

## Product Introduction

# LS-BMC™

(Lion Security Biometric Recognition Smart Card)



「Lion Security Co., Ltd」



Feb. 2017 / Proposed to

# Contents

The Only company to make Mass production possible of  
Biometric Smartcard

## I Background

1. Market Growth of Biometric Authentication
2. Convenient Usability vs. Psychological Rejection and Anxiety
3. Combination of Biometrics and Smart Card

## II LS-BMC™

1. Feature and Standard
2. No Battery
3. Module Block Diagram
4. Fingerprint Sensor Specification
5. CPU

## III Competence

1. Mass Production

## IV Field of Application

1. Access Control
2. System Log in & Manager Approval Card
3. Alternative Means of Public Key Certificate
4. Financial Card

## V Competitors

1. Competitor Status in Product Development Cycle
2. Domestic
3. Overseas

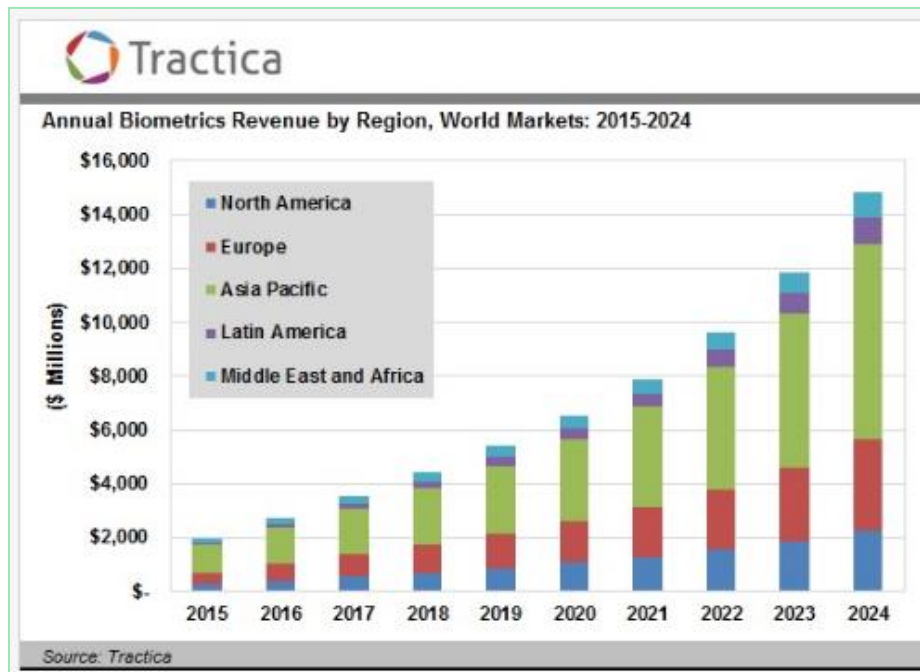
## VI Price Table

1. **LS-BMC™** Price Table Template

# I. Background

## 1. Market Growth of Biometric Authentication

- The market for using biometrics for identifying and authenticating people is trending up: Due to convenient usability and safety, the usage of biometrics is expanded to many fields, especially substituting for the authenticating means like public key certificate
- The total global biometric authentication market will increase from 2 billion dollars in 2015 to 14.9 billion in 2024
- Specially in the healthcare sector, it expects to be reached to 3.5 billion in 2024



# I. Background

## 2. Convenient Usability vs. Psychological Rejection and Anxiety

- There are still concerns about the possibility of leakage of information for biometric authentication
- Public key certificate or other passwords can be changed even if they are leaked, but they can not be changed if biometric data is leaked
- People are still reluctant to the fact that they provide their biometric data to the service organization like financial institutions



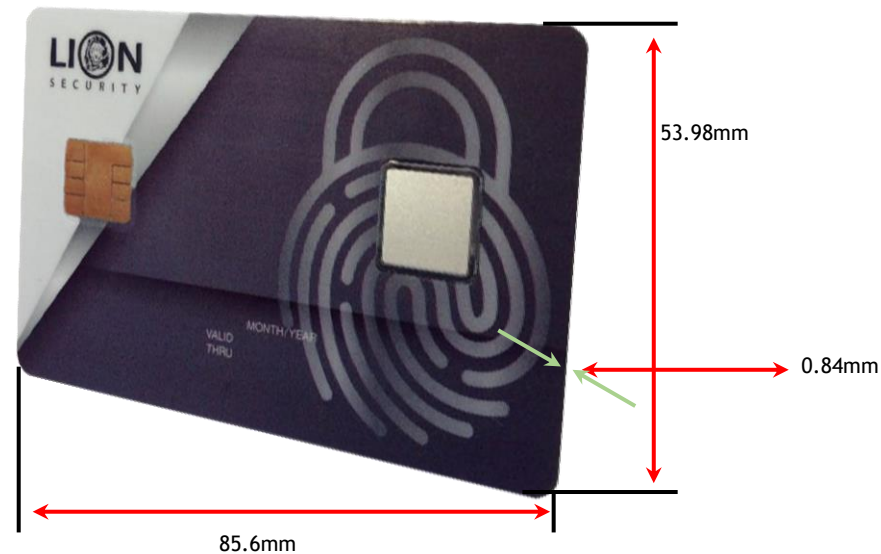
According to “theguardian” above, US government hack stole fingerprints of 5.6 million federal employees

<https://www.theguardian.com/technology/2015/sep/23/us-government-hack-stole-fingerprints>

# I. Background

## 3. Combination of Biometrics and Smart Card

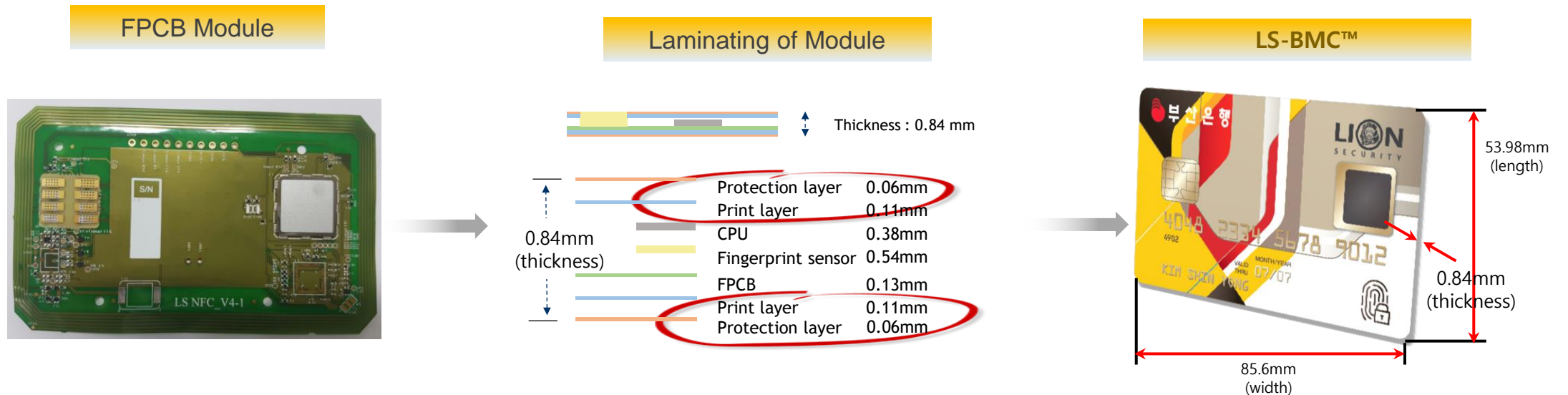
- No hacking risk. No leakage risk: **LS-BMC™** can be a solution to their psychological rejection and anxiety
- The smart card IC chip stores fingerprint data with strong encryption, and authentication is performed when the scanned fingerprint 1:1 matches within the fingerprint smart card itself
- Since the biometric data is not stored in the DB of the service organization, no leakage risk
- Even if the smart card is stolen, no one can access the encrypted fingerprint data



# II. LS-BMC™ (Lion Security Biometric Fingerprint Recognition Smart Card)

## 1. Feature and Standard

- ❑ **LS-BMC™** conforms to ISO 7810, 7816 standard
- ❑ Within 0.84mm thick while keeping the fingerprint smart card module safely and superior flatness
- ❑ The cover sheet on the module is not peeled off, so Internal module and plastic cover sheet is not broken

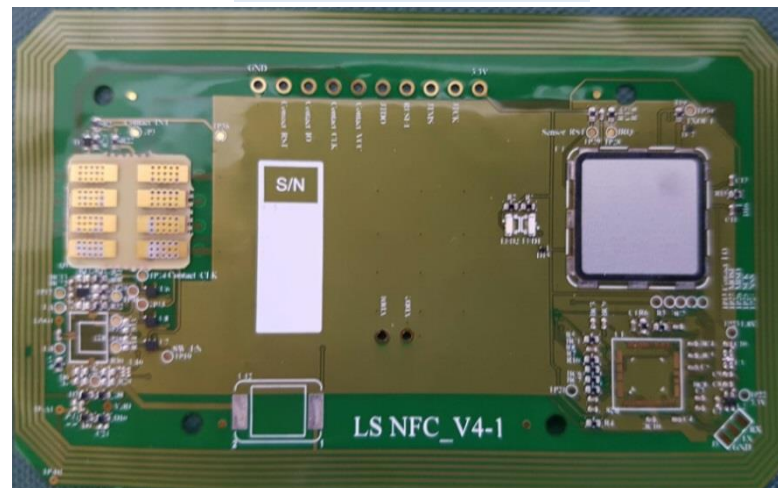


## II. LS-BMC™ (Lion Security Biometric Fingerprint Recognition Smart Card)

### 2. No Battery

- In the **LS-BMC™**, the battery is not built in to drive **LS-BMC™**
- Instead of battery, Energy Harvesting technology is applied: **LS-BMC™** receives a small amount of power form the RF reader or smart phone and amplifies it to the necessary power to activate
- No battery, no charging, semi-permanent use

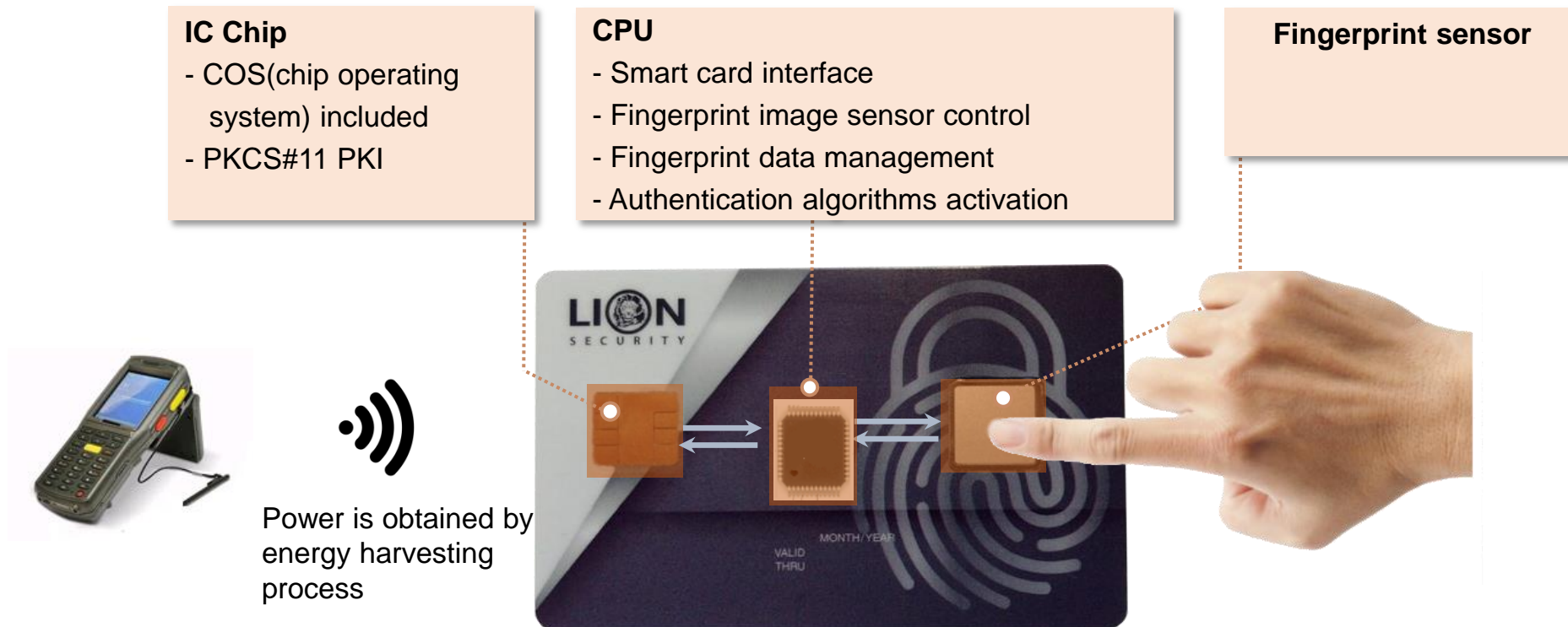
FPCB Module



## II. LS-BMC™ (Lion Security Biometric Fingerprint Recognition Smart Card)

### 3. Module Block Diagram

- Through the interface between major components(IC Chip, CPU, Sensor), biometric authentication process is executed
- In the early future, it is possible to extend to financial card: credit card, check card





## II. LS-BMC™ (Lion Security Biometric Fingerprint Recognition Smart Card)

### 4. Fingerprint Sensor Specification

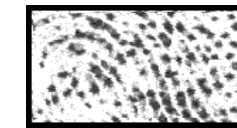
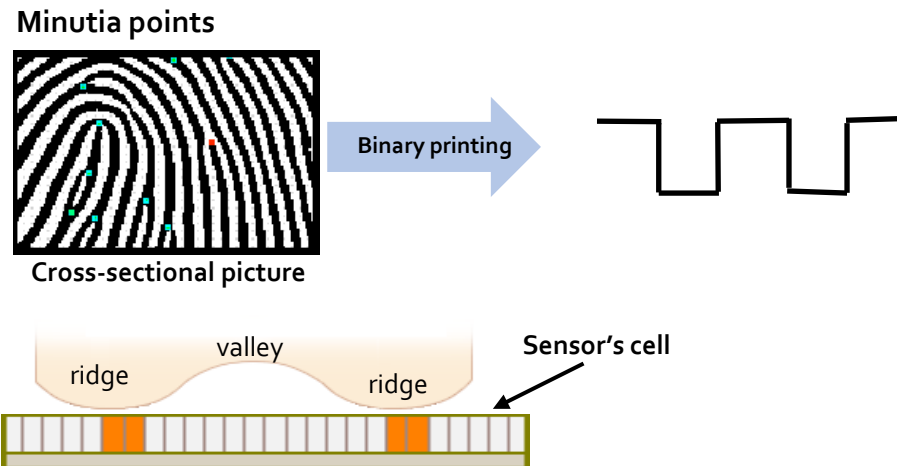
Classification	Description	Value
FRR	0.1% (rejection rate)	
FAR	0.001% (unauthorized approval rate)	
Authentication time	Less than 1 sec.	
Input voltage	+1.8 ~ +3.3V	
Max current	5mA/h (Image capture)	
Min current	10uA/h (Deep sleep)	
Data command interface	SPI interface supports speeds up to 12MHz	
Size	14 x 14 x 0.5 mm	
Interface	Serial SPI + Interrupt	
Active sensing area		9.6 x 9.6mm
Size sensing array		192 x 192 pixels
Pixel resolution	8 bit gray scale	256 level
Clock frequency	Serial SPI communication	Up to 12MHz
Operation temperature	With active finger detection	-20 ~ +60
Storage temperature		-40 ~ +85

## II. LS-BMC™ (Lion Security Biometric Fingerprint Recognition Smart Card)

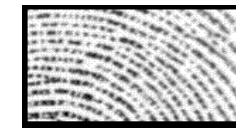
### 4. Fingerprint Sensor Specification(continued)

- MEMS(Micro Electro Mechanical Systems) sensor technology applies: it enables to scan high quality fingerprint image

- Compared to semiconductor and optical sensor, MEMS sensor technology converts scanned fingerprint to binary image, using intelligent software algorithm, and avoids the image scanning distortion



Semiconductor sensor



Optical sensor



MEMS

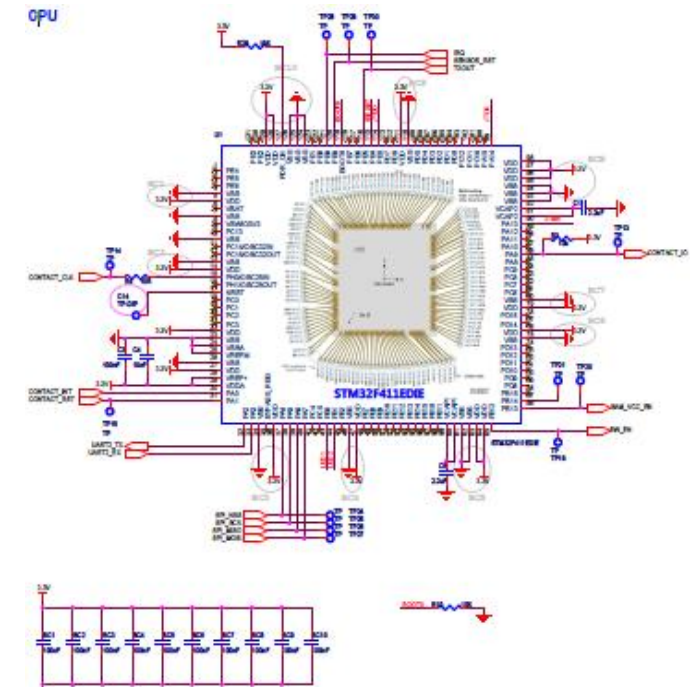
## II. LS-BMC™ (Lion Security Biometric Fingerprint Recognition Smart Card)

### 5. CPU

- STMICROELECTRONICS' CPU is used in the current product and the dedicated CPU through ASIC process will be used from 2018
- Once ASIC's CPU is used, the price of **LS-BMC™** will be reduced by 30%~40%

#### Current CPU: STM32F411

Classification	Specification
<b>Core</b>	ARM 32-bit Cortex -M4 CPU with FPU, Adaptive real-time accelerator allowing 0-wait state execution from Flash memory, frequency up to 100MHz, memory protection unit, 125 DMIPS/1.25 DMIPS/MHz and DSP instructions
<b>Memory</b>	Up to 512Kbytes of Flash memory. 128Kbytes of SRAM
<b>Clock, reset and supply management</b>	1.7V to 3.6V application supply and I/Os POR, PDR, PVD and BOR 4- to 26 MHz crystal oscillator Internal 16 MHz factory-trimmed RC 32 KHz oscillator for RTC with calibration Internal 32 KHz RC with calibration
<b>Power consumption</b>	RUN : 100uA/MHz (Peripheral off) Stop (Flash in stop mode, fast wakeup time): 43uA type, 65uA max Standby : 2.4uA
<b>Interface</b>	Up to 13 communication: Up to 3 * I2C interface(SMBUS/PMBUS) Up to 3 UART (2 * 12.5Hbit/s, 1 * 6.25Mbits/s)



ASIC: Application specific integrated circuit

# III. Competence

## 1. Mass Production

- Mass Production is available at the process of all stages
- Reasonable price possible, half price of other competitors

### Step. 1

#### FPCB

(Flexible Printed Circuits Board)



1. FPCB Data Input
2. Copper Plating
3. Laser Drill
4. Line Formatting
5. AOI & PSR
6. Gold Plating
7. Marking



### Step. 2

#### SMD/COF

(Surface-Mount Devices)/  
(Chip On Film)



1. Solder Paste
2. Mount
3. Reflow
4. Bonding



### Step. 3

#### SHEET



1. Design
2. Plating
3. Printing



### Step. 4

#### Laminating & Post-Laminating



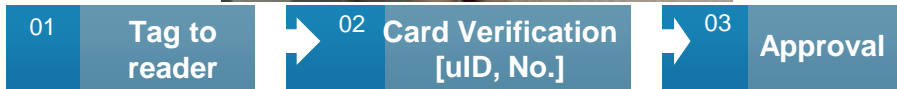
1. Laminating
2. Punching
3. Milling
4. Bonding

# IV. Field of Application

## 1. Access Control

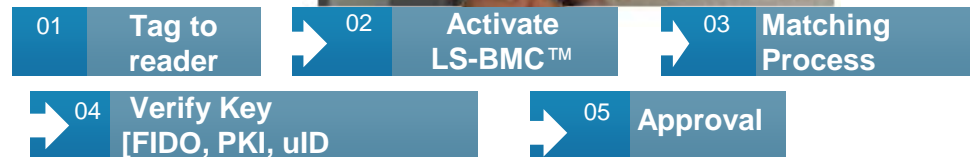
### Access ID Card

#### General ID Card Access Control



**Card Verification Process**  
(Just verify whether the card itself is valid)

#### LS-BMC™ ID Card Access Control



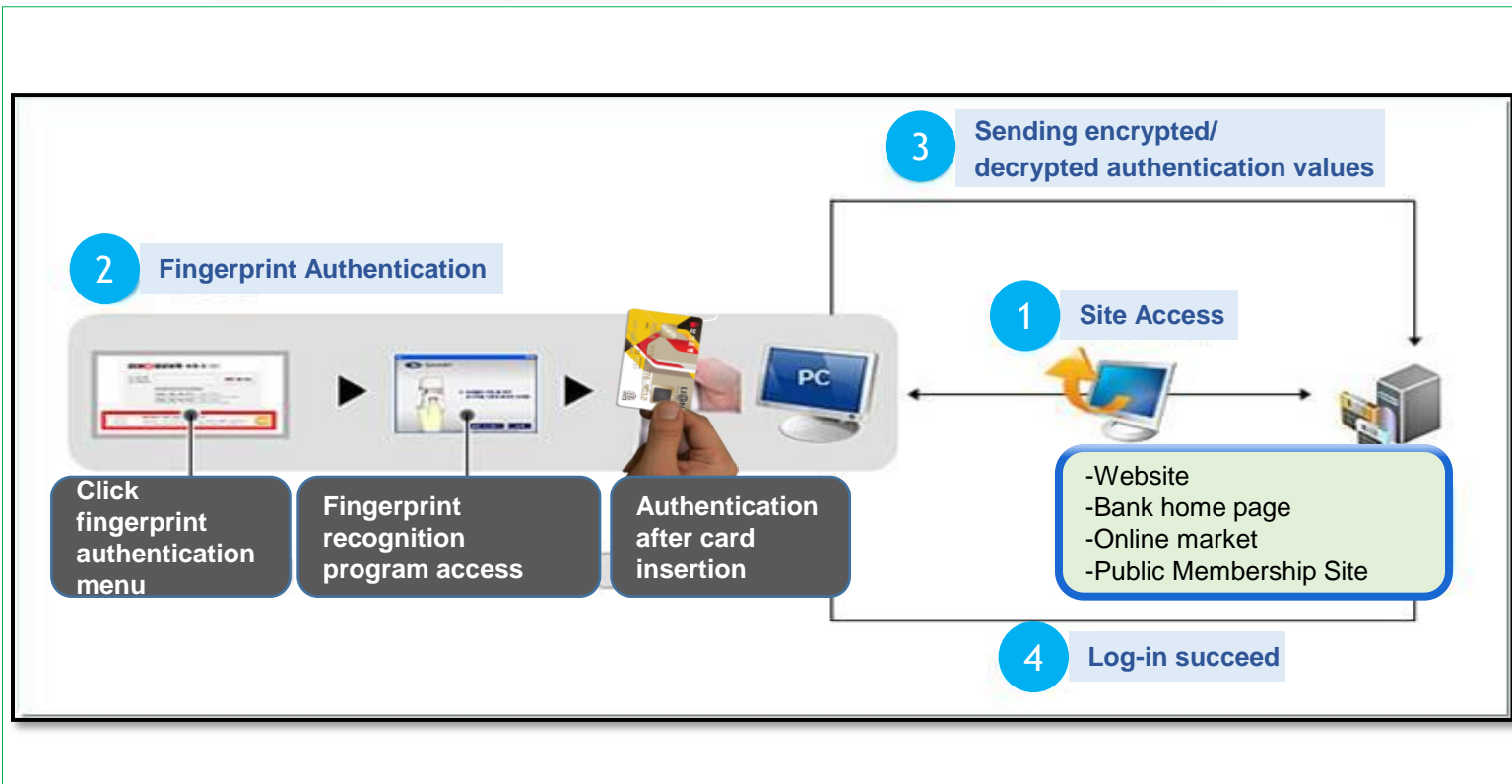
**User Authentication Process**  
(Card User verification)

# IV. Field of Application

## 2. System Log in & Manager Approval Card

**Biometric Authentication Log in(PC) / Information Security (System and Data Access)**

**Manager Approval Card**



**Authorized person's final approval for the certain transactions:**  
Blocking the source of damage caused by false approval



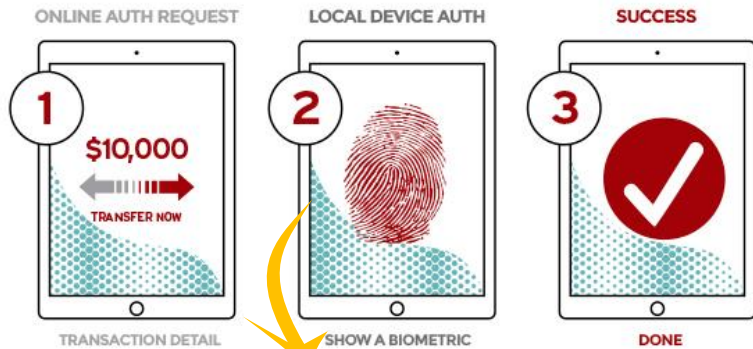
# IV. Field of Application

## 3. Alternative means of Public Key Certificate

### FIDO Biometric Authentication / Alternative means of Public Key Certificate

#### UAF (Universal Authentication Framework):

Biometric Authentication only with fingerprint recognition without password input



Biometric Authentication by Fingerprint recognition smart card, instead of biometric information in Trustzone



#### U2F (Universal 2<sup>nd</sup> Factor):

Biometric Authentication as an additional security measure to supplement your password



Biometric Authentication by Fingerprint recognition smart card instead of PKI



# IV. Field of Application


## 4. Financial Card (Credit Card & Check Card)

### Credit Card · Check Card


#### Activation of Credit Card through biometric authentication



- More than 21,000 stolen and abused damages are reported per year, these kinds of damages would be dramatically reduced
- By reducing those friction with customers, customer satisfaction would be achieved
- Compensation liability insurance premium rate will be lowered



Enhancing corporate image



Reducing administrative costs



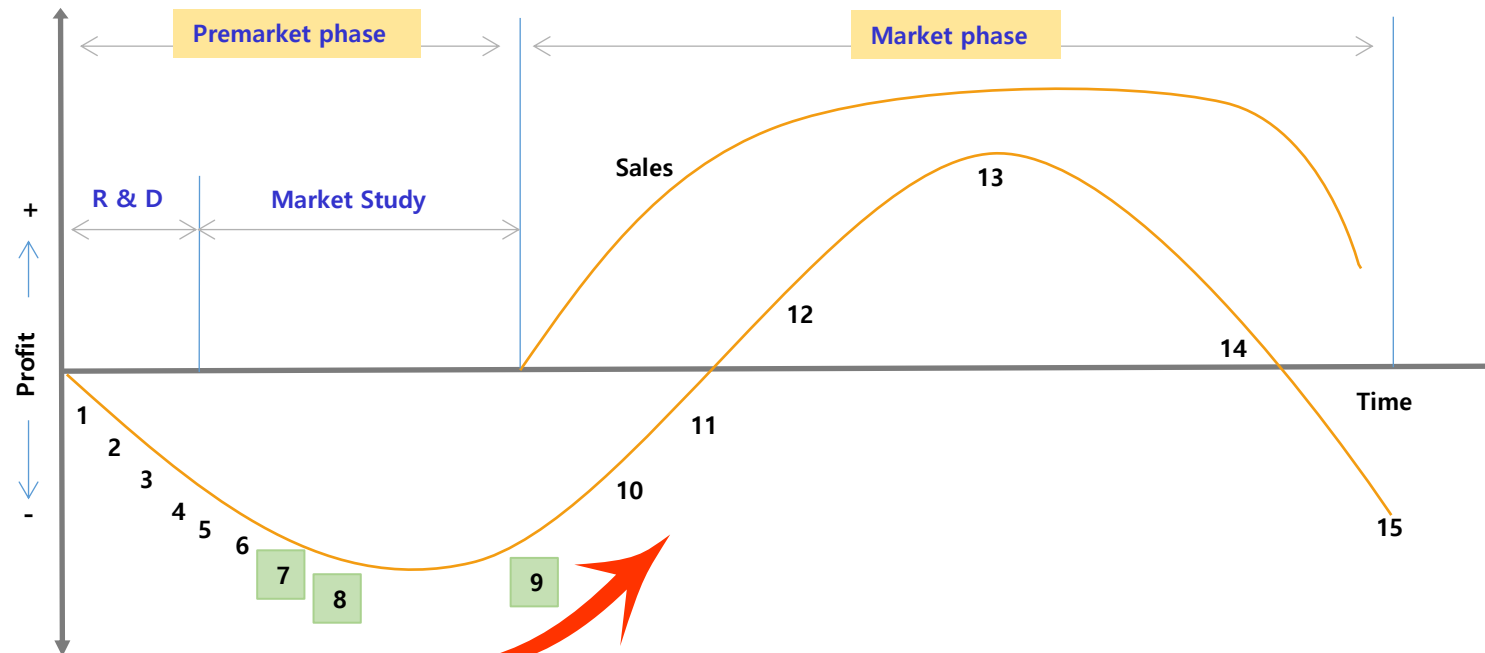
# IV. Competitors

## 1. Competitor Status in Product Development Cycle

□ All competitors are passing through the stage of 5, 6 and 7

### Premarket Phase

1. Idea Generation
2. Idea Evaluation
3. Feasibility Study
4. Technical R&D
5. Product (market) R & D
6. Preliminary Product
7. Market Testing
8. Commercial Production



**Lion Security is forwarding to 10 stage.**

### Market Phase

9. Product introduction
10. Market Development
11. Rapid Growth
12. Competitive Market
13. Maturity
14. Decline
15. Abandonment

# IV. Competitors

## 2. Domestic

- None commercialized: even if there are some “commercialization” articles related to fingerprint recognition smart cards, no companies commercialized

Company	Article date	Media	Title of Article
Korea Smart ID [KSID]	2016.12.13	Etnews	KSID supplies fingerprint recognition smart card to Woori Bank...Target sales of 19 billion KRW in 2017
Crucial Tech + Kona I	2016.05.25	ZDNet Korea	Fingerprint recognition credit card....How ripple effect will be...(Thin thickness. Low power consumption realization)
	2016.05.24	Etnews	Fingerprint recognition smart card came out...Kona I-Crucial Tech, First commercialization of the industry
TelCuOn	2016.03.26	Datanet	The integration of biometric authentication and smart card...perfect secure authentication possible
Posco ICT + KSID + Zwipe	2015.02.16	Etnews	The first in Korea...Released smart card with fingerprint recognition function
Truegate	2001.11.12	HanKyung	TrueGate developed fingerprint recognition smart card



# IV. Competitors

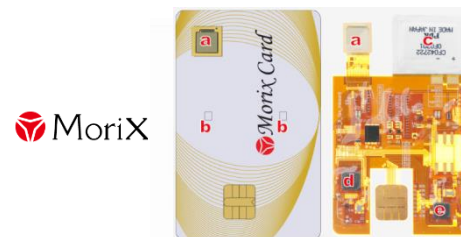
## 3. Overseas

No Mass Production. No Commercialization as well

Company	Article date	Media	Article summary
<b>Zwipe</b> [Founded 2009.09, Norway Oslo]	2017.01.17	BIOMETRIC update.com	ISG Group to sell Zwipe biometric access control and ID solutions
	2016.10.31	BIOMETRIC update.com	Zwipe announces joint venture with Kuang-Chi Group
	2016.06.20	BIOMETRIC update.com	Zwipe and Hitachi High-Tech announce partnership
	2014.10.17	FindBiometrics	Introducing on-Card Fingerprint Biometric Payments From MasterCard and Zwipe
<b>MeReal Biometrics</b> [Founded 2015, HongKong]	2016.11.29	BIOMETRIC update.com	MeReal Biometrics named Fintech Rising Star at India FinTech Awards
	2016.11.04	BIOMETRIC update.com	French Casino Group piloting MeReal Biometrics smartcard
<b>Morix Co., Ltd.</b> [Founded 1982, Janpan]	n/a	n/a	n/a
<b>NXT-ID</b> [Founded 2011, ISA]	2016.10.31	Yahoo Finance	Nxt-ID, Inc. and WorldVentures Demo the New flye Smart Card At Money20/20

**Kuang-Chi Group in China invested 8.9 million dollars to Zwipe, obtaining 20% of outstanding shares**

**Pilot test is scheduled to be carried out with the support of parent company, Group Partouche in France**



# IV. Price Table

## 1. LS-BMC™ Price Table Template

**MOQ: 1,000**

Qty	Price
1,001~5,000	USD 40
5,001~10,000	USD 35
10,001~50,000	USD 30
50,001~100,000	USD 25
Over 100,000	USD 18

