

SSA-248289: Denial-of-Service Vulnerabilities in the IPv6 Stack of Nucleus Products

Publication Date: 2021-04-13
 Last Update: 2021-04-13
 Current Version: V1.0
 CVSS v3.1 Base Score: 7.5

SUMMARY

The IPv6 stack of affected products contains two vulnerabilities when processing IPv6 headers which could allow an attacker to cause a denial-of-service condition.

Siemens has released updates for several affected products and recommends to update to the latest versions. Siemens is preparing updates and recommends specific countermeasures for products where updates are not, or not yet available.

AFFECTED PRODUCTS AND SOLUTION

Affected Product and Versions	Remediation
Nucleus 4: All versions < V4.1.0	Update to V4.1.0 or later version https://support.sw.siemens.com/en-US/product/1336134128 (login required)
Nucleus NET: All versions	See recommendations from Section Workarounds and Mitigations or upgrade to the latest versions of Nucleus ReadyStart or Nucleus 4.
Nucleus ReadyStart: All versions	See recommendations from section Workarounds and Mitigations
Nucleus Source Code: versions including affected IPv6 stack	Contact customer support to receive patch and update information.
VSTAR: versions including affected IPv6 stack	Contact customer support to receive patch and update information.

WORKAROUNDS AND MITIGATIONS

Siemens has identified the following specific workarounds and mitigations that customers can apply to reduce the risk:

- For additional mitigation advice please contact customer support or your local Nucleus Sales team

GENERAL SECURITY RECOMMENDATIONS

As a general security measure, Siemens strongly recommends to protect network access to devices with appropriate mechanisms. In order to operate the devices in a protected IT environment, Siemens recommends to configure the environment according to Siemens' operational guidelines for Industrial Security (Download: <https://www.siemens.com/cert/operational-guidelines-industrial-security>), and to follow the recommendations in the product manuals.

Additional information on Industrial Security by Siemens can be found at: <https://www.siemens.com/industrialsecurity>

PRODUCT DESCRIPTION

Nucleus NET module incorporates a wide range of standard-compliant networking and communication protocols, drivers, and utilities to deliver full-featured network support in any embedded device. The networking functionality is fully integrated into the Nucleus RTOS and supports a variety of processors and MCUs.

The Nucleus RTOS provides a highly scalable micro-kernel based real-time operating system designed for scalability and reliability in systems spanning the range of aerospace, industrial, and medical applications.

VSTAR is a complete AUTOSAR 4 based ECU solution providing the tools and embedded software for on-time product deployment. The VSTAR implementation enables scalable support from resource limited small ECUs to powerful multi core solutions. The VSTAR modules developed according to ISO 26262 requirements can be used to address up to and including ASIL D use-cases.

Nucleus ReadyStart is a platform with integrated software IP, tools, and services ideal for applications where a small footprint, deterministic performance, and small code size are essential.

VULNERABILITY CLASSIFICATION

The vulnerability classification has been performed by using the CVSS scoring system in version 3.1 (CVSS v3.1) (<https://www.first.org/cvss/>). The CVSS environmental score is specific to the customer's environment and will impact the overall CVSS score. The environmental score should therefore be individually defined by the customer to accomplish final scoring.

An additional classification has been performed using the CWE classification, a community-developed list of common software security weaknesses. This serves as a common language and as a baseline for weakness identification, mitigation, and prevention efforts. A detailed list of CWE classes can be found at: <https://cwe.mitre.org/>.

Vulnerability CVE-2021-25663

The function that processes IPv6 headers does not check the lengths of extension header options, allowing attackers to put this function into an infinite loop with crafted length values.

CVSS v3.1 Base Score	7.5
CVSS Vector	CVSS:3.1/AV:N/AC:L/PR:N/UI:N/S:U/C:N/I:N/A:H/E:P/RL:O/RC:C
CWE	CWE-835: Loop with Unreachable Exit Condition ('Infinite Loop')

Vulnerability CVE-2021-25664

The function that processes the Hop-by-Hop extension header in IPv6 packets and its options lacks any checks against the length field of the header, allowing attackers to put the function into an infinite loop by supplying arbitrary length values.

CVSS v3.1 Base Score	7.5
CVSS Vector	CVSS:3.1/AV:N/AC:L/PR:N/UI:N/S:U/C:N/I:N/A:H/E:P/RL:O/RC:C
CWE	CWE-835: Loop with Unreachable Exit Condition ('Infinite Loop')

ADDITIONAL INFORMATION

For further inquiries on security vulnerabilities in Siemens products and solutions, please contact the Siemens ProductCERT:

<https://www.siemens.com/cert/advisories>

HISTORY DATA

V1.0 (2021-04-13): Publication Date

TERMS OF USE

Siemens Security Advisories are subject to the terms and conditions contained in Siemens' underlying license terms or other applicable agreements previously agreed to with Siemens (hereinafter "License Terms"). To the extent applicable to information, software or documentation made available in or through a Siemens Security Advisory, the Terms of Use of Siemens' Global Website (https://www.siemens.com/terms_of_use, hereinafter "Terms of Use"), in particular Sections 8-10 of the Terms of Use, shall apply additionally. In case of conflicts, the License Terms shall prevail over the Terms of Use.