

# Securing Wi-Fi QR Codes

Encrypting the Wi-Fi passwords



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# Join the Wi-Fi and find the password!





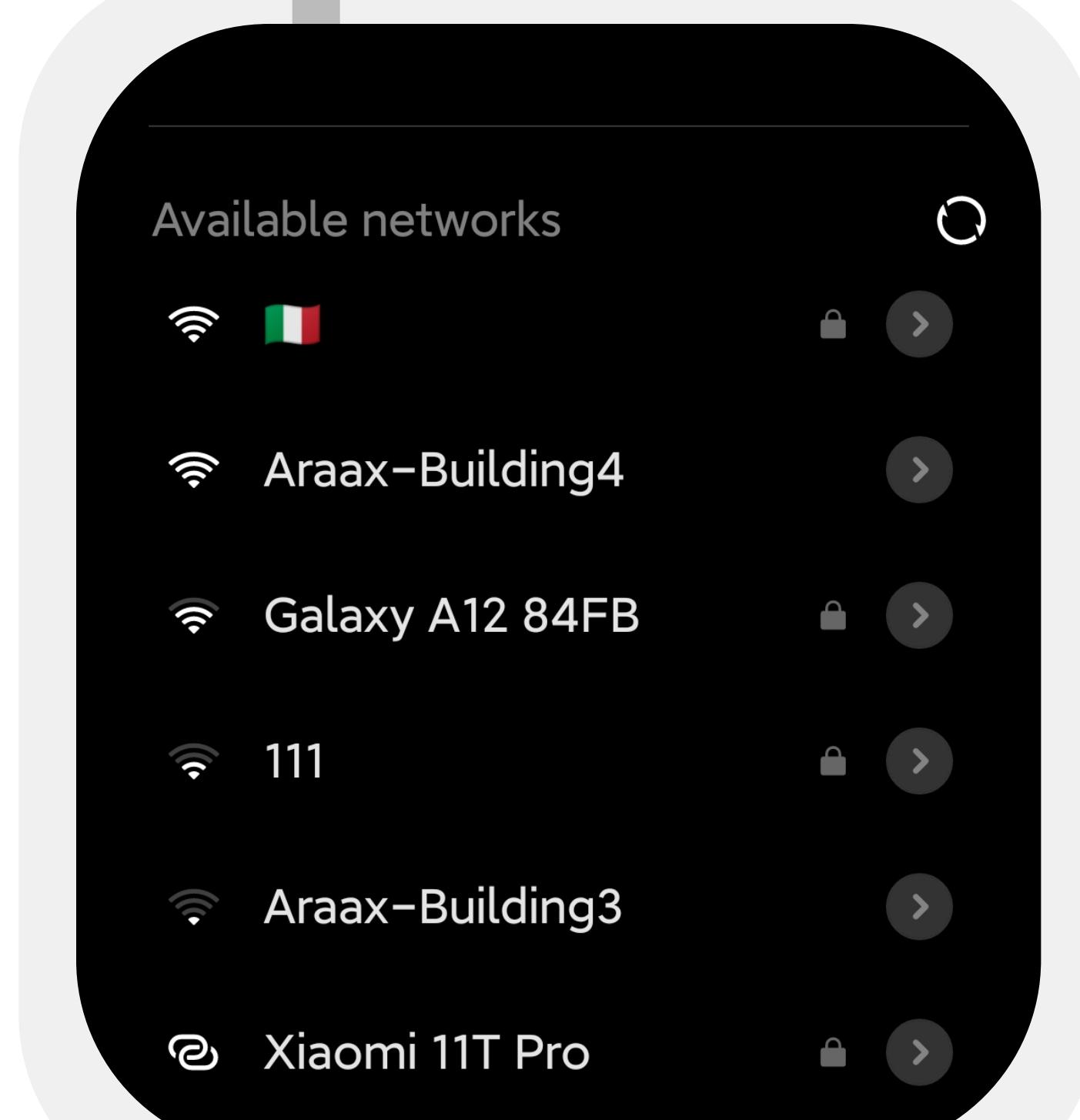
December, 2023; Mohammad Javad Rakhshani



# Test on MIUI OS

(No password leak)

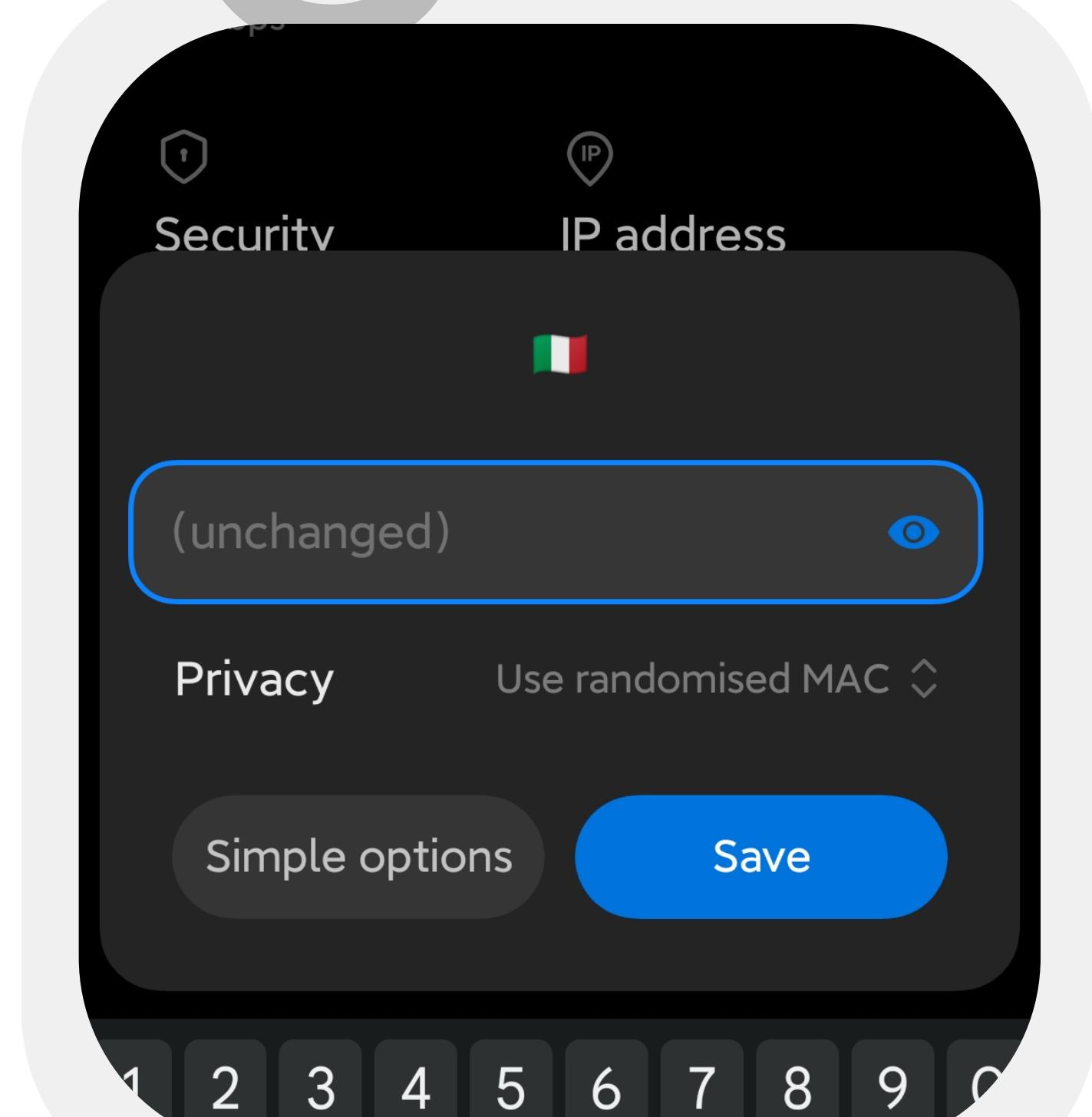
## 1 Search



## 2 Scan



## 3 Connect





# Test on MIUI Scanner App

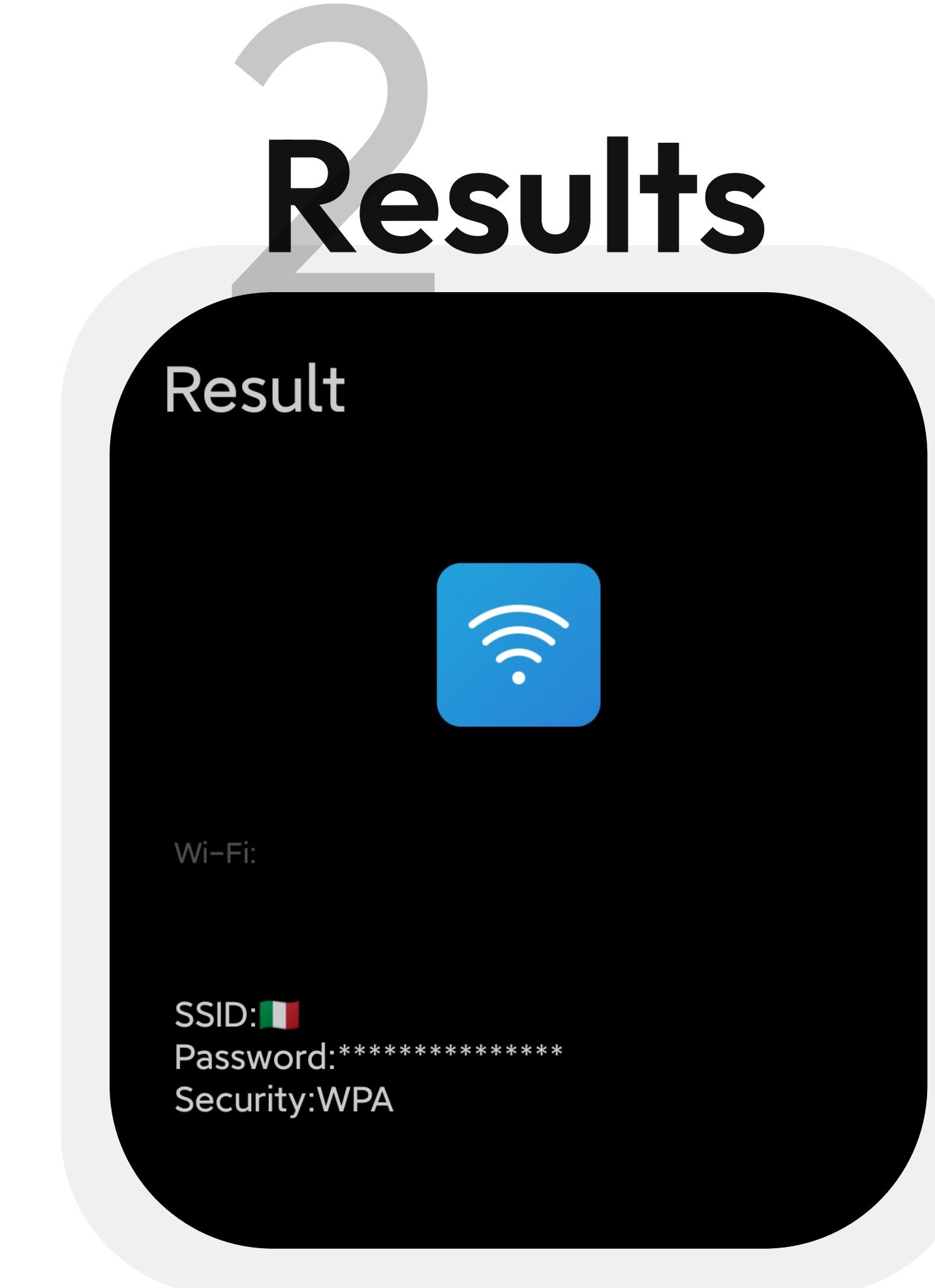
(No password leak)

Version: 13.2202.24

1  
Scan



2  
Results



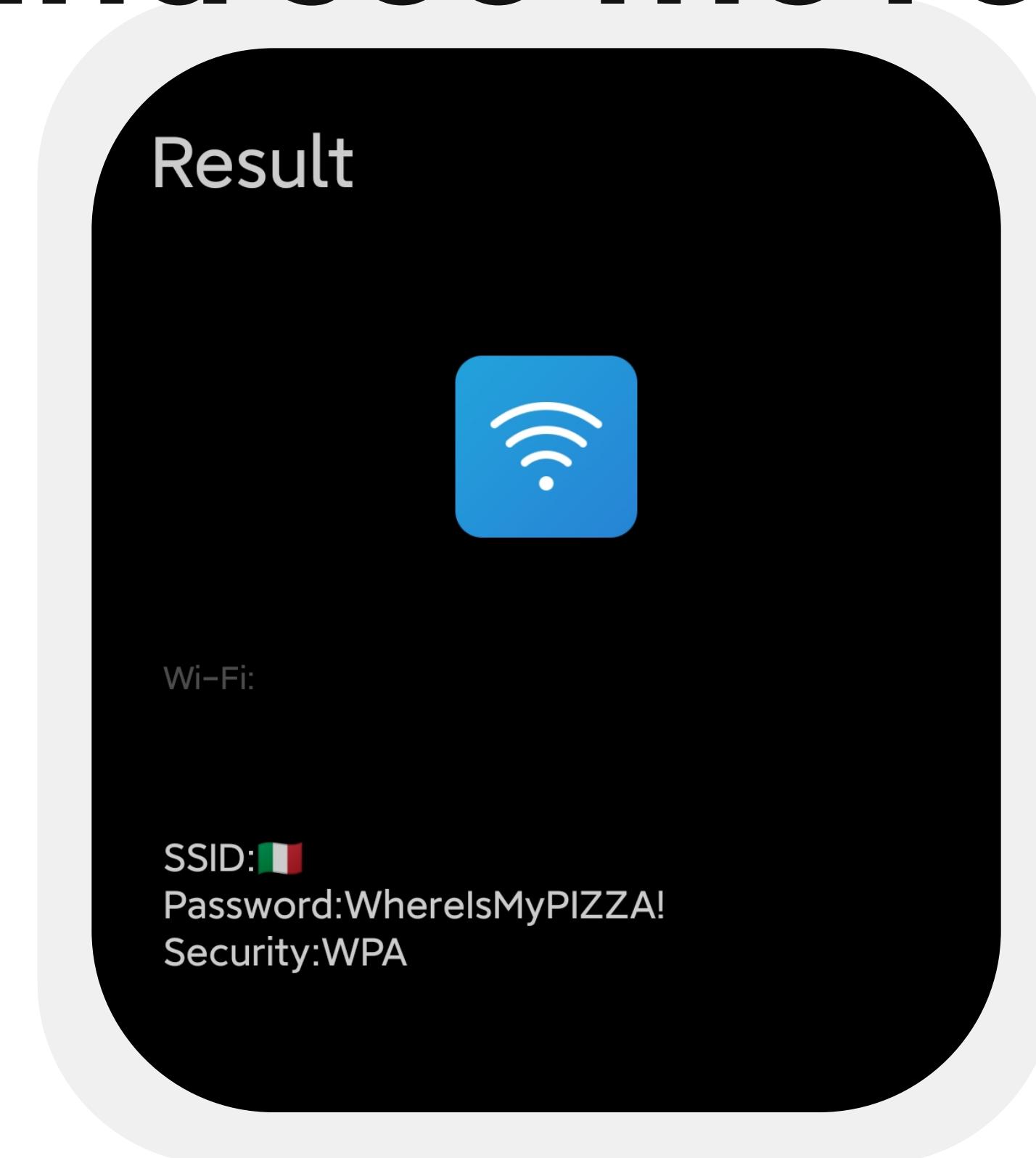


# Test on MIUI Scanner App

(Password leak)

Version: 13.2202.24

## Touch and see the results!



# 🔓 Third-Party QR Code Scanners (Password leak)

1 Latest Version: 1.61.1

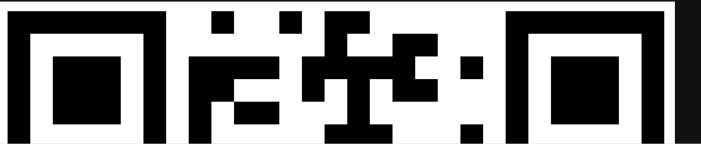
## Binary Eye

WIFI:S:  
🇮🇹;T:WPA;P:WhereIsMyPIZZA!;;

41 characters, QR CODE

Type	Wi-Fi network
Name	🇮🇹
Password	WhereIsMyPIZZA!
Authentication type	WPA
Error correction level	M
Version	3 (29 modules)

57 49 46 49 3A 53 3A F0 WIFI:S:  
9F 87 AE F0 9F 87 B9 3B ;  
54 3A 57 50 41 3B 50 3A T:WPA;P:  
57 68 65 72 65 49 73 4D WhereIsM  
79 50 49 5A 5A 41 21 3B yPIZZA!;  
3B ;



2 Latest Version: 3.0

## OBSQR

Wi-Fi access point

Security WPA  
Network SSID 🇮🇹  
Password WhereIsMyPIZZA!

CANCEL CONNECT





# Protocol



WIFI:S:;T:WPA;P:WhereIsMyPIZZA!;H:false;;



# Protocol



WIFI:S:<SSID>;T:<WEP | WPA | nopass>;P:<PASSWORD>;H:<true | false | blank>;



# Protocol



WIFI:S:🇮🇹;T:WPA;P:WhereIsMyPIZZA!;;



SSID: 

Security: **WPA**

Password: **WhereIsMyPIZZA!**



# QR Codes are safe?

Error Correction

Identifiers

Errors

# Yes!

Standard

Indecipherable



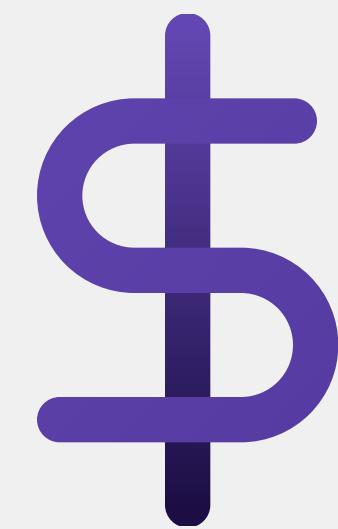


# QR Codes are safe?

Plain-text  
Tracking      Cipher  
                  No!      Secret  
                  Errors      Encryption



# ⚠ Where do we use QR Codes?



## Payment

- Card Info
- Fake Card



## URI

- Download
- Phishing



## Access

- Login Page
- Passwords



## Marketing

- Where?
- When?



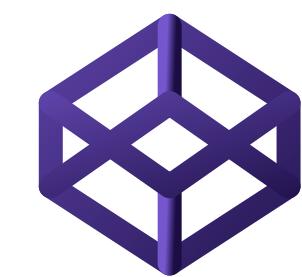
# What is my Goal?



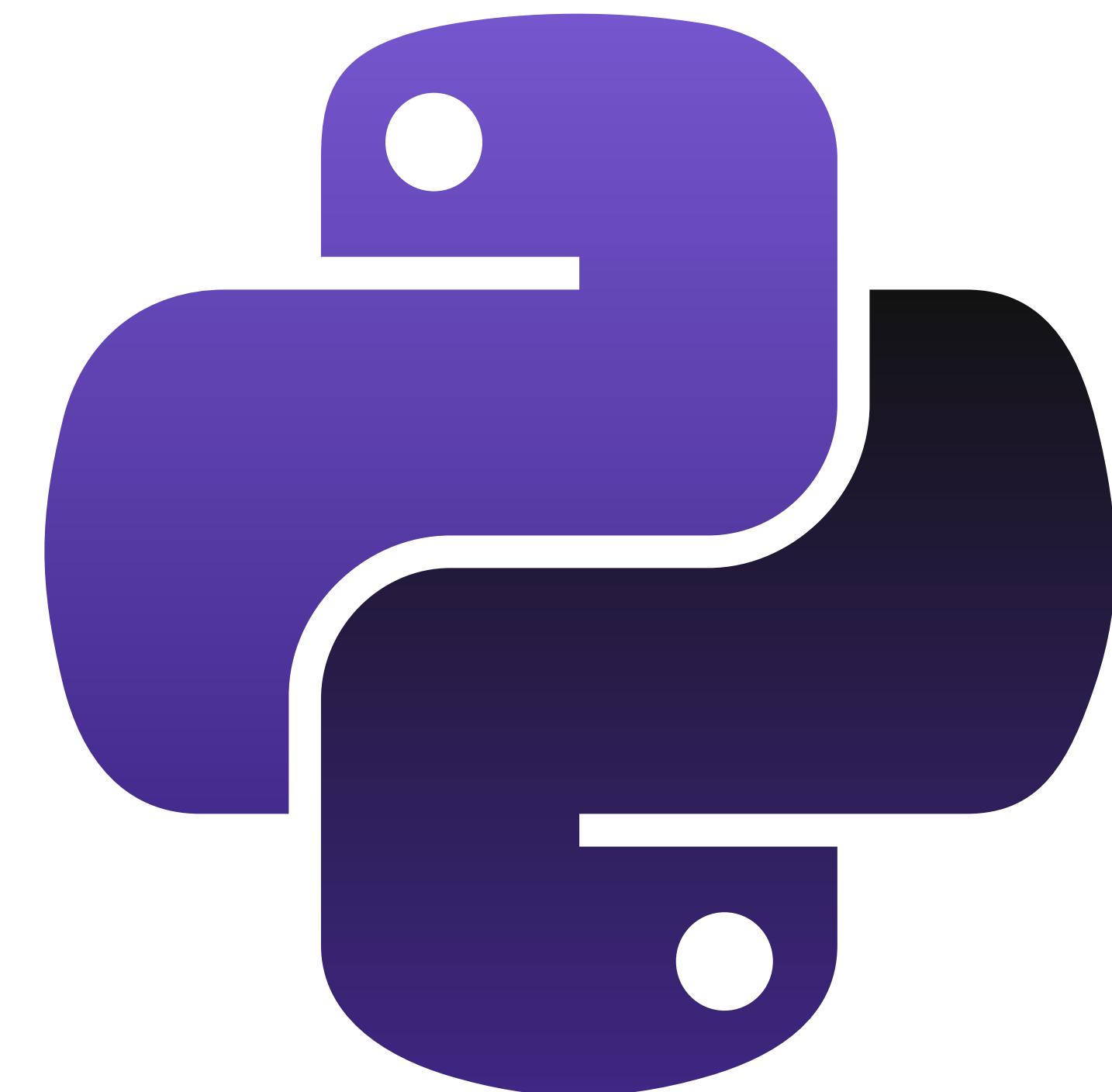
SSID:

Security: **WPA**

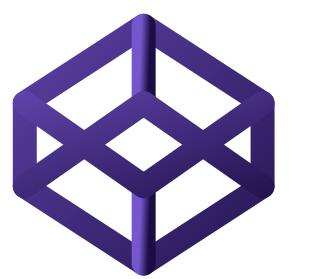
Password: **##!@\$HJSASB@B\$==**



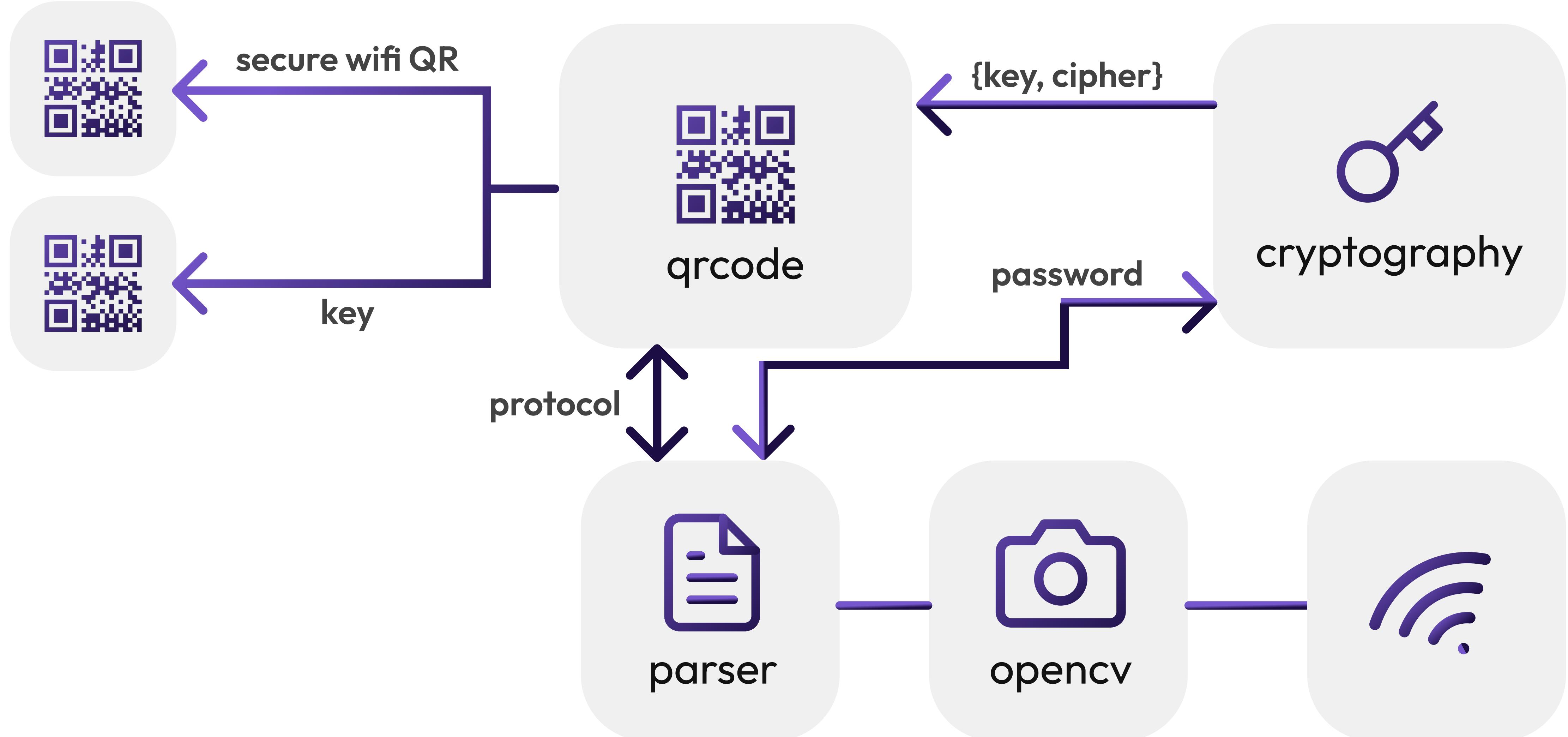
How?

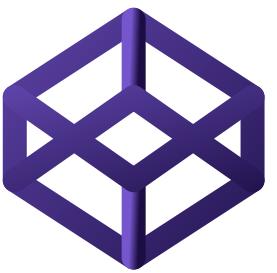


Python

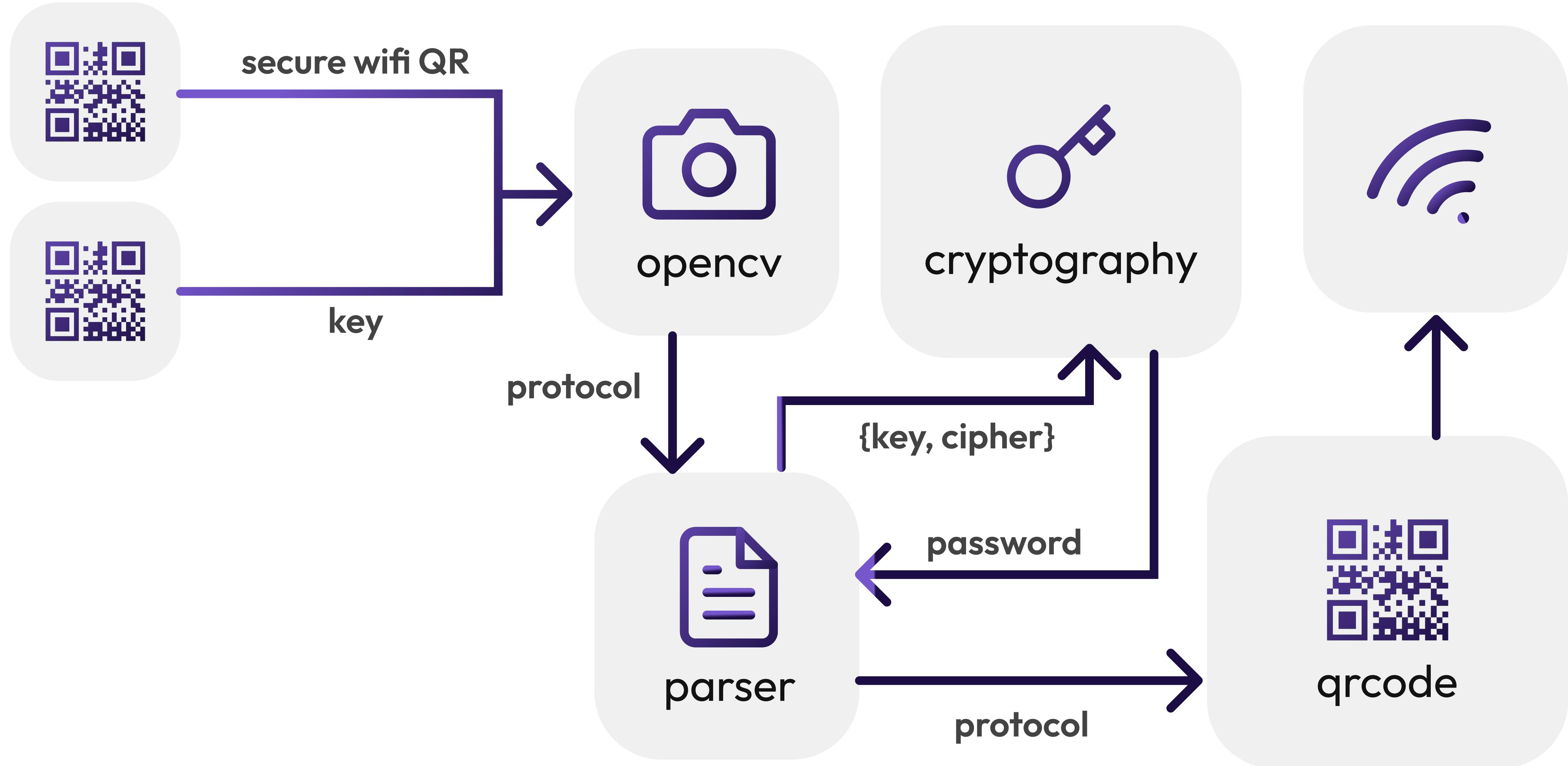


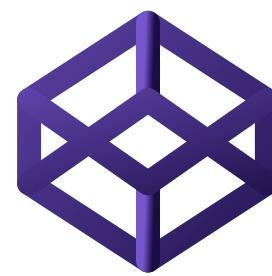
# Schematic (Encryption)





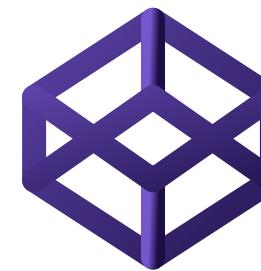
# Schematic (Decryption)





# Encryption



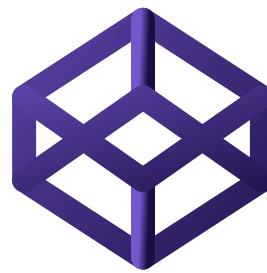


# Encryption



opencv

```
1 import cv2 #OpenCV
2 device = cv2.VideoCapture(i_device) #Get the device
3 qr_scanner = cv2.QRCodeDetector() #Init QR Detector
4
5 while True:
6     captured, img = device.read() # Read frames from dev
7     if captured:
8         captured_qr, decoded_info, points, _ =
9             qr_scanner.detectAndDecodeMulti(img)
10
11 # Get the text data from [decoded_info] and [points]
```

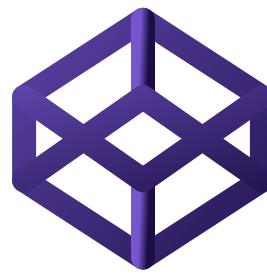


# Encryption



parser

```
1 [ WIFI:S:;T:WPA;P:WherelsMyPIZZA!;H:false;; ]  
2  
3 if protocol.lower().find("wifi") != -1:  
4     SSID_start_index          = protocol.find("S:") + 2  
5     PRIVACY_start_index       = protocol.find("T:") + 2  
6     PASSWORD_start_index     = protocol.find("P:") + 2  
7     HIDDEN_start_index       = protocol.find("H:") + 2  
8  
9     SSID = protocol[  
10        SSID_start_index : SSID_start_index +  
11        protocol[SSID_start_index: ].find(";")  
12    ]
```



# Encryption

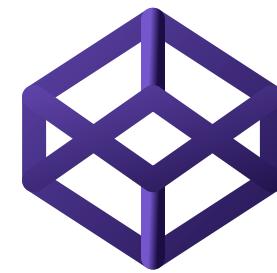


qrcode

```
1 <- protocol  
2 QR = qrcode.QRCode(  
3   error_correction=(L,M,Q,H),  
4   box_size=box_size,  
5   border=border,  
6 )  
7 QR.add_data(protocol)  
8 QR.make(fit=True)  
9  
10 img = QR.make_image()  
11 img.save("safe-wifi-share.png")
```

Level L (Low)  
Level M (Medium)  
Level Q (Quartile)  
Level H (High)

7% of data bytes can be restored.  
15% of data bytes can be restored.  
25% of data bytes can be restored.  
30% of data bytes can be restored.



# Encryption



cryptography

```
1 <- password
2 password_inbytes = bytes(password, encoding="utf-8")
3
4 KEY = Fernet.generate_key() #Secret Key
5 f = Fernet(KEY) #Fernet Instance from the KEY
6
7 cipher = f.encrypt(password_inbytes)
8
9 key_str = str(KEY, encoding="utf-8")
10 cipher_str = str(cipher, encoding="utf-8")
11
12 return {"key": key_str, "cipher": cipher_str}
```

# Securing Wi-Fi QR Codes

Encrypting the Wi-Fi passwords



10 January 2024  
 GitHub

Presentation and the code will be available open-source.



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