International Adoption of Chinese Cryptography Algorithms

The Implementation and Standardization Progress

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OpenSSL
Cryptography and SSL/TLS Toolkit

Me…

- Architect at BaishanCloud, a startup cloud computing company
- OpenSSL Committer

Chinese Algorithms

- 5 major Chinese Cryptographic Algorithms
  - SM2, a public key algorithm (signature, key exchange and encryption schemes)
  - SM3, a hash function
  - SM4, a block cipher
  - SM9, an identity based encryption algorithm
  - ZUC, a stream cipher

Bouncy Castle

- Australian based open source project founded in 2000
- Provides APIs in Java and C# .Net languages
- APIs include basic cryptography services and more high-level APIs support certificate generation, TLS, secure MIME, and OpenPGP message handling.
- Development funded through donations and commercial support contracts.
- Home at: https://www.bouncycastle.org
- Code also mirrored at: https://github.com/bcgit

Bouncy Castle and Chinese Ciphers

- Bouncy Castle Java 1.6.0 (current release)
  - SM2
  - SM3
  - SM4
- Bouncy Castle C# .Net 1.8.3 (current release)
  - SM2
  - SM3
- SM4 for C# .Net is going to support in next release (1.8.4)

OpenSSL

- A very widely used SSL/TLS and cryptography library
  - Written in C language
  - But wrapped for many other programming languages
  - 20 years old now, founded in 1998…
- Typical usage
  - Combined with web servers to provide HTTPS services
- Latest release: 1.1.1
  - in September, 2018
  - A bundle of new features…

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OpenSSL and Chinese Ciphers

- Started from last OpenSSL China tour
  - To make OpenSSL be recognized wider in China
- In OpenSSL 1.1.1
  - SM4
  - SM3
  - SM2
- ZUC is in review status
- SM9 has not started yet

OpenSSL
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What has not been done?

- No cipher suites for TLS protocols
  - Which makes it not possible to make ‘real’ TLS handshakes…
- No SM2 certificate support
  - OpenSSL only supports the ‘base’ SM2 algorithm

What’s next?

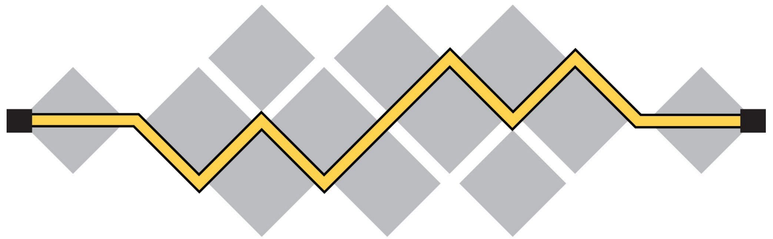
- Resolve the problems in previous slide…
- Support ZUC and SM9
- Make Chinese ciphers get more supported in other open source crypto libraries
    - Client side is also important, such as browsers…

Standardization Status

- ISO
  - SM2/SM9: ISO/IEC 14888-3:2016/DAmd 1
- 3GPP LTE
  - ZUC as 128-EEA3 and 128-EIA3
- TPM 2.0
  - SM2/SM3/SM4 (If I recall correctly…)
- ……

IETF

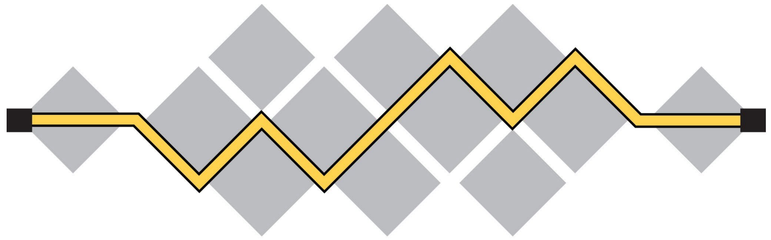
- Previous efforts in making IETF RFCs
  - draft-shen-sm2-ecdsa-02, 2014, CNNIC
  - draft-sca-cfrg-sm3-02, 2017, SCA/BaishanCloud/Ribose et al
  - draft-ribose-cfrg-sm4-10, 2017, Ribose et al
  - draft-sca-curdle-tls-sm34-0, 2018, BaishanCloud/Ribose et al



I E T F®

IETF

- Current progress…
  - Design new Chinese cipher suites for TLS 1.2 and TLS 1.3
  - Make new SM2 and other algorithm RFC drafts based on relevant ISO docs
    - SM2, SM3, SM4
    - SM9 and ZUC probably need to be addressed as well…
- Submit a new batch of drafts to several IETF WGs
  - Curdle
  - CFRG



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OASIS KMIP

- KMIP
  - Key Management Interoperability Protocol
  - SM2/SM3/SM4 numeric IDs are assigned
  - Will be standardized soon

Next move…

- PCKS#11 ?
- CA/B Forum Baseline Requirement?

Thank you very much!

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