The CozyDuke APT - Securelist

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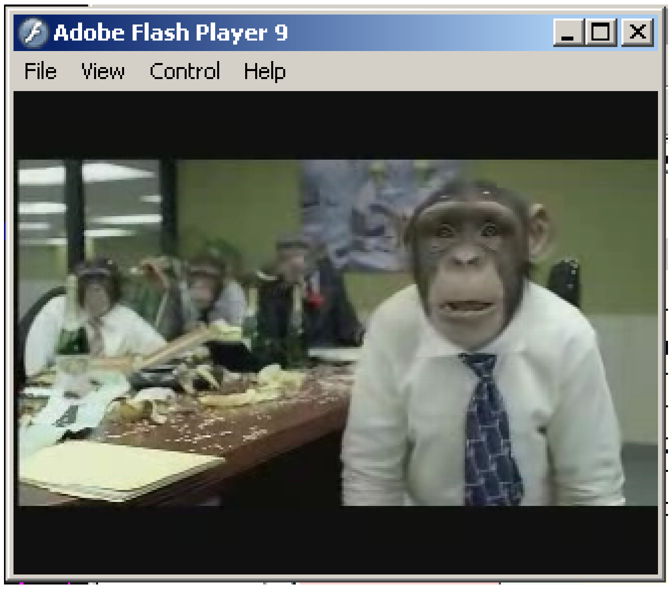
CozyDuke (aka CozyBear, CozyCar or "Office Monkeys") is a threat actor that became increasingly active in the 2nd half of 2014 and hit a variety of targets. The White House and Department of State are two of the most spectacular known victims.

The operation presents several interesting aspects

- blatantly sensitive high profile victims and targets
- crypto and anti-detection capabilities
- strong malware functional and structural similarities mating this toolset to early MiniDuke second stage components, along with more recent CosmicDuke and OnionDuke components

The actor often spearphishes targets with e-mails containing a link to a hacked website. Sometimes it is a high profile, legitimate site such as "diplomacy.pl", hosting a ZIP archive. The ZIP archive contains a RAR SFX which installs the malware and shows an empty PDF decoy.



In other highly successful runs, this actor sends out phony flash videos directly as email attachments. A clever example is "Office Monkeys LOL Video.zip". The executable within not only plays a flash video, but drops and runs another CozyDuke executable. These videos are quickly passed around offices with delight while systems are infected in the background silently. Many of this APT's components are signed with phony Intel and AMD digital certificates.

Recent Cozyduke APT activity attracted significant attention in the news:
Sources: State Dept. hack the 'worst ever'
White House computer network 'hacked'

[Three Months Later, State Department Hasn't Rooted Out Hackers]
[State Department shuts down its e-mail system amid concerns about hacking]

Let's examine a smattering of representative CozyDuke files and data. There is much to their toolset.

Office Monkeys dropper analysis
The droppers and spyware components often maintain fairly common characteristics
68271df868f462c06e24a896a9494225,Office Monkeys LOL Video.zip

Believe it or not, recipients in bulk run the file within:
95b3ec0a4e539efaa1faa3d4e25d51de,Office Monkeys (Short Flash Movie).exe

This file in turn drops two executables to %temp%

- 2aabd78ef11926d7b562fd0d91e68ad3, Monkeys.exe
- 3d3363598f87c78826c859077606e514, player.exe

It first launches Monkeys.exe, playing a self-contained, very funny video of white-collar tie wearing chimpanzees working in a high rise office with a human colleague. It then launches player.exe, a CozyDuke dropper maintaining anti-detection techniques:
3d3363598f87c78826c859077606e514,338kb,player.exe,Trojan.Win32.CozyBear.v,CompiledOn:2014.07.02 21:13:33

The file collects system information, and then invokes a WMI instance in the root\securitycenter namespace to identify security products installed on the system, meaning that this code was built for x86 systems, wql here:
SELECT * FROM AntiVirusProduct
SELECT * FROM FireWallProduct

The code hunts for several security products to evade:

- CRYSTAL
- KASPERSKY
- SOPHOS
- DrWeb
- AVIRA
- COMODO Dragon

In addition to the WMI/wql use, it also hunts through the "SOFTWARE\Microsoft\Windows\CurrentVersion\Uninstall\" registry key looking for security products to avoid.

Following these checks, it drops several more malware files signed with the pasted AMD digital signature to a directory it creates. These files are stored within an 217kb encrypted cab file in the dropper's resources under the name "A". The cab file was encrypted and decrypted using a simple xor cipher with a rotating 16 byte key: \x36\x11\xdd\x08\xac\x4b\x72\xf8\x51\x04\x68\x2e\x3e\x38\x64\x32.

The cab file is decompressed and its contents are created on disk. These dropped files bundle functionality for both 64bit and 32bit Windows systems:
C:\Documents and Settings\user\Application Data\ATI_Subsystem\
6761106f816313394a653db5172dc487,54kb,amdhcp32.dll ← 32bit dll,CompiledOn:2014.07.02 21:13:24
d596827d48a3ff836545b3a999f2c3e3,60kb,aticaldd.dll ← 64bit dll,CompiledOn:2014.07.02 21:13:26
bc626c8f11ed753f33ad1c0fe848d898,285kb,atiumdag.dll ← 32bit dll, 279kb, Trojan.Win32.CozyDuke.a, CompiledOn:2014.07.02 21:13:26
4152e79e3dbde55dcf3fc2014700a022,6kb,racss.dat

The code copies rundll32.exe from windows\system32 to its newly created %appdata%\ATI_Subsystem subdirectory as "amdocl_as32.exe" alongside the three dll's listed above. It runs atiumdag.dll with two parameter values, it's only export and an arbitrary pid, i.e.: "C:\Documents and Settings\user\Application Data\ATI_Subsystem\amdocl_as32.exe" "C:\Documents and Settings\user\Application Data\ATI_Subsystem\atiumdag.dll"", ADL2_ApplicationProfiles_System_Reload 1684"

This dll is built with anti-AV protections as well. However, it looks for a different but overlapping set, and the random duplication suggests that this component was cobbled together with its dropper, partly regionally based on target selection.

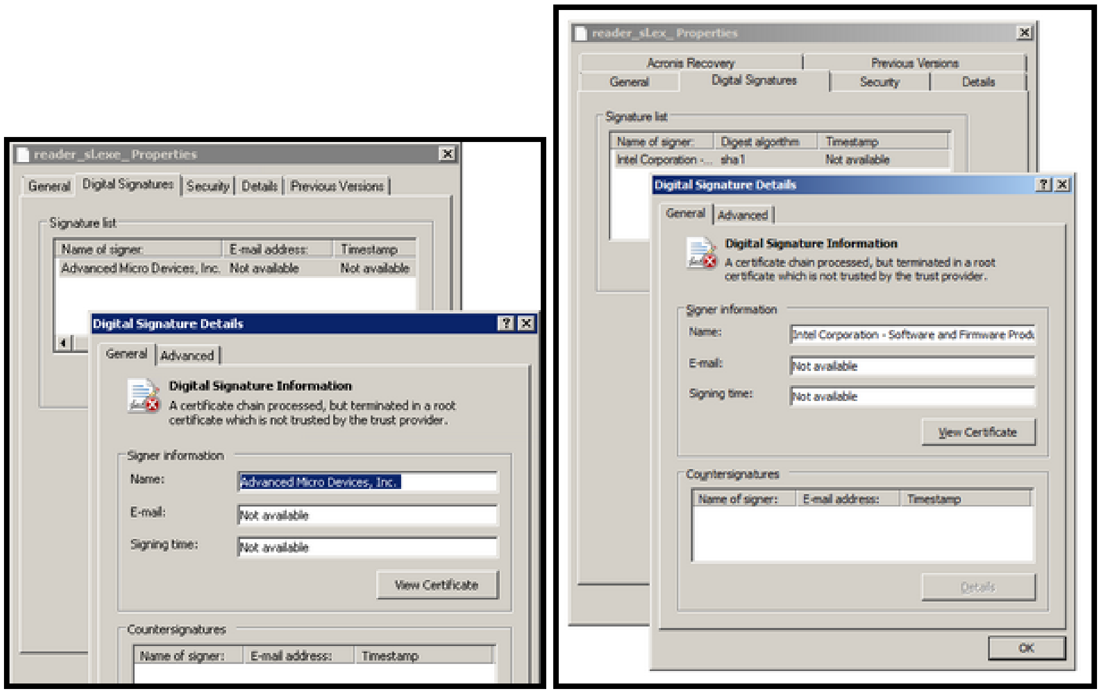
- KASPERSKY

The code collects information about the system efd5aba3-6719-4655-8a72-1aa93feefa38C:\Documents and Settings\user\Application Data\ATI_Subsystem\amdocl_as32exeMyPCuserMicrosoft Windows XP 512600 SP 30 x32Admin192.60.11.1008:11:17:f2:9a:efSophos Anti-Virus

Finally, this process beacons to www.sanjosemaristas.com, which appears to be a site that has been compromised and misused multiple times in the past couple of years. hxxp://www.sanjosemaristas.com/app/index.php?{A01BA0AD-9BB3-4F38-B76B-A00AD11CBAAA}, providing the current network adapter's service name GUID. It uses standard Win32 base cryptography functions to generate a CALG_RC4 session key to encrypt the collected data communications and POSTs it to the server.

Executable-Signing Certificates

Samples are usually signed with a fake certificate - we've seen two instances, one AMD and one Intel:


reader_sl.exe_ Properties
General | Digital Signatures | Security | Details | Previous Versions
Digital Signature Details
General | Advanced
View Certificate
reader_sl.ex_ Properties
Acronis Recovery | Previous Versions
General | Digital Signatures | Security | Details
Details
OK

Signature list

Name of signer	E-mail address	Timestamp
Advanced Micro Devices, Inc.	Not available	Not available

Digital Signature Information
A certificate chain processed, but terminated in a root certificate which is not trusted by the trust provider.

Signer information
Name: Advanced Micro Devices, Inc.
E-mail: Not available
Signing time: Not available

Countersignatures

Name of signer:	E-mail address:	Timestamp

Signature list

Name of signer:	Digest algorithm	Timestamp
Intel Corporation -...	sha1	Not available

Digital Signature Information
A certificate chain processed, but terminated in a root certificate which is not trusted by the trust provider.

Signer information
Name: Intel Corporation - Software and Firmware Produ
E-mail: Not available
Signing time: Not available

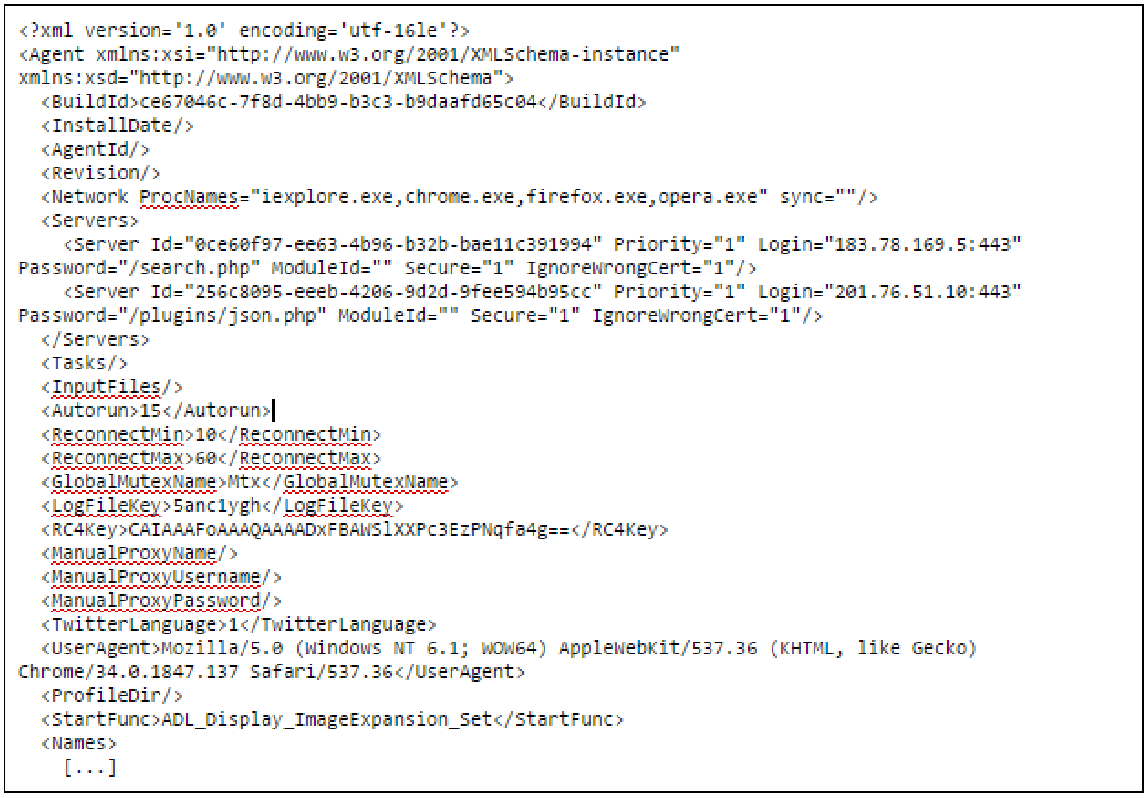
Countersignatures

Name of signer:	E-mail address:	Timestamp

Fake certificates

Configuration files:

Some of the malware uses an encrypted configuration file which is stored on disk as "racss.dat". This is encrypted by RC4, using key {0xb5, 0x78, 0x62, 0x52, 0x98, 0x3e, 0x24, 0xd7, 0x3b, 0xc6, 0xee, 0x7c, 0xb9, 0xed, 0x91, 0x62}. Here's how it looks decrypted:



```
<?xml version='1.0' encoding='utf-16le'?>
<Agent xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <BuildId>ce67046c-7f8d-4bb9-b3c3-b9daafd65c04</BuildId>
  <InstallDate/>
  <AgentId/>
  <Revision/>
  <Network ProcNames="iexplore.exe,chrome.exe,firefox.exe,opera.exe" sync=""/>
  <Servers>
    <Server Id="0ce60f97-ee63-4b96-b32b-bae11c391994" Priority="1" Login="183.78.169.5:443"
Password="/search.php" ModuleId="" Secure="1" IgnoreWrongCert="1"/>
    <Server Id="256c8095-eeeb-4206-9d2d-9fee594b95cc" Priority="1" Login="201.76.51.10:443"
Password="/plugins/json.php" ModuleId="" Secure="1" IgnoreWrongCert="1"/>
  </Servers>
  <Tasks/>
  <InputFiles/>
  <Autorun>15</Autorun>
  <ReconnectMin>10</ReconnectMin>
  <ReconnectMax>60</ReconnectMax>
  <GlobalMutexName>Mtx</GlobalMutexName>
  <LogFileKey>5anc1ygh</LogFileKey>
  <RC4Key>CAIAAAFoAAAQAAAADxFBAWSlXXPc3EzPNqfa4g==</RC4Key>
  <ManualProxyName/>
  <ManualProxyUsername/>
  <ManualProxyPassword/>
  <TwitterLanguage>1</TwitterLanguage>
  <UserAgent>Mozilla/5.0 (Windows NT 6.1; WOW64) AppleWebKit/537.36 (KHTML, like Gecko)
Chrome/34.0.1847.137 Safari/537.36</UserAgent>
  <ProfileDir/>
  <StartFunc>ADL_Display_ImageExpansion_Set</StartFunc>
  <Names>
    [...]
```

C&Cs:

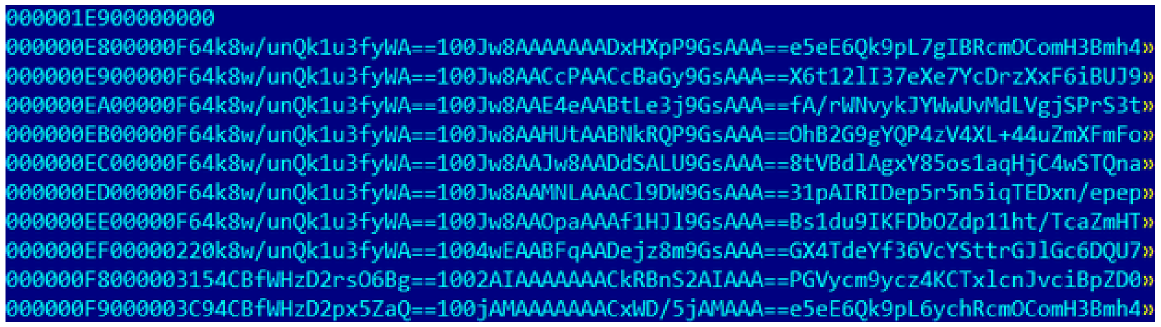
121.193.130.170:443/wp-ajax.php
183.78.169.5:443/search.php
200.119.128.45:443/mobile.php
200.125.133.28:443/search.php
200.125.142.11:443/news.php
201.76.51.10:443/plugins/json.php
202.206.232.20:443/rss.php
202.76.237.216:443/search.php
203.156.161.49:443/plugins/twitter.php
208.75.241.246:443/msearch.php
209.40.72.2:443/plugins/fsearch.php
210.59.2.20:443/search.php
208.77.177.24:443/fsearch.php
www.getiton.hants.org.uk:80/themes/front/img/ajax.php
www.seccionpolitica.com.ar:80/galeria/index.php
209.200.83.43/ajax/links.php
209.200.83.43/ajax/api.php
209.200.83.43/ajax/index.php
209.200.83.43/ajax/error.php
209.200.83.43/ajax/profile.php
209.200.83.43/ajax/online.php
209.200.83.43/ajax/loader.php
209.200.83.43/ajax/search.php

Second stage malware and communications:

The attackers send commands and new modules to be executed to the victims through the C&Cs. The C&C scripts store these temporarily until the next victim connects in local files. We've identified two such files:

- settings.db
- sdfg3d.db

Here's how such a database file appears:



```
000001E900000000
000000E800000F64k8w/unQk1u3fyWA==100Jw8AAAAAAADxHXpP9GsAAA==e5eE6Qk9pL7gIBRcmOComH3Bmh4»
000000E900000F64k8w/unQk1u3fyWA==100Jw8AACcPAACcBaGy9GsAAA==X6t12lI37eXe7YcDrzXxF6iBUJ9»
000000EA00000F64k8w/unQk1u3fyWA==100Jw8AAE4eAABtLe3j9GsAAA==fA/rWNvykJYWwUvMdLVgjSPrS3t»
000000EB00000F64k8w/unQk1u3fyWA==100Jw8AAHUtAABNkRQP9GsAAA==OhB2G9gYQP4zV4XL+44uZmXFmFo»
000000EC00000F64k8w/unQk1u3fyWA==100Jw8AAJw8AADdSALU9GsAAA==8tVBdlAgxY85os1aqHjC4wSTQna»
000000ED00000F64k8w/unQk1u3fyWA==100Jw8AAMNLAAACl9DW9GsAAA==31pAIRIDep5r5n5iqTEDxn/epep»
000000EE00000F64k8w/unQk1u3fyWA==100Jw8AAOpaAAAf1HJl9GsAAA==Bs1du9IKFDbOZdp11ht/TcaZmHT»
000000EF00000220k8w/unQk1u3fyWA==1004wEAABFqAADejz8m9GsAAA==GX4TdeYf36VcYSttrGJlGc6DQU7»
000000F8000003154CBfWHzD2rsO6Bg==1002AIAAAAAAACkRBnS2AIAAA==PGVycm9ycz4KCTxlcnJvciBpZD0»
000000F9000003C94CBfWHzD2px5ZaQ==100jAMAAAAAAACxWD/5jAMAAA==e5eE6Qk9pL6ychRcmOComH3Bmh4»
```

These are BASE64 encoded and use the same RC4 encryption key as the malware configuration.

Decoding them resulted in the following payloads:

59704bc8bedef32709ab1128734aa846 *ChromeUpdate.ex_
5d8835982d8bfc8b047eb47322436c8a *cmd_task.dll
e0b6f0d368c81a0fb197774d0072f759 *screenshot_task.dll

Decoding them also resulted in a set of tasking files maintaining agent commands and parameter values:

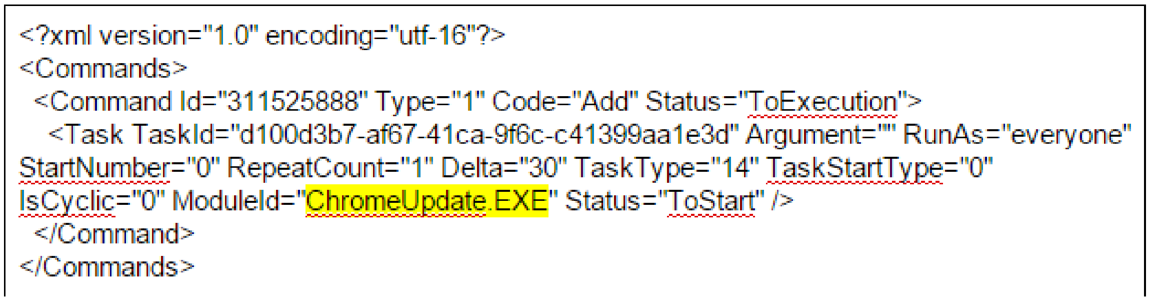
conf.xml

And a set of "reporting" files, maintaining stolen system "info", error output, and "AgentInfo" output, from victim systems:
DCOM_amdocl_ld_API_.raw
Util_amdave_System_.vol
Last_amdpcom_Subsystem_.max
Data_amdmiracast_API_.aaf
7.txt

screenshot_task.dll is a 32-bit dll used to take a screenshot of the full desktop window and save it as a bitmap in %temp%. The number of times the screenshot is repeated is configurable within the xml task file.

cmd_task.dll is a 32-bit dll that maintains several primitives. It is used to create new processes, perform as a command line shell, and several other tasks.

Each of these payloads is delivered together with a configuration file that explains how to run it, for instance:



```
<?xml version="1.0" encoding="utf-16"?>
<Commands>
  <Command Id="311525888" Type="1" Code="Add" Status="ToExecution">
    <Task TaskId="d100d3b7-af67-41ca-9f6c-c41399aa1e3d" Argument="" RunAs="everyone"
StartNumber="0" RepeatCount="1" Delta="30" TaskType="14" TaskStartType="0"
IsCyclic="0" ModuleId="ChromeUpdate.EXE" Status="ToStart" />
  </Command>
</Commands>
```

Furthermore, ChromeUpdate is a 64-bit executable (which appears to be a WEXTRACT package) that oddly drops a 32-bit Dll. Cache.dll is simply stored as a cabinet file in the ChromeUpdate's resource section.

ChromeUpdate.exe starts the file with "rundll32 cache.dll,ADB_Setup"

Cache.dll analysis

9e3f3b5e9ece79102d257e8cf982e09e	cache.dll	438k bytes	CompiledOn: Tue Feb 3 06:56:12 2015

Cache.dll was written in C/C++ and built with a Microsoft compiler.

Cache.dll code flow overview

- rc4 decrypt hardcoded c2 and urls
- resolve hidden function calls
- collect identifying victim system data
- encrypt collected data
- send stolen data to c2 and retrieve commands

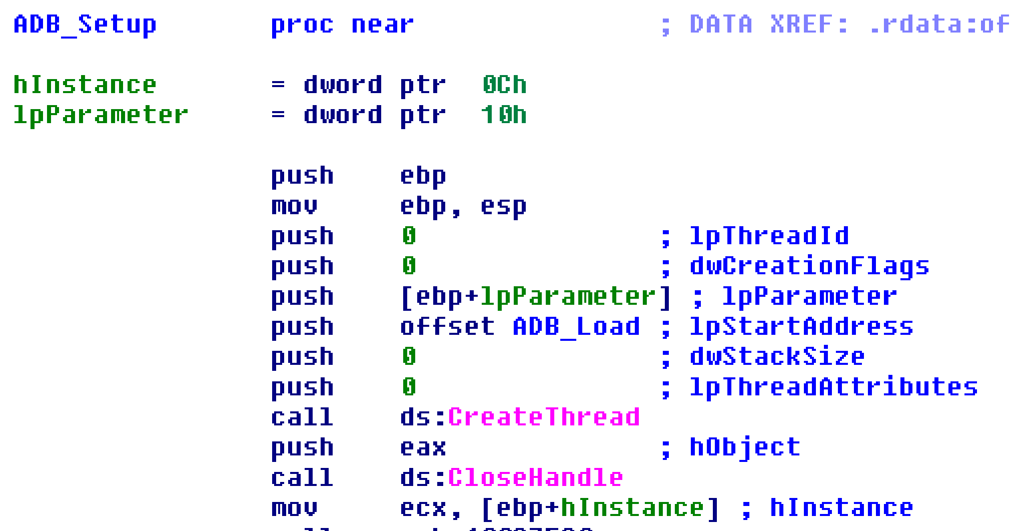
Cache.dll code details

Structurally, cache.dll is a fairly large backdoor at 425kb. It maintains both code and data in the raw, encrypted blobs of data to be decrypted and used at runtime, and hidden functionality that isn't exposed until runtime. No pdb/debug strings are present in the code.

It maintains eight exports, including DllMain:

- ADB_Add
- ADB_Cleanup
- ADB_Initnj
- ADB_Load
- ADB_Release
- ADB_Remove
- ADB_Setup

ADB_Setup is a entry point that simply spawns another thread and waits for completion.

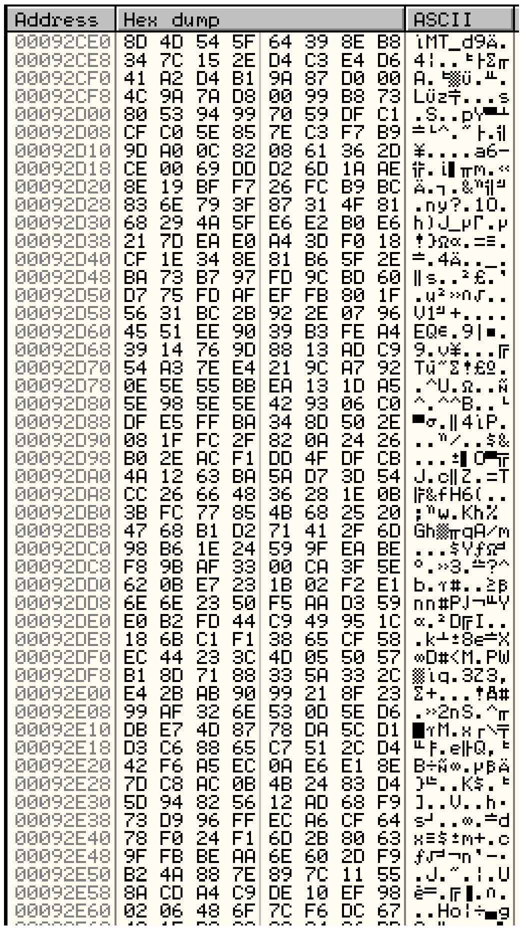


```
ADB_Setup       proc near               ; DATA XREF: .rdata:of

hInstance       = dword ptr  0Ch
lpParameter     = dword ptr  10h

                push    ebp
                mov     ebp, esp
                push    0               ; lpThreadId
                push    0               ; dwCreationFlags
                push    [ebp+lpParameter] ; lpParameter
                push    offset ADB_Load ; lpStartAddress
                push    0               ; dwStackSize
                push    0               ; lpThreadAttributes
                call    ds:CreateThread
                push    eax             ; hObject
                call    ds:CloseHandle
                mov     ecx, [ebp+hInstance] ; hInstance
```

```
                        call    sub_10037FC0
                        pop     ebp
                        retn    10h
ADB_Setup               endp
```

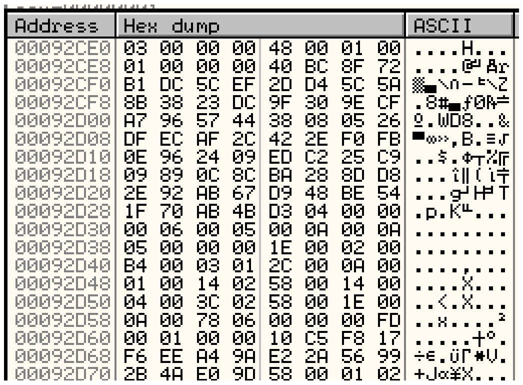
Above, we see a new thread created with the start address of Cache.dll export "ADB_Load" by the initial thread.

This exported function is passed control while the initial thread runs a Windows message loop. It first grabs an encrypted blob stored away in a global variable and pulls out 381 bytes of this encrypted data:

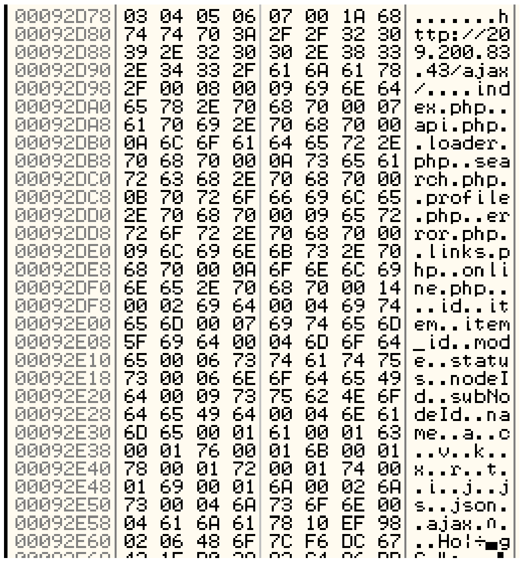


```
Address   Hex dump                 ASCII
00092CE0  8D 4D 54 5F 64 39 8E B8  ìMT_d9Ä.
00092CE8  34 7C 15 2E D4 C3 E4 D6  4¦..╘├Σ╓
00092CF0  41 A2 D4 B1 9A 87 D0 00  A.╘▒Üç╨.
00092CF8  4C 9A 7A D8 00 99 B8 73  LÜz╪...s
00092D00  80 53 94 99 70 59 DF C1  .S..pY▀┴
00092D08  CF C0 5E 85 7E C3 F7 B9  ╧└^.~├.╣
00092D10  9D A0 0C 82 08 61 36 2D  ¥....a6-
00092D18  CE 00 69 DD D2 6D 1A AE  ╬.i▌╥m.«
00092D20  8E 19 BF F7 26 FC B9 BC  Ä.┐.&ⁿ╣╝
00092D28  83 6E 79 3F 87 31 4F 81  .ny?.1O.
00092D30  68 29 4A 5F E6 E2 B0 E6  h)J_µΓ.µ
00092D38  21 7D EA E0 A4 3D F0 18  !}Ωα.=≡.
00092D40  CF 1E 34 8E 81 B6 5F 2E  ╧.4Ä.._.
00092D48  BA 73 B7 97 FD 9C BD 60  ║s..²£.`
00092D50  D7 75 FD AF EF FB 80 1F  .u²»∩√..
00092D58  56 31 BC 2B 92 2E 07 96  V1╝+....
00092D60  45 51 EE 90 39 B3 FE A4  EQε.9│■.
00092D68  39 14 76 9D 88 13 AD C9  9.v¥...╔
00092D70  54 A3 7E E4 21 9C A7 92  Tú~Σ!£º.
00092D78  0E 5E 55 BB EA 13 1D A5  .^U.Ω..Ñ
00092D80  5E 98 5E 5E 42 93 06 C0  ^.^^B..└
00092D88  DF E5 FF BA 34 8D 50 2E  ▀σ.║4ìP.
00092D90  08 1F FC 2F 82 0A 24 26  ..ⁿ/..$&
00092D98  B0 2E AC F1 DD 4F DF CB  ...±▌O▀╦
00092DA0  4A 12 63 BA 5A D7 3D 54  J.c║Z.=T
00092DA8  CC 26 66 48 36 28 1E 0B  ╠&fH6(..
00092DB0  3B FC 77 85 4B 68 25 20  ;ⁿw.Kh%
00092DB8  47 68 B1 D2 71 41 2F 6D  Gh▒╥qA/m
00092DC0  98 B6 1E 24 59 9F EA BE  ...$YƒΩ╛
00092DC8  F8 9B AF 33 00 CA 3F 5E  °.»3.╩?^
00092DD0  62 0B E7 23 1B 02 F2 E1  b.τ#..≥ß
00092DD8  6E 6E 23 50 F5 AA D3 59  nn#PJ¬╙Y
00092DE0  E0 B2 FD 44 C9 49 95 1C  α.²D╔I..
00092DE8  18 6B C1 F1 38 65 CF 58  .k┴±8e╧X
00092DF0  EC 44 23 3C 4D 05 50 57  ∞D#<M.PW
00092DF8  B1 8D 71 88 33 5A 33 2C  ▒ìq.3Z3,
00092E00  E4 2B AB 90 99 21 8F 23  Σ+...!Å#
00092E08  99 AF 32 6E 53 0D 5E D6  .»2nS.^╓
00092E10  DB E7 4D 87 78 DA 5C D1  █τM.x┌\╤
00092E18  D3 C6 88 65 C7 51 2C D4  ╙╞.e╟Q,╘
00092E20  42 F6 A5 EC 0A E6 E1 8E  B÷Ñ∞.µßÄ
00092E28  7D C8 AC 0B 4B 24 83 D4  }╚..K$.╘
00092E30  5D 94 82 56 12 AD 68 F9  ]..V..h·
00092E38  73 D9 96 FF EC A6 CF 64  s┘..∞.╧d
00092E40  78 F0 24 F1 6D 2B 80 63  x≡$±m+.c
00092E48  9F FB BE AA 6E 60 2D F9  ƒ√╛¬n`-·
00092E50  B2 4A 88 7E 89 7C 11 55  .J.~.|.U
00092E58  8A CD A4 C9 DE 10 EF 98  è═.╔▐.∩.
00092E60  02 06 48 6F 7C F6 DC 67  ..Ho|÷▄g
```

The standard win32 api CryptDecrypt uses rc4 to decrypt this blob into a hardcoded c2, url path, and url parameters listed below with a simple 140-bit key "\x8B\xFF\x55\x8B\xEC\x83\xEC\x50\xA1\x84\x18\x03\x68\x33\xC9\x66\xF7\x45\x10\xE8\x1F\x89\x45\xFC\x8B\x45\x14\x56".



```
Address   Hex dump                 ASCII
00092CE0  03 00 00 00 48 00 01 00  ....H...
00092CE8  01 00 00 00 40 BC 8F 72  ....@╝År
00092CF0  B1 DC 5C EF 2D D4 5C 5A  ▒▄\∩-╘\Z
00092CF8  8B 38 23 DC 9F 30 9E CF  .8#▄ƒ0₧╧
00092D00  A7 96 57 44 38 08 05 26  º.WD8..&
00092D08  DF EC AF 2C 42 2E F0 FB  ▀∞»,B.≡√
00092D10  0E 96 24 09 ED C2 25 C9  ..$.φ┬%╔
00092D18  09 89 0C 8C BA 28 8D D8  ...î║(ì╪
00092D20  2E 92 AB 67 D9 48 BE 54  ...g┘H╛T
00092D28  1F 70 AB 4B D3 04 00 00  .p.K╙...
00092D30  00 06 00 05 00 0A 00 0A  ........
00092D38  05 00 00 00 1E 00 02 00  ........
00092D40  B4 00 03 01 2C 00 0A 00  ....,...
00092D48  01 00 14 02 58 00 14 00  ....X...
00092D50  04 00 3C 02 58 00 1E 00  ..<.X...
00092D58  0A 00 78 06 00 00 00 FD  ..x....²
00092D60  00 01 00 00 10 C5 F8 17  .....┼°.
00092D68  F6 EE A4 9A E2 2A 56 99  ÷ε.ÜΓ*V.
00092D70  2B 4A E0 9D 58 00 01 02  +Jα¥X...
```



```
00092D78 03 04 05 06 07 00 1A 68 .......h
00092D80 74 74 70 3A 2F 2F 32 30 ttp://20
00092D88 39 2E 32 30 30 2E 38 33 9.200.83
00092D90 2E 34 33 2F 61 6A 61 78 .43/ajax
00092D98 2F 00 08 00 09 69 6E 64 /....ind
00092DA0 65 78 2E 70 68 70 00 07 ex.php..
00092DA8 61 70 69 2E 70 68 70 00 api.php.
00092DB0 0A 6C 6F 61 64 65 72 2E .loader.
00092DB8 70 68 70 00 0A 73 65 61 php..sea
00092DC0 72 63 68 2E 70 68 70 00 rch.php.
00092DC8 0B 70 72 6F 66 69 6C 65 .profile
00092DD0 2E 70 68 70 00 09 65 72 .php..er
00092DD8 72 6F 72 2E 70 68 70 00 ror.php.
00092DE0 09 6C 69 6E 6B 73 2E 70 .links.p
00092DE8 68 70 00 0A 6F 6E 6C 69 hp..onli
00092DF0 6E 65 2E 70 68 70 00 14 ne.php..
00092DF8 00 02 69 64 00 04 69 74 ..id..it
00092E00 65 6D 00 07 69 74 65 6D em..item
00092E08 5F 69 64 00 04 6D 6F 64 _id..mod
00092E10 65 00 06 73 74 61 74 75 e..statu
00092E18 73 00 06 6E 6F 64 65 49 s..nodeI
00092E20 64 00 09 73 75 62 4E 6F d..subNo
00092E28 64 65 49 64 00 04 6E 61 deId..na
00092E30 6D 65 00 01 61 00 01 63 me..a..c
00092E38 00 01 76 00 01 6B 00 01 ..v..k..
00092E40 78 00 01 72 00 01 74 00 x..r..t.
00092E48 01 69 00 01 6A 00 02 6A .i..j..j
00092E50 73 00 04 6A 73 6F 6E 00 s..json.
00092E58 04 61 6A 61 78 10 EF 98 .ajax.∩.
00092E60 02 06 48 6F 7C F6 DC 67 ..Ho|÷▄g
```

The code then decodes this set of import symbols and resolves addresses for its networking and data stealing functionality:
InternetCloseHandle
InternetReadFile
HttpSendRequestA
HttpOpenRequestA
HttpQueryInfoA
InternetConnectA
InternetCrackUrlA
InternetOpenA
InternetSetOptionW
GetAdaptersInfo

Much like the prior office monkey "atiumdag.dll" component, this code collects identifying system information using standard win32 API calls:

- Computer name - GetComputerNameW
- User name - GetUserNameW
- Adapter GUID, ip address, mac address - GetAdaptersInfo
- Windows version - GetVersionExW

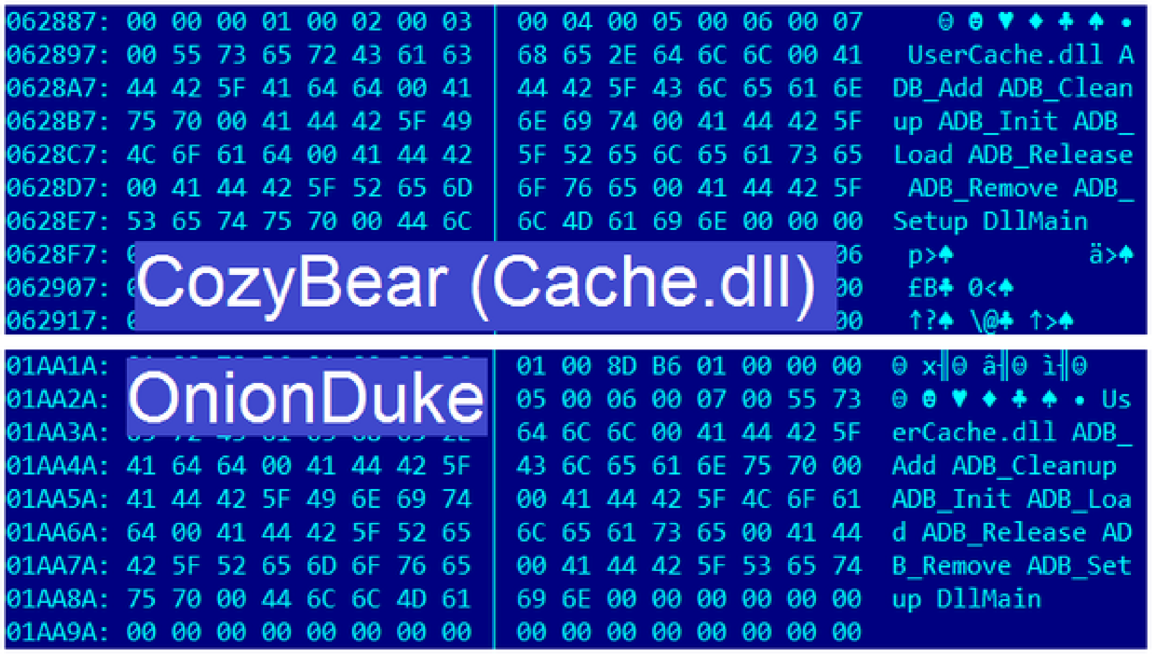
It then uses the runtime resolved networking API calls to send the collected data back to a hardcoded c2 and set of urls.

Cache.dll connectback urls:
209.200.83.43/ajax/links.php
209.200.83.43/ajax/api.php
209.200.83.43/ajax/index.php
209.200.83.43/ajax/error.php
209.200.83.43/ajax/profile.php
209.200.83.43/ajax/online.php
209.200.83.43/ajax/loader.php
209.200.83.43/ajax/search.php

Observed user-agent string on the wire, but it's dynamically generated based on the Windows system settings (retrieved using standard win32 api "ObtainUserAgentString"):
"User-Agent: Mozilla/4.0 (compatible; MSIE 6.0; Windows NT 5.1; SV1; .NET CLR 2.0.50727; .NET CLR 3.0.04506.648: .NET CLR 3.5.21022)"

Connections with MiniDuke/CosmicDuke/OnionDuke:

One of the second stage modules of Cozy Bear, Show.dll, is particularly interesting because it appears to have been built onto the same platform as OnionDuke. Below we compare Show.dll with the OnionDuke sample MD5: c8eb6040fd02d77660d19057a38ff769. Both have exactly the same export tables and appear to be called internally "UserCache.dll":



```
062887: 00 00 00 01 00 02 00 03  00 04 00 05 00 06 00 07     ☺ ☻ ♥ ♦ ♣ ♠ •
062897: 00 55 73 65 72 43 61 63  68 65 2E 64 6C 6C 00 41   UserCache.dll A
0628A7: 44 42 5F 41 64 64 00 41  44 42 5F 43 6C 65 61 6E  DB_Add ADB_Clean
0628B7: 75 70 00 41 44 42 5F 49  6E 69 74 00 41 44 42 5F  up ADB_Init ADB_
0628C7: 4C 6F 61 64 00 41 44 42  5F 52 65 6C 65 61 73 65  Load ADB_Release
0628D7: 00 41 44 42 5F 52 65 6D  6F 76 65 00 41 44 42 5F   ADB_Remove ADB_
0628E7: 53 65 74 75 70 00 44 6C  6C 4D 61 69 6E 00 00 00  Setup DllMain
0628F7:                                               06   p>♠          ä>♠
062907:                                               00   £B♣ 0<♠
062917:                                               00   ↑?♠ \@♣ ↑>♠

01AA1A:                          01 00 8D B6 01 00 00 00  ☺ x╢☺ â╢☺ ì╢☺
01AA2A:                          05 00 06 00 07 00 55 73  ☺ ☻ ♥ ♦ ♣ ♠ • Us
01AA3A:                          64 6C 6C 00 41 44 42 5F  erCache.dll ADB_
01AA4A: 41 64 64 00 41 44 42 5F  43 6C 65 61 6E 75 70 00  Add ADB_Cleanup
01AA5A: 41 44 42 5F 49 6E 69 74  00 41 44 42 5F 4C 6F 61  ADB_Init ADB_Loa
01AA6A: 64 00 41 44 42 5F 52 65  6C 65 61 73 65 00 41 44  d ADB_Release AD
01AA7A: 42 5F 52 65 6D 6F 76 65  00 41 44 42 5F 53 65 74  B_Remove ADB_Set
01AA8A: 75 70 00 44 6C 6C 4D 61  69 6E 00 00 00 00 00 00  up DllMain
01AA9A: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00
```

This seems to indicate the authors of OnionDuke and Cozy Bear are the same, or working together.

Another interesting comparison of two other files matches a recent second stage tool from the CozyDuke attacks with a second stage component from other Miniduke/Onionduke attacks.
2e0361fd73f60c76c69806205307ccac, update.dll (Miniduke), 425kb (internal name = "**UserCache.dll**")
9e3f3b5e9ece79102d257e8cf982e09e, cache.dll (Cozyduke), 425kb (internal name = "**UserCache.dll**")

The two share identical export function names in their export directories, and the naming appears to be randomly assigned at compile time. The table below presents the function matches based on size data, but the calls, jmps and code all match as well. The contents of only one of these exports in update.dll has no match whatsoever in cache.dll.

update.dll export names (Onionduke)	Code block size	cache.dll export names (Cozyduke)
ADB_Init	191 bytes	ADB_Cleanup
ADB_Cleanup	119 bytes	ADB_Init
ADB_Add	14 bytes	ADB_Release
ADB_Load	36 bytes	no comparison
ADB_Release	15 bytes	ADB_Init
ADB_Remove	44 bytes	ADB_Setup

ADB_Setup	107 bytes	ADB_Remove
DllMain	6 bytes	DllMain

Unlike the atiumdag.dll file above, however, cache.dll and update.dll do not maintain anti-AV and anti-analysis functionality sets. Perhaps they plan to pair this stealer with another dropper that maintains the WMI anti-AV functionality.

We expect ongoing and further activity from this group in the near future and variations on the malware used in previous duke-ish incidents.

For more information about MiniDuke, CosmicDuke and OnionDuke, please see References.

Appendix: Parallel and Previous Research

The MiniDuke Mystery: PDF 0-day Government Spy Assembler 0x29A Micro Backdoor, Securelist, Feb 2013

Miniduke is back: Nemesis Gemina and the Botgen Studio, Securelist, July 2014

MiniDuke 2 (CosmicDuke), CrySyS, July 2014

COSMICDUKE Cosmu with a twist of MiniDuke [pdf], F-Secure, September 2014

THE CASE OF THE MODIFIED BINARIES, Leviathan Security, October 2014

A word on CosmicDuke, Blaze's Security Blog, September 2014

OnionDuke: APT Attacks Via the Tor Network, F-Secure, November 2014

The Connections Between MiniDuke, CosmicDuke and OnionDuke, F-Secure, January 2015