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BIOMETRIC PAYMENT CARDS

THE NEXT STEP IN THE EVOLUTION OF THE PAYMENT CARD

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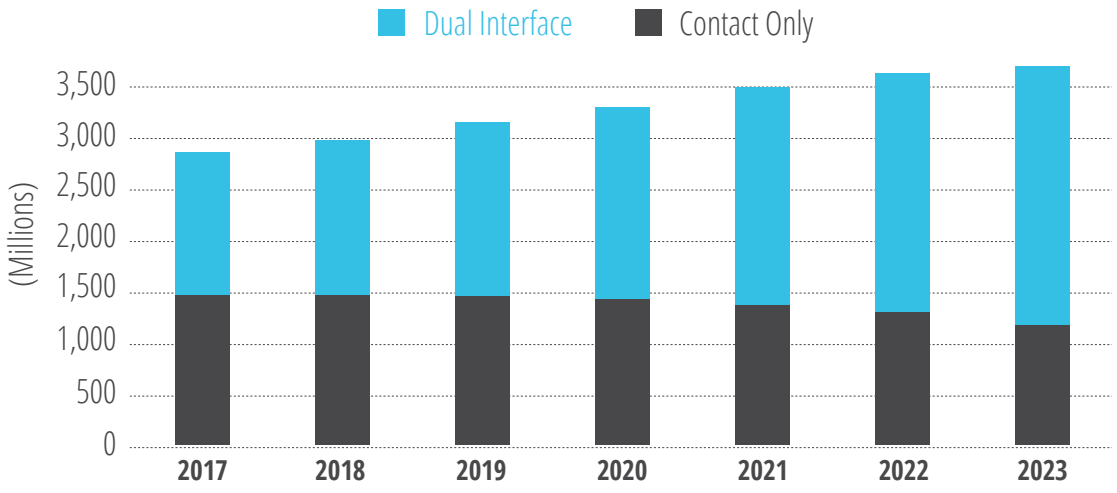
THE PAYMENT CARDS MARKET PRIMED FOR BIOMETRIC EVOLUTION

The integration of the biometric sensor into the payment card is considered one of the next-generation transformative innovations to move the payment card into the 21st century. Biometric sensor integration will not only provide the required lasting security authentication mechanism for the foreseeable future, but also enable the payment card to move from a simple secure authentication media toward one that can help banks, financial institutions, and issuers differentiate, create new levels of brand stickiness, personalize experiences, and enable access to new end markets and opportunities *via* financial inclusion initiatives and Internet of things (IoT) market adjacencies.

Over the past 20 years, the payment cards market has seen the introduction, and near global adoption of the Europay, Mastercard, and Visa (EMV) chip card standard. Overall, the EMV payment cards market can be considered very well established and largely mature. All of the major economies have already completed their respective EMV migration programs, with most others at various stages of the EMV migration process. Only a handful of large emerging countries remain, including the Philippines and Indonesia.



According to ABI Research, EMV payment card shipments will reach close to 3 billion units by the end of 2018. By 2023, this is forecast to grow to just over 3.6 billion. Despite the market being established for more than 20 years, little has changed from the look, feel, and security perspectives.

The year 2017 marked a significant one within the payment cards market, as the penetration rate of contactless EMV cards issued exceeded 50% for the first time. The growth in contactless EMV cards has been primarily driven by two main factors:

- Higher levels of convivence
- The ability to offer comparable contactless experiences used on mobile and wearable devices on cards

The wider trend of account-based ticketing on transportation networks and the subsequent acceptance of EMV-enabled payment cards has driven contactless issuance and use into the mainstream. The continued

increase in contactless payment card penetration plays directly to the strengths of the biometric payment card, used as a primary or additional authentication mechanism to secure both contact and contactless payment transactions.

Despite little change in terms of payment card look, feel, and functionality, the payment card has undergone a number of innovative changes over the past two decades. During that 20-year time frame, new innovations have included:

- The largely global move and adoption of contactless payment cards
- The introduction of mobile wallets
- Less-visual innovations, including the migration from static to dynamic and, more recently, combined data authentication and the introduction of Card Verification Value (CVV) and Card Verification Code (CVC) numbers on the rear of the payment card to help secure Card not Present (CNP) transactions.

Overall, the payment cards market, from an innovation perspective, has not moved quickly. In terms of functionality, look, feel, and use cases, the payment card itself remains relatively unchanged. Improved security and authentication mechanisms have been at the forefront of each payment card development, to date, and this will remain the case going forward. However, the need to improve security and stay one step ahead of the security threat curve is now being paired and driven by a new set of drivers, which is being directly pushed by the banks, issuers, and financial institutions.

The biometric payment card has arguably arrived at the perfect time. The payment cards market is now at a cross roads, with contactless cards becoming even more common place, alongside a need to improve upon security, which has directly led to the rise in innovation as it relates to next-generation powered payment cards with biometric payment cards now viewed as the technology to breathe life back into the payment cards market.

BANKS, ISSUERS, AND FINANCIAL INSTITUTIONS IN UNCHARTED TERRITORIES

Traditional banks and issuers are now in uncharted territories, as they look to combat and compete against emerging challengers, in the form of neo-banks and pre-paid specialists targeting emerging economies, as well as needing to remain competitive against each other.

This, in turn, has driven a new wave of innovation, ensuring that the payment card of the future cannot just be viewed as a means to securely authenticate a payment, but as a payment method that can drive differentiation, brand stickiness, and personalized experiences, as digital payments moves from a technology solely designed to securely authenticate and complete a transaction, toward personalized and tailored payment journeys.

Technological innovation is playing a key and crucial role in moving the payment card into the 21st century, creating new feature sets designed to address next-generation security, while also providing new levels of value, differentiation, and use cases, primarily targeting:

- **Card Differentiation**: The average number of cards per person is increasing. In addition, payment media choice is increasing, along with the ability to use a mobile or wearable device to complete a payment transaction. As payment credential choice continues to increase, the ability to simply authenticate a payment will not be enough. There needs to be a compelling reason for a user to choose one credential type over another, and this is where differentiation is key.

- **Brand Stickiness**: Banks and issuers are also global brands in their own right. Not only are traditional banks and financial institutions competing against one another, but they now have a new wave of disruptive vendor types, *via* new challenger banks looking to disrupt, displace, and ultimately eat into the established banking vendors' market share.
- **Personalization/Tailored Experiences**: The payment card is one of the primary medias from which banks and issuers can communicate with their respective client base, but it is traditionally one that does little in terms of actual communication, aside from being linked to a bank *via* ownership of a card, and thus by association. The integration of technologies, including biometric sensors, moves the card from a static generic solution, to one that is more personalized and tailored, as the payment card moves beyond a medium from which to authenticate a payment toward a payments journey, placing the consumer at the center.
- **Financial Inclusion**: Today, regions still remain where cash is king, largely driven by the fact that access to digital banking facilities is often limited and out of reach. In order to target and provide digital banking facilities to the underbanked, banks and financial institutions need a remote way of providing a digitized service, while also ensuring identity and proof of life. This can enable access to digitized payment services, and a secure and efficient way of delivering much needed social and welfare benefits.
- **Improving Bank-to-Consumer Relationships**: The payment card is one of the medias in which an issuer has a direct physical relationship with its customers. Creating more interactive card form factors will further improve this relationship.
- **Payment Credential Choice on the Increase**: Overall, payment form factor choice is increasing. Choice is the key word and banks and financial institutions need to look toward technology and innovation to ensure that their card remains top of wallet.
- **Addressing Total Cost of Card Ownership**: In the majority of payment card markets, the cost of payment card supply and all associated costs with printing, issuance, and secure personalization is covered by the bank/financial institutions. The requirement to physically churn and update physical features has translated into a market where a 3-year card expiration has become the norm. The addition of a biometric sensor will help move the expiration goal posts, as banks and financial institutions look toward technology to create cards with a longer life expectancy in order to spread the associated issuance costs over a longer period of time.

FROM MOBILE DEVICES TO CARDS

Biometrics and the use of fingerprint technology is by no means a new concept. Consumers have been using fingerprint-based biometric technologies for several years to securely unlock mobile devices and to authenticate Card Present (CP) and CNP transactions on mobile wallet platforms. Biometric sensors can now be found in nearly all smartphone devices, and this familiarity, understanding, and comfort with fingerprint authentication has paved the way for its inclusion into the payment card. Users already have a good understanding of the following concepts, including:

- **The Role of Biometrics**: Thanks to mobile devices, users already know how the fingerprint is unique to each individual and how it can be leveraged to add another layer of security onto an authentication process. In addition, consumers are well rehearsed in biometric authentication use cases and understand how to interact with a sensor.
- **The Fingerprint Registration Process**: Consumers understand how to register a biometric fingerprint and are familiar with the enrollment process.

- **Use Existing Infrastructure**: Thanks to mobile wallets and the use of fingerprint authentication as a Two-Factor Authentication (2FA) method to securely authenticate a payment, users already understand how to use biometric technology in conjunction with existing Point of Sale (POS) infrastructure.

When looking at the powered payment cards market, there is a clear trend in the transfer of mobile technologies toward the card, whether that be the addition of a display, One-Time Password (OTP), lights, Light-Emitting Diodes (LEDs), and/or a biometric sensor. Usage of and experiences with like-for-like technologies, commonly used within the smartphone market for secure mobile applications, can now be leveraged to enhance card security, by adding a technology already widely used by consumers and already leveraged by multiple Original Equipment Manufacturers (OEMs) and service providers.

BALANCING SECURITY WITH USABILITY

SECURITY WILL REMAIN A CORE FOCUS

Security will remain a core and required focus point within the payment cards market. The increasingly hyperconnected world and the IoT have placed a further emphasis on the security piece. In addition, as criminals become more advanced and continually develop and refine exploits, this will place additional focus on the requirement to stay one step ahead of the security threat curve.

The addition of a biometric sensor onto the payment card adds an additional security layer *via* a Multi-Factor Authentication (MFA) approach, adding a third pillar to the two that have become synonymous in addressing security today. These pillars come in the form of something you have and something you know, the third being something you are. The addition of a biometric sensor greatly improves and hardens the security mechanisms already well adopted and established in the payment cards market, enabling Stronger Customer Authentication (SCA), a key requirement outlined in the European Union's (EU) Second Payment Services Directive (PSD2). Other security drivers include:

- **Unique Identifier**: Adding something you are, as a unique identifier for each user to the transaction and authentication process, adding onto the "something you have and something you know."
- **Match on Card Technology**: Securely storing the biometric profile on the card, limiting exposure and risk.
- **Limiting Exposure to CP Fraud**: Limiting exposure to contactless card payment fraud is currently addressed via transaction caps and PIN challenges after a set number of successful contactless transactions. The addition of fingerprint authentication will provide the required mechanism to harden contactless payment security.
- **Future Proofing**: Adding further digital security mechanisms to complement other digital and physical security mechanisms already adopted.
- **Proof of Life**: Used to address social and welfare fraud applications, by adding fingerprint technology to ensure proof of life.
- **Ability to Address Multiple Transaction Types in the Form of CP and CNP Transactions**: Biometric payment cards are not a CP technology only; they can also be used to address CNP *via* technology coexistence.

WHAT IS IN IT FOR THE CONSUMER?

Addressing security is one aspect to the biometric payment card, but innovation and technology can not exclusively be designed for addressing security purposes alone, particularly in end markets where the consumer sits at the center. Today, security mechanisms are purposely being designed to ensure that usability and ease of use can remain, and that security features do not negatively impact the consumer experience as difficult to use. Clunky and time-consuming security experiences will untimely translate into an unhappy customer base. To achieve this fine balance and trade-off between security and usability, seamless, simple, convenient, automated, and non-intrusive security solutions are being pursued, with fingerprint authentication falling into this category bucket, driven by the following consumer advantages:

- **Security as a Differentiator**: Thanks to large-scale hacks and continued media coverage, the importance of security is becoming increasingly better understood by consumers. Security is an area that used to sit in the background and was largely unquestioned. As security education continues to increase, security will shift to become a differentiator in its own right, with consumers considering security and security mechanisms used as part of their purchasing decision.
- **Little Change to Consumer Behavior**: Thanks to match on card authentication and battery harvesting technology, no change is required to existing POS infrastructure, requiring minimal changes in consumer behavior.
- **Simplicity**: No need to remember a Personal Identification Number (PIN) or multiple PINs if in ownership of multiple cards.
- **Financial Inclusion**: For some, access to digital banking facilities remains out of reach due to remote and rural locations, and underdeveloped banking infrastructure. Biometric sensors can help accelerate financial inclusion programs *via* the use of a security technology that combines identity with proof of life.
- **Remote Enrollment**: This adds another level of convenience and reduces intrusion levels, enabling users to securely enroll their biometric fingerprint in the comfort of their own home, using a solution like Mastercard's disposable remote enrollment device.
- **Already a Well Understood Technology**: Consumers now have a better understanding and are becoming increasingly more comfortable with fingerprint technology, largely driven by mobile payments, most notably through Apple, Google, and Samsung Pay.
- **Abolishing Contactless Spending Limits**: The addition of fingerprint authentication will mark the beginning of the end for contactless spending limits, breaking down another friction barrier.
- **New Use Cases**: Combining with other technologies will further increase functionality in CP and CNP applications.
- **Market Convergence**: Using a biometric payment card credential across other applications and use cases, including access control, contactless ticketing, retail and loyalty, healthcare, government ID, automotive, and others.
- **Unifying the Consumer User Experience (UX)**: Today, there are multiple device types already using biometric fingerprint authentication for myriad use cases. Biometric sensors are commonplace and, in some instances, considered a standard feature within many device types, including smartphones, tablets, laptops, and notebooks. Although they are often used for different applications, the common denominator is the use of a person's fingerprint to securely authenticate a transaction in order to protect a digital asset. Expanding beyond connected devices toward unconnected devices further unifies the consumer UX, increasing the potential use cases of biometric fingerprint authentication.

EXPANDING THE BIOMETRICS CHAIN OF TRUST

Although the biometric payment card is a relatively new concept, fingerprint authentication has and continues to be used across many different device types, spanning a multitude of use cases, whether securely granting access to a device in a logical access control scenario, a physical access control use case to securely enter a building or pass through a physical barrier/gate, or used to authenticate a transaction, whether that be a payment or used as a secure digital signature.

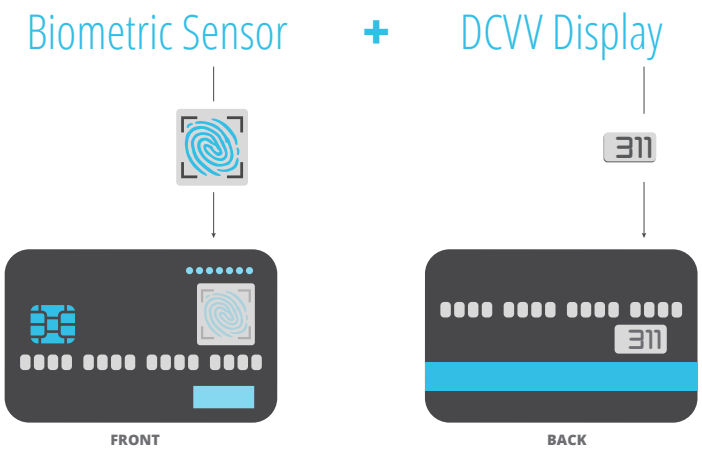
This presents a significant opportunity to use one identity across a variety of use cases and end markets. The biometric payment card is another piece of this security puzzle, extending and expanding a biometric fingerprint chain of trust, which largely targets online devices today, toward offline media in the payment card sector.

Although this offline market remains in a nascent phase, the rise of new applications, including crypto-currencies, has proliferated an innovation to aid the secure storage of crypto-currencies within cold-wallet/offline situations.

BIOMETRIC PAYMENT CARDS ARE MORE THAN A CP SECURITY ENHANCER

The addition of the biometric sensor into the payment card is not the only innovation being touted in the market today. Alongside the biometric sensor card are the Dynamic Card Verification Value (DCVV)/Dynamic Card Verification Code (DCVC) display cards, designed specifically to address CNP transactions, using a display screen and an OTP mechanism to approach CVV/CVC in a dynamic fashion.

Within the industry, there is perhaps a misconception that the biometric payment card is designed to address CP transactions and the DCVV/DCVC is designed for CNP. This misconception could have repercussions, particularly if banks and financial institutions are prioritizing CNP over CP fraud, or *vice versa.*



BIOMETRIC SENSOR AND DCVV DISPLAY PAYMENT CARD

Taken at face value, this statement is true to some degree. However, the biometric payment card should not be singled out as a technology designed to only address one specific area of payment transactions. In reality, the biometric payment card should not be considered a technology siloed for a singular transactional use case, but one that is designed to protect any digital asset, used not only as another factor of authentication for CP transactions, but as one that can be used in conjunction with other technologies, including DCVV/DCVC.

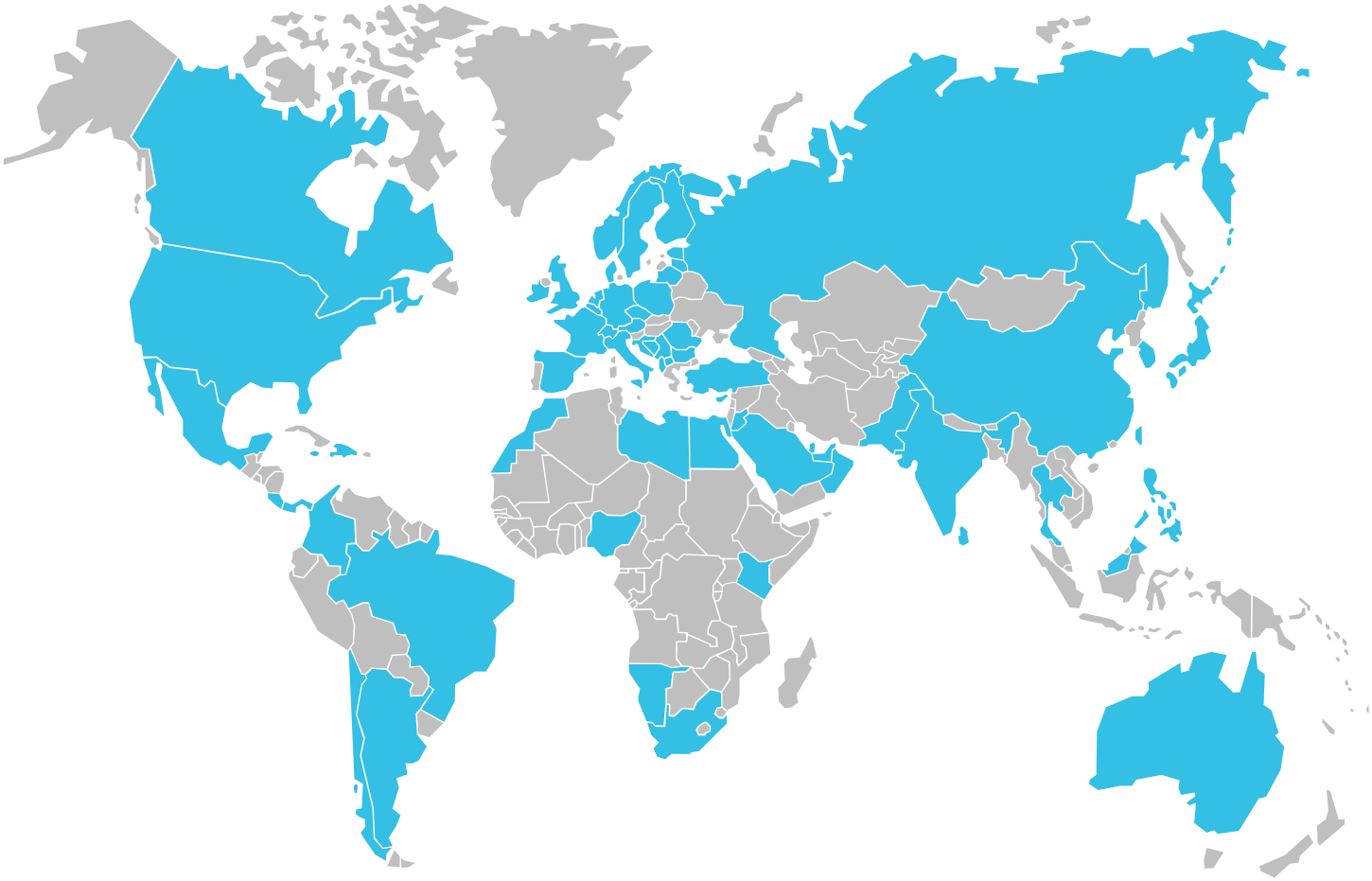
The use of fingerprint authentication ties in very well with SCA, occupying the "something you are" within the three authentication pillars of something you have, something you know, and something you are. Furthermore, the use of biometrics can be used to complement the other SCA pillars, in something you have (to help protect against physical theft) and something you know (in conjunction with a DCVV/DCVC display card) using the fingerprint to securely activate/display an OTP for Electronic/Mobile (e/m)-commerce transactions.

Overall, these innovations and the rise of powered payment cards should not be considered as competing technologies, but ones that can complement and strengthen each other with use cases spanning CP and CNP transaction types, encompassing in-store, e/m-commerce, or in-app payments and Mail Order/Telephone Order (MOTO) payment types.

SIGNIFICANT MARKET ACTIVITY SIGNALS CLEAR ADOPTION INTENT

Biometric payment cards have been in the market periphery for a number of years, largely remaining in a dormant phase, as vendors continued to research, develop, and ultimately define and understand the potential customer base for the integrated biometric sensor.

Fast forward to today and activity is ever increasing with a host of biometric payment card pilots underway, marking the beginning of the exploratory and testing phase by many issuers, which has already translated into the first large-scale biometric card order, as reported by IDEX in October 2018.



GLOBAL BIOMETRIC PAYMENT CARD ACTIVITIES

Note: The above diagram depicts biometric payment card trials at various stages of competition, alongside pilots likely to Kick Off (KO) within the next 6 months, alongside countries that have passed the required regulatory and privacy scans for biometric card usage.

The growth in activity signals positive market signs of things to come. Only a few years ago, the biometric payment cards market was largely populated by a number of disruptive startup vendors looking to establish a foothold *via* innovation in an already well-established market. Today, the payment card Tier One vendors, including IDEMIA, Feitian, and XH Smart have all integrated biometric payment cards into their respective product portfolios, alongside the world's leading payment networks, including Mastercard and China UnionPay (CUP), which have both heavily invested in and continue to support fingerprint payment authentication technologies.

In addition, the Global Biometric Payment Card Activities diagram shows, global activity is wide ranging, spanning all continents, with pilots taking place across a wide variety of different end markets, from well-established to emerging payment regions. This demonstrates how the biometric sensor is a digital payment enabler and securer for established and emerging regions alike, able to address very differing priorities, from differentiation and card security in established regions to financial inclusion and proof of life in emerging areas.

A TECHNOLOGY NOT LIMITED TO MATURE ESTABLISHED REGIONS

Financial inclusion remains a significant priority and a core policy for many governments worldwide, supported by myriad projects and legislation, designed to bring digital banking facilities to the un/underbanked, and as a means of effectively and efficiently delivering essential social and welfare benefits. However, the ability to provide access to digital banking facilities is often hindered by a number of factors, including:

- **Lack of Physical Banking Infrastructure**: Rural and remote areas can be extremely difficult to target, particularly in terms of the creation of a physical brick and mortar banking presence. Technology can and is used to break down this barrier, presenting the ability to remotely serve users and deliver and manage digital banking services.
- **Identities**: Securely verifying that someone is who they say they are can prove extremely problematic, particularly in regions with no national identity programs or where population censuses are not considered accurate. The addition of a biometric sensor breaks down this barrier, providing new levels of identity assurance.
- **Addressing Fraud**: The distribution of much needed social and welfare benefits continues to attract the efforts of those looking to exploit social/welfare payment distribution systems. To ensure that the distribution is only being delivered to those who need it the most, fingerprint authentication can be used to securely authenticate an identity and ensure proof of life, establishing an additional barrier to help disrupt and reduce social/welfare fraud rates.

In conclusion, the biometric payment card is not a payment card form factor with a limited use across well-established payment markets. The flexibilities, to not only to securely authenticate a payment, but to also enable other functions associated with identities and proof of life, are making the technology relevant across both established and emerging regions.

SIGNIFICANT OPPORTUNITIES BEYOND PAYMENTS

With nearly 3 billion payment cards being issued annually, the payment cards market continues to be viewed as the holy grail opportunity as it relates to biometric sensor payment cards. However, the payment card and the process to authenticate a transaction shares many synergies across multiple other end markets where digital security and authentication are paramount requirements. The combining of an identity with another digital asset presents other opportunities related to market convergence and co-branded opportunities.

FINANCIAL INCLUSION

Beyond the ability to authenticate a payment is the need to provide banking services and make them accessible to the unbanked. Significant inhibitors present challenging market conditions, driven by rural locations, the lack of officially recognized identity documents, including passports and birth certificates, high levels of illiteracy, and the lack of historical credit records. Biometrics can help bridge these gaps, reduce the challenges, and address the associated pain points in bringing digital banking services to the unbanked, when it is used as the technology enabler to provide trust between a bank/financial institution and an identity.

The ability to leverage a biometric card to improve assurance levels and help prove that a person is who they say they are will aid banks and financial institutions in bringing much needed services to unbanked populations, which previously remained out of reach. In turn, the biometric payment card can facilitate new green field opportunities for banks and financial institutions when used as the trust anchor to bring digital banking services to the customer, including direct debits, standing orders, balance checking, and Person-to-Person (P2P) and Person-to-Bank (P2B) money transfers.

GOVERNMENT/NATIONAL ID

The majority of national ID projects globally require the enrollment of a citizen's biometrics. It could be a single fingerprint, all 10 fingerprints, a facial scan, or a combination of all. In Electronic Identification (eID) instances, where fingerprint enrollment is a requirement, significant opportunity exists for biometric sensor cards to merge public and private sector services, offering a platform from which a government can distribute social welfare, using the biometric sensor as proof of life to help mitigate against any associated fraud. This is particularly relevant in emerging regions where social welfare fraud puts a significant strain on welfare funds.

ACCESS CONTROL

Access control is another significant opportunity, notably physical and logical access, from a biometric sensor card perspective, *via* the use of existing contactless infrastructure. ABI Research believes there is a significant early opportunity within government employee access control solutions, where security is paramount in accessing sensitive sites/locations. Although the access control market may not present a significant volume opportunity in the millions, it does present a realistic use case, and another next-generation biometric smart card proof point, extending from enterprise government applications to other access control opportunities within high-end hotels, hospitality, and casinos.

IoT

Next-generation payment cards could be used as a primary, centralized platform for authentication requirements across a number of IoT end markets, including and perhaps most notably the smart home and automotive sectors. A next-generation smart card could also be the dominant authentication platform to enable IoT market adjacencies, using the same card and technology to unlock an automobile, authenticate an in-car payment, or to securely access a home or make any necessary adjustments to a smart home setup or automobile preferences.

EXPANSION INTO CO-BRANDING

The co-branding opportunity is significant within the IoT space with an issuer potentially able to partner and co-brand with a number of other service providers or OEMs. Taking ride sharing as an example, a biometric sensor card could be co-branded and supported by the car OEM and an issuing bank, allowing the ability to pay at the POS, while also being leveraged as a platform from which a user can securely access a ride sharing scheme. The same could apply for bike sharing, parking, and other smart city initiatives. As for the IoT, the opportunity for co-branding opens new market opportunities for those involved. It may enable an issuing bank to play and operate in end markets that previously remained out of reach.

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For more information, visit www.idexbiometrics.com and follow @IDEXBiometrics

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