# The Android Malware’s Journey: From Google Play to banking fraud

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Francesco Iubatti, Alessandro Strino

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From Google Play to banking fraud
Read the Technical Analysis

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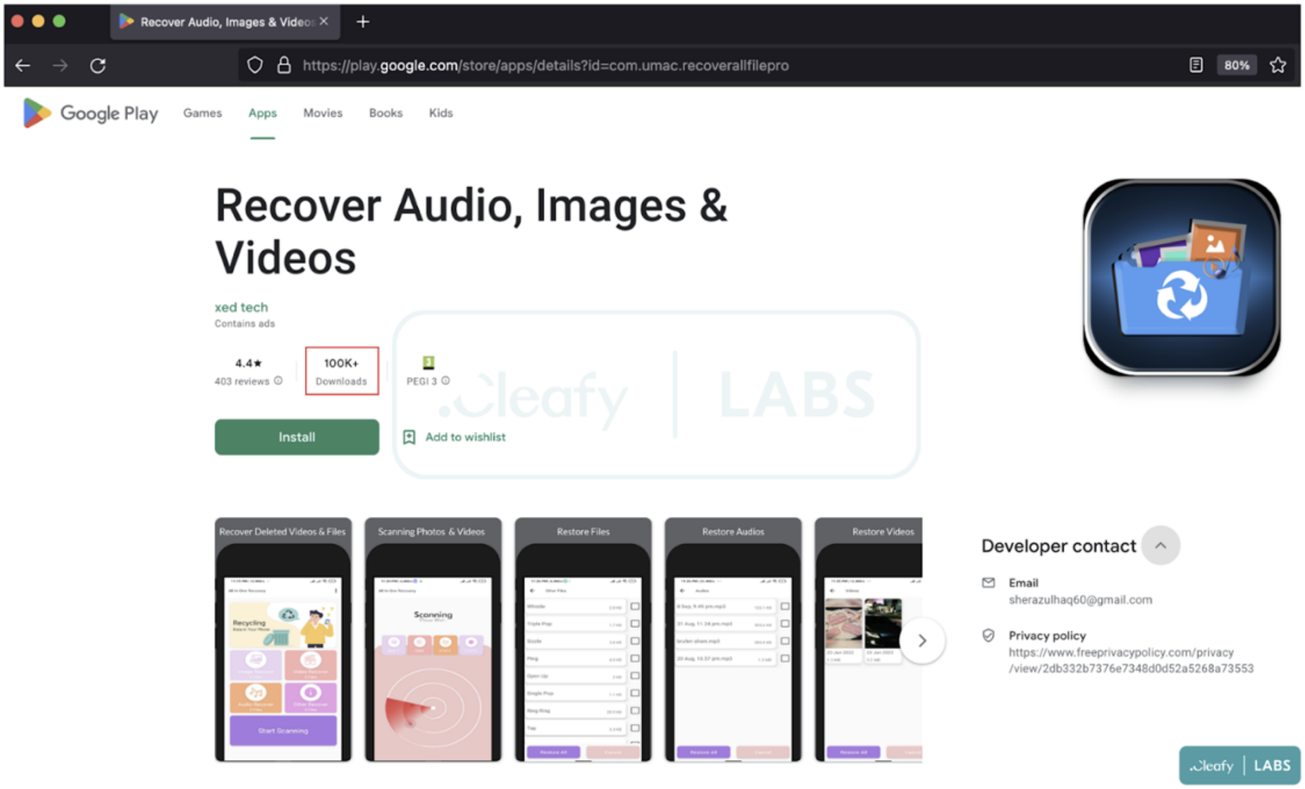
## Background and Key points

- In the last two months, we observed, through our telemetries, an increase in the number of **Vultur** infections among our customers.
- At the beginning of October 2022, the Cleafy Threat Intelligence Team discovered and reported to Google a **dropper of Vultur**, a known Android banking trojan, on the official **Play Store** with **100.000+ downloads**. Recently, other researchers publicly disclosed the same malicious dropper application.
- This dropper hides behind a fake utility application. Since its relatively small amount of permissions and **small footprint**, it appeared as a legitimate app and was able to elude the antivirus solutions and the Google Play analysis.
- After the installation phase, the dropper uses **advanced evasion techniques**, such as **steganography**, **file deletion**, and **code obfuscation**, in addition with multiple checks before the malware download.

- Once the banking trojan (Vultur) has been downloaded and installed through a fake update, Threat Actors (TAs) can observe everything that happens on the infected devices and carry out bank fraud through **ATO (Account Takeover) attacks.**



https://play.google.com/store/apps/details?id=com.umac.recoverallfilepro

Recover Audio, Images & Videos

xed tech
Contains ads

4.4★ 403 reviews
100K+ Downloads
PEGI 3

Developer contact

Email
sherazulhaq60@gmail.com

Privacy policy
https://www.freeprivacypolicy.com/privacy/view/2db332b7376e7348d0d52a5268a73553

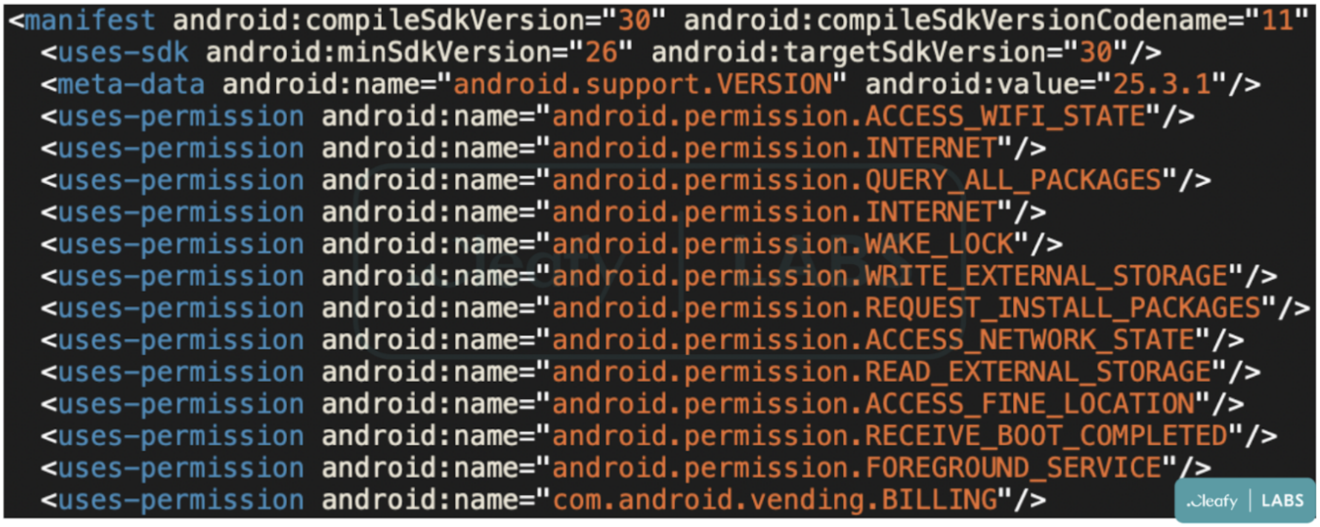
Figure 1 - Malicious dropper on Google Play Store

## Analysis of the malicious dropper

During the last years, the number of Android banking trojans has increased, and new techniques to perform banking fraud have been developed. Although most of the banking trojans are distributed via *ishing campaigns, TAs also use official app stores to deliver their malware using **dropper applications**, namely an application designed to download malware into the target device.

One of the main reasons behind this choice is the possibility of reaching a more significant number of potential victims and, thus, a greater likelihood of completing  fraud. Furthermore, since these droppers hide behind utility apps and come from a trusted source, they can mislead even “experienced” users.

The application, discovered in October by the Cleafy TIR team on the Google Play Store, appears like a legitimate recovery tool with a relatively small amount of permissions and a small footprint.



```
<manifest android:compileSdkVersion="30" android:compileSdkVersionCodename="11"
  <uses-sdk android:minSdkVersion="26" android:targetSdkVersion="30"/>
  <meta-data android:name="android.support.VERSION" android:value="25.3.1"/>
  <uses-permission android:name="android.permission.ACCESS_WIFI_STATE"/>
  <uses-permission android:name="android.permission.INTERNET"/>
  <uses-permission android:name="android.permission.QUERY_ALL_PACKAGES"/>
  <uses-permission android:name="android.permission.INTERNET"/>
  <uses-permission android:name="android.permission.WAKE_LOCK"/>
  <uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE"/>
  <uses-permission android:name="android.permission.REQUEST_INSTALL_PACKAGES"/>
  <uses-permission android:name="android.permission.ACCESS_NETWORK_STATE"/>
  <uses-permission android:name="android.permission.READ_EXTERNAL_STORAGE"/>
  <uses-permission android:name="android.permission.ACCESS_FINE_LOCATION"/>
  <uses-permission android:name="android.permission.RECEIVE_BOOT_COMPLETED"/>
  <uses-permission android:name="android.permission.FOREGROUND_SERVICE"/>
  <uses-permission android:name="com.android.vending.BILLING"/>
```

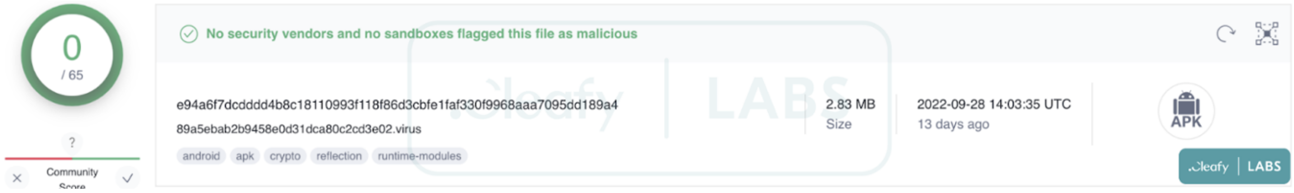
Figure 2 - Snippet of AndroidManifest file

The combination of these elements, plus the use of multiple evasion techniques, makes the application very difficult to detect with automatic sandboxes or machine learning methodology. It goes, then, undetected by antivirus solutions and Google Protects.

This explains why, even though an overview of this dropper was already described in the last article of Threat Fabric, we decided to publish this report and analyze in detail how this application ended up in the Play Store and attempted to commit bank fraud.

The application found on the Play Store belongs to the **Brunhilda dropper** service since it shares multiple behaviors with the same past related samples, such as:

- The request of Android 8.0 or above versions;
- Some code similarities;
- The information sent to the C2 server and his configuration.



No security vendors and no sandboxes flagged this file as malicious

e94a6f7dcdddd4b8c18110993f118f86d3cbfe1faf330f9968aaa7095dd189a4
89a5ebab2b9458e0d31dca80c2cd3e02.virus

2.83 MB
Size

2022-09-28 14:03:35 UTC
13 days ago

Figure 3 - Antivirus detection of the Vultur's dropper application

The application code has changed compared to previous variants and a piece of interesting evidence is the use of multiple evasion techniques, used to stay undetectable and slow down the analysis. Some techniques are listed below:

**Steganography** (a technique used to hide secret data within an ordinary file to avoid detection): as shown in Figure 4, inside the application asset directory, there is a PNG file that hides an encrypted payload that, once decrypted, becomes a zip file that contains a dex file. The following dex file contains the code used to communicate with the C2 server and download the "real" malware on the user devices (currently, the Android banking trojan called Vultur).

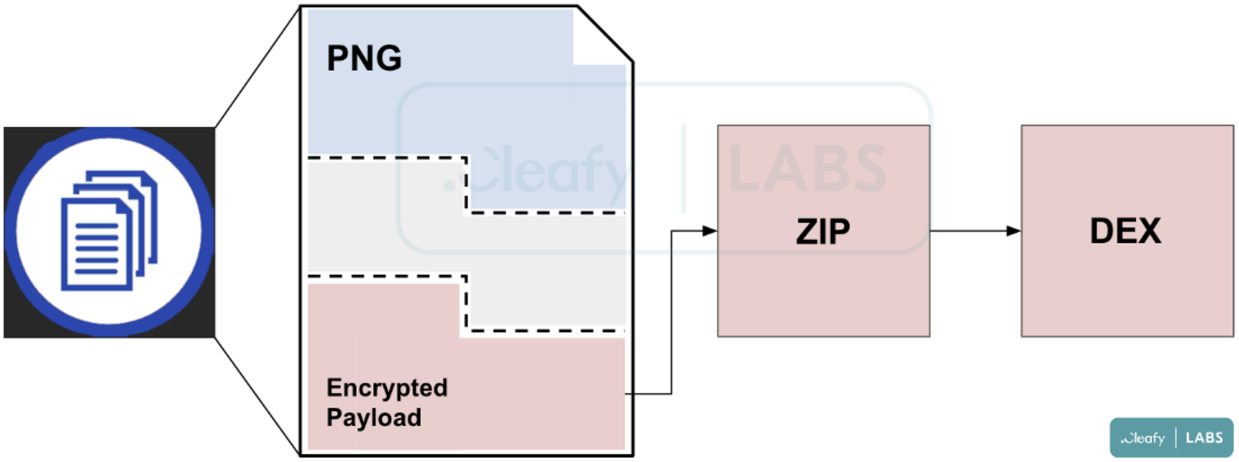
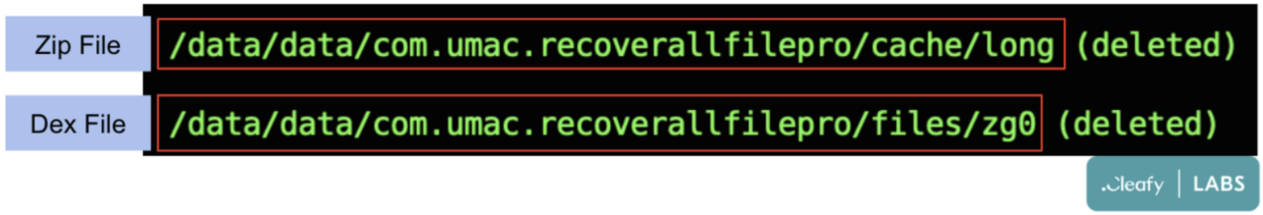


Figure 4 - Extraction of encrypted payload from PNG image

- **File Deletion**: After the payload is decrypted and uncompressed, both the zip and dex files are removed from their directories, as shown in Figure 5.
- **Code obfuscation and Anti-emulation**: All the code is obfuscated, and the strings are encrypted with the AES algorithm. Moreover, the dropper performs multiple checks to control if it is running on an emulator/sandbox device or a legitimate one to stop the attack or proceed.

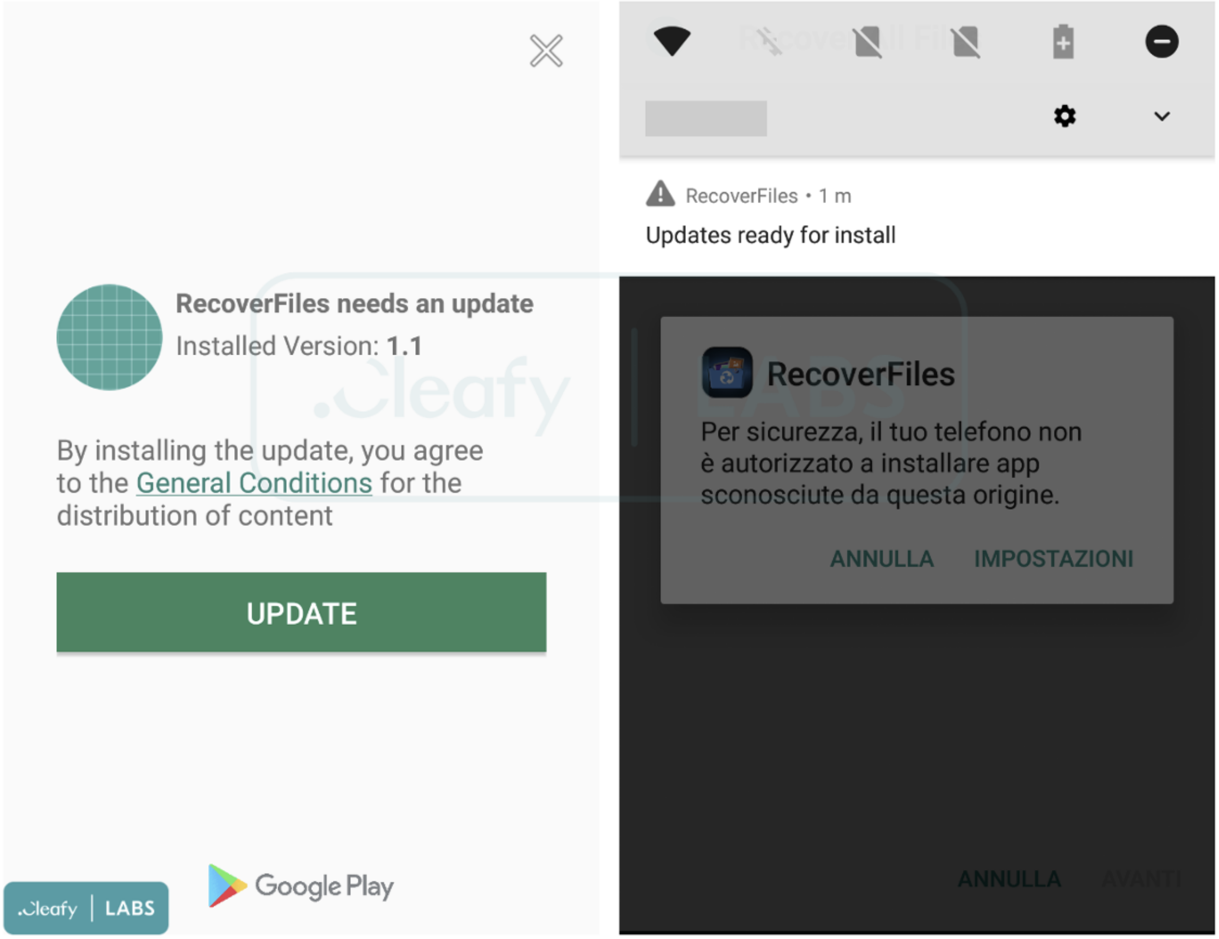


```
/data/data/com.umac.recoverallfilepro/cache/long (deleted)
/data/data/com.umac.recoverallfilepro/files/zg0 (deleted)
```

Figure 5 - Deletion of zip and dex files from memory

Once the victim downloads and installs the application from the Google Play Store to complete the attack chain, the dropper displays to the user a persistent update request to download a new application (Figure 6) that represents the actual malware, namely the Android banking trojan belonging to the Vultur family.

Although in that way, the user has to accept the Android permission to download and install the application from a different source than the official Google Store, this technique allows TAs to not upload the malicious application directly to the official store, making the dropper application undetectable.



RecoverFiles needs an update

Installed Version: **1.1**

By installing the update, you agree to the General Conditions for the distribution of content

UPDATE

RecoverFiles • 1 m

Updates ready for install

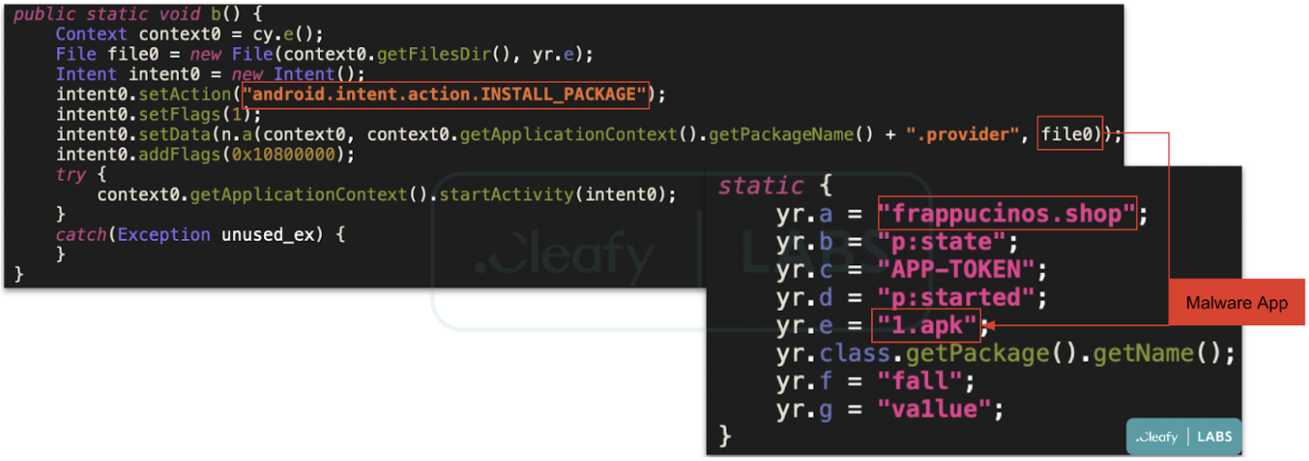
RecoverFiles

Per sicurezza, il tuo telefono non è autorizzato a installare app sconosciute da questa origine.

ANNULLA IMPOSTAZIONI

ANNULLA AVANTI

Figure 6 - Fake update requested to download the banking trojan



```
public static void b() {
    Context context0 = cy.e();
    File file0 = new File(context0.getFilesDir(), yr.e);
    Intent intent0 = new Intent();
    intent0.setAction("android.intent.action.INSTALL_PACKAGE");
    intent0.setFlags(1);
    intent0.setData(n.a(context0, context0.getApplicationContext().getPackageName() + ".provider", file0));
    intent0.addFlags(0x10800000);
    try {
        context0.getApplicationContext().startActivity(intent0);
    }
    catch(Exception unused_ex) {
    }
}
```

```
static {
    yr.a = "frappucinos.shop";
    yr.b = "p:state";
    yr.c = "APP-TOKEN";
    yr.d = "p:started";
    yr.e = "1.apk";
    yr.class.getPackage().getName();
    yr.f = "fall";
    yr.g = "vallue";
}
```

Figure 7 - Configuration file of the malicious dropper

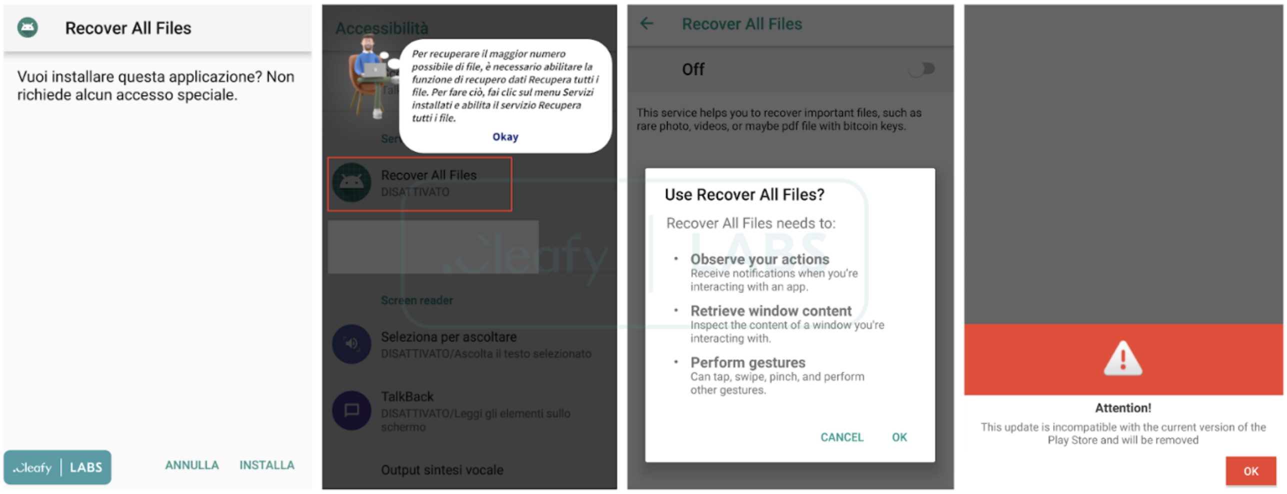
## Overview of Vultur

When the user installs the application requested in the fake update, a new popup appears to the user (Figure 8). Notably, the malware needs the “notorious” Accessibility Services to control the user’s device.

At this point, Vultur uses multiple techniques to try to remain unsuspected in the eyes of the user, in particular:

- A fake alert is displayed to the user, saying, “This update is incompatible with the current version of the Play Store and will be removed,” followed by a toast (a small Android popup) saying that the application has been removed;
- The icon of the downloaded application is not displayed on the phone;
- With the accessibilities services, the malware does not allow the infected user to open the settings app to see which applications are installed on their device

Furthermore, if an analyst tries to install Vultur directly on a device, to analyze it, the malware does not start, and it does not communicate with the C2 server. The malware must be installed and launched through the dropper application.



Vuoi installare questa applicazione? Non richiede alcun accesso speciale.

*Per recuperare il maggior numero possibile di file, è necessario abilitare la funzione di recupero dati Recupera tutti i file. Per fare ciò, fai clic sul menu Servizi installati e abilita il servizio Recupera tutti i file.*

This service helps you to recover important files, such as rare photo, videos, or maybe pdf file with bitcoin keys.

Use Recover All Files?

Recover All Files needs to:

- Observe your actions
  Receive notifications when you're interacting with an app.
- Retrieve window content
  Inspect the content of a window you're interacting with.
- Perform gestures
  Can tap, swipe, pinch, and perform other gestures.

This update is incompatible with the current version of the Play Store and will be removed

Figure 8 - Installation phases of Vultur

Using keylogging and screen recording capabilities, TAs can obtain all the information they need to carry out their fraudulent activities. During our investigations, we noticed that the usual modus operandi of Vultur’s TAs is to try to carry out bank fraud during the night hours.

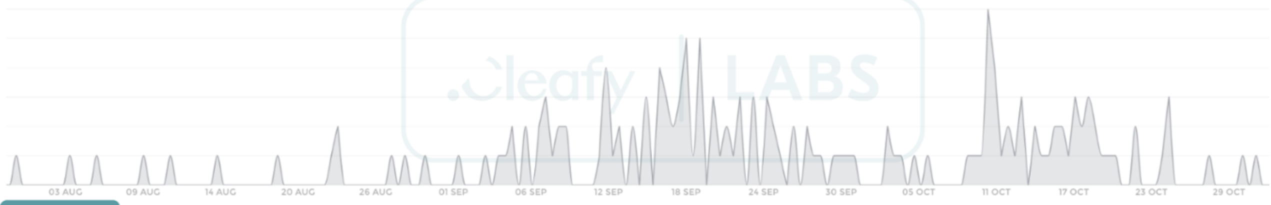


Figure 9 - Vultur infection during the months on our customers

## Final Considerations

This research aims to show how TAs are constantly improving their techniques to stay undetected using advanced evasion techniques such as steganography, file deletion, and code obfuscation. And at the same time, the use of official app stores to deliver banking trojans to reach a more significant number of potential victims is a new trend that is gaining strength.

According to our findings, we expect to see new sophisticated banking droppers campaigns on the official stores in the next months.

### Appendix 1:IOCs

| IoC | Description |
|---|---|
| com.umac.recoverallfilepro | Package name of the dropper on Google Play Store (currently removed) |
| 89a5ebab2b9458e0d31dca80c2cd3e02 | MD5 of the dropper |
| frappucinos[.]shop | C2 of the dropper |
| 95c8f5879f6d83d7c98a8d737cf2783e | MD5 of Vultur |
| flipstageparty[.]club | C2 of Vultur |