

DHCP Experiment

In order to observe DHCP in action, we'll perform several DHCP-related commands and capture the DHCP messages exchanged as a result of executing these commands. Do the following¹:

1. Begin by opening the Windows Command Prompt application (which can be found in your Accessories folder). As shown in Figure 1, enter "*ipconfig /release*". The executable for *ipconfig* is in C:\windows\system32. This command releases your current IP address, so that your host's IP address becomes 0.0.0.0.
2. Start up the Wireshark packet sniffer, as described in the introductory Wireshark lab and begin Wireshark packet capture.
3. Now go back to the Windows Command Prompt and enter "*ipconfig /renew*". This instructs your host to obtain a network configuration, including a new IP address. In Figure 1, the host obtains the IP address 192.168.1.108
4. Wait until the "*ipconfig /renew*" has terminated. Then enter the same command "*ipconfig /renew*" again.
5. When the second "*ipconfig /renew*" terminates, enter the command "*ipconfig /release*" to release the previously-allocated IP address to your computer.
6. Finally, enter "*ipconfig /renew*" to again be allocated an IP address for your computer.
7. Stop Wireshark packet capture.

1.

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C:\WINDOWS\SYSTEM32>ipconfig/release
Windows IP Configuration
IP Address for adapter Local Area Connection has already been released.
C:\WINDOWS\SYSTEM32>ipconfig/renew
Windows IP Configuration

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix  . : ne2.client2.atthi.com
    IP Address. . . . . : 192.168.1.101
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.1.1

C:\WINDOWS\SYSTEM32>ipconfig/renew
Windows IP Configuration

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix  . : ne2.client2.atthi.com
    IP Address. . . . . : 192.168.1.101
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.1.1

C:\WINDOWS\SYSTEM32>ipconfig/release
Windows IP Configuration

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix  . :
    IP Address. . . . . : 0.0.0.0
    Subnet Mask . . . . . : 0.0.0.0
    Default Gateway . . . . . :

C:\WINDOWS\SYSTEM32>ipconfig/renew
Windows IP Configuration

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix  . : ne2.client2.atthi.com
    IP Address. . . . . : 192.168.1.101
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.1.1

C:\WINDOWS\SYSTEM32>_
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Figure 1 Command Prompt window showing sequence of *ipconfig* commands that you should enter.

Now let's take a look at the resulting Wireshark window. To see only the DHCP packets, enter into the filter field "bootp". (DHCP derives from an older protocol called BOOTP. Both BOOTP and DHCP use the same port numbers, 67 and 68. To see DHCP packets in the current version of Wireshark, you need to enter "bootp" and not "dhcp" in the filter.) We see from Figure 2 that the first *ipconfig* renew command caused four DHCP packets to be generated: a DHCP Discover packet, a DHCP Offer packet, a DHCP Request packet, and a DHCP ACK packet.

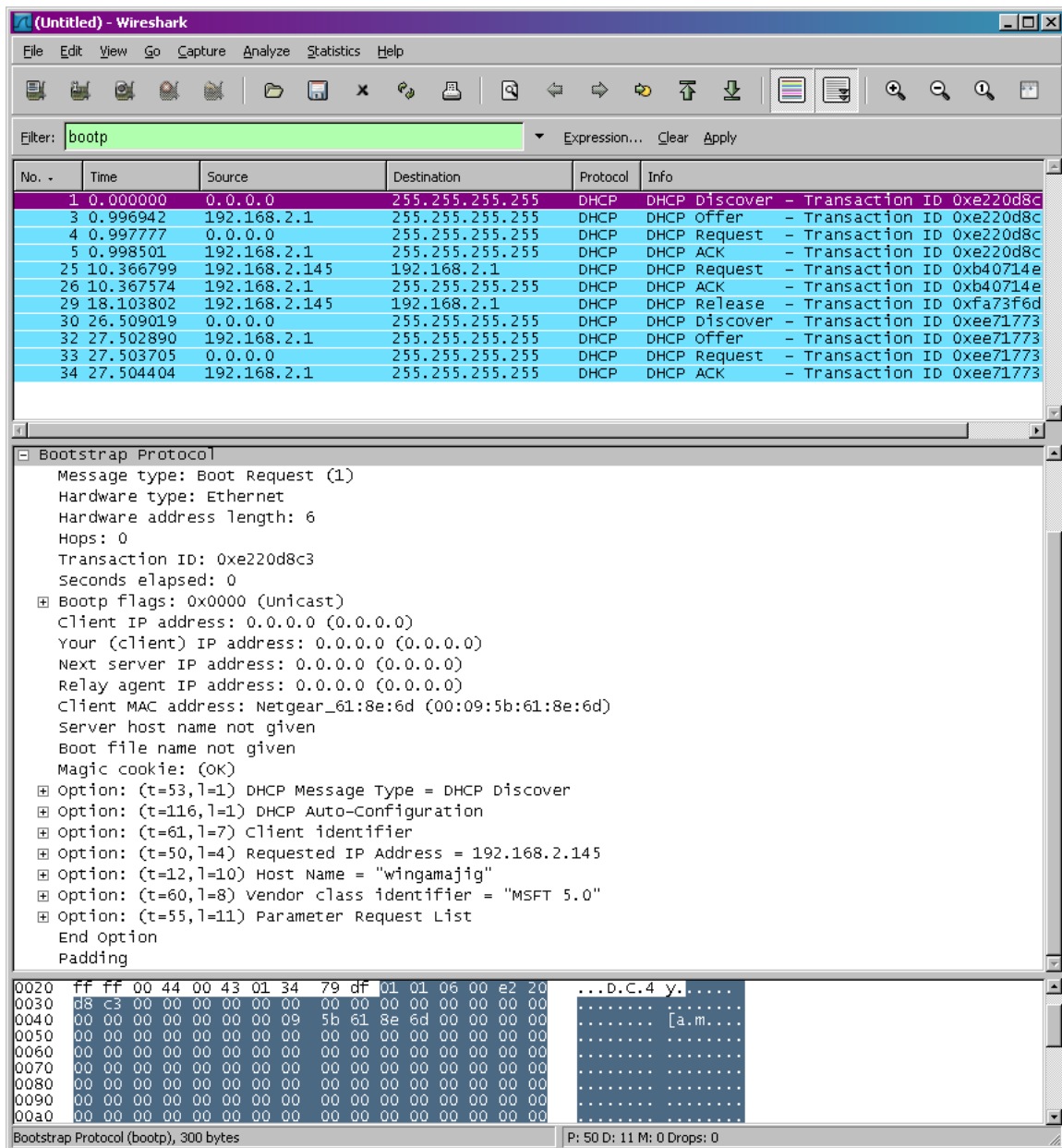


Figure 2 Wireshark window with first DHCP packet – the DHCP Discover packet – expanded.

Answer the following questions:

1. Are DHCP messages sent over UDP or TCP?
2. Look at the sequence of the first four-packet Discover/Offer/Request/ACK DHCP exchange between the client and server. For each packet, indicated the source and destination port numbers. Are the port numbers the same as in the example given in this lab assignment?
3. What is the link-layer (e.g., Ethernet) address of your host?
4. What values in the DHCP discover message differentiate this message from the DHCP request message?
5. What is the value of the Transaction-ID in each of the first four (Discover/Offer/Request/ACK) DHCP messages? What are the values of the Transaction-ID in the second set (Request/ACK) set of DHCP messages? What is the purpose of the Transaction-ID field?
6. A host uses DHCP to obtain an IP address, among other things. But a host's IP address is not confirmed until the end of the four-message exchange! If the IP address is not set until the end of the four-message exchange, then what values are used in the IP datagrams in the four-message exchange? For each of the four DHCP messages (Discover/Offer/Request/ACK DHCP), indicate the source and destination IP addresses that are carried in the encapsulating IP datagram.
7. What is the IP address of your DHCP server?
8. What IP address is the DHCP server offering to your host in the DHCP Offer message? Indicate which DHCP message contains the offered DHCP address.
9. In the example screenshot in this assignment, there is no relay agent between the host and the DHCP server. What values in the trace indicate the absence of a relay agent? Is there a relay agent in your experiment? If so what is the IP address of the agent?
10. Explain the purpose of the router and subnet mask lines in the DHCP offer message.
11. Explain the purpose of the lease time. How long is the lease time in your experiment?
12. What is the purpose of the DHCP release message? Does the DHCP server issue an acknowledgment of receipt of the client's DHCP request? What would happen if the client's DHCP release message is lost?