



## Technical Analysis of Apple Pay

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On September 9<sup>th</sup>, Apple announced their highly anticipated entry into the payments arena. Tim Cook began the payments portion of the presentation with a video of the new iPhone 6 and an NFC<sup>1</sup> enabled VeriFone MX915 contactless payment device. The clip demonstrated what appeared to be an NFC contactless payment transaction: the Apple Pay tender type was presented by the customer, an associated “card-on-file-at-iTunes” Bank Of America branded payment card was selected from the iPhone 6; the customer appeared to locally authenticate the payment tender using the iPhone’s fingerprint reader, and the transaction was subsequently approved. Tim Cook then faced the crowd and ended the clip with an enthusiastic yet very “simplistic “...That’s it!”. In conjunction with the demo, Apple announced strategic partnerships in the payment space with Visa, MasterCard, and American Express, along with several of the biggest card issuing banks, and a group of large merchants that include Staples, Macy’s, McDonald’s, Walgreen’s, and Whole Foods, and others.

Apple has been extremely successful over the years in changing the way the general public has both adopted and interacted with new consumer technology. With a reported 900 million cards on file in iTunes, and announcements that Apple has aligned itself with the card brands and acquirers, we expect Apple to succeed where PayPal, Google Wallet, and Softcard (formally Isis Mobile Wallet) have failed to see widespread consumer adoption. Apple’s simple approach focused on just the payment aspect and not shopping cart analysis, promotions engine processing, bounce-back coupons, etc. We believe that by largely riding the existing transaction message specifications, and potentially minimizing customization required by the retail merchant, the Apple Pay solution is a viable option that retail, c-store, and hospitality merchants may be compelled to integrate with.

Reliant is a thought leader in the payment integration space and the first organization to attain the PCI Standards Council Qualified Integrator & Reseller (PCI QIR) designation. Our Redbox Platform product is used in over 5,000

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<sup>1</sup> NFC stands for Near Field Communication. It is a set of standards for smartphone radio frequency (RF) communication. It requires close proximity between the NFC enabled device and the reader. This is typically no more than a few centimeters. Most current payment terminals from manufacturers such as VeriFone, Ingenico, and HHP either include an NFC reader or can support the addition of a modular one.

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stores globally and often integrated into retail payment infrastructure. From this perspective, we thought it prudent to look deeper into Apple Pay to quantify and identify some key drivers and discuss how these may affect business requirements. Apple has not released any specifications for Apple Pay and much of the internal details remain confidential. Reliant has engaged in discussions this past week with some of our senior level contacts at card brands, acquirers, and bank processor certification teams. This analysis represents our current thinking on Apple Pay based on what we do know, what has been confirmed, what we don't know, and what we believe will be likely relative to the implementation and implications of Apple Pay.

### **What We Know: Apple Pay High Level Functionality & Key Success Points:**

- Apple Pay leverages the existing NFC contactless payment message specification and further secures it by using single one-time, per-use payment “tokens” for authorization through iPhone 6<sup>2</sup> and Apple Watch.
- The approach represents something that Google and PayPal did not do: leveraging the existing acquirer and bank certification processes, while riding the same identical rails for contactless payment. Banks and card brands have been brought into the process and asked to focus on their core business: payment processing.
- Apple Pay will support Visa, MasterCard or American Express payment cards, plus a variety of other credit or debit cards on file currently maintained on iTunes – including Bank of America, Capital One, Wells Fargo, and Chase. These banks are already launched marketing initiatives aimed at becoming the “iTunes-card-on-file” of choice for early adopters of Apple Pay. A number of additional acquirers have also been defined as in-progress relative to boarding.
- Apple Pay allows users to add payment cards through the integrated iPhone camera. Consumers can submit the payment card information and verify that this card is allowed to process on Apple Pay directly with the acquirer. This will include validation with the consumer prior to allowing the new card to be processed for payment of a transaction.
- Transaction routing is believed to support the capability for merchants to process directly with American Express over the contactless payment infrastructure.
- When a customer uses Apple Pay, their card number is not part of the handshake between the consumer's iPhone 6, the NFC reader and the

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<sup>2</sup> The iPhone 6 is due to start shipping in October 2014. Previous versions of the iPhone do not include an NFC chip. It is reasonable to expect that older phones will be able to be equipped with an NFC reader/writer as an accessories. These are already available in the marketplace.

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merchant's processor. It is not present within the transaction object that is written to disk, stored in memory, read by the NFC pad, and doesn't traverse any part of the store's internal infrastructure. This keeps the merchant entirely outside of PCI scope, relative to the Apple Pay components. This represents the ultimate PCI scope reduction for point-of-sale and store infrastructure. Not only is PCI not applicable to any part of the in-store Apple Pay transaction cycle, but the use of one-time, per transaction tokens provide better data protection than even the best available encryption for card data.

- Given Apple's history of providing easy to use software experiences and the strong track record of Apple getting their customer base to adopt new applications, we expect the use of Apple Pay to be an easier end-user experience than, say, the introduction of EMV<sup>3</sup> in the U.S. market. When EMV was introduced into the U.K. in 2004, the British Government initiated a significant marketing campaign to train the public to accept the newly issued cards. Adoption of EMV in the U.S. is lagging and no one is suggesting that a national government sponsored marketing campaign will ever happen. Apple Pay is one of the next generation technologies that largely solves the problems of security and fraud that EMV is design to address and may put additional pressure on all parties to hold off on continuing EMV investment.
- It should also be noted that Apple has another incentive to get the Apple Pay implementation right that's missing in Google, PayPal, and Softcard initiatives: Apple is a major Level 1 retailer with about 450 stores worldwide and more than \$18 billion in retail sales. Apple can use their experience, as a merchant, to look for ways to make the product easy to implement and while lowering interchange costs.

### **What We Don't Know: Implications for Merchants, Integrators, and the Card Brands:**

- Apple has not provided any information that shows the entire payment routing flow which leaves considerable speculation regarding all the integration and configuration points.
- Apple did not cover the authentication process between the fingerprint reader, the secure element and token creation. We do not know how the single session payment token is generated and whether this process is can occur when an iPhone is offline (no WiFi or 3G/4G mobile data network connectivity). We suspect that some form of offline processing capability will be available.

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<sup>3</sup> EMV is also known as chip & pin. If a merchant does not have an EMV capable infrastructure in place by October 2015 they will be liable for any charge backs.

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- Details on the payment token format and its creation process are not available to us at this time.
- The context and details on how the local and back-end process to construct the iPhone 6 “device account number” is unknown. This “device account number” is believed to essentially represent the “fingerprint” of the device. Payment card tokens will reside within the secure element of the iPhone 6. This has created some speculation on how merchant settlement will actually take place.
- It is believed that American Express cards will be supported natively upon Apple Pay as released in October for any retail merchant currently supporting contactless payment today. We are unclear on the approach and merchant pre-requisites for Visa and MasterCard.
- For Visa and MasterCard to further support this concept of single purpose payment tokens without requiring any point-of-sale or third party payment application modifications, there would need to be a numeric placeholder presented potentially to both the POS and payment applications to continue to support BIN or low level BIN range indicators for payment card type, receipt indicators, and raw POS log tender definitions.
- However it has been stated that the Apple Pay payment process hinges on a single use payment “token.” What is unclear is how Apple Pay will support refund, post void and other required brick-and-mortar transactions. If the token is indeed single use, then a backend capability will be necessary to allow single session tokens to roll up and correlate to a consolidated value that can be used to represent a unique card. There has been no information released about backend processing or data flows in this regard.
- The specifics of Apple Pay’s tokenization approach are not available. Apple claims that each Apple Pay “tap” has a single one time use token. It may be possible, however, that just part of the token is fully dynamic, such as the portion that represents the authentication data<sup>4</sup>. What is unclear is how merchants will be able to maintain unique numeric token representations of card numbers for use in downstream loss prevention, CRM/analytics, and sales audit processing. These all typically requires uniqueness in tokens for card data history.
- No information has been provided regarding the implementation of card-not-present transactions and how single-use of payment “tokens” will be rendered on screen for use in card-not-present and ecommerce transactions. It may be that an ecommerce transaction will include a QIR component, but there are issues regarding how omnichannel payment will

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<sup>4</sup> These are the CVV, CID, and CVV2 values

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function. The Apple Pay ecosystem will create additional integration opportunities, particularly in the ecommerce space for Apple, which we suspect will be supported.

- Outside of the U.S., EMV capable, NFC wireless payment devices are already a reality. This means that an NFC-based EMV and an Apple Pay solution can co-exist. The benefits that Apple Pay may bring to a merchant could mean that an upgrade to support both payment types might make sense where an EMV implementation alone lacks the necessary ROI.
- Apple has not made any formal announcements or statements regarding Apple Pay pricing, however it is believed that Apple Pay has negotiated rates lower than that of traditional processor per transaction costs. Apple's alignment with banks, processors, and card brands points to a world where their interests will, at least, in part be protected. Since a number of large merchants have also signed up with Apple Pay, this indicates that retailers will probably not be at a disadvantage relative to interchange and transaction rates.

### **What We Believe This Will Mean for Merchant Environments**

- We believe that the DCN (device card number) represents a unique identifier for a brand-specific BIN prefixed profile which maps exclusively to that device and is not portable. For instance, the DCN for the same payment card will likely be different for an Apple Watch versus an iPhone.
- All cards imported/added are believed to receive a unique DCN which is stored in a secure element locally on the device. Therefore, if you had 4 separate acquirer issued cards then you would have 4 unique card representations (not card numbers) of those cards securely stored within the secure element locally on the iPhone 6.
- From a long term strategic perspective and with the advent and proliferation of web service based protocols in traditional "off the shelf" front end POS systems it's not that far of a stretch to believe that Apple could handle the transaction directly and cut the acquirer entirely out of the authorization process.
- As with any customer initiative in retail, programs that incentivize consumers often have a much higher adoption rate. Apple has a tremendous capability to motivate their customer base to not only use Apple Pay but ultimately change consumer behavior.

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- With Apple Pay, Apple aggressively closes the loop on iBeacon technology<sup>5</sup>, customer engagement and Bluetooth low energy in a way that PayPal simply can't today without the retailer making large changes to retail application and payment processing infrastructure. There are significant opportunities for additional consumer and B2C applications through the nexus of location based services and payment in an integrated platform.
- From the merchant perspective, Apple Pay represents a compelling alternative to P2PE<sup>6</sup>. Although we are years away from completely removing traditional card holder data at the store level, Apple's design, as mentioned above, eliminates PCI scope while providing real benefits to the consumer. Furthermore, Apple Pay does not appear to have the same additional cost of implementation and recurring cost structure<sup>7</sup> found in P2PE deployments. Most new Android phones and Windows phones already include NFC. With the iPhone now supporting it going forward, the new generation of mobile smartphones will all be NFC enabled. If momentum quickly shifts to the use of mobile wallets, traditional payment card use may decline substantially over the next five years.
- Reliant has previously documented to our customers how P2PE does not fully deliver the promises of scope reduction and does not have the enhanced capabilities as some of its advocates profess. Apple Pay's agnostic approach, with no requirement for P2PE, is directly in line with how contactless EMV was introduced into Canada. In most processor driven P2PE implementations all transaction get routed back to the processor. Accordingly, merchants that have implemented this style of P2PE infrastructure may have to pay an additional transaction fee levied by the processor in order to route the transaction to Apple Pay.
- While there was no announcement for support for Apple Pay on non-Apple devices, we anticipate potential adoption for other NFC enabled phones. Since card holder data isn't stored on the device itself we believe that there won't be overwhelming security concerns. Maintaining an Apple payment account will likely be a requirement, however. Apple has had a Microsoft Windows iTunes offering since 2007. This has shown they are

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<sup>5</sup> iBeacon is Apple's indoor proximity systems that uses Bluetooth low energy technology to locate and interact with Apple mobile devices.

<sup>6</sup> P2PE stands for Point to Point Encryption. It refers to a technical approach for encrypted card data at swipe. Many P2PE implementations are sold by processors using payment technology from vendors such as VeriFone and Ingenico. An example is TransArmor from First Data. In these processor driven implementations, encryption keys are not provided to the merchant and control of the payment infrastructure is effectively given to the processor.

<sup>7</sup> Specifically, most processor provided EMV solutions include various encryption, tokenization, token storage, and payment terminal software costs.

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willing to build software for non-Apple platforms. In addition, there have been credible rumors of an iTunes Android application since 2013.

Please be aware that Reliant is closely tracking Apple Pay and its implications for the secure integration into our retail, c-store and hospitality customer environments.

Should you have any questions or would like to know more about Reliant's payment consulting practice as it relates to onboarding EMV, alternative payment methods or payment implementation expertise, please contact Phil Stead, Vice President – Retail Systems at [pstead@reliantsecurity.com](mailto:pstead@reliantsecurity.com) or alternatively reach Phil at (646)867-1270

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pg. 7