Cryptographic Technology Group, Computer Security Division

Information Technology Laboratory, National Institute of Standards and Technology

Cryptography Standards at NIST

The development of cryptography standards fits the NIST mission: to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life. Within NIST, the standards for cryptographic algorithms are developed within the Computer Security Division. Several groups collaborate in this area of cryptography, e.g., to develop algorithms and validate their implementation.

- Information Technology Laboratory (ITL): advancing measurement science, standards, and technology through research and development in information technology, mathematics, and statistics.
- Computer Security Division (CSD): Cryptographic Technology; Secure Systems and Applications; Security Components and Mechanisms; Security Engineering and Risk Management; Security Testing, Validation and Measurement.
- Cryptographic Technology Group (CTG): research, develop, engineer, and produce guidelines, recommendations and best practices for cryptographic algorithms, methods, and protocols.

Examples of ongoing activities

The Crypto group develops new standards, and also develops applications and performs research that promote adoption of better cryptographic technologies. Examples:

- New standards for Post-Quantum Cryptography (PQC)
- New standards for Lightweight Cryptography project (LWC)
- New standards for Threshold Cryptography (TC)
- Reference material in Privacy Enhancing Cryptography (PEC)
- Applications for Interoperable Randomness Beacons
- Research on Circuit complexity
- Revised standards for Digital Signatures
- New and revised methods for Random Bit Generation
- New and revised guidance on Key management

Find more detailed info at https://www.nist.gov/itl/csd/cryptographic-technology

Computer Security Resource Center (CSRC)

The Computer Security Division maintains a Computer Security Resource Center (CSRC), with documentation on publications, projects, news, and events.

Examples of relevant publications

The following lists are not exhaustive

FIPS:

- FIPS 180: Secure Hash Standard (SHS)
- FIPS 186: Digital Signature Standard (DSS)
- FIPS 197: Advanced Encryption Standard (AES)
- FIPS 198: The Keyed-Hash Message Authentication Code (HMAC)
- FIPS 202: SHA-3 Standard: Permutation-Based Hash and Extendable-Output Functions

SP 800:

(R. denotes “Recommendation for”)

- SP 800-22: A Statistical Test Suite for Random and Pseudorandom Number Generators for Cryptographic Applications
- SP 800-38: R. Block Cipher Modes of Operation (it is a series of publications A-G)
- SP 800-52: Guidelines for the Selection, Configuration, and Use of Transport Layer Security (TLS) Implementations
- SP 800-56: R. Pair-Wise Key-Establishment Schemes Using Discrete Logarithm Cryptography (SP 800-56A) and Integer Factorization Cryptography (SP 800-56B)
- SP 800-56C: R. Key-Derivation Methods in Key-Establishment Schemes
- SP 800-57: R. for Key Management
- SP 800-90A: R. Random Number Generation Using Deterministic Random Bit Generators
- SP 800-90B: R. Entropy Sources Used for Random Bit Generation
- SP 800-90C: R. Random Bit Generator (RBG) Constructions
- SP 800-108: Recommendation for Key Derivation Using Pseudorandom Functions
- SP 800-132: R. Password-Based Key Derivation
- SP 800-133: R. Cryptographic Key Generation
- SP 800-185: SHA-3 Derived Functions: SHAKE, HMAC, TSC, ParallelHash
- SP 800-186: R. Discrete-Logarithm Based Cryptography: Elliptic Curve Domain Parameters

Guidance on cryptography standards:

There are also guidelines on how to develop, implement and use other crypto standards:

- NISTIR 7977: Cryptographic Standards and Guidelines Development Process
- SP 800-175: Guideline for Using Cryptographic Standards in the Federal Government
- FIPS 140: Security Requirements for Cryptographic Modules

The development of several standards benefits from the collaboration of several groups.

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