White Paper

Biometric Payments Come of Age

Biometrics is fast becoming the go-to-tool for banks and payment services providers in the continuing fight against fraud across both traditional and emerging payment channels.

From removing the PIN for cash obtained from ATMs and supporting higher-value authenticated contactless physical payments using the latest biometric payment card technology to supporting wallets and even Naked payments – no card, no mobile just you!

This white paper from research and consulting company Goode Intelligence (GI) explores what is driving banks and payment providers to adopt biometrics, drawing on recent published research on biometrics for payments.

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BIOMETRICS –SUPPORTING PAYMENT AUTHENTICATION IN ALL PAYMENT CHANNELS

Biometrics has become an important tool in the fight against fraud in almost all payment channels. From cash obtained from ATMs to the newest ways of paying for goods and services biometric technology is being leveraged in traditional and emerging payment channels.

Payments have been the major driving force for the wide-scale adoption of biometrics in the consumer market. Today, millions of customers (575 million plus during 2018) are using biometrics on a daily basis around the world to provide secure convenient user authentication and transaction authorisation and this theme is set to continue with a forecast of over 1.2 billion users by 2020.

Goode Intelligence believes that biometrics is one of the few technologies that can support payee authentication and transaction authorization in so many payment channels:

- In-store at the point of sale using biometrically enabled smartphones, naked payments using integrated biometric sensors and biometric payment cards
- eCommerce using the latest FIDO WebAuthn standards
- Mobile in-app payments
- Withdrawing cash from a biometric ATM
- Authorizing payments using your voice through the telephone channel
- Supporting payments in emerging channels including:
  - o In-car biometric payments
  - o Via smart home devices
  - o Using a smart wearable device with integrated biometric sensor

Biometrics is also the enabler to support smart digital-only customer on-boarding where biometric passports and trusted ID documents are used to verify identity to ensure that customers can open new payment accounts within minutes using their smartphones.

Biometric payment adoption is being driven by a number of factors that include a drive for frictionless authentication whilst paying in all channels, **industry and state regulation**, **a desire to reduce payment fraud**, and **technology standardisation**.

NO ONE SIZE FITS ALL MODEL FOR BIOMETRIC PAYMENTS

Biometric technology is being used for customer identification and payment authorization globally and what is remarkable is the wide range of models and systems that are being used to support this.

There is certainly no one fits all model for biometric payments with significant differences in deployment based on regions.

Cloud-Based Biometric Payment Models

India and Brazil with large centralized biometric databases set the tone for regions where regulation and culture support the use of this model.

India's Aadhaar biometric identity scheme is the largest biometric system in the world with over one billion citizens enrolled. Aadhaar Pay is a service linked to the universal identity service to support payment at physical locations including retailers and ATMs.

With Itaú Bank in Brazil, over two billion ATM transactions were processed by 35 million customers in 24,000 ATMs using their fingerprint as replacement for the PIN – **cutting down fraud by 70 percent**.[1]

Decentralized Biometric Payment Models

In other regions where data protection and privacy legislation is less supportive of centralized biometric models local biometric models are more prevalent; often categorized as decentralized or device-based biometrics.

Europe in particular with its stringent General Data Protection Regulation (GDPR) is having a significant impact on how biometric systems are designed and deployed. This is echoed in North America where device-based biometric payment solutions, including Apple Pay, dominate the current biometric payment landscape.

Biometric data is enrolled and stored on the device, a smartphone or a biometric payment card. A range of biometric sensors including fingerprint, face and iris are leveraged to repeatedly verify the identity of the owner to support payment authorization.

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[1] Figures for 2017 from Itaú Bank

MAJOR TRENDS FOR BIOMETRIC PAYMENTS

The major trends that Goode Intelligence is seeing for biometric payments include:

- Rise of mobile & multi-modal mobile-based biometric authentication
- The arrival of biometric payment cards
- Biometric adoption in all payment channels supported by APIs and IoT devices that support voice and face biometrics
- Beginning of the deployment of single biometric platform to support multiple payment channels and identity, authentication and fraud management functions
- The growth of biometric identity verification (proofing) harnessing mobile face biometrics
- Tighter integration with fraud detection, fraud management and risk-based authentication solutions including adoption of behavioral biometrics / analytics
- Different speeds of adoption and regional differences;
    - Mobile will drive the market in the EU, North America and China
    - Where a region has a mature National ID (NID) system that supports biometrics for identification we shall see use of these systems by banks wanting to leverage this infrastructure – biometrics as a service operated jointly by the private sector and the state

- Industry regulation will start to specifically reference biometrics as part of its guidance on two and multifactor authentication (EU PSD2, USA FFIEC guidelines and Bank of China and Korea legislation)
- The growth of face biometrics as a biometric technology that is versatile and can support identity verification and authentication
- Leveraging the power of machine learning (ML) and Artificial Intelligence (AI) technology to improve biometric performance and spoof / liveness detection
- Cash is still king in many regions and the ATM is the main delivery mechanism. The adoption of biometrics for ATM access will increase in regions where it has already been deployed (Japan, Eastern Europe and South America) and start being deployed in other regions where the PIN is still the predominant authentication mechanism. This includes leveraging the biometric capability of a smartphone to provide out-of-band biometric authentication (OOBBA) when accessing ATMs
- Naked payments offer retailers an alternative customer experience opportunity – linked to identity for age verification

CONTINUOUS CUSTOMER AUTHENTICATION – BLENDING PASSIVE AND ACTIVE BIOMETRIC AUTHENTICATION

Biometric technology is fast becoming the glue that binds this technology together; passively verifying a person's voice while they order goods via their smart speaker, then actively requesting a face or fingerprint when the payment provider's risk engine decides that a payment request is outside the normal risk appetite – for example, purchasing a new smartphone in Hong Kong with my new biometric payment card when I reside in London. Old school step-up payment verification would be a decline by the retailer and then a call; perhaps hours later, from the card issuer's contact center to then verify my identity using long-forgotten knowledge-based identifiers. New school is to instantly receive a secure message through my card issuer's mobile app to allow step-up verification using a smartphone-based biometric – instantly at the retailer allowing me to purchase my new smartphone.

This linking of fraud management, adaptive authentication and a choice of passive and active biometric tools will be crucial for payment service providers seeking to engage with their customers and stay in the game.

BIOMETRICS SUPPORTING EMERGING PAYMENT CHANNELS

The rise of always on connected things is providing opportunity for retailers to reach more pervasively into our lives; whether it is the latest voice-controlled smart home speaker or a connected automobile crammed full of biometric sensors to support payments on the move or at the gas station.

Goode Intelligence predicts that with the rise of smart home voice-controlled devices, Amazon Echo, Google Home and Apple Homepod, this will led to an explosion of conversational commerce applications that will use voice biometrics to identify customers and authorize payments.

"Alexa, ask Capital One, when is my auto loan due?"

Source: Capital One

The emergence of new channels is being driven by the Internet of Things (IoT) and we are only at the beginning of a movement that allows consumers to make payments from a wide range of intelligent connected devices that include the smart home, smart car and smart city

BIOMETRIC PAYMENT CARDS SUPPORTING FRICTIONLESS CONTACTLES HIGH-VALUE PAYMENTS

An emerging area of biometric payments that offers real potential and has seen plenty of activity with pilots and proof of concepts during 2018 is biometric payment cards where the card uses an embedded biometric sensor, currently a touch fingerprint sensor. There a number of vendors globally bringing biometric payment cards to market with backing from the main payment schemes including JCB, Mastercard and Visa.

UK Contactless Payment Cards Statistics for 2017

Contactless cards accounted for 15% of all payments

108.4m contactless payment cards (79.3 million contactless debit cards) were in circulation

Rapid growth in the use of contactless cards means cash will be overtaken as Britain's most frequently used payment method by the end of 2018

How does the technology work?

Biometric Payment Cards are ISO 7810 compliant contact and contactless cards that can be adopted by banks to replace non-biometric smartcards – eliminating the use of a PIN and supporting higher-value contactless payments in physical locations.

They operate in the same way as normal smartcards (in both contact and contactless modes) apart from the user having to activate the card using their enrolled fingerprint. There is a match between the person's finger and a fingerprint template stored on the card. If the match is successful then the card is activated and the customer can use the card either in an ATM or at a Point-of-Sale (POS) terminal. If the match is unsuccessful, then the card cannot be used. This means that the card is useless without the presence of the legitimate owner and if the card is lost or stolen then cannot be used.

As this technology is still being developed and refined (receiving feedback from pilots) each card manufacturer and card scheme has different approaches to how the card operates including the enrolment process. Small red and green LED lights on the card can provide feedback to the card owner during enrolment and payment scenarios.

Eight Advantages of Biometric Payment Cards

BIOMETRIC PAYMENT CARDS

Eight Advantages for Card Issuers and Retailers

Goode Intelligence

1 SECURITY

Security – contactless card cannot be used without cardholders biometric that never leaves the card

2 USER EXPERIENCE

Eliminates need for PIN and improves the user experience

3 USE EXISTING INFRASTRUCTURE

No need to change existing point of sale (POS) infrastructure

4 STANDARDS

Meets EMV, ISO and PSD2 payment and card standards

5 DUAL INTERFACE

Supports both contact and contactless interfaces

6 NO PAYMENT LIMITS

Removes payment cap currently seen with unauthenticated contactless payments

7 MAKES PAYMENT CARDS COOL AGAIN

Positive reaction from card pilots with consumers wanting to use biometrics for payment cards

8 MATCHES (BEATS) MOBILE PAYMENTS FOR USABILITY

Ensures card issuer retains customer control

Information taken from the Goode Intelligence analyst report "Biometrics for Payments Market & Technology Analysis, Adoption Strategies & Forecasts 2018-2023"

Biometric Payment Card Ecosystem

The biometric payment card ecosystem is important in ensuring that this technology is successful and includes:

Table 1: Biometric Payment Ecosystem

Biometric Sensor Vendors	Fingerprint Cards, IDEX and NEXT Biometrics
Biometric Algorithm Vendors	Precise Biometrics, IDEMIA, Innovatrics & Fulcrum Biometrics
Biometric Smart Card Vendors	Zwipe, CardLab, Card Tech, Feitian, Jinco, Linxens, Kona I, MeReal Biometrics, NXP, SmartMetric
Smart Card Vendors	Gemalto, G&D, IDEMIA
Payment Schemes	MasterCard, JCB and Visa
Card Issuers	Retail banks, casino operators, entertainment providers, sports stadium and colleges and schools
Retailers	Physical retail stores plus other locations that accept payments including casino operators, entertainment providers, sports stadium and colleges and schools

Source: Goode Intelligence

As part of the research for the report we interviewed key stakeholders in the ecosystem including Precise Biometrics.

Precise Biometrics – Interview with Fredrik Sjoholm VP Sales

"Precise Biometrics' card offering is biometric software algorithms that are optimized to run in constrained environments. Our focus for biometric payment cards is with dual interface smart cards (contact and contactless) and operating in a small embedded platform and low power consumption. Having worked with smart cards and mobile devices for over 20 years, we can use this experience for creating efficient algorithms for payment cards, which will be a real differentiator in this market.

There are a number of options for where the biometric template and processing takes place on the card. Due to security reasons, we recommend putting the matching algorithm in the SE (similar to PINs in EMV cards) which means that the biometric templates and the matching processing always occur securely in the SE. We are involved in biometric payment pilots around the world and are working with companies such as NXP, Kona-i, Fingerprint Cards and Visa. The data that we are receiving back from the pilots is incredibly important and enables us to refine our software including user experience improvements.

Biometric Payments Come of Age

Precise's route to market is through the fingerprint sensor manufacturers and via the SE and biometric smart card vendors.

"One of the most important aspects of biometric payment cards is cost. For it to be a success and in the hands of hundreds of millions of consumers the cost has to be in the right place for the card issuers. To reach higher volumes, the biometric cards likely will have to go below $10 as target price. We believe the efficiency of our software can play an integral part in enabling card manufacturers to push down cost on the total card platform without sacrificing security and user convenience."

Fredrick Sjoholm, VP Sales at Precise Biometrics

We expect to see new card schemes standards for biometric payment cards later this year or early next year that will mean the same experience across all EMV cards, biometric and non-biometric. By being an independent fingerprint software company supplying many of the current pilots we can ensure that there is a common user experience across cards from multiple suppliers. ."

BIOMETRICS FOR PAYMENTS; MARKET & TECHNOLOGY ANALYSIS, ADOPTION STRATEGIES AND FORECASTS 2018-2023

The second edition of **Biometrics for Payments - Market & Technology Analysis, Adoption Strategies & Forecasts 2018-2023** is a 320 page analyst report that provides detailed analysis of the market and adoption of biometrics for payments.

The report includes:

1. Review of current global adoption
2. Market analysis, including key drivers and barriers for adoption across a wide range of payment scenarios
3. Technology analysis
4. Analysis of important technology vendors and services providers operating in this sector
5. Forecasts for users and revenue within the six-year period 2018 to 2023

It also explores some of the key considerations for payment providers when deploying biometric technology including the impact of both state and industry regulation.

Goode Intelligence predicts that there will be over 2.6 billion biometric payment users and 579 million biometric payment cards in use by 2023 with the use of biometrics being driven by a number of factors including:

- Desire for frictionless authentication while paying in all channels
- The need to reduce payment fraud
- Industry and state regulation
- Technology standardisation

The report covers the following payment channels: Physical locations using biometric technology integrated into payment terminals (Naked Payments), biometric payment cards or by using smart devices, Digital Payments including eCommerce, mCommerce, wCommerce, IoT, Cryptocurrency and ATMs.

ABOUT GOODE INTELLIGENCE

Since being founded by Alan Goode in 2007, Goode Intelligence has built up a strong reputation for providing quality research and consultancy services in cybersecurity including:

- Biometrics
- Mobile Security
- Banking Security
- Authentication and Identity
- Internet of Things Security

For more information on this or any other research please visit www.goodeintelligence.com. Follow us on Twitter.

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ABOUT PRECISE BIOMETRICS

Precise Biometrics is a market-leading supplier of solutions for convenient and secure authentication of people's identity. We develop and sell fingerprint software that provides the market's best user experience and security. Our solutions are used hundreds of millions of times every day by people all over the world and are marketed together with strong business partners. For more information, please visit **https://precisebiometrics.com**. Follow us on **LinkedIn** and **Twitter**.