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DHCP: Dynamic Host Configuration Protocol

It is a network management protocol for IP networks for automatically assigning IP addresses and other communication parameters to devices connected to the network using a client-server architecture

IP-configuration:

```
Command Prompt
C:\Users\itsaai>ipconfig/all

Windows IP Configuration

Host Name . . . . . : DESKTOP-E2R3330
Primary Dns Suffix . . . . . :
Node Type . . . . . : Mixed
IP Routing Enabled . . . . . : No
WINS Proxy Enabled . . . . . : No

Ethernet adapter Ethernet:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Description . . . . . : Realtek PCIe GbE family controller
Physical Address. . . . . : {0-1E-B8-22-FD-F8}
DHCP Enabled. . . . . : Yes
Autocconfiguration Enabled . . . . : Yes

Ethernet adapter Ethernet 2:

Connection-specific DNS Suffix . :
Description . . . . . : VirtualBox Host-Only Ethernet Adapter
Physical Address. . . . . : {08-00-27-00-00-19}
DHCP Enabled. . . . . : No
Autocconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::800c:404:f02:d03%25(Preferred)
IPv4 Address. . . . . : 192.168.56.1(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . :
DHCPv6 IAD . . . . . : 07870631
DHCPv6 Client GUID . . . . . : 80-40-00-01-25-80-39-E2-C0-3E-BA-22-FD-F8
NetBIOS over Tcpip. . . . . : Enabled

Wireless LAN adapter Local Area Connection* 13:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Description . . . . . : Microsoft Wi-Fi Direct Virtual Adapter #5
Physical Address. . . . . : {5E-3A-45-1D-93-5D}
DHCP Enabled. . . . . : Yes
Autocconfiguration Enabled . . . . : Yes

Wireless LAN adapter Local Area Connection* 14:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Description . . . . . : Microsoft Wi-Fi Direct Virtual Adapter #6
Physical Address. . . . . : {0E-3A-45-1D-93-5D}
```

We release our IP address to understand how DHCP works

```
C:\Users\litssu>ipconfig/release

Windows IP Configuration

No operation can be performed on Ethernet while it has its media disconnected.
No operation can be performed on Local Area Connection* 13 while it has its media disconnected.
No operation can be performed on Local Area Connection* 14 while it has its media disconnected.

Ethernet adapter Ethernet:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :

Ethernet adapter Ethernet 2:

    Connection-specific DNS Suffix  . :
    Link-local IPv6 Address . . . . . : fe80::9806:a634:f92:d403%25
    IPv4 Address. . . . . : 192.168.56.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . :

Wireless LAN adapter Local Area Connection* 13:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :

Wireless LAN adapter Local Area Connection* 14:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :

Wireless LAN adapter Wi-Fi:

    Connection-specific DNS Suffix  . :
    Link-local IPv6 Address . . . . . : fe80::65f1:118a:e3a4:c2de%9
    Default Gateway . . . . . :

C:\Users\litssu>
```

Next we capture our packets in wireshark

The image shows a Wireshark packet capture window. The top pane displays a list of captured packets. The bottom pane shows the details of the selected packet (Frame 37), which is a DHCP Discover packet. The packet list shows various DNS and DHCP traffic. The details pane for Frame 37 shows the Ethernet II, Internet Protocol Version 4, User Datagram Protocol, and Dynamic Host Configuration Protocol (DHCP) layers.

No.	Time	Source	Destination	Protocol	Length	Info
27	0.956646	172.40.5.169	224.0.0.251	MDNS	103	Standard query 0x0005 PTR _233637DE._sub._googlecast._tcp.local, "QM" question PTR _googlecast._tcp.local, "QM" question
28	0.967684	172.40.5.127	224.0.0.251	MDNS	142	Standard query 0x0000 SRV ["m": "Amith's phone", "s": "[8193, 8194]", "t": "121"] _mi-connect._udp.local, "QM" question TXT ["nm-
29	0.987696	172.40.7.84	172.40.15.255	UDP	62	2007 → 2007 Len=20
30	1.007733	172.40.3.229	224.0.0.251	MDNS	103	Standard query 0x0001 PTR _233637DE._sub._googlecast._tcp.local, "QU" question PTR _googlecast._tcp.local, "QU" question
31	1.048521	172.40.2.65	224.0.0.251	MDNS	289	Standard query response 0x0000 PTR, cache flush Android-7.local PTR, cache flush Android-7.local A, cache flush 172.40.2.65 AA-
32	1.058446	172.40.0.124	224.0.0.251	MDNS	126	Standard query 0x0000 ANY Android-16.local, "QM" question ANY Android-16.local, "QM" question A 172.40.0.124 AAAA fe80::da32e-
33	1.068656	172.40.7.84	172.40.15.255	UDP	62	2008 → 2008 Len=20
34	1.118756	172.40.7.84	172.40.15.255	UDP	62	2007 → 2007 Len=20
35	1.115693	CiscoMer_11:b0:65	Chongqin_1d:93:5d	ARP	60	Who has 169.254.194.222? Tell 10.128.128.128
36	1.115722	Chongqin_1d:93:5d	CiscoMer_11:b0:65	ARP	42	169.254.194.222 is at 5c:3a:45:1d:93:5d
37	1.150022	0.0.0.0	255.255.255.255	DHCP	342	DHCP [Discover] Transaction ID 0x4dad1bd6
38	1.231570	172.40.7.84	172.40.15.255	UDP	62	2008 → 2008 Len=20

Frame 37: 342 bytes on wire (2736 bits), 342 bytes captured (2736 bits) on interface \Device\NPF_{5E900080-9929-49CF-9607-F68538DE2E8A}, id 0

- Ethernet II, Src: XiaoMiCo_47:30:70 (a4:55:90:47:30:70), 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
- Dynamic Host Configuration Protocol (DHCP)

0000 ff ff ff ff ff ff a4 55 90 47 30 70 00 00 45 10U Gby...E:
0010 01 48 00 00 00 00 40 11 39 96 00 00 00 00 ff ff ..H..@.9.....
0020 ff ff 00 44 00 43 01 34 62 71 01 01 06 00 4d ad ...D.C.4.bq...M:
0030 1b 65 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0040 00 00 00 00 00 00 a4 55 90 47 30 70 00 00 00 00U Gby.....
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
0080 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
0090 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00a0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00b0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00c0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00d0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

We enter ipconfig/renew ,which gets new IP addresses for those networks which have DHCP enabled ,we confirm as below:

```
C:\Users\itssu>ipconfig/renew

Windows IP Configuration

No operation can be performed on Ethernet while it has its media disconnected.
No operation can be performed on Local Area Connection* 13 while it has its media disconnected.
No operation can be performed on Local Area Connection* 14 while it has its media disconnected.

Ethernet adapter Ethernet:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :

Ethernet adapter Ethernet 2:

    Connection-specific DNS Suffix  . :
    Link-local IPv6 Address . . . . . : fe80::bd06:a63d:f92:d403c25
    IPv4 Address. . . . . : 192.168.56.1
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . :

Wireless LAN adapter Local Area Connection* 13:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :

Wireless LAN adapter Local Area Connection* 14:

    Media State . . . . . : Media disconnected
    Connection-specific DNS Suffix  . :

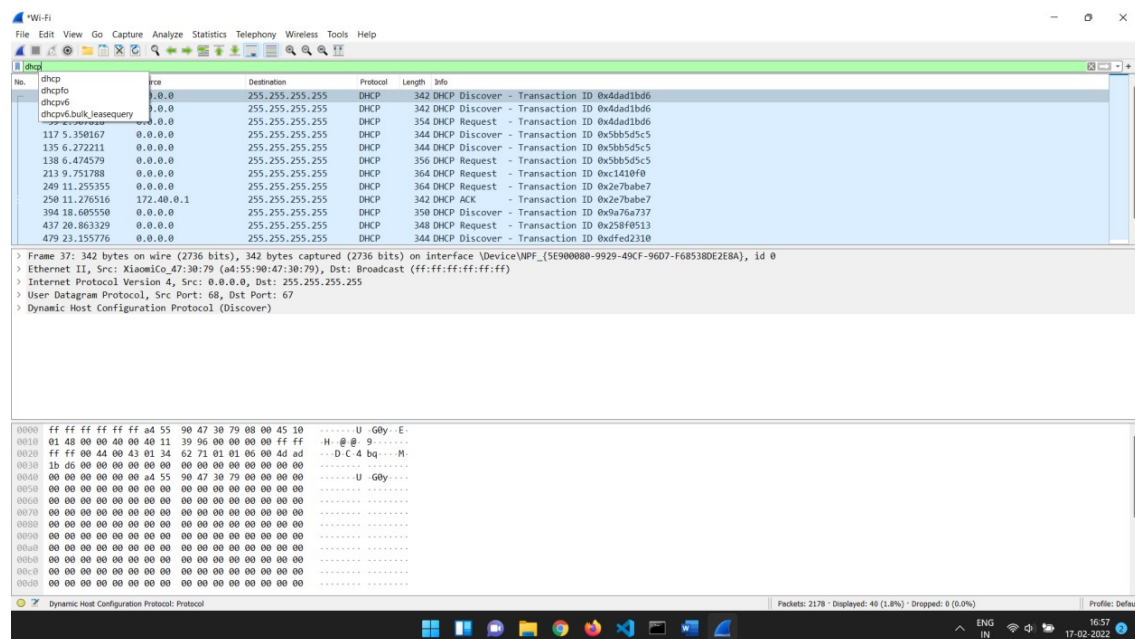
Wireless LAN adapter Wi-Fi:

    Connection-specific DNS Suffix  . :
    Link-local IPv6 Address . . . . . : fe80::65f1:118a:e3a4:c2de09
    IPv4 Address. . . . . : 172.40.15.254
    Subnet Mask . . . . . : 255.255.240.0
    Default Gateway . . . . . : 172.40.0.1

C:\Users\itssu>ipconfig/all

Windows IP Configuration
```

We filter out captured packets using filter on dhcp:



The requests and procedures like "Offer", "request", "Ack",
,
"Discover".

Initially we have 0.0.0.0 IP address then we requested DHCP server for IP address then DHCP server offered us a IP address for lease and then we gave ack(acknowledgement) for acceptance of that IP address.

Also destination address is 255.255.255.255 which means it is broadcasting to all hosts , so the DHCP server will know about DHCP client.