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The Directory: Key management and public-key infrastructure establishment and maintenance

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This document was prepared by ITU-T as ITU-T X.508 (10/2024) and drafted in accordance with its editorial rules, in collaboration with Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6, *Telecommunications and information exchange between systems*.

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INTERNATIONAL STANDARD ISO/IEC 9594-12
RECOMMENDATION ITU-T X.508

Information technology – Open Systems Interconnection – The Directory: Key management and public-key infrastructure establishment and maintenance

Summary

Recommendation ITU-T X.508 | ISO/IEC 9594-12 is intended to fill the gap between Recommendation ITU-T X.509 | ISO/IEC 9594-8 and Recommendation ITU-T X.510 | ISO/IEC 9594-11 by giving a description of selected cryptographic algorithms with references to more detailed specifications. To establish the theory behind the cryptographic algorithm, an informative annex gives in introduction to the supporting mathematics. Also, some considerations on migration to post quantum algorithm are included.

Section 3 provides a best practice guideline for establishing and maintaining a public-key infrastructure (PKI) with emphasis on environments outside the traditional PKI environments, such as guidance for establishing a PKI for networks of Internet of things (IoT) and smart grid.

History *

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Authenticated encryption, authentication, block cipher, confidentiality, cryptography, encryption, information security, mode of operation.

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

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In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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INTERNATIONAL STANDARD
ITU-T RECOMMENDATION

Information technology – Open Systems Interconnection – The Directory: Key management and public-key infrastructure establishment and maintenance

SECTION 1 – GENERAL

1 Scope

This Recommendation | International Standard supplements Rec. ITU-T X.509 | ISO/IEC 9594-8 and Rec. ITU-T X.510 | ISO/IEC 9594-11 by providing an extended description of cryptographic algorithms and guidance in establishment and maintenance of a public-key infrastructure (PKI).

It is outside the scope of this Recommendation | International Standard to define new cryptographic algorithms, but it is within scope to discuss already-defined cryptographic algorithms that provide optimal protection, including future protection against attacks using powerful quantum computers.

This Recommendation | International Standard specifies how public-key infrastructure (PKI) may be adapted to support machine-to-machine (M2M) communication, e.g., smart grid and Internet of things (IoT), to allow interworking.

This Recommendation | International Standard specifies the procedures for establishment and maintenance of a PKI supporting new areas, such as intelligent electricity network (smart grid) and industrial Internet of things.

2 Normative references

The following Recommendations and International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation | International Standard. At the time of publication, the editions indicated were valid. All Recommendations and Standards are subject to revision, and parties to agreements based on this Recommendation | International Standard are encouraged to investigate the possibility of applying the most recent edition of the Recommendations and Standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards. The Telecommunication Standardization Bureau of the ITU maintains a list of currently valid ITU-T Recommendations.

2.1 Identical Recommendations | International Standards

- Recommendation ITU-T X.501 (2019) | ISO/IEC 9594-2:2020, *Information technology – Open Systems Interconnection – The Directory: Models*.
- Recommendation ITU-T X.509 (2019) | ISO/IEC 9594-8:2020, *Information technology – Open Systems Interconnection – The Directory: Public-key and attribute certificate frameworks*.
- Recommendation ITU-T X.510 (2020) | ISO/IEC 9594-11:2020, *Information technology – Open Systems Interconnection – The Directory: Protocol specifications for secure operations*.
- Recommendation ITU-T X.520 (2019) | ISO/IEC 9594-6:2020, *Information technology – Open Systems Interconnection – The Directory: Selected attribute types*.
- Recommendation ITU-T X.680 (2021) | ISO/IEC 8824-1:2021, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation*.
- Recommendation ITU-T X.681 (2021) | ISO/IEC 8824-2:2021, *Information technology – Abstract Syntax Notation One (ASN.1): Information object specification*.
- Recommendation ITU-T X.682 (2021) | ISO/IEC 8824-3:2021, *Information technology – Abstract Syntax Notation One (ASN.1): Constraint specification*.
- Recommendation ITU-T X.683 (2021) | ISO/IEC 8824-4:2021, *Information technology – Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 specifications*.

2.2 Paired Recommendations | International Standards equivalent in technical content

- Recommendation ITU-T X.800 (1991), *Security architecture for Open Systems Interconnection for CCITT applications*.

  ISO 7498-2:1989, *Information processing systems – Open Systems Interconnection – Basic Reference Model. Part 2: Security Architecture.*

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