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Information security — Lightweight cryptography —

Part 8: Authenticated encryption

Sécurité de l'information — Cryptographie pour environnements contraints —

Partie 8: Cryptage authentifié

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 27, *Information security, cybersecurity and privacy protection*.

A list of all parts in the ISO/IEC 29192 series can be found on the ISO and IEC websites.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

Introduction

This document specifies authenticated encryption tailored for implementation in constrained environments. Data transmitted from one party to another is often vulnerable against various attacks such as eavesdropping or malicious alterations. Similarly, data at rest usually requires protection.

Encryption mechanisms as specified in the ISO/IEC 18033 series and ISO/IEC 10116 provide solutions against eavesdropping. Integrity protection is usually guaranteed with a message authentication code (MAC) algorithm, such as those defined in the ISO/IEC 9797 series. In addition, ISO/IEC 19772 describes several authenticated encryption mechanisms, that is to say mechanisms that efficiently combine the encryption and MAC operations.

Nonetheless, some applications including radiofrequency identification (RFID) tags, smart cards, secure batteries, health-care systems and sensor networks, encounter several constraints. Chip area, energy consumption, execution time, program code, RAM size and communication bandwidth are typically critical for the applications listed above. The ISO/IEC 29192 series specifies lightweight cryptography suitable for these constrained environments. ISO/IEC 29192-2 and ISO/IEC 29192-3 respectively define lightweight block ciphers and stream ciphers. Both can be used to provide confidentiality. Regarding protection against alteration, lightweight MAC algorithms are defined in ISO/IEC 29192-6.

In this document, lightweight authenticated encryption mechanisms are defined. Similar to ISO/IEC 19772, they provide confidentiality, integrity and optionally data origin authentication. They differ from those specified in the aforementioned document, in that they have been specifically designed for constrained environments.

This document specifies a unique method. In the future, other methods may be added to this document, including lightweight authenticated encryption with additional data (AEAD) methods, based either on block ciphers or stream ciphers.

Information security — Lightweight cryptography —

Part 8: Authenticated encryption

1 Scope

This document specifies one method for authenticated encryption suitable for applications requiring lightweight cryptographic mechanisms.

This method processes a data string with the following security objectives:

a) data confidentiality, i.e. protection against unauthorized disclosure of data,

b) data integrity, i.e. protection that enables the recipient of data to verify that it has not been modified.

Optionally, this method can provide data origin authentication, i.e. protection that enables the recipient of data to verify the identity of the data originator.

The method specified in this document is based on a lightweight stream cipher, and requires the parties of the protected data to share a secret key for this algorithm. Key management is outside the scope of this document.

NOTE Key management techniques are defined in the ISO/IEC 11770 series.

2 Normative references

There are no normative references for this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
authenticated encryption
(reversible) transformation of data by a cryptographic algorithm to produce ciphertext that cannot be altered by an unauthorized entity without detection, i.e. it provides data confidentiality, data integrity, and optionally data origin authentication

[SOURCE: ISO/IEC 19772:2020, 3.2, modified — The definition was slightly modified to make the data origin authentication optional.]