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Verbatim Store N Go Secure Portable HDD GD25LK01-3637-C VER4.0 Risky Crypto

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When analyzing the external SSD Verbatim Store 'n' Go Secure Portable HDD, Matthias Deeg found out that the firmware of the USB-to-SATA bridge controller INIC-3637EN uses AES-256 with the ECB (Electronic Codebook) mode. This operation mode of block ciphers like AES encrypts identical plaintext data, in this case blocks of 16 bytes, always to identical ciphertext data. For some data, for instance bitmap images, the lack of the cryptographic property called diffusion concerning the ECB mode can leak sensitive information even in encrypted data.

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SYSS-2022-006 Advisory ID:

Store 'n' Go Secure Portable HDD Product:

Manufacturer: Affected Version(s): Tested Version(s): Verbatim GD25LK01-3637-C VER4.0 GD25LK01-3637-C VER4.0

Use of a Cryptographic Primitive with a Risky Implementation (CWE-1240) Vulnerability Type:

Risk Level: Solution Status: Open Manufacturer Notification: 2022-01-31 Solution Date:

Public Disclosure: 2022-06-08 CVE-2022-28382

CVE Reference: Author of Advisory: Matthias Deeg (SySS GmbH)

Overview:

The Verbatim Store 'n' Go Secure Portable HDD is a portable USB drive with AES 256-bit hardware encryption and a built-in keypad for passcode entry.

The manufacturer describes the product as follows:

"The AES 256-bit Hardware Encryption seamlessly encrypts all data on the drive in real-time with a built-in keypad for password input. The SSD does not store passwords in the computer or system's volatile memory making it far more secure than software encryption. Also, if it falls into the wrong hands, the SSD will lock and require re-formatting after 20 failed password attempts."[1]

Due to the use of an insecure encryption AES mode (Electronic Codebook), an attacker may be able to extract information even from $\,$ encrypted data, for example by observing repeating byte patterns.

Vulnerability Details:

When analyzing the external SSD Verbatim Store 'n' Go Secure Portable HDD, Matthias Deeg found out that the firmware of the USB-to-SATA bridge controller INIC-3637EN uses AES-256 with the ECB (Electronic Codebook)

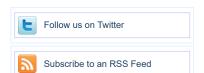
This operation mode of block ciphers like AES encrypts identical plaintext data, in this case blocks of 16 bytes, always to identical ciphertext data.

For some data, for instance bitmap images, the lack of the cryptographic property called diffusion concerning the ECB mode can leak sensitive information even in encrypted data.

One famous example for this is an ECB-encrypted image of the TUX penguin, which, for instance, is referenced in the Wikipedia article about block cipher modes of operation[2] to illustrate this issue.

Thus, the use of the ECB operation mode can put the confidentiality of specific information at risk, even in an encrypted form.

Additionally, in attack scenarios where an attacker has short-time physical access to a Verbatim Store 'n' Go Portable Secure HDD, and later returns it to its legitimate owner, the attacker may be able to compromise the integrity of the stored data by exploiting the fact that the same 16-byte plaintext blocks result in the same 16-byte ciphertext blocks, by replacing specific encrypted 16-byte blocks with other ones.



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Intrusion Detection (866) BSD (370) Java (2,888) CentOS (55) Proof of Concept (PoC): JavaScript (817) Cisco (1,917) The same 16 byte long plaintext pattern was written several times to an unlocked Verbatim Store 'n' Go Secure Portable HDD. Debian (6,620) Kernel (6.255) When the SSD was then read using another SSD enclosure, the same 16 byte long ciphertext pattern could be observed for the corresponding plaintext data. Local (14,173) Fedora (1,690) Magazine (586) FreeBSD (1,242) Overflow (12,390) Gentoo (4,272) Solution: **HPUX** (878) Perl (1,417) SySS GmbH is not aware of a solution for the described security issue. PHP (5,087) iOS (330) Disclosure Timeline: Proof of Concept (2,290) iPhone (108) 2022-01-31: Vulnerability reported to manufacturer 2022-02-11: Vulnerability reported to manufacturer again 2022-03-07: Vulnerability reported to manufacturer again 2022-06-08: Public release of security advisory Protocol (3,426) IRIX (220) Python (1,449) Juniper (67) Remote (30,009) Linux (44,118) Root (3,496) Mac OS X (684) References: [1] Product website for Verbatim Store 'n' Go Secure Portable HDD Ruby (594) Mandriva (3,105) https://www.verbatim-europe.co.uk/en/prod/store-n-go-portable-ssd-with-keypad-access-256gb-53402/ NetBSD (255) Scanner (1,631) [2] Wikipedia article about block cipher mode of operation Security Tool (7,768) OpenBSD (479) https://en.wikipedia.org/wiki/Block_cipher_mode_of_operation#Electronic_codebook_(ECB) [3] SySS Security Advisory SYSS-2022-006 Shell (3,098) RedHat (12,339) https://www.syss.de/fileadmin/dokumente/Publikationen/Advisories/SYSS-2022-006.txt Shellcode (1,204) Slackware (941) [4] SySS GmbH, SySS Responsible Disclosure Policy https://www.syss.de/en/responsible-disclosure-policy Sniffer (885) Solaris (1,607) Spoof (2,165) SUSE (1,444) Credits: SQL Injection (16,089) Ubuntu (8.147) This security vulnerability was found by Matthias Deeg of SySS GmbH. TCP (2,377) UNIX (9,150) E-Mail: matthias.deeg (at) syss.de
Public Key:
https://www.syss.de/fileadmin/dokumente/Materialien/PGPKeys/Matthias_Deeg.asc Trojan (685) UnixWare (185) Key fingerprint = D1F0 A035 F06C E675 CDB9 0514 D9A4 BF6A 34AD 4DAB **UDP** (875) Windows (6,504) Other Virus (661) Disclaimer: Vulnerability (31,104) The information provided in this security advisory is provided "as is" and without warranty of any kind. Details of this security advisory may be updated in order to provide as accurate information as possible. The latest version of this security advisory is available on the SySS website. Web (9.329) Whitepaper (3,728) x86 (946) XSS (17,478) Creative Commons - Attribution (by) - Version 3.0 URL: http://creativecommons.org/licenses/by/3.0/deed.en Other

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