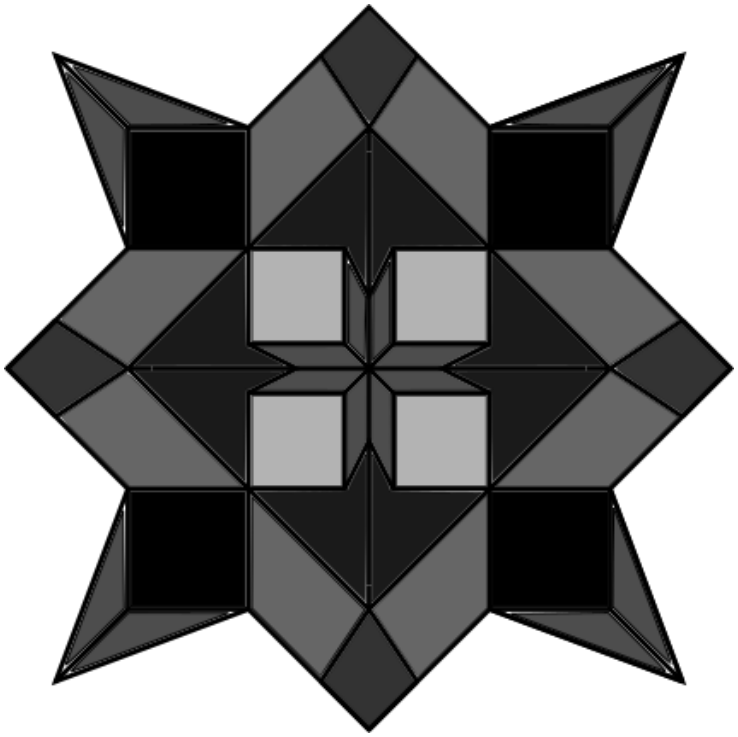


Malware Analysis Report

Remote Access Trojan-Reverse Shell

Aug 2022 | Jan Duinkerken | v1.1

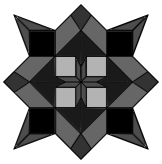


Table of Contents

Executive Summary

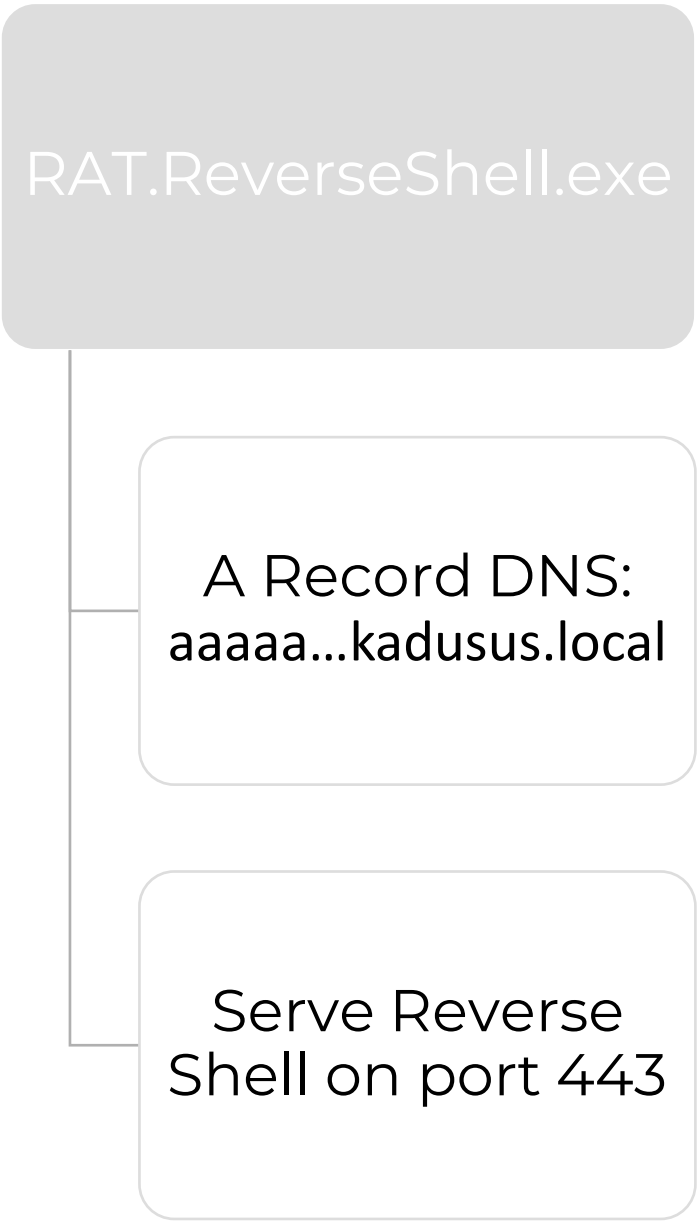
SHA256 hash	481eae82ac4cd1a9cfadc026a628b18d7b4c54f50385d28c505fbcb3e999b8b0

This Trojan's main functionality is creating a Reverse shell listening on open on port 443 with the purpose of letting the attacker execute code remotely and have complete access to our machines

YARA signature rules are attached in Appendix A. Malware sample and hashes have been submitted to VirusTotal for further examination.

High-Level Technical Summary

This is a really basic trojan; it consists of just one file that launches an A record DNS query to aaaaaaaaaaaaaaaaaaa.kadusus.local and if it gets a response it then serves a shell using port 443



Basic Static Analysis

After running floss agains the RAT sample we only got one interesting result:

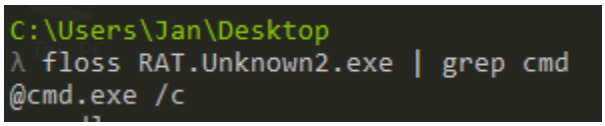
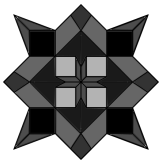


Fig 1: FLOSS Command Example Output

This tells us the Trojan is calling the cmd, but we still don't know what commands it will run or any more concrete information on how it deploys the shell and when it does

We also analyzed the binary using PEView and PEStudio and didn't find anything incriminating, but it is interesting that this is a 64 bit executable.



Basic Dynamic Analysis

At first glance the Trojan doesn’t seem to do anything, it doesn’t spawn a shell or create any files. It is only if the domain aaaa…kadusus.local is reachable that it opens a TCP connection on port 443 and serves the reverse shell.

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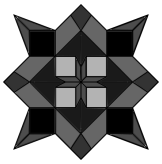


Advanced Static Analysis

Running the binary through a decompiler confirms our suspicions that this sample is written in Nim, due to the fact that the main function is divided in 4 stages: main, WinMain, NimMain and NimMainInner.

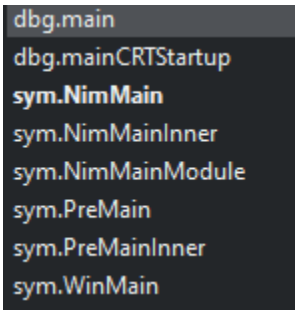
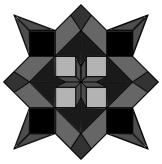


Fig 2: Main Methods as Shown by Cutter

Some interesting parts of the assembly code can be found in Appendix C.



Advanced Dynamic Analysis

By running the executable through a debugger (x64dbg), we were not able to find any more important information. So, we can conclude that the only functionality of this trojan is the one we discovered during the Basic Dynamic Analysis section of this report

Indicators of Compromise

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

Network Indicators

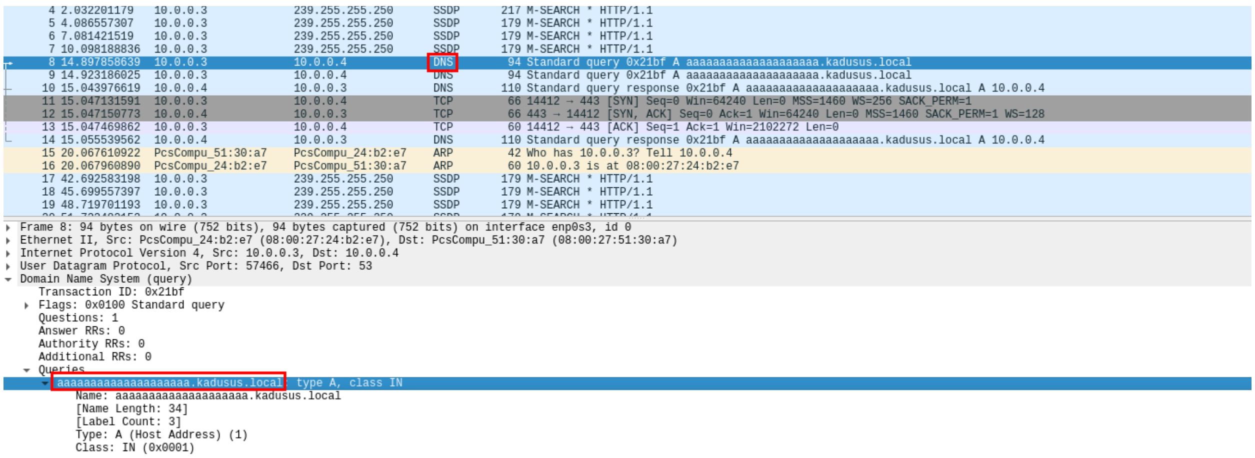


Fig 3: WireShark Packet Capture of DNS Query

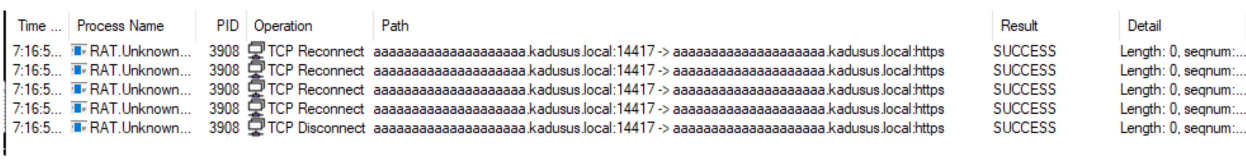


Fig 4: Trojan Serving a Reverse Shell on Port 443.

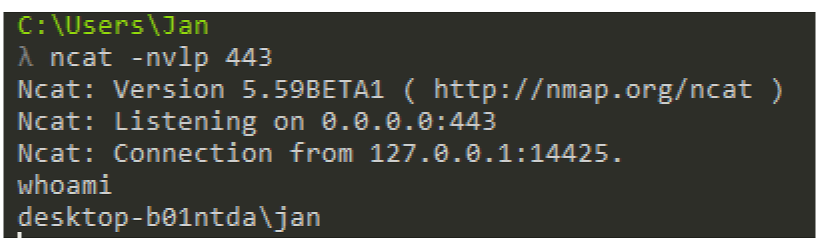
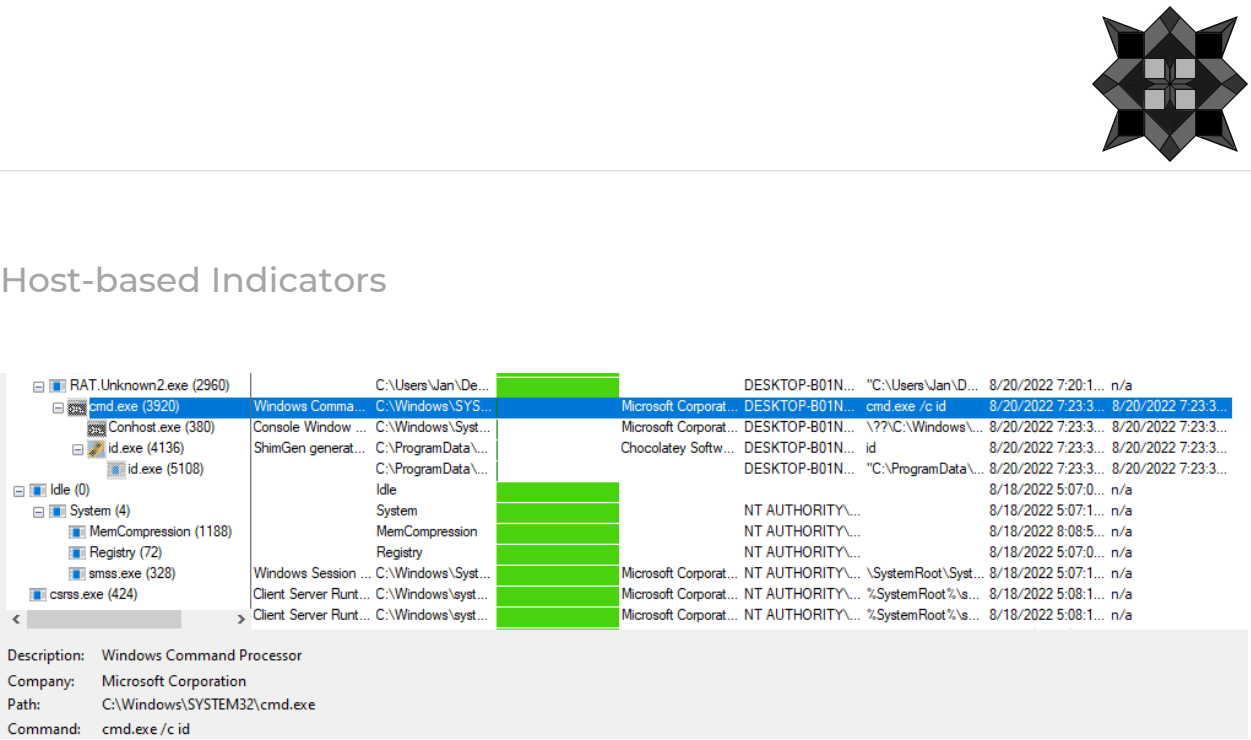


Fig 5: Reverse Shell

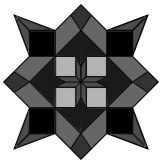


Host-based Indicators

RAT.Unknown2.exe (2960)		C:\Users\Jan\De...			DESKTOP-B01N...	"C:\Users\Jan\D...	8/20/2022 7:20:1...	n/a
cmd.exe (3920)	Windows Comma...	C:\Windows\SYS...		Microsoft Corporat...	DESKTOP-B01N...	cmd.exe /c id	8/20/2022 7:23:3...	8/20/2022 7:23:3...
Conhost.exe (380)	Console Window ...	C:\Windows\Syst...		Microsoft Corporat...	DESKTOP-B01N...	\??\C:\Windows\...	8/20/2022 7:23:3...	8/20/2022 7:23:3...
id.exe (4136)	ShimGen generat...	C:\ProgramData\...		Chocolatey Softw...	DESKTOP-B01N...	id	8/20/2022 7:23:3...	8/20/2022 7:23:3...
id.exe (5108)		C:\ProgramData\...			DESKTOP-B01N...	"C:\ProgramData\...	8/20/2022 7:23:3...	8/20/2022 7:23:3...
Idle (0)		Idle					8/18/2022 5:07:0...	n/a
System (4)		System			NT AUTHORITY\...		8/18/2022 5:07:1...	n/a
MemCompression (1188)		MemCompression			NT AUTHORITY\...		8/18/2022 8:08:5...	n/a
Registry (72)		Registry			NT AUTHORITY\...		8/18/2022 5:07:0...	n/a
smss.exe (328)	Windows Session ...	C:\Windows\Syst...		Microsoft Corporat...	NT AUTHORITY\...	\SystemRoot\Syst...	8/18/2022 5:07:1...	n/a
csrss.exe (424)	Client Server Runt...	C:\Windows\syst...		Microsoft Corporat...	NT AUTHORITY\...	%SystemRoot%\s...	8/18/2022 5:08:1...	n/a
	Client Server Runt...	C:\Windows\syst...		Microsoft Corporat...	NT AUTHORITY\...	%SystemRoot%\s...	8/18/2022 5:08:1...	n/a

Description: Windows Command Processor
Company: Microsoft Corporation
Path: C:\Windows\SYSTEM32\cmd.exe
Command: cmd.exe /c id

Fig 6: RAT Process Spawning a Child CMD Process to Run the Remote Commands



Rules & Signatures

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

```
C:\Users\Jan\Desktop
λ yara32 rule.yara RAT.Unknown2.exe.malz -s -w -p 32
RAT_ReverseShell RAT.Unknown2.exe.malz
0xfa00:$string1: kadusus
0xf910:$string2: cmd
0x136f4:$string2: cmd
0x20c85:$string2: cmd
0x4ff72:$string2: cmd
0x4ffd1:$string2: cmd
0x4fff3:$string2: cmd
0x50018:$string2: cmd
0x50036:$string2: cmd
0x55aec:$string2: cmd
0x56806:$string2: cmd
0x635c6:$string2: cmd
0x6562a:$string2: cmd
0x670ac:$string2: cmd
0x6bd9e:$string2: cmd
0x6bdbb:$string2: cmd
0x6c48f:$string2: cmd
0x6df48:$string2: cmd
0x6df75:$string2: cmd
0x0:$PE_magic_byte: MZ
```

Fig 7: YARA Rules Firing

Appendices

A. Yara Rules

Full Yara repository located at: http://github.com/HuskyHacks/PMAT-lab

```
rule RAT_ReverseShell {

    meta:
        last_updated = "2022-08-23"
        author = "Jan Duinkerken"
        description = "Rule for identifying the kadusus trojan"

    strings:
        $string1 = "kadusus" ascii
        $string2 = "cmd"
        $PE_magic_byte = "MZ"

    condition:
        $PE_magic_byte at 0 and
        $string1 and
        $string2
}
```

B. DNS Record Queries

Domain
aaaaaaaaaaaaaaaaaaaa.kadusus.local

C. Decompiled Code Snippets

```
[0x0040ce36]
 mov     rcx, r9
 lea     rdx, [0x00411940]
 call    appendString.part.0         ; sym.appendString.part.0_4
 lea     rcx, [0x0042b7d0]
 mov     rdx, r9
 call    asgnRef                     ; sym.asgnRef_3
 mov     r9d, 1
 mov     r8d, 6
 mov     edx, 1
 mov     word [0x0042b810], 0x1bb
 mov     ecx, 2
 call    newSocket__Jq0qsT9cdAR4d7YGWWa2QIA ; sym.newSocket__Jq0qsT9cdAR4d7YGWWa2QIA
 lea     rcx, [0x0042b7e0]
 mov     rdx, rax
 call    asgnRef                     ; sym.asgnRef_3
 mov     rax, qword [0x00412310]
 lea     rcx, [env]                  ; jmpbuf env
 mov     byte [var_20h], 0
 mov     rdx, qword [rax]
 mov     qword [var_130h], rdx
 lea     rdx, [var_130h]
 mov     qword [rax], rdx
 mov     rdx, rbp
 call    _setjmp                     ; sym._setjmp ; int setjmp(jmpbuf env)
 cdqe
 mov     qword [var_128h], rax
 test    rax, rax
 jne     0x40cec8
```

```
[0x0040cec3]
 call    command__M5FdzVu9bbC9c8rPhMsT9axZA ; sym.command__M5FdzVu9bbC9c8rPhMsT9axZA
```

Fig 8: Create New Socket and Execute Command

Fig 9: Creating the DNS Record Query Address at Runtime