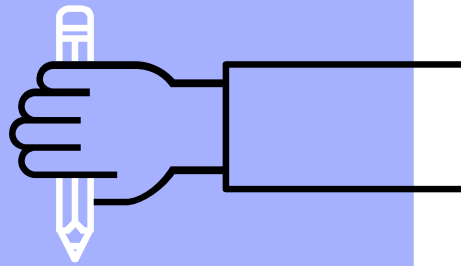
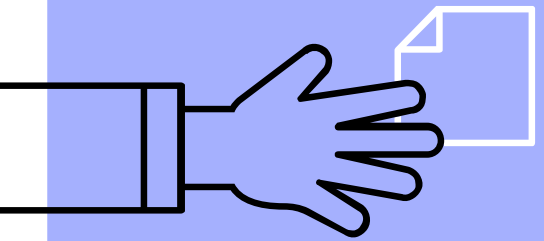


Wifi Hacking

CS 166: Information Security - Sec. 01

Prof. Chao-Li Tarng

Team 19: Michael Huh, Shreya Raj, John Buclatin, Erica Xue, and Natalie Kao



Introduction

Problem Statement:

- Wi-Fi security vulnerability allows unauthorized access and breaches.
- Attackers exploit these vulnerabilities to infiltrate networks, access information, and disrupt operations.
- Specifically targeting WPA2 vulnerabilities inherent in Wi-Fi networks.

Project Focus:

- Analyze WiFi hacking techniques, specifically WPA2 vulnerabilities
- Research strategies to prevent attacks

Approaches

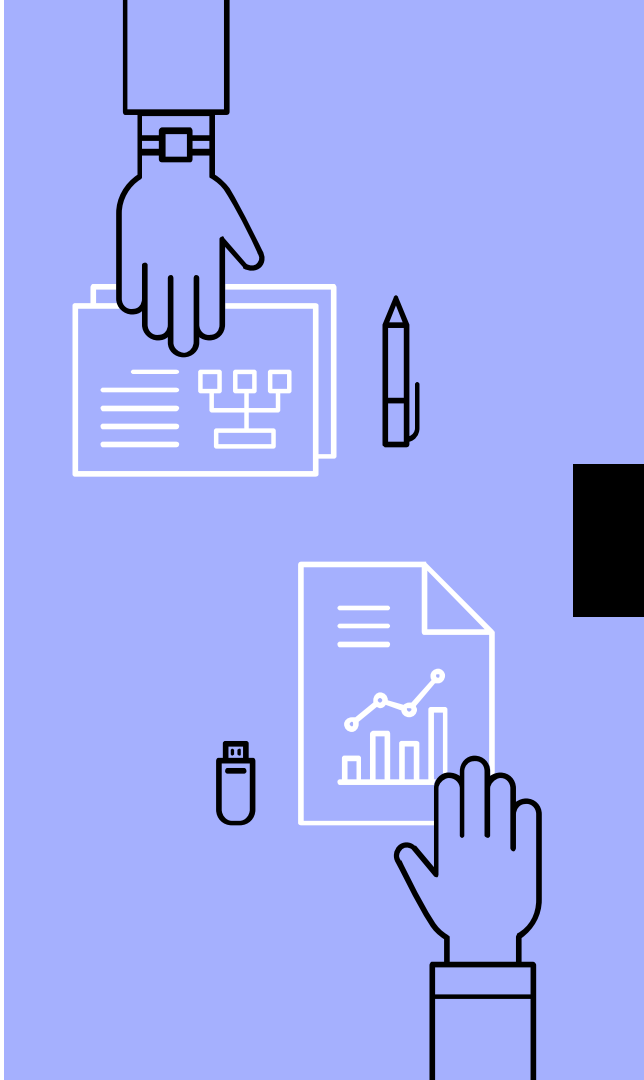
- Conduct penetration tests of Wi-fi networks using router
- Testing in virtual environment to ensure a safe, isolated environment

[redacted]

Architecture

1. **Technologies**
   a. WiFi Network
   b. Kali Linux as primary OS
   c. Aircrack-ng suite

2. **Dictionary Attack**
   a. Rock You wordlist



Technologies

Kali Linux:

- A Linux distribution with built-in tools for security testing.

WiFi Network (Router/Modem/Network Provider):

- Essential components that provide internet connectivity.

Network Adapter – Support Monitor Mode:

- Hardware that can capture all nearby wireless traffic.

Technologies

Aircrack-ng:

- Tools for cracking network security, highlighting vulnerabilities.

Airmon-ng:

- Activates monitor mode on network adapters.

Airodump-ng:

- Captures and logs wireless network packets.

Aireplay-ng:

- Generates and manipulates network traffic for testing.

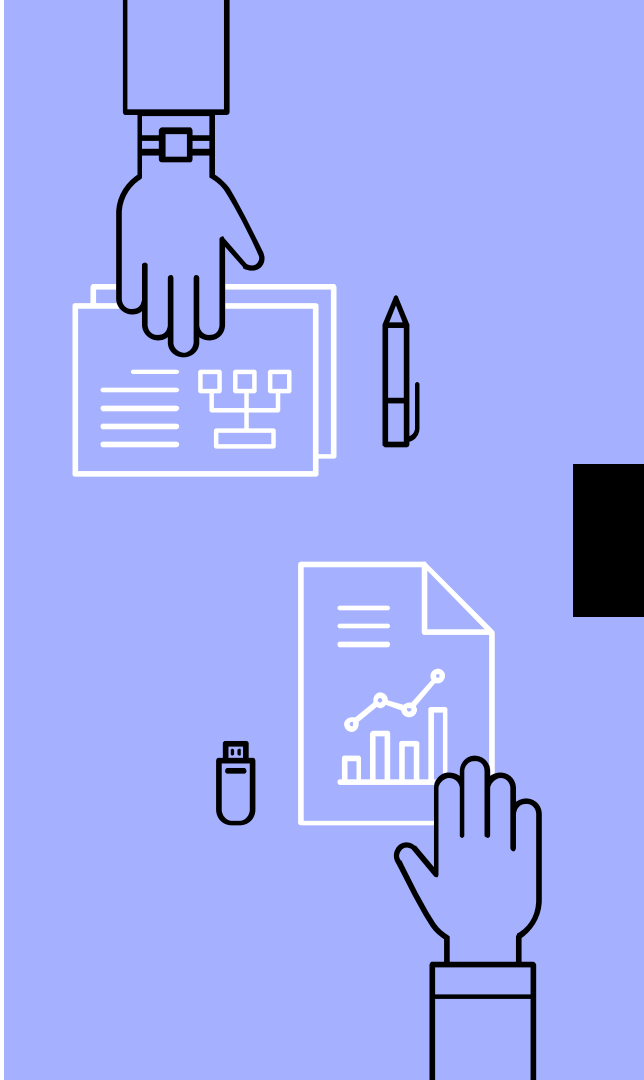
Wireshark:

- Analyzes detailed network traffic for deep insights.

RockYou Word List

History

- Social app and advertising network, RockYou, suffered devastating cyber attack in 2009 that led to exposure of over 32 million user passwords
- Passwords were stored in plaintext
- Leaked passwords compiled into wordlist known as RockYou.txt file
- List is now a standard tool used for password cracking and network testing



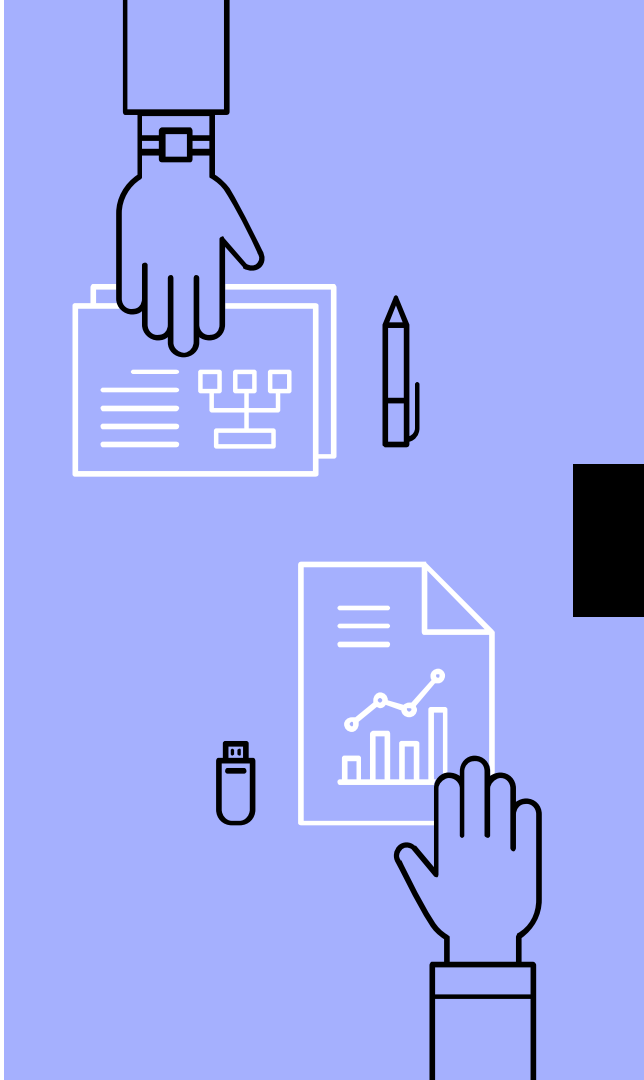
RockYou Word List

Usage from Security Professionals

- Tests strength of network and system security
- Crack hashed passwords or breach

Usage from Attackers

- Use wordlist in **password-spraying attacks** to gain unauthorized access to accounts
  - Dictionary attack where list of usernames are used and passwords from RockYou.txt are tried against each account



RockYou Word List

Our Application

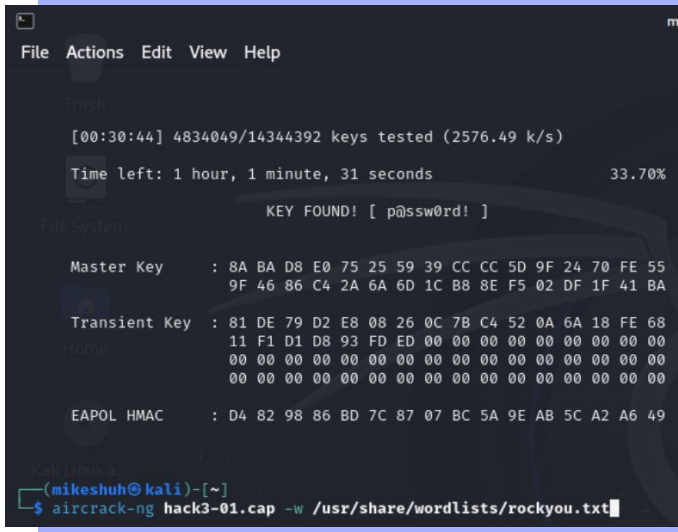
- *Use aircrack-ng to run a dictionary attack to discover password with the wordlist*

Demo

Summary

Result: Successfully cracked password !

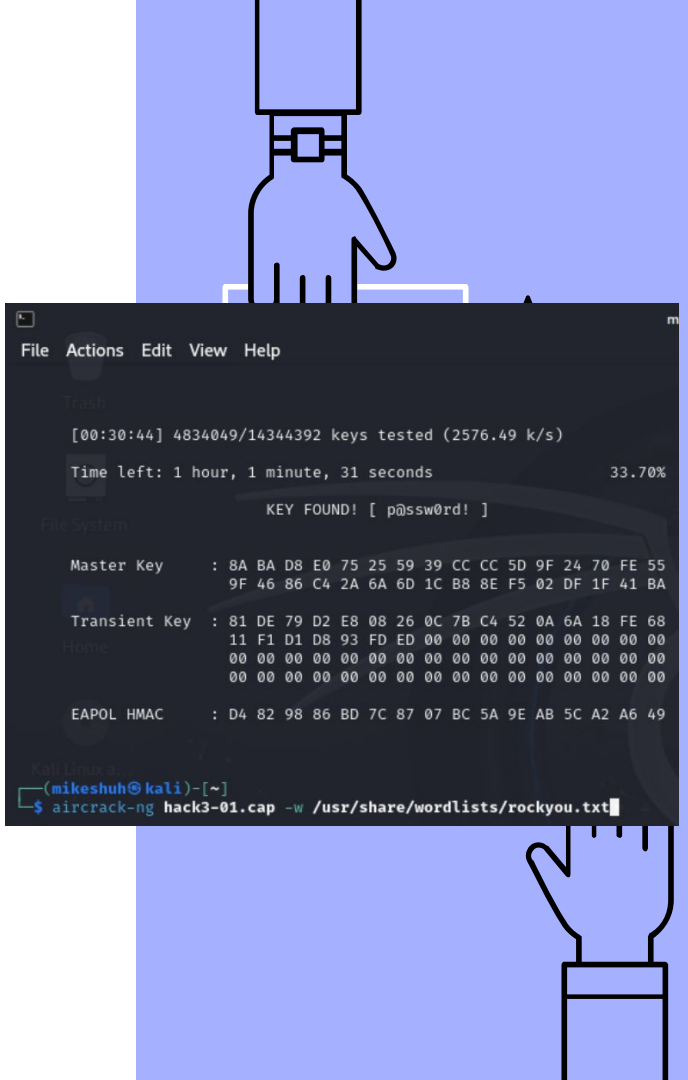
- Password Statistics
  - In 2023, the most common password worldwide was “123456” & runner up was “admin” (Borgeaud)
  - 43 % of all passwords are simply the username (Study: Hackers Attack)
  - Password patterns most commonly indicate that years, names, and personal favorite things (food, sports team, etc) are easily hacked passwords (Cyber News)



Summary (cont.)

Result: Successfully cracked password !

- Success of dictionary attacks rely on:
  - Password Complexity (Wright)
    - Stolen/reused credentials are implicated in 80% of hacking-related breaches
  - Quality of Password Cracking Software and Dictionary
  - Attack Speed and Tools



Future Work

- Explore advanced encryption methods like WPA3
- Brute Force Attacks
  - Method: attempting all possible passwords
    - Document Findings
- Develop further countermeasures
  - Scripts to continually monitor network safety

Conclusion

- Confirmed WiFi security weakness to penetration testing
  - Conducted as described in demo
- Use strong passwords!
  - Longer the password, the better
  - Mixed case letters, numbers, and symbols
  - Random memorable phrases

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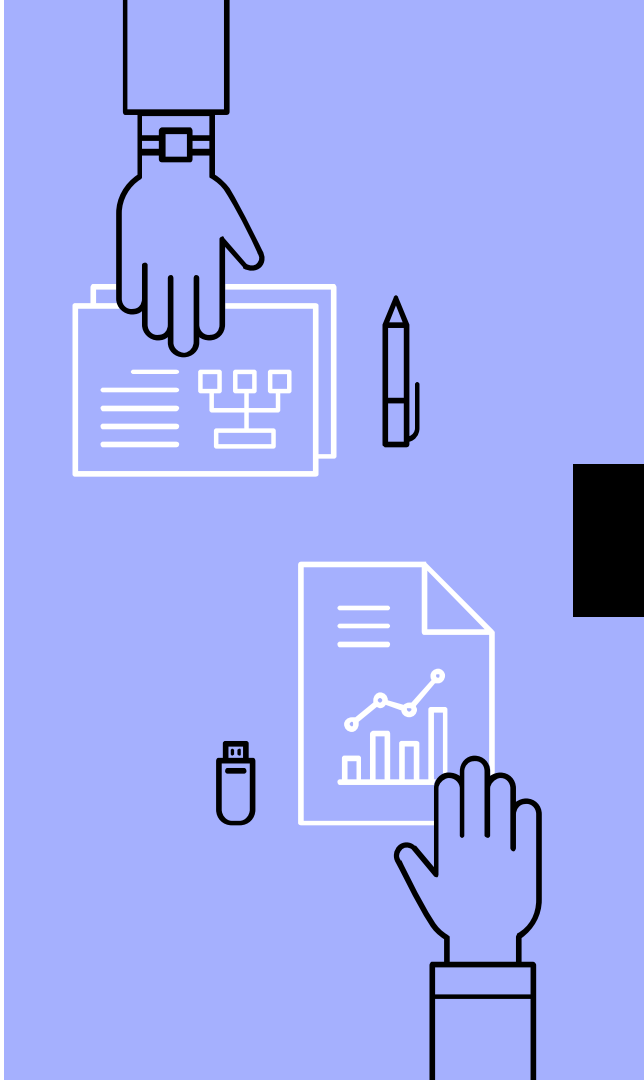
Thank you!



The PowerPoint presentation should include minimally the followings:

- Title page, including
  - Topic
  - Course name, number, and section
  - Instructor
  - Time
- Introduction
  - Problem statement
  - Approaches
- Architecture, design, and key algorithm
- (Optional but strongly suggested) live demo or video demo
- Summary of the result
- Suggestion for future work
- Conclusion
- Credit, including the work, guidance, and support you have used and received
  - Open source
  - Key articles