In Lab 5 we used python3 to scan the WiFi channels and print out information on any newly discovered networks by sniffing for Beacon frames.

For the homework assignment you will extend your sniffing to include the remaining management frames. Your task **[6 pt]**:

- **[0.5 pts]** Run your python script (it actually works i.e. no crashes and such). The current template should run (if the pcap files are in the correct location) and display every Beacon frame in the selected pcap.
- Instead of live sniffing, the data stored in pcap files will be used, therefore your script should open a pcap file [files available on Moodle – see contents of each file below]
  - This makes testing easier and eliminates the issue of trying to get the adapter to work on your device
  - `mgt_frames.pcap` contains *Association Response*, *Re-association Request*, *Re-association Response*, *Authentication* and *Deauthentication* frames
  - `test_pcap2.pcap` contains *Probe Request* and *Probe Response* frames
  - `test_pcap3.pcap` contains *Association Request*, *Association Response*, *Probe Request*, *Probe Response*, *Disassociate*, *Authentication* and *Action frames*
  - `test_pcap4.pcap` contains *Probe Request and Probe Response frames*
- **[1 pt]** *Every* **Probe Response** and **Probe Request** frame that is detected is displayed in the terminal.
  - For the Probe Response print the BSSID, SSID, Channel and Signal Strength
  - For the Probe Request print the SSID, Channel and Signal Strength
- **[1 pt]** *Every* **Authentication** and **Deauthentication** frame that is detected is displayed in the terminal
  - For both frames print the BSSID, Channel and Signal Strength
- **[1 pt]** *Every* **Association Request** and **Association Response** frame that is detected is displayed in the terminal
  - For the Association Request print the BSSID, SSID, Channel and Signal Strength
  - For the Association Response print the BSSID, Channel and Signal Strength
- **[1 pt]** *Every* **Re-association Request** and **Re-association Response** frame that is detected is displayed in the terminal
  - For the Re-association Request print the BSSID, SSID, Channel and Signal Strength
  - For the Re-association Response print the BSSID, Channel and Signal Strength
- **[1 pt]** *Every* **Disassociate** and **Action** frame that is detected is displayed in the terminal
  - For both frames print the BSSID, Channel and Signal Strength
- **[0.5 pts]** Use colorama (https://pypi.org/project/colorama/) to assign different colours to the frame groups (grouped above by points).

- Example:
  - Probe request and Probe response frames could be blue,
  - Authentication and De-authentication frames could be green,
  - Association Request and Association Response frames could be yellow,
  - Re-assocation Request and Re-association Response frames could be red,
  - Disassociate and Action frames could be magenta
- Available colours: black, white, red, green, yellow, blue, magenta and cyan
- dim, normal and bright can also be applied

Sample Output

PROBE RESPONSE

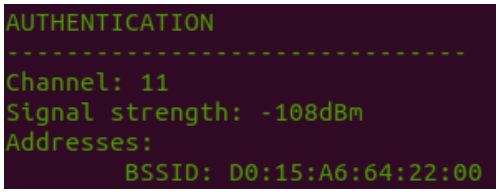
BSSID: 5C:71:0D:4C:17:40
SSID: eduroam
Channel: 1
Signal Strength: -92dBm

PROBE REQUEST

SSID: eduroam
Channel: 6
Signal Strength: -94dBm

DEAUTHENTICATION

BSSID: 5C:71:0D:4C:16:40
Channel: 6
Signal Strength: -89dBm



Additional Notes

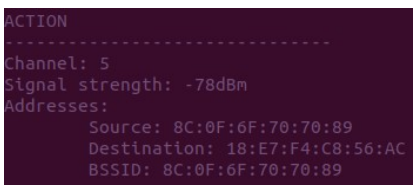
- The template can be ignored, create your own file
- Every frame should be displayed, do not store previously discovered SSIDs as is done in the lab file

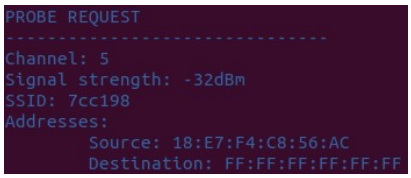
Modifications

- You can use any colour you desire for the frames (once the colour does change)
- You can display your information differently, just include the specified fields

Bonus Points

- **[2 pts]** For the management frames above
  - Add a **Destination** and **Source** address to the output for the Probe Response, Probe Request, Authentication, Deauthentication, Association Request, Association Response, Re-association Request, Re-association Response, Disassociate and Action frames





- **[1.5 pts]** Every RTS, CTS and ACK Control Frame that is discovered is printed. The colour for all control frames can be the same.
    - For the RTS frames print the Channel, Signal Strength, Receiver Address and Transmitter Address
    - For both the CTS and ACK frames print the Channel, Signal Strength and Receiver Address
    - Files with RTS, CTS and ACK frames: `ctl_frames.pcap` and `test_pcap[1 - 4].pcap`

```
RTS
------------------------------
Channel: 11
Signal strength: -89dBm
Addresses:
        Transmitter: BC:A5:8B:A5:F3:0E
        Receiver: 5C:71:0D:4C:4E:E0

CTS
------------------------------
Channel: 11
Signal strength: -93dBm
Addresses:
        Receiver: BC:A5:8B:A5:F3:0E
```

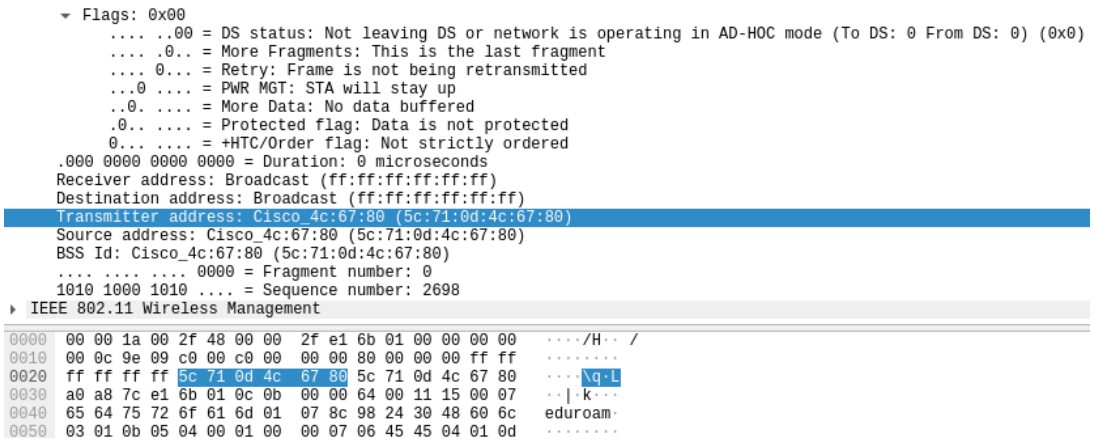
```
ACK
------------------------------
Channel: 5
Signal strength: -78dBm
Addresses:
        Receiver: 54:B2:03:14:60:07
```

- **[0.5 pts]** Every Data Frame that is discovered is printed. The colour for all data frames can be the same.
    - For each frame print the Channel, Signal Strength, Address 1, Address 2 and Address 3
        - We'll assume address 4 does not exist
    - Files with Data Frames: `test_pcap[1 - 4].pcap`

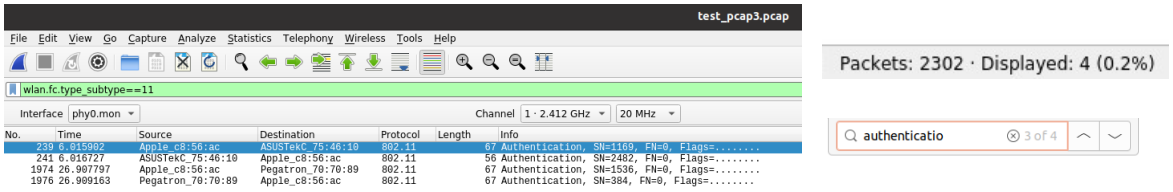
```
DATA FRAME
------------
Channel: 5
Signal Strength: -90dBm
Addresses:
        Address 1: 38:6B:1C:60:FD:36
        Address 2: 5C:E5:0C:C3:83:49
        Address 3: 38:6B:1C:60:FD:36
```

Hints

- Use the AND operation to isolate individual bits
- Use Wireshark to figure out where data lies in the 802.11 frame



- Save the output of your scrip to a file. E.g. `python3 packet_reader.py > pcap3_output.txt`. The number of frames (e.g. Beacon, Probes) can then be counted easily.
- Use Wireshark to determine the number of frames (e.g. Authentication) that should be present in the file.



Due Date: Check Moodle for date
Late Submission Deadline: Check Moodle for date (usually 1 week after due date)
Submission Files: .py file(s)
Location: Moodle Homework 5 link