

Cybersecurity Advisory – Specially Crafted IEC 61850 Protocol Sequence Vulnerability in Relion® 670, 650 and SAM600-IO

CVE-2021-27196

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Affected Products and versions

1. Relion 670 series version 1.1 all revisions
2. Relion 670 series version 1.2.3 all revisions
3. Relion 670 series version 2.0 all revisions
4. Relion 670/650 series version 2.1 all revisions
5. Relion 670/650 series version 2.2.0 all revisions
6. Relion 670/650/SAM600-IO series version 2.2.1 all revisions
7. Relion 670 series version 2.2.2 all revisions
8. Relion 670 series version 2.2.3 all revisions
9. Relion 650 series version 1.1 all revisions
10. Relion 650 series version 1.2 all revisions
11. Relion 650 series version 1.3 all revisions

Vulnerability ID

CVE ID: CVE-2021-27196

Summary

A privately reported vulnerability in which an attacker having access to the IEC 61850 network with knowledge on how to reproduce the attack and knowing the IP addresses of the different IEC 61850 access points (of IEDs/products) can reproduce this attack and force IEDs to reboot.

An attacker who successfully exploited this vulnerability could reboot the device resulting in a denial of service situation. During the reboot phase, the primary functionality of the device is not available.

Vulnerability Severity

The severity assessment has been performed by using the FIRST Common Vulnerability Scoring System (CVSS) v3.1. The CVSS Environmental Score, which can affect the vulnerability severity, is not provided in this advisory since it reflects the potential impact of a vulnerability within the end-user organizations' computing environment; end-user organizations are therefore recommended to analyze their situation and specify the Environmental Score.

CVSS v3.1 Base Score: 7.5 (High)

CVSS v3.1 Temporal Score: 7.2

CVSS v3.1 Vector: AV:N/AC:L/PR:N/UI:N/S:U/C:N/I:N/A:H/E:H/RL:O/RC:C

CVSS v3.1 Link: <https://nvd.nist.gov/vuln-metrics/cvss/v3-calculator?vector=AV:N/AC:L/PR:N/UI:N/S:U/C:N/I:N/A:H/E:H/RL:O/RC:C&version=3.1>

Vulnerability Details

A vulnerability exists in the command handling of the device included in the product revisions listed above. An attacker could exploit the vulnerability by using specially crafted message and force the device to reboot. During reboot, the primary protection functionality is not available.

Recommended immediate actions

The problem is corrected in the following product versions:

Products and Fixed Versions
1. Relion 670 series version 1.1 → Please follow recommendation as listed in the mitigation factor section or upgrade to the latest product version. For upgrades, please get in touch with your local Hitachi ABB Power Grids contacts.
2. Relion 670 series version 1.2.3 → Fixed in revision 670 1.2.3.20
3. Relion 670 series version 2.0 → Fixed in revision 670 2.0.0.13
4. Relion 670 series version 2.1 → Planned*
5. Relion 670/650 series version 2.2.0 → Fixed in revision 670 2.2.0.13
6. Relion 670/650/SAM600-IO series version 2.2.1 → Fixed in revision 670 2.2.1.6
7. Relion 670 series version 2.2.2 → Fixed in revision 670 2.2.2.3
8. Relion 670 series version 2.2.3 → Fixed in revision 670 2.2.3.2
9. Relion 650 series version 1.1 → Planned*
10. Relion 650 series version 1.2 → Please follow recommendation as listed in the mitigation factor section or upgrade to product version 1.3. For upgrades, please get in touch with your local Hitachi ABB Power Grids contacts.
11. Relion 650 series version 1.3 → Fixed in revision 650 1.3.0.7

* Follow mitigation recommendation for these versions

** New update in Revision B of this cybersecurity advisory

Hitachi ABB Power Grids recommends that customers apply the update to the fixed or latest firmware at the earliest convenience. Please get in touch with your local Hitachi ABB Power Grids contacts to get the latest firmware on a specific product version.

Mitigation Factors

Recommended security practices and firewall configurations can help protect a process control network from attacks that originate from outside the network. Such practices include that process control systems are physically protected from direct access by unauthorized personnel, have no direct connections to the Internet, and are separated from other networks by means of a firewall system that has a minimal number of ports exposed, and others that have to be evaluated case by case. Process control systems should not be used for Internet surfing, instant messaging, or receiving e-mails. Portable computers and removable storage media should be carefully scanned for viruses before they are connected to a control system.

More information on recommended practices can be found in the Cybersecurity Deployment Guidelines for each product version.

Workarounds

There is no workaround available.

Frequently Asked Questions

What is the scope of the vulnerability?

An attacker who successfully exploited this vulnerability could reboot the device resulting in a denial of service situation. During the reboot phase, the primary functionality of the device is not available.

What causes the vulnerability?

The vulnerability is caused by a weakness in the message processing in the IEC 61850 protocol.

What might an attacker use the vulnerability to do?

An attacker who successfully exploited this vulnerability could reboot the device resulting in a denial of service situation. During the reboot phase, the primary functionality of the device is not available.

How could an attacker exploit the vulnerability?

An attacker could try to exploit the vulnerability by creating a specially crafted message and sending the message to an affected system node. This would require that the attacker has access to the system network, by connecting to the network either directly or through a wrongly configured or penetrated fire-wall, or that he installs malicious software on a system node or otherwise infects the network with malicious software. Recommended practices help mitigate such attacks, see section Mitigating Factors above.

Could the vulnerability be exploited remotely?

Yes, an attacker who has network access to an affected system node could exploit this vulnerability. Recommended practices include that process control systems are physically protected, have no direct connections to the Internet, and are separated from other networks by means of a firewall system that has a minimal number of ports exposed.

What does the update do?

The update mitigates the identified weakness in the IEC 61850 protocol.

When this security advisory was issued, had this vulnerability been publicly disclosed?

No, Hitachi ABB Power Grids received information about this vulnerability through responsible disclosure.

When this security advisory was issued, had ABB received any reports that this vulnerability was being exploited?

No, Hitachi ABB Power Grids had not received any information indicating that this vulnerability had been exploited when this security advisory was originally issued.

Acknowledgements

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- Markus Mahrla, GAI NetConsult GmbH
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Support

For additional information and support please contact your product provider or Hitachi ABB Power Grids service organization. For contact information, see <https://www.hitachiabb-powergrids.com/contact-us/> for Hitachi ABB Power Grids contact-centers.

Revision

Date	Revision	Description
2021-03-08	A	Original document
2021-04-12	B	Update on Recommended immediate actions Section <ul style="list-style-type: none">• Relion 670 series version 2.0 → Fixed in revision 670 2.0.0.13