MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
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Mini Project Report
of
Computer Networks LAB

DEVICE IDENTIFICATION
USING
MAC ADDRESSES

SUBMITTED
BY

STUDENT NAMEs	REG. NOS, ROLL NOS, SECTIONS
Pradyumn Kamath	200905398, 60, C
Udeet Mittal	200905406, 64, C

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1. ABSTRACT

A MAC address is a hardware identification number that uniquely identifies each device on a network. It is given to a network adapter when it is manufactured and is hardwired or hard coded onto your computer's network interface card (NIC) and is unique to it.

Manufacturers all place a special number sequence (called the Organizationally Unique Identifier or OUI) in the MAC address that identifies them as the manufacturer. The OUI is typically right at the front of the address.

Bluetooth is a short-range wireless technology standard that is used for exchanging data between fixed and mobile devices over short distances and building personal area networks (PANs).

Bluetooth technology uses the principles of device "inquiry" and "inquiry scan." Scanning devices listen in on known frequencies for devices that are actively inquiring. When an inquiry is received, the scanning device sends a response with the information needed for the inquiring device to determine and display the nature of the device that has recognized its signal.

Using this knowledge, we have designed a tool which helps identify the maker of devices connected to the system via Bluetooth with the help of the MAC addresses of these devices.

2. INTRODUCTION

2.1 General Introduction to the topic

MAC Addresses are unique 48-bits hardware number of a computer, which is embedded into a network card (known as a Network Interface Card) during the time of manufacturing. MAC Address is a 12-digit hexadecimal number (6-Byte binary number), which is mostly represented by Colon-Hexadecimal notation.

The First 6-digits (say 00:40:96) of MAC Address identifies the manufacturer, called OUI (Organizational Unique Identifier). IEEE Registration Authority Committee assigns these MAC prefixes to its registered vendors.

Here are some OUI of well-known manufacturers:

CC:46:D6 - Cisco

3C:5A:B4 - Google, Inc.

3C:D9:2B - Hewlett Packard

00:9A:CD - HUAWEI TECHNOLOGIES CO., LTD

2.2 Hardware and Software Requirements

Computer with Bluetooth enabled and Linux-based operating system.

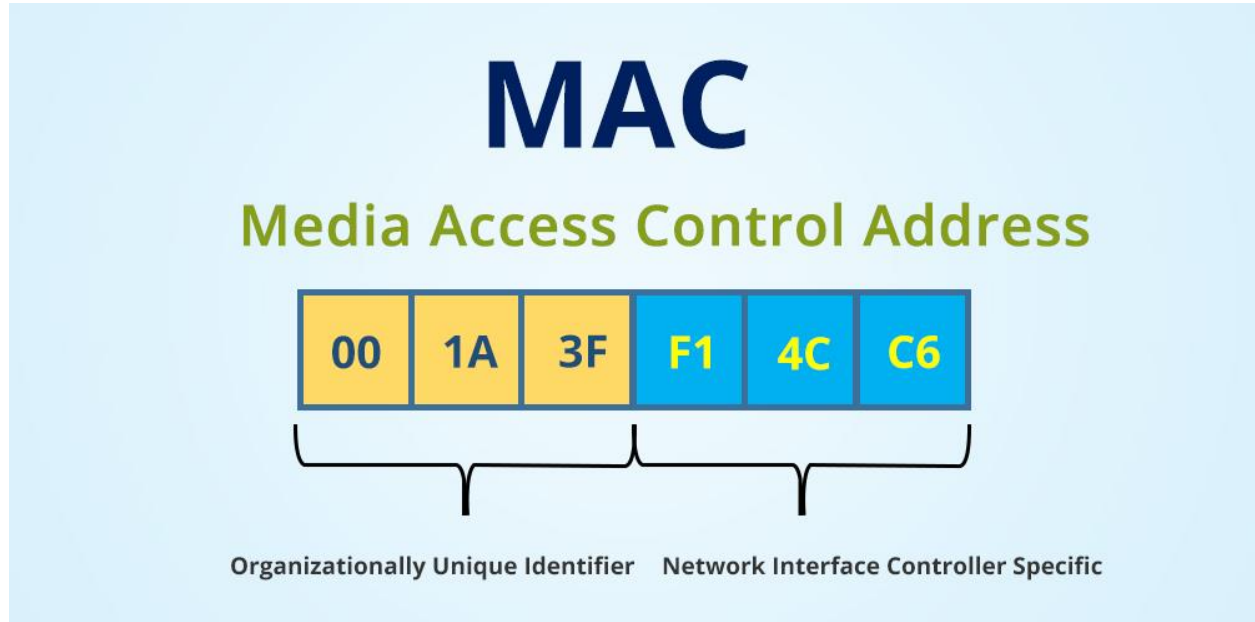Recommended to have latest version of Firefox/Chrome installed.
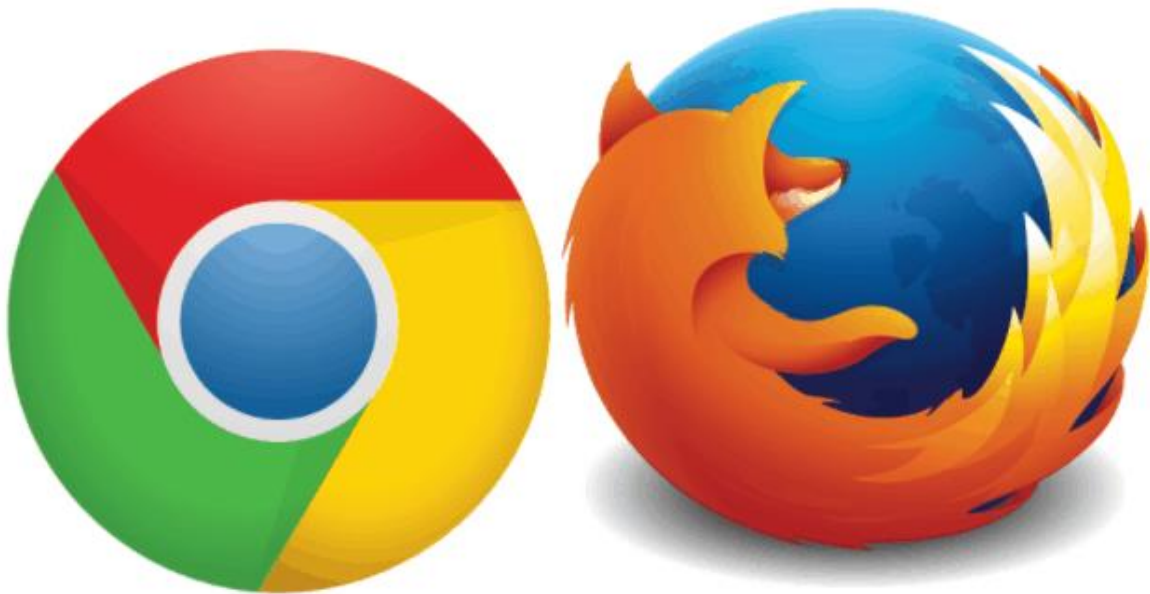
Fig. 2.11: MAC Address (OUI/NIC)

Fig. 2.21: Chrome and Firefox

3. PROBLEM DEFINITION

Problem Statement:

Design a tool to identify the different types of devices used in communication.

Ideally, we would like to identify the devices used during communication directly with the help of a tool.

Currently, since no such tool is publicly available, we are required to go through device settings to identify the type of device used in communication.

This results in needless complication of the device identification process leading to delay and incorrect identification of devices.

We seek to resolve this by developing a tool which identifies the devices and their manufacturers making the overall process simpler and more efficient.

4. OBJECTIVES

4.1 Identifying the devices used in communication:

Done with the help of the MAC address of the given device. Used to identify the manufacturer as well as the type of device used in communication.

4.2 Reducing the time taken to identify the different devices connected to the computer.

4.3 Recognizing Bluetooth connected devices.

4.4 Identifying the manufacturers of the connected devices.

4.5 Simplifying the device identification process.

Fig. 4.1: Different types of Bluetooth devices

5. METHODOLOGY

We selected the problem statement of identifying the different types of devices used in communication, since the idea of developing a tool to achieve this really resonated with us. We have developed a tool which identifies the type of device and provides the name of its manufacturer. We particularly focused on Bluetooth connection since it is one of the more prevalent forms of communication used in today's environment.

We started by studying about the MAC addresses of devices, in particular the Organizational Unique Identifier (OUI) and various methods of extracting the MAC address. The various methods included using Wireshark to trace Bluetooth Packets and use their MAC addresses. We finally decided on a set of terminal commands consisting of *hcitool* to extract the required MAC address of a device.

We use this MAC address to identify the manufacturer of the device by using its OUI and comparing it with the common identifiers until we find a match and display the manufacturer's name on a website.

6. IMPLEMENTATION DETAILS

We implemented the tool by developing a Python script which extracts the MAC address of a Bluetooth connected device. It uses a set of terminal commands consisting of *hcitool* commands such as 'hcitool con' which produces the MAC address and other connection details of the device. It is then connected to a web API which then compares the OUI of the given address with all the common identifiers to identify the manufacturer of the device. The final result is displayed on a website which shows the device name and its manufacturer.

We need to run "python3 main.py" command first in the terminal and then open the webpage to get the results.

Python script:

```
import subprocess
from maclookup import ApiClient
import logging

out = subprocess.Popen(['hcitool', 'con'],
              stdout=subprocess.PIPE,
              stderr=subprocess.STDOUT)
stdout, stderr = out.communicate()
ans = stdout.decode('utf-8')
mac_address = ans[20:38]
client = ApiClient('at_3XhxcPo9m1JSaQg1Atow8fCHyGgZ2')
logging.basicConfig(filename='myapp.log', level=logging.WARNING)
response = client.get(mac_address)
mac_address = "MAC Address is: "+mac_address
lines = [mac_address,
      "Company Name: "+response.vendor_details.company_name,
      "Company Address: "+response.vendor_details.company_address]
with open('output.txt', 'w') as f:
   for line in lines:
      f.write(line)
      f.write('\n')
```
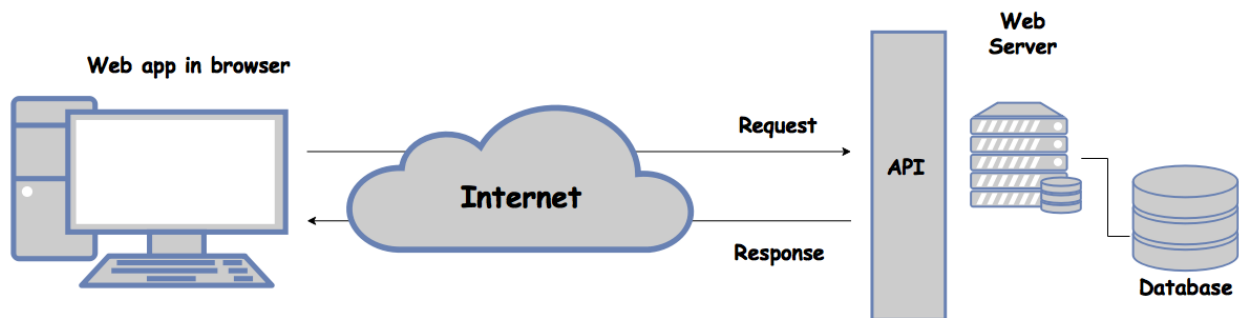

Fig. 6.1: Working of a web API

7. CONTRIBUTION SUMMARY

We started with equal deliberation over the problem statement. We discussed the various possibilities regarding the problem statement and explored different options equally and divided the work into development of the Python script, development of terminal commands and the development of the website to host the final product.

The Python script to extract the MAC address using terminal commands was developed by Udeet. The terminal commands to find the device name and connection details were developed by Pradyumn. The front-end work that is the development of the website was done in equal parts by both Udeet and Pradyumn.

The final files produced are index.html, style.css, main.py and output.txt.

8. OUTPUT

The following figures contain the final output screenshots of the project.

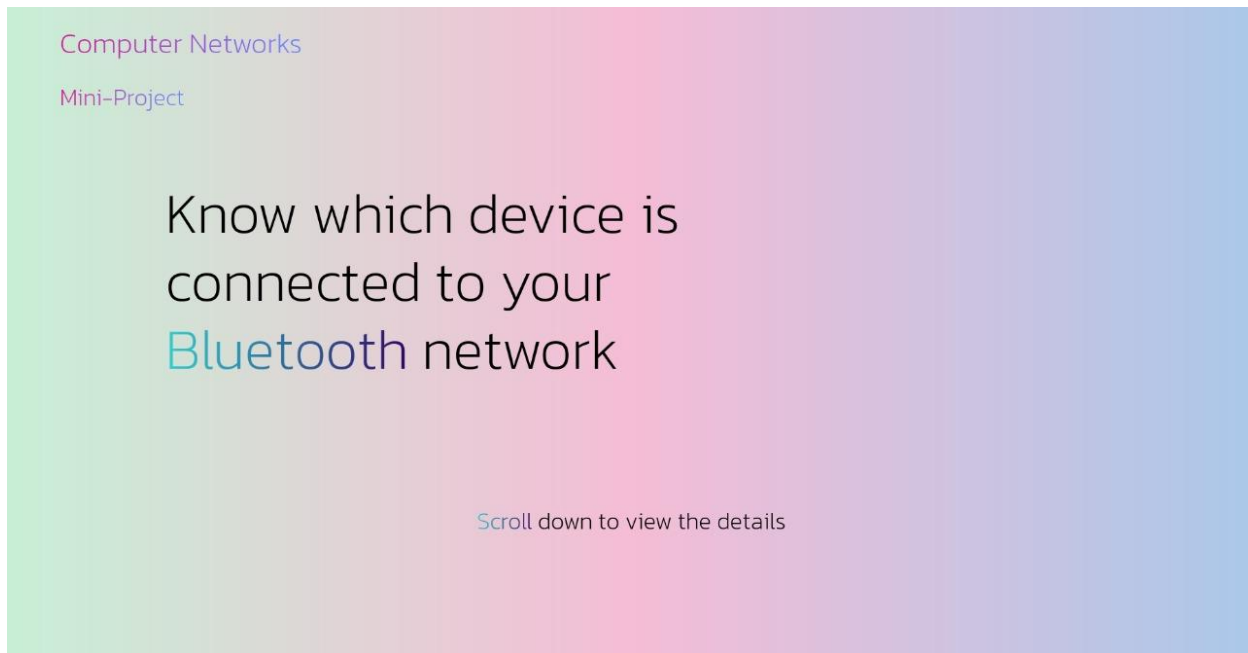They are for the test case of connection with "Boat Wireless Earphones".
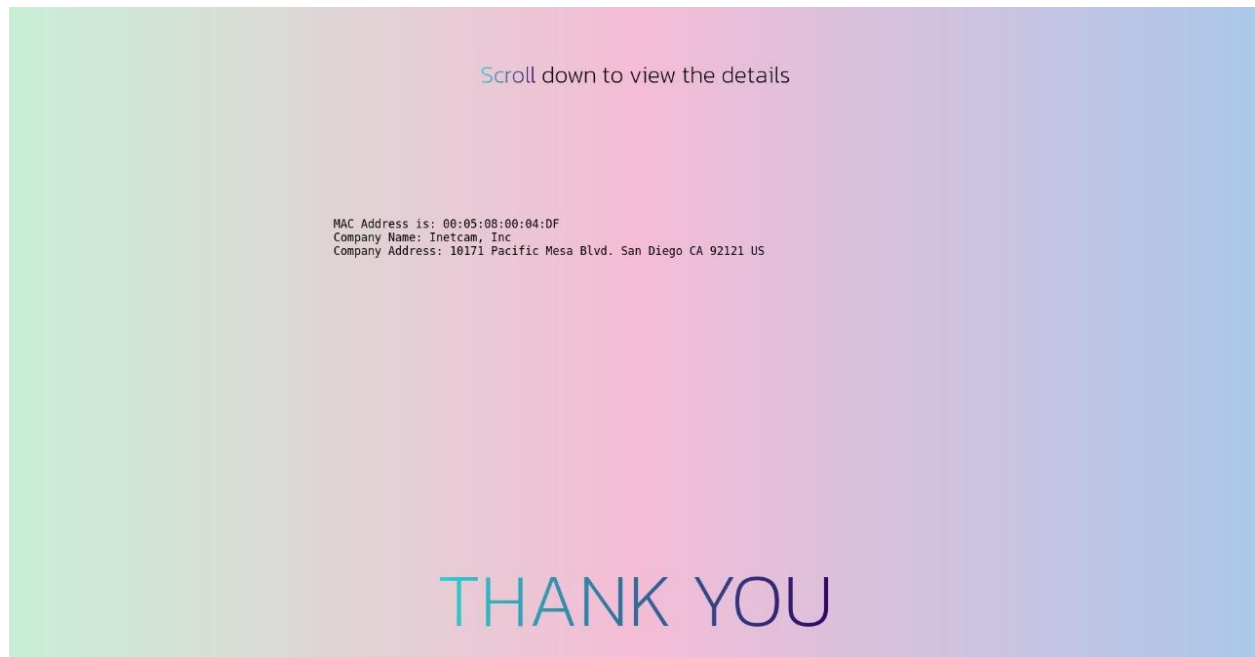

Fig. 8.1: Output screenshot 1

Fig. 8.2: Output screenshot 2

9. REFERENCES

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https://pypi.org/project/maclookup/

https://www.javatpoint.com/what-is-mac-address

https://novelbits.io/bluetooth-address-privacy-ble/#:~:text=A%20Bluetooth%20address%20sometimes%20referred,is%20referred%20to%20as%20BD_ADDR%20