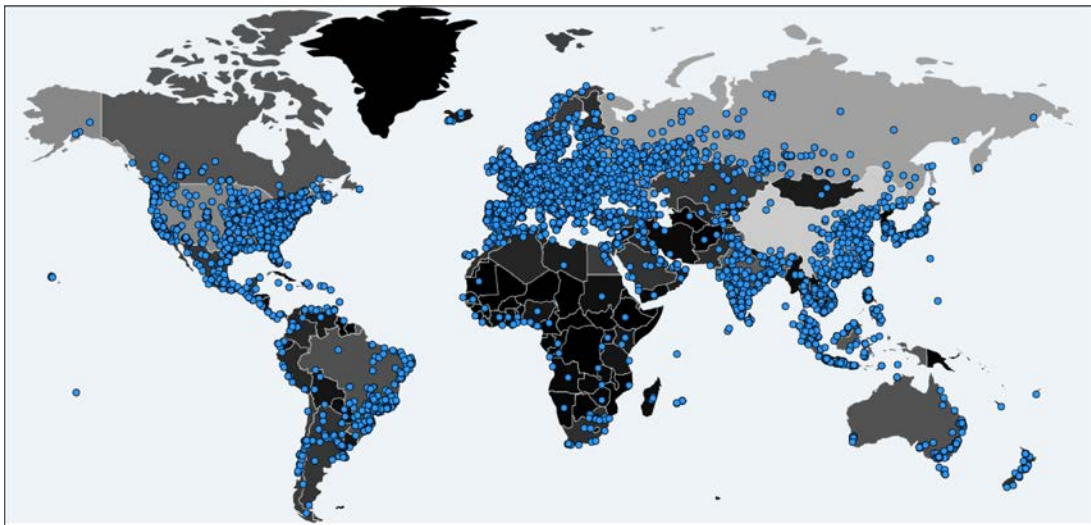


WANNACRY 랜섬웨어 분석 보고서

현재 전 세계적으로 큰 문제를 일으키고 있는 WannaCry 랜섬웨어(Ransomware)는 윈도우 운영 체제의 SMB 원격 코드 실행 취약점을 통해 네트워크에 연결된 취약한 기기를 대상으로 활동하는 악성코드 유형입니다.

일단 랜섬웨어 감염이 이루어질 경우 시스템 내에 존재하는 문서, 사진, 음악, 동영상 등의 데이터 파일을 암호화하고, 파일 복구를 위한 중요 엔트리 정보(VSC 등)를 제거하여 암호화된 파일을 인질(랜섬)로 비트코인(Bitcoin) 가상 화폐를 지불하지 않으면 복구가 불가능한 상황이 됩니다.



자료 출처 : <https://intel.malwaretech.com/botnet/wcrypt/?t=24h&bid=all>

WannaCry 랜섬웨어의 국내 유입 시점은 체크멀 AppCheck 센서 기준 2017-05-12 19:34:33(한국 시간)에 최초로 확인이 되었으며, 해외는 5월 12일(한국 시간 5월 13일 새벽)부터 위 그림과 같이, 전 세계에서 WannaCry 랜섬웨어 감염 사례가 보고 되고 있습니다.

한국의 경우 해외와 비교하여 WannaCry 랜섬웨어 최초 감염 시간은 비슷하거나 오히려 해외 언론에 기사화된 시간보다 국내 유입 시간이 오히려 빨랐다고 볼 수 있습니다.

이번에 문제가 된 WannaCry 랜섬웨어는 2017년 3월 15일에 보안 패치가 이루어진 Windows SMB(Server Message Block) 원격 코드 실행 취약점(CVE-2017-0143, CVE-2017-0144, CVE-2017-0145, CVE-2017-0146, CVE-2017-0148)으로 공격이 이루어진 문제로, 최신 보안 패치가 적용되지 않은 시스템이 많았기 때문에 단 시간 내에 네트워크에 연결된 많은 윈도우 시스템이 즉각적으로 감염이 된 원인이 되었습니다.

또한 SMB 프로토콜은 거의 모든 윈도우 제품에서 현재도 사용되는 기술이라서, 알려지지 않은 프로토콜 취약점과 랜섬웨어 공격 기술이 병합된 금번 WannaCry 랜섬웨어는 파급력이 클 수 밖에 없었습니다.

윈도우 SMB 프로토콜은 사실상 개발이 거의 30년 가까이 되는 아주 오래된 마이크로소프트사의 기술로 파일이나 주변장치를 공유하는데 사용되는 공유 프로토콜인데, 최초 SMB 프로토콜이 만들어지는 시점에서는 SMB 프로토콜의 보안성에 대한 고려없이 만들어졌다고 알려져 있습니다.

또한, 아래와 같이 최신 백신에서조차 탐지하지 못하는(5월 17일 16:00시 현재) WannaCry 2.5 버전 변종이 아래와 같이, 탐지되고 있는 상태입니다. (아래 그림에서는 검색 당시 전세계 컴퓨터 백신 중 단 3개만 악성코드 대응이 가능하다고 검색이 된다.)

SHA256: 925b3acaa3252bf4d660eab22856fff155f3106c2fee7567711cb34374b499f3

File name: WannaCry.exe

Detection ratio: 3 / 61

Analysis date: 2017-05-15 07:20:22 UTC (32 minutes ago)



Analysis | File detail | Additional information | Comments 0 | Votes

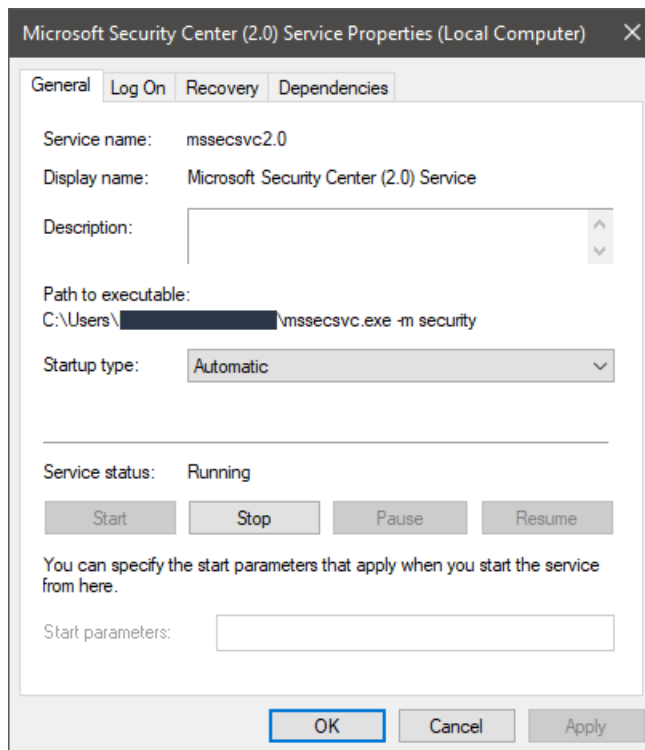
Antivirus	Result	Update
Baidu	Win32.Trojan.WisdomEyes.16070401.9500.9556	20170503
CrowdStrike Falcon (ML)	malicious_confidence_67% (D)	20170130
TrendMicro-HouseCall	Suspicious_GEN.F47V0514	20170515

자료 출처 : <https://www.virustotal.com/en/file/925b3acaa3252bf4d660eab22856fff155f3106c2fee7567711cb34374b499f3/analysis/>

실제로 WannaCry 랜섬웨어의 감염으로 인한 행위를 단계별로 살펴보면 아래와 같습니다.

WANNACRY 공격 STEP #1

Windows SMB 원격 코드 실행 취약점을 통해 다운로드 및 실행된 파일은 "msseccsv2.0 (표시 이름 : Microsoft Security Center (2.0) Service)" 서비스로 등록 및 자동 실행됩니다.



WANNACRY 공격 STEP #2

실행된 파일은 하드 코딩된 www.ifferfsodp9ifjaposdfjhgosurijfaewrwergwea.com Kill Switch 도메인 주소에 접속을 시도하여 WannaCryptor 랜섬웨어(Ransomware)의 실행 여부가 결정되며, 만약 도메인이 등록되어 있지 않은 상태인 경우에는 정상적으로 동작합니다.

WANNACRY 공격 STEP #3

실행된 WannaCryptor 랜섬웨어는 시스템(S) 파일 속성값을 가진 C:\Windows\tasksche.exe 파일을 생성 및 실행하여 숨김(H) 폴더 속성값을 가진 C:\ProgramData\qarllldlnupcv423 또는 syuukjyl842 등의 다양한 폴더명을 생성하여 관련 파일을 생성합니다.

WANNACRY 공격 STEP #4

WannaCry 공격으로 인해 랜섬웨어에 의해 생성 파일 목록은 아래와 같습니다.

C:\%ProgramData%\qarlldnupcv423
C:\%ProgramData%\qarlldnupcv423\%msg
C:\%ProgramData%\qarlldnupcv423\TaskData\Tor
C:\%ProgramData%\qarlldnupcv423\@Please_Read_Me@.txt
C:\%ProgramData%\qarlldnupcv423\@WanaDecryptor@.exe
C:\%ProgramData%\qarlldnupcv423\@WanaDecryptor@.exe.lnk
C:\%ProgramData%\qarlldnupcv423\00000000.eky
C:\%ProgramData%\qarlldnupcv423\00000000.pky
C:\%ProgramData%\qarlldnupcv423\00000000.res
C:\%ProgramData%\qarlldnupcv423\b.wnry (바탕 화면 배경 파일 = @WanaDecryptor@.bmp)
C:\%ProgramData%\qarlldnupcv423\c.wnry (C&C 서버 및 Tor 파일 주소)
C:\%ProgramData%\qarlldnupcv423\f.wnry (암호화된 파일 일부 목록)
C:\%ProgramData%\qarlldnupcv423\r.wnry (랜섬웨어 결제 안내 파일 = @Please_Read_Me@.txt)
C:\%ProgramData%\qarlldnupcv423\s.wnry (C:\%ProgramData%\qarlldnupcv423\TaskData 관련 ZIP 압축 파일)
C:\%ProgramData%\qarlldnupcv423\t.wnry (암호화/복호화 관련 파일)
C:\%ProgramData%\qarlldnupcv423\taskdl.exe
C:\%ProgramData%\qarlldnupcv423\tasksche.exe (qarlldnupcv423 서비스 및 시작 프로그램 등록 파일)
C:\%ProgramData%\qarlldnupcv423\taskse.exe
C:\%ProgramData%\qarlldnupcv423\u.wnry (@WanaDecryptor@.exe 파일)

WANNACRY 공격 STEP #5

파일 생성 이후에는 파일 암호화 행위를 수행하는 "C:\%ProgramData%\qarlldnupcv423\tasksche.exe" 파일이 실행되어 암호화 대상 파일에 대하여 숨김(H) 속성값을 해제(attrib +h)합니다.

또한 접근할 수 없는 폴더 및 파일에 대한 권한 획득 목적으로 "icaccls . /grant Everyone:F /T /C /Q" 명령어를 실행합니다. 효과적인 파일 암호화를 위해 다음과 같은 명령어를 실행하여 특정 프로세스 종료를 진행합니다.

```
taskkill.exe /f /im mysqld.exe  
taskkill.exe /f /im sqlwriter.exe  
taskkill.exe /f /im sqlserver.exe  
taskkill.exe /f /im MSExchange*  
taskkill.exe /f /im Microsoft.Exchange.*
```

이를 통해 하드 디스크, 외장 하드, USB 기기에 존재하는 다음의 확장명을 가진 파일에 대한 파일 암호화가 진행됩니다.

```
.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, .djp, .djuv, .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, .xsm, .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
```

파일 암호화 시에는 <원본 파일명>.<원본 확장명>. WNCRYT 형태로 암호화한 후 최종적으로 <원본 파일명>.<원본 확장명>. WNCRY 형태로 암호화된 파일을 저장합니다.

Name	Date modified	Type	Size
@Please_Read_Me@.txt	5/29/2017 3:24 AM	Text Document	1 KB
@WanaDecryptor@.exe	5/29/2017 3:24 AM	Shortcut	1 KB
Original File.bmp.WNCRY	1/26/2017 10:50 PM	WNCRY File	1,076 KB
Original File.doc.WNCRY	1/26/2017 10:24 PM	WNCRY File	24 KB
Original File.hwp.WNCRY	1/26/2017 10:27 PM	WNCRY File	16 KB
Original File.jpg.WNCRY	1/26/2017 10:53 PM	WNCRY File	152 KB
Original File.mp3.WNCRY	2/21/2013 9:16 PM	WNCRY File	6,768 KB
Original File.pdf.WNCRY	1/26/2017 10:30 PM	WNCRY File	21 KB
Original File.png.WNCRY	1/26/2017 10:57 PM	WNCRY File	36 KB
Original File.ppt.WNCRY	1/26/2017 10:38 PM	WNCRY File	312 KB
Original File.rtf.WNCRY	1/26/2017 10:41 PM	WNCRY File	10 KB
Original File.txt.WNCRY	1/28/2017 9:04 PM	WNCRY File	3 KB
Original File.xlsx.WNCRY	1/26/2017 10:45 PM	WNCRY File	9 KB
Original File.zip.WNCRY	1/28/2017 9:04 PM	WNCRY File	6,951 KB

파일 암호화 과정에서는 전체 디스크에 대한 암호화가 완료되는 시점까지 원본 파일을 삭제하지 않으며, 파일 암호화가 완료되는 시점에서 원본 파일을 "C:\Windows\Temp" 임시 폴더에 <숫자>. WNCRYT 형태로 변경하여 복구할 수 없도록 삭제 처리합니다.

WANNACRY 공격 STEP #6

파일 암호화 이후에는 @WanaDecryptor@.exe 파일 실행을 통해 다음과 같은 명령어로 볼륨 새도우 복사본 삭제 및 부팅 복구 옵션 변경을 통해 암호화되기 이전 상태로 복구할 수 없도록 합니다.

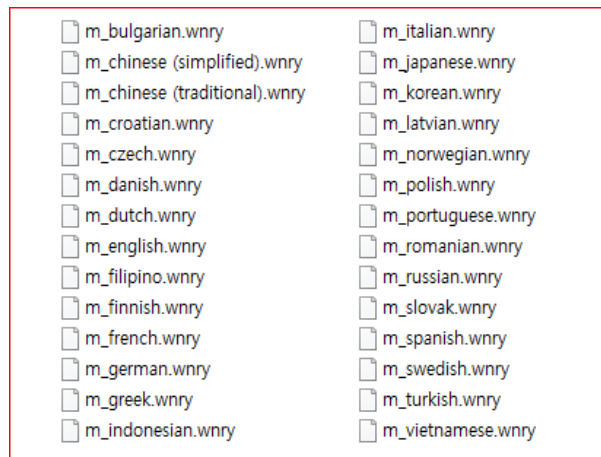
```
cmd.exe /c vssadmin delete shadows /all /quiet & wmic shadowcopy delete & bcdedit /set {default} bootstatuspolicy ignoreallfailures & bcdedit /set {default} recoveryenabled no & wadmin delete catalog -quiet
```

파일 암호화 이후에는 Tor 프로토콜을 통한 통신 목적으로 "C:\ProgramData\qarlldlnupcv423\TaskData\Tor" 폴더 내에 Tor 관련 파일을 생성합니다.

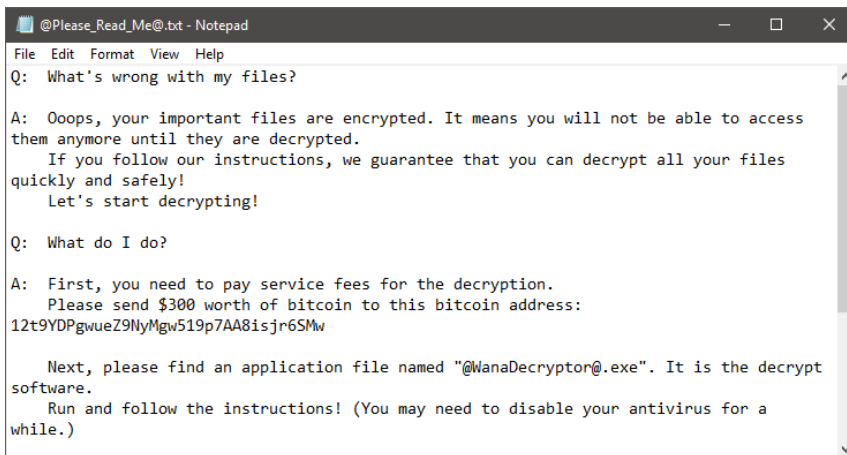
Name	Date modified	Type	Size
libeay32.dll	12/31/1999 11:00 ...	Application extension	3,123 KB
libevent_core-2-0-5.dll	12/31/1999 11:00 ...	Application extension	408 KB
libevent_extra-2-0-5.dll	12/31/1999 11:00 ...	Application extension	402 KB
libevent-2-0-5.dll	12/31/1999 11:00 ...	Application extension	703 KB
libgcc_s_sjlj-1.dll	12/31/1999 11:00 ...	Application extension	511 KB
libssp-0.dll	12/31/1999 11:00 ...	Application extension	91 KB
ssleay32.dll	12/31/1999 11:00 ...	Application extension	695 KB
taskhsvc.exe	12/31/1999 11:00 ...	Application	3,026 KB
tor.exe	12/31/1999 11:00 ...	Application	3,026 KB
zlib1.dll	12/31/1999 11:00 ...	Application extension	105 KB

WANNACRY 공격 STEP #7

마지막 단계에서 생성되는 WannaCry 랜섬웨어 메시지 창에서는 감염된 운영 체제의 언어에 따라 한국어(Korean)를 포함한 28 개 언어별로 메시지를 생성하기 위해 "C:\ProgramData\qarlIdlnupcv423\msg" 폴더 내에 존재하는 파일을 이용합니다.



그 외에 파일 암호화 안내 목적으로 @Please_Read_Me@.txt 텍스트 파일과 바탕 화면 배경을 @WanaDecryptor@.bmp 파일로 변경합니다.





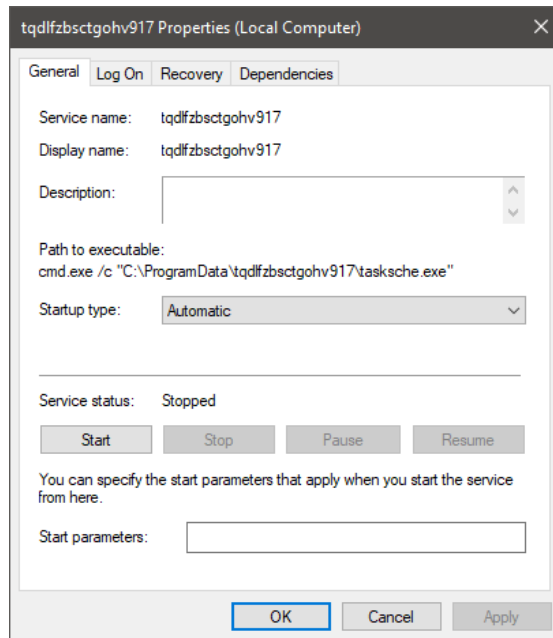
모든 랜섬웨어에 행위가 완료되는 시점에서 한국어(Korean) 메시지가 포함된 "Wana Decrypt0r 2.0" 메시지 창을 생성하며, 정해진 시간 내에 금전을 지불하지 않을 경우 금액 상승 및 파일을 복구할 수 없다는 내용이 포함되어 있습니다.



WANNACRY 공격 STEP #8

특히 WannaCry 랜섬웨어는 시스템 부팅 시마다 다음과 같은 자동 실행값을 통해 자동 실행되어 파일 암호화 및 결제 안내 메시지가 지속적으로 생성됩니다.

```
HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion\Run
- "C:\ProgramData\qarllldnupcv423\tasksche.exe"
```



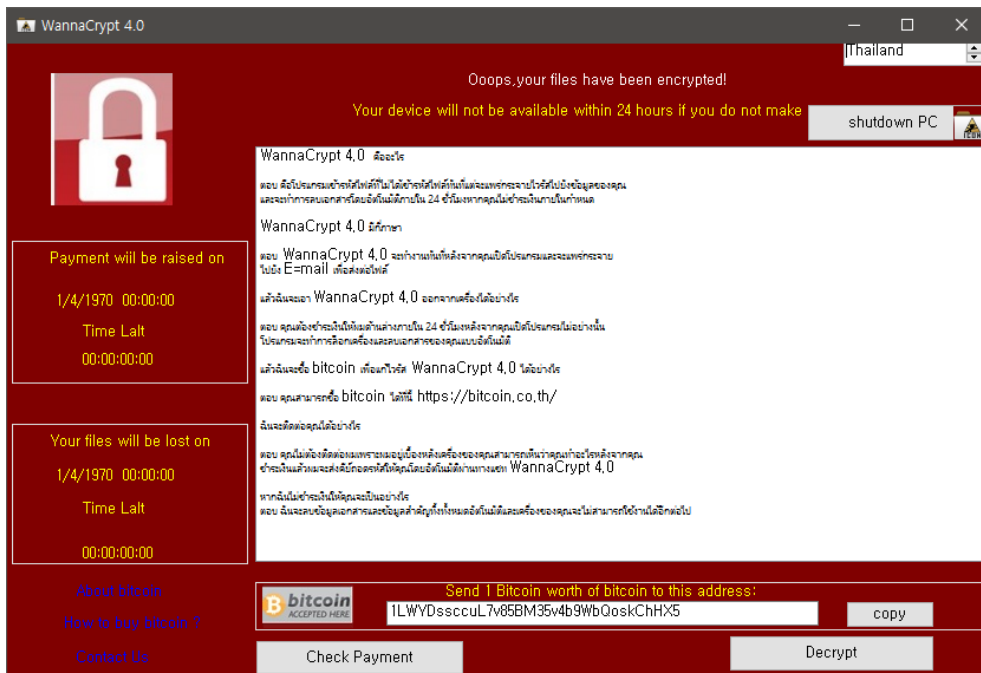
WANNACRY 공격 STEP #9

더욱 문제가 되는 부분은 WannaCry 랜섬웨어는 감염된 기기에서 445 번 포트를 통해 외부의 다양한 IP 스캔을 통해 전파 기능을 가지고 있습니다.

No.	Time	Source	Destination	Protocol	Length	Info
98	101.851970		93.188.59.6	TCP	66	50883 → 445 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
99	101.866592		140.146.154.86	TCP	66	50885 → 445 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
100	101.866672		112.42.2.150	TCP	66	50884 → 445 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
104	101.928557		207.237.6.178	TCP	66	50887 → 445 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
105	101.928622		87.13.237.34	TCP	66	50886 → 445 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
106	101.928662		120.96.33.116	TCP	66	50888 → 445 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
107	101.928794		162.6.185.238	TCP	66	50889 → 445 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
108	101.928820		183.167.197.15	TCP	66	50890 → 445 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
116	102.147119		36.246.144.65	TCP	66	50892 → 445 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
119	102.537247		220.203.188.6	TCP	66	50893 → 445 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
122	102.631934		106.21.148.128	TCP	66	50894 → 445 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
123	102.632127		14.188.203.205	TCP	66	50895 → 445 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
124	102.632198		42.131.218.51	TCP	66	50896 → 445 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
125	102.632490		177.215.120.81	TCP	66	50898 → 445 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
126	102.632541		153.53.230.54	TCP	66	50900 → 445 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
127	102.632605		36.242.192.142	TCP	66	50897 → 445 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
128	102.632741		76.59.197.202	TCP	66	50899 → 445 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
129	102.632813		205.152.80.201	TCP	66	50901 → 445 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
130	102.632897		119.190.168.155	TCP	66	50902 → 445 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
131	102.633095		103.164.179.168	TCP	66	50903 → 445 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
132	102.633162		159.139.28.233	TCP	66	50904 → 445 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1

해당 전파 기능으로 인하여 감염된 기기의 하드 디스크 자원이 시간이 지남에 따라 용량이 소모되는 증상이 발생할 수 있으므로 단순히 랜섬웨어 차단 뿐만 아니라 생성된 악성 파일을 제거하여 재실행되지 않도록 조치를 하여야 합니다.

현재 활발하게 작동하는 WannaCry 랜섬웨어는 버전 2.0 대가 대부분이지만, 해외에서 수집된 악성코드 중에는 공격용으로 개발중인 2.5 또는 4.0 신규 버전이 아래 이미지와 같이 확인되고 있으므로 SMB 취약점 및 다양한 유포 방식으로 WannaCry 랜섬웨어 변종은 향후 지속적으로 공격이 이루어질 것으로 예상됩니다.



첨부 1. [IOC / KILL SWITCH] 2017년 05월 15일 16:00 [1]

www[.]iuqerfsodp9ifjaposdfjhgosurijfaewrwegwea.com

www[.]ifferfsodp9ifjaposdfjhgosurijfaewrwegwea.com

첨부 2. [IOC / C2 DOMAIN & IP] 2017년 05월 15일 16:00 [2]

57g7spgrzlojinas.onion

76jdd2ir2embyv47.onion

cwwnhwhlz52maq7.onion

gx7ekbenv2riucmf.onion

sqjolphimrr7jqw6.onion

xxlvbrloxvriy2c5.onion

1.rvb87.org

astra4925.startdedicated.de

belegost.csail.mit.edu

belegost.seul.org

blogs.a01x.de

cloud.cfotr.com

cryptochess.rvb87.org

cyberdynesys.org

dannenbergtorauth.de

ehlo.4711.se

ftp.rvb87.org

imap.rvb87.org

ip93.ip-94-23-173.eu

joostrijneveld.nl

kerksanders.nl

kili.joostrijneveld.nl

lfbn-1-14687-209.w2-3.abo.wanadoo.fr

maatuska.4711.se

marliesrijneveld.nl

mysql.rvb87.org

ns1.epow0.org

off-scan-21-12-2014-mvd.ditchyourip.com

poop.rvb87.org

ppcseed.ns.7server.net

ramonj.nl
rvb87.org
seed1.fair-coin.org
static.148.176.243.136.clients.your-server.de
stigatle.no
testnet3.btcseed.kronolabs.com
testnet-seed.bitcoin.petertodd.org
testnet-seed.bitcoin.schildbach.de
tor.epow0.org
tor-exit.stigatle.no
www.rvb87.org
2.3.69.209:9001
50.7.151.47:443
50.7.161.218:9001
62.138.7.231:9001
83.162.202.182:9001
94.23.173.93:443
128.31.0.39:9101
136.243.176.148:443
146.0.32.144:9001
163.172.153.12:9001
163.172.185.132:443
163.172.35.247:443
171.25.193.9:80
178.62.173.203:9001
185.97.32.18:9001
188.166.23.127:443
193.23.244.244:443
213.61.66.116:9003
217.172.190.251:443
188.166.23[.]127:443
193.23[.]244[.]244:443
2.3.69[.]209:9001
146.0.32[.]144:9001
50.7.161[.]218:9001
217.79.179[.]77
128.31.0[.]39

213.61.66[.]116
212.47.232[.]237
81.30.158[.]223
79.172.193[.]32
89.45.235[.]21
38.229.72[.]16
188.138.33[.]220

첨부 3. [IOC / MD5] 2017 년 05월 15일 16:00 [3]

d724d8cc6420f06e8a48752f0da11c66
24f32da258b8c42c71abfb7577fb35a8
84c82835a5d21bbcf75a61706d8ab549
db349b97c37d22f5ea1d1841e3c89eb4
f107a717f76f4f910ae9cb4dc5290594
7f7ccaa16fb15eb1c7399d422f8363e8
800446ec5d8b6041f6b08693d8aa1d53
fefe6b30d0819f1a1775e14730a10e0e
f97d2e6f8d820dbd3b66f21137de4f09
7e6b6da7c61fcb66f3f30166871def5b
5bef35496fcbdbe841c82f4d1ab8b7c2
638f9235d038a0a001d5ea7f5c5dc4ae
86721e64ffbd69aa6944b9672bcabb6d
d6114ba5f10ad67a4131ab72531f02da
80a2af99fd990567869e9cf4039edf73
f0d9ffefa20cdadf5b47b96b7f8d1f60
3c6375f586a49fc12a4de9328174f0c1
4362e287ca45a4862b7fe9ecaf46e985
509c41ec97bb81b0567b059aa2f50fe8
7a2726bb6e6a79fb1d092b7f2b688af0
007a71c83b7e5e7dee8cca4cb13e86c1
31dab68b11824153b4c975399df0354f
54a116ff80df6e6031059fc3036464df
3175e4ba26e1e75e52935009a526002c
246c2781b88f58bc6b0da24ec71dd028
bdda04ebcc92840a64946fc222edc563
93bec8b34a4894c34c54cca5039c089

82fd8635ff349f2f0d8d42c27d18bc7
46d140a0eb13582852b5f778bb20cf0e
f9992dfb56a9c6c20eb727e6a26b0172
c39ed6f52aaa31ae0301c591802da24b
c61256583c6569ac13a136bfd440ca09
bec0b7aff4b107edd5b9276721137651
b7f7ad4970506e8547e0f493c80ba441
2b4e8612d9f8cddf520a8b2e42779ffa
05a00c320754934782ec5dec1d5c0476
9503af3b691e22149817edb246ea7791
f9cee5e75b7f1298aece9145ea80a1d2
32f5d4bb6e967ac8c15950322b69975b
7c742d6cc135784323395ecc7d526bf6
b8a7b71bfbde9901d20ab179e4dead58
84a912cc30e697c4aab6978fb2fceb7c
835fff032c51075c0c27946f6ebd64a3
3e0020fc529b1c2a061016dd2469ba96
ff81d72a277ff5a3d2e5a4777eb28b7b
eb7009df4951e18ccbe4f035985b635c
57aaa19f66b1eab6bea9891213ae9cf1
08bab082019257268a3726ae75463f47
92cc807fa1ff0936ef7bcd59c76b123b
82fc5885862b097be5ec9ec2176e30f1
13d702666bb8eadcd60d0c3940c39228
947d69c0531504ee3f7821574ea405a7
c3e7343ae0de8f6c6a907ba06925fe19
0156edf6d8d35def2bf71f4d91a7dd22
38089fd3b6f1faa54cfe974fd1e29f0a
52ba0c7470f214486da9a6c7a710afa0
1fd3d102d83758e8317df2380821e807
7d31adca26c6c830f6ea78ed68de166b
df535dcb74ab9e2ba0a63b3519eee2bb
2822abbaff89f989a4377b3c54067540
57b5c96abfd7ab5f33d9e3c20067687a
8ff9c908dea430ce349cc922cee3b7dc
8424e87370e83d18d1239f43238b318b
efa8cda6aa188ef8564c94a58b75639f

4b27c04d8c3befc0b534c1e41933245d
b0badc4ce72ce584ef0855249dbb0d98
a155e4564f9ec62d44bf3ea2351fd6ce
0fb1ce09b168987ce7f47bcd82fa034d
bb54f7f62e845ce054d1b3234ea52b22
b33c6822e68a5a1a666579681fdc5429
c39f774f7b4257f0ec3a7329063fc39c
b77288deb5e9ebced8a27c5ea533d029
a0feeb586e91376a36e586504f25c863
f75b0a879aa40db2bece5553a9eaa069
b0a61ac3f9665e6c967b8d58a2db9fcc
5902d0ea85b00f59a44c6d1c9174da56
19f28e4f56b1796cf7ab44b46546a504
254d785f692e4590609df7018ed69035
a77d1e53dd2089e2a040c8b96a523132
27cb59db5793febd7d20748fd2f589b2
c21200c655deb19ef1e1e570cd0393ec
16aa3809de7a2a87d97de34ed7747638
51e7d2cde395ba71078fcd998427c119
358dff8d2be4aff312073979ad025f9b

첨부 4. [IOC /SHA256] 2017 년 05월 15 일 16:00 [4]

000de89bb90f7a8683144868ee84d91c2312b55038fb71e52a15e0d0befb9b8e
00fdb4c1c49aef198f37b8061eb585b8f9a4d5e6c62251441831fe2f6a0a25b7
0101893719d3a9ab8d89e309c5fa03b878d6cfc3da3ae4e7e2796cefd71cf4b4
01541daa8c2bde09d6c82dfeec4e739d4f37652b970a6ed6a0bfde5677d53691
01b628fa60560c0cb4a332818cb380a65d0616d19976c084e0c3eaa433288b88
02932052fafe97e6acaaf9f391738a3a826f5434b1a013abbfa7a6c1ade1e078
02d52143da7a5037ca9e1de5e59885022ab6d16de5db58ed903ae759d1e1fb24
03363f9f6938f430a58f3f417829aa3e98875703eb4c2ae12feccc07fff6ba47
036e3aa8a3ee2e5df8f957922067abba1f37633d02fbc8566e020079d1e223bd
03b04cc3f9d64cf981be6aeb3ce0cf6a8694ecfc7425ac99bf03cd40e9550218
03e2f8bcb0c93df0cf994a622677907ecd558f8fa3d7625a97d638df36900d07
049b7ea5ecbfc53cef6d35ba85cd809be4ab175074ae7321fd9ace076a0b58
06111d44f4ea9149277253696e12fa655c87fb6181e9dc33cdb9296e311a3304
065e46dbdf5251bf334f6a383fbaef19be8da04d2b5692f1aba6f9b533b40974

07bd75c4c6dc26be6a21c044c0535a7b06ba3b1834cbade71427436bde6763fb
07c44729e2c570b37db695323249474831f5861d45318bf49ccf5d2f5c8ea1cd
09a46b3e1be080745a6d8d88d6b5bd351b1c7586ae0dc94d0c238ee36421cafa
0a26612bc265d0cb2a7dbeec1c37fca6ae2fb1b4de19545178e655bb62b9961f
0a73291ab5607aef7db23863cf8e72f55bcb3c273bb47f00edf011515aeb5894
0af8de5c6de8cfb4a4ceebcf7bdcc00170f3ec9f420bad66200fe6d942b92f46
0bb221bf62d875cca625778324fe5bd6907640f6998d21f3106a0447aabc1e3c
0caa1566e439c01d88c953382b26f9d2f7f279594ebe986c06e7781a71cf9d74
0db91ff8822f1623fe36d712b5f56d339dc21008f1ecc617a5de2f522039c5b3
0e6b4811cef5f0f2e507c6629ef798520b8fb0485014760831b27604ddf836e8
0ea1c54ac32651a83f88a8d50f4c32085d872fe697a02ff7af4b2be6bee83e19
0eb975bfb48165abd4be164a4ec28340bab4e937ead15ad77a3575f36d5b221f
0ec811324df2c93c2bf2d005ede23d0ae28fc25137d1e9cbdb83e208999eb93f
0fc245e8a1134e31b7687fb7501faa05628813c87b9561ee26f2092cb76e5a36
11011a590796f6c52b046262f2f60694310fa71441363d9116ada7248e58509a
11d0f63c06263f50b972287b4bbd1abe0089bc993f73d75768b6b41e3d6f6d49
11fd66b4e1090c9af7ea59daf7f62fa6ae3090c10042aa0826eacb3e226636ad
1214e010178a1bdab5ce0ee9fe1bd2ef425f1a315798afa1390a98f8e3857898
122068a73ba511848fcc85731cbc41e81676c725b49e697af39f65f68494625a
146f61db72297c9c0facff560487f8d6a2846ecec92ecc7db19c8d618dbc3a4
149601e15002f78866ab73033eb8577f11bd489a4cea87b10c52a70df78d9ff
14c498948724d72311aa6fea90a3a6473927daaa3836051d5ca97fad377459e3
14f124f2dff97ca2d0fa8c53f1225c5307b50b43b4a401d2a708b0c1c12584dc
16493ecc4c4bc5746acbe96bd8af001f733114070d694db76ea7b5a0de7ad0ab
16a2a471038f5e4e79c816ceb0c2eb272463c37268b7b4e845f287f5027f070d
1729b1140f6f139e57f42d6f26ae78d74745588871190ee74b901aed860f3280
17d5ba3dfa5c765d85c7a8c3c012f30bdfda2ece32f610503bd1475062487b2a
190d9c3e071a38cb26211bfffef6c4bb88bd74c6bf99db9bb1f084c6a7e1df4e
191f3e94249f21fb596b4dba7eb197ab89bacae93f1b1fdbd9db733904bd5438
19ee90ce04745337b6808d0714ec6b4e07e86fdc21506dbc9253bc4c9d95ca13
1a84fd4b0e9b475cf09dd78668ce77c7c56f23c07d9ef969b8abaf3fecdd43e4b
1adfee058b98206cb4fbc1a46d3ed62a11e1dee2c7ff521c1eef7c706e6a700e
1b974d46cde9f6e837ec369120dd2727eb774ca58fa8d552b9baeb2c41fc0cdc
1be07198c324c9732d4e2676945ec021eeacd78775aea2100f49ca0483d3f901
1be0b96d502c268cb40da97a16952d89674a9329cb60bac81a96e01cf7356830
1c50aab8555945315f9850222c95ccf9335b6e6eaa990cfe6424f2d3d14f4ae0b
1caaa6e55bceeb27ba1e2d9918bae4161592d722fd16bf348bb5b98a501ef908

1cbcbf5a77d2d235bfc6dcf769169f6b0d96c0377bcaa128589025bb9d8cec9a
1d2e6e6c98ea8c09fcb9287d82bef1940c89cbbcaf12a3ea0fd544f939beb5f1
1d55e742356c5318e59ff68111f0b6468fc75daad48d3cf9c277d8123b5baac3
1e650e9dfb7cc094c389534c483719028886eafa143cca548c7b0b2916540bb7
1e6753f948fa648ef9e0d85795b7f090968ee1f240efc0628283776ea55ccb0f
1f01ed57b60951c4fd7de05a5d4b324a9ffff272a34aa2f1d4859e4936d99e26
1f14937ccb88737f786a247fc91ea99338f8f99a42852d8fbc3fdce4d7b5ce75
1f21838b244c80f8bed6f6977aa8a557b419cf22ba35b1fd4bf0f98989c5bdf8
1f40615d6a9986a92453215e874e9aa63be2f241cb588c6810bcc889cc51d2da
1f7c6b5942809f649df4354ad6c98c13fb9879be2214882b7a02777119b574d0
1fd1b393afc46ee0303c2a0981637da0028ca344b12bc3b816e1f8ddd282e1c5
2134dd25d73096e4c0c88fd2496c1774b8f4d3a9d576b9060318d78cf31feb69
216ffa480d22bb605785da975191e80fe9ef810a93d2f0893921a4265c9a89aa
22ccdf145e5792a22ad6349aba37d960db77af7e0b6cae826d228b8246705092
23e5e738aad10fb8ef89aa0285269aff728070080158fd3e7792fe9ed47c51f4
247b4c95e9a38c9d9c96fef676175188db8bf2e50e6272e37e6414c6aad4301e
24d004a104d4d54034dbccffc2a4b19a11f39008a575aa614ea04703480b1022c
255898006562e324aa875f10d68b903aaf5d76bf612cedd956caa1d2e1e2c663
2584e1521065e45ec3c17767c065429038fc6291c091097ea8b22c8a502c41dd
2590e7aa362d38d246cd3541f4ffb9a63a289709eb040dadd7c10003be87bfe
263f6a2f0777852c72fd68251081de63a1d8f30d453a5c94339e520ae535e63e
26cbe5449699cd6b0ab5b8b23e899e02e2db19dc03c65e60eb16a3f1d18f371c
26fd072fda6e12f8c2d3292086ef0390785efa2c556e2a88bd4673102af703e5
2802fc1434fe2f8f02ce074c67a32bb3b13b5ecc598c0f026c965fc3be3e8ce1
2898e3ec7774e2c1572125f75cfc46e630bd419c96e4803b406771ade965c822
28ea4b21dd9130aa4d2c092acb543b46bd8d884926b85950a9f44952b261ebdb
2909c8a4855622619836421164b75795002075d9948957bf741e62abd47569b7
290f06eb156695165317a4b7f9668be7ae18cf8322e4fc2aeeb0af3dd6bc0801
295c33e0b7c7be8081a5930d0cf5454af3b0b801da6126e4402365ece539c4da
29611b3b709c2faab693d1d6cb2d104f48f4ef0dfef9d3e0d82e61673902934d
2a5f6043855a9bd09c9d765c438a33efd0fbca3c9199a68e73103eb3685a722c
2adc900fafa9938d85ce53cb793271f37af40cf499bcc454f44975db533f0b61
2bc87f1bbfdb23fe503ef89bcbf6908ffd7218433e0fbfa51282c0dc51dece01
2bf05a1e4cba313e400d48e9a40e1b4bb1cdee9dd5b539b5a1d5420d74cc6a0f
2c2d8bc91564050cf073745f1b117f4ffdd6470e87166abdfcd10ecdff040a2e
2c53cb08978c62cebcb561cbc7edf59592544c13cf60cc0ef317f94a9f48e1a2
2c937034f307c4b47070d3267cc243c867936996ecc12847e51d7d99aefc4359

2c95bef914da6c50d7bdedec601e589fbb4fda24c4863a7260f4f72bd025799c
2ca2d550e603d74dedda03156023135b38da3630cb014e3d00b1263358c5f00d
2cea9032615df2e36a25bdc95542c2865a009589c8bd8bc612d903a268be37b9
2d4df2da89b68259c1ab8d1b7a1b1aa3e6884a5fec931b67e524660ef8cd3896
2f1b9bab6fb911ae02c381df00892f94b25876f2c3808623d13089069e6ee380
302c232e07e6a30ae1612360570d1fbfdea1631e2589f8f23e7aa931c83c2550
30d208b5d8ea43a36d1a279f5556205570a9c0177a120277083f4ef6f6f47aed
30ef778ce481a6bcfa3bde2fee35645fec5f19957cf62e7c8371ad226d39540c
3171651f36684f06d480bf0c1b3a308d75b7c3c39de4bab5075a9a1e77166382
3177a1287600a09ec1ab861a456ebd7925bae2d8488c34203850682c6fee375f
31c2024d0df684a968115e4c3fc5703ef0ea2de1b69ece581589e86ba084568a
31c48b65f89004a1b899299e26c2652822a84699a817068e5d3a6e92aa976e46
31ec99404e5376abe9b1870b85706b6ad816673d8a3051ff9276806fa4816149
321ecb0d9b2f1cfef92ce76dbae37adaeb78d16af81eb3d7e20258031afb75b1
32f24601153be0885f11d62e0a8a2f0280a2034fc981d8184180c5d3b1b9e8cf
3351c7e77d06b512cedb8fbbf91c197bff95479a346de858699726b0fe6fb3f5
3405e42f4dd0a47c250fb6663680f3f16f94df913909ca375607bac6a7811086
3463ea99389ef4836cfe0565539ee80c4c3a8159930c408f86147a59632d593a
3739ce45a5a5f575e7acb2d7dbe24ca0f4a7d9925b440001ab8e78063307a89c
37c58ce8e10fccd21a33d0c81d1d26ec793c4c2ec727f0f930a0d2d259df5422
3857448d484e1257dc9f19e940b3422c5c8ddac3ff759fa568087c6c5b4303f4
386e5bfe2b9a202ea06b1839d689268a6c7237dfb49db57d1173de79344b093c
38b56d0106ffd672e19bdafb0b379177f6148bdd7ac6746b2c902986dbacc753
38c6efb48b32a3f22cc4c307e9043d59aedb0e008300663f83803819e5f260b3
39e4284f74ba4f057048acef80e7dbace207b77f8f1d9bc11c89804c9775a6f0
3aac36c35e24b913f2b3740364cd4d15936b7b65a8799918eb1ff843cebbe1db
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첨부 5. [IOC / FILE EXTENSIONS] 2017 년 05월 15일 16:00

.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

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3. CheckMAL Ransomware Analysis System
4. https://www.us-cert.gov/sites/default/files/ALERT_TA17-132A.xlsx
5. <https://docs.google.com/spreadsheets/d/1XNCCiiwplfW8y0mzTUdLLVzoW6x64hkHJ29hcQW5deQ/pubhtml#> - 등 다수 시스템에서 정보 수집
6. AV-TEST GMBH(<https://plus.google.com/+avtestorg/posts/AwZPe1EtWNY>)