WANNACRY RANSOMWARE / CRYPTOWORM

PRACTICAL MALWARE ANALYSIS & TRIAGE REPORT

PMAT Report / 2022-10-22 / straysheep-dev / v1.0

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Executive Summary

`SHA256SUM=24D004A104D4D54034DBCFFC2A4B19A11F39008A575AA614EA04703480B1022C`

WannaCry is a 32-bit Windows executable that encrypts all user data on the machine when executed. It then attempts to infect other machines on both the local network and public internet, finally displaying a prompt demanding payment in the form of bitcoin to recover from the infection.

EFFECTIVE RISK

At the time of writing it's well known that the domain contacted as part of the killswitch routine has been registered as a sinkhole in an effort to slow the spread of infection, and that MS17-010, Eternal Blue, is used to spread the infection.

- If the killswitch domain serves a valid HTTP response, infection is mitigated.
- If Windows Defender is enabled and updated on the endpoint, infection is mitigated.
- If the endpoint lacks privileges to write system files & services, infection is mitigated.

SCOPE OF INFECTION

Administrative accounts and endpoints with higher privileges are the point of infection.

Once infection occurs, non-administrative accounts and other un-patched Windows machines on the network can become infected.

Technical Summary

1. An initial DNS query + HTTP request is made to:

`[hxxp://] www [dot] iuqerfsodp9ifjaposdfjhgosurijfaewrwergwea [dot] com /`

If the request succeeds with a valid response, it terminates and the host is not infected.

If the HTTP request fails, it continues.

2. The *first* system service is created for persistence and propagation:

   `DisplayName:` Microsoft Security Center (2.0) Service

   `Path:` `HKLM\System\CurrentControlSet\Services\mssecsvc2.0`

   `ImagePath:` `C:\Path\To\wannacry.exe -m security`

If the `mssecsvc2.0` service fails to be created, it exits.

If `mssecsvc2.0` is created, it continues.

3. `C:\Windows\tasksche.exe` is created and executed with `/i`.
4. `tasksche.exe` unpacks utilities to `C:\ProgramData\<random-string>\`

5. The *second* system service is created to kick off the infection:

   `DisplayName:` <random-string>

   `Path:` `HKLM\System\CurrentControlSet\Services\<random-string>`

   `ImagePath:` `cmd.exe /C “C:\ProgramData\<random-string>\tasksche.exe”`

6. From within `C:\ProgramData\<random-string>\` the following is executed:
   a. `attrib +h .` to hide the directory
   b. `icacls.exe . /grant Everyone:F /T /C /Q`

c. `taskdl.exe` is executed
    i. `Note: taskdl.exe's OriginalFilename: cliconfg.exe`
d. `C:\Windows\System32\cmd.exe /c 269581666413478.bat`
e. Then `269581666413478.bat` executes:
    i. `cscript.exe //nologo m.vbs`
f. `@WanaDecryptor@.exe co` then executes:
    i. `.\Taskdata\Tor\taskhsvc.exe`
    ii. `Note: @WanaDecryptor@.exe's OriginalFilename: LODCTR.EXE`
g. `Cmd.exe /c start /b @WanaDecryptor@.exe vs` is executed

7. Next, `cmd.exe /c vssadmin delete shadows /all /quiet & wmic shadowcopy delete & bcedit /set {default} bootstatuspolicy ignoreallfailures & bcedit /set {default} recoveryenabled no & wbadmin delete catalog -quiet` is executed

8. Lastly `cmd.exe /c` is once again used to execute `reg add HKLM\SOFTWARE\Microsoft\Windows\CurrentVersion\Run /v "<random-string>" /t REG_SZ /d "\"C:\ProgramData\<random-string>\tasksche.exe\"" /f`

From this point on, the following two commands can be seen running in a loop:

1. `taskdl.exe`
2. `taskse.exe C:\ProgramData\<random-string>\@WanaDecryptor@.exe`

- `Autoruns64.exe` also shows `<random-string>` exists under `HKLM\SOFTWARE\Wow6432Node\Microsoft\Windows\CurrentVersion\Run`
- The main binary attempts to spread over TCP port 445 using MS17-010, Eternal Blue
- Files are encrypted and renamed with an extension of `.WNCRY`
- A prompt is repeatedly displayed as the foreground window, demanding payment

Dynamic Analysis

WannaCry's behavior can be broken into two parts, initial infection, and post infection.

INITIAL INFECTION

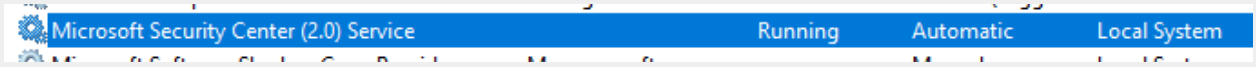
Attempts an HTTP GET request to:

`[hxxp://] www [dot] iuqerfsodp9ifjaposdfjhgosurijfaewrwergwea [dot] com /`

```
TCP      54 80 → 49826 [ACK] Seq=249 Ack=114 Win=64128 Len=0
DNS     109 Standard query 0xe71b A www.iuqerfsodp9ifjaposdfjhgosurijfaewrwergwea.com
DNS     125 Standard query response 0xe71b A www.iuqerfsodp9ifjaposdfjhgosurijfaewrwergw
TCP      66 49827 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM
TCP      66 80 → 49827 [SYN, ACK] Seq=0 Ack=1 Win=64240 Len=0 MSS=1460 SACK_PERM WS=128
TCP      60 49827 → 80 [ACK] Seq=1 Ack=1 Win=262144 Len=0
HTTP    154 GET / HTTP/1.1
TCP      54 80 → 49827 [ACK] Seq=1 Ack=101 Win=64256 Len=0
```

If a response is returned, it stops and exits. If the request fails, it continues execution.

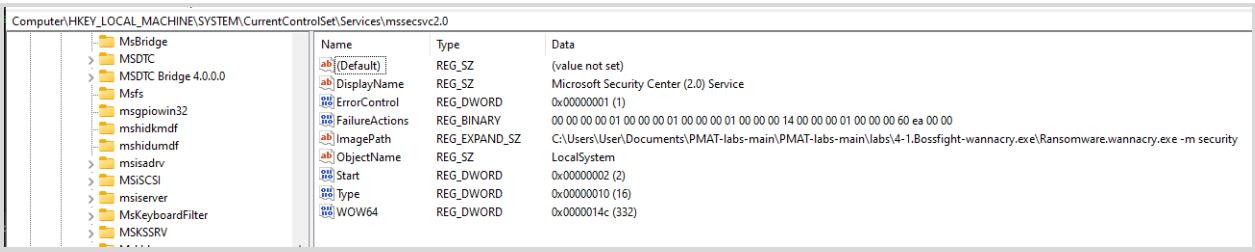
A system service named Microsoft Security Center (2.0) Service (`mssecsvc2.0`) is created.



`Path: HKLM\System\CurrentControlSet\Services\mssecsvc2.0`

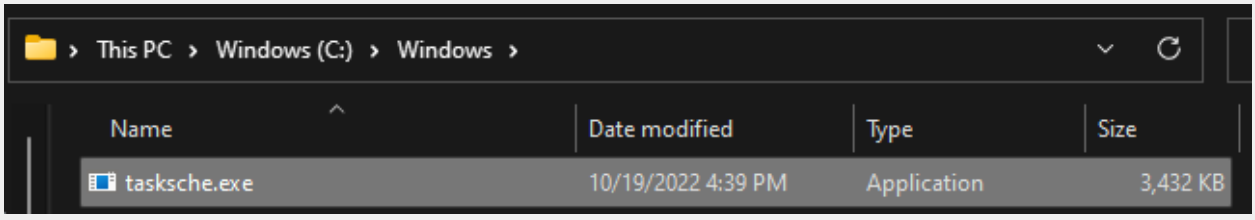
➥ `ImagePath: C:\Path\To\wannacry.exe -m security`

If the service cannot be created, it exits.



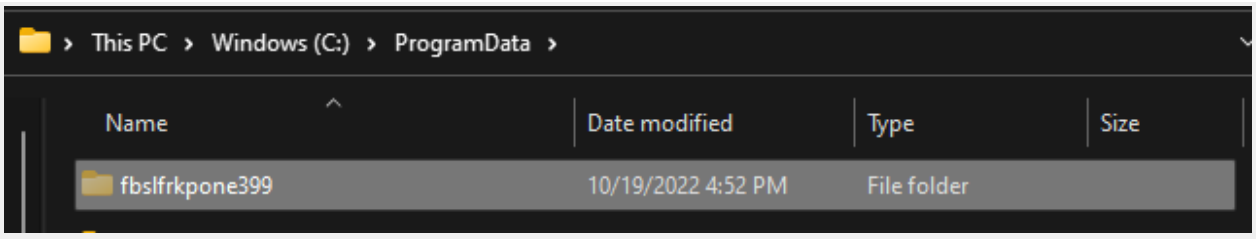
`mssecsvc2.0` will run the main wannacry binary with the `-m security` argument

`C:\Windows\tasksche.exe` is created.

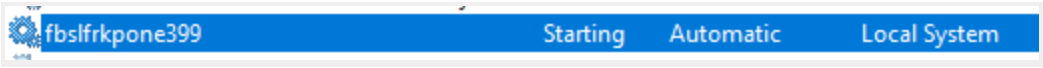


`C:\Windows\tasksche.exe` is executed and unpacks utilities to a hidden directory:

➥ `Path: C:\ProgramData\<random-string>\`

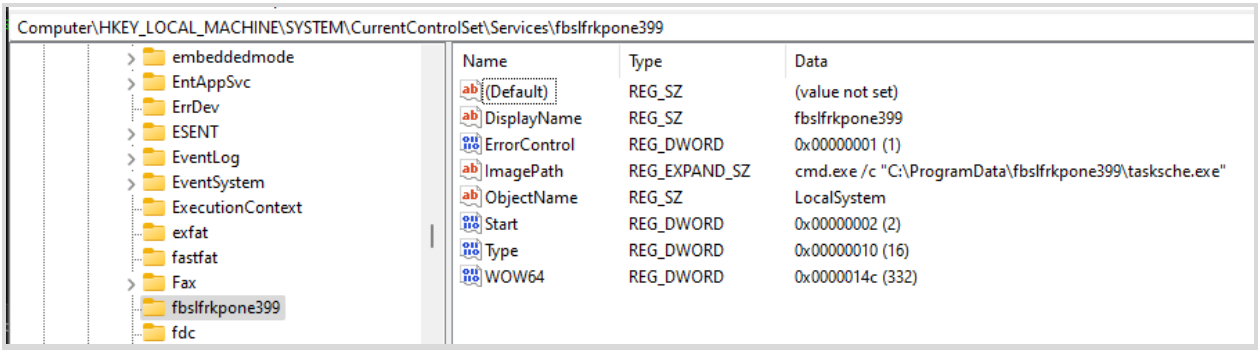


An additional service named after the `<random-string>` is created.



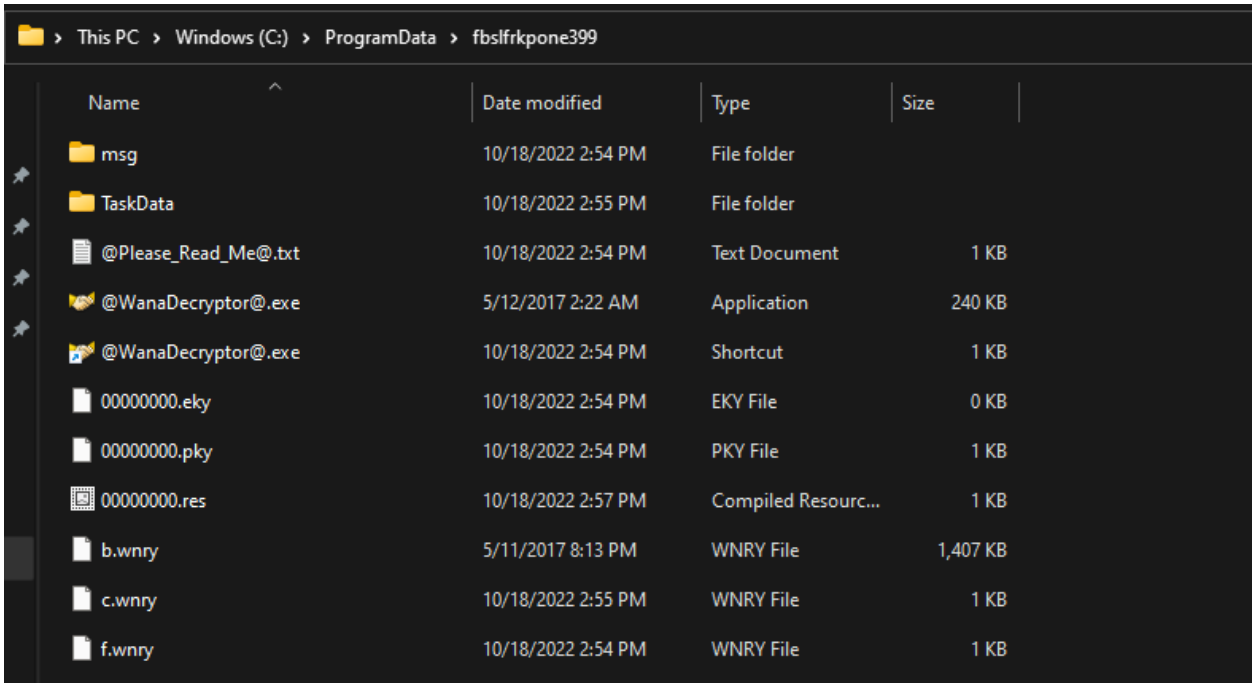
`Path: HKLM\System\CurrentControlSet\Services\<random-string>`

➥ `ImagePath: cmd.exe /C “C:\ProgramData\<random-string>\tasksche.exe”`



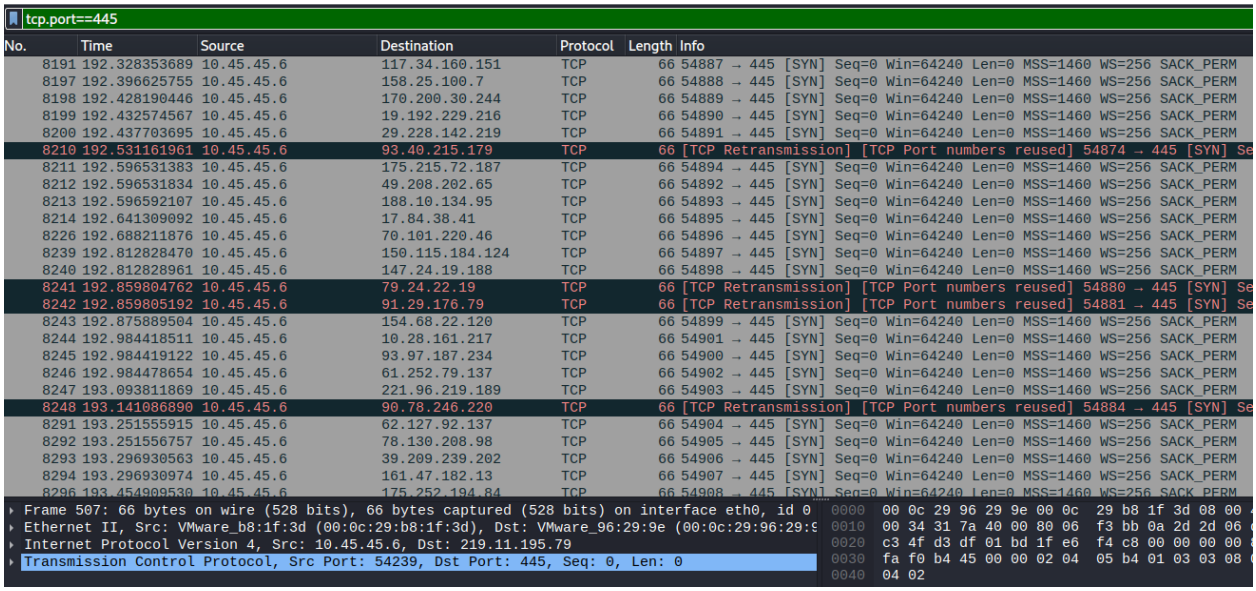
```
TimeCreated  : 10/18/2022 3:04:24 PM
ProviderName : Microsoft-Windows-Sysmon
Id           : 11
Message      : File created:
               RuleName: EXE
               UtcTime: 2022-10-18 22:04:24.438
               ProcessGuid: {f75684c1-22e8-634f-2b01-000000001600}
               Image: C:\WINDOWS\tasksche.exe
               TargetFilename: C:\ProgramData\fbslfrkpone399\tasksche.exe
               CreationUtcTime: 2022-10-18 22:04:24.438
               User: WINDEV2209EVAL\User

TimeCreated  : 10/18/2022 3:04:24 PM
ProviderName : Microsoft-Windows-Sysmon
Id           : 13
Message      : Registry value set:
               RuleName: T1031,T1050
               EventType: SetValue
               UtcTime: 2022-10-18 22:04:24.454
               ProcessGuid: {f75684c1-627f-634e-0c00-000000001600}
               Image: C:\Windows\system32\services.exe
               TargetObject: HKLM\System\CurrentControlSet\Services\fbslfrkpone399\Start
               Details: DWORD (0x00000002)
               User: NT AUTHORITY\SYSTEM

TimeCreated  : 10/18/2022 3:04:24 PM
ProviderName : Microsoft-Windows-Sysmon
Id           : 13
Message      : Registry value set:
               RuleName: T1031,T1050
               EventType: SetValue
               UtcTime: 2022-10-18 22:04:24.454
               ProcessGuid: {f75684c1-627f-634e-0c00-000000001600}
               Image: C:\Windows\system32\services.exe
               TargetObject: HKLM\System\CurrentControlSet\Services\fbslfrkpone399\ImagePath
               Details: cmd.exe /c "C:\ProgramData\fbslfrkpone399\tasksche.exe"
```

Sysmon followed the `<random-string>` service binary being unpacked and starting.



Screenshot of the utilities unpacked to the ProgramData directory.

SMB traffic will flood the network, attempting to reach numerous private and public IP's over TCP port 445. If a connection can be established, the Eternal Blue exploit, MS17-010 is sent as a payload to spread the infection.



Traffic leaving an infected host targeting TCP destination port 445

At just over 56 minutes the infected machine attempted to reach over 83,500 hosts.

Note that even if Windows Defender is able to stop the file encryption routine on the host, **this propagation mechanism still runs successfully in the background** as a separate process of the main `wannacry.exe` binary with the `-m security` argument.

It's assumed target IP's are generated at random based on the string `%d.%d.%d.%d`.

Tor connections are also made *to* hosts on port `9001` and `9101`:

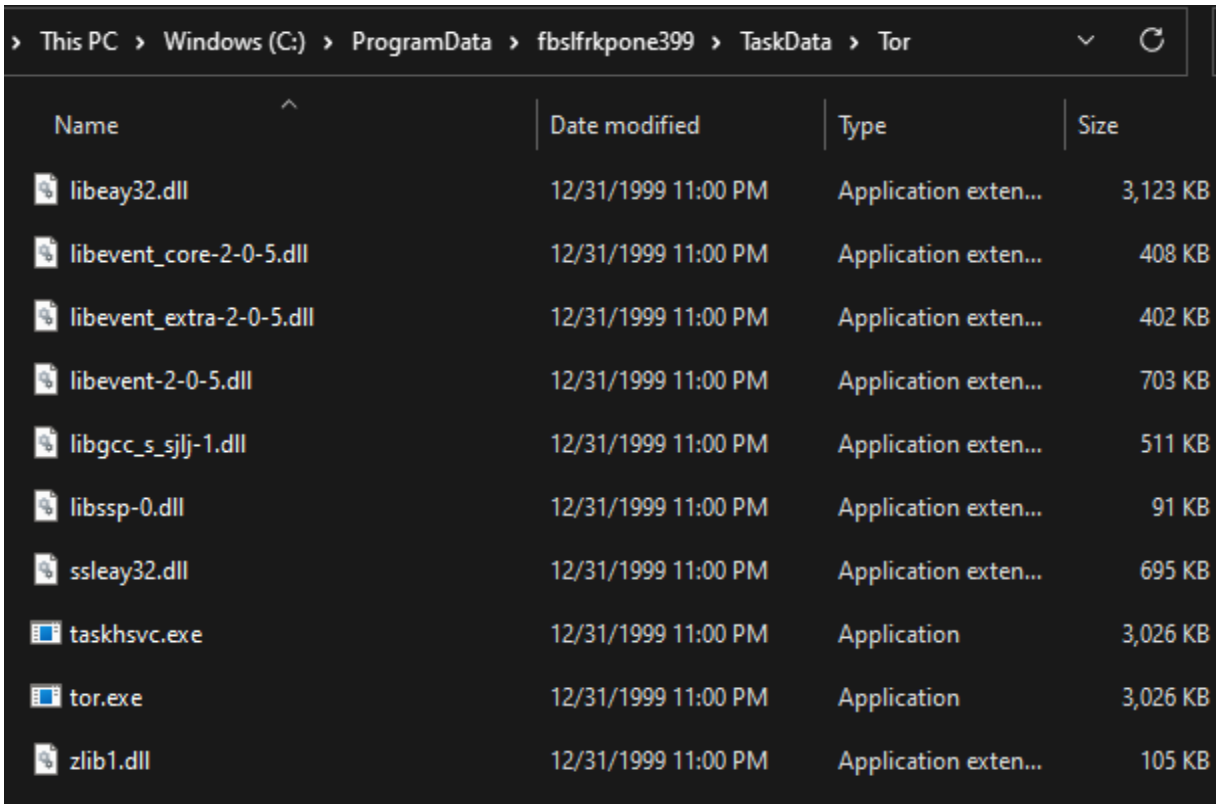
Ethernet · 1 | IPv4 · 3 | IPv6 | TCP · 3 | UDP

Address A	Port A	Address B	Port B	Packets	Bytes	Stream ID	Total Packets	Percent Filtered	Packets A → B	Bytes A → B	Packets A → B	Bytes B → A
10.45.45.6	57875	62.210.92.11	9001	5	330 bytes	7863	5	100.00%	5	330 bytes	0	0 bytes
10.45.45.6	59883	78.24.75.53	9001	5	330 bytes	9125	5	100.00%	5	330 bytes	0	0 bytes
10.45.45.6	62064	128.31.0.39	9101	5	330 bytes	15212	5	100.00%	5	330 bytes	0	0 bytes

While a local proxy is started and *listening* on `127.0.0.1:9050`:

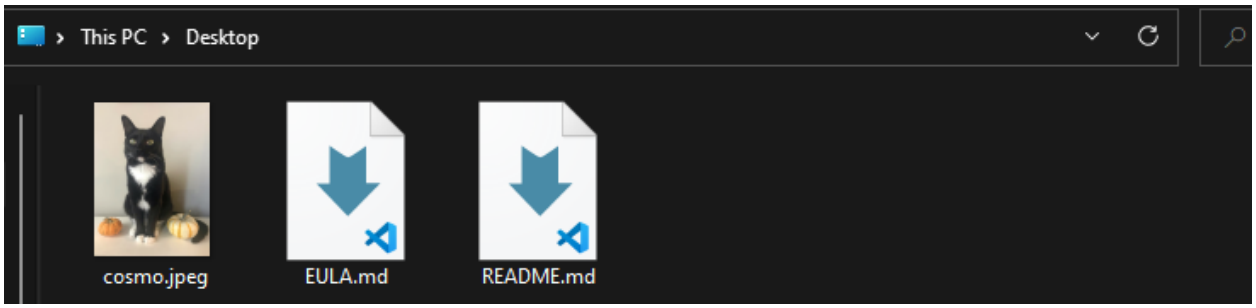
Process Name	Process ID	Protocol	State	Local Address	Local Port	Remote Address	Remote Port	Create Time	Module Name
taskhsvc.exe	9264	TCP	Listen	127.0.0.1	9050	0.0.0.0	0	10/19/2022 5:26:46 PM	taskhsvc.exe
taskhsvc.exe	9264	TCP	Established	127.0.0.1	9050	127.0.0.1	49842	10/19/2022 5:27:20 PM	taskhsvc.exe
[Time Wait]		TCP	Time Wait	127.0.0.1	49841	127.0.0.1	9050		
@WanaDecryptor@.exe	8744	TCP	Established	127.0.0.1	49842	127.0.0.1	9050	10/19/2022 5:27:20 PM	@WanaDecryptor@.exe

Tor is also included within the set of utilities under ProgramData:

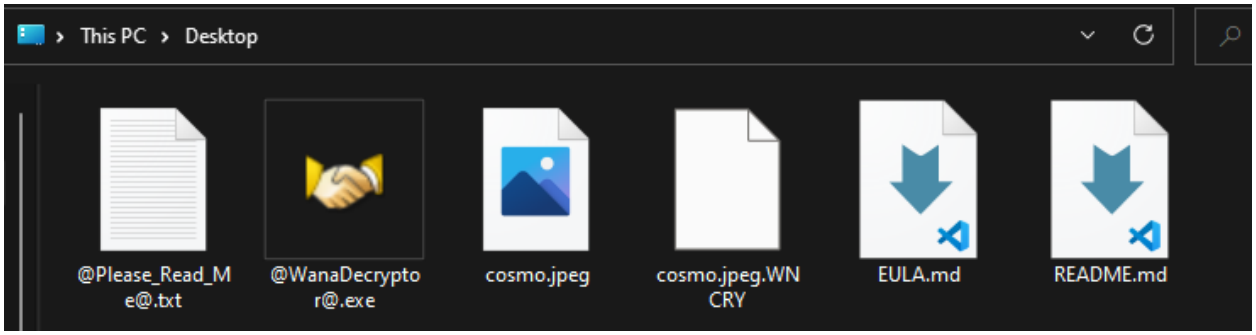


Tor binaries and libraries

The visual indicators are the most obvious, starting with all user files being encrypted:



↓ ↓ ↓



This is followed by the wallpaper and payment prompt:

All user files available to the host have the `.WNCRY` extension appended at this point.

POST INFECTION

WannaCry does not encrypt file extensions it does not know about.

- This was first observed when `.yar` YARA rule files were not encrypted after infection
- This was tested on various valid and invalid file extensions, which proved to survive
- During static analysis, strings were discovered that match common file extensions
- The entire list of target file extensions for encryption is included in the Appendices
- It's assumed this is how WannaCry determines what to encrypt without breaking the operating system

WannaCry may flood (depending on your configuration), but does not encrypt logs.

- A sample of possible hunting queries is included in the IOC & YARA section
- A list of suspicious log entries is available in the Appendices

Review of the logs after infection revealed a few additional noteworthy points.

- WannaCry runs `vssadmin delete shadows /all`, a common ransomware TTP
- `C:\Windows\tasksche.exe /i` is run, noting the `/i` argument
- A file named `C:\ProgramData\<random-string>\203341666389597.bat` is executed
- `C:\ProgramData\<random-string>\m.vbs` is run with `cscript.exe //nologo m.vbs`

Static Analysis

`SHA256SUM=24D004A104D4D54034DBCFFC2A4B19A11F39008A575AA614EA04703480B1022C`

VirusTotal Score (67/72)

```
Md5         db349b97c37d22f5ea1d1841e3c89eb4

Sha1        e889544aff85ffaf8b0d0da705105dee7c97fe26

Sha256      24d004a104d4d54034dbcffc2a4b19a11f39008a575aa614ea04703480b1022c

File-size   3723264 bytes

Entropy     7.964

Cpu         32-bit

Original Filename: lhdfrgui.exe
```

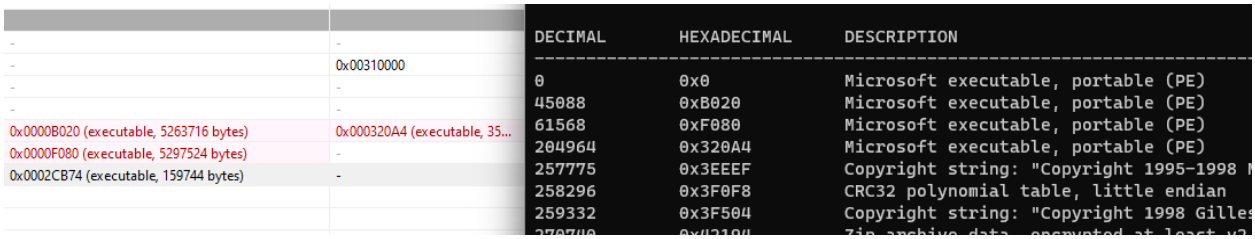
Interesting strings extracted with `floss.exe`:

```
\\%s\IPC$
Microsoft Base Cryptographic Provider v1.0
%d.%d.%d.%d
mssecsvc2.0
Microsoft Security Center (2.0) Service
%s -m security
C:\%s\qeriuwjhrf
C:\%s\%s
WINDOWS
tasksche.exe
CloseHandle
WriteFile
CreateFileA
CreateProcessA
http://www.iuqerfsodp9ifjaposdfjhgosurijfaewrwergwea.com
!This program cannot be run in DOS mode.
```

Specific strings and signatures are provided under IOC & YARA Rules and the Appendices

BINARY COMPOSITION

`pestudio.exe` shows multiple executables embedded which we can confirm with `binwalk`:



List of interesting imported functions and their use, picked up by `pestudio.exe`:

advapi32.dll

11 Total Imported Functions

ChangeServiceConfig2A | Changes the optional configuration parameters of a service

CreateServiceA | Creates a service object,adds it to a specified service control manager database

CryptAcquireContextA | Used to acquire a handle to a particular key container

CryptGenRandom | Fills a buffer with cryptographically random bytes

StartServiceCtrlDispatcherA | Connects the main thread of a service process to the service control manager

iphlpapi.dll

2 Total Imported Functions

GetAdaptersInfo | retrieves adapter information for the local computer

kernel32.dll

32 Total Imported Functions

GetCurrentThread | Retrieves a pseudo handle for the calling thread

GetCurrentThreadId | Retrieves the thread identifier of the calling thread

MoveFileExA | Moves an existing file or directory, including its children

QueryPerformanceFrequency | Retrieves the frequency of the performance counter. The frequency of the performance counter is fixed at system boot and is consistent across all processors

msvcrt.dll

28 Total Imported Functions

rand | Generates a pseudorandom number

srand | Sets the starting seed value for the pseudorandom number generator used by the rand function

wininet.dll

3 Total Imported Functions

InternetCloseHandle | Closes a single Internet handle

InternetOpenA | Initializes an application's use of the WinINet functions

InternetOpenUrlA | Opens a resource specified by a complete FTP or HTTP URL

ws2_32.dll

13 Total Imported Functions

10 (ioctlsocket) | controls the I/O mode of a socket

11 (inet_addr) | converts a string containing an IPv4 dotted-decimal address into a proper address for the IN_ADDR structure

115 (WSAStartup) | Initiates use of the Winsock DLL by a process

12 (inet_ntoa) | Converts an (Ipv4) Internet network address into an ASCII string

14 (ntohl) | Converts a u_long from TCP/IP network order to host byte order

16 (recv) | Receives data from a connected socket or a bound connectionless socket

18 (select) | Determines the status of one or more sockets to perform synchronous I/O

19 (send) | Sends data on a connected socket

23 (socket) | Creates a socket that is bound to a specific transport service provider

3 (closesocket) | Closes an existing socket

4 (connect) | Establishes a connection to a specified socket

8 (htonl) | Converts a u_long from host to TCP/IP network byte order

9 (htons) | Converts a u_short from host to TCP/IP network byte order

DECOMPILED MAIN FUNCTION

The main() function decompiled in Cutter shows the killswitch using InternetOpenUrlA + InternetCloseHandle to obtain the exit code of its HTTP request.

Decompiler (main)

```
#include <stdint.h>

int32_t main (void) {
    int32_t var_14h;
    int32_t var_8h;
    int32_t var_41h;
    int32_t var_45h;
    int32_t var_49h;
    int32_t var_4dh;
    int32_t var_51h;
    int32_t var_55h;
    int32_t var_6bh;
    ecx = 0xe;
    esi = "http://www.iuqerfsodp9ifjaposdfjhgosurijfaewrwergwea.com";
    edi = &var_8h;
    eax = 0;
    do {
        *(es:edi) = *(esi);
        ecx--;
        esi += 4;
        es:edi += 4;
    } while (ecx != 0);
    *(es:edi) = *(esi);
    esi++;
    es:edi++;
    eax = InternetOpenA (eax, 1, eax, eax, eax, eax, eax, eax, ax, al);
    ecx = &var_14h;
    esi = eax;
    eax = InternetOpenUrlA (esi, ecx, 0, 0, 0x84000000, 0);
    edi = eax;
    esi = imp.InternetCloseHandle;
    if (edi == 0) {
        void (*esi)() ();
        void (*esi)(uint32_t) (0);
        eax = fcn_00408090 ();
        eax = 0;
        return eax;
    }
    void (*esi)() ();
    eax = void (*esi)(uint32_t) (edi);
    eax = 0;
    return eax;
}
```

Jumping back to the graph view, we can see the `test edi, edi` where it will either terminate and exit (if it receives a valid response from its HTTP request) or continue execution into `fcn.00408090` if the GET request fails.

Killswitch at the bottom of the main() function

BINWALK

`binwalk` reveals multiple Windows executables within the main binary:

```
DECIMAL       HEXADECIMAL     DESCRIPTION
--------------------------------------------------------------------------------
0             0x0             Microsoft executable, portable (PE)
45088         0xB020          Microsoft executable, portable (PE)
61568         0xF080          Microsoft executable, portable (PE)
204964        0x320A4         Microsoft executable, portable (PE)
257775        0x3EEEF         Copyright string: "Copyright 1995-1998 Mark Adler "
258296        0x3F0F8         CRC32 polynomial table, little endian
259332        0x3F504         Copyright string: "Copyright 1998 Gilles Vollant "
270740        0x42194         Zip archive data, encrypted at least v2.0 to extract, compressed siz
284940        0x4590C         Zip archive data, encrypted at least v2.0 to extract, compressed siz
285153        0x459E1         Zip archive data, encrypted at least v2.0 to extract, compressed siz
294607        0x47ECF         Zip archive data, encrypted at least v2.0 to extract, compressed siz
305712        0x4AA30         Zip archive data, encrypted at least v2.0 to extract, compressed siz
317407        0x4D7DF         Zip archive data, encrypted at least v2.0 to extract, compressed siz
```

There also are a number of zip archives embedded. Extracting one of them we can see what files it contains, however the contents are password protected:

```
    36973  2010-11-20 04:16   msg/m_english.wnry
    37580  2010-11-20 04:16   msg/m_filipino.wnry
    38377  2010-11-20 04:16   msg/m_finnish.wnry
    38437  2010-11-20 04:16   msg/m_french.wnry
    37181  2010-11-20 04:16   msg/m_german.wnry
    49044  2010-11-20 04:16   msg/m_greek.wnry
    37196  2010-11-20 04:16   msg/m_indonesian.wnry
    36883  2010-11-20 04:16   msg/m_italian.wnry
    81844  2010-11-20 04:16   msg/m_japanese.wnry
    91501  2010-11-20 04:16   msg/m_korean.wnry
    41169  2010-11-20 04:16   msg/m_latvian.wnry
    37577  2010-11-20 04:16   msg/m_norwegian.wnry
    39896  2010-11-20 04:16   msg/m_polish.wnry
    37917  2010-11-20 04:16   msg/m_portuguese.wnry
    52161  2010-11-20 04:16   msg/m_romanian.wnry
    47108  2010-11-20 04:16   msg/m_russian.wnry
    41391  2010-11-20 04:16   msg/m_slovak.wnry
    37381  2010-11-20 04:16   msg/m_spanish.wnry
    38483  2010-11-20 04:16   msg/m_swedish.wnry
    42582  2010-11-20 04:16   msg/m_turkish.wnry
    93778  2010-11-20 04:16   msg/m_vietnamese.wnry
      864  2017-05-11 15:59   r.wnry
  3038286  2017-05-09 16:58   s.wnry
    65816  2017-05-12 02:22   t.wnry
    20480  2017-05-12 02:22   taskdl.exe
    20480  2017-05-12 02:22   taskse.exe
   245760  2017-05-12 02:22   u.wnry
---------                     -------
  6162177                     36 files
```

DEBUGGING

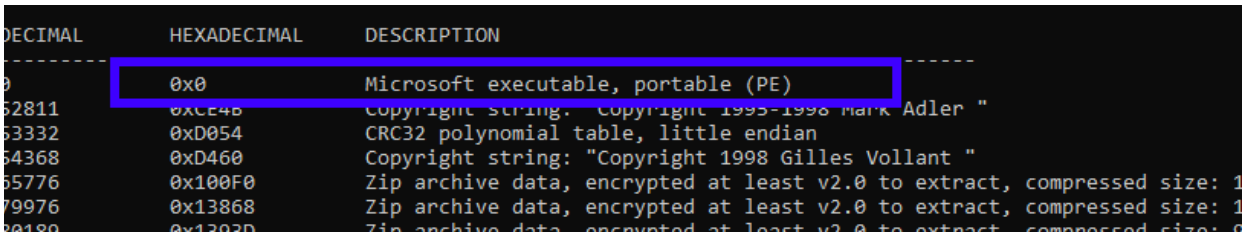
Recursively extracting the embedded binaries doesn't immediately lead to `tasksche.exe`.

The binary at `320A4` contains the main ransomware routine and attempts a tor connection, but has no services, utilities, propagation, or persistence mechanisms.

Rather than bruteforcing the zip file passwords and continuing to extract binaries, we turn to running WannaCry in a debugger. Shortly after the killswitch routine fails, it writes `HKLM\System\CurrentControlSet\Services\mssecsvc2.0` and `C:\Windows\tasksche.exe` to disk, then exits.

Here you'll need to prevent tasksche.exe from starting its services. Defender can do this.

`binwalk C:\Windows\tasksche.exe` once again reveals similar output, but this time with only one PE file embedded:



Now attaching `tasksche.exe` to a debugger, looking at strings across all modules we see a reference to `CryptGenKey`:

Extracting the decryption key from memory is beyond the scope of this analysis, but placing a breakpoint on `CryptGenKey` may be a good starting point to finding the private key(s).

WannaCry appears to have an anti-debugging mechanism. Writing `C:\Windows\tasksche.exe` to disk and kicking off the `<random-string>` service essentially happen simultaneously, separated by milliseconds. This won't occur unless WannaCry is executing at normal speed, (holding down F7 to step through quickly). Until it detects it's executing "normally", it will continue looping over the same routine.

For these reasons, further analysis will be required to fully unpack the malware’s components, as well as potentially recover the decryption key(s) from memory.

IOC & YARA

The following points are the best indicators of compromise, to quickly identify infection:

NETWORK

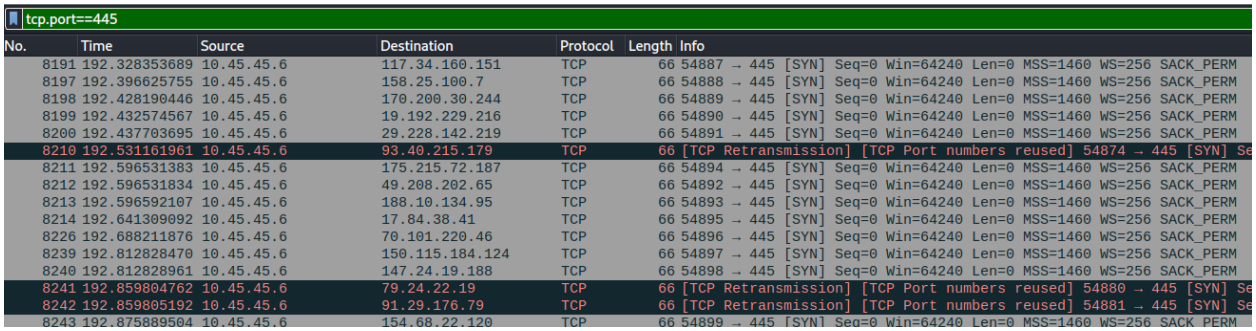
1. DNS A record query for:

`www [dot] iuqerfsodp9ifjaposdfjhgosurijfaewrwergwea [dot] com`

2. HTTP GET request to:

`[hxxp://] www [dot] iuqerfsodp9ifjaposdfjhgosurijfaewrwergwea [dot] com /`

3. TCP port 445 connection attempts to public IP addresses flooding the network:



HOST

4. `C:\Windows\tasksche.exe` was created
5. A system service named Microsoft Security Center (2.0) Service (`mssecsvc2.0`) exists

   `Path: HKLM\System\CurrentControlSet\Services\mssecsvc2.0`

6. `HKLM\SOFTWARE\Wow6432Node\Microsoft\Windows\CurrentVersion\Run\` has an entry for `<random-string>`
7. A hidden folder `C:\ProgramData\<random-string>\` was created
8. CLI logs for: `vssadmin delete shadows /all /quiet & wmic shadowcopy delete`
9. The visual GUI indicators (wallpaper and payment prompt)

HUNTING QUERIES

WannaCry may flood the logs, but as mentioned in post infection it does not encrypt them.

A list of suspicious log entries generated is included in the Appendices.

These queries try to make the assumption that file, service, or argument names may later be obfuscated in a future version, and try to match on unique CLI and LOLBAS strings.

DNS requests (`Sysmon Event Id='22', Property=4`):

```
$query = 'iuqerfsodp9ifjaposdfjhgosurijfaewrwergwea'
```

```
$query = '\w{20,}'
```

Suspicious command line arguments (`Sysmon Event Id='1', Property=10`):

```
$query = 'attrib(.exe)?\s+\+h\s+\.'
```

```
$query = 'icacls(.exe)?\s+\.\s+/grant\s+Everyone:F\s+/T\s+/C\s+/Q'
```

```
$query = 'vssadmin\s+delete\s+shadows'
```

```
$query = 'wmic\s+shadowcopy\s+delete'
```

```
$query = '-\w\s+security'
```

Suspicious File Creation (`Sysmon Event Id='11', Property=5`):

```
$query = '\w.vbs'
```

```
$query = '\d+.bat'
```

YARA RULE

The following YARA rule file was developed in efforts to precisely detect this version of the sample. Ideally you can run this like a threat hunting query recursively on a file system and only match on this sample. It's designed to match on either *the sha256sum*, or a number of *specific strings this sample contains*. A link to the rule file is included in the appendices below.

```
import "hash"
import "pe"

rule wannacry_ransomware {
    meta:
        last_updated = "2022-10-20"
        author = "straysheep-dev"
        description = "WannaCry ransomware 2017-05-12"
    strings:
        $string1 = "iuqerfsodp9ifjaposdfjhgosurijfaewrwergwea" ascii
        $string2 = "C:\\%s\\qeriuwjhrf" ascii
        $string3 = "%s -m security" ascii
        $string4 = "lhdfrgui.exe" wide
        $string5 = "115p7UMMngoj1pMvkpHijcRdfJNXj6LrLn" ascii
        $string6 = "12t9YDPgwueZ9NyMgw519p7AA8isjr6SMw" ascii
        $string7 = "13AM4VW2dhxYgXeQepoHkHSQuy6NgaEb94" ascii
    condition:
        hash.sha256(0, filesize) ==
"24d004a104d4d54034dbcffc2a4b19a11f39008a575aa614ea04703480b1022c" or
        pe.is_pe and
        $string1 and
        $string2 and
        $string3 and
        $string4 and
        $string5 and
        $string6 and
        $string7
}
```

Appendices

LINKS

Public link to the YARA rule:

https://github.com/straysheep-dev/malware-analysis/blob/main/wannacry-20170512.yar

VirusTotal submission for this sample:

https://www.virustotal.com/gui/file/24d004a104d4d54034dbcffc2a4b19a11f39008a575aa614ea04703480b1022c

Microsoft Security Bulletin MS17-010 - Critical:

https://learn.microsoft.com/en-us/security-updates/SecurityBulletins/2017/ms17-010

Relevant CVE's:

https://www.cve.org/CVERecord?id=CVE-2017-0143

https://www.cve.org/CVERecord?id=CVE-2017-0144

https://www.cve.org/CVERecord?id=CVE-2017-0145

https://www.cve.org/CVERecord?id=CVE-2017-0146

https://www.cve.org/CVERecord?id=CVE-2017-0147

https://www.cve.org/CVERecord?id=CVE-2017-0148

TARGET FILE EXTENSIONS

The list of file extensions targeted for encryption, this was extracted from the main binary.

.123	.3dm	.3ds	.3g2	.3gp	.602	.accdb	.aes	.ARC	.asc
.asf	.asm	.asp	.avi	.backup	.bak	.bat	.bmp	.brd	.bz2
.cgm	.class	.cmd	.cpp	.crt	.csr	.csv	.dbf	.dch	.der
.dif	.dip	.djvu	.doc	.docb	.docm	.docx	.dot	.dotm	.dotx
.dwg	.edb	.eml	.fla	.flv	.frm	.gif	.gpg	.hwp	.ibd
.iso	.jar	.java	.jpeg	.jpg	.jsp	.key	.lay	.lay6	.ldf
.m3u	.m4u	.max	.mdb	.mdf	.mid	.mkv	.mml	.mov	.mp3
.mp4	.mpeg	.mpg	.msg	.myd	.myi	.nef	.odb	.odg	.odp
.ods	.odt	.onetoc2	.ost	.otg	.otp	.ots	.ott	.p12	.PAQ
.pas	.pdf	.pem	.pfx	.php	.png	.pot	.potm	.potx	.ppam
.pps	.ppsm	.ppsx	.ppt	.pptm	.pptx	.ps1	.psd	.pst	.rar
.raw	.rtf	.sch	.sldm	.sldx	.slk	.sln	.snt	.sql	.sqlite3
.sqlitedb	.stc	.std	.sti	.stw	.suo	.svg	.swf	.sxc	.sxd
.sxi	.sxm	.sxw	.tar	.tbk	.tgz	.tif	.tiff	.txt	.uop
.uot	.vbs	.vcd	.vdi	.vmdk	.vmx	.vob	.vsd	.vsdx	.wav
.wb2	.wk1	.wks	.wma	.wmv	.xlc	.xlm	.xls	.xlsb	.xlsm
.xlsx	.xlt	.xltm	.xltx	.xlw	.zip				

SUSPICIOUS LOG ENTRIES

```
"C:\Users\User\Documents\Ransomware.wannacry.exe"

C:\Users\User\Documents\Ransomware.wannacry.exe -m security

C:\WINDOWS\tasksche.exe /i

cmd.exe /c "C:\ProgramData\fbslfrkpone399\tasksche.exe"

C:\ProgramData\fbslfrkpone399\tasksche.exe

attrib +h .

icacls . /grant Everyone:F /T /C /Q

taskdl.exe

C:\Windows\system32\cmd.exe /c 269581666413478.bat

cscript.exe  //nologo m.vbs

taskdl.exe

@WanaDecryptor@.exe co

cmd.exe /c start /b @WanaDecryptor@.exe vs

@WanaDecryptor@.exe  vs

TaskData\Tor\taskhsvc.exe

cmd.exe /c vssadmin delete shadows /all /quiet & wmic shadowcopy delete &
bcdedit /set {default} bootstatuspolicy ignoreallfailures & bcdedit /set
{default} recoveryenabled no & wbadmin delete catalog -quiet

taskse.exe C:\ProgramData\fbslfrkpone399\@WanaDecryptor@.exe

cmd.exe /c reg add HKLM\SOFTWARE\Microsoft\Windows\CurrentVersion\Run /v
"fbslfrkpone399" /t REG_SZ /d "\"C:\ProgramData\fbslfrkpone399
\tasksche.exe\"" /f

taskdl.exe

taskse.exe C:\ProgramData\fbslfrkpone399\@WanaDecryptor@.exe

"C:\ProgramData\fbslfrkpone399\@WanaDecryptor@.exe"
```

CLI captured by Sysmon, then sorted manually. Displayed chronologically, earliest entry at the top.