

# Experiment: 1

## Listing Wi-Fi Networks in the Surroundings

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**Abstract**—With the widespread use of Wi-Fi networks, understanding their characteristics becomes crucial for various purposes including network optimization, security assessment, and troubleshooting. In the report, we analyze Wi-Fi networks from a packet capture (pcap) file using a Python script.

### I. INTRODUCTION

We analyze key parameters such as SSID, BSSID, supported protocols, average RSSI, band, and channel from the captured data. This experiment provides us a deeper understanding of how the Wi-Fi system works in our surroundings. The below experiment is a simple way to list all the Wi-Fi networks present in the surroundings, by using their beacon frames.

### II. PROCEDURE

I created a Python script to analyze a packet capture file (.pcap) and extract relevant details about Wi-Fi networks.

#### A. Methodology

- 1) Parsing the packet capture file using “scapy” Python package
- 2) Filtering Wi-Fi beacon frames, which can be “Dot11Beacon” frames or “Dot11ProbeResp” probe
- 3) Extracting SSID, BSSID, supported protocols, RSSI, band, channel information using scapy (code is attached)
- 4) Calculating the average RSSI for each Wi-Fi network, which is just average of all the RSSI values observed for that network.
- 5) Saving the results to a CSV file using the “CSV” Python module.

The above procedures were done for two files:

- The Captured.pcap file provided in Moodle
- My own pcap file, which I obtained by capturing packets from ESB. In order to capture packets in my pcap file, I used Network Monitor mode on my Linux laptop, and then used Wireshark to save the captured packets.

#### B. Definitions

- **SSID (Service Set Identifier):** The name of the Wi-Fi network
- **BSSID (Basic Service Set Identifier):** MAC address of Wi-Fi network
- **RSSI (Received Signal Strength Indicator):** Strength of the Wi-Fi signal
- **Band:** 2.4GHz or the 5GHz band of the Wi-Fi router

- **Channel:** Channel number of the channel provided by the Wi-Fi router

### III. OBSERVATIONS

Below are the Wi-Fi data obtained for the “Captured.pcap” file provided:

	SSID	BSSID	Channel	Capability	Band	Average RSSI
1	Anand	d8:47:32:3a:e2:c0	2	short-slot+ESS+privacy	2.4 GHz	-82.0
2	AndroidAP5508	3c:57:6c:09:55:db	6	short-slot+ESS+privacy+short-preamble	2.4 GHz	-43.75
3	Nivi	b8:c1:ac:7c:b5:d8	11	short-slot+ESS+privacy	2.4 GHz	-79.02702702702703
4	OLA_DRIVER_HOTSPOT_+Hj1vyXCO	00:23:b1:8b:08:56	11	res+res12+DSSS+OFDM+ESS+privacy+short-preamble+PBCC	2.4 GHz	-91.0
5	RTL8186-default	00:00:00:00:00:00	11	short-slot+ESS	2.4 GHz	-91.0
6	kindpanda2.4	68:f1:7b:aa:a0:87	10	short-slot+ESS+privacy	2.4 GHz	-90.5
7	Ranjani	0c:02:b5:96:5e:8b	10	short-slot+ESS+privacy	2.4 GHz	-89.0

Fig. 1. Beacon Frames from “Captured.pcap” file

Below are the Wi-Fi data obtained from the packets which I captured:

	SSID	BSSID	Channel	Capability	Band	Average RSSI
1	iitmwifi	48:4a:e9:f1:b1:50	132	short-slot+ESS+privacy	5 GHz	-76.75
2	eduroam	48:4a:e9:f1:b1:51	132	short-slot+ESS+privacy	5 GHz	-78.1
3	esb	48:4a:e9:f1:b1:52	132	short-slot+ESS+privacy	5 GHz	-77.44827586206897

Fig. 2. Beacon Frames observed in laptop

### IV. DISCUSSION

- 1) The analysis identified multiple Wi-Fi networks operating in the vicinity. For the pcap provided, we got 7 Wi-Fi networks in the vicinity. For my own capture, I could find only 3 Wi-Fi networks.
- 2) We observed different channels. For the pcap provided, 2.4GHz, and for my capture, it is 5GHz.
- 3) We should pick the network with a higher Average RSSI value in order to get better quality internet (this is along with other factors).

### V. CONCLUSIONS

The Python script successfully analyzed the packet capture file, providing comprehensive details about the Wi-Fi networks present. The extracted information facilitates understanding of network configurations and performance characteristics, aiding in network management and optimization efforts.

### REFERENCES

- [1] Scapy Documentation: <https://scapy.net/>
- [2] Python Documentation: <https://www.python.org/doc/>