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Tap to Pay: Will Contactless Cards Pave the Way for NFC Mobile Payments in the U.S.?

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I. Introduction

After 15 years of industry stakeholder debates, trials and pilots to determine when contactless payments would take off in the U.S., all the components are finally in place to make it happen. This report discusses stakeholder perspectives on the reality of issuance, acceptance, and adoption of EMV dual-interface cards, as well as the impact of contactless cards on NFC mobile payments.

The findings reflect discussions with 12 stakeholders, representing card networks, financial institutions, payment processors, merchants, and technology providers, as well as secondary industry research.

What are contactless payments?

Contactless payment transactions require no physical contact between the contactless card or other form factor (e.g., mobile device) and the point-of-sale (POS) terminal.[1] To make a contactless payment, the consumer holds the contactless card, mobile, or other device in close proximity (1-2 inches) to the terminal to communicate the payment account information wirelessly.

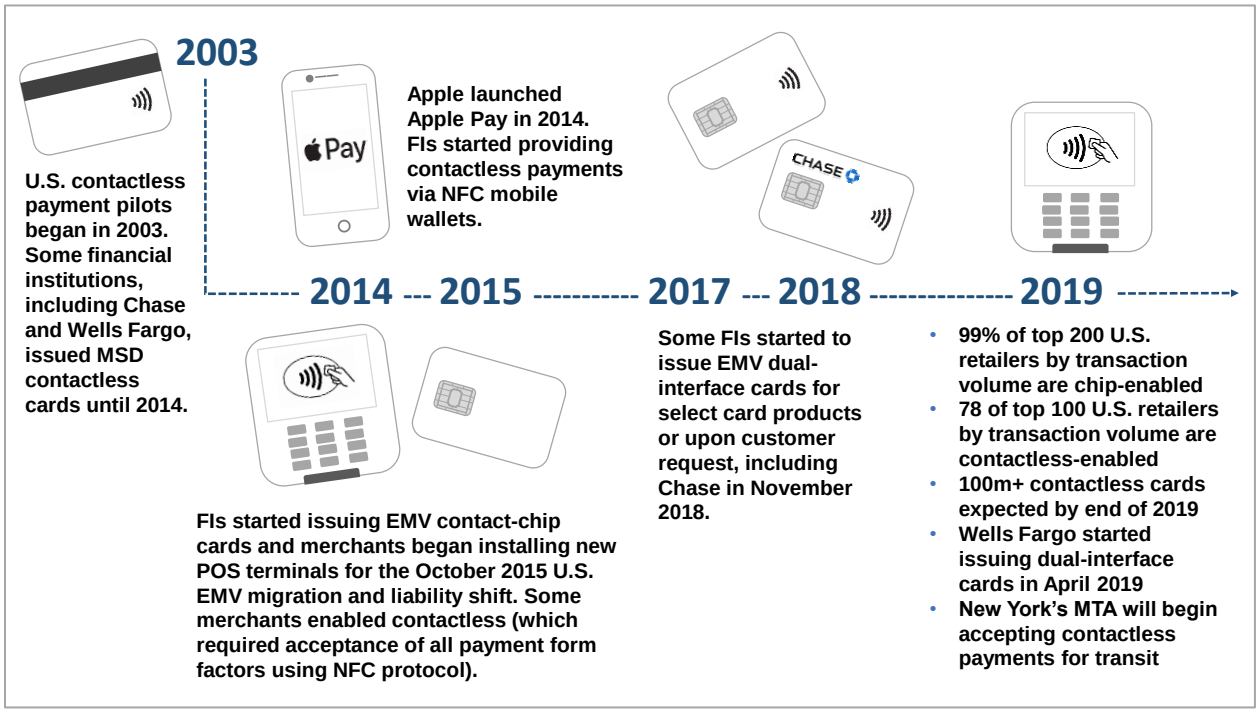
An EMV dual-interface card combines contact and contactless technology. This card has an embedded near field communication (NFC) antenna[2] that communicates with the POS terminal via radio waves to send a dynamic cryptogram for each transaction. Cardholders either insert or tap a dual-interface card at the POS terminal. Dual-interface cards provide the same security as contact-only EMV chip cards, with an improved user experience afforded by the speed of contactless payments.[3] The terms *dual-interface* and *contactless* are used interchangeably to refer to EMV contactless cards throughout this report.

II. Contactless Payments Evolution in the U.S.

The evolution of contactless payments in the U.S. began with the first magnetic stripe data (MSD) contactless card pilots in 2003, moving through the Apple Pay launch and migration to EMV chip card technology in 2014, and progressing toward increased contactless acceptance and issuance of dual-interface cards by 2018 (see **Figure 1**).

[1] The contactless card and POS terminal are compliant with the EMV Contactless Specifications.
[2] The antenna on a dual-interface card performs two functions: (1) enables power from the terminal to the chip on the card; and (2) transmits transaction data wirelessly between the chip and terminal.
[3] For more information on dual-interface cards, see "Dual Interface Card Personalization," *U.S. Payments Forum*, Sep 2018.

Figure 1: Evolution of Contactless Payments in U.S.



A. Early Contactless Developments

Early MSD contactless cards contained magnetic stripe data, an embedded contactless smart chip, and a small antenna that communicated with the POS reader through a contactless radio frequency interface. Cardholders paid by tapping their cards on the POS reader instead of swiping.[4] Additionally, contactless cards used encryption technology to generate a unique three- or four-digit card verification value (CVV) transmitted with each transaction to the issuer for authorization, along with other measures specifically designed to protect the security of the consumer's payment credentials and transaction.

From 2003 to 2005, a few large financial institutions (FIs), card networks and merchants launched contactless payment pilots in the U.S. American Express, Bank of America, Chase, Citibank, Wells Fargo, and other FIs piloted contactless cards and other form factors, such as key fobs and stickers, with customers in select regions. The providers marketed their contactless technology as Amex Expresspay, Mastercard Paypass, Visa Paywave, and Chase Blink. Chase, the largest U.S. credit card issuer, was one of the first to issue contactless cards commercially in 2005.

The value proposition for contactless payments promoted convenience, speed, enhanced security, and a potential cash replacement. Consumers and merchants would benefit from ease of use, faster checkout, and more security by tapping a card or device instead of swiping a magstripe card or paying with cash. In particular, contactless payments offered a strong business case for merchants with high-volume, small

[4] In the U.S., card networks supported pre-EMV contactless payment products based on ISO/IEC 14443, the international standard for contactless smart chip. For more information, see "The What, Who and Why of Contactless Payments," *Smart Card Alliance*, Nov 2006.

ticket items traditionally paid with cash, such as quick service restaurants (QSRs), pharmacies, grocery stores, convenience stores, movie theaters/sports stadiums, and transit. Merchants that accepted contactless payments included 7-Eleven, AMC Theaters, Best Buy, CVS, McDonald's, Walgreens, and Regal Cinemas. Some sports stadiums and New York's Metropolitan Transportation Authority (MTA) participated in contactless payment trials as well.

Despite the value proposition, the initial U.S. rollout of contactless payments did not come close to achieving the mass adoption that industry stakeholders had anticipated. Limited availability of contactless cards and low merchant acceptance made it challenging to incent consumers to modify their payment behavior, as merchants also had to add contactless readers to existing POS systems or purchase new terminals. At the same time, customer benefits were not significant enough to make a notable difference. For example, tapping was not much faster than swiping a card. Card networks had already waived signature verification rules for some low-value swiped transactions, which reduced customer friction at merchant locations that no longer required signatures.

In 2008, the contactless card base had reached 50 million, but only 120,000 merchants accepted the cards.[5] By 2014, as FIs began planning for the EMV chip migration, the quantity of contactless cards in circulation, cardholder usage, and merchant acceptance were all low. As a result, Chase and Wells Fargo determined that the added cost to include the new chip in contactless cards was no longer worthwhile. They discontinued contactless card issuance and focused on issuing EMV contact-only cards.[6] Today, most EMV chip cards issued in the U.S. are still *contact-only*.

B. Contactless Payments in Canada and the United Kingdom

In Canada and the United Kingdom (UK), most EMV cards are dual-interface and can be inserted or tapped at the POS terminal. Broad availability of dual-interface cards and merchant acceptance have contributed to the growth of contactless payments in Canada and the UK by enabling consumers to increase their comfort and familiarity with this payment method.

Canada's payment industry introduced contactless MSD cards in 2005, around the same time as the U.S., but they did not gain traction due to limited merchant and issuer interest and inadequate stakeholder benefits. When Canada began migrating its contactless cards to EMV chip technology in 2008, the appeal of contactless increased, particularly the faster transaction times compared to contact-only cards. However, it was the liability shift in 2011 that incented more FIs to switch from contact-only to dual-interface cards, and merchants to install contactless-enabled POS terminals. As consumers began to experience faster transactions afforded by dual-interface cards, they began seeking issuers and merchants that accepted contactless cards.

Today, almost all credit and debit cards issued in Canada are dual-interface, and almost all merchants accept contactless payments. **Figure 2** illustrates the rapid growth of contactless payments in Canada. Volume and Canadian dollar (C$) value grew from 215 million transactions and C$9.66 billion in 2012 to

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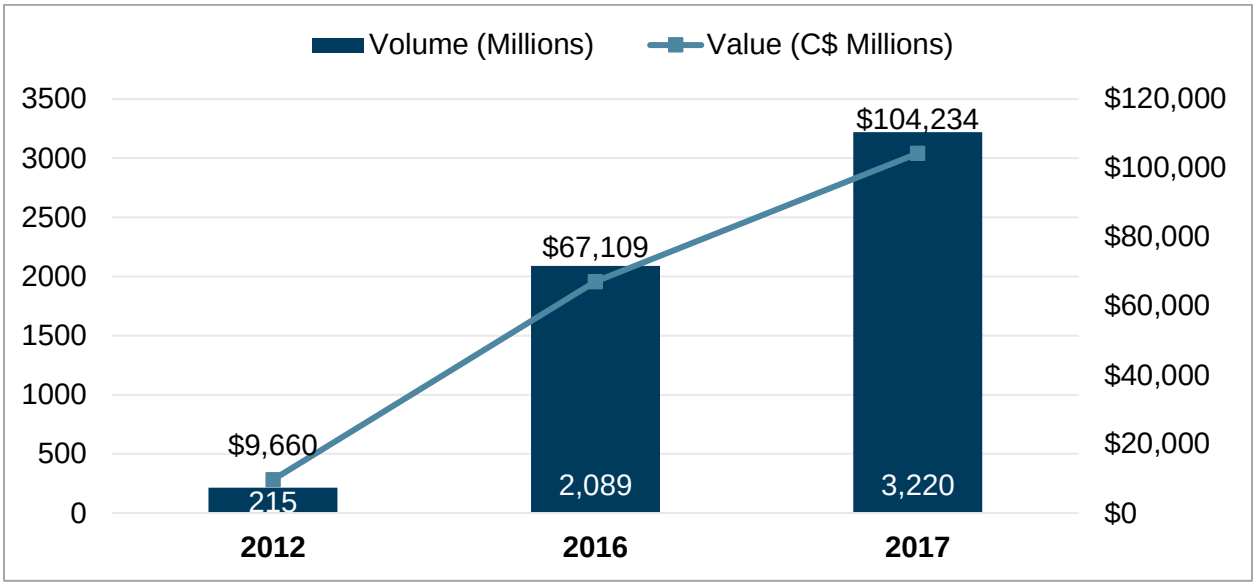
[5] Jim Daly, "Contactless II," *Digital Transactions*, Apr 2, 2018.
[6] "Blink Waves Bye-Bye to Contactless Forever?" *PYMNTS.com*, May 12, 2014. EMV chip cards generate dynamic cryptograms unique to each transaction that prevent fraudsters from using stolen card credentials to create counterfeit cards for POS transactions.

over 3.2 billion transactions and C$104.2 billion in 2017. Contactless payments represented about 29 percent of all POS card payments in 2017, from only 7 percent in 2014. They occurred mostly at *frequent use* merchants – grocery stores or supermarkets, pharmacies/drug stores and gas stations, as well as coffee shops and QSRs, which experience lower-value but higher-volume transactions. *Payments Canada* reported that over 40 percent of contactless cardholders said they use the contactless feature to pay wherever it is accepted.[7]

Figure 2: Canada Contactless Volume and Value (Millions of Transactions and C$ Millions)[8]



Unlike Canada, where FIs introduced contact and contactless EMV chip cards around the same time, the UK introduced contactless cards in 2007 to an already mature EMV chip and PIN card market, and included a £10 limit on PIN-less contactless payments. The low limit slowed adoption because the value of most card transactions exceeded £10 and required a PIN for authentication, but other contributing factors were low issuance (only one issuer offered contactless cards) and poor acceptance (many retailers were unaware of how the cards worked and did not have NFC-enabled terminals).

Over the past decade, the UK payments industry has worked collaboratively to identify ways to incent contactless usage. They increased the limits on contactless transactions without PIN authentication, worked towards broader issuance and acceptance, and implemented consistent messaging to raise customer awareness, particularly on security. Increasing the limit to £20 in 2012 encouraged more merchants to upgrade their terminals to accept and consumers to use contactless payments. In 2015, the UK raised the limit to £30, which significantly increased the number of contactless transactions made, especially at supermarkets and restaurants, where transactions averaged between £20 and £30.[9] Public transit was another important driver for widespread contactless adoption in the UK. When Transport for London (TfL) expanded contactless acceptance to all modes of transit in 2014, contactless payments grew

[7] "2018 Canadian Payment Methods and Trends," *Payments Canada*, Dec 2018.
[8] "2018 Canadian Payment Methods and Trends," *Payments Canada*, Dec 2018.
[9] "Consumers embrace £30 limit as higher value spend drives new contactless behaviour across the UK," *Visa*, Apr 4, 2016

rapidly.[10] Today, contactless open payments represent over half of all TfL pay-as-you-go trips, of which 12.5 percent originate from NFC mobile wallets.[11]

Sixty-three percent of people in the UK now make contactless payments, and no age group or region falls below 50 percent usage. Almost 119 million cards in circulation in the UK (78 percent of debit cards and 62 percent of credit cards) had contactless functionality at the end of 2017.[12] The supermarket was the most popular merchant location, representing 38 percent of all contactless payments. Increasing use of debit cards, along with a growing preference for contactless payments, has caused cash payments to decline.

Some key lessons learned from the evolution of contactless payments in Canada and the UK include the need for mutual interest and value for stakeholders – issuers, merchants, and consumers. Broad adoption will not occur unless both issuers and merchants make the necessary changes to enable consumers to experience the convenience, speed, and additional benefits of contactless cards relative to other payment options. Consistency in messaging about contactless payments and industry education is also critical. Today, consumers in Canada and the UK can tap their cards (or mobile phones) if the transaction value is less than C$100 or £30, respectively. If a transaction exceeds the contactless limit, the cardholder must insert his EMV chip card and enter his PIN to authenticate.

C. Contactless Payments in the U.S. Today

Beginning in 2014, several key factors emerged to create a more receptive environment for contactless payments in the U.S. Notably, the U.S. EMV chip card migration and the launch of Apple Pay generated renewed interest in and infrastructural preparedness for contactless payments. As merchants installed new POS terminals designed to work with dual-interface cards, some also enabled contactless capability. Initially, this capability required merchants to complete a complex certification process, which is now more streamlined. By December 2018, nearly all (99 percent) of the top 200 U.S. retailers by transaction volume were EMV chip-enabled, and therefore equipped with contactless capability.[13] Seventy-eight of the top 100 U.S. merchants by transaction volume offered the ability to tap to pay at checkout.[14]

In the past year, more issuers have begun replacing contact cards with dual-interface cards. Contactless issuance strategies include select card products, new customer accounts, expired cards, or in response to ad hoc customer requests. While less than 5 percent of cards (7 percent credit and 1 percent debit) issued in the U.S. are contactless, issuers that have launched contactless cards have seen double-digit shares of face-to-face transactions.[15] Citi has issued over 7 million dual-interface Costco cobranded credit cards. Since Costco started accepting contactless cards at its 519 U.S. locations in August 2018, over half of in-

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[10] Transport for London (TfL) has been accepting contactless open payments on buses since 2012, but expanded acceptance to all modes of transportation in 2014.
[11] John Adams, "How the London Underground brings in 53,000 new contactless users a day," *PaymentsSource*, Apr 10, 2019.
[12] "UK Payments Markets Summary 2018," *UK Finance,* Jun 18, 2018.
[13] "U.S. Payments Forum Market Snapshot: The State of Contactless Payments, Fraud and What's Next for 2019," *U.S. Payments Forum*, Dec 11, 2018
[14] "Contactless Payments: Global Highlights," *Visa*, Feb 2019.
[15] Monica Gabel, Teresa Epperson and Bob Hedges, "Why U.S. Banks Should Make Contactless Cards an Immediate Priority," *ATKearney*, Jul 2018.

store payments made with their cobranded card have been contactless. In November 2018, Chase also began issuing contactless cards, followed by Wells Fargo in April 2019.

Additionally, a growing number of U.S. transit agencies are accepting contactless fare payments and others are evaluating the technology.[16] Transit riders in Chicago and Portland, Ore., can use dual-interface cards and NFC mobile wallets to pay for fares, and riders in New York, Boston, and other cities are preparing to do so in the next few years. Public transit offers opportunities for riders to use contactless payments regularly.

III. Stakeholder Perspectives

A. Card Networks

According to three major card networks (Visa, Mastercard and American Express (Amex)[17]), merchant acceptance and consumer use of contactless cards is gaining momentum globally. They observe that contactless cards gain traction rapidly when launched in markets where most merchants have contactless-enabled terminals. As a result, the card networks are seeing strong consumer demand, particularly for small-ticket transactions, and lower costs to issue contactless cards. For example, outside the U.S., over 40 percent of in-store Visa transactions occur using some form of contactless payment,[18] and contactless accounts for more than half of Amex card-present transactions in some countries.[19]

Following success in other countries, the card networks are actively marketing contactless cards in the U.S. to build support from FIs, merchants and consumers to fill a gap where NFC mobile payment adoption is lagging. The card networks use multiple media channels, including television ads and public events, to increase awareness and promote the benefits of a contactless interface. The interoperability enables consumers to tap at any contactless-enabled POS terminal and eliminates waiting for a contact card transaction to complete before removing the card, which still occurs at some merchant locations.[20]

Growing consumer awareness and merchant acceptance, along with lower card costs, have strengthened the value proposition for contactless card issuance in the U.S. Card network rules in the U.S. do not require FIs to issue dual-interface cards, nor is there a liability shift if fraud occurs with a contactless card. The decision to issue dual-interface cards is at the discretion of the FIs, who must evaluate the benefits of contactless for their own institutions and customers. Card networks expect that dual-interface card issuance will become part of a natural reissuance cycle, but note that some FIs may decide to reissue in select markets sooner to accelerate adoption, particularly to support transit. They expect U.S. issuers to focus on credit cards first, similar to the launch of EMV contact chip cards and consistent with previous U.S. contactless deployments.

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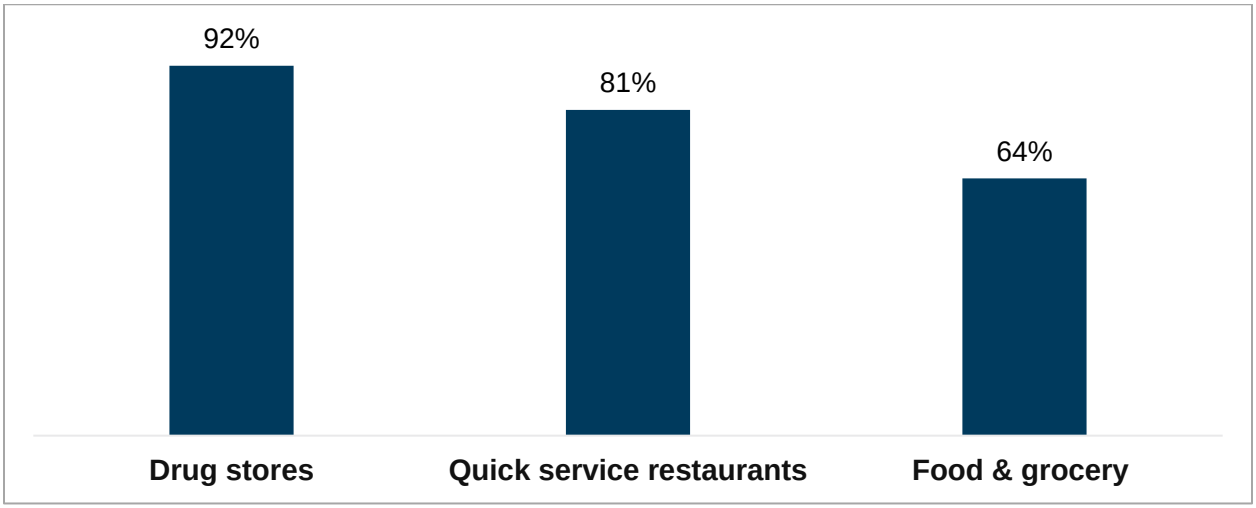
[16] For more information, see "Transit Contactless Open Payments: Technical Solution for Pay As You Go," *U.S. Payments Forum*, Sep 2018.
[17] At time of publication, Discover was not offering contactless cards.
[18] "Contactless Payments Global Highlights," *Visa*, Feb 2019.
[19] Interview with Amex, Aug 2018.
[20] Some merchants still wait for the card/terminal to exchange all data before the customer can withdraw the card, however many now use the Visa Quick Chip or Mastercard Mchip fast process.

Globally, contactless payments are strongest in high-frequency merchant categories, such as grocery stores, QSRs, pharmacies, and transit. These merchants tend to have high-volume, low-average ticket sales, so checkout speed and convenience are essential. Over half of consumers experience their first contactless tap in a grocery store or QSR,[21] so large regional brands and everyday spend merchants have the opportunity to help increase consumer familiarity with contactless cards by fostering more consistency.

In the U.S., over 60 percent of Visa's face-to-face transactions occur at contactless-enabled merchant locations. The majority of merchants within the *everyday spend* categories already allow customers to tap to pay at checkout. 64 percent of grocery transactions, 81 percent of QSR transactions, and 92 percent of drug store transactions take place at contactless-enabled merchants. This demonstrates a strong opportunity for successful transitions in these retail venues when consumers have contactless cards (see **Figure 3**).[22]

Figure 3: Percentage of Visa Transactions at *Everyday Spend* Contactless-Enabled Locations[23]



As demonstrated in Canada, the UK, and other markets, consumers will use contactless cards to replace cash, generating more card transactions for the issuers. Although the proportion of Visa's contactless payment transactions in the U.S. was less than 1 percent in 2017, the card network saw an increase in cash displacement. Cash still represents about 60 percent of in-store purchases under $10 and just over 40 percent of purchases between $10 and $20.[24] Therefore, if the U.S. follows the same trajectory as other developed markets, replacing cash could be a compelling reason and opportunity for broader issuance of contactless cards in the U.S. FIs could significantly reduce cash-handling costs and increase incremental earnings in card transaction volume through cash displacement.

[21] Interview with Visa, Jul 2018.
[22] "Contactless Payments Global Highlights," *Visa*, Feb 2019.
[23] "Contactless Payments Global Highlights," *Visa*, Feb 2019.
[24] John Stewart, "Visa Gets Set for the Next Big EMV Phase—Making Contactless Transactions Routine," *Digital Transactions*, Mar 28, 2018.

Overall, card networks agree that the U.S. market is ready for contactless cards, but recognize that there is some hesitancy among merchants and issuers to proactively plan, based on low adoption rates of early contactless card offerings and the sluggish growth of NFC mobile wallets (i.e., Apple Pay, Google Pay and Samsung Pay) in recent years.

To encourage dual-interface card issuance and acceptance, the card networks established rules for accepting, issuing, and testing contactless payments, along with guidelines for implementation. Furthermore, the card networks are identifying contactless opportunities and value propositions to assist with issuer and merchant business cases. They are providing educational materials and best practices to explain the benefits and address how and where to use contactless.

Since 80 percent of transactions still occur in physical stores, it is important to focus on the card experience by making contactless more habitual.[25] Dual-interface cards will help drive contactless adoption in the U.S. through consumer habituation and familiarity with card payments (relative to mobile). As evidenced in other markets, contactless acceptance and issuance are equally important components for broad adoption – merchants and issuers should try to synchronize their efforts so that contactless cards will gain traction and be successful in the U.S. Some card experts noted that merchants are ready for contactless transactions, and a strong transit use case shows the viability, but card issuance is really the key – issuance leads to usage.

B. Issuers

The U.S. banking infrastructure encompasses many stakeholders, making it much more complex than other markets (e.g., Canada, UK). Compared to the five large FIs that control the market in Canada, the U.S. has over 10,000 banks and credit unions [26] that are governed by several regulatory agencies. Canada has three network processors (Mastercard, Visa, and Interac), while the U.S. has over 16 payment networks and processers handling multiple payment methods.

FIs in the U.S. have not experienced any competitive pressure or consumer demand to offer contactless cards, nor have they received a mandate from the card networks. Since issuers control the market, they must determine whether they see value in providing contactless options to their customers. This is not a natural progression for issuers, and it has created pressure in the marketplace, as some stakeholders (and customers) might construe moving from NFC mobile payments to contactless cards as a backward-looking strategy. First, issuers note that the early business case for contactless cards was based on an unproven hypothesis at that time (i.e., contactless cards would replace cash payments) and therefore did not provide a positive return on investment (ROI). This situation presented the original *chicken and egg* dilemma – if FIs issue contactless cards but merchants do not enable their POS terminals to accept them, there is no value, and vice versa. Second, when issuers began planning for the EMV chip migration, there were over 1.2 billion cards in circulation, so manufacturing costs were a key factor in their decision to opt for a contact-only chip card strategy.[27] Between 2014 and 2016, cost estimates for dual-interface cards

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[25] John Stewart, "Visa Gets Set for the Next Big EMV Phase—Making Contactless Transactions Routine," *Digital Transactions*, Mar 28, 2018.
[26] In 2018, there were 5,542 commercial banks and savings institutions (FDIC, Q2 2018) and 5,436 credit unions (NCUA, Q3 2018) in the U.S.
[27] Carmen Chai, "Contactless 'tap-and-go' cards finally enter U.S. market," *Creditcards.com*, Jan15, 2017.

were $2-$2.50 in bulk, about twice the cost of contact-only cards.[28] Third, during that same timeframe, the larger issuers were trying to build adoption of NFC mobile wallets to support contactless payments. Since then, the dynamics have changed. Adoption of NFC mobile payments has not grown as rapidly as anticipated when launched in 2014, and the cost of dual-interface cards has dropped by almost 50 percent, incenting issuers to reconsider offering contactless cards to customers.

Issuers still face difficult strategic and ROI decisions on whether to issue contactless cards. Will cardholders have enough places to use contactless – i.e., will enough merchants accept the cards? What can issuers expect from efforts to introduce contactless cards to mass transit systems? How should contactless cards be coordinated with their mobile contactless services? How can they use contactless cards to differentiate their business from competitors? Once FIs decide to move forward, they must plan for card reissuance, testing, certification, and branding and assess distribution options (e.g., by customer segment, expiration date, mass reissuance, etc.). They also need to consider the incremental costs of card reissuance, as well as potential customer disruption if they do not effectively communicate the differences between contact, contactless, and mobile and the overall benefits.

Issuers have different strategy options. *Early adopters* hope that being the first to offer contactless cards will give them the advantage of being *top of wallet* and see this as a benefit over cards loaded into an NFC wallet, where a customer can easily choose between multiple cards for a contactless payment. Many issuers plan to take a phased approach. Initially, some will limit dual-interface cards to specific regions, segments or products, or to customers who specifically request contactless cards. They may begin by replacing contact cards as they expire and providing contactless cards with new accounts. FIs hope that a targeted approach will enable customers to adjust to contactless payments and see their value, which will allow FIs to assess the ROI before doing a mass reissuance.

Other issuers plan to deplete their contact card inventory before they issue new dual-interface cards or just take a *wait and see* approach. They may prepare for contactless, but will wait for other issuers to go first. These FIs are not quite ready for mass conversion, having recently made a substantial investment in EMV contact card issuance, and are reluctant to disrupt customers who just became accustomed to dipping instead of swiping a card. They are weighing the costs and benefits, and while they may see the long-term prospects of dual-interface, they are cautious about the short-term projections.

Issuers see the value of contactless acceptance in everyday, low-value spend categories (e.g., at QSRs, food and grocery stores, pharmacies, transit) to build consumer habituation, but need to see many more merchant locations accepting contactless to generate demand. Not all merchants have activated the contactless feature yet, even though most large U.S. retailers are now chip-enabled and nearly 70 percent of card transactions occur at contactless-enabled merchants in the U.S.[29] This lack of action concerns some issuers, who still believe that until there is broader contactless *acceptance*, the business case for dual-interface cards is uncertain.

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[28] Nick Holland, "Why now? Contactless cards get a strong second wind in the U.S." *Payment Source*, Jan 29, 2018.
[29] "US Payments Forum Market Snapshot: Future of Payments Is About Customer Experience, Choice and Security," *U.S. Payments Forum,* Apr 17, 2019.

Experiences in other countries indicate that increased activity by U.S. transit agencies to accept contactless open-loop payments may strengthen the business case for issuers by possibly generating some competition, serving as a catalyst for retail contactless acceptance, and influencing consumer contactless adoption at non-transit venues. The transit use case shows the potential for contactless cards to replace a significant number of cash transactions. However, before making the investment in contactless cards, some FIs still want to understand how much cash could be displaced by card-based (i.e., revenue generating) payments.

FIs acknowledge that moving consumers to tap and pay in the U.S. will be a gradual process. Issuers do not think customer demand will occur organically and want assurances that there will be enough volume to justify their expense. Consumers are generally unaware of the value of contactless cards, so demand is not a given. Not all issuers agree on whether contactless cards will increase mobile adoption, especially if consumers perceive that it is easier to pay with their contactless cards instead of mobile phones. However, the general view is that putting contactless cards into the U.S. market will have a positive influence on mobile payment adoption.

Achieving broad contactless payment adoption will require all stakeholders in the value chain to work together to ensure sufficient availability of cards and devices, consistent processes, and broad consumer awareness of the *how* and *why* to incent *tap to pay*. If contactless card issuance plans are effective, merchant acceptance and customer adoption should grow, leading to increased card transaction volume for issuers and stronger customer retention and loyalty.

C. Processors

Payment processors have observed growing interest in contactless implementation among issuers across asset tiers. One large U.S. processor saw an uptick in dual-interface cards from 1 percent to 7 percent between 2016 and 2018.[30] The number of clients requesting dual-interface cards has increased, and represents about 50 percent of the processor's EMV chip card projects. The processor noted that their FI clients also diverge on their strategies for implementing dual-interface cards. Similar to the issuer perspectives, the majority of the processor's clients are not planning a mass reissuance of dual-interface cards at this time, but are preparing for the industry shift to contactless. Clients are also monitoring how other regions (e.g., Europe, Asia, and Latin America) are responding to card network mandates to have contactless-enabled terminals and dual-interface cards by certain dates over the next two years, although there are no mandates in the U.S.[31]

Processors view contactless acceptance as more promising today than earlier attempts in the mid-2000s. Implementing NFC-capable terminals to support the EMV migration removed a key barrier. However, processors expect to see a lag in merchant contactless acceptance, similar to EMV contact card acceptance, but to a smaller degree. Given the complexity of their operations (e.g., number of locations and POS terminals, staff training, etc.), big box merchants have more work to do than smaller "mom and pop" shops with one or two locations and only a few POS terminals. Furthermore, merchants investing in

[30] Interview with processor, Aug 2018.
[31] Amex, Mastercard and Visa contactless payment scheme mandates in Europe, the Middle East, Africa, Latin America and Asia – new terminals: October 2018; new cards: October 2018 (Visa)/April 2019 (Amex, Mastercard); all terminals: April 2023.

omni-channel/online payment opportunities, such as in-app payments, order ahead, or online payment/in-store pickup, may not consider contactless payments a priority. Over the long term, the processors also view the shift to contactless cards as a positive driver for NFC mobile payments.

D. Merchants

The majority of U.S. merchants have completed their EMV contact chip card migrations. Increasing FI and card network marketing efforts are motivating them to consider their options for enabling acceptance of contactless payments. Merchants that accept contactless payments provide a more tailored experience for their customers with the improved transaction speed of tapping instead of inserting a card, shorter lines, and more efficient checkout. The contactless tap feature works consistently across devices to remove friction, whether contactless card, NFC mobile or wearable, and it reduces the risk of consumers inadvertently leaving their cards in the POS terminals.

Several large U.S. merchants in everyday spend categories now accept contactless payments. See **Figure 4** for examples.

Figure 4: Contactless Acceptance at Large U.S. Retailers[32]

Category	Retailer	# of U.S. locations
QSR	McDonald's	14,100
	Taco Bell	7,000
Pharmacy	CVS	9,800
	Walgreens	8,100
Convenience stores	7-Eleven	10,000+
Coffee	Starbucks	14,300
	Dunkin'	8,500
Grocery stores	Albertson's	2,277

QSRs rely heavily on transaction speed, so it is important to have a *quick tap* interaction with the customer at the POS terminal that is faster than inserting an EMV chip card. Because many consumers frequent QSRs daily to purchase food and drinks, it is easier to generate consumer habituation. Once QSR merchants accept contactless payments in all their locations, they have the opportunity to educate their customers everywhere to help drive adoption of contactless cards.

[32] Other merchants accepting contactless include Target, Publix, Safeway, Traders Joe's, and Whole Foods. For a list of retailers that accept Apple Pay and Google Pay see: https://www.apple.com/apple-pay/where-to-use/ and https://pay.google.com/about/where-to-use/

Despite the migration to EMV chip cards and the pervasiveness of contactless-capable POS terminals, not all merchants are ready to enable contactless. Given the limited number of dual-interface cards to date and low customer demand, they are less optimistic about broad availability of dual-interface cards in the U.S. in the near future. Some merchants think that FIs might wait until they are confident that contactless card volume will be a strong replacement for cash payments. Yet one QSR/coffee shop merchant noted that contactless cards might not replace cash transactions in businesses where other card-based payment options already exist. Other merchants indicated that cards, including reloadable gift cards, and QR code-based mobile payment apps linked to loyalty programs, have already begun to replace cash as a payment choice in their locations. It will be important for merchants to understand how issuer plans might affect their strategies.

While merchants want to support multiple payment choices for their customers, the overlapping arrival of the EMV chip card migration and NFC mobile wallets in the U.S. complicated the transition to contactless card issuance and acceptance. Merchants sense that some consumers are unaware that contactless cards and NFC mobile wallets work the same way at the merchant POS terminal. Some merchants note concern with losing control of the payment experience when they turn on NFC in their stores because contactless technology extends acceptance to all NFC mobile wallets by default, rather than enabling merchants to manage the wallet options. Every merchant is different and has to weigh the pros and cons of enabling contactless.

Merchants with habitual customers have a stronger likelihood of increasing broad adoption of contactless payments, if they work together to address current inconsistencies in contactless acceptance and messaging for cards and mobile payments. To date, marketing and messaging for contactless cards and NFC mobile wallets have been fragmented and brand-specific. Poor signage leaves consumers confused about which merchants accept contactless payments and whether their mobile wallets or dual-interface cards will work. Not all POS terminal models use the same area on the reader to tap for an NFC connection. For various reasons – some not under their control – merchants may handle contactless card payments differently. For instance, merchants may set varying dollar limits, ask for PINs or other authentication at different times, or enact differing cash-back policies.[33] Inconsistent or inaccurate communication about payment acceptance features can create negative user experiences that may deter use of contactless payments. If the process works consistently for both cards and mobile across POS terminals, customers will have positive experiences and want to make contactless payments regularly.[34]

E. Contactless Card vs. Mobile Phone

There are many reasons why consumers may adapt more easily to contactless cards than NFC mobile payments. Some stakeholders view the transition from inserting to tapping a card as more intuitive than switching from a card to a mobile phone payment. Although tapping is a new feature, U.S. consumers have a lot of experience with cards.

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[33] In Canada and the UK, consumers can tap their card (or mobile phone) if the transaction total is under C$100 and £30, respectively. If a transaction exceeds these limits, then the cardholder must insert his EMV chip card and enter his PIN.
[34] "Consumer Experience at the Contactless Point-of-Sale," *U.S. Payments Forum*, forthcoming.

Dual-interface cards allow customers to make contactless payments without any additional effort – the capability is already available on the cards. Paying with an NFC mobile phone provides additional benefits, but requires users to take a few extra steps, including (1) owning an NFC-enabled mobile device; (2) installing a mobile wallet app; (3) enrolling a credit/debit card from a participating issuer; and (4) setting up an authentication method (e.g., passcode, fingerprint, facial recognition, etc.). Although dual-interface cards and NFC mobile wallets leverage the same contactless and cryptographic technologies, NFC mobile wallets also use enhanced security tools, such as payment tokenization, [35] geolocation and CDCVM/ODCVM (e.g., fingerprint, passcode).[36] Additionally, mobile payment apps can offer complementary features, such as location-based promotions and loyalty rewards, which are not available with cards.[37]

Dual-interface cards may provide a better user experience than NFC mobile wallets in the short-term. For example, if consumers tap a dual-interface card at a POS terminal that is not contactless-enabled, they can insert the card instead to complete the transaction with minimal interruption. If attempting to pay with an NFC mobile wallet at a POS terminal that is not contactless-enabled, the user must present an alternative payment method (e.g., credit/debit card, cash, etc.), which could delay the checkout process. This uncertainty may drive consumers to use a contactless card, at least in the short-term, because they know it will work each time they pay. The simplicity of using contactless cards may also appeal to a broader consumer audience that includes those who are less tech-savvy.

F. Key Findings

Payment industry stakeholders support contactless cards, but do not agree on the timing of when the cards will achieve mass adoption. Still unclear is the tipping point for the number of contactless-enabled merchant locations needed to incent FIs to issue cards and the number of customers with contactless cards needed to incent acceptance. Some issuers and merchants need to be convinced of the value of contactless cards and want some assurance of customer adoption. With many first-generation EMV chip cards approaching renewal in the next few years and more merchants enabling contactless acceptance, this would be an ideal time for more issuers to consider dual-interface cards.

While the U.S has the components for success, it will require the participation and collaboration of multiple parties. Coordinating efforts to generate demand through consumer awareness, education, and messaging is critical to explain the nuances between contactless cards, NFC mobile wallets, and other emerging payment options (e.g., QR code-based mobile payments) and to address inconsistencies. Educating consumers about the benefits of using contactless payments can increase familiarity and incent habituation for making everyday purchases. The transition to contactless card payments may be more intuitive than mobile payments, but once consumers experience and appreciate the benefits of contactless

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[35] For more information, see Susan Pandy and Marianne Crowe, "Industry Perspectives on the Evolution of EMV Payment Tokenization," *Federal Reserve Bank of Boston*, Sep 24, 2018.
[36] CDCVM and ODCVM are Visa and Mastercard terms for *consumer device/on device* cardholder verification methods that allow verification of a cardholder using a fingerprint, facial recognition, or device passcode when making a payment from a mobile device. These CVMs do not work with contactless cards, where PIN or signature may be required at POS, along with 3D-Secure, if the transaction is mobile in-app. Use of CD- or ODCVM eliminates the need to set dollar transaction limits on mobile contactless payments.
[37] For more information, see Elisa Tavilla, "Rewarding Loyal Customers to Increase Mobile Payments Adoption," *Federal Reserve Bank of Boston*, Apr 6, 2017.

payments, it will be easier for them to use mobile devices. Some stakeholders believe consumers have become accustomed to using EMV chip cards and are ready to transition to contactless cards, while others worry that it will be too disruptive.

Other developing use cases may gain consumer attention. Some FIs accept NFC contactless cards and mobile wallets at the ATM to initiate banking functions. NFC capability is also available in multiple consumer devices, such as smartphones, fitness activity trackers, and other wearables, making the technology less extraneous and easier to use than earlier options (e.g., contactless stickers and key fobs). Yet the question remains: Will contactless cards pave the way for consumers to migrate to mobile tap to pay, or will the convenience of contactless cards give new life to traditional plastic cards and further impede the transition to mobile payments?

The success of contactless payments in other countries demonstrates that when all the required elements are in place – broad acceptance, issuance, and consumer demand – mass adoption is more likely to occur. Transaction data from Canada, the UK, and several other countries (e.g., Australia, Ireland, New Zealand, and Switzerland), found that in the first three years after major contactless issuance in each country, there was an increase of 5 to 40 new transactions per credit or debit card per year.[38] The same study also showed that consumers tend to increase their usage and frequency of electronic payments when they can tap to pay. One stakeholder also noted that the U.S. starting transactional point is actually much further along than what Canada, the UK, and other countries showed at the beginning of their contactless migration.

It is clear that the U.S. is on the way to supporting both card and mobile contactless payments, motivated by the completion of the EMV migration to chip cards and a solid NFC mobile payment foundation, which should accelerate the path to mass adoption in the U.S.

[38] Monica Gabel, Teresa Epperson and Bob Hedges, "Why U.S. Banks Should Make Contactless Cards an Immediate Priority," *ATKearney*, Jul 2018.