



Polytechnic University of Puerto Rico

Department of Electrical Engineering

Hato Rey

Module 5 Project COE 4331

Computer Networks Laboratory

December 13, 2024

Schmidt Montilla, Coral S., Student ID: 148830

Professor: Juan Tovar

## Table of Contents

Introduction.....	3
Method .....	4
Part 1: Locating the MAC Address on a Computer .....	5
Step 1: Open a Windows command prompt window.....	5
Step 2: Use the <i>ipconfig /all</i> command.....	5
Step 3: Locate the MAC (physical) address(es) in the output from the <i>ipconfig /all</i> command .....	6
Part 2: Analyzing the Parts of a MAC Address .....	6
Step 1: List MAC addresses discovered by you and your classmates in Part 1, Step 3a.....	6
Step 2: Lookup the vendors who are the registered owners of the OUI that you listed in the table.....	7
Reflection .....	7
Conclusion .....	9
References.....	10

## Introduction

This lab aimed to provide practical insights into Media Access Control (MAC) addresses and their essential role in networking. By using the `ipconfig /all` command, we explored how to locate and interpret the MAC addresses associated with different network interfaces. These unique physical addresses, embedded in network interface cards (NICs), facilitate device identification and communication at the Data Link Layer [2]. The lab also highlighted scenarios where multiple MAC addresses are present on a single device, reflecting the diverse capabilities of modern computers. Additionally, the hands-on activities emphasized the immutability and importance of MAC addresses in ensuring efficient and accurate network operations [1].

## Method

# Lab – Determine the MAC Address of a Host

## Topology



## Addressing Table

Device	Interface	IP Address	Subnet Mask
PC	VLAN 1	192.168.1.2	255.255.255.0

## Objectives

- Determine the MAC address of a Windows computer on an Ethernet network using the **ipconfig /all** command.
- Analyze a MAC address to determine the manufacturer.

## Background / Scenario

Every computer on an Ethernet local network has a Media Access Control (MAC) address that is burned into the Network Interface Card (NIC). Computer MAC addresses are usually displayed as 6 sets of two hexadecimal numbers separated by dashes or colons (example: 15-EF-A3-45-9B-57). The **ipconfig /all** command displays the computer MAC address. You may work individually or in teams.

## Required Resources

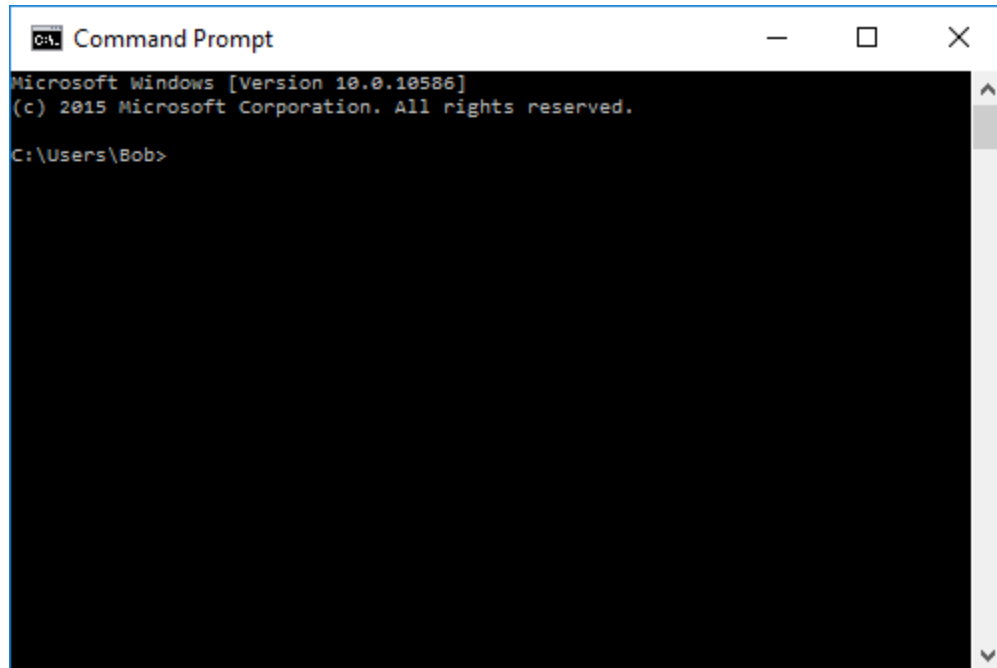
- PC running Windows 10 with at least one Ethernet network interface card (NIC)
- Connectivity to the Internet

## Part 1: Locating the MAC Address on a Computer

In this part of the lab, you will determine the MAC address of a computer using the Windows **ipconfig** command.

### Step 1: Open a Windows command prompt window

Right-click on the **Start** button and select **Command Prompt**.

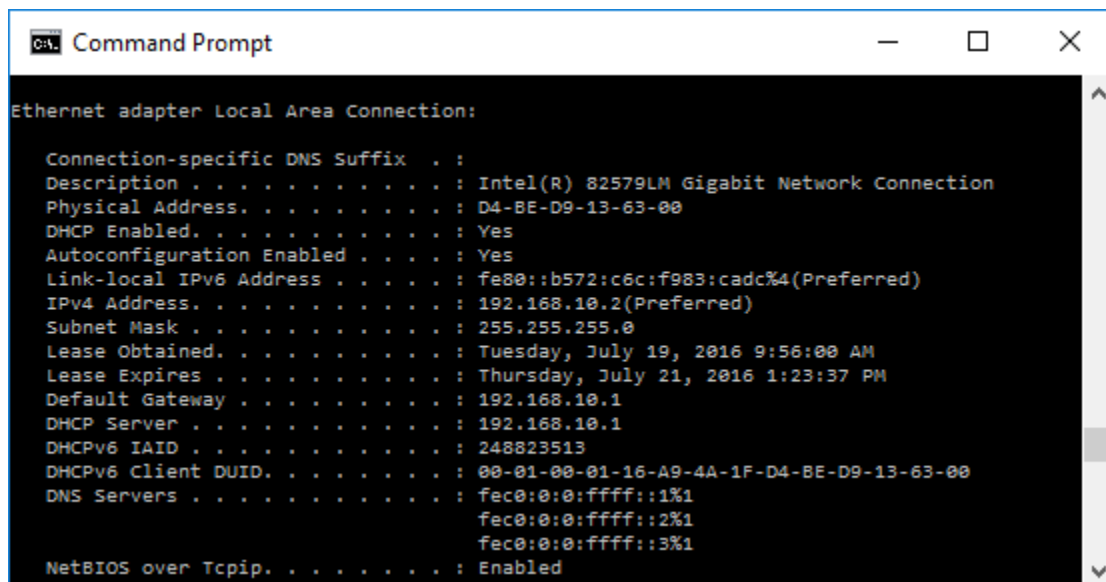


```
CA: Command Prompt
Microsoft Windows [Version 10.0.10586]
(c) 2015 Microsoft Corporation. All rights reserved.

C:\Users\Bob>
```

### Step 2: Use the *ipconfig /all* command

Enter the **ipconfig /all** command at the command prompt. Press Enter. (Typical results are shown in the following figure, but your computer will display different information.)



```
CA: Command Prompt

Ethernet adapter Local Area Connection:

    Connection-specific DNS Suffix  . : 
    Description . . . . . : Intel(R) 82579LM Gigabit Network Connection
    Physical Address. . . . . : D4-BE-D9-13-63-00
    DHCP Enabled. . . . . : Yes
    Autoconfiguration Enabled . . . . : Yes
    Link-local IPv6 Address . . . . . : fe80::b572:c6c:f983:cad4%4(Preferred)
    IPv4 Address. . . . . : 192.168.10.2(Preferred)
    Subnet Mask . . . . . : 255.255.255.0
    Lease Obtained. . . . . : Tuesday, July 19, 2016 9:56:00 AM
    Lease Expires . . . . . : Thursday, July 21, 2016 1:23:37 PM
    Default Gateway . . . . . : 192.168.10.1
    DHCP Server . . . . . : 192.168.10.1
    DHCPv6 IAID . . . . . : 248823513
    DHCPv6 Client DUID. . . . . : 00-01-00-01-16-A9-4A-1F-D4-BE-D9-13-63-00
    DNS Servers . . . . . : fec0:0:0:ffff::1%1
                           fec0:0:0:ffff::2%1
                           fec0:0:0:ffff::3%1
    NetBIOS over Tcpip. . . . . : Enabled
```

### Step 3: Locate the MAC (physical) address(es) in the output from the *ipconfig /all* command

Use the table below to fill in the description of the Ethernet adapter and the Physical (MAC) Address:

Description	Physical Address
Intel(R) Wi-Fi 6 AX200 160 MHz	C8-5E-A9-65-9B-2C

How many MAC addresses did you discover in your PC? I found 1 Mac addresses on my PC.

## Part 2: Analyzing the Parts of a MAC Address

Every Ethernet network interface has a physical address assigned to it when it is manufactured. These addresses are 48 bit (6 bytes) long and are written in hexadecimal notation. MAC addresses are made up of two parts. One part of the MAC address, the first 3 bytes, represents the vendor who manufactured the network interface. This part of the MAC is called the OUI (Organizationally Unique Identifier). Each vendor who wants to make and sell Ethernet network interfaces must register with the IEEE in order to be assigned an OUI.

The second part of the address, the remaining 3 bytes are the unique ID for the interface. All MAC addresses that begin with the same OUI must have unique values in the last 3 bytes.

In the example shown in the lab, the physical MAC address for the Ethernet LAN interface is D4-BE-D9-13-63-00.

Manufacturer OUI	Unique Identifier for the Interface	Vendor Name
D4-BE-D9	13-63-00	Dell Incorporated

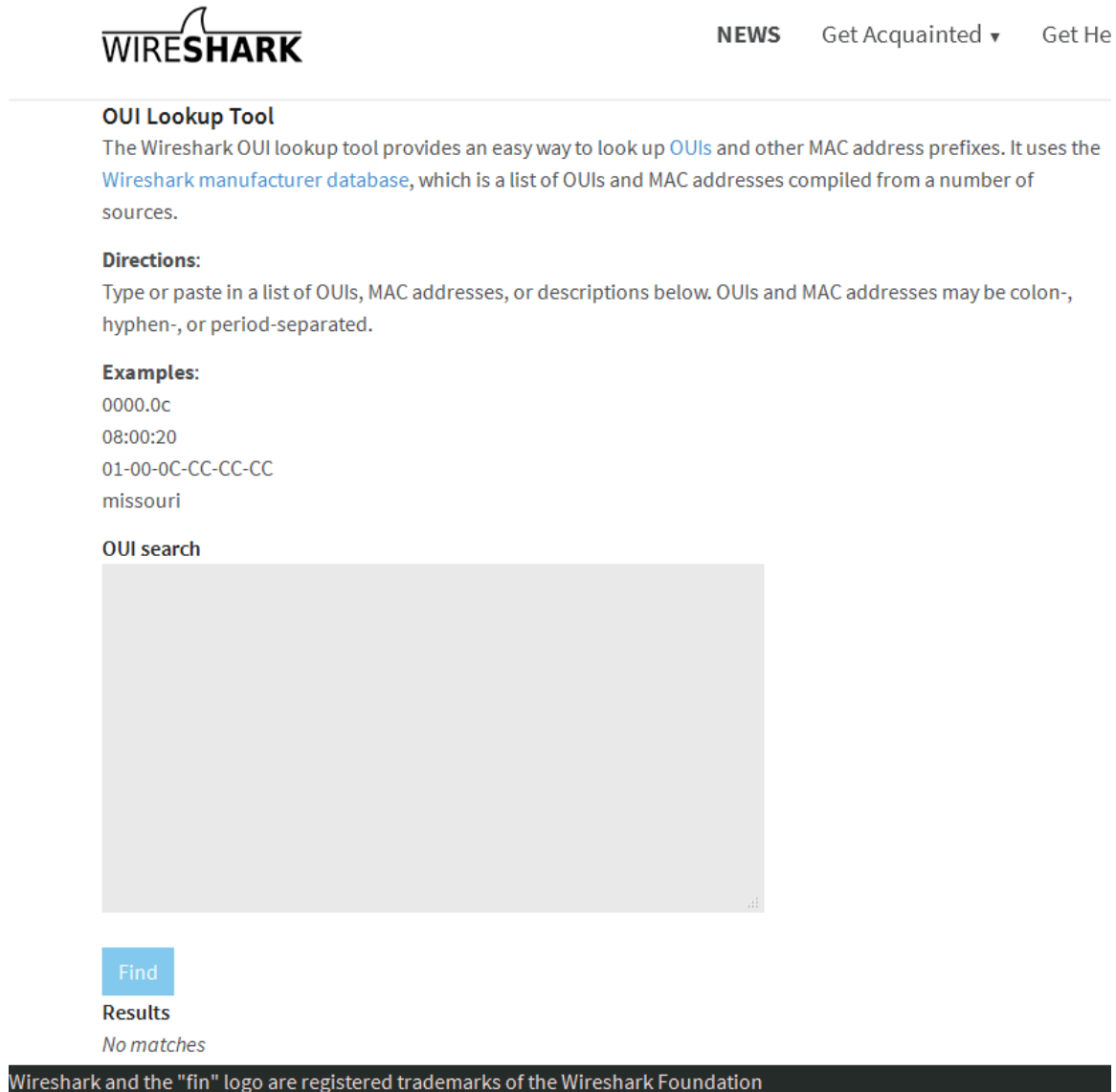
### Step 1: List MAC addresses discovered by you and your classmates in Part 1, Step 3a.

List the 3-byte Manufacturer OUI and the 3-byte unique interface identifier. You will fill in the Vendor name in Step 2.

Manufacturer OUI	Unique Identifier for the Interface	Vendor Name
D4-BE-D9	13-63-00	Dell Incorporated
C8-5E-A9	65-9B-2C	C8:5E:A9 Intel Corporate

## Step 2: Lookup the vendors who are the registered owners of the OUI that you listed in the table.

- a. Wireshark.org provides an easy to use lookup tool at <https://www.wireshark.org/tools/oui-lookup.html>. Use this tool, or use the Internet to search for other ways to identify an OUI.



The screenshot shows the Wireshark OUI Lookup Tool interface. At the top is the Wireshark logo and navigation links: NEWS, Get Acquainted, and Get Help. The main heading is "OUI Lookup Tool". Below it, a description states: "The Wireshark OUI lookup tool provides an easy way to look up OUIs and other MAC address prefixes. It uses the Wireshark manufacturer database, which is a list of OUIs and MAC addresses compiled from a number of sources." The "Directions:" section says: "Type or paste in a list of OUIs, MAC addresses, or descriptions below. OUIs and MAC addresses may be colon-, hyphen-, or period-separated." The "Examples:" section lists: 0000.0c, 08:00:20, 01-00-0C-CC-CC-CC, and missouri. Below this is a large text input area labeled "OUI search". A blue "Find" button is at the bottom left. Below the button, the text "Results" is shown, followed by "No matches". At the very bottom, a black banner contains the text: "Wireshark and the 'fin' logo are registered trademarks of the Wireshark Foundation".

- b. Use the information that you found to update the vendor column in the chart in Step 1a. How many different vendors did you discover? I only found 1 vendor.

## Reflection

1. Why might a computer have more than one MAC address?

A computer may have multiple MAC addresses because each network interface card (NIC) in the computer has its own unique MAC address. For example, a laptop with both a Wi-Fi adapter and an Ethernet port will have separate MAC addresses for each interface. Additionally, other devices, such as Bluetooth adapters or virtual network interfaces, also have distinct MAC addresses, enabling simultaneous communication through different network layers [2].

2. The sample output from the **ipconfig /all** command shown previously had only one MAC address. Suppose the output was from a computer that also had wireless Ethernet capability. How might the output change?

If the computer also had wireless Ethernet capability, the ipconfig /all output would include an additional MAC address for the wireless adapter. Each adapter would be listed separately, with its corresponding description and unique physical address [1].

3. Try connecting and disconnecting the network cable(s) to your network adapter(s) and use the **ipconfig /all** again. What changes do you see? Does the MAC address still display? Will the MAC address ever change?

Disconnecting a network cable changes the status of the adapter to "disconnected" in the ipconfig /all output, but the MAC address remains visible because it is a hardware-encoded identifier in the NIC. A MAC address does not change over time unless the NIC is replaced or explicitly altered through special configurations, such as MAC address cloning [2].

4. What are other names for the MAC address?

Other names for the MAC address include "physical address," "hardware address," "Ethernet hardware address," and "Wi-Fi address." These terms emphasize the hardware-based nature of MAC addresses and their role in enabling network communication [2].



## Conclusion

This lab deepened our understanding of MAC addresses by combining theoretical knowledge with practical applications. We identified and analyzed MAC addresses, gaining insights into their structure, purpose, and role in facilitating communication between devices on a network. The exploration of multiple network interfaces underscored the complexity and flexibility of modern networking [2]. Furthermore, we learned that MAC addresses, as hardware-defined identifiers, remain constant unless explicitly altered or replaced. This understanding equips us with the tools to troubleshoot network issues and reinforces the importance of MAC addresses in maintaining seamless device interactions within local networks [1].

## References

- [1] M. Address, “Lab 3.2.2.4 - Determine the MAC Address of a Host,” *YouTube*, Jan. 30, 2018. Available: [https://www.youtube.com/watch?v=Uzb295pkL\\_0](https://www.youtube.com/watch?v=Uzb295pkL_0). [Accessed: Dec. 11, 2024]
- [2] GeeksforGeeks, “What is MAC Address?,” *GeeksforGeeks*, Oct. 09, 2017. Available: <https://www.geeksforgeeks.org/mac-address-in-computer-network/>. [Accessed: Dec. 13, 2024]