The hidden part of TDSS

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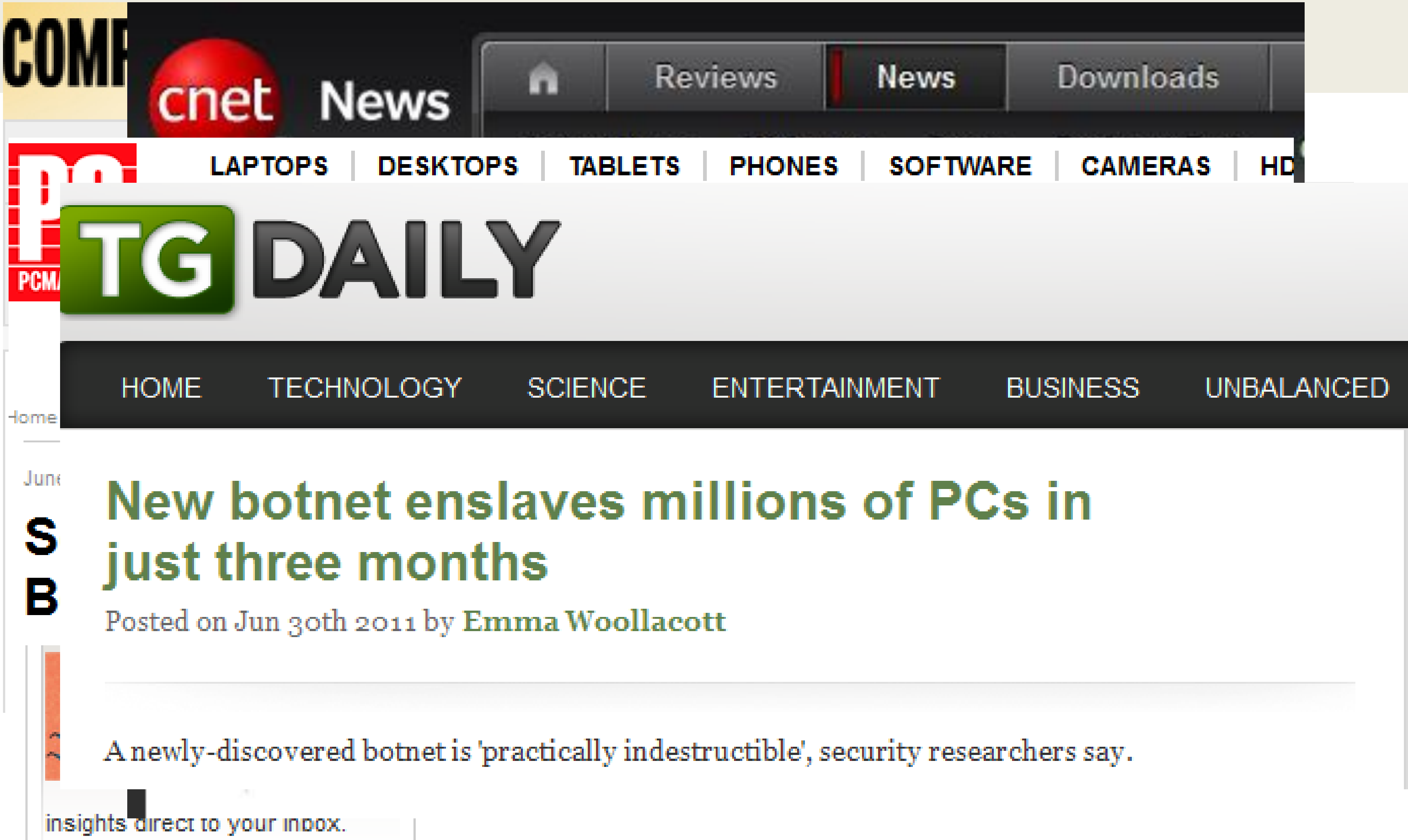
Kaspersky Lab



New botnet enslaves millions of PCs in just three months

Posted on Jun 30th 2011 by Emma Woollacott

A newly-discovered botnet is 'practically indestructible', security researchers say.

insights direct to your inbox.

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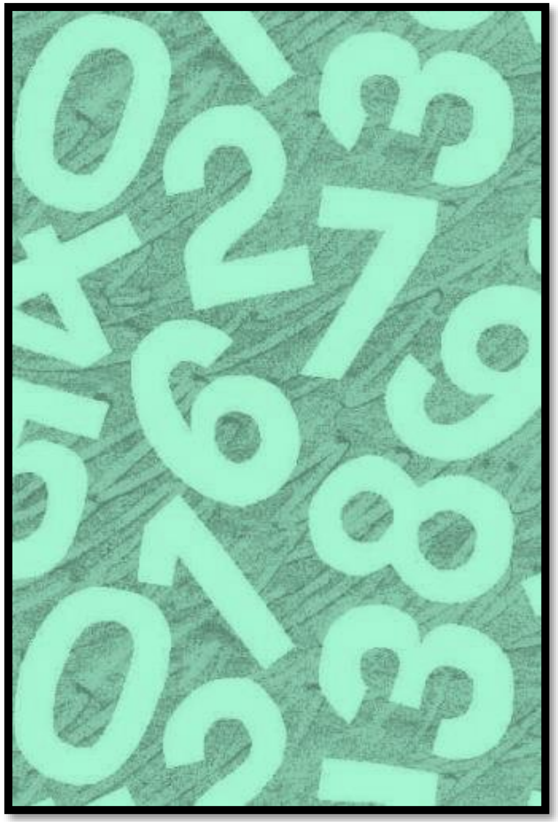
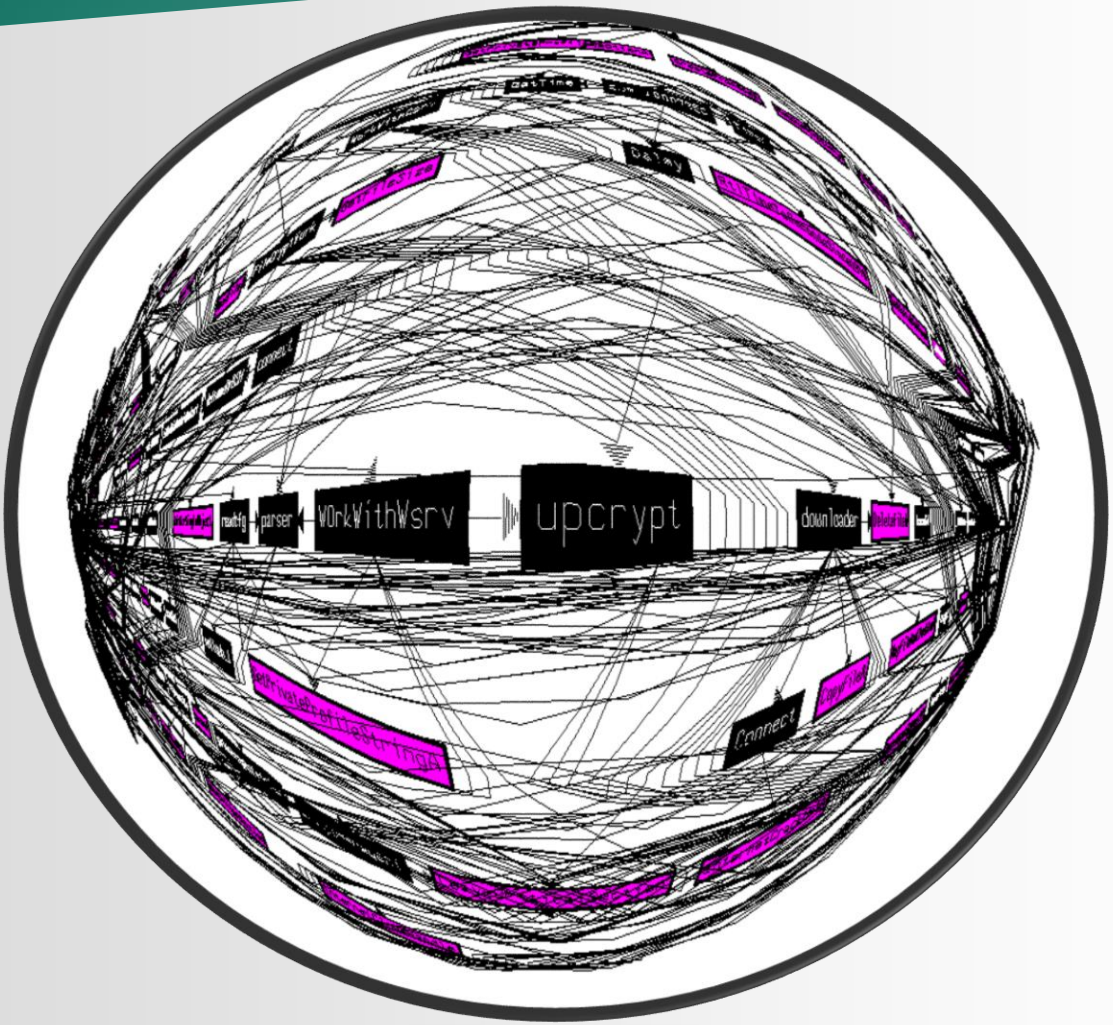




TDSS Overview

Main modules

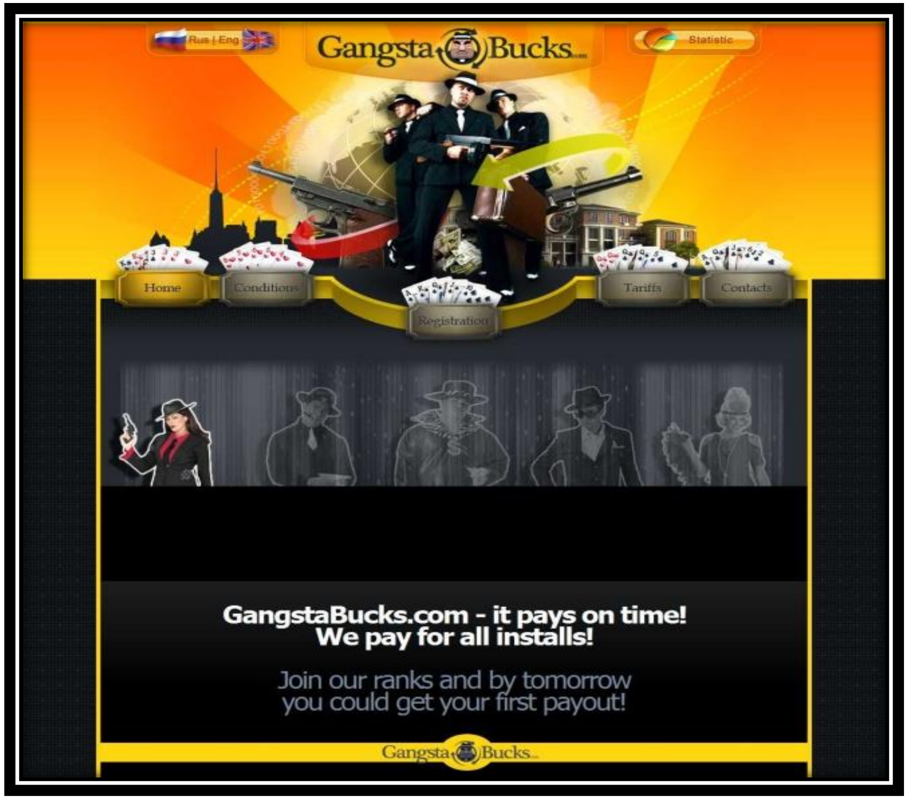
•MBR infector – bypass drivers digital signatures protection

•x64 rootkit – TDSS works on every modern Windows system

•Clicker – clicks banners and links

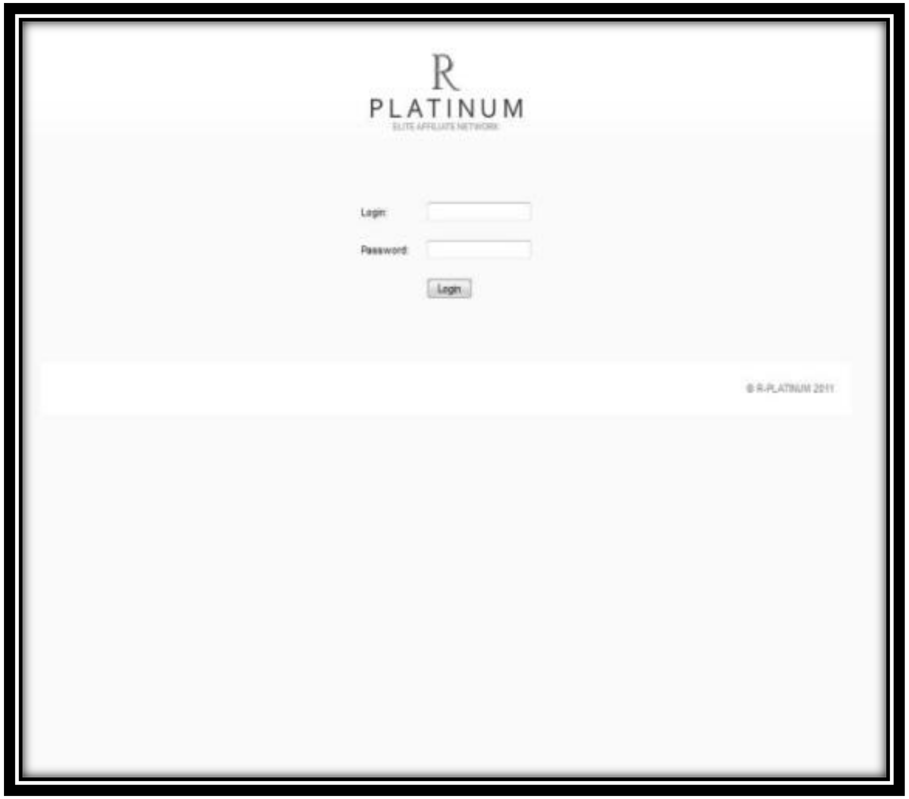
•Target on Black SEO – promoting web site via Google, Bing, Altavista and more

Affiliate Network



GangstaBucks.com - it pays on time!
We pay for all installs!

Join our ranks and by tomorrow
you could get your first payout!



Login:

Password:

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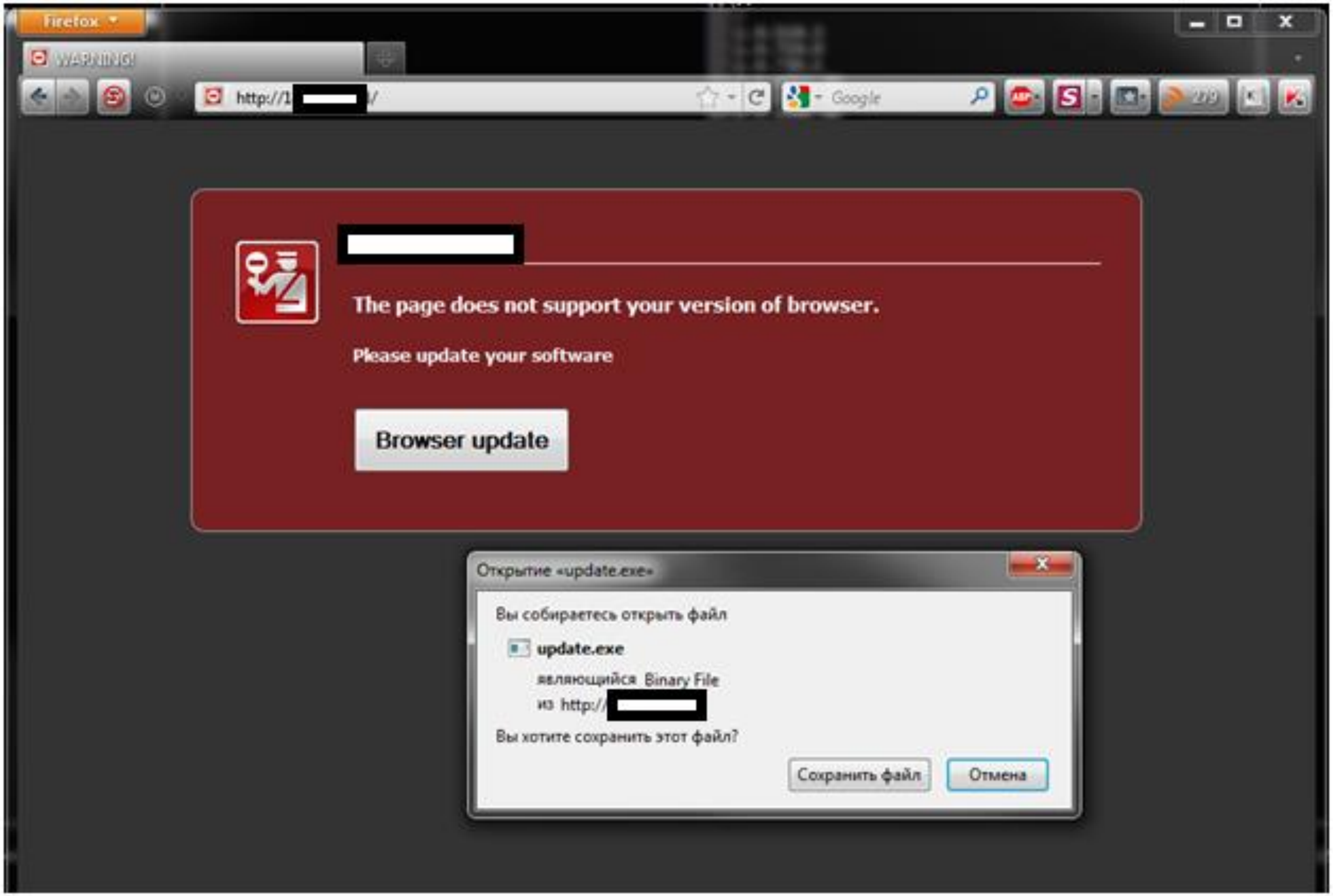
- Two Affiliate Networks are spreading TDSS
- 20 - 200 USD for 1 000 installs
- Affiliates installs TDSS via SPAM, Worms, Exploits and etc.

Malicious DHCP



[redacted]

The page does not support your version of browser.

Please update your software

Открытие «update.exe»

Вы собираетесь открыть файл

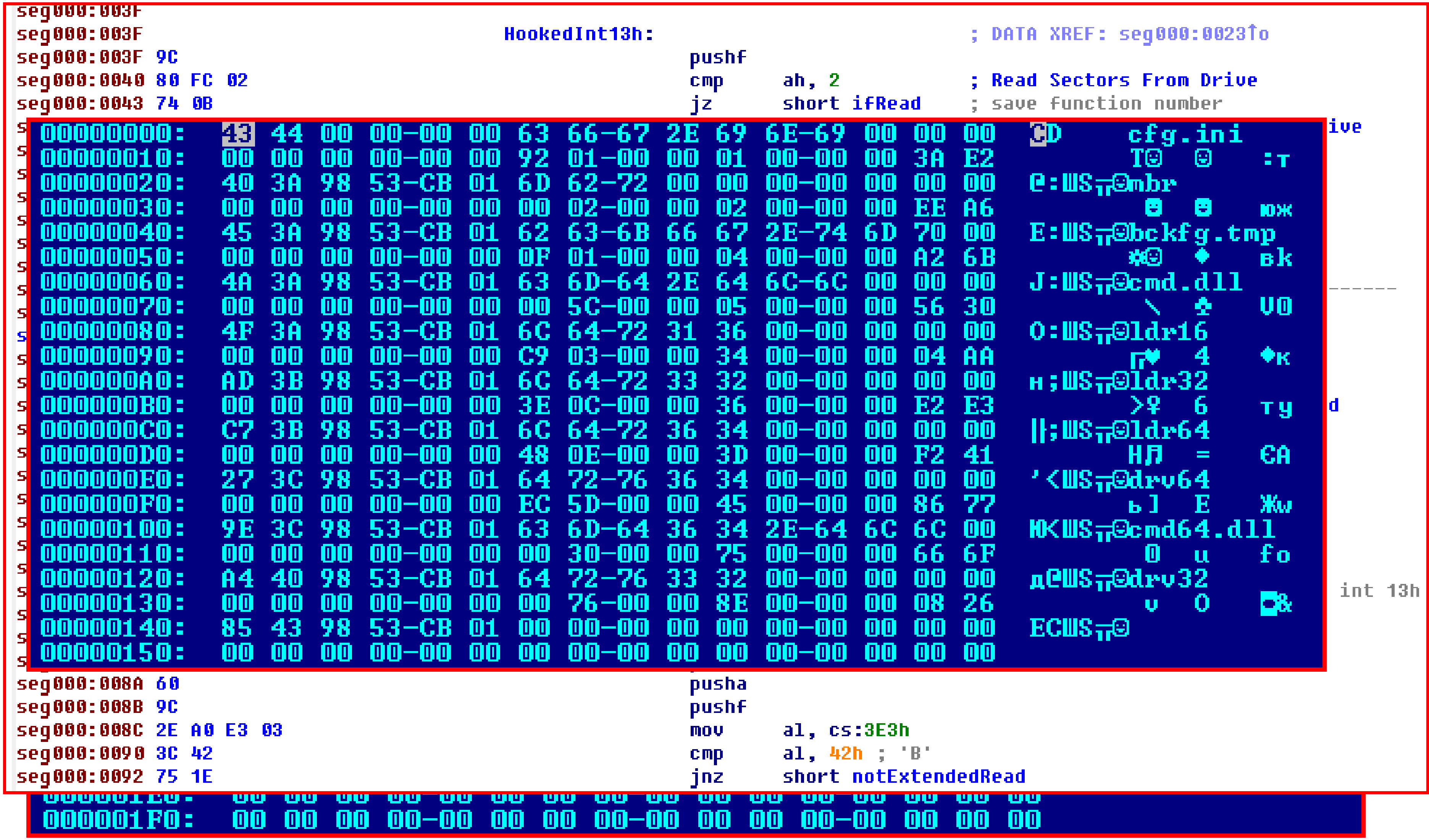
update.exe

являющийся Binary File

из http://[redacted]

Вы хотите сохранить этот файл?

Boot

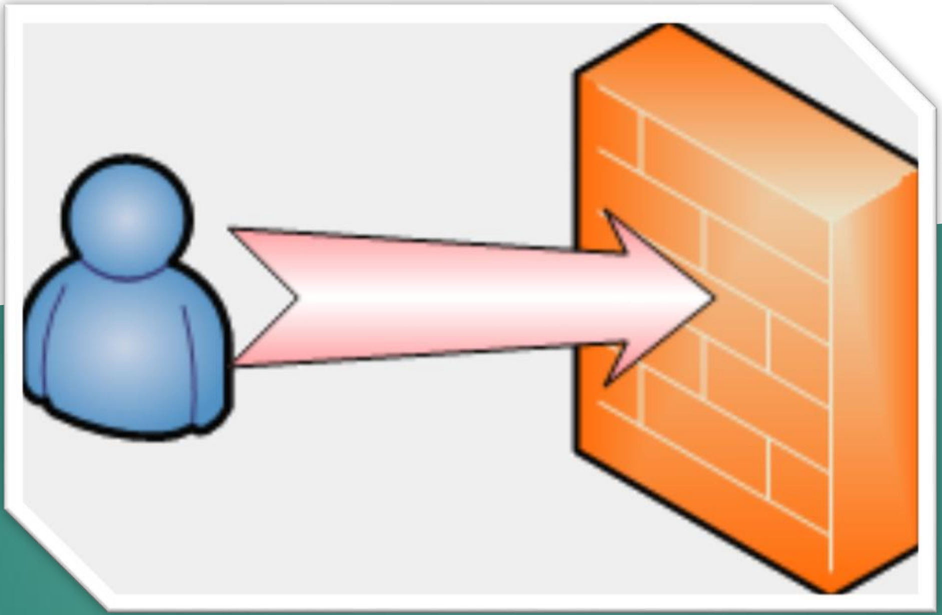


```
seg000:003F
seg000:003F                                  HookedInt13h:                               ; DATA XREF: seg000:0023↑o
seg000:003F 9C                                                   pushf
seg000:0040 80 FC 02                                             cmp     ah, 2            ; Read Sectors From Drive
seg000:0043 74 0B                                                jz      short ifRead     ; save function number
```

```
00000000:  43 44 00 00-00 00 63 66-67 2E 69 6E-69 00 00 00   CD    cfg.ini
00000010:  00 00 00 00-00 00 92 01-00 00 01 00-00 00 3A E2         Т☺  ☺   :т
00000020:  40 3A 98 53-CB 01 6D 62-72 00 00 00-00 00 00 00   @:ШS╦☺mbr
00000030:  00 00 00 00-00 00 02 00-00 02 00 00-00 00 EE A6         ☻  ☻    юж
00000040:  45 3A 98 53-CB 01 62 63-6B 66 67 2E-74 6D 70 00   E:ШS╦☺bckfg.tmp
00000050:  00 00 00 00-00 0F 01 00-00 04 00 00-00 00 A2 6B        ☼☺  ♦    вk
00000060:  4A 3A 98 53-CB 01 63 6D-64 2E 64 6C-6C 00 00 00   J:ШS╦☺cmd.dll
00000070:  00 00 00 00-00 00 5C 00-00 05 00 00-00 00 56 30         \  ♣    V0
00000080:  4F 3A 98 53-CB 01 6C 64-72 31 36 00-00 00 00 00   O:ШS╦☺ldr16
00000090:  00 00 00 00-00 C9 03 00-00 34 00 00-00 04 AA 00        ╔♥  4   ♦к
000000A0:  AD 3B 98 53-CB 01 6C 64-72 33 32 00-00 00 00 00   н;ШS╦☺ldr32
000000B0:  00 00 00 00-00 3E 0C 00-00 36 00 00-00 E2 E3 00        >♀  6    ту
000000C0:  C7 3B 98 53-CB 01 6C 64-72 36 34 00-00 00 00 00   ╟;ШS╦☺ldr64
000000D0:  00 00 00 00-00 48 0E 00-00 3D 00 00-00 F2 41 00        H♫  =    ЄA
000000E0:  27 3C 98 53-CB 01 64 72-76 36 34 00-00 00 00 00   '<ШS╦☺drv64
000000F0:  00 00 00 00-00 EC 5D 00-00 45 00 00-00 86 77 00        ь]  E    Жw
00000100:  9E 3C 98 53-CB 01 63 6D-64 36 34 2E-64 6C 6C 00   Ю<ШS╦☺cmd64.dll
00000110:  00 00 00 00-00 00 30 00-00 75 00 00-00 66 6F 00         0  u    fo
00000120:  A4 40 98 53-CB 01 64 72-76 33 32 00-00 00 00 00   д@ШS╦☺drv32
00000130:  00 00 00 00-00 00 76 00-00 8E 00 00-00 08 26 00         v  О    ◘&
00000140:  85 43 98 53-CB 01 00 00-00 00 00 00-00 00 00 00   ЕCШS╦☺
00000150:  00 00 00 00-00 00 00 00-00 00 00 00-00 00 00 00
```

```
seg000:008A 60                                                   pusha
seg000:008B 9C                                                   pushf
seg000:008C 2E A0 E3 03                                          mov     al, cs:3E3h
seg000:0090 3C 42                                                cmp     al, 42h ; 'B'
seg000:0092 75 1E                                                jnz     short notExtendedRead
```

```
000001E0:  00 00 00 00-00 00 00 00-00 00 00 00-00 00 00 00
000001F0:  00 00 00 00-00 00 00 00-00 00 00 00-00 00 00 00
```



Reversing TDSS networking.

Client to Server

1. Original request

command|noname|30127|0|0.03|0.15|5.1 2600 SP2.0|en-us|iexplore|351|0 ~~and Benchmark(20000000,md5(1))|~~1614895754

2. RC4 or its modification where Key is the targeted host name

ХЪ7U>tюjЇ\+_Э→/СИY>Ко↓н>4L•хоУч¶@_►F_M!aw♀:Ыlр↔d;_fщ☻§ю¶♥0язl

3. BASE64

r1writ0aL0PIWZtL7hntuzRMB3hv0/cUQL4QRrxNIeB3

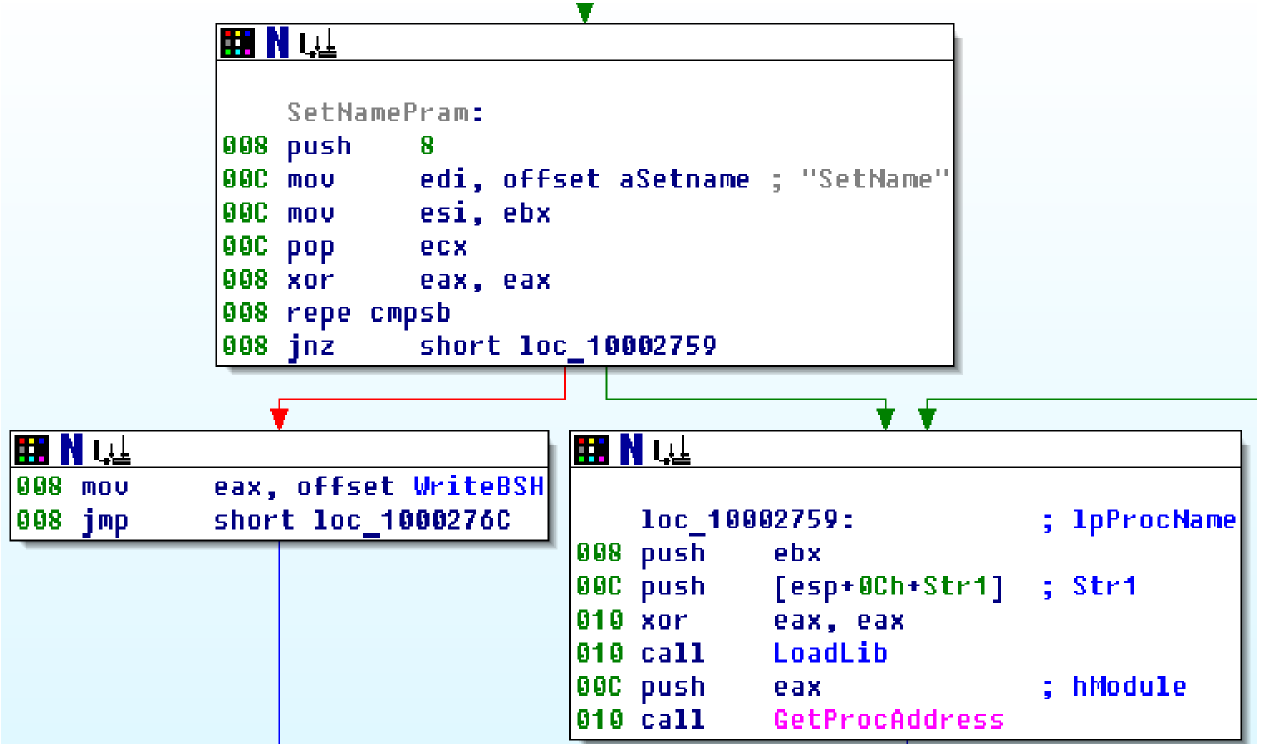
4. Additional trash

4EszDdXaN1U+dP5qr1writ0aL0PIWZtL7hntuzRMB3hv0/cUQL4QRrxNIeB3DDr

5. HTTPS

Server to Client

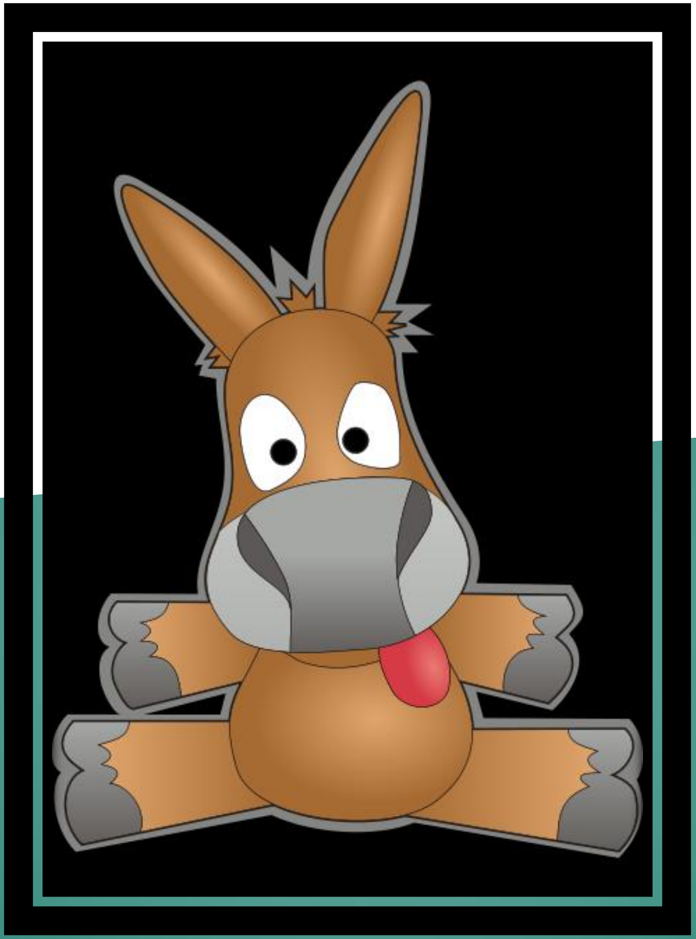
1. Set Name parameter – additional unique key for RC4 or its modification



```
    SetNamePram:
008 push    8
00C mov     edi, offset aSetname ; "SetName"
00C mov     esi, ebx
00C pop     ecx
008 xor     eax, eax
008 repe cmpsb
008 jnz     short loc_10002759
```

```
008 mov     eax, offset WriteBSH
008 jmp     short loc_1000276C
```

```
    loc_10002759:                  ; lpProcName
008 push    ebx
00C push    [esp+0Ch+Str1]         ; Str1
010 xor     eax, eax
010 call    LoadLib
00C push    eax                    ; hModule
010 call    GetProcAddress
```

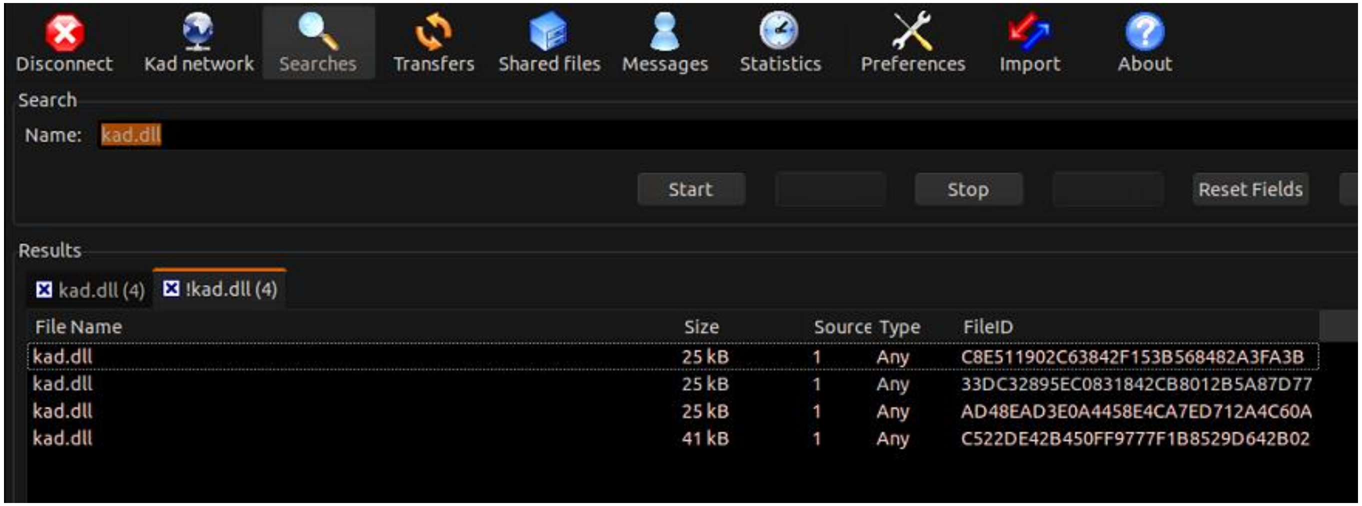


ANALYZING P2P FUNCTIONALITY

Analyzing p2p functionality

KAD.DLL algorithm:

1. Share encrypted file named as “ktzrules”
2. Upload kad.dll on TDSS infected PCs
3. Kad.dll loads public nodes.dat file with KAD Client/Servers IPs
4. Kad.dll searchs for “ktzrules” file in public KAD network
5. Kad.dll downloads “ktzrules” and executes commands



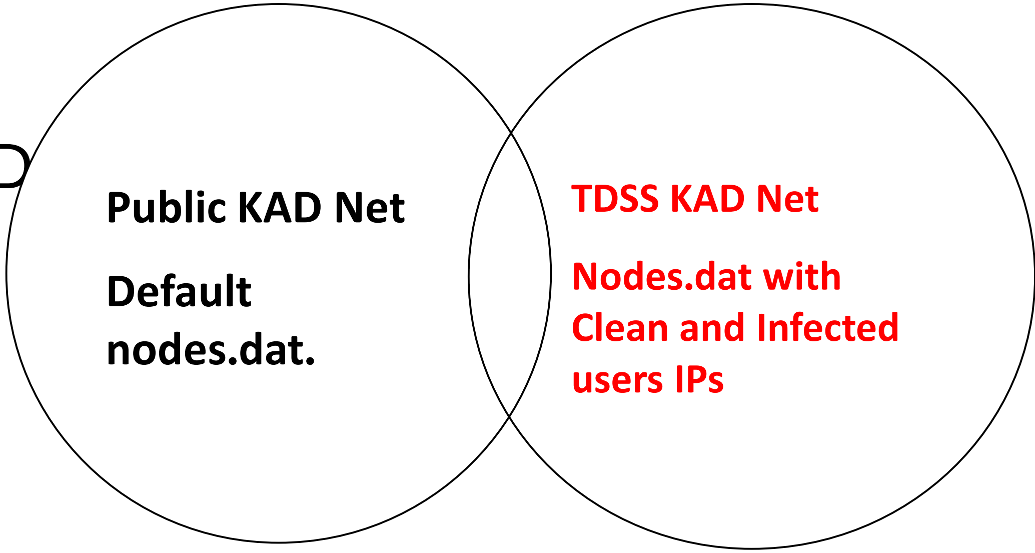
Name: kad.dll

File Name	Size	Source	Type	FileID
kad.dll	25 kB	1	Any	C8E511902C63842F153B568482A3FA3B
kad.dll	25 kB	1	Any	33DC32895EC0831842CB8012B5A87D77
kad.dll	25 kB	1	Any	AD48EAD3E0A4458E4CA7ED712A4C60A
kad.dll	41 kB	1	Any	C522DE42B450FF9777F1B8529D642B02

Analyzing p2p functionality

KAD.DLL functions:

1. SearchCfg – find “ktzrules” file with commands
2. LoadExe – Find and download exe file from KAD
3. ConfigWrite – write in configuration file
4. Search – find specified file in KAD
5. Publish – publish specified file
6. Knock – download new nodes.dat file

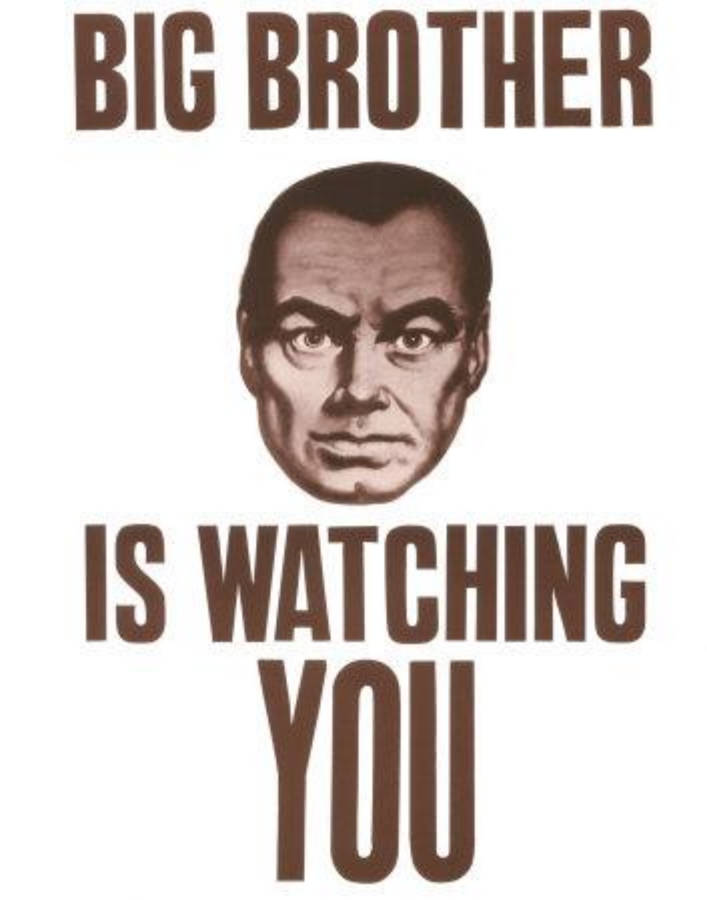


Public KAD Net

Default nodes.dat.

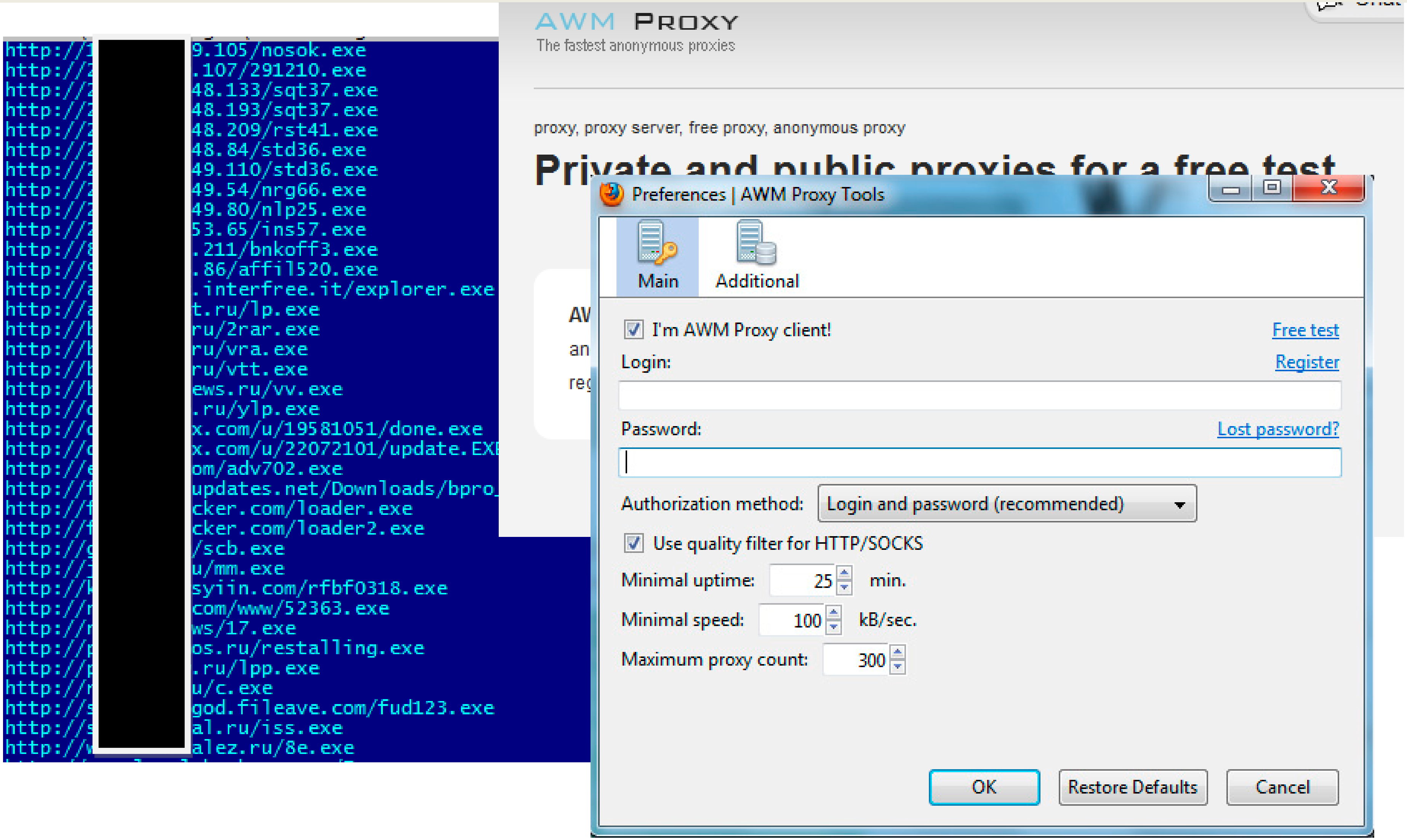
TDSS KAD Net

Nodes.dat with Clean and Infected users IPs



Monitoring active bot

Installs and proxy



```
http://[redacted]9.105/nosok.exe
http://          .107/291210.exe
http://          48.133/sqt37.exe
http://          48.193/sqt37.exe
http://          48.209/rst41.exe
http://          48.84/std36.exe
http://          49.110/std36.exe
http://          49.54/nrg66.exe
http://          49.80/nlp25.exe
http://          53.65/ins57.exe
http://          .211/bnkoff3.exe
http://          .86/affil520.exe
http://          .interfree.it/explorer.exe
http://          t.ru/lp.exe
http://          ru/2rar.exe
http://          ru/vra.exe
http://          ru/vtt.exe
http://          ews.ru/vv.exe
http://          .ru/ylp.exe
http://          x.com/u/19581051/done.exe
http://          x.com/u/22072101/update.EX
http://          om/adv702.exe
http://          updates.net/Downloads/bpro_
http://          cker.com/loader.exe
http://          cker.com/loader2.exe
http://          /scb.exe
http://          u/mm.exe
http://          syiin.com/rfbf0318.exe
http://          com/www/52363.exe
http://          ws/17.exe
http://          os.ru/restalling.exe
http://          .ru/lpp.exe
http://          u/c.exe
http://          god.fileave.com/fud123.exe
http://          al.ru/iss.exe
http://          alez.ru/8e.exe
```

AWM PROXY

The fastest anonymous proxies

proxy, proxy server, free proxy, anonymous proxy

Private and public proxies for a free test

Preferences | AWM Proxy Tools

☑ I'm AWM Proxy client!

Free test

Login:

Register

Password:

Lost password?

Authorization method: Login and password (recommended)

☑ Use quality filter for HTTP/SOCKS

Minimal uptime: 25 min.

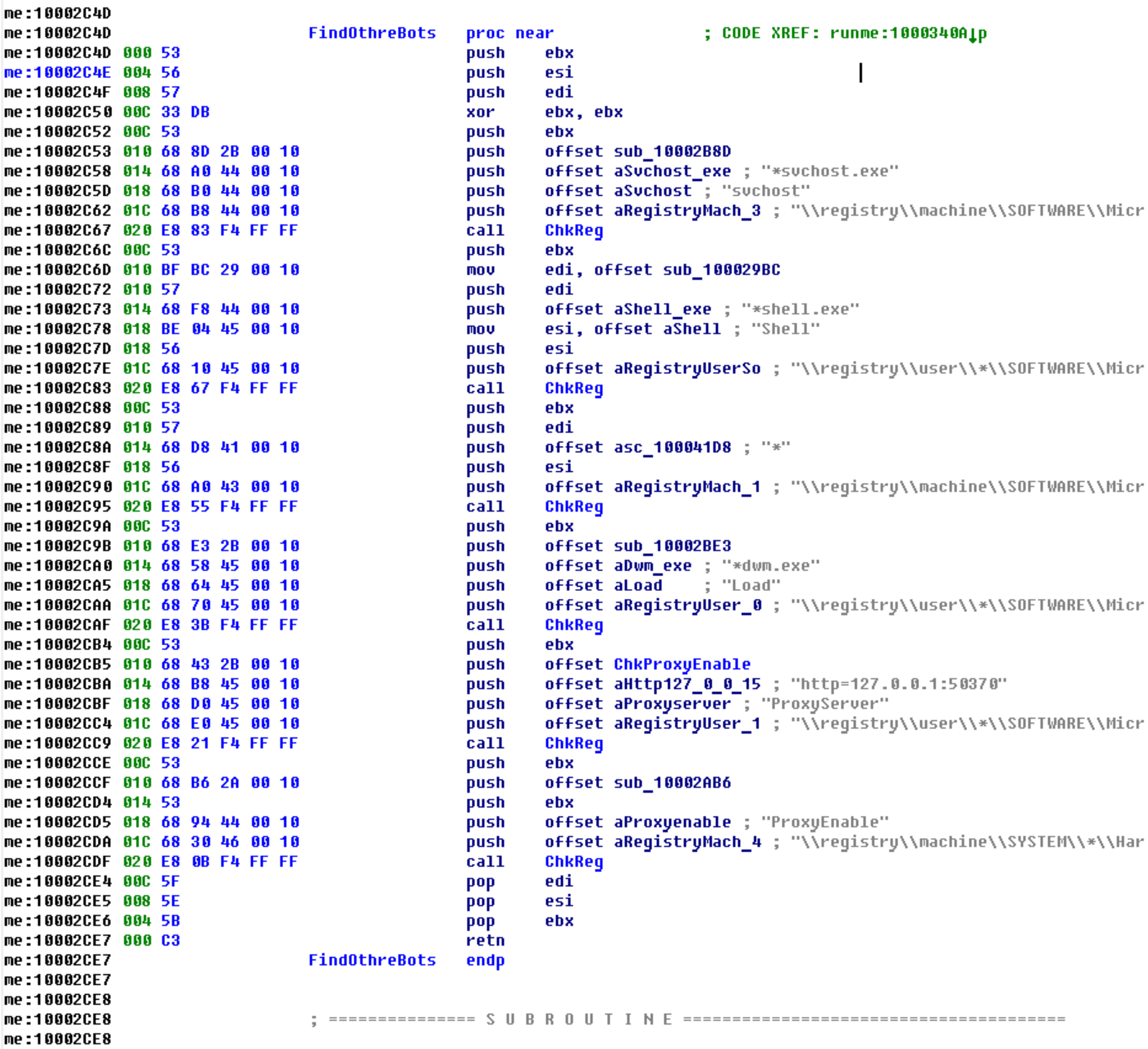
Minimal speed: 100 kB/sec.

Maximum proxy count: 300

Anti-Virus

- Gbot
- ZeuS
- Clishmic
- Optima

Full list includes ~30 malware families name



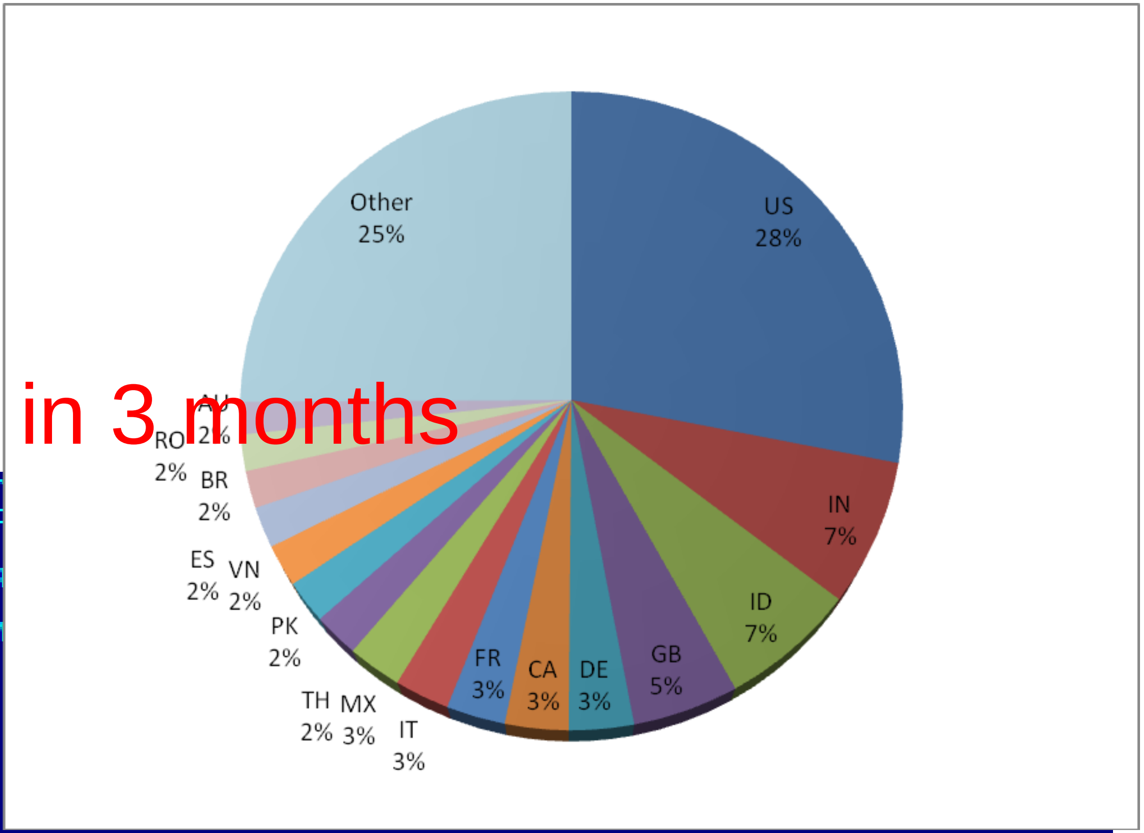
```
me:10002C4D
me:10002C4D                      FindOthreBots  proc near               ; CODE XREF: runme:1000340A↓p
me:10002C4D 000 53                              push    ebx
me:10002C4E 004 56                              push    esi
me:10002C4F 008 57                              push    edi
me:10002C50 00C 33 DB                           xor     ebx, ebx
me:10002C52 00C 53                              push    ebx
me:10002C53 010 68 8D 2B 00 10                  push    offset sub_10002B8D
me:10002C58 014 68 A0 44 00 10                  push    offset aSvchost_exe ; "*svchost.exe"
me:10002C5D 018 68 B0 44 00 10                  push    offset aSvchost ; "svchost"
me:10002C62 01C 68 B8 44 00 10                  push    offset aRegistryMach_3 ; "\\registry\\machine\\SOFTWARE\\Micr
me:10002C67 020 E8 83 F4 FF FF                  call    ChkReg
me:10002C6C 00C 53                              push    ebx
me:10002C6D 010 BF BC 29 00 10                  mov     edi, offset sub_100029BC
me:10002C72 010 57                              push    edi
me:10002C73 014 68 F8 44 00 10                  push    offset aShell_exe ; "*shell.exe"
me:10002C78 018 BE 04 45 00 10                  mov     esi, offset aShell ; "Shell"
me:10002C7D 018 56                              push    esi
me:10002C7E 01C 68 10 45 00 10                  push    offset aRegistryUserSo ; "\\registry\\user\\*\\SOFTWARE\\Micr
me:10002C83 020 E8 67 F4 FF FF                  call    ChkReg
me:10002C88 00C 53                              push    ebx
me:10002C89 010 57                              push    edi
me:10002C8A 014 68 D8 41 00 10                  push    offset asc_100041D8 ; "*"
me:10002C8F 018 56                              push    esi
me:10002C90 01C 68 A0 43 00 10                  push    offset aRegistryMach_1 ; "\\registry\\machine\\SOFTWARE\\Micr
me:10002C95 020 E8 55 F4 FF FF                  call    ChkReg
me:10002C9A 00C 53                              push    ebx
me:10002C9B 010 68 E3 2B 00 10                  push    offset sub_10002BE3
me:10002CA0 014 68 58 45 00 10                  push    offset aDwm_exe ; "*dwm.exe"
me:10002CA5 018 68 64 45 00 10                  push    offset aLoad     ; "Load"
me:10002CAA 01C 68 70 45 00 10                  push    offset aRegistryUser_0 ; "\\registry\\user\\*\\SOFTWARE\\Micr
me:10002CAF 020 E8 3B F4 FF FF                  call    ChkReg
me:10002CB4 00C 53                              push    ebx
me:10002CB5 010 68 43 2B 00 10                  push    offset ChkProxyEnable
me:10002CBA 014 68 B8 45 00 10                  push    offset aHttp127_0_0_15 ; "http=127.0.0.1:50370"
me:10002CBF 018 68 D0 45 00 10                  push    offset aProxyserver ; "ProxyServer"
me:10002CC4 01C 68 E0 45 00 10                  push    offset aRegistryUser_1 ; "\\registry\\user\\*\\SOFTWARE\\Micr
me:10002CC9 020 E8 21 F4 FF FF                  call    ChkReg
me:10002CCE 00C 53                              push    ebx
me:10002CCF 010 68 B6 2A 00 10                  push    offset sub_10002AB6
me:10002CD4 014 53                              push    ebx
me:10002CD5 018 68 94 44 00 10                  push    offset aProxyenable ; "ProxyEnable"
me:10002CDA 01C 68 30 46 00 10                  push    offset aRegistryMach_4 ; "\\registry\\machine\\SYSTEM\\*\\Har
me:10002CDF 020 E8 0B F4 FF FF                  call    ChkReg
me:10002CE4 00C 5F                              pop     edi
me:10002CE5 008 5E                              pop     esi
me:10002CE6 004 5B                              pop     ebx
me:10002CE7 000 C3                              retn
me:10002CE7                      FindOthreBots  endp
me:10002CE7
me:10002CE8
me:10002CE8                      ; ============== S U B R O U T I N E ========================================
me:10002CE8
```

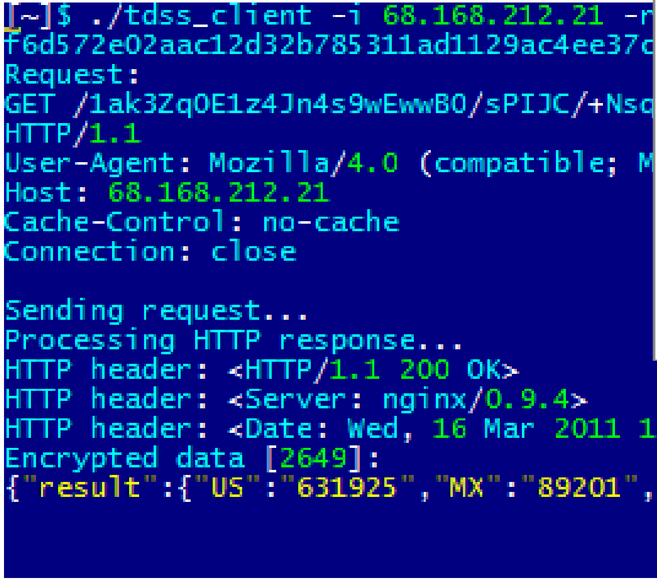
Getting CnC stats

Getting CnC stats

60 proxy CnCs
3 MySQL DBs

5M infected PCs in 3 months





```
[~]$ ./tdss_client -i 68.168.212.21 -r
f6d572e02aac12d32b785311ad1129ac4ee37c
Request:
GET /1ak3Zq0E1z4Jn4s9wEwwB0/sPIJC/+Nsq
HTTP/1.1
User-Agent: Mozilla/4.0 (compatible; M
Host: 68.168.212.21
Cache-Control: no-cache
Connection: close

Sending request...
Processing HTTP response...
HTTP header: <HTTP/1.1 200 OK>
HTTP header: <Server: nginx/0.9.4>
HTTP header: <Date: Wed, 16 Mar 2011 16:41:08 GMT> HTTP header: <Content-Type: text/html> HTTP header:
Encrypted data [2649]:
{"result":{"US":"631925","MX":"89201","GB":"80959","TH":"76313","IN":"71901","FR":"68737","IT":"59532",
```

Summary

•MBR infector – bypass drivers digital signatures protection
•x64 rootkit – TDSS works on every modern Windows system
•Clicker – click banners and links
•Target on Black SEO – promoting web site via Google, Bing, Altavista and more

•P2P botnet – no servers, no centers, sophisticated crypto protection for command file in hidden KAD network.
•Own AV – detects more then 30 malware families
•Clients Proxy –additional anonymizer via infected PCs
•5 millions infected computers

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Prof. Dr. Claudia Ecker

WATCHMEN

03.06.09

Thank You

Qu35t10n5?

Sergey (k1k) Golovanov, Malware Expert

Global Research and Analysis Team

Kaspersky Lab