BI INTELLIGENCE

THE PAYMENTS ECOSYSTEM REPORT:

Everything You Need To Know About The Next Era Of Payment Processing

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Content

Key Points

- **The payments industry is going through a period of rapid transformation brought on by the transition to digital.** That's because payments is about transferring information from one party to another, and nearly every stakeholder in the industry benefits when that process runs on digital rails.

- **2016 will be a watershed year for the payments industry.** Payments companies are improving security, expanding their mobile offerings, and building commerce capabilities that will give consumers a more compelling reason to make purchases using digital devices.

- **Payments is an extremely complex industry.** To understand where the next big digital opportunity lies, it's critical to understand how the traditional credit- and debit-processing chain works and what roles acquirers, processors, issuing banks, card networks, independent sales organizations, gateways, and software and hardware providers play. Card payments involve thousands of companies competing and collaborating to facilitate transactions.

- **Mobile provides the common ground for many of the biggest leaps happening within the payments industry.** Smartphones have become the go-to computing device for every digital activity, and payments is no exception.

    - **The groundwork has been laid out for mobile in-store payments to gain traction this year.** Major smartphone companies, such as Apple, Samsung, and Google, have all built mobile wallet platforms. Meanwhile, merchants are inadvertently rallying behind a common mobile payments technology — near field communication (NFC). A wide base of potential users on the consumer and merchant sides should

unlock the potential of mobile payments this year. We forecast US in-store mobile payments will grow from $120 billion in 2016 to $808 billion by 2019.

- **New mobile buying options will accelerate mobile commerce.** Mobile browsing is skyrocketing. However, small smartphone screens, spotty internet connections, and cumbersome purchasing processes are keeping mobile commerce from taking off. Payments companies are going after this opportunity by releasing buy buttons to help ease the friction of mobile shopping and capture a share of processing revenue. As mobile shopping barriers drop, mobile commerce will match PC commerce and eventually overtake it.

- **Mobile peer-to-peer (P2P) money transfers will become more common, and services will become more competitive.** Although P2P payments are thriving off social commerce and network effects, their revenue potential remains limited. P2P apps like Venmo will look to evolve into platforms that come with other, more lucrative payment capabilities, including in-store payments. Simultaneously, mobile wallets like Apple Pay will likely add P2P capabilities to attract users.

- **Remittances is another massive industry being transformed by mobile.** As with P2P payments, those who send and receive remittances across borders are transitioning away from cash and to mobile-based transfers. Legacy players are seeing digital-based remittances drive growth, but these companies will still face challenges around the massive infrastructure they've built to handle cash transfers.

- **Direct carrier billing offers the option to have the purchase of goods added to a user's mobile phone bill.** This provides one of the easiest ways to pay on mobile, especially in emerging markets where banking penetration is low. Although

fees for these services levied by the carriers are uncompetitive in developed markets, carrier billers are beginning to take a stab at these markets.

- **Alternative technologies could disrupt the processing ecosystem.** Devices ranging from refrigerators to smartwatches now feature payment capabilities, which will spur changes in consumer payment behaviors. Connected devices could also incentivize consumers to make payments outside of physical stores, which ultimately threatens payments companies confined to those environments. Likewise, blockchain technology, the protocol that underlies Bitcoin, could one day change how consumer card payments are verified.

Payments is a complex and rapidly evolving space. It involves an intricate web of companies coordinating to power transactions in diverse environments. Demand for digital goods and services is forcing payments companies to build new business models. This means that a different hierarchy could emerge in the payments industry as startups find entry points into the market and as incumbents adapt to digital.

In this report, we offer a high-level look at the payments industry — how it functions, who the key players are, and what trends are shaping the industry. This report provides a compendium of all our most important research and analysis on the payments industry. We'll start by seeing how last year's key events will help shape this year's payment trends. From there, we'll explain traditional card processing, in addition to prepaid, store cards, and PIN debit transactions. Then we'll dive into the most important developments brought on by mobile and look at what could be the next technologies to disrupt payments.

The analysis and diagrams that follow are simplified, and the lists of companies included in the infographics are not exhaustive — they're meant to be an introduction to the players and trends in the space.

Click here to download a PowerPoint presentation of the diagrams »

Click here to download the charts and data in Excel »

Key Themes In Payments: 2015, 2016, And Beyond

The makeup of the payments ecosystem has changed measurably over the past year, as many online and mobile-focused players have established themselves alongside legacy providers.

Five key events marked 2015 as a critical year for the payments ecosystem and will have broad implications for 2016:

- **New security standards were implemented.** EMV — short for Europay, MasterCard, and Visa — is a set of security standards created by major card networks to better protect card-present data. The standards have been used internationally for years, and the US officially migrated to this standard on October 1, 2015. This has bolstered the security of card-present payments. However, it's also widened the security gap between in-store and online commerce, making the latter more attractive to fraudsters. The rollout of EMV could also inadvertently boost in-store mobile wallet adoption. If merchants are ordering a new, EMV-compliant terminal from a major provider like Verifone or Ingenico, it's likely that device will also accept NFC payments through mobile wallets such as Apple Pay. In the long run, EMV will help universalize NFC technology, which will give mobile wallets an opportunity to compete squarely with traditional methods of payment.

- **Mobile wallets flooded the market.** Apple Pay was the only major digital wallet of 2014; however, 2015 saw competitors and collaborators launch wallets of their own. Android Pay, Samsung Pay, Chase Pay, and Walmart Pay were all released last year, reflecting the significant opportunity companies see in this service. This means a

majority of smartphone users in the US will have access to mobile wallets. And with NFC terminals more widely available in stores, they'll also have places to use those mobile wallets. There's a possibility that consumers will be hesitant to adopt mobile payments, but we expect that they'll see success, as many consumers have become increasingly dependent on their smartphones.

- **Mobile commerce matured.** Although consumers have made mobile phones their primary computing device, they haven't relied on them to make purchases, largely because of their small screens, spotty internet service, and lengthy mobile checkout process. However, a number of smartphone manufacturers have committed to making phones with larger screens, and a bevy of payment companies have integrated one-click buy buttons into online checkout pages. Smartphones have also adopted biometric technology that enables people to buy things with their fingerprint. These features have made purchasing on mobile easier, which will spur a significant spike in mobile commerce.

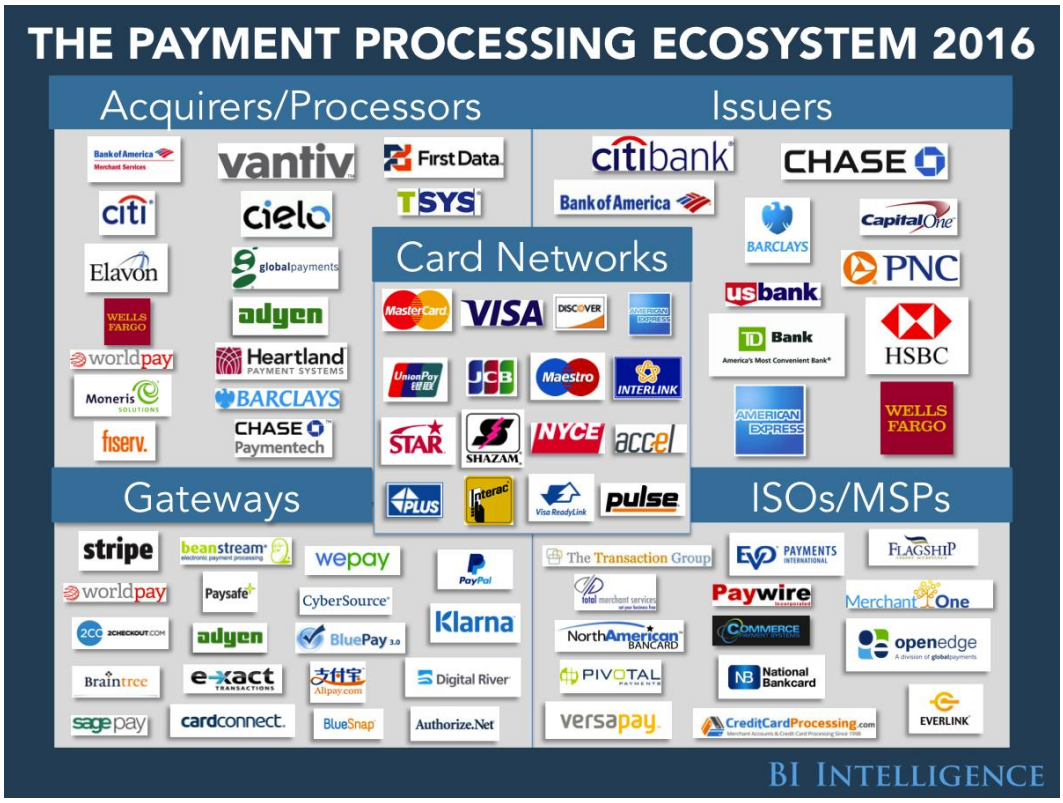
- **Software services moved to the foreground for merchants.** Many new mobile point-of-sale (mPOS) devices are extremely cheap for merchants to purchase. To further increase the stickiness and utility of these products, terminal vendors are stocking the devices with software platforms that contain business management tools and even working capital programs. Software-centric terminals are giving small businesses access to enterprise-grade services that can help them optimize workflow and sales. mPOS also gives software providers an opportunity to sell their products directly to merchants, which threatens to disintermediate traditional sellers. Ultimately, stakeholders throughout the ecosystem have an opportunity to earn new revenue as small merchants start accepting card payments.

- **Alternative payment infrastructures received heavy investments.** A blockchain is a public ledger, or list of transactions, involving Bitcoin. Recently, we've seen a surge of investments in this

technology, as various banks, tech giants, startups, and payments companies begin exploring its applications outside of Bitcoin. Visa Europe, for instance, started exploring the blockchain as a tool for routing cross-border transactions. The blockchain relies on a distributed ledger that is publicly verified by a network of users, eschewing the need for an intermediary or central authority. We expect the blockchain to first impact interbank transfers, however, it could eventually make its way into consumer card payments, at which point intermediaries such as card networks could be in trouble.

The Ecosystem For Payment-Card Processing

To understand each of these trends and how they might alter the broader payments landscape, it's first critical to understand the complicated card-processing pathways and the diverse set of players interacting to push through countless transactions for consumers and businesses.



The payment transaction is the foundational process that the payments industry is built on. There are five types of businesses in the payment-processing ecosystem. Before getting into how a card transaction is processed, we'll define each of these types of businesses.

Acquirers And Processors

Acquirers are typically banks that work with merchants to allow them to accept payments. Acquiring banks, such as Bank of America and Wells Fargo, are responsible for providing merchants with most of the systems they need for accepting card payments. These systems include payment terminals, processing services, and a bank account into which settled funds from purchases can be deposited. They also assume risk associated with card transactions, although risk is often mitigated by being selective about the merchants with whom the acquirer chooses to partner. Acquirers are members of card networks like MasterCard and Visa (discussed later).

Processors are responsible primarily for data transmission and security. We lump processors in with acquirers because some acquirers, such as Chase Paymentech, process transactions in-house. Other acquirers contract a third-party processor, such as First Data, to handle transactions.

There are two types of processors in the payment-card system: front-end processors and back-end processors.

- **Front-end processors** route transactions from merchants to the cardholder's bank to gain authorization, i.e. make sure a customer has enough available credit or funds to make a purchase.
- **Back-end processors** are responsible for a fund's settlement, which ends with the merchant receiving a deposit for transactions.

Some processors have a salesforce that directly seeks out business from merchants, but often they outsource this function to independent sales organizations, or ISOs. (For more on ISOs, see below.) Acquirers may also use a salesforce to sell services to large merchants, but this is less common.

Issuing Banks

Issuing banks, or issuers, provide consumers and businesses with debit and credit cards connected to checking or credit accounts. They are the bank named on a customer's credit or debit card, and hold the customer's deposits or credit associated with the account. The same bank may also serve as a merchant's acquiring bank — the name denotes a service provided rather than a unique business entity.

Card Networks

Card networks are commonly assumed to be the issuers of credit, since these are the businesses most closely associated with credit card payments. But for the largest networks, Visa and MasterCard, this isn't the case. (American Express and Discover are distinct in that they *do* provide credit and act like issuing banks.) Card networks act as a kind of hub within the card-processing ecosystem and serve two main functions: routing transactions between issuers and acquirers, and setting the rules by which everyone operates. As a kind of governing body, a card network also sets the interchange fees charged by issuing banks, establishes rules for membership in the network, and resolves disputes between different parties. One caveat is that a national government can override a card network's fee terms and set limits on these fees.

Independent Sales Organizations And Merchant Service Providers

ISOs and Merchant Service Providers (MSPs) are entities that sell payment-processing services to merchants on behalf of acquirers/processors but are not banks. They also sell or lease payment terminals. They are feet-on-the-ground salespeople and often operate regionally. It would be too cumbersome a task for a big bank to sell its products to millions of merchants. Instead, ISOs and MSPs fill this role. They also provide merchants with customer service and ensure merchants' acceptance devices are up and running. Once a merchant chooses an acquirer/processor and a terminal, the ISO or MSP is the point of contact with the merchant.

There is no significant difference between an ISO and an MSP; MSPs are registered with MasterCard, whereas ISOs are registered with Visa.

ISOs and MSPs are among the businesses being directly and immediately disrupted by new mobile payments technologies. These companies are being forced to change their business model as merchants begin adopting mobile points-of-sale (mPOS). In the past, businesses bought bulky and expensive POS devices, giving an opportunity for ISOs, MSPs, and others to service them. However, new mPOS devices can be purchased for relatively little cost, sometimes even in retail stores, and so servicing these devices is less necessary since a broken device can be easily replaced.

As mPOS drives down the overall cost of physical devices, a higher value is being placed on added software services. Two types of vendors are playing a sizable role in the selling of payment technology:

- **Independent Software Vendors** (ISVs) create business-related software platforms, usually for a wide audience, which they can sell directly to merchants or to other sellers.
- **Value-Added Resellers** (VARs) integrate pre-made software products, like those made by ISVs, and integrate them into hardware

devices such as computers or terminals. The finished product is then sold to merchants.

These organizations specialize in software, giving them an advantage over traditional selling agents as merchant demand for software services rises. Software vendors are now interfacing directly with merchants and in some cases, controlling the relationship with the merchant. Some software companies are even becoming ISOs themselves.

But implementing a full POS system will continue to require a series of different companies. Demand for software will give ISVs and VARs a greater influence over the selling process, but selling organizations that have partnerships with major acquirers will still play a role. Each group has a different set of specialties that will be more or less valuable depending on the specific merchant served and the specific set of services offered. Nevertheless, traditional selling agents will have to gain more knowledge about the software on the systems they're pitching in order to remain relevant.

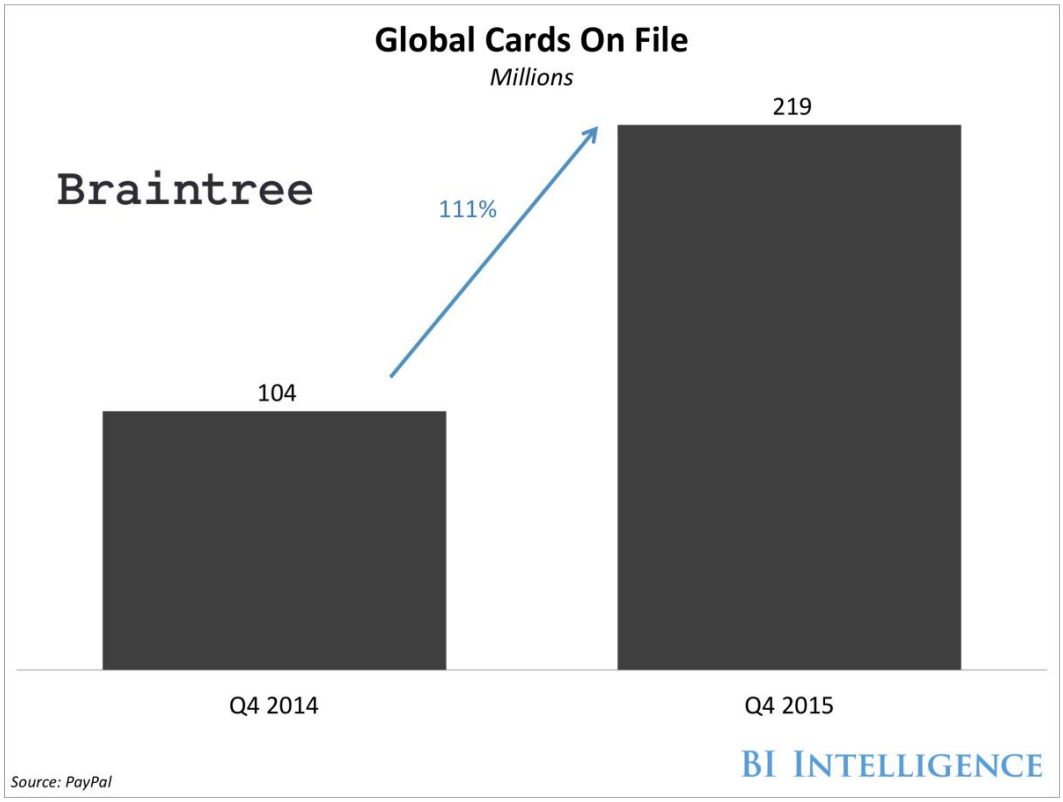
Payment Gateways

Payment gateway businesses are specific to e-commerce companies, serving essentially as the online version of a payment terminal and a front-end processor for online businesses. Gateways like Stripe act as the portal through which e-commerce merchants connect to acquirers. In addition, they usually provide added services like analytics and reporting for their merchants.

Gateways have begun to play a more significant role in the ecosystem as merchants build an online presence. Gateways are also being propped up with massive investments. For example, Stripe received an undisclosed investment from Visa that valued the firm at $5 billion. Meanwhile, Klarna, a Sweden-based company with an online checkout platform that also functions as a gateway, recently hit a $2.25 billion valuation and is now operating in the US.

As more merchants develop mobile channels, gateways that specialize in mobile will have even more opportunities for growth. For example, PayPal-owned Braintree, a mobile-focused gateway, grew 111% YoY in terms of cards on file in Q4 2015.

We expect gateways to play a more significant role in card processing in 2016 as consumers continue to move more purchasing online.

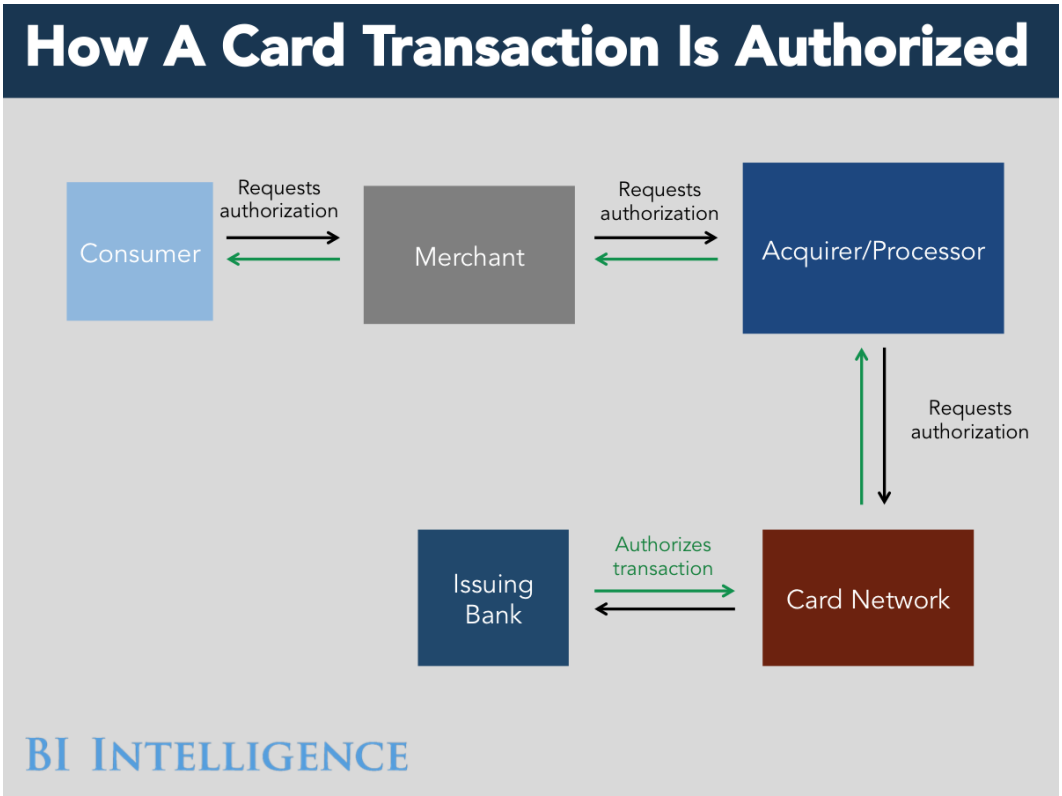


The Anatomy Of A Card Transaction

There are three stages to payment-card processing, and each player outlined above is involved in one of these stages, either directly or tangentially.

To illustrate each stage, we'll use a $100 credit-card transaction as an example.

1. Authorization

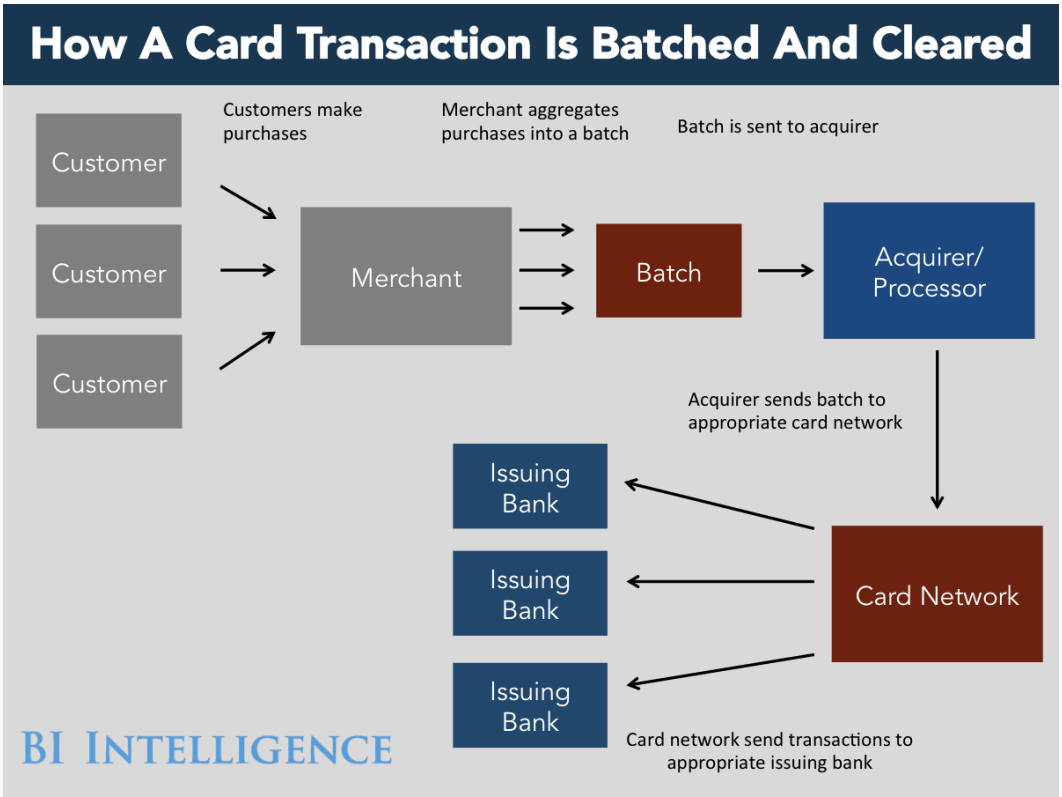


A customer elects to make a $100 purchase with a credit card. When she swipes her card at a payment terminal, the transaction data goes through the merchant's payment terminal to the acquiring bank. The acquirer then sends an authorization request to the card network, and the card network routes that request to the cardholder's issuing bank. If credit or funds are available and the card hasn't been reported lost or stolen and isn't otherwise flagged as suspect, the issuing bank relays an authorization code back through the card

network to the acquirer. The acquirer then relays it back to the merchant. Once the merchant receives the authorization code, the transaction is complete.

Of course, this all happens in seconds. The next stages in payment processing are more drawn out.

2. Batching And Clearing



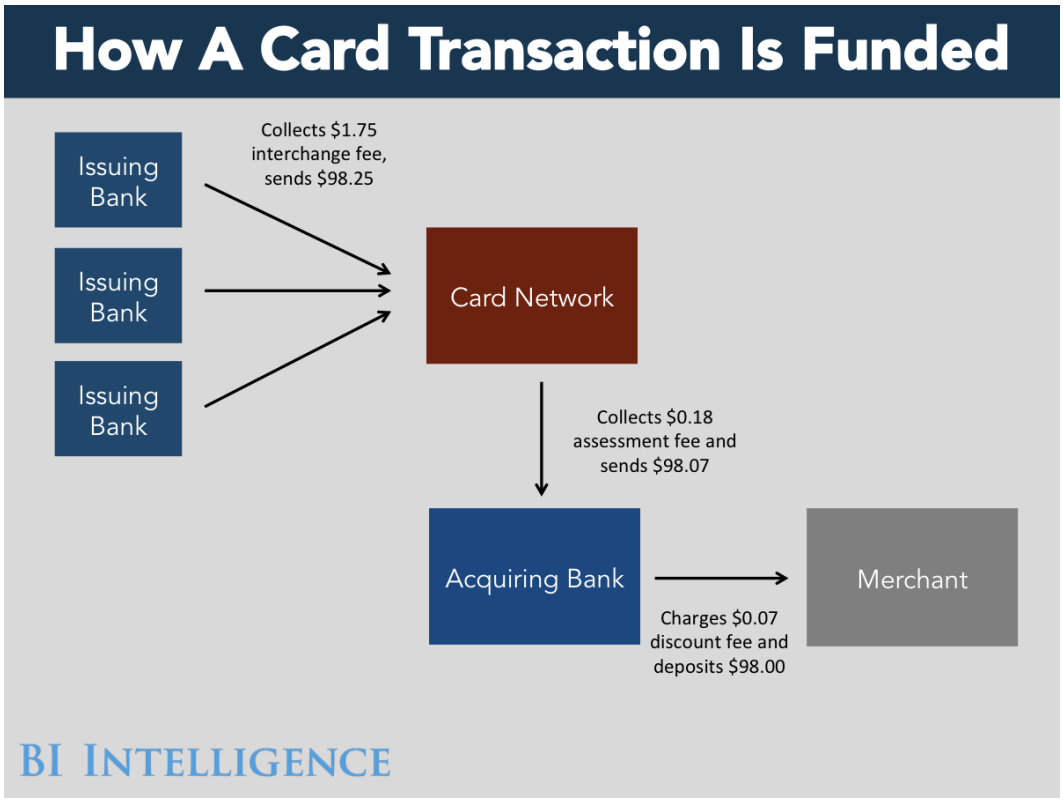
While the transaction goes through from the consumer's point of view after authorization, and the individual can walk out of the store with her purchase, the merchant hasn't actually received any money. Before the merchant can receive funds, all the day's transactions need to be batched and cleared.

At the end of the day, the batch — an aggregation of all the transactions that take place over the course of a day — is sent to the acquirer. The acquirer requests payment on behalf of the merchant by sending a history of the day's transactions to the appropriate card networks. The card network then divides

the transactions according to which bank issued the card and sends a request for funds to the appropriate issuing bank.

3. Funding

Once the issuing bank receives a request for funds, money actually begins to move. The issuing bank sends the requested amount back to the acquirer via the card network, minus an interchange fee that amounts to about $1.75. The card network takes out an additional $0.18 in the form of an assessment fee and passes the funds to the acquirer, which completes the clearing process.



In the final stage, the acquirer subtracts a discount fee of about $0.07 and deposits the remaining amount in the merchant's account.

There are two important caveats:

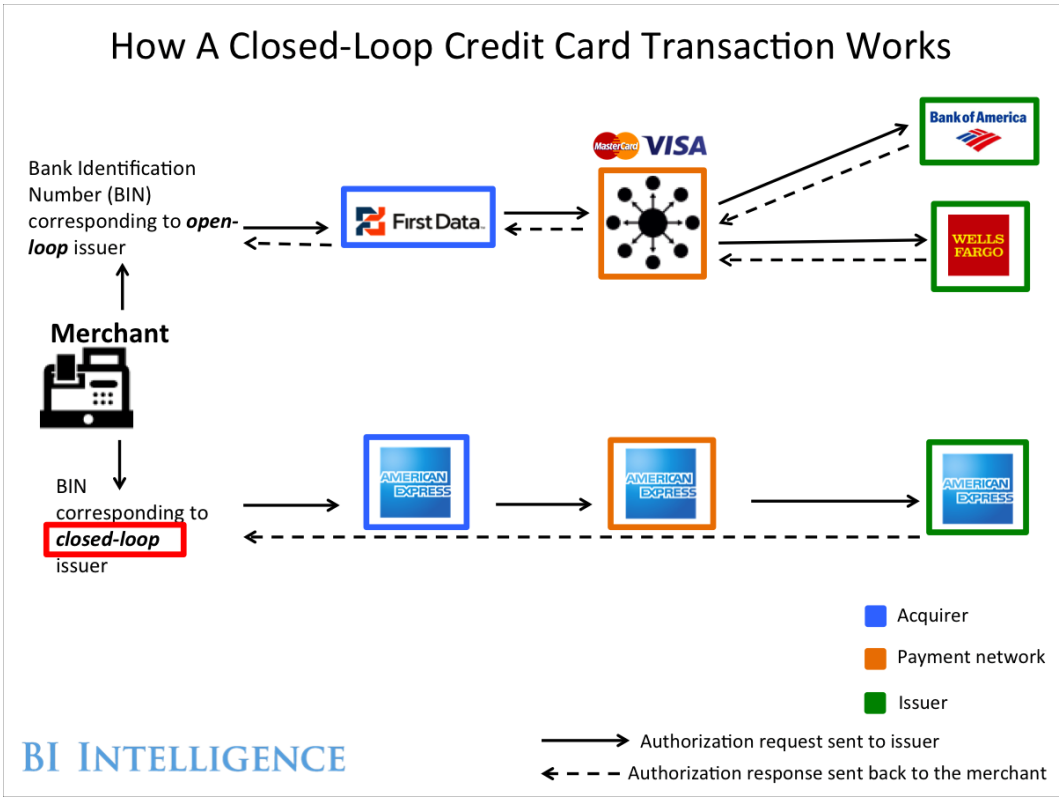
- Debit-card transactions confirmed by a PIN are settled through a different process. In a PIN debit transaction, the customer enters their 4 to 12 digit PIN number at the point-of-sale after inserting their card.

The payment is then routed through a debit network, such as ACCEL. The issuer debits a customer's account immediately, and a clearing and settlement command is communicated in the same step, meaning the merchant is guaranteed payment from the issuing bank, Jeff Guthrie, chief sales and relationship officer at Moneris, told BI Intelligence.

- Transactions can also be settled in real time, meaning these transactions are cleared individually instead of in a batch. The advantage of this form of processing is that it's faster, but it's also more risky in terms of security and more expensive for merchants. It's typically used by high-volume business and e-commerce companies.

Closed-Loop Transactions

Visa and MasterCard — which represented 70% of payment-card transaction volume in the US in 2014 — partner with issuers and acquirers to handle payments. However, American Express and Discover operate "closed-loop" networks in which they simultaneously play the role of issuer and card network, and sometimes acquirer. Most importantly, this means they lend credit to consumers directly. Visa and MasterCard, on the other hand, are not banks and only route the transaction.



In a closed-loop transaction, the POS terminal's processing engine reads a card's Bank Identification Number (BIN) associated with a closed-loop network, which essentially commands the processor to send the transaction down a specific pathway. The authorization request then passes through either the merchant's general-purpose acquirer or the closed-loop vendor's

acquiring service. In either case, once the request reaches the network, the closed-loop vendor takes over, routing the request to its issuing bank, which evaluates the funds in the account. The vendor either approves or rejects the authorization request depending on the level of funds in a customer's account.

American Express used to provide acquiring services but has since de-emphasized this side of its business. American Express operates as both network and issuer, and also has the ability to serve as a merchant's acquirer. However, in order to achieve wide distribution, Amex has over time allowed merchants to use their existing acquiring bank to handle Amex transactions, according to Guthrie.

The closed-loop payments scheme has some distinct advantages, chief among them customer insights. Closed-loop vendors can gain information about their members' shopping habits, because they have access to customers' spending and balance history. These kinds of insights enable closed-loop networks to optimize things like rewards programs to drive even more added sales from cardholders.

Store and loyalty cards, formally known as private-label cards, often act as closed-loop cards. Store cards are branded with a merchant's logo and often do not have a general-purpose card network displayed on the card. These cards are issued by a third-party bank — such as Synchrony Financial — that provides acquiring, routing, and issuing services on behalf of the merchants. In some cases, however, store cards are open-loop if they are labeled with a card network.

These cards are used by some of the largest merchants, like Target and Macy's, because they give customers access to merchant-specific deals, and they also give merchants a chance to extract bigger sales from their most loyal customers. We expect these cards to increase in popularity as they become available for use in mobile wallets. Mobile wallets bypass the frustration of having too many store cards in a physical wallet.

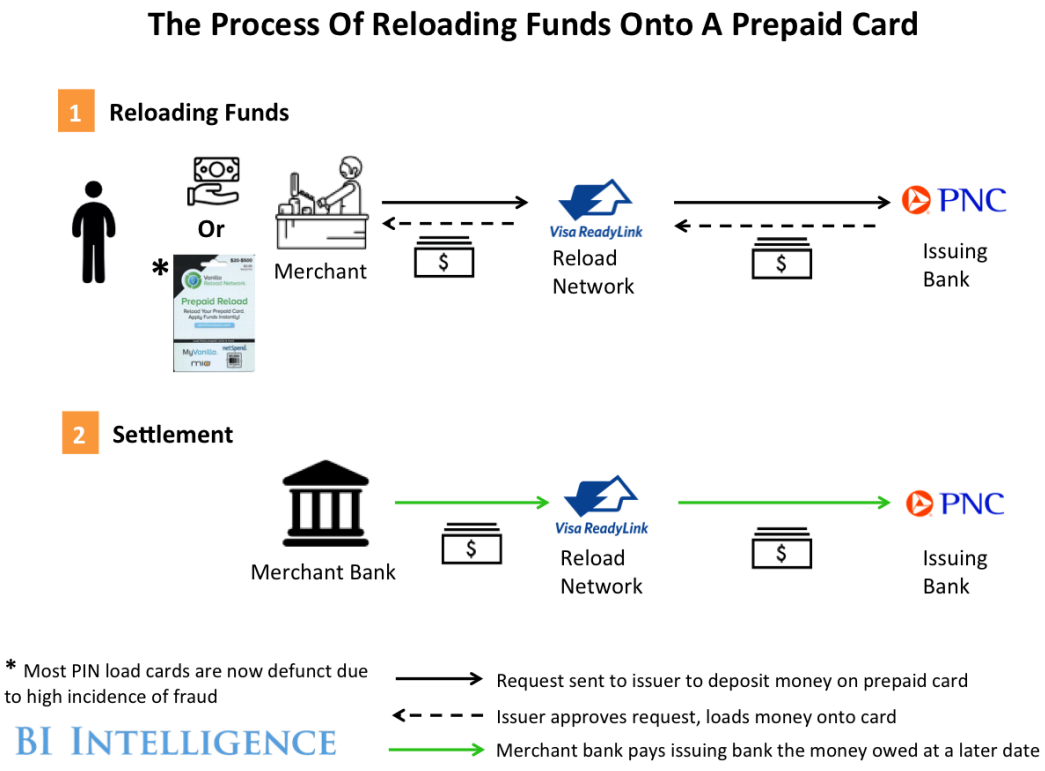
Prepaid-Card Transactions

Prepaid cards act like standard debit cards, however, funds must be preloaded in order for a transaction to be processed. American Express' Bluebird is an example of one of these. Because cards must be preloaded, the cards don't allow customers to accrue a negative balance, which prevents overdraft fees. As objects of stored value that don't require a bank account or credit check, prepaid cards appeal particularly to the financially underserved. But as prepaid products have become more robust and consumer attitudes have changed since the financial crisis, their appeal has grown for both the banked and unbanked at all income levels.

A prepaid-card transaction operates exactly like a non-PIN debit card transaction in terms of structure: The transaction flows through a merchant processor, acquirer, general payment network, and issuing bank. The vast majority of prepaid cards leverage Visa's or MasterCard's payment network, although American Express now processes a decent volume of prepaid-card transactions. Discover processes a very minor share of prepaid-card payments.

Despite these similarities, interchange fees can differ greatly. Prepaid card issuers often have assets under $10 billion, exempting them from the Durbin Amendment, which sets caps on the interchange rates imposed by card networks. Issuers exempt from this amendment can charge a higher interchange rate than larger issuers.

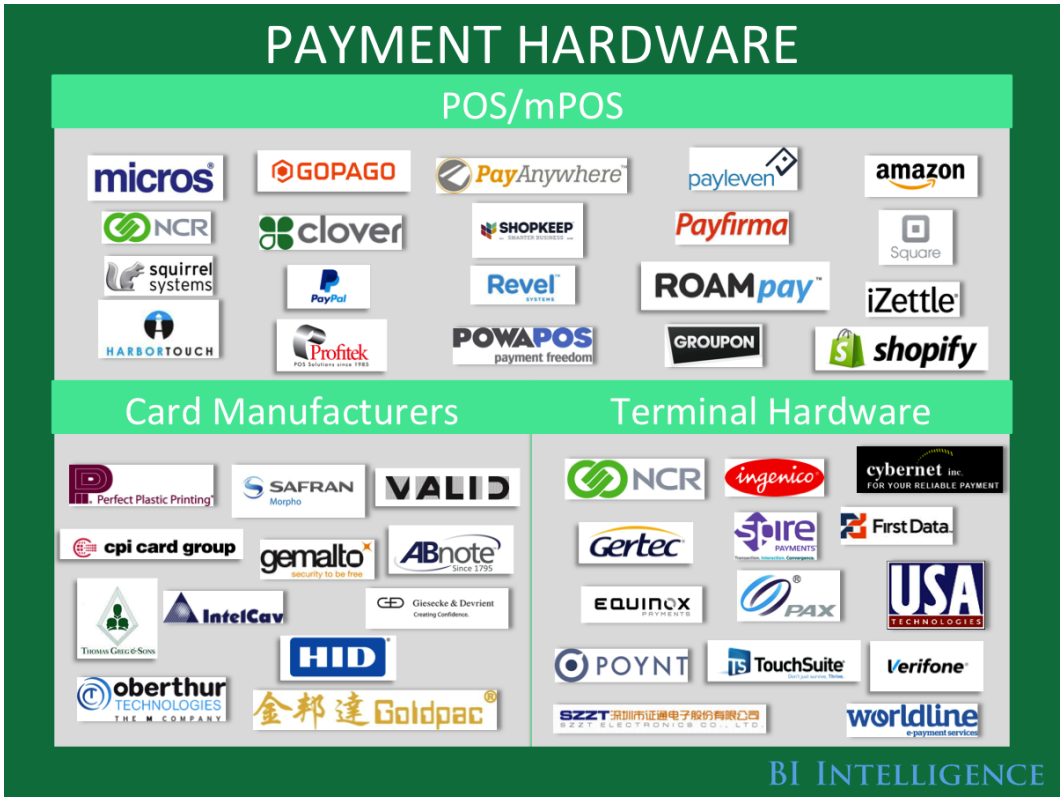
Reloads are a key factor differentiating prepaid from traditional debit. Prepaid cardholders almost exclusively reload their cards by handing cash to a merchant at the POS.



To make a cash-based reload, a prepaid-card customer gives a store clerk the amount they want reloaded in cash plus a reload fee, which varies by retail location, but is either free or a few dollars. A funding request is sent to the appropriate issuer, which immediately deposits funds into a user's account. The merchant then settles with the issuer at a later time or date. Separate networks, such as Visa ReadyLink and Green Dot, process reloads. The reload network acts similarly to a traditional payment network like Visa or MasterCard, but is partitioned from the POS' general network and only helps route reload-related payments. *Click here to read more details about the prepaid-card industry*.

Hardware And Software Powering Payments

As we've discussed, there are five types of players in the payments-processing ecosystem. Companies that make payments hardware and software are the unofficial sixth member of that ecosystem, though their role is indirect. They do not participate in the processing aspect of payments, but rather create solutions that merchants use to run cards and manage payments. Together with plastic cards, payments hardware is the most visible aspect of the payment-card ecosystem.



Legacy Acceptance Hardware And Software

Legacy acceptance hardware providers develop and sell card readers to distributors. Distributors can be processors, acquirers, or ISOs depending on each organization's business model. Two providers, Ingenico and VeriFone, dominate the acceptance hardware industry in most markets.

On the legacy software side, which covers products for front-office functions like order entry and back-office functions like inventory management, NCR and MICROS stand out as significant players. But a lot of crossover exists; hardware requires an operating system to act as a user interface, and software requires hardware for data input. Data from a card transaction might enter NCR's transaction management software via an Ingenico terminal, for example.

Legacy providers have been particularly successful at winning and retaining the business of the largest merchants because they have the resources to create customized solutions for large enterprises with specific needs. These systems are very robust, meaning that upgrades can be challenging to implement and can involve on-the-ground software consultants.

These companies have also created systems for small- to medium-sized businesses (SMBs), such as NCR's Aloha, which is targeted at restaurants.

Mobile Point-Of-Sale

The payments hardware and software space is going through a period of massive innovation with the advent of the mobile point-of-sale (mPOS). Startups like Square and ShopKeep have pioneered software and hardware for accepting payments via tablets and smartphones. These products are often cheaper than legacy solutions, but many are not rugged enough to sustain heavy usage.

mPOS has entered the industry through the small business merchant segment, because many of these merchants want cheaper and more portable products as a way to begin accepting card payments. These devices also come with software that gives smaller merchants access to enterprise-grade management services.

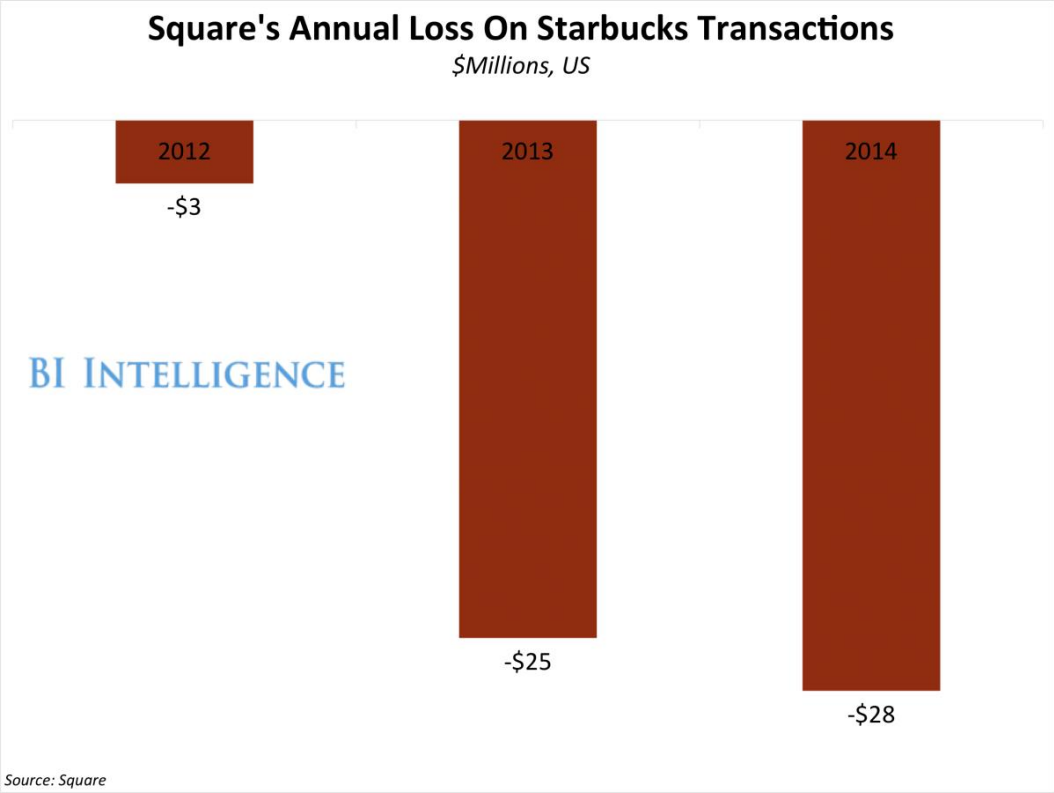
mPOS devices often contain app marketplaces with apps that solve specific needs like inventory management, marketing, loyalty, and payroll. In this way, businesses can download the apps they want, giving them a customized solution similar to the ones legacy providers deliver to large firms at a much higher cost.

These apps can even help merchants analyze things like foot traffic, weather, and supply in order to optimize sales. Higher sales also benefit the mPOS processor because they earn revenue by taking a cut of the merchant's transactions. Further, the app marketplaces are open systems and can be updated over-the-air, giving clients a constant feed of new management options at little-to-no cost.

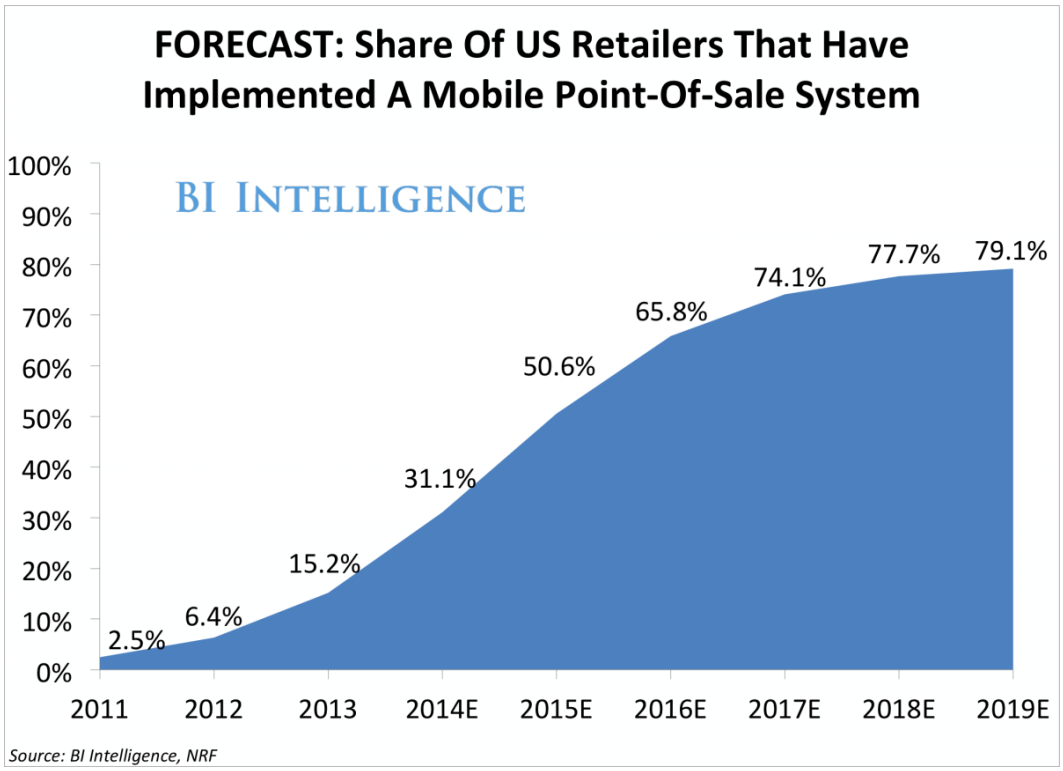
The move to mPOS will continue to put pressure on hardware providers as well as ISOs, which have traditionally sold legacy hardware. mPOS companies, on the other hand, often do not use an outside salesforce. Merchants themselves buy these relatively cheap solutions directly from

stores or online. Square, for instance, sells its reader at Duane Reade stores.

Although small merchants are gravitating toward mPOS, these devices haven't attracted large enterprises. Beyond durability issues, mPOS manufacturers don't have the scale or resources to build a custom device for a specific enterprise.



For example, Square partnered with Starbucks in 2012, making Square the exclusive processor for the coffee giant in US stores. But while the partnership initially seemed successful, it actually weighed Square down. The company registered a net loss of $28 million by 2014. The program will be phased out by Q3 2016.



Over time, as the software capabilities of mPOS devices improve and become more scalable, these devices will serve the needs of large enterprises. This, along with continued penetration into the SMB segment, will drive mPOS adoption. By 2019, we forecast that nearly 80% of US retailers will have implemented an mPOS device.

mPOS is also a positive force in the industry because it helps many small businesses move beyond cash-based payments. Companies like Square have largely onboarded micro-merchants to its systems — merchants with under $125,000 in sales made up 63% of Square's customers as of Q2 2015. These are merchants that likely didn't have payment systems in place before. In this way, Square is expanding the addressable market for others in the payments ecosystem, like card networks, since mPOS helps a greater number of lower-tier merchants in the US take card payments.

Click here to read our in-depth report on the impact of mPOS.

Card Manufacturers

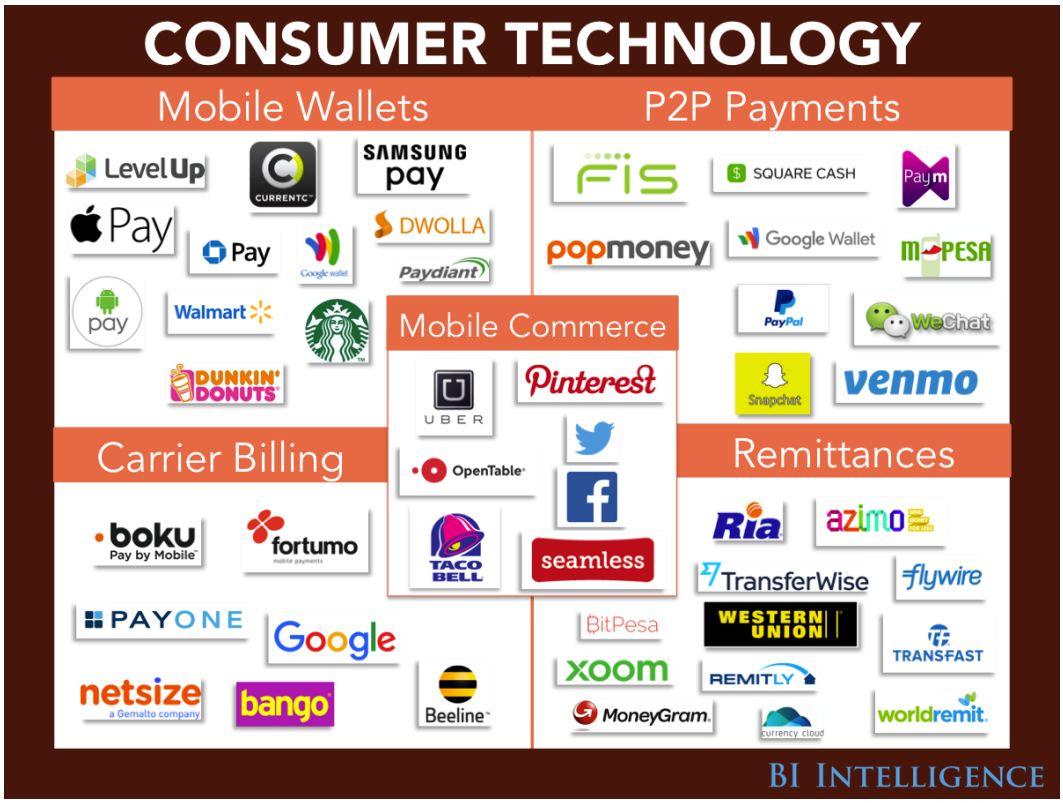
Card manufacturers make the plastic cards that are issued through the cardholder's bank. Companies that produce cards for banks are currently benefiting from two trends:

- **Data breaches.** Every time there is a massive data breach, like those suffered by Target and Home Depot, banks must reissue credit and debit cards, giving business to card manufacturers. In addition to the cost of the cards, these banks incur additional fees from card manufacturers because card reissues require manufacturers to disrupt their normal order flow.
- **The EMV migration.** US banks are also in the midst of reissuing cards to comply with the October 2015 EMV deadline. This will give card manufacturers a boost in activity.

But growing interest in mobile payments will hurt the card-manufacturing industry. As people become less reliant on physical cards and store their card numbers online and in apps, banks may reissue customers' cards less frequently. Larger manufacturers like Oberthur and Gemalto have already recognized this trend and are developing other technologies to combat obsolescence. Oberthur is helping develop Secure Elements, a piece of phone hardware which stores card data to enable mobile payments, Philip Andreae, Oberthur's vice president of field marketing, told BI Intelligence.

Smartphone providers are also tangentially part of this ecosystem. Smartphone vendors like Apple and Samsung now participate in this ecosystem because they provide the overall hardware enabling mobile wallets. However, the ability to make transactions isn't the main purpose of these devices, which is why we chose not to include them in our infographic.

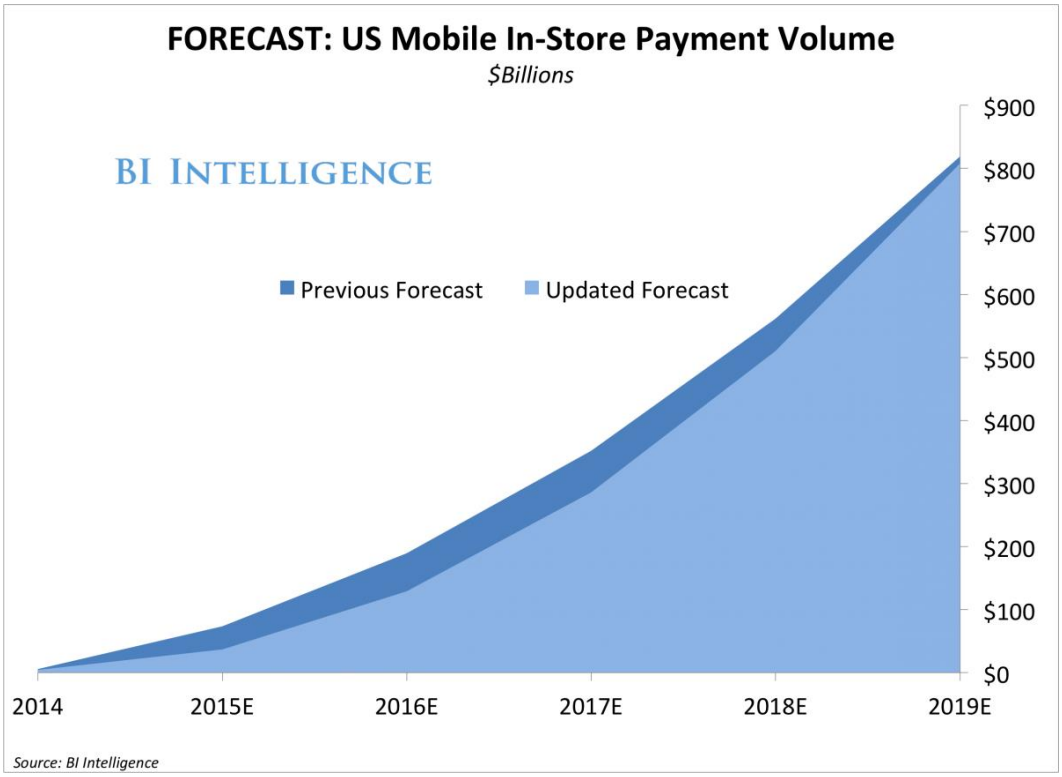
How Mobile Is Transforming The Payments Ecosystem



As we've said, technology is affecting every aspect of the card-processing ecosystem, even as the basic structure of payment processing remains relatively unchanged. In this section, we'll look at how mobile is creating new ways to pay in stores and online. Mobile won't change the underlying anatomy of a transaction, but it will change the customer experience and could give different stakeholders an advantage over others.

In-Store Mobile Payments

Mobile wallets — apps people use to pay in stores — excite retailers because they can offer rich data about a customer's transactions that can be used to improve the customer experience, increase foot traffic, and lead to larger sales. Developing technologies such as biometric authentication for mobile payments also promises to reduce the fraud burden on banks and merchants alike.



Mobile in-store payments have moved from novelty to a viable method of payment in the US for a few key reasons:

- **Apple, Samsung, and Google all have wallets.** In 2014, Apple was the only new major wallet on the market. However, last year Google and Samsung both released digital wallets of their own. Mobile wallets now have a massive potential user base since they are featured on smartphones from all major phone manufacturers. In addition, these wallets all rely on near field communication (NFC) technology, a type of contactless communication between two devices. Now that NFC offers a clear preferred mobile acceptance technology, merchants can begin adopting the appropriate corresponding payment terminals.

- **The EMV migration has also lead to merchant adoption of NFC terminals.** The implementation of EMV as a security standard in the US has forced merchants to upgrade to EMV-compliant terminals, which come bundled with NFC technology as well. 80% of the terminals Verifone sold in the US during Q1 2015 were NFC-capable. *Click here to read more about the EMV migration.*

Now that the infrastructure is in place, here's why mobile in-store payments could take off:

- **The smartphone has become the consumer's primary computing device.** Consumers are completing an array of tasks on their mobile phones, and younger consumers in particular are glued to these devices. This dependency on smartphones makes them more likely to explore payment options on the devices as well.
- **Chip cards have caused headaches that could encourage the use of alternative payments.** Chip card acceptance has become problematic because merchants have been inconsistently rolling out EMV-compliant terminals. Moreover, inserting a chip-based card into a terminal requires a wait time that consumers, and even merchants, might not like. These headaches could influence customers to try contactless mobile payments, which are often faster.
- **Mobile companies are providing adoption incentives.** Samsung and Google are not only advertising their wallets on TV and online, but they're also offering things like gift cards when customers adopt their wallets.
- **Rewards cards can be linked to them.** Store cards and rewards cards can now be loaded in mobile wallets, which gives consumers an easier way to store all of their cards. Moreover, the ability to rack up rewards through these wallets gives consumers added incentive to use them.
- **One of the major wallets can be used almost anywhere.** Samsung Pay uses magnetic secure transmission (MST) technology that makes it compatible with almost any terminal, including those legacy terminals that only accept magnetic stripe-based cards. This advantage could lead to heavy adoption and frequent usage.
- **The security behind mobile wallets could encourage merchant and consumer adoption.** Apple Pay, for example, limits the

merchant's fraud liability because sensitive payment data never enters the merchant's system. The prospect of avoiding security breaches could push more merchants to adopt mobile wallets like Apple Pay, giving consumers even more places to use them. *Click here to read an in-depth description of the security behind Apple Pay*.

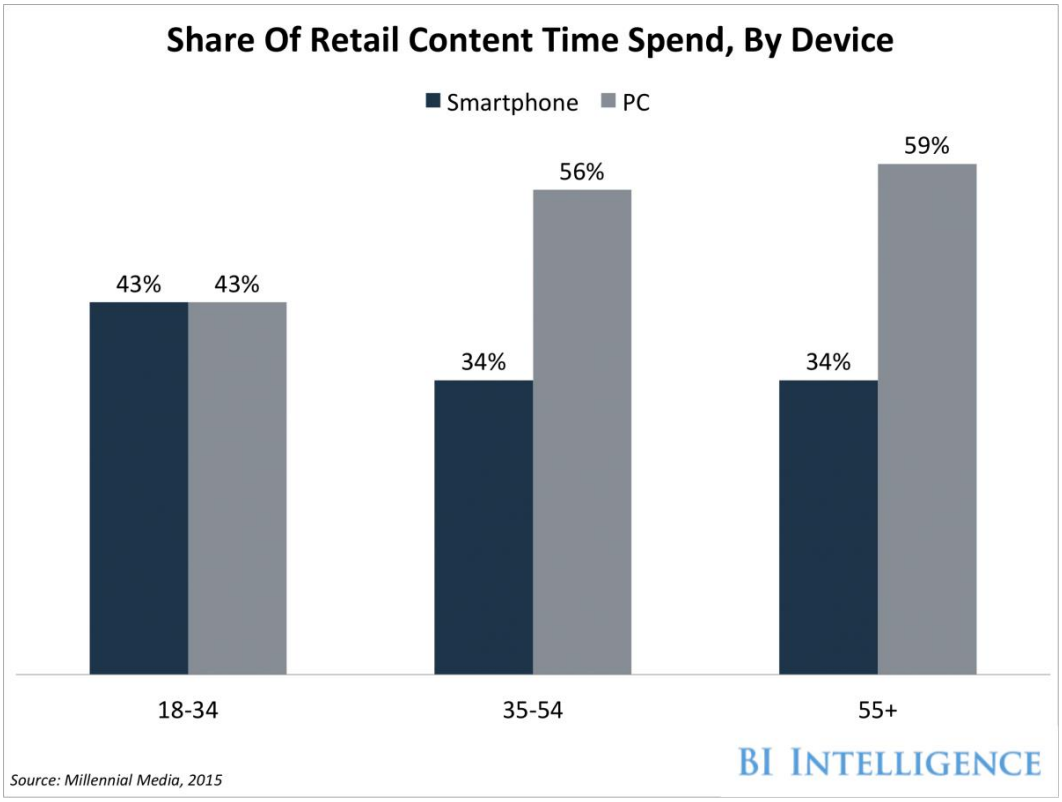
Due to these and other factors, we forecast US in-store mobile payments will grow from $37 billion in 2015 to $808 billion by 2019. This will partly be driven by increased mobile in-store payments among millennials. In Q3 2015, over one-quarter of millennials surveyed had made an in-store mobile payment over the course of a month, according to the BI Intelligence Digital Banking Survey. *To read our latest mobile payment forecasts, click here*.

Mobile Commerce

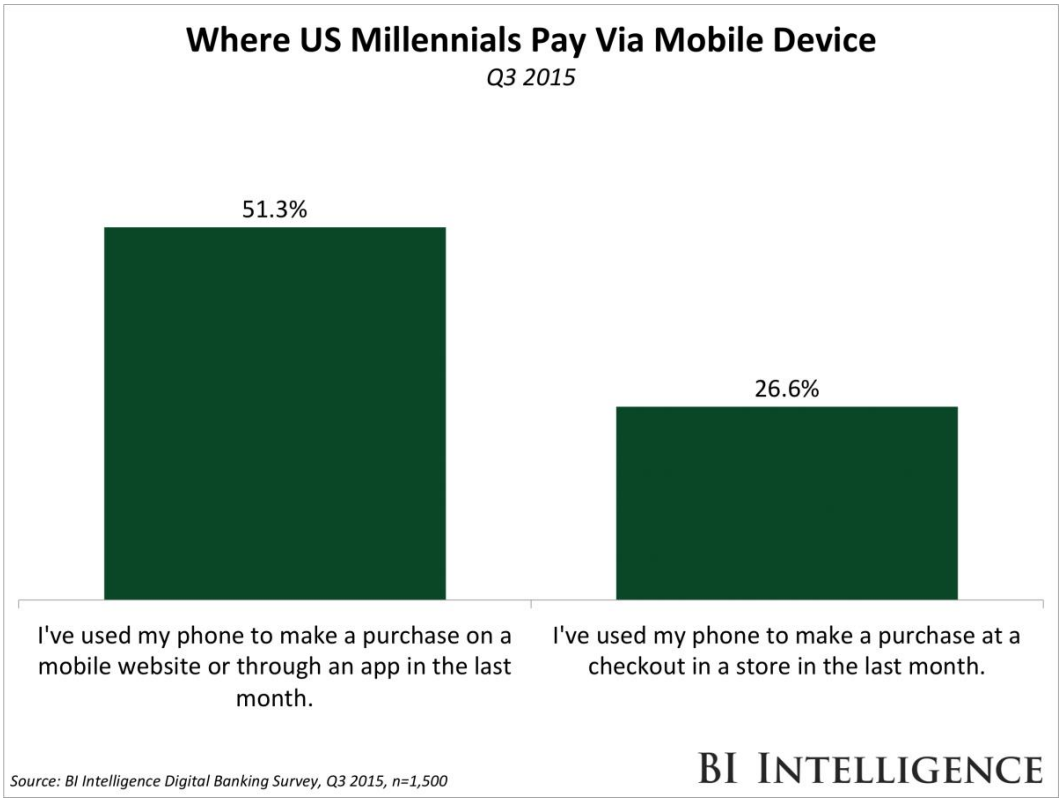
Mobile commerce involves any payment made on a mobile phone without interaction at a physical payment terminal. This sector is poised to disrupt traditional forms of shopping as millennials — the largest working generation in the US — become more familiar with buying on mobile.

Mobile is already on par with PCs as a retail browsing tool.

- 18- to 34-year-olds spend 43% of their retail browsing time on a smartphone, equal to the 43% they spend on PCs.
- 20% of millennials are "mobile-only," meaning they only use a mobile phone as their digital device. This indicates smartphones may overtake PCs in terms of purchasing activity among this demographic as they improve in design and capability.



High browsing traffic has already translated to a significant level of mobile purchasing. A slim majority — 51% — of millennials have made a purchase on their phone over the course of a month, according to the BI Intelligence Digital Banking Survey.



For now, mobile still isn't close to driving conversions at nearly the same rate as PCs. Mobile shoppers only complete a purchase 1.3% of the time, compared to 3.7% on PCs, because smartphones have smaller screens, spotty internet connection, and perhaps most importantly, poor checkout options.

Payments companies are lowering this barrier with the use of one-click checkout buttons. As mobile shopping proliferates, a bevy of digital payments companies have developed faster checkout pages to try and boost conversion rates. These checkout options require as little as one click for a customer to make a purchase. For example, consumers can use their PayPal accounts to buy something with PayPal's One Touch. Meanwhile, companies like Klarna allow people to click a button and pay for the item later.

Expedited checkout buttons are proliferating because they benefit everyone in the value chain:

- **Customers have a better shopping experience.** Expedited checkout buttons ease the friction of making an online purchase because customers don't have to enter as much information.

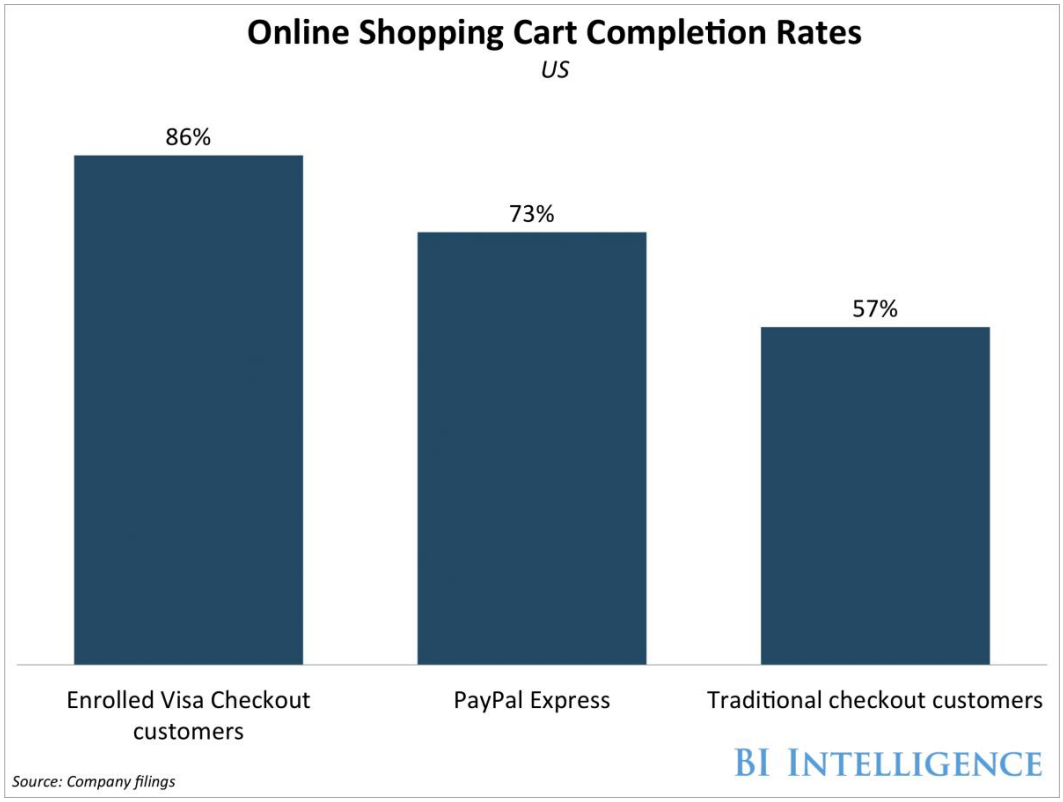
- **Merchants see higher conversion rates.** 86% of customers who use Visa Checkout
  — a one-click buy button that lets consumers make purchases online and on mobile without having to manually enter their payment information each time — end up finalizing a purchase, compared with just 57% for a traditional checkout customer. This brings in more sales for a merchant.

- **Payment companies see higher transaction volumes.** Because buy buttons are low-friction, they make it more likely that a shopper will complete a purchase. This boosts transaction volume, which gives the payment providers more processing revenue.

Given all these incentives throughout the value chain, we expect major stakeholders to emphasize checkout buttons, which will slowly increase conversion rates on both mobile and desktop. Similar buying options could help mobile conversion rates reach parity with PC conversion rates. This will position mobile commerce to match PC commerce and eventually overtake it as mobile becomes the dominant computing device for consumers.

We expect mobile commerce to nearly match PC commerce by 2020. US consumers will spend $284 billion on mobile, representing about 45% of that year's total US e-commerce tally.

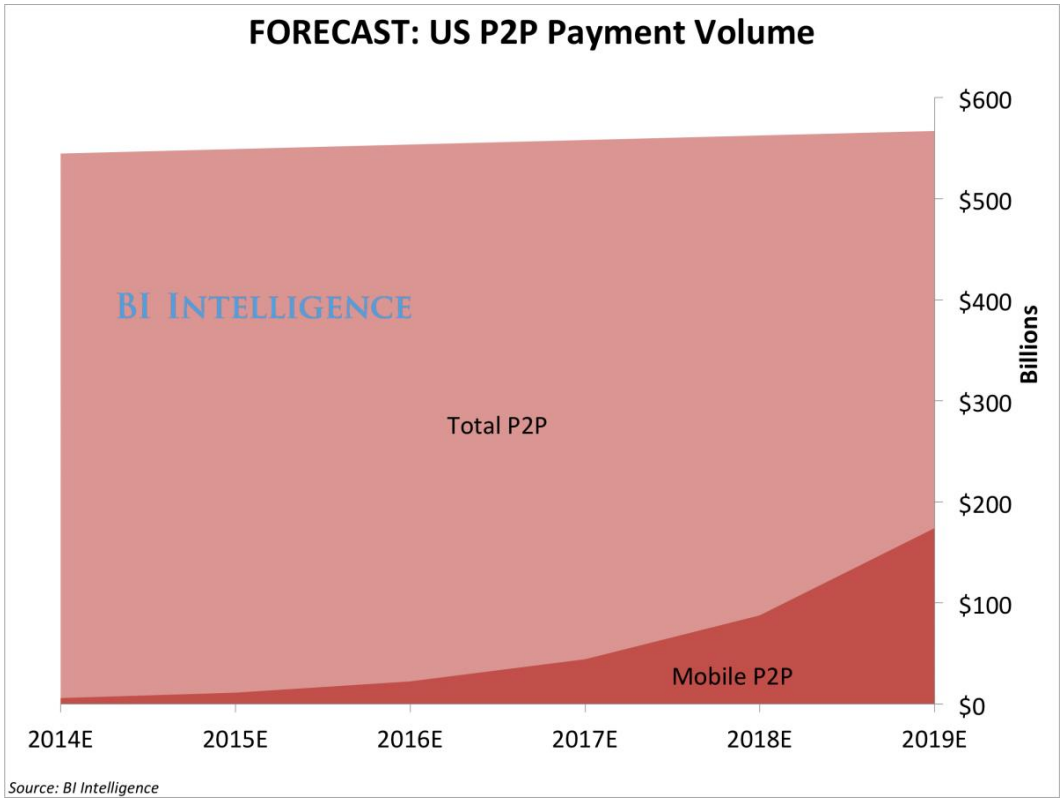
Click here to read more about how mobile checkout options are lifting mobile commerce.



The one major challenge for payments companies as they push mobile commerce is that card-not-present fees, which are charged for mobile and e-commerce transactions, are higher than card-present fees. But merchants will not want to pay more money to processors. It's possible that biometric authentication features like the iPhone's Touch ID will strengthen security to the point where card networks will be forced to lower their rates.

Mobile Peer-to-Peer Payments

US domestic peer-to-peer (P2P) payments transacted with any type of payment instrument, including cash, reached about $540 billion in 2014, according to our estimates. We forecast that P2P payments transacted on mobile devices will grow from $5.6 billion in 2014 to $174 billion by 2019 and from a 1% share of total P2P payments last year to 30% by 2019.



P2P payment apps like Venmo have taken off in the US market in the last few years, and we expect volume, transactions, and users to continue to grow as people recognize that these apps solve real problems. The ability to transfer money in real time via a mobile device is much easier and faster than writing a check or going to an ATM to get cash. Venmo has shown the potential of mobile P2P, having processed $2.5 billion in transactions in Q3 2015, a growth of 174% from the $906 million the app processed a year earlier. This app, in particular, has also benefited from network effects, since much of its activity derives from social situations.

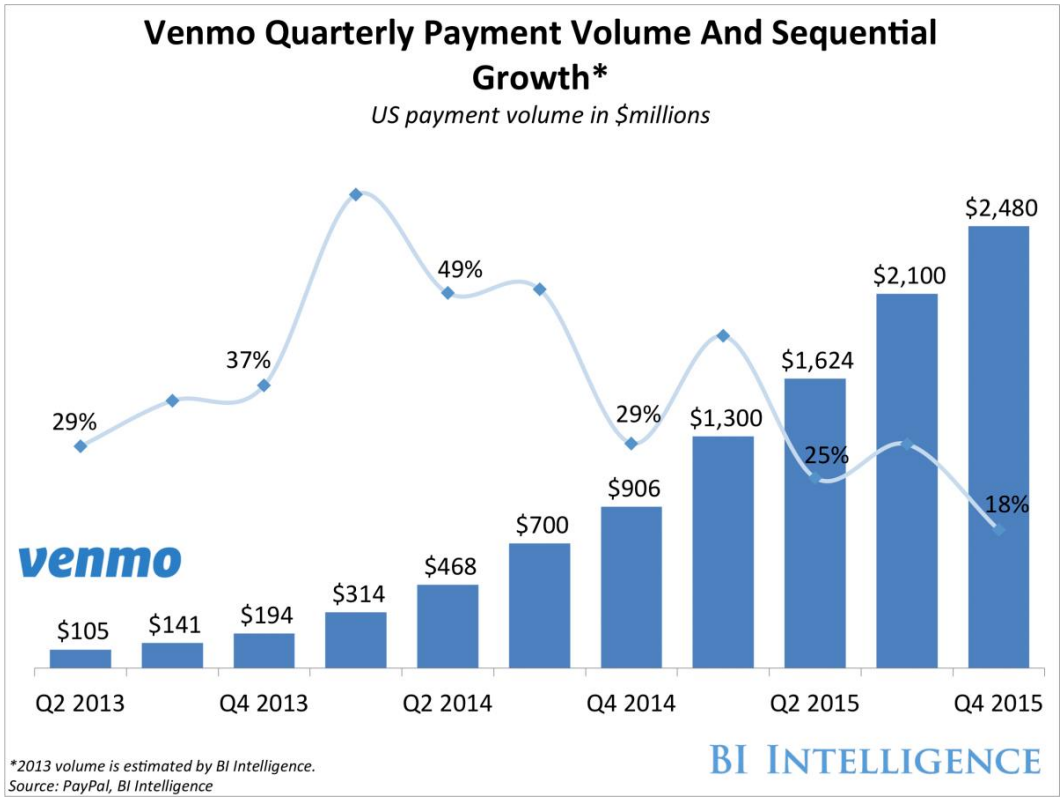
The P2P model will become bundled with other services. Rumors recently surfaced that Apple was exploring the integration of P2P features in Apple Pay, and Facebook has already implemented P2P transfers in its Messenger app. Venmo is now reversing this trend, moving from P2P to other capabilities, namely, in-store and online commerce.

P2P is ultimately a way of driving social commerce and bringing in new users through network effects, however, the revenue potential is fairly

limited if it enables bank-to-bank transfers. These types of transfers cost very little to process since they pass through clearing houses, and, as a result, these transactions almost never include fees for consumers. In this way, P2P is a platform to attract users that a company can eventually monetize. We therefore expect smartphone vendors like Apple to implement P2P as a way of building a sizable user base for Apple Pay.

Once companies like Apple do this, it could weaken Venmo. That's because once Apple devices have similar P2P capabilities alongside a much more established in-store payments network through Apple Pay, merchants will likely support it over Venmo's model. Apple benefits from a huge established base of smartphone users and strong brand trust. It is possible that Venmo could proliferate in stores via its parent brand, PayPal, however, PayPal hasn't developed a very robust in-store presence.

To read more about P2P payments click here.

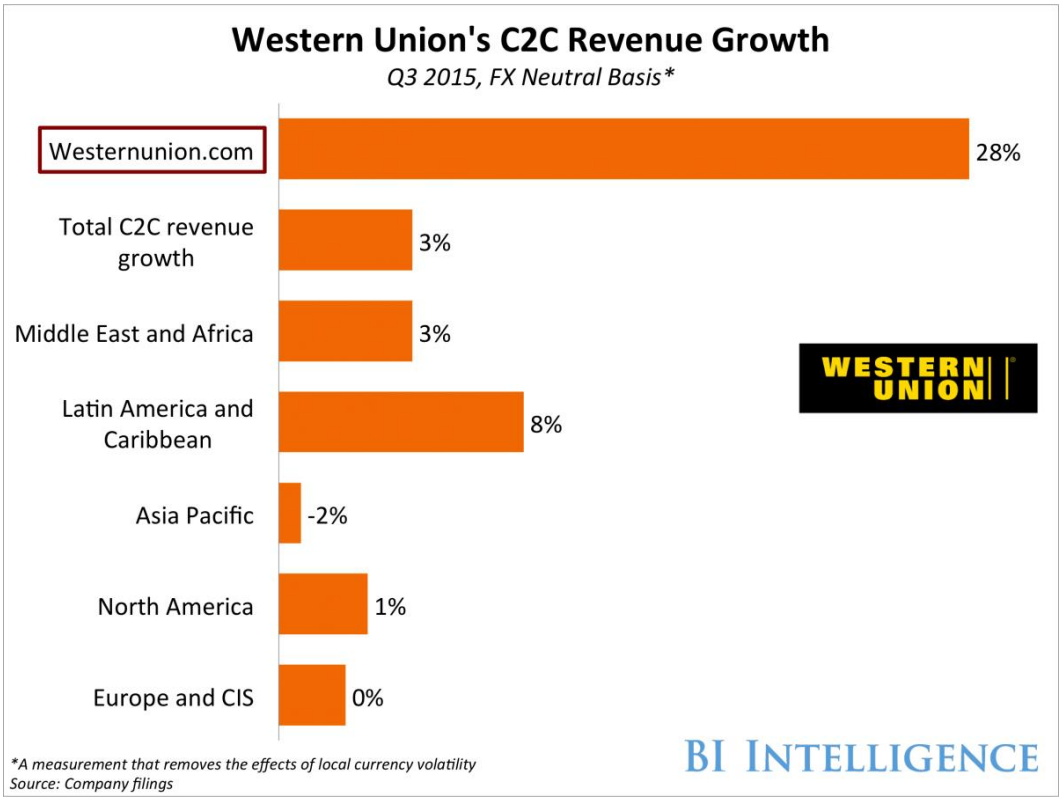


Remittances

Remittances — money sent to friends and family abroad — are undergoing a rapid transformation as a result of the migration to mobile. The industry is massive — $583 billion was remitted across borders in 2014, according to the World Bank, for revenue of about $34.3 billion, according to our estimates. In the past, remittances required a network of brick-and-mortar partners that could accept and pay out physical cash. That meant that in order to be competitive, remittance businesses had to have capital available to develop these networks in a lot of different countries. This barrier to entry limited the global market to a few players — such as Western Union, MoneyGram, and Ria — that charge high fees.

In recent years, fees have started to fall as digital-first startups like Azimo and TransferWise have undercut the transfer fees of established players. Although we estimate that 94% of remittances in 2014 still involved cash on the sending or receiving end (or both), that number will change as smartphones proliferate.

In fact, digital is the fastest-growing segment for giants like Western Union, which now earns 7% of its revenue through online and mobile channels. The firm's digital revenue grew 28% year-over-year (YoY) in its consumer-to-consumer (C2C) segment during Q3 2015, compared with just 3% overall C2C revenue growth. This came as a result of the rapid growth of its digital business in the US. It also expects future growth to come from the 33 other countries where it now has an online presence.

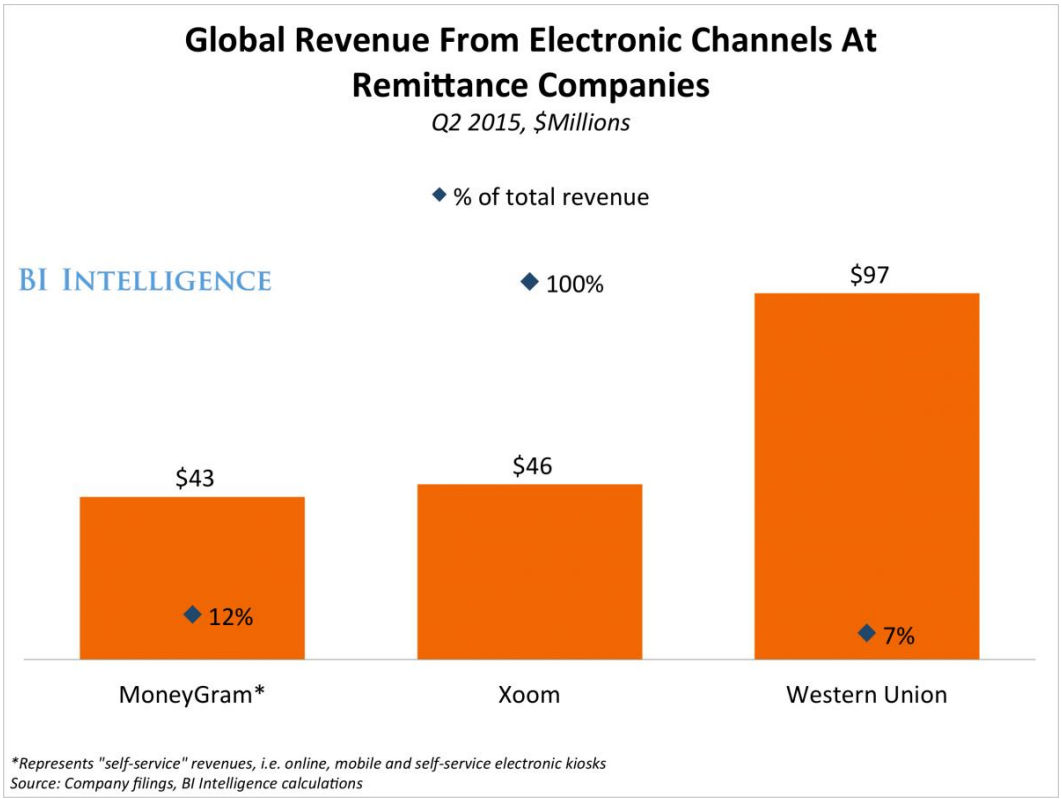


Startups are already outpacing some legacy providers in digital.

- Xoom, a digital-first company, earned $46 million in Q2 2015, more than MoneyGram's "self-service" revenue, which includes online, mobile, and self-service kiosks in retail stores.
- This made Xoom, a company founded in 2005, the second-largest US-based digital remittance company.

Legacy players will struggle to maintain their grip on this industry over time as digital grows its share of transfer activity. However, remittances on the receiving end won't migrate to digital nearly as quickly as on the sending end, giving legacy firms a buffer. This is because people in many receiving markets tend not to have bank accounts that they can link to digitally and thus will need to continue to pick up cash at physical remittance storefronts.

Click here to see a detailed report explaining the remittances industry.



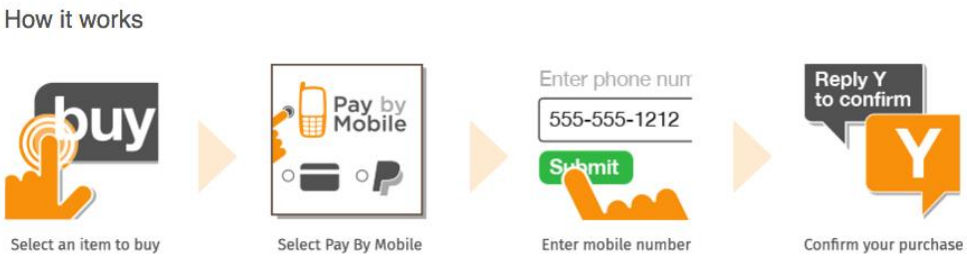
Carrier Billing

The carrier billing market is projected to grow from $14.5 billion in 2014 to $24.7 billion in 2019, according to Ovum. The payment method allows consumers to make purchases by adding the value of a transaction to their mobile bill. It's primarily used for purchasing digital goods like apps and music, but in some instances it's used for making purchases in the real world as well. Carrier billing has major potential as an alternative payment method, however, the transaction fees are high, which can drag down sales potential.

Carrier billing has the most potential in emerging markets because payment-card penetration is often low in these countries, whereas mobile phones are fairly common. Since many people do not have payment cards in these countries, app developers are willing to pay the steep fees demanded by carriers if the choice is between some revenue and no revenue.

In developed markets, carriers take a large cut of purchase volume, sometimes exceeding 30%, which is much larger than the typical cost of a

card transaction. There's little incentive for a merchant to adopt carrier billing when people in the developed world have many other ways to pay.



Nonetheless, carriers are starting to dip their toes into developed markets, despite the challenges.

- Apple quietly launched carrier billing services for Russian iPhone users in partnership with carrier billing company Boku and Beeline, Russia's third-largest mobile network operator (MNO). The tech giant had launched its first carrier billing endeavor in Germany earlier in 2015.

- Microsoft and Boku partnered to launch carrier billing for US Windows users who subscribe to Sprint. Customers will be able to use the service on any device that runs Windows 10. The company expects the service to expand to more mobile carriers in the future, with an international launch due in 2016.

- As part of its September 2 launch in Japan, Netflix announced an exclusive, "fully integrated" partnership with SoftBank Group Corp., a Japanese telecom. The partnership will enable customers to pay their Netflix subscription with SoftBank carrier billing, meaning they can add the cost of their Netflix account directly onto their mobile bill.

Direct carrier billing companies tout high conversion rates as their distinct advantage over other payment methods. In-app conversion rates for customers shopping with direct carrier billing average 56-68%, compared with average in-app credit card conversion rates of 8-11%, according to the UK-based direct carrier billing company, Bango. Conversion rates are higher

for direct carrier billing because the process is more frictionless, enabling a customer to direct the purchase to their mobile phone bill. In-app credit-card payments are more cumbersome because a first-time user has to enter all their credit-card information, and they usually abandon the purchase. Although conversion rates are higher, direct carrier billing purchases are relatively low, running between $4.00 to $4.50 on average at Bango, according to Richard Leyland, a former vice president of marketing at Bango.

Carrier billing isn't a significant threat to the payment-card industry as a whole, but it could become a significant niche competitor to cards in the growing digital-goods market.

To read more about the carrier-billing market, click here.

Alternative Technologies Disrupting The Current Payment-Processing Ecosystem

Two emerging phenomena could fundamentally alter the processing ecosystem — the blockchain and connected devices.

Blockchain Technology

Blockchain is the name given to the software underlying the Bitcoin protocol. In the Blockchain system, transactions are publically available in a historical ledger and transactions are verified through the solving of mathematical equations by various entities and most often performed by computers. What makes the Blockchain unique is that because the record is public and verified by multiple entities, all activity is crowd-monitored, evading the need for a central authority. Although it's traditionally associated with Bitcoin, this software can be mimicked to power other types of payment processes using other currencies.

Financial institutions have recognized this opportunity and are now investing money in blockchain projects. UBS, Santander, Visa, MasterCard, and others have devoted resources to exploring a variety of applications of this technology.

Given investments in the blockchain and its broad applicability in financial services, it's plausible the technology could disintermediate a number of processes.

- **Inter-bank transfers:** R3 CEV, a blockchain startup looking to develop a global open-source blockchain, recently completed its first inter-bank transfer using blockchain technology. The participating banks simulated exchanging value on a private cloud-based distributed ledger, allowing them to bypass clearing houses. The blockchain will likely first disrupt these types of transactions, considering it's already being tested by major banks.

- **Payment card transactions:** Card transactions could be verified by a group of users instead of networks like Visa and MasterCard. The lack of a central authority could reduce processing fees, which would have major ripple effects; merchants would save on costs, issuers would lose interchange revenue, security could improve, and card networks could be de-emphasized or eliminated altogether. Should this scenario occur, chances are it wouldn't happen for a long time, however.

- **Cross-border transactions:** Card networks could increase the efficiency of cross-border transactions using blockchain technology in categories like cross-border and multi-currency payments. The blockchain could help them convert currencies without intermediaries like financial institutions. In one example, a card network could convert one fiat currency to Bitcoin during transit and then to another fiat currency once the payment reaches its destination. This could save on exchange costs.

Connected Devices

Digital payment terminals will soon be added to everyday appliances. Appliances like dishwashers, coffee machines, and refrigerators will become connected to the internet over time. BI Intelligence forecasts that there will be 5 billion consumer IoT device installations by 2020, up from 815 million in 2015. As these devices proliferate, some of them will have a number of capabilities beyond internet connection. Samsung, for instance, unveiled a smart refrigerator at this year's Consumer Electronics Show (CES) that enables users to pay for groceries from their refrigerator via MasterCard.

If consumers adopt these appliances, they may start shopping for essential goods from their home instead of going to the store. This behavior will help boost mobile commerce.

Amazon's Dash buttons could also help drive the payments-enabled device revolution. Last year, Amazon launched a one-click purchasing device for Amazon Prime members called Dash. The key fob-sized device is branded by select Amazon partners — such as Tide, Gillette, and Huggies — and allows customers to re-order items with the push of a button. A number of other brands have since hopped onboard the program. This year Amazon also launched the Dash Replenishment Service, which is integrated directly into products, enabling them to automatically order refills through Amazon.

Connected devices ultimately threaten payments companies that are confined to physical store environments. For example, POS vendors like Verifone and Ingenico have historically provided solutions for in-store merchants. Products like Amazon Dash essentially replace these terminals with personal devices that a household can use. POS providers will have to find ways to integrate their technology into connected devices, otherwise they will lose business as retailers selling essential goods see less foot traffic.

ACH

Another, more ordinary, payment method could displace some card network revenue. ACH — automated-clearing-house transactions — will likely grow in significance in the years to come. ACH transactions are often used for automatic bill paying. The user links a checking account instead of a payment card for recurring payments. This method can also be used for payments through some mobile apps, including Venmo, which recently suggested it would enable merchants, including in-store merchants, to take payments via its app.

If ACH does make its way to more physical environments through apps like Venmo, it would allow more transactions to bypass the card networks. Should that happen, card networks could lose processing revenue from a measurable share of transactions. Moreover, in the coming years, ACH systems will move much faster, with payments clearing far more quickly than

in the past. This could make ACH more competitive with the existing system, although it's unlikely to disrupt networks overnight.

Banks would have limited incentive to support these kinds of P2P payments, since issuing banks collect significantly less money from an ACH-based transaction compared to a card transaction. This could cause conflict between merchants and issuing banks.

Wearables

Wearables will also play a role. Most major smartwatch manufacturers have bought into the prospect of wearable-assisted mobile payments. Apple, Swatch, Samsung, Jawbone, and Microsoft all include payments capabilities on their respective smartwatches. These manufacturers could help lift mobile in-store payments activity, particularly because they could make paying for an item as simple as tapping your wrist against a terminal. However, this payment technique still hasn't sunk in as a mainstream behavior.

The Bottom Line

- **Events from last year will help shape the trends in payments in 2016.** New security standards, new mobile payment options, and heavy investments in the blockchain will cause a shift in the way consumers, merchants, banks, and others handle payments in 2016.
- **Changes in the ecosystem will help propel mobile payments this year.** Both mobile in-store payments and mobile commerce will become more visible as merchant infrastructure is updated and as buying options evolve. This will mainly benefit all players in the ecosystem, and will also add new ones in, such as smartphone and Secure Element manufacturers and security vendors.
- **Alternative technologies pose a threat to many players in the processing ecosystem.** The blockchain, connected devices, and even ACH could alter the landscape significantly by shuffling the participating stakeholders involved in transactions.
- **Expect more partnerships and collaboration in the meantime.** Regardless of the changes ripping through the payments ecosystem, the bottom line is that payment processes involve a complicated set of overlapping players relying on each other's technologies. Because of this structure, startups will need to leverage legacy providers' infrastructure to power payments, which will necessitate more partnerships in the industry. This will create massive new payments companies that co-exist alongside incumbents.

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