Targeted Attacks in the Middle East Using KASPERAGENT and MICROPSIA

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This blog is the result of joint research between Unit 42 and Eyal Sela ClearSky Cyber Security (http://www.clearskysec.com/blog/).

Over the past few months Palo Alto Networks have been working together with ClearSky on preventing and detecting targeted attacks in the Middle East using two relatively new Microsoft Windows malware families which we call KASPERAGENT and MICROPSIA. In addition, our research has uncovered evidence of links between attacks using these two new malware families and two families of Google Android malware we are calling SECUREUPDATE and VAMP.

We named the first new Microsoft Windows malware family “KASPERAGENT” based on strings we found in the malware. (Note that we DO NOT believe this is a reference to Kaspersky Lab). We named the second new Microsoft Windows malware family MICROPSIA because the malware is very tightly packed making it appear smaller than it is, similar to the human condition micropsia (https://en.wikipedia.org/wiki/Micropsia). We named the first new Google Android malware family SECUREUPDATE because it masks its malicious updates a secure updates. We named the second new Google Android malware family VAMP because it’s focused on stealing data.

The attacks are not highly sophisticated, but the themes used, organizations and geographies targeted, as well the persistence of the attacker suggest a determined and noteworthy adversary. Some of this activity has been covered in a recent post by 360 security (http://zhuiri.360.cn/report/index.php/2017/03/09/twotailedscorpion), however there is still a great deal of extra detail we are able to add in this report.

Starting in March 2016, Palo Alto Networks began monitoring this threat following the successful prevention of the execution of a sample of the KASPERAGENT malware on a customer system, however the malware had likely already been used in attacks as early as July, 2015.

At the time of writing, we have uncovered:

- 113 samples of the KASPERAGENT malware
- 94 samples of the MICROPSIA malware
- 17 samples of Android Malware which are related to this activity.
- 39 command and control domains registered in relation to this activity

Most of the attacks discovered so far target users in the United States, Israel, Palestinian Territories, and Egypt; although there are occasional outliers. Notable outliers include media organizations in a variety of countries.

This post will begin by exploring how the attackers attempt to gain a foothold into target networks before briefly describing the malware families used.

One Bit.ly at a time

This group of attackers favors using URL shortening services to disguise the true links they are sending in spear phishing emails. In particular, a number of samples we analyzed were linked via the URL shortening service “bit.ly”. The URL shortening service then redirects users to the malicious payload hosted on attacker controlled pages, with the malicious payload nearly always contained in an archive file (most commonly a RAR file.) Using the statistics provided by these link-shortening services, we can gain an immediate insight into the targets clicking these links:

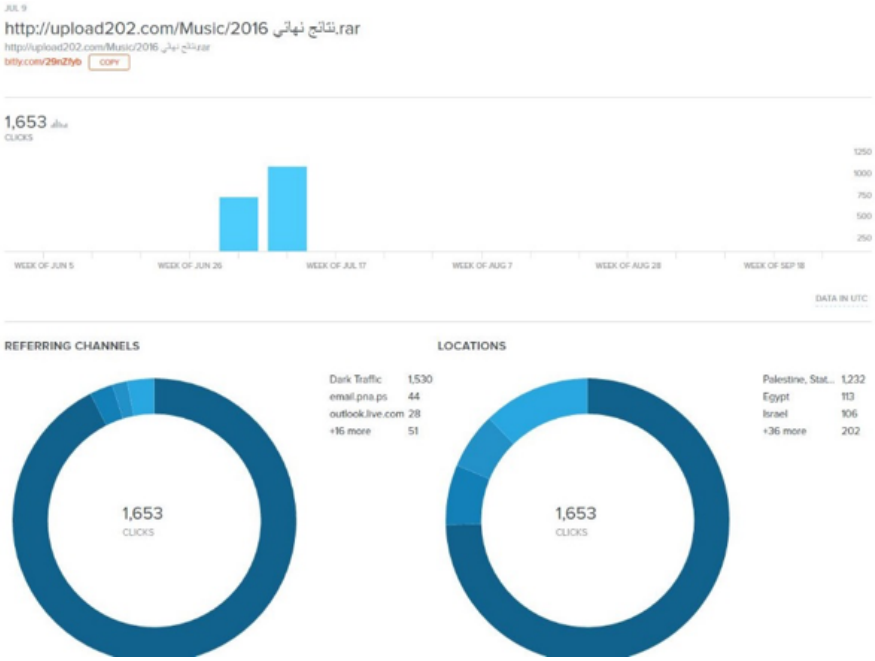


Figure 1: The bit.ly statistics for a link to a dropper for the MICROPSIA malware family.

The statistics vary per link, suggesting different target audiences for different waves of spear phishing. For example, the statistics shown in ***Figure 1*** the campaign targeted 113 users in Egypt, whereas in another example shown in **Figure 2**, Egypt did not make the top 3 countries targeted:

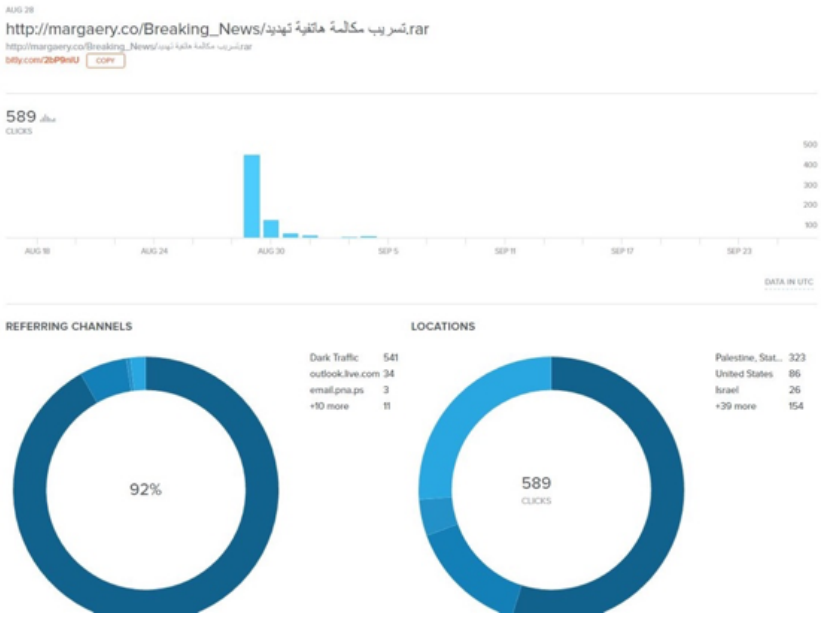


Figure 2: The bit.ly statistics for another link to a copy of the MICROPSIA malware family

FAKE NEWS!

Sending spear phishing emails with direct links to malicious shortened URLs was not the only method employed by the attackers to entice users to install the malware, another method favored by the attackers was the setting up of fake news sites. **Figure 3** shows examples of pages created by the attackers to this end.

palestine2020.blogspot.ie/2016/07/blog-post_290.html

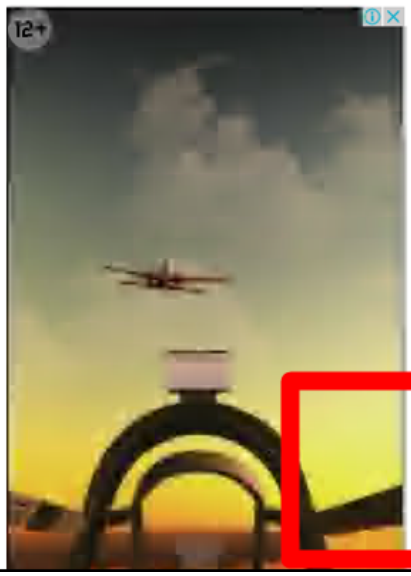
NETWORK INFORMATION - DIRECT NEWS FEEDS - NEWS AS IT IS FROM THE SOURCE

Informatics Network

HOW CAN YOU PUBLISH YOUR NEWS IN THE NEWS FEED ALAMBESHRH- CLICK HERE

أدخل كلمة بحث...

LATEST NEWS جنرالات السيسي في سوريا؟ رأي القدس Nov 05, 2016 AM 06:46



هل تعلم ان الدراسة في كندا هي أضمن طريقة حاليا للهجرة؟

Leaking the names of successful public secondary school this year

comments 0

Leaking the names of successful public secondary school this year

Leaking secondary school results before the official results of hours have been posted on social networking pages. For the results, click on the following link:

http://bit.ly/29nZfyb

Figure 3: Two fake new sites with links to shortened malicious URLs.

We are unable to confirm how traffic was driven to these sites, the attackers may have helped drive traffic via fake social media accounts, or they may have sent spear phishing links to these pages.

Malware Analysis: MICROPSIA, KASPERAGENT and the missing link

During our analysis, we discovered two distinct malware families which for the most part leveraged distinct infrastructure with no overlaps, initially leading us to categorize these campaigns separately. Later, we discovered a key link between the two sets of activity which leads us to believe they are related.

The MICROPSIA activity centers around domains registered using the email address adam.swift.2016@gmail[.]com – and no samples of KASPERAGENT talk to these domains. However, one of the domains (drive.acount-manager[.]net) registered by this address was used to host a sample (babf156ede8b5c2e6c961b6ffcccc5eb7a3d283b398370754061613f439d40f9) of KASPERAGENT, causing us to link the two sets of activity.

KASPERAGENT

We have named the most common malware involved in this campaign, KASPERAGENT, due to PDB strings left behind in many samples of the malware. An example of a PDB string left behind is given below:

```
1 c:\Users\USA\Documents\Visual Studio 2008\Projects\New folder (2)\kasper\Release\kasper.pdb
```

This analysis is based on the following file:

SHA256: babd654ef363e0645ce374dd9e2a42afe339c52f1cf17fc2285d8bebd3cfa11e

The file is compressed using the legitimate tool “mpress.exe” and once executed drops the payload to the directory C:\vault\igfxtray.exe which has the SHA256 hash f26caee34184b6a53ecbc0b5ce1f52e17d39af2129561dd6361fb4d4364e2c8b.

The malware also drops a decoy document containing Arabic names and ID numbers to the same folder and displays it to the user.

KASPERAGENT is developed in Microsoft Visual C++ and attempts to disguise itself as a product that does not exist: “Adobe Cinema Video Player”. The malware first establishes persistence using the classic method of adding a Run key, using the value “MediaSystem”.

The malware connects to a C2 serverhosted on www.mailsinfo[.]net. The C2 server string in the binary is “obfuscated” in the most basic of senses, with the author adding ‘@’ characters between letters and splitting the starting “www.m” to another string.

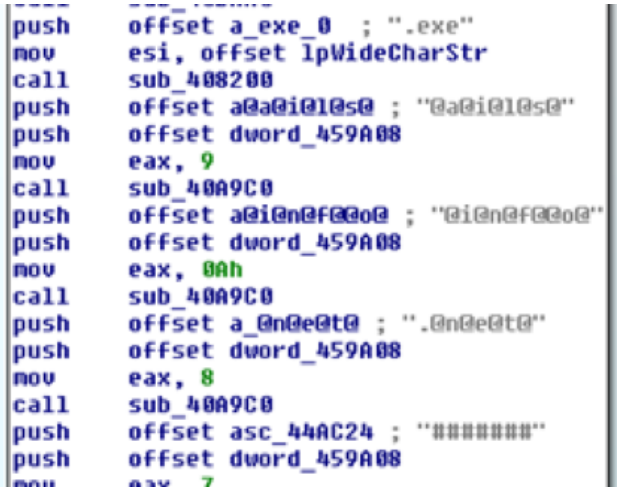


Figure 4: The Command and Control domain is obfuscated using a basic technique

Most of the samples of KASPERAGENT use “Chrome” as the user agent, but this recent sample uses “OPAERA”, possibly a misspelling of “Opera”, the browser.

The malware communicates with the C2 server via HTTP requests and in the most recent samples observed the callbacks are made to PHP scripts whose names relate to towns or navigation. Example URLs used include:

- GET request to /dad5/town.php
- POST request to /dad5/addCity.php and /dad5/sign.php

Most examples of the malware are nearly identical, and the malware simply acts as a basic reconnaissance tool and downloader for further payloads, however some examples of the malware include extended capabilities beyond that of a simple downloader. Examples of the extended-capability KASPERAGENT samples include:

- a52d3e65fe5bbf57bab79b1c5092b66d9650247249b72f667a927f266d09efe6
- c9ffb81a97a9458f1fc96f35cd187b1d7311479e77d031586abdc3d426da0859
- 7f11e0bbc892a97b7c42416c43fe178ebb240939d9dee70c3c598305ce8a2d4f

These extended-capability samples connect to www.stikerscloud[.]com and implement the following additional functionality:

- Theft of passwords for Firefox and Chrome browsers
- Take screenshots
- Recording user keystrokes
- Exfiltrate basic environment information such as the username and computer name
- Perform arbitrary commands
- Enumerate removable drives and copy files of interest to a new folder for exfiltration
- Update the malware to a new version
- Exfilitrate arbitrary files (zip compressed and encrypted)

It’s also worth mentioning that sometimes that both versions of the malware are wrapped in a Microsoft .NET Framework loader which is responsible for deploying the malware and displaying the decoy document. The author (imaginatively) calls this wrapper ‘Loader’ an example of this is the file is 4c1973278a30d1b4ce206eca63676624d234260758a0674d191d338a02914d23, which contains the PDB string: C:\Users\Yousef\Desktop\MergeFiles\Loader v0\Loader\obj\Release\Loader.pdb

MICROPSIA Analysis

The MICROPSIA malware family is written in Delphi (https://en.wikipedia.org/wiki/Delphi_(programming_language)) and is an information stealing malware family with a wide range of data theft functionality built in. This analysis is based on the following sample:

SHA256: 6e461a8430f251db38e8911dbacd1e72bce47a89c28956115b702d13ae2b8e3b

We named the malware MICROPSIA because of the way it is often packaged. The malware is often delivered as a RAR, which once extracted contains an EXE, which is further packed using UPX. Once unpacked from UPX, the next level is a further SFX RAR file, which then contains the actual malware files within. This effectively means the initial payload is extremely compressed and

appears much smaller than it really is. (https://en.wikipedia.org/wiki/Micropsia) The final payload contains four legitimate executables as resources:

1. Two embedded DLLs relating to the OpenSSL library used for traffic encryption.
2. A copy of a command line version of WinRAR – used for encrypting and compressing the exfiltrated data
3. The file 'shortcut.exe' from optimumx.com (Creates, modifies or queries Windows shell links)
   this is used for persistence by creating a link in the startup folder to the payload.

The malware begins execution by first copying itself to a predefined location, setting up persistence via an LNK file (hence the inclusion of the aforementioned shortcut.exe)

The main capabilities of the malware are as follows:

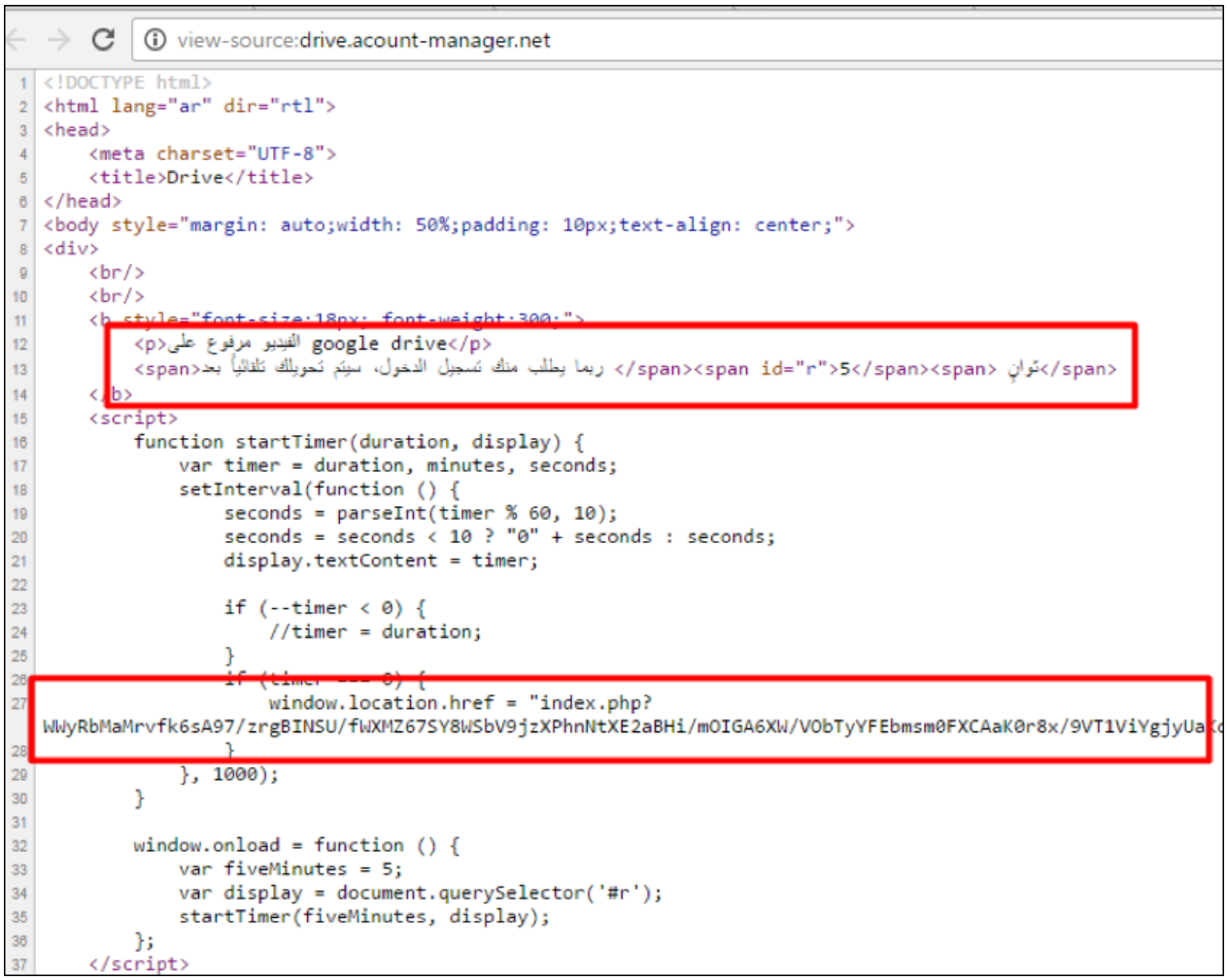
- Logging of keystrokes to a hardcoded text file and exfiltration to a remote server
- Capturing screenshots of the infected machines
- Searching for files with extensions matching Microsoft Office documents and using WinRAR to archive these prior to exfiltration. Example syntax of the command used is as follows:

```
1 "Rar.exe a -r -ep1 -v2500k -hpd58ccc009be55ff172a9039bf35cf270 -ta2016-12-11 ProgramData\Recovery\bin\sys\sysTime\LMth_E E:\*.x
```

The value "d58ccc009be55ff172a9039bf35cf27" is used to encrypt exfiltrated documents and appears to be an MD5 hash, but we have not identified a string that maps to this hash.

A side of phishing

Interestingly in some cases the attackers combined an attempt to infect targeted users with malware, with an attempt to steal their credentials via traditional phishing techniques. The attackers sometimes directed users to sites spoofing legitimate services such as Google Drive to download the malware, however first the target users would be asked to fill in their credentials in, giving the attackers two chances to successfully steal target users' data (via the phish and via the eventual malware infection):



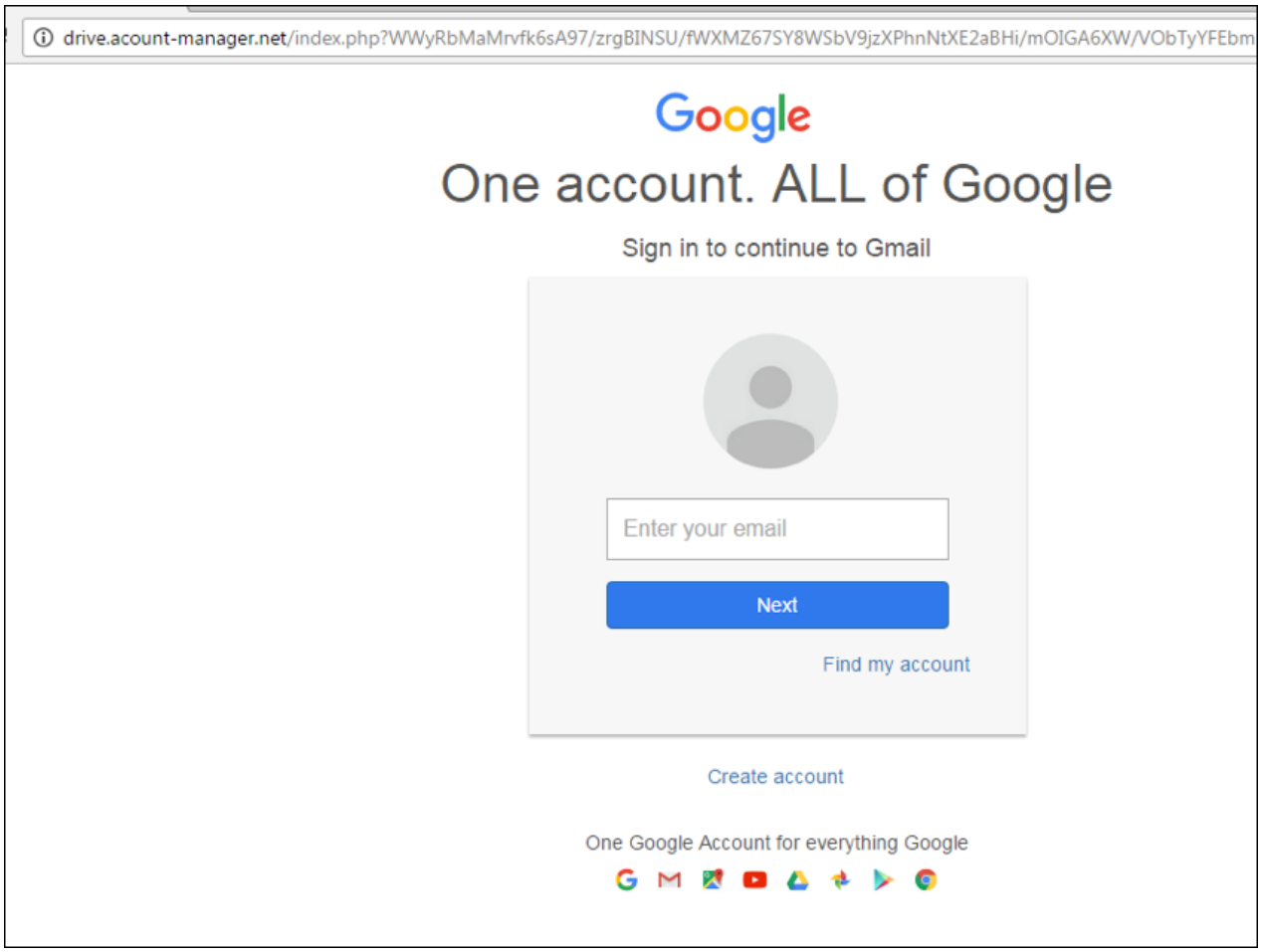


Figure 5: In some cases, users were required to fill in their credentials to download the malware

And there's an APK twist…

Whilst a large number of the domains associated with the adam.swift.2016@gmail[.]com email address are associated with MICROPSIA samples, some have been observed hosting Android apps or acting as C2 domains for Android malware samples. Analysis of these apps shows these are also malicious, and the apps also contain some social engineering tricks to enable installation.

There are two main APK malware families used by the threat actor. The first is a malware family used to gain a foothold on to the device, it is effectively a downloader with no additional functionality and we call this malware SECUREUPDATE.

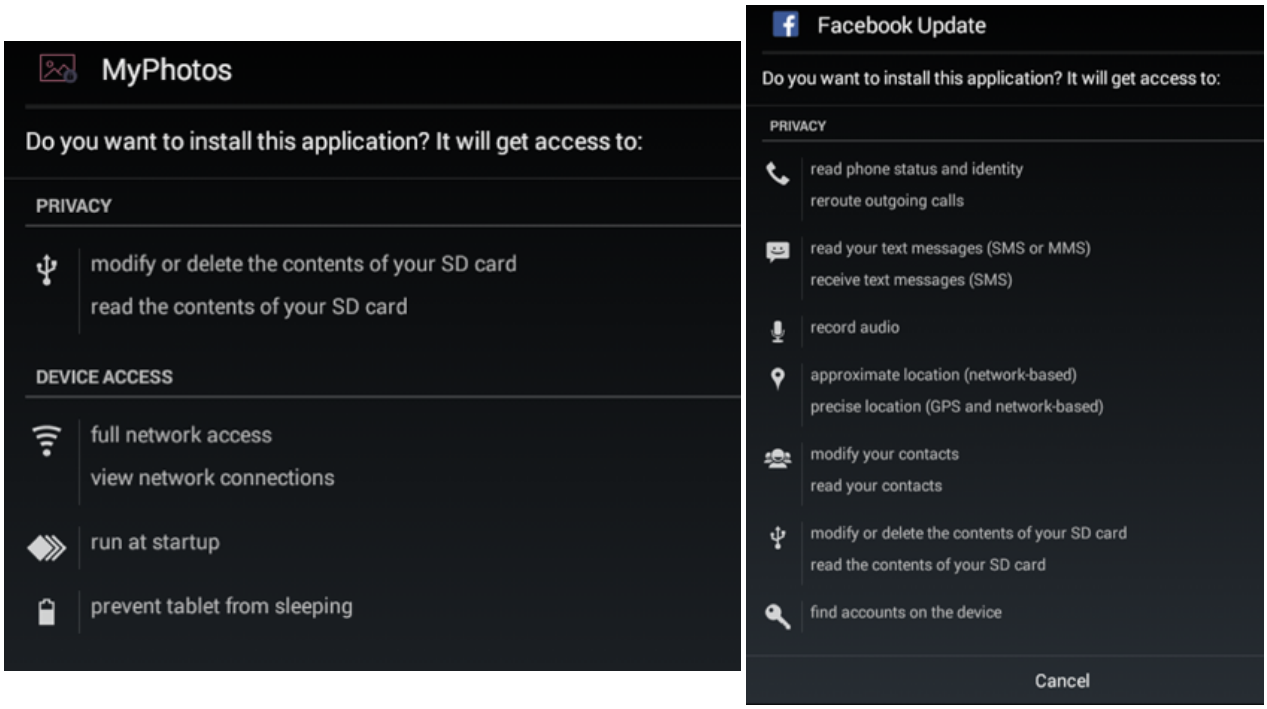


Figure 6: The applications often pretend to be social applications popular with end users.

In the sample we analyzed (6b4d65abf95cfb3cedd39b217ff0e4ee2229ae32aeda5170f34c5a3b9c5a0f3) the malware used the local calendar to sleep, creating an alarm in the future, at which point the malware would call back to receive an "Update":

```
private void a(Context paramContext)
{
  System.out.println("Setup Alarm");
  PendingIntent localPendingIntent = PendingIntent.getBroadcast(paramContext, 0, new Intent(paramContext, DownloadFileReceiver.class), 0);
  paramContext = (AlarmManager)paramContext.getSystemService("alarm");
  Calendar localCalendar = Calendar.getInstance();
  localCalendar.setTimeInMillis(System.currentTimeMillis() + 900000L);
  paramContext.set(1, localCalendar.getTimeInMillis(), localPendingIntent);
}
```

Figure 7: The alarm functionality in the SECUREPDATE malware was used to download and execute a further payload at a later date.

In a similar vein to the 'a side of phishing' section, some of the versions of SECUREUPDATE backdoor attempt to steal credentials for users, making them create accounts for these fake apps in addition to the installation of the malware. This technique relies on credential re-use across many accounts but will still yield some success for the attackers:

Figure 8: Some of the apps require users to "Login" giving the attacker the chance to record credentials of victims that may well be reused elsewhere.

The second malware family is a malware family we call VAMP, which is already described in great detail (https://ti.360.com/upload/report/file/APTSWXLVJ8fnjoxck.pdf) in the blog by 360, VAMP is fully featured with all the capabilities you'd expect from a malware family that resides on a phone. Features of the malware include:

- Ability to record calls
- Contact theft
- Theft of documents stored on the device
- Theft of messages

Another outlier in terms of domains registered by adam.swift.2016@gmail[.]com is the domain AppPure[.]info. From the outset, the site appears to be a legitimate page:

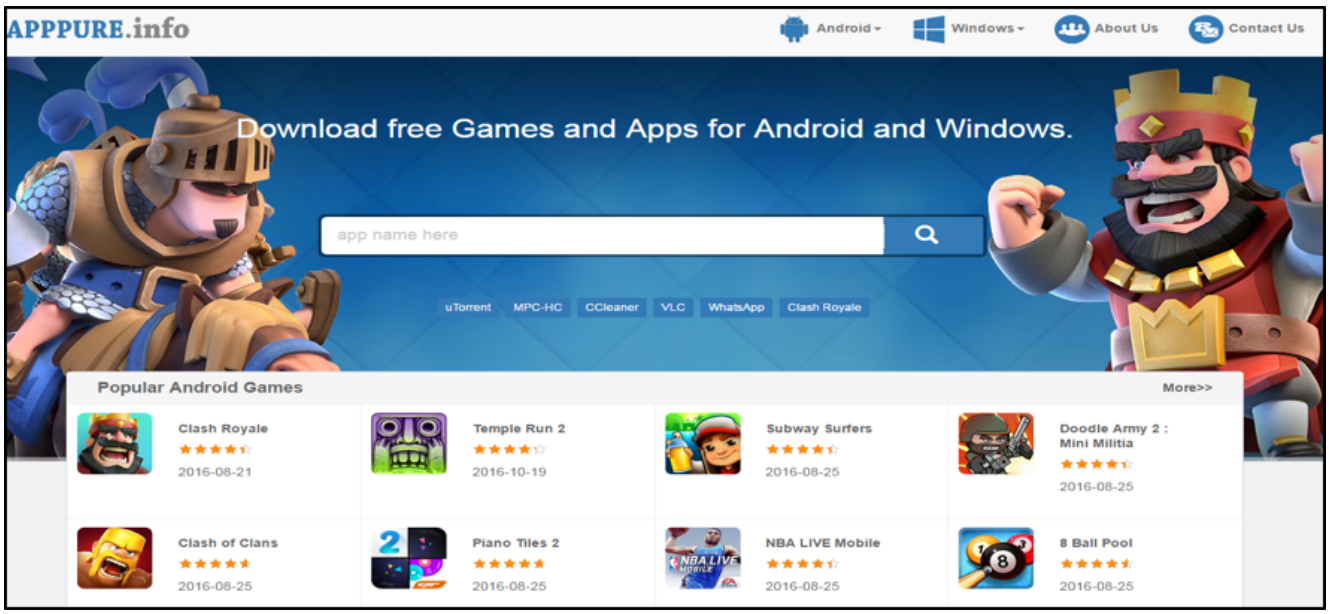


Figure 9: The app store created by the attackers which we believe was used to distribute malicious apps.

Although we have been unable to find malicious content hosted on this site, we believe that it is very likely that amongst the many legitimate apps available for download via this store some malicious apps may exist.

Concluding thoughts

Through this campaign there is little doubt that the attackers have been able to gain a great deal of information from their targets. We have been unable to uncover any evidence which allows us to confidently attribute this campaign to any known threat actor at present.

The scale of the campaign in terms of sheer numbers of samples and the maintenance of several differing malware families involved suggests a reasonably sized team and that the campaign is not being perpetrated by a lone wolf, but rather a small team attackers.

The campaign also illustrates that for some targets old tricks remain sufficient to run a successful espionage campaign, including use of URL shortening services, classic phishing techniques as well as using archive files to bypass some simple file checks.

Palo Alto Networks customers are defended from this threat in the following ways:

- WildFire and Traps detect all of the malware discussed in this report as malicious.
- The C2 domains listed in this report are blocked through Threat Prevention.
- AutoFocus customers can monitor this activity by looking at the tags:
- VAMP (https://autofocus.paloaltonetworks.com/#/tag/Unit42.Vamp)
- KASPERAGENT (https://autofocus.paloaltonetworks.com/#/tag/Unit42.KasperAgent)
- MICROPSIA (https://autofocus.paloaltonetworks.com/#/tag/Unit42.Micropsia)
- SECUREUPDATE (https://autofocus.paloaltonetworks.com/#/tag/Unit42.SecureUpdate)

Appendix A – Associated C2 Domains

mediafreeuploader[.]co[.]uk

appppure[.]net

upload404[.]club

upload999[.]net

upload999[.]com

upload999[.]org

arnani[.]info

al-amalhumandevelopment[.]com

acount-manager[.]net

gooogel-drive[.]com

acount-manager[.]org

acount-manager[.]info

appppure[.]info

stikerscloud[.]com

upload999[.]info

apppure[.]info

mary-crawley[.]com

mydriveweb[.]com

google-support-team[.]com

mavis-dracula[.]com

9oo91e[.]co

useraccountvalidation[.]com

mailsinfo[.]net

acount-manager[.]com

upload202[.]com

upload909[.]net

upload101[.]net

mediauploader[.]me

ran-togomory[.]com

shildon-cooper[.]info

mediauploader[.]info

akashipro[.]com

beauty-dance[.]net

margaery[.]co

go-mail-accounts[.]com

kagami-adam[.]com

kalisi[.]org

kalisi[.]info

cecilia-dobrev[.]com

kalisi[.]xyz

appppure[.]pro

cecilia-gilbert[.]com

gooogel[.]org

feteh-asefa[.]com

Appendix B – Associated Windows Malware Samples

KASPERAGENT

2c8a67f8118b6aef159dd280d5998b1c41edb406a1bc8e3960254a9642b6ae4b

a72178289bb518f9f100b78e56a9425332bf3a5220a6c5abd3d07c669a5d8b25

7fdf2bdc500a8703cceb76a427752ee70164b8283b4df42c5b13ed2124a88dbd

6926f430865bd08b621bd1c6581bfe77db3e9891b14f97d00563770186fc5e74

46b0f586a646e800ab63d1404a08864fb09aca73a13fd22542a9fce038643219

e9050c541859f2fabff6dcd492df02a48dd32d99b1f3e98ef7c14bbb6aa734a2

2709506acdb0c6aba5ce794ceada11b64078f5731b91359cb398bc967cb67eba

fcfe51fd23aadcab5a7878bd59b5354d3491d237b259e230ac51e49306b253c7

1bb2a7a6c271b7e607cf87f2a4003eae1653f304cde104fc0311611cbb96e431

b384ed2a4f484b70786e5ea84ff513d30fe4d068fd76cc214d448f7f1c4329fb

1bbd9498f50259917d737b70a875772f963424f69fb942b86d626283e154cab2

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f26caee34184b6a53ecbc0b5ce1f52e17d39af2129561dd6361fb4d4364e2c8b

325c5aa819dbd1596464ec018b9efb5938dbc59ac6a94c459932ef07412bca02

4b77194c47b5abb04b1395955ca25aa0bb63ce796247d22946bc07919c8e1b56

9ae853b1e678926358ac8c1cd583eb2d5968b99c2a16cf34334a22051bb630ec

1184916919ea9790adcd53b60c4bf875e54733e508344ffe6baf10b919a0fd1d

beb05e01b87e1a432b3ef37eb55db723a5a5231872a53ab777d7821358e97574

433d2c8a3e93191d09e11994438ec3413152baf64e26e8d9e43c2d2e056b700c

783486dd30ca43d3a6c6807530c023f61631e4b3e6f2e6c2830b5209ee384e13

2813409822b56ae81f08adcaed29a215b3bef0e4f1cc5a22c7169f9e16a188a0

6eca9aacc7d9ef570bf2521f5a1156825832282650d2d3734d964a834f97b3f4

b8285b66aa42f61de1c43423ea25f8cbe03ebb96d0917c153476e185a5909e57

6c51b3ca96d06cc695de3875f4d31962bb936331a82541ab610f269fec0b0a8c

cd051cb14f118e33a2299925a704a56d89ba92a310f2176a0942ec29babedee6

d5e145bf964b91210b79b25fc92ce19aacacadac14ebeb6f4111b6f4cabfd6c7

98553dacbb2fdd8d655907f29e8ba36265f931fd5c6fe83c4defafc10767d4f0

e1addb50f0fea302317c40017fcdad84e1b8bc0f6d5b3f2609de2a0576ad8f9a
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ae5625a0fe39b34884cfd33832181392e9cf5157b8070b2e1b3d04c87fb46eec
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400c9fa4012a67e88b986d206deb8b10acff3091b6e7c98f0f98ac553ebd021b
c7d2a0803f9d4f9f37d5a0f3a37b97eaa672d4b3c700163847736cb9f91aabad
71aa4f9bc78fd5d457e4a2f2914516fc0081d2d5d22da26e1c70f86d9bd6bab1
117f80111e0fb67f728091a1b96042ea6f1633ece8c8a519e45e38d408a6691e
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df2f111c952ac720cb9e33afb24a1c9d0c9ecaeaea4c079f48fadc1a4ed333d5
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646b6591002c125108fa1e108aa9be84f4c83f3130836279745e372ee12867cf
4c1973278a30d1b4ce206eca63676624d234260758a0674d191d338a02914d23
e771f7512bd1efc86884fad12115f2fb5abc97eef78ca7dce1fbc9fb6f23360d
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34a4a989a6d83eea916c455a9c304823786f11d39c7525583f75a0fd35906a1e
967fd8f1e08cde8dbc960f3d9fcac5a86b77003cae88d59be78ce0a7e6ad0d88
83d07d027709c724b146aaf44ff63d969b9c2824bb5f0b3c1be5af4f18b3cd97
42c12d9b35abbb79212bf9d35d7c391d18e2635e558eb6ab8472510df79da09f
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365be95490051c077b2bea93eb8e647cc4ab76cc51ebc6781abfca8b6d55b551
a52d3e65fe5bbf57bab79b1c5092b66d9650247249b72f667a927f266d09efe6
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MICROPSIA

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Appendix C – Associated Android Malware Samples

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Appendix D – Observed PDB Strings

C:\Users\USA\Documents\Visual Studio 2008\Projects\New folder (2)\kasper\Release\kasper.pdb

C:\Users\Yousef\Desktop\MergeFiles\Loader v0\Loader\obj\Release\Loader.pdb

c:\Users\USA\Documents\Visual Studio 2008\Projects\New folder (2)\s7 – Copy – Copy 19-2-17\Release\s7.pdb

c:\Users\USA\Documents\Visual Studio 2008\Projects\New folder (2)\s7\Release\s7.pdb

C:\Users\Progress\Desktop\Loader v0\Loader\obj\Release\Loader.pdb

D:\Merge\Debug\testproj.pdb

c:\Users\USA\Documents\Visual Studio 2008\Projects\New folder (2)\kasper – Copy – 21-2-17\Release\kasper.pdb

C:\Users\Yousef\Desktop\MergeFiles\merge photos\Loader v0\Loader\obj\Release\Loader.pdb

C:\Users\Yousef\Desktop\Loader v0\Loader\obj\Release\Loader.pdb

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