Data Security and Encryption

数据安全与加密

Xitian Huang

6 August 2022

Data Leak
Shanghai National Police Database

- https://breached.to/
- Info ~1 Billion Chinese Citizens
- 10 BTC (200,000 USD or 1,300,000 RMB)

2022 - SHGA Shanghai Gov National Police database

by ChinaDan - Thursday June 30, 2022 at 08:55 AM

ChinaDan

BreachForums User

MEMBER

Posts:	5
Threads:	1
Joined:	Jun 2022
Reputation:	183

June 30, 2022, 08:55 AM (This post was last modified: July 3, 2022, 10:25 AM by Muffin. *Edit Reason: Locked by staff due to all # the spam*)

In 2022, the Shanghai National Police (SHGA) database was leaked. This database contains many TB o data and information on Billions of Chinese citizens.

Sell: Shanghai GOV (SHGA.gov.cn) National Police Database

Host: http://oss-cn-shanghai-shga-d01-a.ops.ga.sh/
Data leaked from these tables:

```
----TABLES----
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172.2gb
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22.4tb 22.4tb
nb_theme_address_case_dwd_test 7COIWTt7QU-YPwWub8z_SQ 150 0 22375506 1749307 25.2gb
25.2gb
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2.8gb
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4.3gb
person_address_label_info_master t64pp9WnS3maY9jBjzTtiw 90 0 969830088 0 282.8gb
282.8gb
```
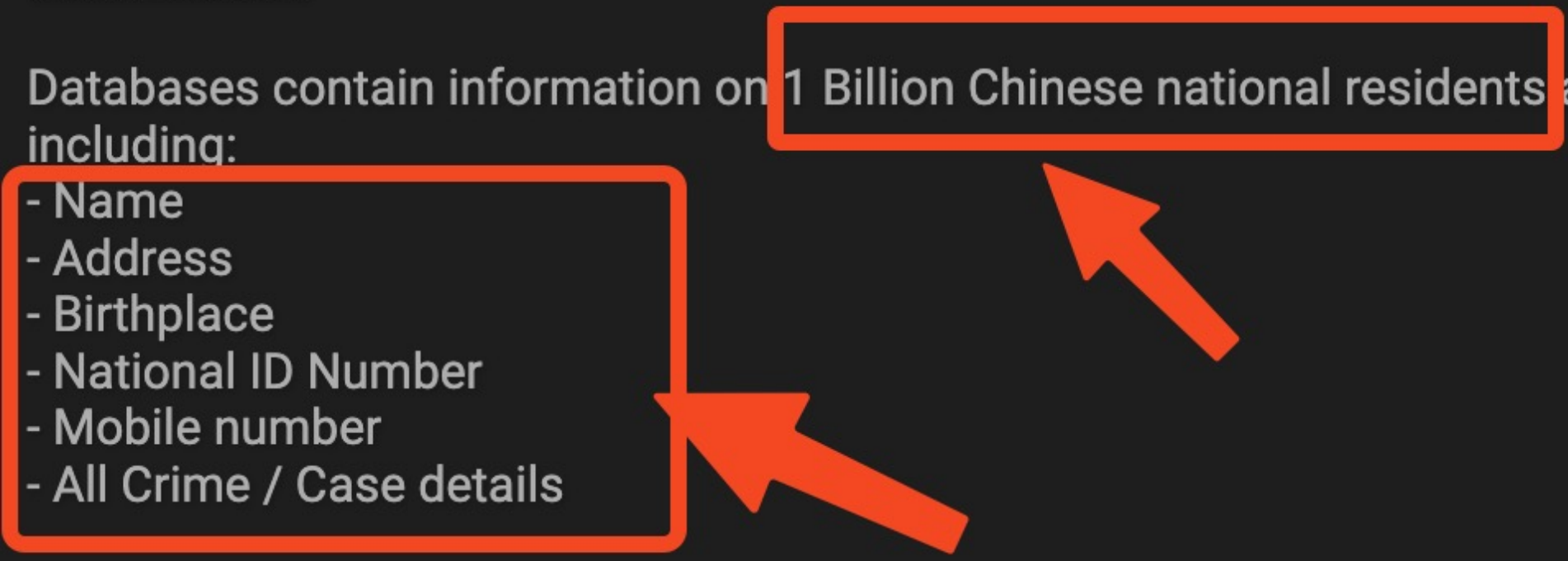

Data Details:

Databases contain information on 1 Billion Chinese national residents and several billion case re
including:

- Name
- Address
- Birthplace
- National ID Number
- Mobile number
- All Crime / Case details



UPDATE: Per request, sample size increased to 750k (250k for each of the 3 main index): https://gofile.io/d/sCggGC
Staff update: Due to the chances of the file being reported to gofile, uploaded the sample to our servers: https://cdn.breached.to/shga_sample_750k.tar.gz

PRICE: I am selling all of this data for 10BTC ($200k USD)

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20时许,报案人罗友军来所报案,2014年11月29日15时许,其在本市普陀区枣阳路465弄21号门口与一男子发生纠纷,被该男
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上午9时许,报警人张丽萍110报称:于2006年1月4日晚20时至次日上午8时间,受害单位(东沟镇东塘路771号上海东际塑料制
日07时42分,报警人使用13818080572报警称:在 瑞和路168号 8号楼门口 2辆轿车相撞。双方理赔中心理赔","CASE_T
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0:28:56,手机号:13052027987,报警人在天通庵路654号,称:赔偿纠纷 请民警到场处理。赔偿纠纷 ,民警到场调解,并
日12时28分,事主110报警称:杭州路宁武路电动自行车被窃。民警到现场后经了解系报警人自己未锁电动自行车停在路边后


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Encryption
Cryptography 密码学

Symmetric Encryption ⟺ Private Key 私钥

Asymmetric Encryption ⟺ Public Key 公钥
Private Key 私钥

Number Theory

Mathematical Preliminaries

Modular Arithmetic 同余

Periodicity

$$a \equiv b \bmod n$$

$$a \bmod n \equiv b$$

"congruent"

$$32 \bmod 12 \equiv ?$$

$$32 \equiv 8 \bmod 12$$

$$12 \overline{)\,32} = 2 \text{ years}$$

$$24$$

$$8 \text{ months}$$

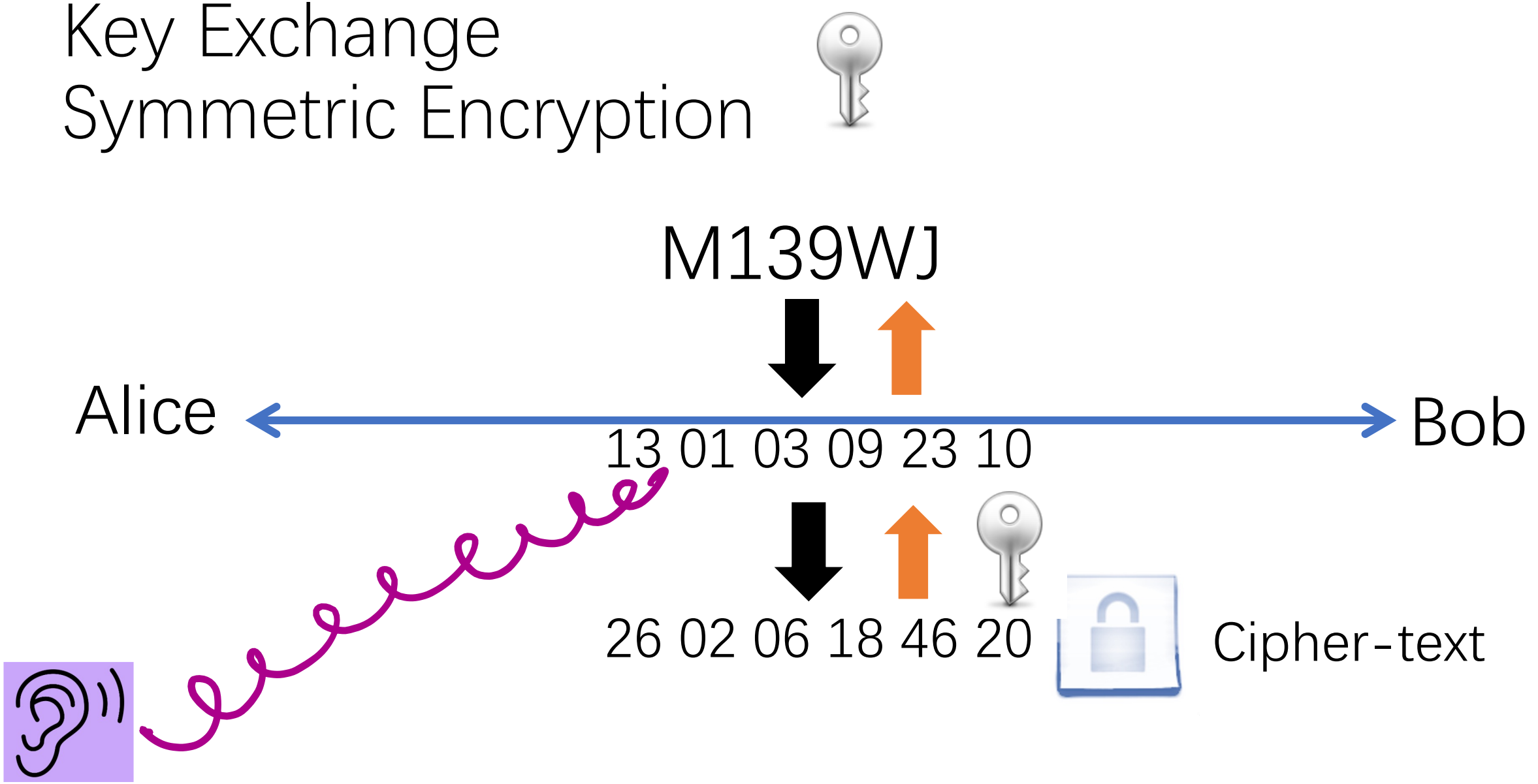
Remainder

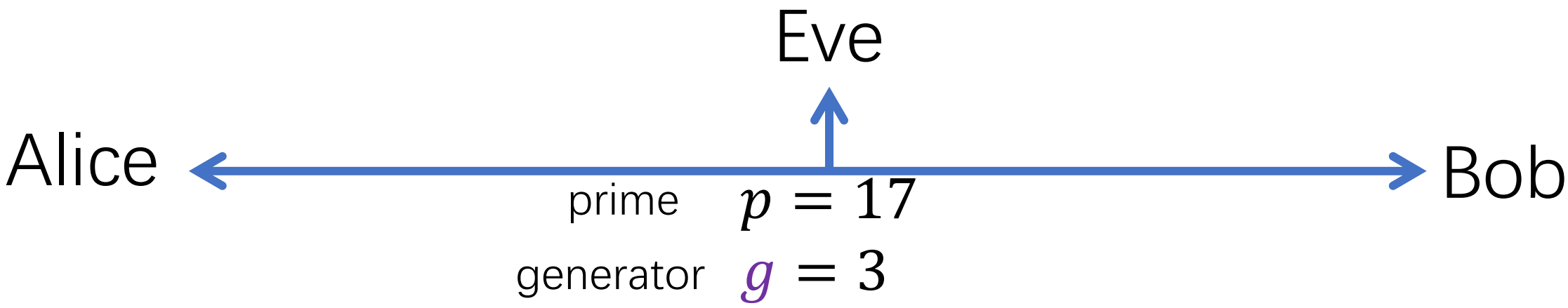
Mathematical Preliminaries
Prime number 素数/质数

1,2,3,5,7,11,13,17,19,23,29…

Infinitely many!

Key Exchange
Symmetric Encryption





$$g^{a} \bmod p = A$$

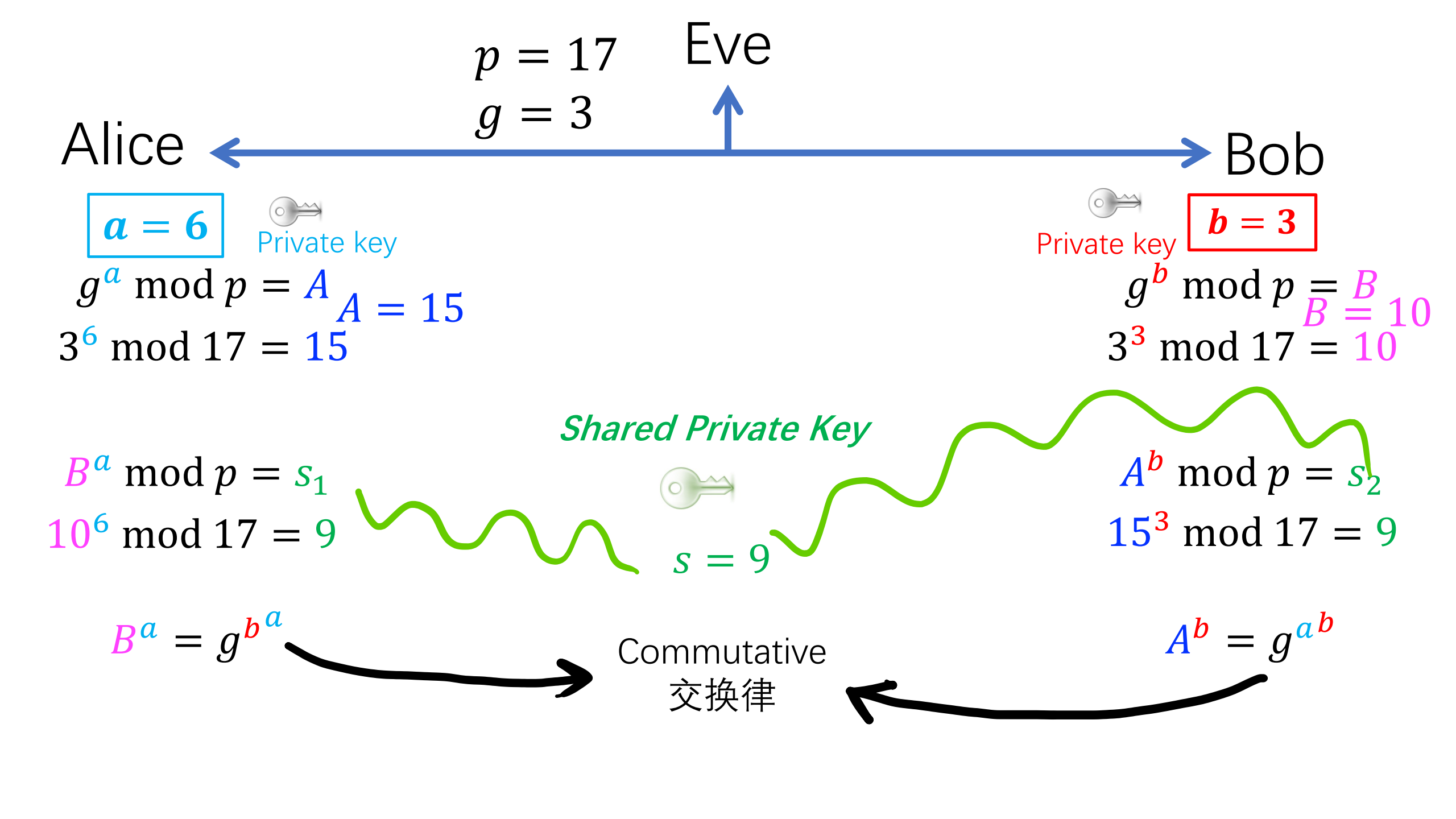
Easy

$$g^{?} \bmod p = A$$

Hard **Discrete Logarithm**

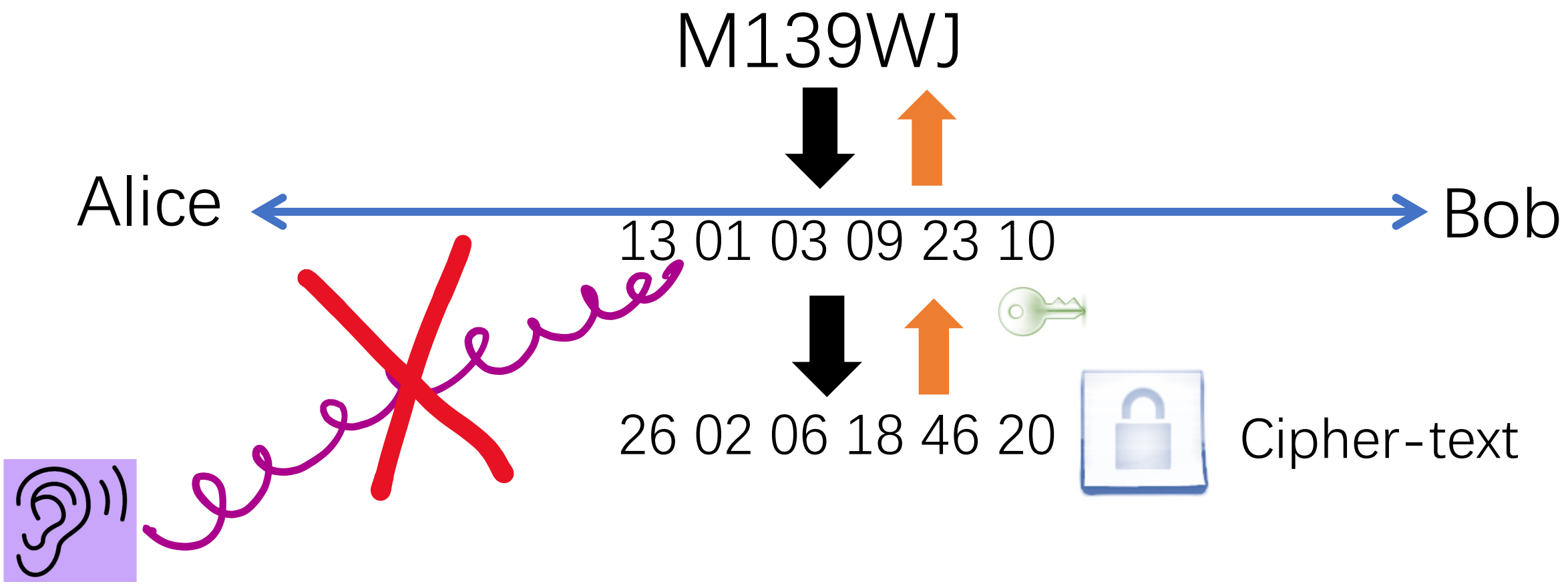
trial and error

One-way Function


$p = 17$
$g = 3$
Eve
Alice
Bob
$a = 6$
Private key
Private key
$b = 3$
$g^a \bmod p = A$
$A = 15$
$3^6 \bmod 17 = 15$
$g^b \bmod p = B$
$B = 10$
$3^3 \bmod 17 = 10$
Shared Private Key
$B^a \bmod p = s_1$
$10^6 \bmod 17 = 9$
$A^b \bmod p = s_2$
$15^3 \bmod 17 = 9$
$s = 9$
$B^a = g^{b^a}$
Commutative
交换律
$A^b = g^{a^b}$

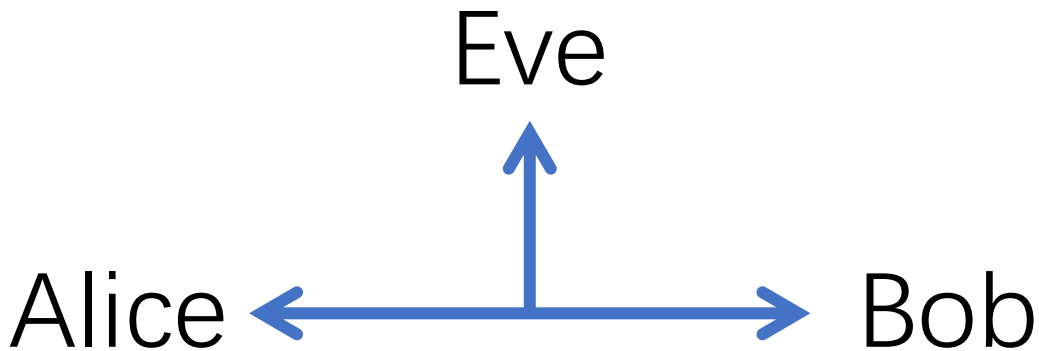
Key Exchange
Symmetric Encryption

Diffie–Hellman key exchange
1976



Key Exchange
Symmetric Encryption

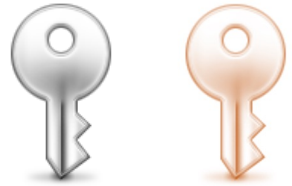
Too many keys

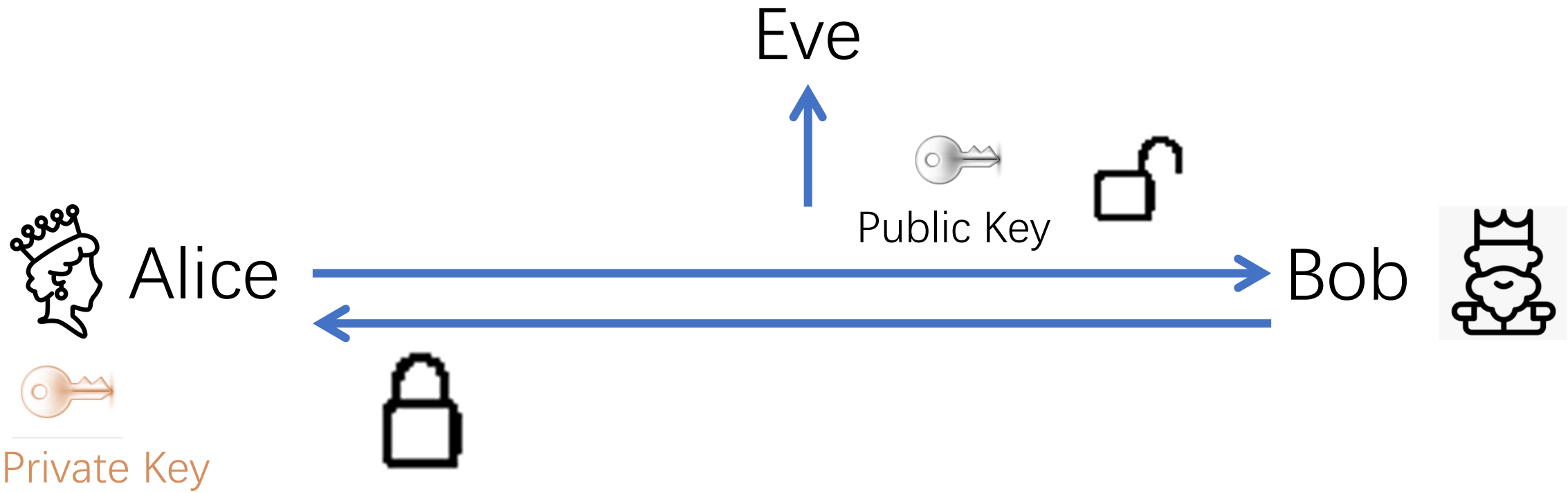


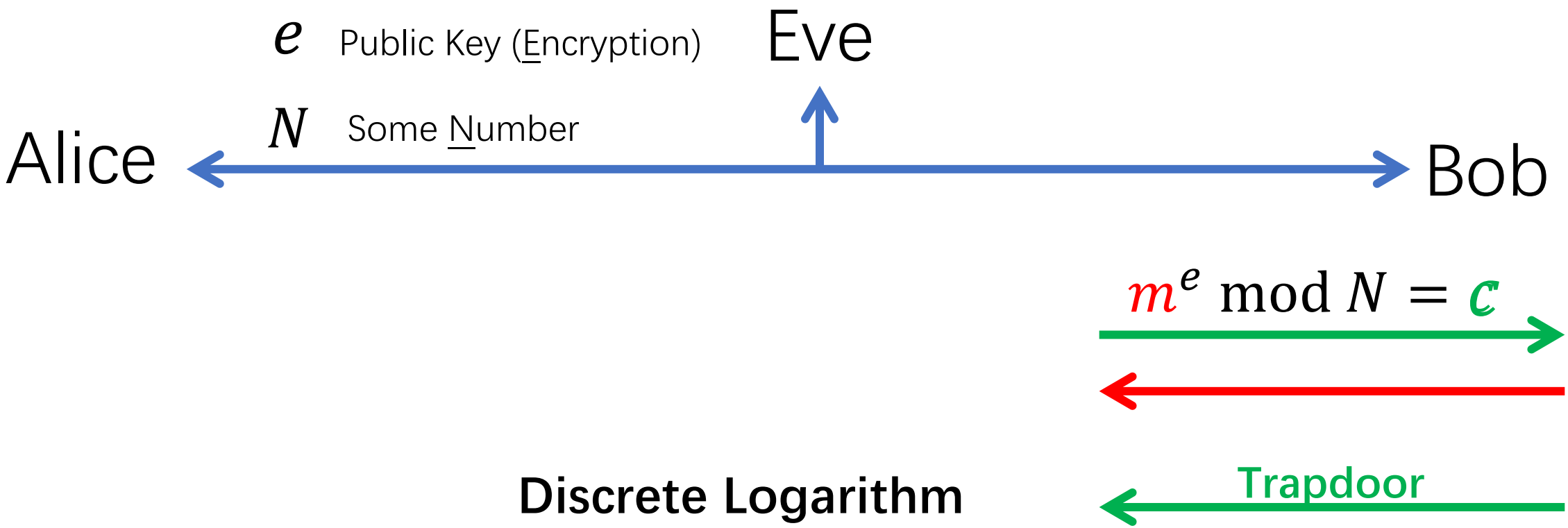
Authentication

Asymmetric Encryption

Public Key 公钥
Private Key 私钥







One-way Function

Trapdoor One-way Function

Factorization of Numbers

$$46 = 2 \times 23$$

$$6895601 = 1931 \times 3571$$

Uniquely decomposed into **prime** numbers

Fundamental theorem of arithmetic
Unique factorization theorem

Leonhard Euler

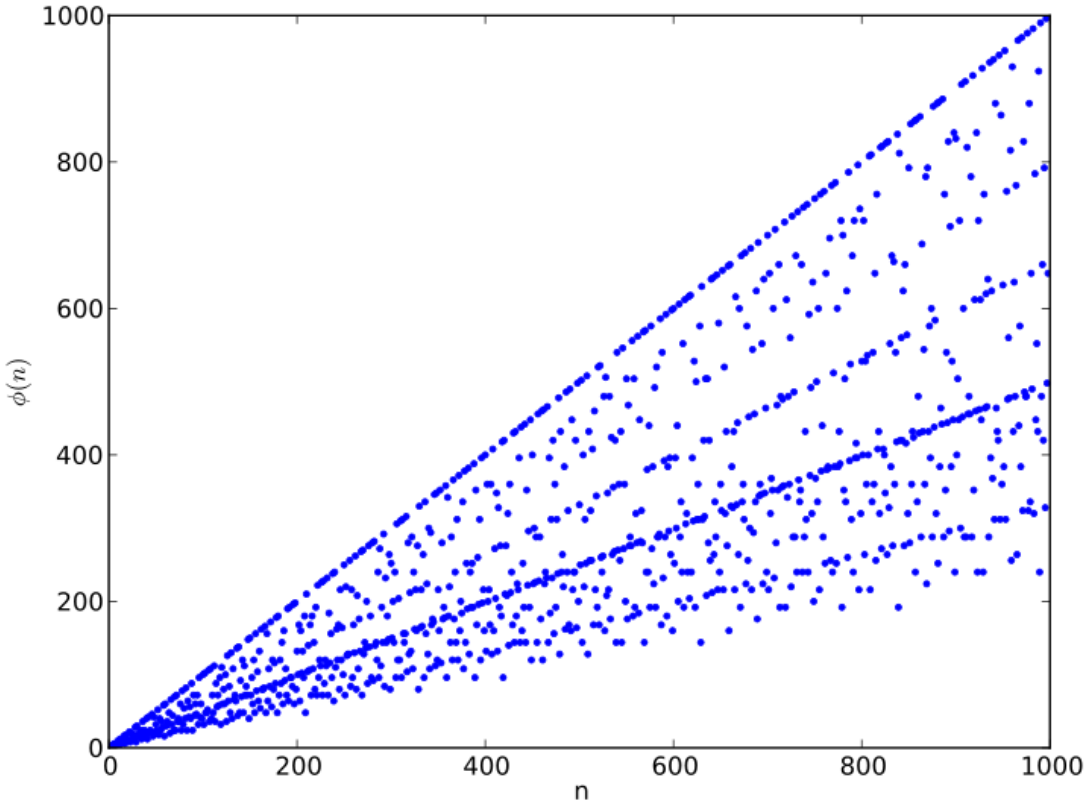
(15 April 1707 – 18 September 1783)

- Euler's function ϕ
- Euler's theorem

- Euler's function ϕ

$$\phi(9) = \#<1, 2, 3, 4, 5, 6, 7, 8, 9> = 6$$

coprime



primes p, q

$$pq = N$$

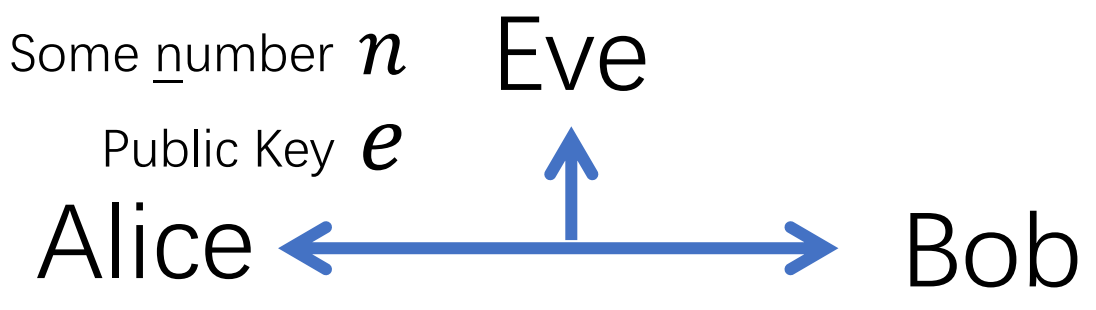
$$\phi(N) = \phi(pq) = \phi(p)\phi(q)$$
$$= (p-1)(q-1)$$

- Euler's theorem

$$m^{\phi(n)} \equiv 1 \bmod n \quad (m, n \text{ coprime})$$

$$m^{k\,\phi(n)} \equiv 1 \bmod n$$

$$m^{k\,\phi(n)+1} \equiv m \bmod n$$



$$m^{e} \equiv c \bmod n$$

$$\boxed{c^{d} \equiv m \bmod n}$$

$$(m^{e})^{d} \equiv m \bmod n$$

$$k\,\phi(n) + 1 = ed$$

$$ed \equiv 1 \bmod \phi(n)$$

Trapdoor
One-way Function

e Public Key (Encryption)

N Some Number

Eve

Alice

Bob

$N = pq$

$221 = 13 \times 17$

$\phi(N) = \phi(pq) = \phi(p)\phi(q)$
$= (p-1)(q-1)$

$\phi(221) = 12 \times 16 = 192$

$e = 5$

$m^e \bmod N = c$

$11^5 \bmod 221 = 163$

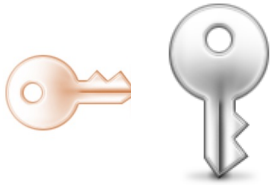
$c^d \bmod N = m$

$163^{77} \bmod 221 = 11$

$d = 77$

Private Key (Decryption)

$$ed \equiv 1 \bmod \phi(n)$$



Asymmetric Encryption

RSA Logarithm
1977
Ron **R**ivest
Adi **S**hamir
Leonard **A**dleman

Discrete Logarithm
Prime Factorization
→ **One-way Function**

Euler's Function
Euler's Theorem
→ **Trapdoor**

Edward Snowden

(1983/6/21 ---)

PRISM(棱镜计划)

Secret Documents Reveal N.S.A. Campaign Against Encryption

Documents show that the N.S.A. has been waging a war against encryption using a battery of methods that include working with industry to weaken encryption standards, making design changes to cryptographic software, and pushing international encryption standards it knows it can break. Related Article »

Excerpt from 2013 Intelligence Budget Request | Bullrun Briefing Sheet

Diffie–Hellman key exchange
1976

RSA Logarithm
1977

1969 at GCHQ
James Ellis
Clifford Cocks
Malcolm Williamson

1973 at GCHQ
Clifford Cocks

(Revealed in 1997)


CENTRAL INTELLIGENCE AGENCY
UNITED STATES OF AMERICA


NATIONAL SECURITY AGENCY
UNITED STATES OF AMERICA

GCHQ

MATHS

Number Theory

No Privacy On Internet