

Wi-Fi Access Point with Time-Based Access Control

Abel Laaouaj & Joel Santana
Communication Systems
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ICT Systems Engineering

GitHub Repo: <https://github.com/AbEl9876/hostapd>

Key Features

This project aims to create a Wi-Fi Access Point (AP) featuring time-based access control, allowing or restricting network access based on specific MAC addresses and time constraints.

The project encompasses essential functionalities, including:

1. Time-Based Access Control:
 - Regulate network access based on predefined time intervals for specific MAC addresses.
2. Monitoring:
 - Notification system alerts the administrator when specified "devices of interest" connect to the network via their MAC addresses.
 - Customizable management of the list of monitored devices.
 - Flexible notification methods tailored to the administrator's preferences.

Steps to Create the Access Point (AP)

Step 1: Setting up Interface IP Address

- Modify the /etc/network/interfaces:

```
auto wlp3s0
```

```
iface wlp3s0 inet static
```

- Assign the IP and mask to the wlp3s0 interface:

```
sudo ip a add 172.16.0.1/24 dev wlp3s0
```

Steps to Create the Access Point (AP)

Step 2: Configuring DHCP Server

- Free port 53:

```
sudo systemctl stop systemd-resolved
```

- Load the configuration into the dnsmasq service:

```
sudo dnsmasq -C dnsmasq.conf
```

Steps to Create the Access Point (AP)

Step 3: Enabling Internet Connection for Devices

- Enable IP forwarding and sets up NAT routing from the Ethernet interface to the wireless interface:

```
sudo sysctl -w net.ipv4.ip_forward=1
```

```
sudo iptables -t nat -A POSTROUTING -o enp4s0 -j MASQUERADE
```

- Load the configuration into the dnsmasq service:

```
sudo dnsmasq -C dnsmasq.conf
```

Steps to Create the Access Point (AP)

Step 4: Running the Access Point

- Run main.py (initializes the AP and the management console):

```
sudo python3 main.py
```

Implementation of *main.py*

- The main functionalities of the program are:
 - To set up the hostapd.
 - To initialize two subprocesses to monitor device connections and disconnections, as well as control their usage based on time ranges to either disconnect them from the AP or grant permission for connection.
 - To provide a menu with a set of instructions that can be very useful for the administrator.

Results: Control menu

- First procedure: Admin email input.

```
abel@abel:~/AP$ sudo python3 main.py
Enter the admin email address: abel
Incorrect email format. Attempt 1 of 3.

Enter the admin email address: ablaga2002@gmail.com
```

- Then, AP is in initialized and the control menu shows the 5 possible options.

Results: Control menu

- If option 1 is chosen, new accepted MAC's with their corresponding periods of time can be entered.

```
#####  
MENU  
#####  
1. Enter accepted MAC list for your AP  
2. Show the list of devices of interest and the time interval when they can connect  
3. Devices connected at this time  
4. Receive information from the second and third option via email  
5. Exit  
Select an option (1-5): 1  
Enter MAC address: 14:99:3e:de:98:f0  
Enter initial time (HH:MM): 19:02  
Enter final time (HH:MM): 19:04  
Do you want to add a new MAC address to the accept list? (Y/N): N  
Data saved successfully.  
Initializing your AP.
```

Results: Control menu

- If option 2 is chosen, a list of devices of interest and the time interval when they can connect is shown.

```
#####  
      MENU  
#####  
1. Enter accepted MAC list for your AP  
2. Show the list of devices of interest and the time interval when they can connect  
3. Devices connected at this time  
4. Receive information from the second and third option via email  
5. Exit  
Select an option (1-5): 2
```

MAC DEVICE	Initial Time Access	Final Time Access
14:99:3e:de:98:f0	19:02	19:04

Results: Control menu

- If option 3 is chosen, a list of connected devices to the AP is shown.

```
#####  
      MENU  
#####  
1. Enter accepted MAC list for your AP  
2. Show the list of devices of interest and the time interval when they can connect  
3. Devices connected at this time  
4. Receive information from the second and third option via email  
5. Exit  
Select an option (1-5): 3  


|                   |
|-------------------|
| MAC DEVICE        |
| 14:99:3e:de:98:f0 |


```

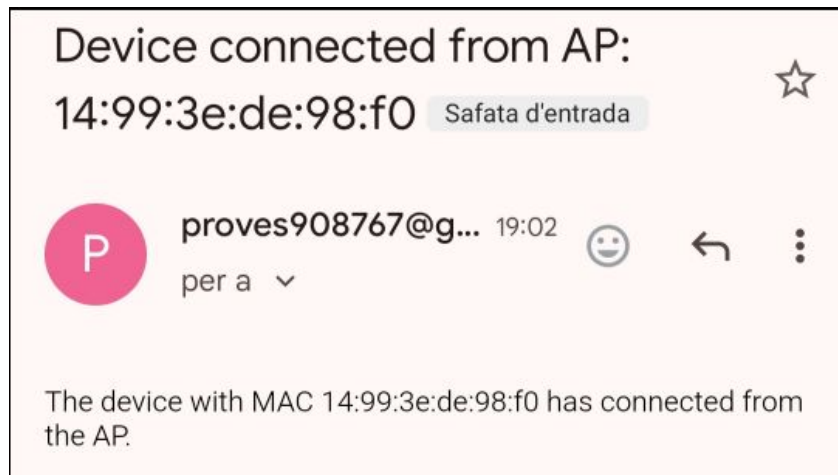
Results: Control menu

- If option 4 is chosen, the information given for option 2 and 3 (devices of interest, and connected devices) is sent by email to the admin email entered at the beginning of the program.
 - In the next slides examples of the different emails are shown.

Notifications

We have four types of notification implemented for our program:

1. Email Connection



Notifications

We have four types of notification implemented for our program:

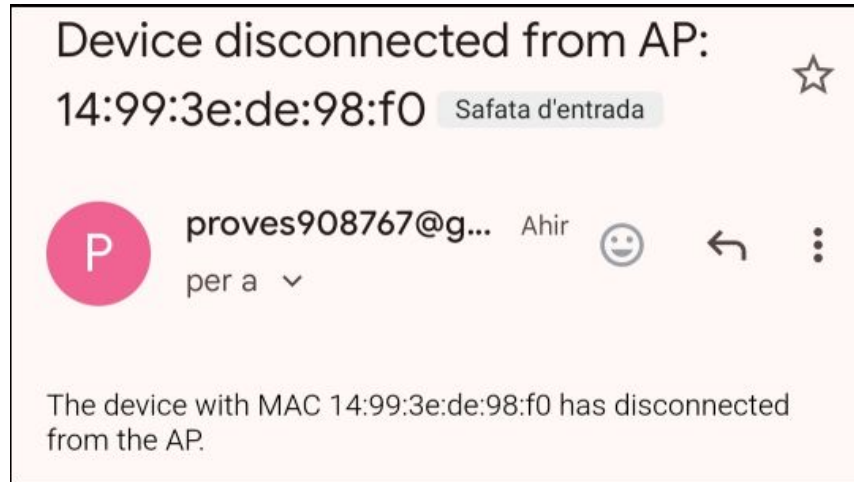
2. Email Disconnection due to end time



Notifications

We have four types of notification implemented for our program:

3. Email Normal disconnection



Notifications

We have four types of notification implemented for our program:

4. Email sent by choosing the Option 4 in the menu. This mail shows the devices of interest and also the connected devices

Information about connected devices and of interest

Safata d'entrada

P

proves908767@g... 19:03

per a

😊

↩

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Table: Information about interest devices

MAC DEVICE	Initial Time Access	Final Time Access
14:99:3e:de:98:f0	19:02	19:04

Table: Connected Devices

MAC DEVICE
14:99:3e:de:98:f0

Video showing the Demo



<https://youtu.be/0ztkv-48olo>