255.255.255.255 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255.255	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 342 342 342 344 344	DHCP DHCP DHCP DHCP DHCP DHCP DHCP	Offer Request Request Discover Offer Offer	- T - T - T - T	ransaction ransaction ransaction ransaction ransaction ransaction	ID ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
No.	Time 21 17.025005 24 18.064758 26 19.070766 27 20.072054 28 22.331867 31 22.338938 32 22.340154 39 23.378914 Transaction ib: Seconds elapsed: Bootp flags: 0xC Client IP addres Your (client) IF Next server IP a Relay agent IP a Client MAC addre Client hardware	Source	Destination 255.255.255.255 10.25.87.232 255.255.255.255 255.255.255.255 255.255.	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 342 342 342 344 344	DHCP DHCP DHCP DHCP DHCP DHCP DHCP	Offer Request Request Discover Offer Offer	- T - T - T - T	ransaction ransaction ransaction ransaction ransaction ransaction	ID ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
No.	Time 21 17.025005 24 18.064758 26 19.070766 27 20.072054 28 22.331867 31 22.338938 32 22.340154 39 23.378914 Transaction io: Seconds elapsed: Bootp flags: 0xC Client IP addres Your (client) II Next server IP ac Relay agent IP ac Client MAC addre Client hardware Server host name	Source 0.0.0.0 10.25.0.3 0.0.0.0 0.0.0.0 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0 0.0.0.0 0.0.0.0 0.0.0.0 0.0.0.0 0.0.0.0 0.0	Destination 255.255.255.255 10.25.87.232 255.255.255.255 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255.255	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 342 342 342 344 344	DHCP DHCP DHCP DHCP DHCP DHCP DHCP	Offer Request Request Discover Offer Offer	- T - T - T - T	ransaction ransaction ransaction ransaction ransaction ransaction	ID ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
No.	Time 21 17.025005 24 18.064758 26 19.070766 27 20.072054 28 22.331867 31 22.338938 32 22.340154 39 23.378914 Transaction ID: Seconds elapsed: Bootp flags: 0x6 Client IP addres Your (client) IF Next server IP a Relay agent IP a Client MAC addre Client hardware Server host name Boot file name in	Source 0.0.0.0 10.25.0.3 0.0.0.0 0.0.0.0 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0 EXISTRUCTURE 20000 (Unicast) 5s: 0.0.0.0 20ddress: 0.0.0.0 2ddress: 0.0.0.0 2ddress: 0.0.0.0 2ddress: padding: (2ddress) 2ddress padding: (2ddress)	Destination 255.255.255.255 10.25.87.232 255.255.255.255 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255.255	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 342 342 342 344 344	DHCP DHCP DHCP DHCP DHCP DHCP DHCP	Offer Request Request Discover Offer Offer	- T - T - T - T	ransaction ransaction ransaction ransaction ransaction ransaction	ID ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
No.	Time 21 17.025005 24 18.064758 26 19.070766 27 20.072054 28 22.331867 31 22.338938 32 22.340154 39 23.378914 Transaction ID: Seconds elapsed: Bootp flags: 0x6 Client IP addres Your (client) IF Next server IP a Relay agent IP a Client MAC addre Client MAC addre Client hardware Server host name Boot file name r Magic cookie: Dr	Source 0.0.0.0 10.25.0.3 0.0.0.0 0.0.0.0 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0 **Example Country 2 address: 0.0.0.0 address: 0.0.0.0 address: 0.0.0.0 address padding: 0 and given not given	Destination 255.255.255.255 10.25.87.232 255.255.255.255 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255 255.255.255.255	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 342 342 342 344 344	DHCP DHCP DHCP DHCP DHCP DHCP DHCP	Offer Request Request Discover Offer Offer	- T - T - T - T	ransaction ransaction ransaction ransaction ransaction ransaction	ID ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
No.	Time 21 17.025005 24 18.064758 26 19.070766 27 20.072054 28 22.331867 31 22.338938 32 22.340154 39 23.378914 Transaction ID: Seconds elapsed: Bootp flags: 0x6 Client IP addres Your (client) IF Next server IP a Relay agent IP a Client MAC addre Client MAC addre Client hardware Server host name Boot file name m Magic cookie: De	Source 0.0.0.0 10.25.0.3 0.0.0.0 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0 EXISTRIBUTION 2 address: 0.0.0.0 address: 0.0.0.0 address: 0.0.0.0 address: padding: 0 enot given not given CP Message Type (Re	Destination 255.255.255.255 10.25.87.232 255.255.255.255 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255 255.255.255.255	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 342 342 342 344 344	DHCP DHCP DHCP DHCP DHCP DHCP DHCP	Offer Request Request Discover Offer Offer	- T - T - T - T	ransaction ransaction ransaction ransaction ransaction ransaction	ID ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
No.	Time 21 17.025005 24 18.064758 26 19.070766 27 20.072054 28 22.331867 31 22.338938 32 22.340154 39 23.378914 Transaction ID: Seconds elapseds: Bootp flags: 0x6 Client IP addres Your (client) IF Next server IP a Relay agent IP a Client MAC addre Client hardware Server host name Boot file name m Magic cookie: Di Option: (53) DHO Option: (55) Pai	Source	Destination 255.255.255.255 10.25.87.232 255.255.255.255 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255 255.255.255.255 262 (08:6d:41:cd:74:12) 200000000000000000000000000000000000	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 342 342 342 344 344	DHCP DHCP DHCP DHCP DHCP DHCP DHCP	Offer Request Request Discover Offer Offer	- T - T - T - T	ransaction ransaction ransaction ransaction ransaction ransaction	ID ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
No.	Time 21 17.025005 24 18.064758 26 19.070766 27 20.072054 28 22.331867 31 22.338938 32 22.340154 39 23.378914 Transaction iv: Seconds elapsed: Bootp flags: 0xC Client IP addre: Your (client) IF Next server IP a Relay agent IP a Client MAC addre Client hardware Server host name Boot file name ir Magic cookie: Di Option: (53) DHO Option: (55) Pai Option: (57) Max	Source	Destination 255.255.255.255 10.25.87.232 255.255.255.255 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255 255.255.255.255 262 (08:6d:41:cd:74:12) 200000000000000000000000000000000000	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 342 342 342 344 344	DHCP DHCP DHCP DHCP DHCP DHCP DHCP	Offer Request Request Discover Offer Offer	- T - T - T - T	ransaction ransaction ransaction ransaction ransaction ransaction	ID ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
llo.	Time 21 17.025005 24 18.064758 26 19.070766 27 20.072054 28 22.331867 31 22.338938 32 22.340154 39 23.378914 Transaction ID: Seconds elapsed: Bootp flags: 0xC Client IP addres Your (client) If Next server IP ac Relay agent IP ac Client MAC addre Client MAC addre Client hardware Server host name Boot file name in Magic cookie: Did Option: (55) Pai Option: (57) Mai Option: (61) Client Option: (61) Client Option: (61) Client Option: (61) Client	Source	Destination 255.255.255.255 10.25.87.232 255.255.255.255 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255 255.255.255.255 255.255.	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 342 342 342 344 344	DHCP DHCP DHCP DHCP DHCP DHCP DHCP	Offer Request Request Discover Offer Offer	- T - T - T - T	ransaction ransaction ransaction ransaction ransaction ransaction	ID ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc

5. First set transac

First set transaction ID: 0x19b66cce Second set transaction ID: 0x19b66ccf

The purpose is to differentiate among groups of DHCP messages.

No.		Time	Source	Destination	Protocol	Length	Info					
	28	22.331867	0.0.0.0	255.255.255.255	DHCP	342	DHCP	Discover	-	Transaction	ID	0x19b66cce
	31	22.338938	10.25.0.3	10.25.87.232	DHCP	344	DHCP	Offer	-	Transaction	ID	0x19b66cce
	32	22.340154	10.25.0.2	10.25.87.232	DHCP	344	DHCP	Offer	-	Transaction	ID	0x19b66cce
ĺ	39	23.378914	0.0.0.0	255.255.255.255	DHCP	342	DHCP	Request	-	Transaction	ID	0x19b66cce
1	40	23.389306	10.25.0.3	10.25.87.232	DHCP	344	DHCP	ACK	-	Transaction	ID	0x19b66cce
	42	23.391011	10.25.0.2	10.25.87.232	DHCP	344	DHCP	ACK	-	Transaction	ID	0x19b66cce
	1203	28.164195	0.0.0.0	255.255.255.255	DHCP	342	DHCP	Request	-	Transaction	ΙD	0x19b66ccf
-	1286	28.430509	10.25.0.3	10.25.87.232	DHCP	344	DHCP	ACK	-	Transaction	ID	0x19b66ccf
	1287	28.430511	10.25.0.2	10.25.87.232	DHCP	344	DHCP	ACK	-	Transaction	ID	0x19b66ccf
1	1307	28.953588	10.25.0.3	10.25.87.232	DHCP	344	DHCP	ACK	-	Transaction	ID	0x19b66ccf
	1308	28.953596	10.25.0.2	10.25.87.232	DHCP	344	DHCP	ACK	-	Transaction	ID	0x19b66ccf
	2079	42.720196	10.25.87.232	10.17.14.12	DHCP	342	DHCP	Release	-	Transaction	ΙD	0x19b66cd0
	2094	53.211128	0.0.0.0	255.255.255.255	DHCP	342	DHCP	Discover	_	Transaction	ID	0xa72fd663
	2095	53.218858	10.25.0.3	10.25.87.232	DHCP	344	DHCP	Offer	-	Transaction	ID	0xa72fd663
	2096	53.224989	10.25.0.2	10.25.87.232	DHCP	344	DHCP	Offer	_	Transaction	ID	0xa72fd663

6.

Discover DHCP: SIP: 0.0.0.0 DIP: 255.255.255.255

Offer DHCP: SIP: 10.25.0.3 DIP: 10.25.87.232 and SIP: 10.25.0.2 DIP: 10.25.87.232

Request DHCP: SIP: 0.0.0.0 DIP: 255.255.255.255

ACK DHCP: SIP: 10.25.0.3 DIP: 10.25.87.232 and SIP: 10.25.0.2 DIP: 10.25.87.232

N	0.	Time	Source	Destination	Protocol	Length	Info				
	28	22.331867	0.0.0.0	255.255.255.255	DHCP	342	DHCP	Discover	- Transaction	ID	0x19b66cce
	31	. 22.338938	10.25.0.3	10.25.87.232	DHCP	344	DHCP	0ffer	- Transaction	ID	0x19b66cce
	32	22.340154	10.25.0.2	10.25.87.232	DHCP	344	DHCP	Offer	- Transaction	ID	0x19b66cce
	39	23.378914	0.0.0.0	255.255.255.255	DHCP	342	DHCP	Request	- Transaction	ID	0x19b66cce
	40	23.389306	10.25.0.3	10.25.87.232	DHCP	344	DHCP	ACK	- Transaction	ID	0x19b66cce
	42	23.391011	10.25.0.2	10.25.87.232	DHCP	344	DHCP	ACK	- Transaction	ID	0x19b66cce
	1203	28.164195	0.0.0.0	255.255.255.255	DHCP	342	DHCP	Request	- Transaction	ID	0x19b66ccf
	1286	28.430509	10.25.0.3	10.25.87.232	DHCP	344	DHCP	ACK	- Transaction	ID	0x19b66ccf
	1287	28.430511	10.25.0.2	10.25.87.232	DHCP	344	DHCP	ACK	- Transaction	ID	0x19b66ccf
	1307	28.953588	10.25.0.3	10.25.87.232	DHCP	344	DHCP	ACK	- Transaction	ID	0x19b66ccf
	1308	28.953596	10.25.0.2	10.25.87.232	DHCP	344	DHCP	ACK	- Transaction	ID	0x19b66ccf

7.

The IP address of DHCP server is 10.17.14.11

8. The offered IP address is 10.25.87.232 Offer, Request and ACK DHCP messages contains the offered IP address as shown below.

20 22 224067		Destination	Protocol	Length	IIIIO				
28 22.331867	0.0.0.0	255.255.255.255	DHCP	342	DHCP	Discover	- Transaction	ID	0x19b66cc6
31 22.338938	10.25.0.3	10.25.87.232	DHCP	344	DHCP	0ffer	 Transaction 	ID	0x19b66cc
32 22.340154	10.25.0.2	10.25.87.232	DHCP	344	DHCP	0ffer	 Transaction 	ID	0x19b66cc
39 23.378914	0.0.0.0	255.255.255.255	DHCP	342	DHCP	Request	- Transaction	ID	0x19b66cc
40 23.389306	10.25.0.3	10.25.87.232	DHCP	344	DHCP	ACK	- Transaction	ID	0x19b66cc
42 23.391011	10.25.0.2	10.25.87.232	DHCP	344	DHCP	ACK	- Transaction	ID	0x19b66cc
1203 28.164195	0.0.0.0	255.255.255.255	DHCP	342	DHCP	Request	- Transaction	ID	0x19b66cc
206 20 420500	10 25 0 2	10 25 07 222	DHCD	244	DHCD	ACK	Transaction	TD	Av10beece
Hardware address	length: 6								
Hops: 2									
Transaction ID:	0x19b66cce								
Seconds elapsed:	0								
Bootp flags: 0x0	0000 (Unicast)								
Client IP addres	s: 0.0.0.0								
Your (client) IF	address: 10.25.87	7,232							
	32 22.340154 39 23.378914 40 23.389306 42 23.391011 203 28.164195 26. 29. 42660 Hardware address Hops: 2 Transaction ID: Seconds elapsed: Bootp flags: 0x0 Client IP address	32 22.340154 10.25.0.2 39 23.378914 0.0.0.0 40 23.389306 10.25.0.3 42 23.391011 10.25.0.2 203 28.164195 0.0.0.0 Hardware address length: 6 Hops: 2 Transaction ID: 0x19b66cce Seconds elapsed: 0 Bootp flags: 0x0000 (Unicast) Client IP address: 0.0.0.0	32 22.340154 10.25.0.2 10.25.87.232 39 23.378914 0.0.0.0 255.255.255.255 40 23.389306 10.25.0.3 10.25.87.232 42 23.391011 10.25.0.2 10.25.87.232 203 28.164195 0.0.0.0 255.255.255.255 204 24.36820 10.25.0.3 10.25.0.2 Hardware address length: 6 Hops: 2 Transaction ID: 0x19b66cce Seconds elapsed: 0 Bootp flags: 0x0000 (Unicast)	32 22.340154 10.25.0.2 10.25.87.232 DHCP 39 23.378914 0.0.0.0 255.255.255.255 DHCP 40 23.389306 10.25.0.3 10.25.87.232 DHCP 42 23.391011 10.25.0.2 10.25.87.232 DHCP 203 28.164195 0.0.0.0 255.255.255 DHCP 204 20.328.164195 0.0.0.0 255.255.255.255 DHCP 205 20.328.164195 0.0.0.0 255.255.255.255 DHCP 206 20.328.164195 0.0.0.0 255.255.255.255 DHCP 207 208 208 208 208 208 208 208 208 208 208	32 22.340154 10.25.0.2 10.25.87.232 DHCP 344 39 23.378914 0.0.0.0 255.255.255.255 DHCP 342 40 23.389306 10.25.0.3 10.25.87.232 DHCP 344 42 23.391011 10.25.0.2 10.25.87.232 DHCP 344 203 28.164195 0.0.0.0 255.255.255.255 DHCP 342 204 28.42620 10.25.0.2 10.25.87.232 DHCP 344 Hardware address length: 6 Hops: 2 Transaction ID: 0x19b66cce Seconds elapsed: 0 Bootp flags: 0x0000 (Unicast) Client IP address: 0.0.0.0	32 22.340154 10.25.0.2 10.25.87.232 DHCP 344 DHCP 39 23.378914 0.0.0.0 255.255.255.255 DHCP 342 DHCP 40 23.389306 10.25.0.3 10.25.87.232 DHCP 344 DHCP 42 23.391011 10.25.0.2 10.25.87.232 DHCP 344 DHCP 203 28.164195 0.0.0.0 255.255.255 DHCP 342 DHCP Hardware address length: 6 Hops: 2 Transaction ID: 0x19b66cce Seconds elapsed: 0 Bootp flags: 0x0000 (Unicast) Client IP address: 0.0.0.0	32 22.340154 10.25.0.2 10.25.87.232 DHCP 344 DHCP Offer 39 23.378914 0.0.0.0 255.255.255.255 DHCP 342 DHCP Request 40 23.389306 10.25.0.3 10.25.87.232 DHCP 344 DHCP ACK 42 23.391011 10.25.0.2 10.25.87.232 DHCP 344 DHCP ACK 203 28.164195 0.0.0.0 255.255.255 DHCP 342 DHCP Request Hardware address Length: 6 Hops: 2 Transaction ID: 0x19b66cce Seconds elapsed: 0 Bootp flags: 0x0000 (Unicast) Client IP address: 0.0.0.0	32 22.340154 10.25.0.2 10.25.87.232 DHCP 344 DHCP Offer - Transaction 39 23.378914 0.0.0.0 255.255.255.255 DHCP 342 DHCP Request - Transaction 40 23.389306 10.25.0.3 10.25.87.232 DHCP 344 DHCP ACK - Transaction 42 23.391011 10.25.0.2 10.25.87.232 DHCP 344 DHCP ACK - Transaction 203 28.164195 0.0.0.0 255.255.255.255 DHCP 342 DHCP Request - Transaction 203 28.28.436500 10.25.0.3 10.25.0.3 DHCP 344 DHCP ACK - Transaction 205 28.436500 10.25.0.3 10.25.0.3 DHCP 344 DHCP ACK - Transaction 305 205 205 205 205 205 205 205 205 205 2	32 22.340154 10.25.0.2 10.25.87.232 DHCP 344 DHCP Offer - Transaction ID 39 23.378914 0.0.0.0 255.255.255.255 DHCP 342 DHCP Request - Transaction ID 40 23.389306 10.25.0.3 10.25.87.232 DHCP 344 DHCP ACK - Transaction ID 42 23.391011 10.25.0.2 10.25.87.232 DHCP 344 DHCP ACK - Transaction ID 203 28.164195 0.0.0.0 255.255.255.255 DHCP 342 DHCP Request - Transaction ID 396.29.436800 10.25.0.2 10.2

No.		Time	Source	Destination	Protocol	Length	Info				
	28	22.331867	0.0.0.0	255.255.255.255	DHCP	342	DHCP	Discover	- Transaction	ID	0x19b66cce
	31	22.338938	10.25.0.3	10.25.87.232	DHCP	344	DHCP	Offer	- Transaction	ID	0x19b66cce
	32	22.340154	10.25.0.2	10.25.87.232	DHCP	344	DHCP	0ffer	 Transaction 	ID	0x19b66cce
	39	23.378914	0.0.0.0	255.255.255.255	DHCP	342	DHCP	Request	 Transaction 	ID	0x19b66cce
	40	23.389306	10.25.0.3	10.25.87.232	DHCP	344	DHCP	ACK	 Transaction 	ID	0x19b66cce
	42	23.391011	10.25.0.2	10.25.87.232	DHCP	344	DHCP	ACK	- Transaction	ID	0x19b66cce
	1203	28.164195	0.0.0.0	255.255.255.255	DHCP	342	DHCP	Request	- Transaction	ID	0x19b66ccf
-!-	1206	20 420500	10 75 0 7	10 25 07 222	DHCD	244	DHCD	ACK	Transaction	TD	av10beecef
	Cli	ent IP addres	ss: 0.0.0.0								
	You	r (client) I	address: 0.0.0.0								
	Nex	t server IP	address: 0.0.0.0								

Relay agent IP address: 0.0.0.0

Client MAC address: Apple_cd:74:12 (08:6d:41:cd:74:12) Client hardware address padding: 00000000000000000000

Server host name not given Boot file name not given Magic cookie: DHCP

> Option: (53) DHCP Message Type (Request) > Option: (55) Parameter Request List

Option: (57) Maximum DHCP Message Size

Option: (61) Client identifier

Option: (50) Requested IP Address (10.25.87.232) Option: (54) DHCP Server Identifier (10.1/.14.11)

> Option: (255) End

No.	Time	Source	Destination	Protocol	Length Info	
	28 22.331867	0.0.0.0	255.255.255.255	DHCP	342 DHCP Discover	- Transaction ID 0x19b66cce
H	31 22.338938	10.25.0.3	10.25.87.232	DHCP	344 DHCP Offer	- Transaction ID 0x19b66cce
	32 22.340154	10.25.0.2	10.25.87.232	DHCP	344 DHCP Offer	- Transaction ID 0x19b66cce
	39 23.378914	0.0.0.0	255.255.255.255	DHCP	342 DHCP Request	 Transaction ID 0x19b66cce
	40 23.389306	10.25.0.3	10.25.87.232	DHCP	344 DHCP ACK	 Transaction ID 0x19b66cce
	42 23.391011	10.25.0.2	10.25.87.232	DHCP	344 DHCP ACK	 Transaction ID 0x19b66cce
	1203 28.164195	0.0.0.0	255.255.255.255	DHCP	342 DHCP Request	- Transaction ID 0x19b66ccf
4	1206 20 420500	10 75 0 7	10 75 07 727	DHCD	344 DHCD VCK	Transaction ID Av10b66ccf

Transaction ID: 0x19b66cce Seconds elapsed: 1

> Bootp flags: 0x0000 (Unicast)

Client IP address: 0.0.0.0

Your (client) IP address: 10.25.87.232

9. In the example screenshot, the 'Relay agent IP address: 0.0.0.0 (0.0.0.0)' indicates that there is no relay agent. In my experiment, I have relay agent and the IP addresses are 10.25.0.3 and 10.25.0.2

No.		Time	Source	Destination	Protocol	Length	Info					
	28	22.331867	0.0.0.0	255.255.255.255	DHCP			Discover	-	Transaction	ID	0x19b66cc
	31	22.338938	10.25.0.3	10.25.87.232	DHCP	344	DHCP	Offer	-	Transaction	ID	0x19b66cc
	32	22.340154	10.25.0.2	10.25.87.232	DHCP	344	DHCP	0ffer	-	Transaction	ID	0x19b66cc
	39	23.378914	0.0.0.0	255.255.255.255	DHCP	342	DHCP	Request	-	Transaction	ID	0x19b66cc
	40	23.389306	10.25.0.3	10.25.87.232	DHCP	344	DHCP	ACK	_	Transaction	ID	0x19b66cc
	42	23.391011	10.25.0.2	10.25.87.232	DHCP	344	DHCP	ACK	_	Transaction	ID	0x19b66cc
1	203	28.164195	0.0.0.0	255.255.255.255	DHCP	342	DHCP	Request	_	Transaction	ID	0x19b66cc
- 1	206	20 420500	10 25 0 2	10 25 07 222	DHCD	211	DHCD	ACK		Transaction	TD	Av10beece
		nsaction ID:										
	Seco	onds elapsed:	0									
>	Boo1	tp flags: 0x0	000 (Unicast)									
	Clie	ent IP addres	s: 0.0.0.0									
	You	r (client) IP	address: 10.25.87	. 232								
			ddress: 0.0.0.0	_								
	Rela	ay agent IP a	ddress: 10.25.0.3									
	Clie	ent MAC addre	ss: Apple_cd:74:12	(08:6d:41:cd:74:12)								
	Clie	ent hardware	address padding: 0	0000000000000000000								
	Clie	ent hardware	address padding: 0	00000000000000000000								
No.	Clie	Time	Source	Destination	Protocol	Length	Info					
No.					Protocol			Discover	_	Transaction	ID	0×19b66cc
No.	28	Time	Source	Destination		342	DHCP	Discover Offer		Transaction Transaction		
No.	28 31	Time 22.331867	Source	Destination 255.255.255	DHCP	342 344	DHCP DHCP		-		ID	0x19b66cc
No.	28 31 32	Time 22.331867 22.338938	Source 0.0.0.0 10.25.0.3	Destination 255.255.255 10.25.87.232	DHCP DHCP	342 344 344	DHCP DHCP	0ffer	-	Transaction	ID	0x19b66cc
No.	28 31 32 39	Time 22.331867 22.338938 22.340154	Source 0.0.00 10.25.0.3 10.25.0.2	Destination 255.255.255.255 10.25.87.232 10.25.87.232	DHCP DHCP DHCP	342 344 344 342	DHCP DHCP	Offer Offer Request	- -	Transaction Transaction	ID ID	0x19b66cc 0x19b66cc
No.	28 31 32 39 40	Time 22.331867 22.338938 22.340154 23.378914	Source 0.0.0 0 10.25.0.3 10.25.0.2 0.0.0 0	Destination 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255	DHCP DHCP DHCP DHCP	342 344 344 342 344	DHCP DHCP DHCP	Offer Offer Request ACK	-	Transaction Transaction Transaction	ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
No.	28 31 32 39 40 42	Time 22.331867 22.338938 22.340154 23.378914 23.389306	Source 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0 10.25.0.3	Destination 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255 10.25.87.232	DHCP DHCP DHCP DHCP DHCP	342 344 344 342 344 344	DHCP DHCP DHCP DHCP DHCP DHCP	Offer Offer Request ACK	-	Transaction Transaction Transaction Transaction	ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
	28 31 32 39 40 42 1203	Time 22.331867 22.338938 22.340154 23.378914 23.389306 23.391011	Source 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0 10.25.0.3 10.25.0.2	Destination 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255 10.25.87.232 10.25.87.232	DHCP DHCP DHCP DHCP DHCP DHCP	342 344 344 342 344 344 342	DHCP DHCP DHCP DHCP DHCP DHCP	Offer Offer Request ACK ACK Request	-	Transaction Transaction Transaction Transaction Transaction	ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
	28 31 32 39 40 42 1203	Time 22.331867 22.338938 22.340154 23.378914 23.389306 23.391011 28.164195 29.43660	Source 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0 0.25.0.2 0.0.0.0 0.25.0.2 0.25.0.2 0.25.0.2 0.25.0.2 0.25.0.2 0.25.0.2	Destination 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 344 342 344 344 342	DHCP DHCP DHCP DHCP DHCP DHCP	Offer Offer Request ACK ACK Request	-	Transaction Transaction Transaction Transaction Transaction Transaction Transaction	ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
	28 31 32 39 40 42 1203 Tra Sec	Time 22.331867 22.338938 22.340154 23.378914 23.389306 23.391011 28.164195 20.42620 nsaction ID: onds elapsed:	Source 0.0.0 0 10.25.0.3 10.25.0.2 0.0.0 10.25.0.3 10.25.0.2 0.0.0 0.0.0 10.25.0.2 0.0.0 0.0	Destination 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 344 342 344 344 342	DHCP DHCP DHCP DHCP DHCP DHCP	Offer Offer Request ACK ACK Request	-	Transaction Transaction Transaction Transaction Transaction Transaction Transaction	ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
	28 31 32 39 40 42 1203 Tra Sec	Time 22.331867 22.338938 22.340154 23.378914 23.389306 23.391011 28.164195 20.42620 nsaction ID: onds elapsed:	Source 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0 0.25.0.2 0.0.0.0 0.25.0.2 0.25.0.2 0.25.0.2 0.25.0.2 0.25.0.2 0.25.0.2	Destination 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 344 342 344 344 342	DHCP DHCP DHCP DHCP DHCP DHCP	Offer Offer Request ACK ACK Request	-	Transaction Transaction Transaction Transaction Transaction Transaction Transaction	ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
	28 31 32 39 40 42 1203 Tra Sec Boo Cli	Time 22.331867 22.338938 22.340154 23.378914 23.389306 23.391011 28.164195 20.432620 nsaction ID: onds elapsed: tp flags: 0x0 ent IP addres	Source 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0 0x19b66cce 0000 (Unicast) 0s: 0.0.0.0	Destination 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 344 342 344 344 342	DHCP DHCP DHCP DHCP DHCP DHCP	Offer Offer Request ACK ACK Request	-	Transaction Transaction Transaction Transaction Transaction Transaction Transaction	ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
	28 31 32 39 40 42 1203 Tra Sec Boo Cli You	Time 22.331867 22.338938 22.340154 23.378914 23.389306 23.391011 28.164195 29.436500 nsaction ID: onds elapsed: tp flags: 0x0 ent IP addres r (client) IF	Source 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0 10.25.0.2 0.0.0.0 0x19b66cce 0000 (Unicast) ss: 0.0.0.0 2 address: 10.25.87	Destination 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 344 342 344 344 342	DHCP DHCP DHCP DHCP DHCP DHCP	Offer Offer Request ACK ACK Request	-	Transaction Transaction Transaction Transaction Transaction Transaction Transaction	ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
	28 31 32 39 40 42 1203 Sec Boo Cli You Nex	Time 22.331867 22.338938 22.340154 23.378914 23.389306 23.391011 28.164195 29.426500 nods elapsed: tp flags: 0x0 ent IP addres r (client) IP t server IP a	Source 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0 10.25.0.2 0.0.0.0 20.25.0.2 0.0.0.0 20.25.0.2 0.0.0.0 20.25.0.2 0.0.0.0 20.25.0.2 0.0.0.0 20.25.0.2 0.0.0.0 20.25.0.2 0.0.0.0 20.25.0.2 0.0.0.0 20.25.0.2 0.0.0.0 20.25.0.2 0.0.0.0 20.25.0.2 0.0.0.0 20.25.0.2 0.0.0.0 20.25.0.2 0.0.0.0	Destination 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 344 342 344 344 342	DHCP DHCP DHCP DHCP DHCP DHCP	Offer Offer Request ACK ACK Request	-	Transaction Transaction Transaction Transaction Transaction Transaction Transaction	ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
1	28 31 32 39 40 42 1203 Tra Sec Boo Cli You Nex Rel	Time 22.331867 22.338938 22.340154 23.378914 23.389306 23.391011 28.164195 29.436500 nsaction ID: onds elapsed: tp flags: 0x0 ent IP address r (client) IP t server IP a ay agent IP a	Source 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0 10.25.0.3 10.25.0.2 0.0.0.0 10.25.0.2 0.0.0.0 10.25.0.2 0.0.0.0 0	Destination 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 344 342 344 344 342	DHCP DHCP DHCP DHCP DHCP DHCP	Offer Offer Request ACK ACK Request	-	Transaction Transaction Transaction Transaction Transaction Transaction Transaction	ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc
	28 31 32 39 40 42 1203 Sec Boo Cli You Nex Rel	Time 22.331867 22.338938 22.340154 23.378914 23.389306 23.391011 28.164195 29.43660 nsaction ID: onds elapsed: tp flags: 0x0 ent IP addres r (client) IF t server IP a ay agent IP a ent MAC addre	Source	Destination 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255 10.25.87.232 10.25.87.232 255.255.255.255	DHCP DHCP DHCP DHCP DHCP DHCP DHCP DHCP	342 344 344 342 344 344 342	DHCP DHCP DHCP DHCP DHCP DHCP	Offer Offer Request ACK ACK Request	-	Transaction Transaction Transaction Transaction Transaction Transaction Transaction	ID ID ID ID ID ID	0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc 0x19b66cc

10. Tell the client the default gateway to send messages and which subnet mask to use.

```
v Option: (1) Subnet Mask (255.255.0.0)
Length: 4
Subnet Mask: 255.255.0.0
v Option: (3) Router
Length: 4
Router: 10.25.0.1
```

11. The client accepted the offered IP address and requested the IP address in the Request DHCP message located in 'Option: (50) Requested IP Address (10.25.87.232)'.

No.		Time	Source	Destination	Protocol	Length	Info					
	28	22.331867	0.0.0.0	255.255.255.255	DHCP	342	DHCP	Discover	_	Transaction	ID	0x19b66cce
	31	22.338938	10.25.0.3	10.25.87.232	DHCP	344	DHCP	Offer	_	Transaction	ID	0x19b66cce
	32	22.340154	10.25.0.2	10.25.87.232	DHCP	344	DHCP	Offer	_	Transaction	ID	0x19b66cce
	39	23.378914	0.0.0.0	255.255.255.255	DHCP	342	DHCP	Request	-	Transaction	ID	0x19b66cce
	40	23.389306	10.25.0.3	10.25.87.232	DHCP	344	DHCP	ACK	-	Transaction	ΙD	0x19b66cce
	42	23.391011	10.25.0.2	10.25.87.232	DHCP	344	DHCP	ACK	-	Transaction	ID	0x19b66cce
	1203	28.164195	0.0.0.0	255.255.255.255	DHCP	342	DHCP	Request	-	Transaction	ID	0x19b66ccf
	1206	20 420500	10 25 0 2	10 25 07 222	חכם	244	DHCD	ACK		Transaction	TD	Av10beecef
	Clie	ent IP address	: 0.0.0.0									
	You	r (client) IP	address: 0.0.0.0									
	Nex1	t server IP ad	dress: 0.0.0.0									
	Rela	ay agent IP ad	dress: 0.0.0.0									
	Clie	ent MAC addres	s: Apple_cd:74:12 (08	:6d:41:cd:74:12)								
	Clie	ent hardware a	ddress padding: 00000	000000000000000								
	Serv	er host name	not given									
	Boo1	t file name no	t given									
	Mag:	ic cookie: DHC	P									
	> 0pt:	ion: (53) DHCP	Message Type (Reques	t)								
	> Opt:	ion: (55) Para	meter Request List									
	> Opt:	ion: (57) Maxi	mum DHCP Message Size									
	> Opt:	ion: (61) Clie	nt identifier									
	Opt:	ion: (50) Requ	ested IP Address (10.	25.87.232)								
	> Opt:	Lon: (54) DHCP	Server Identifier (1	0.17.14.11)								
	> Opt:	ion: (255) End										
	Pado	ding: 00000000	0000000000000000000000	00000								

12.

The purpose of lease time is to tell the client how long can it use this offered IP address. In my experiment, the lease time is 30 minutes.

```
Your (client) IP address: 10.25.87.232
 Next server IP address: 0.0.0.0
  Relay agent IP address: 10.25.0.3
  Client MAC address: Apple_cd:74:12 (08:6d:41:cd:74:12)
  Server host name not given
  Boot file name not given
 Magic cookie: DHCP
> Option: (53) DHCP Message Type (ACK)
> Option: (54) DHCP Server Identifier (10.17.14.11)
v Option: (51) IP Address Lease Time
    Length: 4
 IP Address Lease Time: (1800s) 30 minutes
> Option: (1) Subnet Mask (255.255.0.0)
> Option: (3) Router
> Option: (6) Domain Name Server
> Option: (15) Domain Name
```

13.

The purpose of DHCP Release message is to tell the server to end the lease of the offered IP address. There is no ACK sent for the DHCP Release message as shown in the picture. If the release message is lost, the DHCP server will not reuse the offered IP address until the lease time is over.

2079	42.720196	10.25.87.232	10.17.14.12	DHCP	342	DHCP Release	- Transaction ID 0x19b66cd0
2094	53.211128	0.0.0.0	255.255.255.255	DHCP	342	DHCP Discover	- Transaction ID 0xa72fd663
2095	53.218858	10.25.0.3	10.25.87.232	DHCP	344	DHCP Offer	 Transaction ID 0xa72fd663
2096	53.224989	10.25.0.2	10.25.87.232	DHCP	344	DHCP Offer	 Transaction ID 0xa72fd663
2102	54.260373	0.0.0.0	255.255.255.255	DHCP	342	DHCP Request	 Transaction ID 0xa72fd663
2103	54.285084	10.25.0.3	10.25.87.232	DHCP	344	DHCP ACK	 Transaction ID 0xa72fd663
2104	54.285091	10.25.0.2	10.25.87.232	DHCP	344	DHCP ACK	- Transaction ID 0xa72fd663

14.

There are many ARP packets sent or received during the period of exchanging DHCP packets as shown in the below picture.

Purpose:

- --ARP Probe: ensure that the offered IP address is not assigned to other hosts.
- --ARP Announcement: tell other hosts in the same network the associated MAC address with the offered IP address.
- --Other ARP: help the host with newly-assigned IP address to find the MAC address of the router.

