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Verbatim Store N Go Secure Portable HDD GD25LK01-3637-C VER4.0 Missing Trust

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When analyzing the external SSD Verbatim Store n Go Secure Portable HDD, Matthias Deeg found out that the validation of the firmware for the USB-to-SATA bridge controller INIC-3637EN only consists of a simple CRC-16 check (XMODEM CRC-16). Thus, an attacker is able to store malicious firmware code for the INIC-3637EN with a correct checksum on the used SPI flash memory chip (XT25F01D), which then gets successfully executed by the USB-to-SATA bridge controller. For instance, this security vulnerability could be exploited in a so-called "supply chain attack" when the device is still on its way to its legitimate user. An attacker with temporary physical access during the supply could program a modified firmware on the Verbatim Keypad Secure, which always uses an attacker-controlled AES key for the data encryption, for example. If, later on, the attacker gains access to the used USB drive, he can simply decrypt all contained user data.

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Advisory ID:

SYSS-2022-007 Store 'n' Go Secure Portable HDD Verbatim Product: Manufacturer:

GD25LK01-3637-C VER4.0 GD25LK01-3637-C VER4.0

Affected Version(s): Tested Version(s): Vulnerability Type: Missing Immutable Root of Trust in Hardware

(CWE-1326) Risk Level:

Solution Status: Manufacturer Notification: 2022-01-31

Solution Date: 2022-06-08 Public Disclosure:

CVE-2022-28383

Author of Advisory: Matthias Deeg (SySS GmbH)

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 insufficient firmware validation, an attacker can store malicious firmware code for the USB-to-SATA bridge controller on the external drive which gets executed.

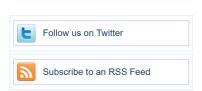
Vulnerability Details:

When analyzing the external SSD Verbatim Store 'n' Go Secure Portable HDD, Matthias Deeg found out that the validation of the firmware for the USB-to-SATA bridge controller INIC-3637EN only consists of a simple CRC-16 check (XMODEM CRC-16).

Thus, an attacker is able to store malicious firmware code for the INIC-3637EN with a correct checksum on the used SPI flash memory chip (XT25F01D), which then gets successfully executed by the USB-to-SATA $\,$ bridge controller.

For instance, this security vulnerability could be exploited in a so-called "supply chain attack" when the device is still on its way to its legitimate user.

An attacker with temporary physical access during the supply could program a modified firmware on the Verbatim Keypad Secure, which uses an attacker-controlled AES key for the data encryption, for example.



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If, later on, the attacker gains access to the used USB drive, he can simply decrypt all contained user data. Intrusion Detection (866) BSD (370) Java (2,888) CentOS (55) JavaScript (817) Cisco (1,917) Proof of Concept (PoC): SySS was able to read and write the SPI flash memory containing the Debian (6,620) Kernel (6.255) firmware of the INIC-3637EN controller (128 KB) using a universal Local (14,173) Fedora (1,690) By analyzing the dumped memory content, SySS found out that the INIC-3637EN firmware is stored from the file offset 0x4000 to the file offset 0x1BFFB, and that the corresponding XMODEM CRC-16 is stored at the file offset 0x1FFFC. FreeBSD (1,242) Magazine (586) Overflow (12,390) Gentoo (4,272) **HPUX** (878) Matthias Deeg developed a simple Python tool for updating the checksum of modified firmware images before writing them to the SPI flash memory Perl (1,417) PHP (5,087) iOS (330) chip. The following output exemplarily shows updating a modified firmware Proof of Concept (2,290) iPhone (108) image: Protocol (3,426) IRIX (220) \$ python update-firmaware.py firmware_hacked.bin
Verbatim Store 'n' Go Firmware Updater v0.1 - Matthias Deeg, SySS GmbH Python (1,449) Juniper (67) (c) 2022 [*] Computed CRC-16 (0x03F5) does not match stored CRC-16 (0x8B17). Remote (30,009) Linux (44,118) [*] Successfully updated firmware file Mac OS X (684) Root (3,496) Solution: Ruby (594) Mandriva (3,105) SySS GmbH is not aware of a solution for the described security issue. NetBSD (255) Scanner (1.631) Security Tool (7,768) OpenBSD (479) Disclosure Timeline: Shell (3,098) RedHat (12,339) 2022-01-31: Vulnerability reported to manufacturer Shellcode (1,204) Slackware (941) 2022-02-11: Vulnerability reported to manufacturer again 2022-03-07: Vulnerability reported to manufacturer again 2022-06-08: Public release of security advisory Sniffer (885) Solaris (1,607) Spoof (2,165) SUSE (1,444) References: SQL Injection (16,089) Ubuntu (8.147) [1] Product website for Verbatim Store 'n' Go Secure Portable HDD UNIX (9,150) TCP (2,377) https://www.verbatim-europe.co.uk/en/prod/store-n-go-portable-ssd-with-keypad-access-256gb-53402/ Trojan (685) UnixWare (185) [2] SySS Security Advisory SYSS-2022-007 **UDP** (875) Windows (6,504) https://www.syss.de/fileadmin/dokumente/Publikationen/Advisories/SYSS-2022-007.txt SySS GmbH, SySS Responsible Disclosure Policy https://www.syss.de/en/responsible-disclosure-policy Other Virus (661) Vulnerability (31,104) Credits: Web (9.329) This security vulnerability was found by Matthias Deeg of SySS GmbH. Whitepaper (3,728) E-Mail: matthias.deeg (at) syss.de x86 (946) Public Key: https://www.syss.de/fileadmin/dokumente/Materialien/PGPKeys/Matthias_Deeg.asc Key fingerprint = D1F0 A035 F06C E675 CDB9 0514 D9A4 BF6A 34AD 4DAB XSS (17,478) Other Disclaimer: 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. Creative Commons - Attribution (by) - Version 3.0 URL: http://creativecommons.org/licenses/by/3.0/deed.en

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