

Practical Malware Analysis & Triage

Malware Analysis Report

Remote Access Trojan Malware

Aug. 2022 | eyyys3c | v1.0



Table of Contents

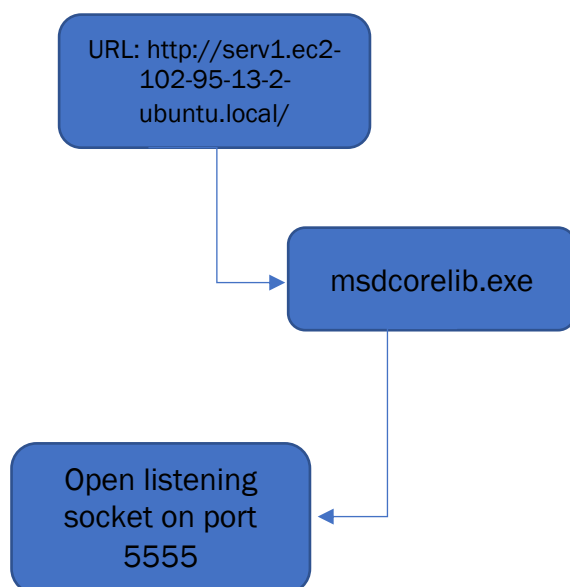
Table of Contents	2
Executive Summary	3
Malware Composition.....	4
msdcorelib.exe.....	Error! Bookmark not defined.
Basic Static Analysis.....	Error! Bookmark not defined.
Basic Dynamic Analysis	6
Advanced Static Analysis.....	8
Advanced Dynamic Analysis.....	9
Indicators of Compromise	10
Network Indicators	10
Host-based Indicators	10
Rules & Signatures.....	11
Appendices.....	12
A. Yara Rules	12
B. Callback URLs	12
C. Decompiled Code Snippets.....	12



Executive Summary

SHA256 hash	248d491f89a10ec3289ec4ca448b19384464329c442bac395f680c4f3a345c8c
-------------	--

Remote Access Trojans (RATs) are malware designed to allow an attacker to remotely control an infected computer. In this sample, the malware will start to query a specific call back URL to download the initial payload *msdcorelib.exe* which will also open a listening socket on the infected machine.





Malware Composition

RAT consists of the following components:

File Name	SHA256 Hash
msdcorelib.exe	0a1ae65540bfbe339805376eff97a85fb56660553916c5ada835c543f7a141e3

`msdcorelib.exe`

The executable that runs after a successfully connecting to the callback URL



Basic Static Analysis

Floss/Strings

```
@SSL support is not available. Cannot connect over SSL. Compile with -d:ssl to enable.  
@https  
@No uri scheme supplied.  
InternetOpenW  
InternetOpenUrlW  
@wininet  
@wininet  
MultiByteToWideChar  
@kernel32  
@kernel32  
MessageBoxW  
@user32  
@user32  
@[+] what command can I run for you  
@[+] online  
@NO SOUP FOR YOU  
@mscordll.exe  
@Nim httpclient/1.0.6  
@msdcorelib.exe  
@AppData\Roaming\Microsoft\Windows\Start Menu\Programs\Startup  
@intrt explr  
@http://serv1.ec2-102-95-13-2-ubuntu.local
```

property	value
md5	689FF2C6F94E31ABBA1DDEBF68BE810E
sha1	69B8ECF6B7CDE185DAED76D66100B6A31FD1A668
sha256	248D491F89A10EC3289EC4CA448B19384464329C442BAC395F680C4F3A345C8C
first-bytes-hex	4D 5A 90 00 03 00 00 00 04 00 00 00 FF FF 00 00 B8 00 00 00 00 00 00 00 40 00 00 00 00 00 00 00
first-bytes-text	M Z @
file-size	519131 bytes
entropy	6.057
imphash	E925C3C5D8AB310DF586608885AEA0E7
signature	n/a
tooling	n/a
entry-point	48 83 EC 28 48 8B 05 C5 A6 01 00 C7 00 01 00 00 00 E8 0A 39 01 00 E8 A5 FC FF 90 90 48 83 C4 28
file-version	n/a
description	n/a
file-type	executable
cpu	64-bit
subsystem	GUI
compiler-stamp	0x613E2B11 (Sun Sep 12 16:30:09 2021 UTC)
debugger-stamp	n/a
resources-stamp	0x00000000 (Thu Jan 01 00:00:00 1970 UTC)
import-stamp	0x00000000 (Thu Jan 01 00:00:00 1970 UTC)
exports-stamp	n/a



Basic Dynamic Analysis

Network-Based Signatures

No.	Time	Source	Destination	Protocol	Length	Info
4	0.000534977	10.0.0.4	10.0.0.3	HTTP	180	GET / 9109/1.1
5	0.000621553	10.0.0.3	10.0.0.4	TCP	84	80 → 17560 [ACK] Seq=1 Ack=86 Win=64256 Len=0
6	0.018297680	10.0.0.3	10.0.0.4	TCP	284	80 → 17560 [PSH, ACK] Seq=1 Ack=86 Win=64256 Len=150 [TCP segment of a reassembled PDU]
7	0.018689737	10.0.0.4	10.0.0.3	TCP	60	17560 → 80 [ACK] Seq=86 Ack=151 Win=261888 Len=0
8	0.018696277	10.0.0.3	10.0.0.4	HTTP	312	HTTP/1.1 200 OK (text/html)
9	0.018977247	10.0.0.4	10.0.0.3	TCP	60	17560 → 80 [ACK] Seq=86 Ack=409 Win=261632 Len=0
10	0.020808528	10.0.0.4	10.0.0.3	TCP	66	17561 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
11	0.020834415	10.0.0.3	10.0.0.4	TCP	66	80 → 17561 [SYN, ACK] Seq=0 Ack=1 Win=64240 Len=0 MSS=1460 SACK_PERM=1 WS=128
12	0.021151529	10.0.0.4	10.0.0.3	TCP	60	17561 → 80 [ACK] Seq=1 Ack=1 Win=262056 Len=0
13	0.021011514	10.0.0.4	10.0.0.3	HTTP	180	GET /msdcorelib.exe HTTP/1.1
14	0.021049079	10.0.0.3	10.0.0.4	TCP	84	80 → 17561 [ACK] Seq=1 Ack=150 Win=04128 Len=0

▼ Hypertext Transfer Protocol

GET / HTTP/1.1\r\n
User-Agent: Intri explor\r\n
Host: serv1.ec2-102-95-13-2-ubuntu.local\r\n
\r\n
[Full request URI: http://serv1.ec2-102-95-13-2-ubuntu.local/]
[HTTP request 1/1]
[Response in frame: 8]

Potential File Download: **msdcorelib.exe**

Host-Based Indicator

Event Properties

Event Process Stack

Date: 7/25/2022 12:07:28.2652452 AM

Thread: 1900

Class: File System

Operation: CreateFile

Result: SUCCESS

Path: **C:\Users\Anya\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\Startup\mscordll.exe**

Duration: 0.0012925

Desired Access: Generic Write, Read Attributes

Disposition: OverwriteIf

Options: Synchronous IO Non-Alert, Non-Directory File

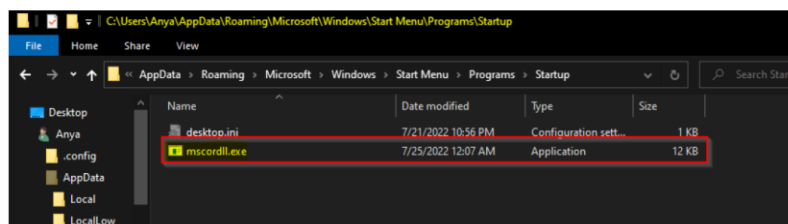
Attributes: N

ShareMode: Read, Write

AllocationSize: 0

OpenResult: Created

Persistence Binary



Remote Access Trojan Malware
Aug 2022
v1.0



encoded base64 from port 5555

Command Injection Capability:

Remote Access Trojan Malware
Aug 2022
v1.0



Advanced Static Analysis

```
[0x004025c0]
72: int main (char **argv);
; var int32_t var_bp_4h @ ebp-0x4
; var int32_t var_4h @ esp+0x14
; var int32_t var_8h @ esp+0x18
; var int32_t var_ch @ esp+0x1c
; arg char **argv @ esp+0x34
lea     ecx, [argv]
and     esp, 0xffffffff
push    dword [ecx - 4]
push    ebp
mov     ebp, esp
push    ecx
sub     esp, 0x14
call    fcn.004015e0
mov     eax, dword [section..data] ; 0x403000
mov     dword [var_4h], 0
mov     dword [var_ch], eax
mov     eax, dword [0x4053d8]
mov     dword [var_8h], eax
mov     eax, dword [0x4053dc]
mov     dword [esp], eax
call    fcn.00401510
mov     ecx, dword [var_bp_4h]
sub     esp, 0x10
leave
```

Decompiler (main)

```
/* jsdec pseudo code output */
/* C:\Users\Anyu\Desktop\mscordll.exe @ 0x4025c0 */
#include <stdint.h>
```

```
int32_t main (char ** argv) {
    int32_t var_bp_4h;
    int32_t var_4h;
    int32_t var_8h;
    int32_t var_ch;
    ecx = &argv;
    fcn_004015e0 ();
    eax = *(section..data);
    var_4h = 0;
    var_ch = eax;
    eax = *(0x4053d8);
    var_8h = *(0x4053d8);
    eax = *(0x4053dc);
    *(esp) = eax;
    fcn_00401510 ();
    ecx = var_bp_4h;
    esp = ecx - 4;
    return eax;
}
```




Advanced Dynamic Analysis

The screenshot shows a debugger interface with the following components:

- CPU Window:** Displays assembly instructions for the module `ntdll.dll`. The instructions are in x86 assembly, including `jmp ntdll.771818AC`, `xor eax, eax`, `inc eax`, `ret`, `mov esp, dword ptr ss:[ebp-18]`, `mov dword ptr ss:[ebp-4], FFFFFFFF`, `mov ecx, dword ptr ss:[ebp-10]`, `mov dword ptr [6]: ecx`, `pop ecx`, `pop edi`, `pop esi`, `pop ebx`, `leave`, `ret`, `mov eax, dword ptr [6]: [30]`, `mov dword ptr ds:[771F6784], ecx`, `mov dword ptr ds:[771F6788], ecx`, `mov byte ptr ds:[eax], cl`, `cmp byte ptr ds:[eax+2], cl`, `je ntdll.771818E3`, `call ntdll.77181877`, and `vmr eax, eax`.
- Memory Window:** Shows a dump of memory starting at address `770D1000`. The dump includes hex values and ASCII representations. For example, the first few lines are:
Address Hex: 770D1000 16 00 18 00 28 7C 00 77 14 00 16 00 78 74 00 77 ...[.]w...xt.w
770D1010 00 00 02 00 EC 5D 00 77 0E 00 10 00 00 7E 00 77 ...[]w...w
770D1020 0C 00 0E 00 E0 7D 00 77 08 00 0A 00 08 73 00 77 ...[]w...w
770D1030 06 00 08 00 D0 7D 00 77 06 00 08 00 E0 7D 00 77 ...[]w...w
770D1040 06 00 08 00 D8 7D 00 77 06 00 08 00 E8 7D 00 77 ...[]w...w
770D1050 1C 00 1E 00 D4 74 00 77 68 4C 73 45 00 00 00 01 ...[]w...w
770D1060 00 39 1F 77 00 00 00 00 60 17 00 77 90 D8 13 77 .9.w...w
770D1070 20 00 22 00 78 80 00 77 84 00 86 00 E0 7F 00 77 .X.w...w
- Command Line:** Shows the command: `Command: Commands are comma separated (like assembly instructions): mov eax, ebx`



Indicators of Compromise

The full list of IOCs can be found in the Appendices.

Network Indicators

No.	Time	Source	Destination	Protocol	Length	Info
4	0.000534977	10.0.0.4	10.0.0.3	HTTP	139	GET / HTTP/1.1
5	0.000541533	10.0.0.3	10.0.0.4	TCP	54	80 → 17560 [ACK] Seq=1 Ack=86 Win=64256 Len=0
6	0.018297689	10.0.0.3	10.0.0.4	TCP	264	80 → 17560 [PSH, ACK] Seq=1 Ack=86 Win=64256 Len=150 [TCP segment of a reassembled PDU]
7	0.018690737	10.0.0.4	10.0.0.3	TCP	60	17560 → 80 [ACK] Seq=86 Ack=151 Win=261888 Len=0
8	0.018695277	10.0.0.3	10.0.0.4	HTTP	312	HTTP/1.1 200 OK (text/html)
9	0.018977247	10.0.0.4	10.0.0.3	TCP	60	17560 → 80 [ACK] Seq=86 Ack=409 Win=261632 Len=0
10	0.020808528	10.0.0.4	10.0.0.3	TCP	66	17561 → 80 [SYN] Seq=0 Win=64240 Len=0 MSS=1460 WS=256 SACK_PERM=1
11	0.020834415	10.0.0.3	10.0.0.4	TCP	66	80 → 17561 [SYN, ACK] Seq=0 Ack=1 Win=64240 Len=0 MSS=1460 SACK_PERM=1 WS=128
12	0.021151529	10.0.0.4	10.0.0.3	TCP	60	17561 → 80 [ACK] Seq=1 Ack=1 Win=262656 Len=0
13	0.021611514	10.0.0.4	10.0.0.3	HTTP	180	GET /msocore110.exe HTTP/1.1
14	0.021649679	10.0.0.3	10.0.0.4	TCP	54	80 → 17561 [ACK] Seq=1 Ack=133 Win=64128 Len=0

▼ Hypertext Transfer Protocol

GET / HTTP/1.1\r\n

User-Agent: Intriexpl\r\n\r\n

Host: serv1.ec2-102-95-13-2-ubuntu.local\r\n\r\n

\r\n\r\n

[Full request URI: http://serv1.ec2-102-95-13-2-ubuntu.local/]

[HTTP request 1/1]

[Response in frame: 8]

Host-based Indicators

C:\Users\AnyA\AppData\Roaming\Microsoft\Windows\Start Menu\Programs\Startup				
File	Home	Share	View	
AppData > Roaming > Microsoft > Windows > Start Menu > Programs > Startup				
Desktop	AnyA	.config	AppData	Local
LocalLow				
Name	Date modified	Type	Size	
desktop.ini	7/21/2022 10:56 PM	Configuration sett...	1 KB	
mscordll.exe	7/25/2022 12:07 AM	Application	12 KB	



Rules & Signatures

A full set of YARA rules is included in Appendix A.

```
1 rule Yara_RAT {
2
3     meta:
4         last_updated = "2022-08-22"
5         author = "eyyys3c"
6         description = "A sample Yara rule for PMAT RAT Malware"
7
8     strings:
9         // Fill out identifying strings and other criteria
10        $string1 = "NO SOUP FOR YOU"
11        $string2 = "nim"
12        $PE_magic_byte = "MZ"
13
14    condition:
15        // Fill out the conditions that must be met to identify the binary
16        $PE_magic_byte at 0 and
17        ($string1 and $string2)
18
19 }
20
```

C:\Users\Anya\Desktop

λ yara32 yara_template.yara RAT.Unknown.exe -s -w -p 32

Yara_RAT RAT.Unknown.exe

0x18e10:\$string1: NO SOUP FOR YOU

0x15e15:\$string2: nim

0x15e4c:\$string2: nim

0x1610e:\$string2: nim

0x1659a:\$string2: nim

0x16ad6:\$string2: nim

0x16b55:\$string2: nim

0x16e54:\$string2: nim

0x16eb8:\$string2: nim

0x16f8e:\$string2: nim

0x16fba:\$string2: nim

0x17357:\$string2: nim

0x17477:\$string2: nim

0x174f7:\$string2: nim

0x1767a:\$string2: nim



Appendices

A. Yara Rules

```
1 rule Yara_RAT {
2
3     meta:
4         last_updated = "2022-08-22"
5         author = "eyyys3c"
6         description = "A sample Yara rule for PMAT RAT Malware"
7
8     strings:
9         // Fill out identifying strings and other criteria
10        $string1 = "NO SOUP FOR YOU"
11        $string2 = "nim"
12        $PE_magic_byte = "MZ"
13
14    condition:
15        // Fill out the conditions that must be met to identify the binary
16        $PE_magic_byte at 0 and
17        ($string1 and $string2)
18
19 }
20
```

B. Callback URLs

Domain	Port
hxxp://serv1.ec2-102-95-13-2-ubuntu.local/	80

C. Decompiled Code Snippets

```
Decompiler (main)
/* jsdec pseudo code output */
/* C:\Users\Anyu\Desktop\mscordll.exe @ 0x4025c0 */
#include <stdint.h>

int32_t main(char ** argv) {
    int32_t var_bp_4h;
    int32_t var_4h;
    int32_t var_8h;
    int32_t var_ch;
    ecx = &argv;
    fcn_004015e0 ();
    eax = *(section..data);
    var_4h = 0;
    var_ch = eax;
    eax = *(0x4053d8);
    var_8h = *(0x4053d8);
    eax = *(0x4053dc);
    *(esp) = eax;
    fcn_00401510 ();
    ecx = var_bp_4h;
    esp = ecx - 4;
    return eax;
}
```