Raytheon Blackbird Technologies

20150911-278-VB Gamker

For

SIRIUS Task Order PIQUE

Submitted to:

U.S. Government

Submitted by:

Raytheon Blackbird Technologies, Inc.

13900 Lincoln Park Drive Suite 400 Herndon, VA 20171

11 September 2015

This document includes data that shall not be disclosed outside the Government and shall not be duplicated, used, or disclosed—in whole or in part—for any purpose other than to evaluate this concept. If, however, a contract is awarded to Blackbird as a result of—or in connection with—the submission of these data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the resulting contract. This restriction does not limit the Government's right to use information contained in these data if they are obtained from another source without restriction.

This document contains commercial or financial information, or trade secrets, of Raytheon Blackbird Technologies, Inc. that are confidential and exempt from disclosure to the public under the Freedom of Information Act, 5 U.S.C. 552(b)(4), and unlawful disclosure thereof is a violation of the Trade Secrets Act, 18 U.S.C. 1905. Public disclosure of any such information or trade secrets shall not be made without the prior written permission of Raytheon Blackbird Technologies, Inc.

SECRET//NOFORN

(U) Table of Contents

1.0	(U)	Analysis Summary	1
2.0	(U)	Description of the Technique	1
3.0	(U)	Identification of Affected Applications	2
4.0	(U)	Related Techniques	2
5.0	(U)	Configurable Parameters	2
6.0	(U)	Exploitation Method and Vectors	2
7.0	(U)	Caveats	2
8.0	(U)	Risks	2
		Recommendations	

1.0 (U) Analysis Summary

(S//NF) This report details the code injection and API hooking methods of an information stealing Trojan known as Gamker. This August 2015 three-page report from Virus Bulletin contains more technical detail than many 30+ page reports from other sources. We recommend continued review of Virus Bulletin reports going forward.

(S//NF) Gamker begins by decrypting itself using a simple XOR method and parsing the PEB to get the ImageBase of kernel32.dll. It then parses the PE header of kernel32.dll in memory to find the address of the export table, which is used to search for GetProcAddress(). Next, the following APIs are resolved using GetProcAddress(): LoadLibraryA(), VirtualAlloc(), VirtualFree(), VirtualProtect(), ExitThread(), and GetModuleHandleExW(). There is nothing unique or particularly interesting in how Gamker resolves its APIs.

(S//NF) Gamker uses an interesting process for self-code injection that ensures nothing is written to disk. We defer to the Sponsor on making a recommendation for PoC development of this self-code injection technique as we are unaware if a similar technique already exists in their inventory. After the APIs are resolved as described in the preceding paragraph, Gamker decrypts a few more blocks of code. On executing the second decryption routine, a new executable image is placed in memory, complete with MZ/PE header and body. Gamker parses the PE to determine its size and changes the memory protection to PAGE_EXECUTE_READWRITE using VirtualProtect(). The current module's memory space is cleared by filling it with zeroes and the MZ/PE header of the new executable is copied to the location of the current module. Then Gamker copies each section of the new executable to the current module's image area, calculating the exact location where each section should be written. A custom loader, as it were. The IAT requires fixing after the code is copied. This self-code injection technique should help avoid detection by PSPs.

(S//NF) Gamker uses routine API hooking with one interesting variation that we haven't seen before, the use of an unusual Assembly language instruction twice in its hooking routine instead of using the more normal **mov** instruction, thereby providing some obfuscation:

lock cmpxchng8b qword ptr [esi] (compare exchange 8-byte)

The first use of this unusual Assembly language instruction assists in making a copy of the original NtQueryInformationProcess(), the API being hooked. The second use implements the hook and the first few bytes of the hooked NtQueryInformationProcess() becomes a jump to the hook function.

(S//NF) We defer to Sponsor on whether or not Gamer's self-code injection technique should be developed as a PoC.

2.0 (U) Description of the Technique

(S//NF) In-memory only code injection via custom loader that copies header and all sections into memory space reserved and fixing up IAT.

3.0 (U) Identification of Affected Applications

(U) Windows.

4.0 (U) Related Techniques

(S//NF) Malware loader.

5.0 (U) Configurable Parameters

(U) Varied.

6.0 (U) Exploitation Method and Vectors

(S//NF) No exploitation methods or attack vectors were discussed in this report.

7.0 (U) Caveats

(U) None.

8.0 (U) Risks

(S//NF) The risk associated with the development of a custom in-memory loader/code injector is moderate to high due to technical complexity. We estimate the development of this PoC will require three FTE weeks.

9.0 (U) Recommendations

(S//NF) We defer to Sponsor on whether or not Gamer's self-code injection technique should be developed as a PoC.