WILL APPLE CONTINUE TO DOMINATE CONTACTLESS PAYMENTS?

Whitepaper

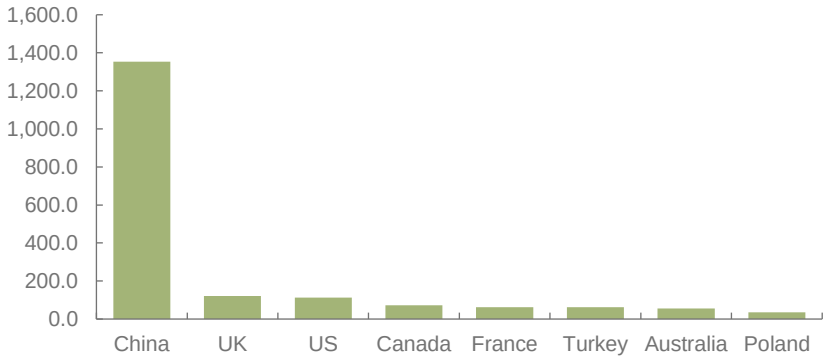
1.1 Contactless Cards: Market Status

1.1.1 Global Adoption

According to Juniper's latest contactless data tracker, the number of contactless payment cards in issue reached 2.5 billion globally in 2017, up from 1.7 billion in 2016. However, only 60% of the cards issued in 2017 were actively used for card payments.

Contactless card deployments (enabling frictionless payment at POS) have been augmented by the creation of digital wallet services facilitating frictionless online payments without the need to share card details with merchants. This paves the way to an integrated in-store/remote payment experience.

Figure 1: Number of Contactless Cards Issued, Selected Markets 2017 (m)



Source: Juniper Research

1.1.2 Contactless Card Adoption in the US

While contactless cards were available in the country from the mid 2000s, these employed the MSD (Magnetic Stripe Data) standard. By 2011, 7 years after the first MSD cards were introduced in the US, less than 2% of US retailers offered contactless payment options.

As of December 2017, Juniper estimates that only 9% of the total payment cards in circulation in the US were contactless-enabled; this translates into just over 100 million cards. While this is a significant number, around 13% of total chip cards issued in the US, Juniper estimates that only 5.5% of the cards were used to make contactless offline purchases in 2017. This translates into 6 million contactless cards used for payment, relatively low in comparison with markets such as Canada (60 million) and the UK (108 million).

1.1.3 Consumer Attitude to Contactless: US & UK Survey 2017

Juniper surveyed a stratified random sample of 500 US and UK smartphone users aged 14 and over in August 2017 on their use of, and attitudes to, contactless payments.

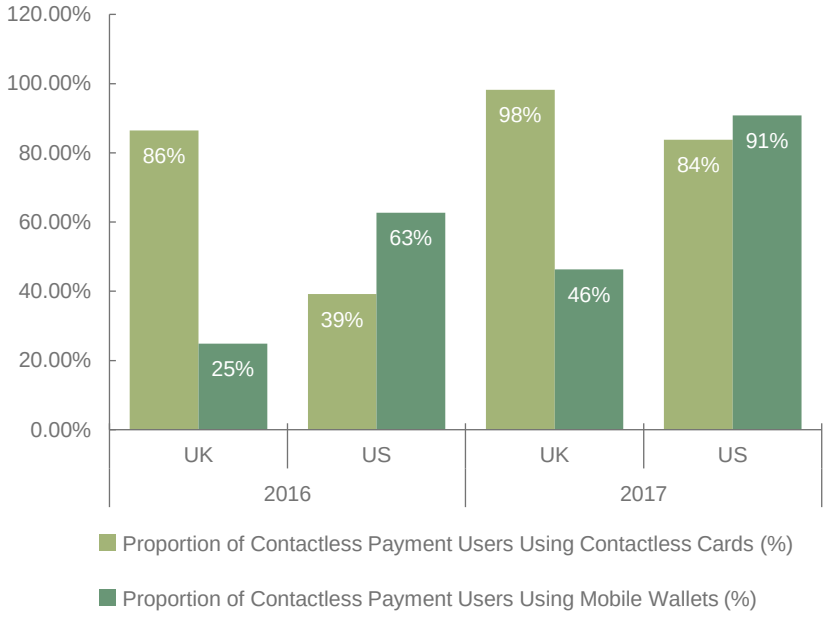
i. Key Findings: US

- Infrastructure still an issue. Lack of availability of contactless terminals is the biggest issue for contactless users, which may also explain why contactless payment usage has barely increased in the US since 2016.
- Our survey suggested that once contactless cards become more common for banks to issue, OEM Pay may have lost its only advantage

in the US. All OEM Pay methods (Apple Pay, Samsung Pay, Google Pay) report lower future usage intent than contactless cards and PSP (Payment Service Provider) apps, and satisfaction ratings for cards are similar if not higher than for OEM Pay options.

- The change in contactless payment adoption compared to our 2016 survey is minimal, indicating that publicity around contactless payments is as yet having little effect.

Figure 2: Contactless Card & Mobile Wallet Adoption Amongst Contactless Payment Users (%) – Survey Findings, 2016 & 2017



Source: Juniper Research

ii. Key Findings: UK

- Contactless payments use has risen rapidly. However, this does not mean larger growth for mobile contactless payments. Contactless cards remain the method most likely to see increased future usage by consumers, and so OEM Pay options will struggle. In addition, satisfaction levels are lower or equal to that of contactless cards, and PSP apps.
- Security is still a concern. Contactless payment users actually have more concerns than non-users, centred around theft of payment devices.
- Convenience and speed are the main drivers of contactless payments, and are likely being seen as synonymous by most respondents.

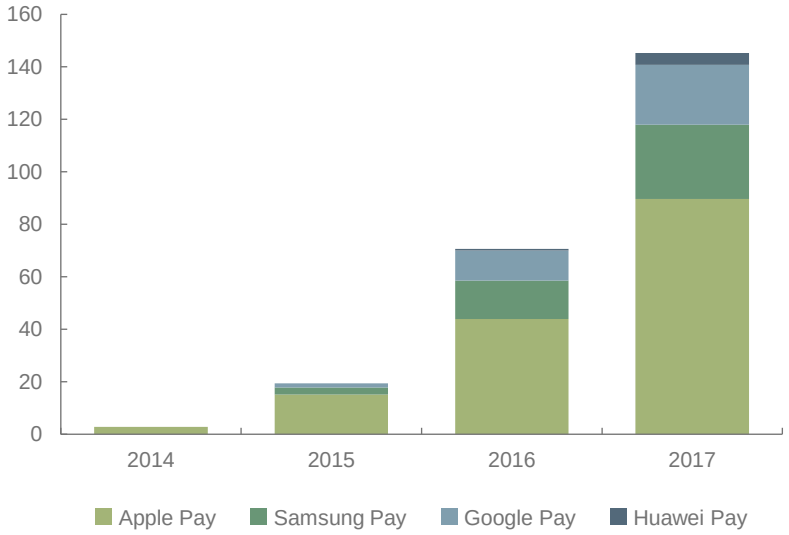
1.2 Contactless Mobile Wallets: Market Status

Over the past 3 years, the contactless wallet space has developed significantly:

- 2015 was the first full calendar year of activity for Apple Pay in its home market and the launch of its service in the UK, Australia and Canada. It is now available in 23 markets worldwide.
- In the same year, another leading OEM, Samsung, introduced its own NFC payment service, now available in 22 markets.
- In 2016, Microsoft launched its own iteration, Microsoft Wallet, which was subsequently (November 2017) rebranded as Microsoft Pay.

- HCE-based wallets have increased dramatically in popularity, with a plethora of banks launching their own wallets, while PayPal and Google have also introduced similar offerings.
- Subsequently, 2 Chinese OEMs, Huawei and Xiaomi, have launched their own wallets. Huawei Pay was introduced in China in March 2016, and began rolling out internationally in early 2018; Xiaomi's Mi Pay launched in China in September 2016.

Figure 3: Mobile Contactless User Base (m), Apple Wallet, Samsung Pay & Android Pay, 2014-2017



Source: Juniper Research

However, as the OEMs and OTTs have flourished, MNO NFC ventures have failed to achieve critical mass and most have been abandoned. This section explores the opportunities for those that remain and also MNO NFC opportunities in emerging and developing markets.

Finally, with PayPal also moving into the NFC space, we look at the opportunities afforded to new entrants, and how they will benefit from the liberalisation of European payments space.

1.2.1 HCE Wallets Market Status & Outlook

In our November 2014 research into NFC, we noted that whereas HCE threatens the central role of the network operator in NFC's value chain, it strengthens that of the bank and makes handset-based contactless payment a more attractive proposition.

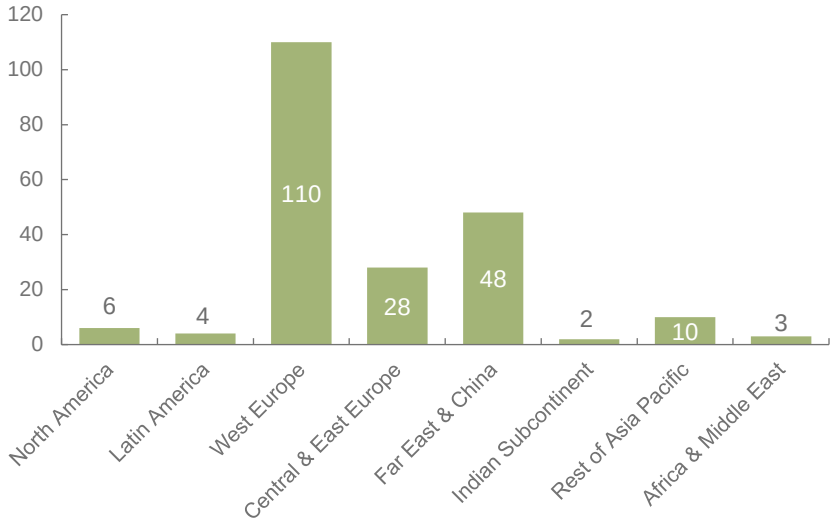
Banks have increasingly understood this. By the end of 2014, Juniper Research estimates that just 7 banks had introduced commercial services based on HCE. By mid January 2016, that number had increased to 55; by the end of 2017, Juniper Research estimates that well over 200 banks had introduced such services. Those launching in 2017 included Belfius (Belgium), Citi (US), Credit Agricole (France), Deutsche Bank (Germany), Rabobank (Netherlands) and SBI (India).

A number of banking collectives have also sought to implement HCE.

In June 2016, the Danish banking collective, the BOKIS partnership, launched an HCE wallet utilising a solution provided by Nordic digital payments specialist, Nets. The BOKIS partnership includes 62 banks that form the small to mid-sized banks segment of the Association of Local Banks, Savings Banks and Cooperative Banks in Denmark, together with

5 Danish regional banks: Jyske Bank, Sydbank, Spar Nord Bank, Arbejdernes Landsbank and Nykredit Bank. Meanwhile, In October 2016, 27 Spanish banks teamed up to launch a new mobile payment platform called Bizum which utilises HCE.

Figure 4: Banks with Announced Commercial HCE Deployments, by Region, End 2017



Source: Juniper Research

However, despite this plethora of bank launches, adoption has been relatively modest: many services have only a few tens of thousands of users, with none yet reporting that they have achieved more than a million.

The scale of the challenge facing the banks is largely tied to that facing NFC in general. In Western Europe; banks' own contactless services are up against both contactless cards and the OEM Pays, making it extremely difficult to gain a foothold.

In the US, where they arguably have a greater opportunity to achieve traction, only 2 of the leading 5 banks, Citi and Wells Fargo, have developed HCE apps which directly use their own cards for in-store payments. A further 2 (Bank of America and US Bank) have opted for enabling OEM Pay solutions in-store and Visa Checkout/Masterpass online, while Chase continues to pursue its closed loop QR code-based alternative.

1.3 Contactless Payments: Smart Wearables Market Status

The facility for NFC radios to be installed in smartwatches enables the use of payment systems through such devices. Precisely how this is done varies from brand to brand, although the characteristics of many of these mechanisms are the same. Payment through a smartwatch is often seen as an easier method of payment than mobile payments. To date, this has also been positioned as a convenience when engaged in running or some other activity where having a smartphone or wallet on the person is unlikely or inconvenient.

Contactless payments via smart wearables has garnered the most attention over the past 12 months with market launches from Fitibit and Garmin, as well as increased adoption by Apple Watch users. In addition, companies such as Visa, Mastercard and American Express see wearables as an important payment sector in the Internet of Things space.

1.3.1 OEM Pay

Growth continues to be driven by Apple Watch users, with the 2 'Wearable Pay' solutions, Fitbit Pay and Garmin Pay, believed to have no more than a few tens of thousands of users between them at best. The smartwatch OEM Pay landscape is dominated by a few large companies that can develop a certain level of partnerships (see table below).

Table 5: Summary of Bank & Country Support of Select OEM Pay Methods (December 2017)

OEM Pay Method	Number of Supporting Banks & Countries
Apple Pay	Over 2,000 banks in 24 countries
Samsung Pay	Over 1,300 banks in 21 countries
Android Pay	Over 1,000 banks in 17 countries
Garmin Pay	30 banks in 8 countries
Fitbit Pay	31 banks in 14 countries
Swatch Pay	14 banks, partnership with UnionPay
MyKronoz Pay	Unknown banks, EMV and PayPal support

Source: Juniper Research

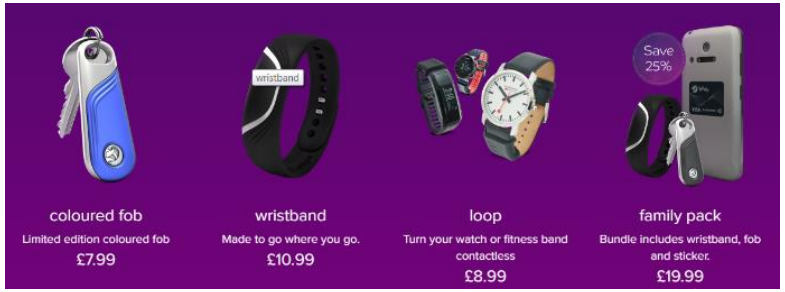
This means that direct partnerships with banks are impractical for smaller smartwatch providers. As a result, these players tend to form partnerships with wallet providers, or launch their own wallet solution, as well as providing the payment facility through the smartwatch itself, rather than partnering with banks.

1.3.2 Contactless Payments via Wearable Accessories

Alongside the likes of Barclays (bPay), some smartwatch makers, most notably Sony, have endeavoured to make the watch' strap the focus of payment, rather than the watch itself. This allows the watch to be an entirely analogue timepiece, with the smarts providing an incidental benefit to the user, rather than being the focus of the device. This is, to an extent, a different kind of wearable than a smartwatch, although it is frequently included in the category as bands are often worn with watches.

Barclays first introduced bPay in the UK in 2014, where consumers preload a contactless-enabled device (initially a wristband) with credit loaded online via a Mastercard or Visa debit or credit card. The maximum credit per wearable is £200 ($290). Barclays subsequently added a fob to its range and launched Loop in 2016, a contactless chip in a small silicon suit, designed to make watches and fitness trackers contactless-ready. Barclays partnered with Garmin and Mondaine to integrate Loop into some of their products. However, it should be noted that bPay does not utilise a SE and is a closed loop system.

Figure 6: Barclays Wearable Portfolio



Source: Barclays

1.4 Contactless Payments Movers & Shakers

Barry Rodrigues

Barclaycard

CEO, Cards & Payments

Barry Rodrigues was appointed CEO, Barclaycard International, in November 2017. Based in New York, he joined the Barclays International Executive Committee, reporting directly to Tim Throsby, President, Barclays International and CEO, Corporate and Investment Bank.

Prior to this, Rodrigues worked at Citi where he was Head of Digital Payments for the Global Consumer Bank. In this role he was responsible for the strategy, design and execution of next-generation payment solutions and platforms across both digital commerce and money transmission. His team was also responsible for negotiating and managing strategic payment partnerships with leading digital players. Rodrigues also led Citi's tokenisation efforts and integration with Zelle.

He has an MBA from George Washington University.

Phil Campbell

Kerv Wearables

Founder

Philip Campbell is the founder of Kerv, the world's first contactless payment ring.

He has 7 years' experience in the emerging payments industry, marketing a range of payment and electronic money products. Frustrated with the progress of payment wearables, Campbell was motivated to start Kerv Wearables. Kerv Wearables launched Kerv Ring, the world's first Mastercard contactless payment ring, in March 2017, after receiving Mastercard's Letter of Approval for the product as an M/Chip Advance payment and data storage device in January 2017.

Prior to this, Campbell also founded Fifth Dimension, Europe's Digital Marketing Agency for Cards, Payments and e-Money.

David Dechamps

Mastercard

Head of Digital Payments, Europe

Having joined Rambus in 2012, David Dechamps has over 20 years of experience managing businesses and running companies in global semiconductor and mobile markets. Dechamps provides the overall vision and leadership necessary to drive future growth.

Before joining Rambus, he was CEO for MobiWire (formerly Sagem Wireless, UPEK, which later merged with AuthenTec) and Wavecom, a publicly traded French wireless solutions company.

He has a bachelor's degree, a master's and a PhD in materials science and engineering from Cornell University.

Eric N Friedman

Fitbit

Co-Founder & CTO

Eric Friedman has been a member of Fitbit's board of directors since March 2007, and most recently was the company CTO.

Previously, Friedman served as an Engineer Manager at CNET Networks; as a Co-Founder of Wind-Up Labs; a founding engineer of Epesi Technologies and a technical member of the Real-Time Collaboration Group at Microsoft.

Eric holds a BSc and MSc in Computer Science from Yale University. He was selected to be a member of the board of directors due to the perspective and experience he brings as the Co-Founder and CTO.

Carsten Ahrens

G+D Mobile Security

CEO

Carsten Ahrens is the CEO of Giesecke+Devrient Mobile Security GmbH. As well as his duties as CEO, he is responsible for the areas of Strategy, Compliance, Sales, Divisions, Marketing and Communications, and the Technology Office. Moreover, he is currently temporarily in charge of Research and Development, Personnel, Operations, and Professional Services.

Ahrens has been working in the Mobile Security unit at G+D since 2013, initially as the Manager of the Telecommunication Industries division and later as the Chief Sales and Marketing Officer.

He had various management positions before joining G+D, including CTO/COO at Funkwerk AG and Managing Director at Ericsson GmbH.

Jim McCarthy

Visa

Global Head of Innovation & Strategic Partnerships

Jim McCarthy is the Global Head of Innovation & Strategic Partnerships for Visa. In this position, he is responsible for the development of Visa's product and technology roadmap, its innovation efforts and leading business development for strategic partnerships.

McCarthy is accountable for the global interoperability of Visa's products and services; developing new channel solutions and technology support; building alliances and solutions for new products, technologies, platforms and market segment penetration; and product analytics.

Prior to joining Visa in 1999, McCarthy worked at IBM where he was the Senior Client Representative to Bank of America.

1.5 Contactless Payments: Market Sizing & Forecast Summary

1.5.1 OEM Pay

Juniper Research forecasts that OEM Pay users, including Apple Pay, Samsung Pay and Google Pay, will reach 450 million by 2020, with Apple accounting for 1 in 2 OEM Pay users globally.

The combined market share of Apple, Samsung and Google will reach 60% of global mobile contactless users by 2023, up from an estimated 50% in 2018. Other OEM Pay users, including the likes of Huawei Pay, Xiaomi Pay, Fitbit Pay and Garmin Pay, will exceed 20 million by 2020. Meanwhile, well over 200 banks had deployed HCE-wallet services in 2017, which are expected to drive future growth in many markets.

Contactless Mobile Wallets: OEM Pay Market Share 2018 & 2020

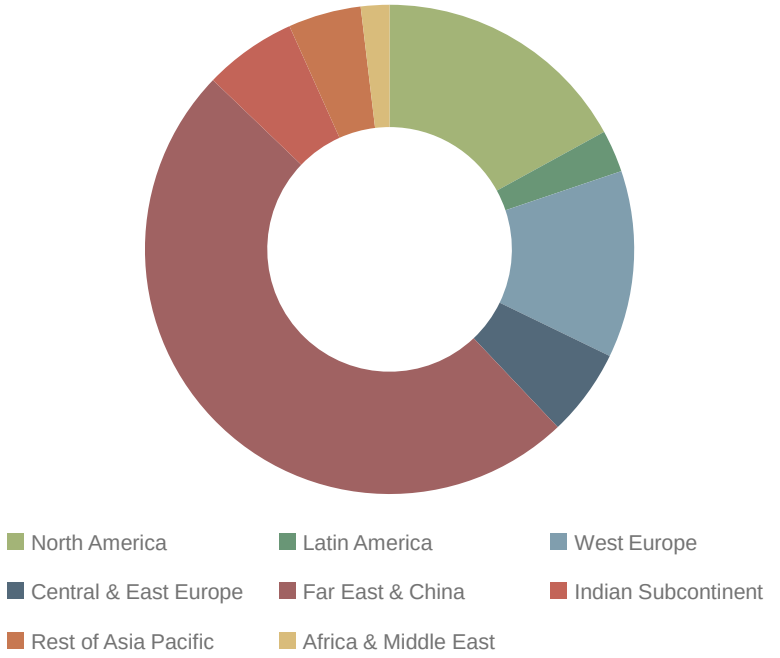
	2018	2020
Apple Pay	140 million	227 million
Samsung Pay	51 million	100 million
Google Pay	39 million	100 million
Other OEM Pay	11 million	22 million
Total	**241 million**	**449 million**

Source: Juniper Research

1.5.2 Contactless Wallets

Meanwhile, the global number of mobile contactless users will exceed 760 million by 2020, up from an estimated 440 million in 2018. We believe that growth over the next 5 years will continue to be dominated by offerings from the major OTT players. In addition we now have the likes of Huawei Pay and Fitbit Pay launching in several markets.

Figure 7: Number of Mobile Contactless Payment Users (m), Split by 8 Key Regions in 2020: 760 million



Source: Juniper Research

Order the Full Research

Juniper's latest **Contactless Payments** report assesses how the dynamics of this ecosystem continue to be disrupted across Contactless Payment Cards, Mobile and Wearable Retail Payments. The research provides extensive analysis of the opportunity for vendors, banks, OEMs and network operators, analysing contactless wallets and infrastructure deployments.

Key Features

- **Sector Dynamics**: Provides an in-depth evaluation of the contactless payment ecosystem, highlighting developments across key segments.
- **OEM Pay Market**: Analysis and a 5 year forecast suite for key contactless wallet adoption, including Apple Pay, Samsung Pay, Google Pay and Other OEM Pay (Fitbit Pay, Garmin Pay, Huawei Pay, Xiaomi Pay).
- **Interviews:** With leading players across the contactless payments, ticketing and couponing value chain, including FitPay, Gemalto, Giesecke+Devrient, Mastercard, IDEMIA, Kerv Wearables, Rambus and Visa.
- **Benchmark Industry:** Provided for the size and growth of the contactless payments, ticketing and coupons market including active users, transaction volumes and values.
- **Juniper Leaderboard:** Key player capability and capacity assessment, together with our Leaderboard positioning matrix.

http://www.juniperresearch.com

What's in this Research?

1. **Executive Summary & Core Findings** – Top-level report summarising key trends, competitive analysis and market forecasts, allied to a series of key takeaways and strategic recommendations for C-level executives. (PDF)
2. **Deep Dive Strategy & Competition** – Strategic analysis of market dynamics, drivers and trends, together with a vendor capability assessment and contactless payment vendor Leaderboard. (PDF)
3. **Deep Dive Data & Forecasting** – Market sizing and analysis by region and sector, together with 5 year forecasts for key metrics, including active users, transaction volumes and values. (PDF)
4. **Interactive Forecast Excel** – Highly granular dataset more than 15,000 datapoints, allied to an Interactive Scenario Tool giving users the ability to manipulate Juniper's data. (Interactive XL)

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