Introduction to the Commercial Cryptography Scheme in China

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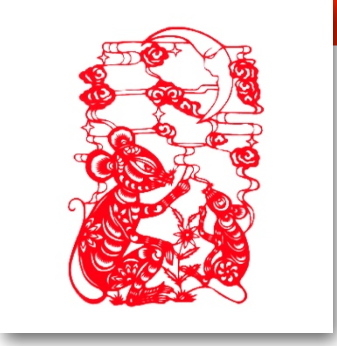
Disclaimer



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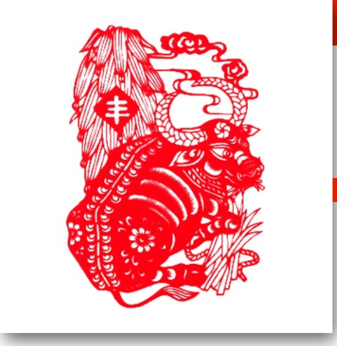
The authors do not represent any Chinese government agency or Chinese government-controlled lab. All information used for this presentation is publicly available on the Internet, despite the fact that most of them are in Chinese.



Agenda

- Background on commercial cryptography in China
- Product certification list
- Published algorithms and standards
- Certification scheme
- Conclusions

What is “Commercial Cryptography”?

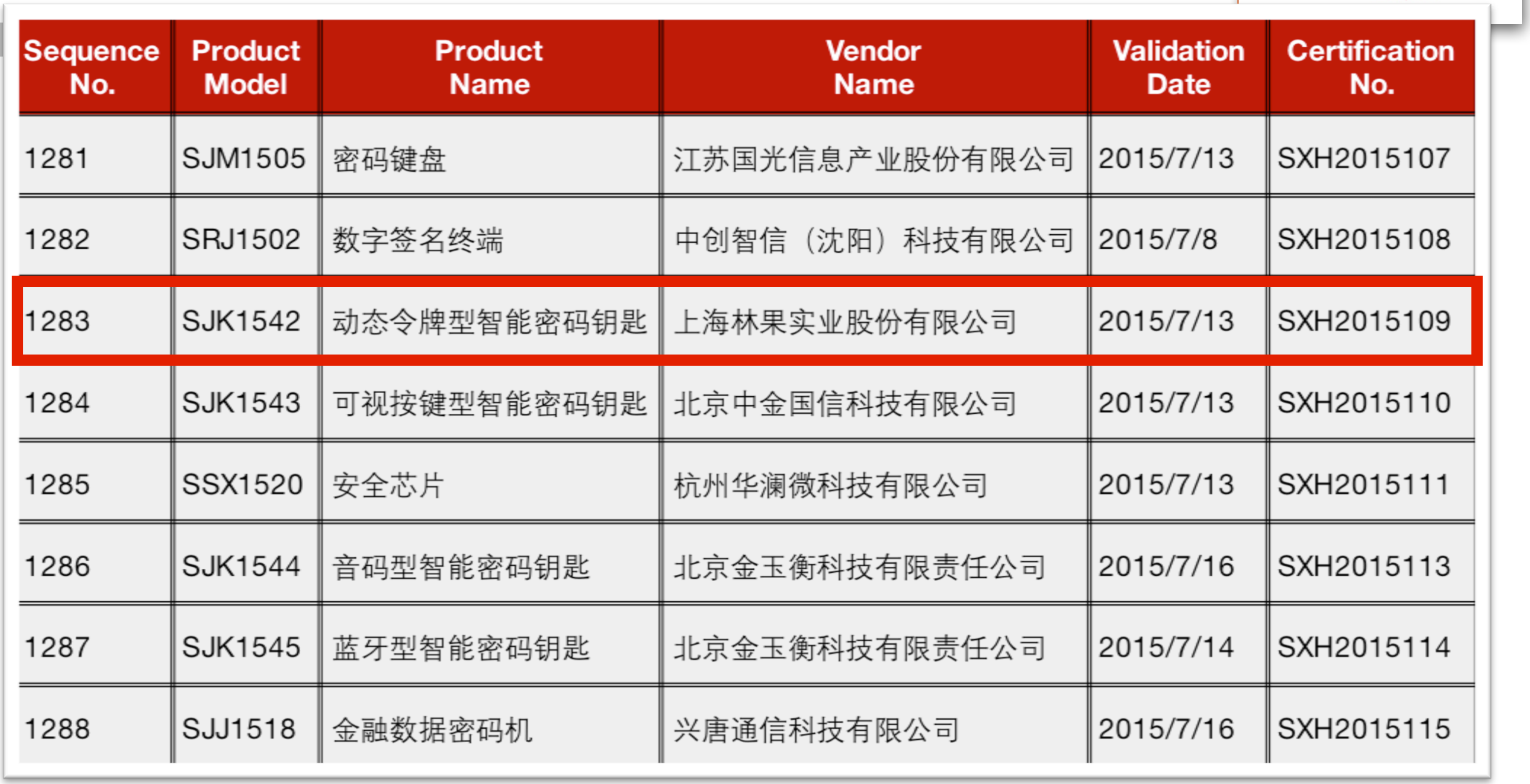
OSCCA and Commercial Cryptography

What is “Commercial Cryptography” in China?

- “Commercial Cryptography” is a set of algorithms and standards used in the commercial area, e.g. banks, telecommunications, third party payment gateways, enterprises, etc. …
- In this area, only “Commercial Cryptography” certified products can be used.

- Constituted by the Chinese Academy of Science (CAS)
- Issued and regulated by the Office of the State Commercial Cryptography Administration (OSCCA)
  - Established in 1999
  - Testing lab setup in 2005

OSCCA Certified Product List



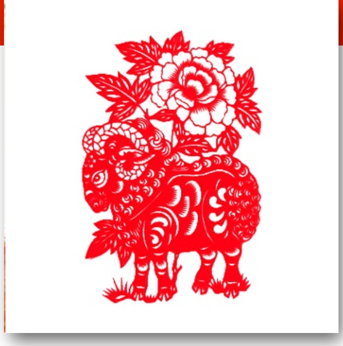
Sequence No.	Product Model	Product Name	Vendor Name	Validation Date	Certification No.
1281	SJM1505	密码键盘	江苏国光信息产业股份有限公司	2015/7/13	SXH2015107
1282	SRJ1502	数字签名终端	中创智信（沈阳）科技有限公司	2015/7/8	SXH2015108
1283	SJK1542	动态令牌型智能密码钥匙	上海林果实业股份有限公司	2015/7/13	SXH2015109
1284	SJK1543	可视按键型智能密码钥匙	北京中金国信科技有限公司	2015/7/13	SXH2015110
1285	SSX1520	安全芯片	杭州华澜微科技有限公司	2015/7/13	SXH2015111
1286	SJK1544	音码型智能密码钥匙	北京金玉衡科技有限责任公司	2015/7/16	SXH2015113
1287	SJK1545	蓝牙型智能密码钥匙	北京金玉衡科技有限责任公司	2015/7/14	SXH2015114
1288	SJJ1518	金融数据密码机	兴唐通信科技有限公司	2015/7/16	SXH2015115

Certified Products and Its Use

- Security IC chip
- Password keypad
- Hardware token including Public Key Infrastructure (PKI), One Time Password (OTP), and its supporting system
- Hardware security machine / card
- Digital signature and verification system
- IPSEC / SSL VPN Gateway
- Value Added Tax (VAT) audit system

OSCCA Certified Product List

- Only OSCCA certified products are allowed to be sold or used in China:
  - Used commercially, no state secrets involved
  - Used for encryption, protection, or security certification of information
  - As its core function, e.g. Hardware Security Module (HSM), smart card chip, Trusted Platform Module (TPM) chip, USB token …
  - Implements Commercial Cryptographic algorithms (no limitation on standard algorithm)
  - Lawfully, no foreign encryption products are allowed to be sold or used in China
  - Software or firmware products are not affected



How many "Commercial Cryptographic Algorithms and Standards" are there?

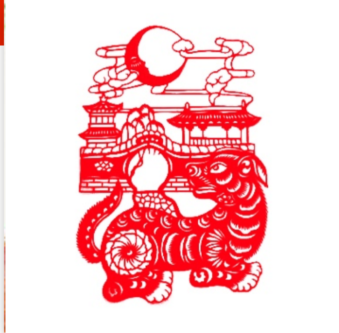
Published Algorithms

- Published: **SM2, SM3, SM4, ZUC**
- GM/T 0003.1: **SM2** (published in 2010):
  - Elliptic Curve Cryptography (ECC) based asymmetric algorithm, public key 512 bits and private key 256 bits (GM/T 0003.1)
  - Digital signature generation and verification (GM/T 0003.2)
  - Key establishment (together with SM3 and a KDF function defined in GM/T 0003.3)
  - Public key encryption (GM/T 0003.4)
  - Competitor of **ECDSA P-256**

Published Algorithms

- GM/T 0004.1-2012: **SM3** (published in 2010):
  - Hash functions
  - Max input: 2^64 bits
  - Output: 256 bits
  - Competitor of **SHA-256**

- GM/T 0002-2012: **SM4** (published in 2012):
  - Block cipher symmetric algorithm
  - Block size: 128 bits
  - Key length: 128 bits
  - Competitor of **AES-128**



Published Algorithms

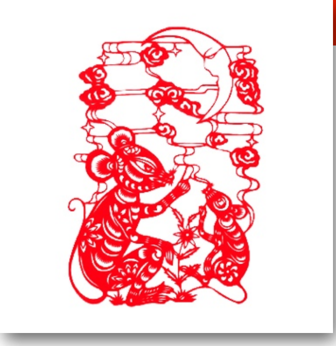
- GM/T 0001.1-2012: **ZUC** (published in 2012):
  - Stream cipher algorithm
  - Message encryption / decryption (GM/T 0001.2)
  - Message authentication check (GM/T 0001.3)
  - Key length: 128 bits
  - IV length: 128 bits

- SM2, SM3 and SM4 have been adopted in TPM2.0 of the Trust Computing Group (TCG) standard.

- ZUC has been adopted by 3GPP (3rd Generation Partnership Project) to be used in 3GPP LTE (128-EEA3 and 128-EIA3).

Published Standards

- GM/T 0005-2012: Randomness Test Specification
- GM/T 0008-2012: Cryptography Test Criteria for Security IC
- GM/T 0011-2012: Trusted Computing Functionality and Interface Specification
- GM/T 0014-2012: Digital Certificate Authentication System Cryptography Protocol Specification
- GM/T 0021-2012: One Time Password Application



Published Standards

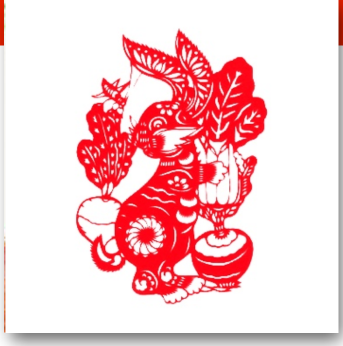
- GM/T XXXX-2013: IPSEC VPN Technology Specification
- GM/T XXXX-2013: Interface Specification for Single Sign On
- GM/T XXXX-2013: Specifications for Host Cryptographic Server
- GM/T XXXX-2013: Technique Requirements for Smart Token
- GM/T XXXX-2013: Security Requirements for Cryptographic Modules

How many roles in the scheme?

OSCCA and Vendor

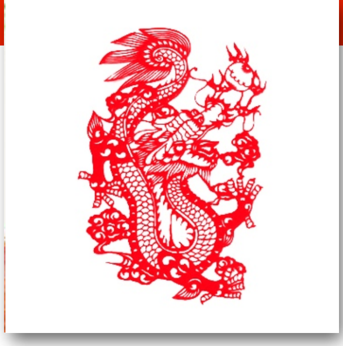
- OSCCA
  - Certification body: Issues the product certificates
  - Testing lab: Tests products according to the standard
  - Market developer and supervisor: Develops new markets and monitors the sale status of certified products

- Vendor
  - Designs and develop product
  - Manufactures the product
  - Sells the product and reports the annual sales progress



How can I certify myself as a vendor?

Application Procedure

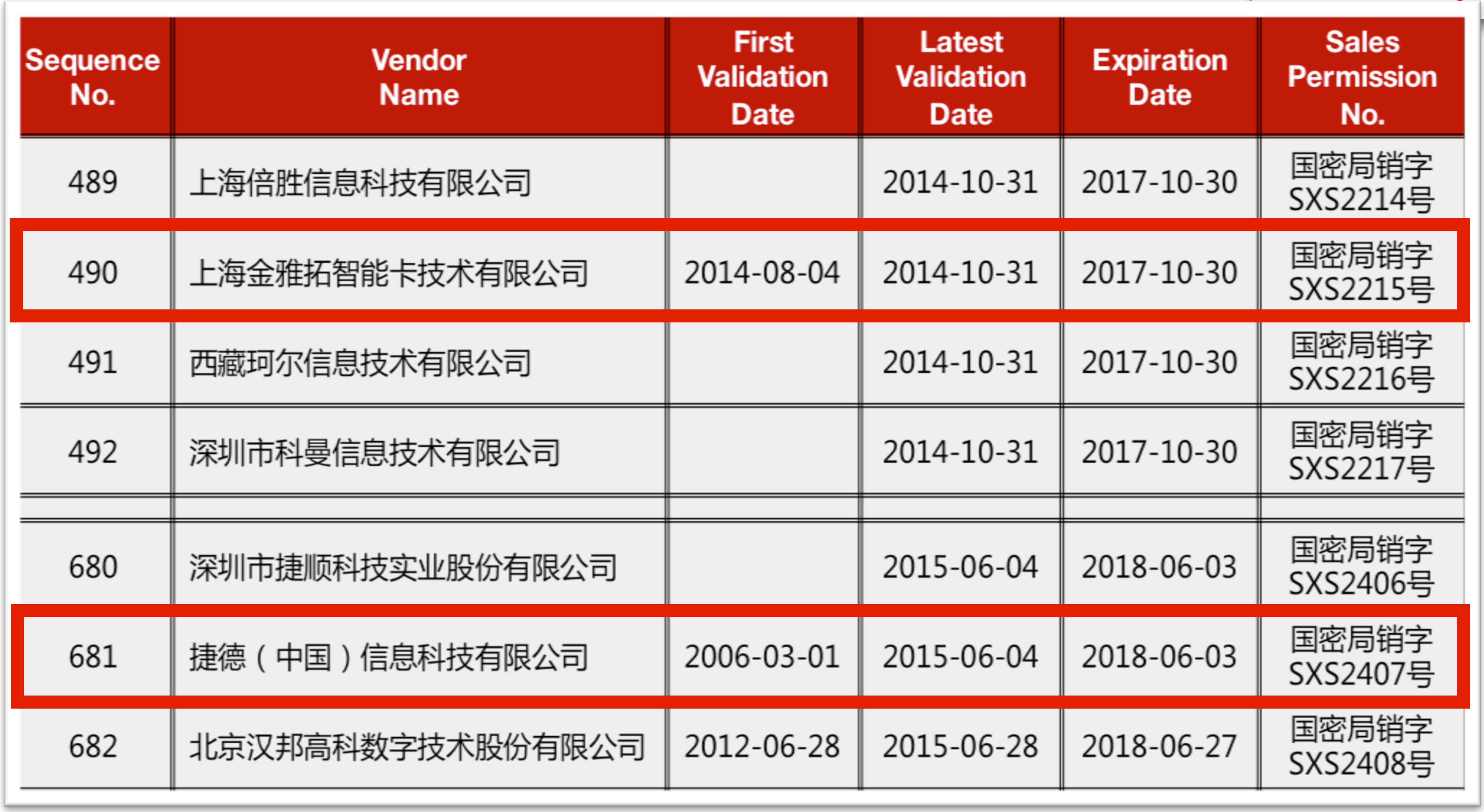


- If you only want to sell cryptographic products in China:
  - Apply for sales permission only
  - Product must be certified and listed in the website
  - Time frame: 1 month or even less
- If you want to sell YOUR OWN cryptographic products in China:
  - Manufacturer permission
  - Sales permission
  - Product certification
  - Time frame: around 6 months depending on the vendor’s condition and the product type

Procedure – Manufacturer Permission

- Has the capability to design the security product
- Has a factory / facility to manufacture the security product
- Has the equipment, a process and an assurance system for manufacturing the security product
- Complies with national laws, regulations, and policy requirements
- Re-validation every 3 years

Procedure – Sales permission



Sequence No.	Vendor Name	First Validation Date	Latest Validation Date	Expiration Date	Sales Permission No.
489	上海倍胜信息科技有限公司		2014-10-31	2017-10-30	国密局销字 SXS2214号
490	上海金雅拓智能卡技术有限公司	2014-08-04	2014-10-31	2017-10-30	国密局销字 SXS2215号
491	西藏珂尔信息技术有限公司		2014-10-31	2017-10-30	国密局销字 SXS2216号
492	深圳市科曼信息技术有限公司		2014-10-31	2017-10-30	国密局销字 SXS2217号
680	深圳市捷顺科技实业股份有限公司		2015-06-04	2018-06-03	国密局销字 SXS2406号
681	捷德（中国）信息科技有限公司	2006-03-01	2015-06-04	2018-06-03	国密局销字 SXS2407号
682	北京汉邦高科数字技术股份有限公司	2012-06-28	2015-06-28	2018-06-27	国密局销字 SXS2408号

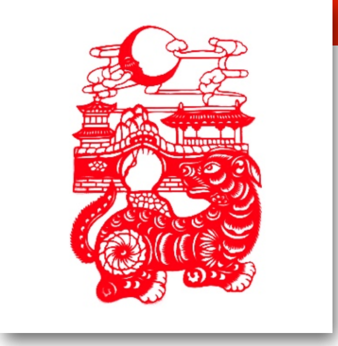
Procedure - Product certification

- To apply a product must be manufactured by a certified manufacturer
- Must pass the security examination held by OSCCA
- Implements Commercial Cryptography Algorithms
- Complies with Commercial Cryptography standards or protocols
- Complies with national laws, regulations and policy requirements
- No expiration date

How is the product certified?

How a Product Can be Certified

- Different approaches:
  - IC product: the design shall:
    - Be validated according to “Cryptography Test Criteria for Security IC” and “Security Requirements for Cryptographic Modules”
    - Pass the algorithm test
    - For a Security Level 2 IC product, anti-DPA/SPA is recommended (test under draft standard)
    - Entropy analysis is mandatory required by “Randomness Test Specification” including 15 tests
  - Other product: USE CERTIFIED IC PRODUCT INSIDE
    - No common chip is allowed



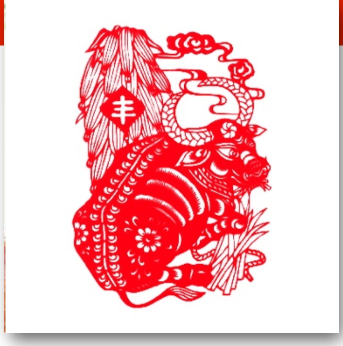
How a Product Can be Certified

- Documentation check:
  - Application form
  - Technical summary report
  - Security design report
  - Guidance to the end user
  - Other materials required by OSCCA
- Application materials shall be submitted through branch office in vendor registered city, and then forwarded to OSCCA
- Comments will be given by OSCCA within 21 days of submission

How a Product Can be Certified

- Vendor modifies documentation and / or design, then resubmits
- When OSCCA is satisfied with the modifications, they will inform the vendor to bring the product for onsite examination
  - Product presentation
  - Functional demonstration
  - Security design explanation
  - By experienced experts group, 8 ~ 10 people, at least half outside OSCCA
- Normally it takes 4 days to get the result

Conclusions, Now and in the Future



Current Situation

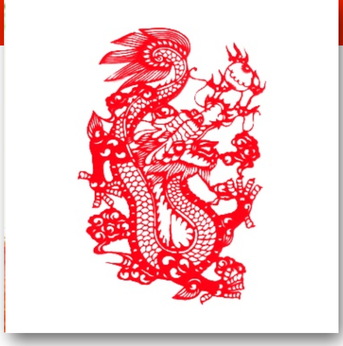
- New procurement in important industries (e.g. banking) must use certified products (HSMs, POSes, VPNs)
- Since 2015, new procurement of smart cards are recommended to use certified ICs. (More than 10 banks are testing internally, one main commercial bank has issued 20K cards with certified IC.)
- Maybe the biggest market: USB token for e-banking

Current Situation

- Lack of information can be found before submitting the application
- Fewer choices of algorithms
- The algorithm standards are published, but common IC with software implementation will not be certified
- No third party labs are involved, only OSCCA can perform the evaluation

A Look Into the Future

- Transition to ISO/IEC 19790?
- More types of products?
- More public to foreign product vendors?
- Publish more algorithms and methodology?
- Authorize third party labs to be part of the game?
- Switch to only Commercial Cryptography, no standard algorithms?



Questions?

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